TOWNWIDE DRAINAGE STUDY

For the

Town of Hamburg

Prepared for:
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1 Introduction

This report presents a Comprehensive Drainage Study and Stormwater Management Plan that includes the results of a drainage study, along with a collection of storm-water management tools that can be used for the planning and evaluation of future land development projects within the Town of Hamburg. This Plan builds upon previous Town drainage studies, stream corridor investigation and evaluations, hydrologic and modeling study, and field data collection.

2 Project Understanding

Study Procedure:

The procedure followed in making this study included:

I. Review of past reports and published information relevant to the drainage of the area. (Ref. 1962 Study).

II. Review of Town-gathered complaints.

III. Past, Present, Future Conditions.

IV. An extensive field reconnaissance to gain information directly related to the current conditions of drainage features.

V. A hydrology/hydraulics study which encompasses the entire area of concern.

3 Background

General:

The Town of Hamburg is located due south of the city of Lackawanna in the west central part of Erie County. With the town's triangular shape, it is bounded on the North by the City of Lackawanna, bounded on the east by Orchard Park, bounded on the south by 18 Mile Creek and the towns of Boston and Eden. There is approximately 10 Miles of Lake Erie Shore line which runs in a northeasterly and southwesterly direction. The land area of the Town of Hamburg is 26,480 acres or 41.4 square miles. In addition, 76,340 acres or 120 square miles contribute to drainage through the Town of Hamburg from neighboring towns. Refer to Figure 1: Project Location Map. The Town of Hamburg lies within what is known as the Erie-Ontario Plain with the southeastern portion of the study area pushing into the beginning of the foothills of the Allegany Plateau.

Climate:

The climate of an area can affect drainage in specific regions. As the ground freezes, surface runoff will increase due to the permeability of frozen soil. Also, the cycle of freezing and thawing of the ground surface can in fact increase the rates of seepage in certain soils. Temperature can greatly influence the rate of evaporation and therefore has an influence on drainage. The average temperature for the Town of Hamburg ranges from 18°F in January and 82°F in August with an overall average of 48°F. (Climate information recorded from www.weather.com)

Due to the lack of impermeability of the soils, refer to Appendix A: Town of Hamburg Soils Survey, and the lack of reliance on ground water recharge in this study as a form of drainage, drainage is highly dependent upon the 13 major drainage streams and man-made ditches and courses in which drain into these major streams. Refer to Figure 6: Town of Hamburg Watercourses Map. This study is broken up into 38 main drainage areas that are represented by numbers 1 through 38. Refer to Figure 6: Town of Hamburg Watershed Map.

Population and Land Use:

The understanding of population and population growth when related to a drainage study is a significant aspect to the overall drainage of an area and demands consideration in future planning and recommendation made to a drainage system. As population grows in an area, land usage can dramatically change, affecting topography and other land characteristics that will ultimately affect the determination of runoff coefficients and other drainage design criteria.

The Town of Hamburg's population as of 2021 is 60,156 and is growing at an average rate of 0.2% yearly. (Current population information recorded from www.census.gov) Average growth rate was the recorded rate from April 1, 2020 to July 1, 2021. In 1960, the population was 41,288 people with the villages of Hamburg and Blasdell containing 13,000 of the total population. These numbers indicate that two-thirds of the population reside in the town outside of the villages. At that time, the town was sparsely populated with room for expansion. This study shows that, excluding village land use, northern industrial area, and the lakeshore area, approximately 22,000 acres of land is available for further development with 17,000 of those acres available for residential use. The current population density of the Town of Hamburg is 1,422 pop. per km² with the heaviest concentration of people residing along the lake front in Athol spring south to Wanakah. This information was collected from the 1962 drainage study refer to Appendix B: 1962 Town of Hamburg, New York Report on Drainage Study Housing & Home Finance Agency Project P-NY-3095.

The 1962 Town of Hamburg Drainage Study indicates an approximate of 22,000 acres of land is available for further development. Two-thirds of the undeveloped area, or 17,000 acres of this land was available for residential development. That land was predicted to contain 90,000 people, an average population density of 6 people per acre.

Through further study of the town's land use and coverage, the study was completed through utilizing public town zoning information. Through in-house data collection and map preparation, data was obtained to accurately represent present day land usage and zoning in the town. Today, out of the 26,480 acres or 41.4 square miles, approximately 73% or 19,330.4 acres (30.2 square miles) of the total land is represented as residential zoning. 7% of the total land, 1853.6 acres (2.9 square miles) is represented by commercial use. And 5% of the total land, 1324 acres (2.1 square miles) is industrial zoning. Current zoning maps of the area show 3.24%, 858 acres (1.34 square miles) available for planned unit development area. Refer to Figure 10: Town of Hamburg Land Use Map.

Future land use in the area has little room for change or growth. With only 3.24% of the area being available for future development, the concern of future land use changes is minimum. The importance of the future growth of an area with concerns to the future drainage of said area relate to that areas ability to transfer water efficiently to a main drainage source. As development occurs, including buildings, roads, driveways and other infrastructure, more and more impervious surfaces are introduced to the area. An impervious surface is any surface that creates a barrier that prevents ground water re-charge. Ground water recharge is a hydrologic process, where water moves downward through the ground, changing from surface water to groundwater.

The more impervious surface there is in an area, the less natural drainage through groundwater recharge can occur. Precipitation and snowmelt accumulate rapidly on impervious surfaces and can cause an overwhelming amount of surface runoff to drainage systems.

As future development continues, appropriate drainage planning is crucial in accommodating the runoff changes.

These changes of future land use and their relationship to the town's drainage will be further explored and modeled within the Hydrologic Model section of this report (pg.20).

Precipitation:

The study of precipitation for the purpose of this drainage study includes the following:

1. The study of long-term average annual precipitation
2. The study and frequency of a ten-year storm

The records utilized in making this precipitation study were obtained through the National Oceanic and Atmospheric Administration (NOAA) National Weather Service Precipitation Frequency Data Server. Average rain fall in the Town of Hamburg is 42 inches per year and the average amount of snowfall is 106 inches per year. The most significant information for this section of the study can be represented by the extreme of periodic rainfall events within the past ten-years. During the past ten years, the extreme of rainfall in a 15-minute period was considered to be 0.75 inches. The extreme rainfall for a two-hour rainfall event is 1.93 inches of rain. In a 24 hour period event 3.49 inches of rain was recorded. And for the most extreme monthly rainfall event, 10.1 inches of rain.

Town of Hamburg – Report on Drainage Study Housing & Home Finance Agency Project:

In 1962, an extensive drainage study of the Town of Hamburg was completed by Norman M. Herthe, Nussbaumer, Clark & Velzy Consulting Engineers. Their study focused on these key features that relate to the drainage of the area:

a) Rainfall Data and preparation of rainfall curves.

b) Population data in order to forecast future growth.

c) The study of various watershed areas, ditches, streams, culverts, and drainage structures.

d) Analysis of ditches, culverts and drainage features as to their adequacy for present and future conditions of drainage.

e) Investigation of current flooding area in which present issues are located.

f) The preparation of town maps to show existing and proposed drainage and storm sewer improvements.

Using these areas of study to gain an understanding of the Town of Hamburg as a whole, recommendations were made to help improve the drainage of the area and plan for future development.

The drainage system for the Town of Hamburg primarily consists of an extensive network of natural streams, man-made ditches, and storm culvert crossings. Flooding in the Town of Hamburg is often attributed to combined heavy rainfall and rapid thaws, as well as the backwater effect from high water levels in the major creeks that dissect the Town. Issues that contribute to drainage failure within the town are outlined below:

- Bedrock elevation is consistently very shallow below ground surface creating an impermeable layer that water can pass.
- Many natural or man-made drainage paths have, over time, collected heavy amounts of debris and sediment collection creating damn like features restricting proper or designed flow.
- Heavy vegetation growth within drainage paths creating blockage for water flow.
- Outdated and/or dilapidated infrastructure including culverts and bridges that convey drainage.

4 Existing Conditions

Establishing existing drainage patterns, watershed boundaries and watershed characteristics are critical steps to the evaluation of alternatives and development of viable recommendations for drainage improvements and flood control measures.
This study placed a strong emphasis on developing detailed mapping and estimating runoff flow rates for current conditions. The mapping presents the key drainage features, watershed characteristics, and drainage patterns for the Town. This section presents the mapping developed for the existing conditions along with descriptions of each watershed area, a summary of the field investigation activities conducted, the watershed modeling effort, and a summary of the existing hydrologic and hydraulic conditions for the individual watershed areas.

Mapping of Existing Conditions

In general, the Town of Hamburg has a natural gradient from East with a mean lake level elevation of 576 feet to West with an elevation of about 900 feet and is bisected by a series of natural watercourses and network of man-made ditches and culverts that convey surface runoff through the Town. There are 13 major drainage courses encompassed in the study area that ultimately discharge to Lake Erie. The

largest forms of run off is contributed to by 18 Mile Creek on the southern border and Rush creek to the North. These creeks begin in hilly terrain with generally wooded surrounding areas, passing through small valleys with steep slopes and ending in deep ravines with exposed shale walls. Refer to Figure 7: Town of Hamburg Watercourses Map.

For the purpose of this study, the main watershed of the Town of Hamburg, which falls into the Niagara River/Lake Erie watershed is broken down further into two main sub-watersheds which include the Eighteen Mile Creek watershed and Smokes Creek watershed. Eighteen Mile creek sub-watershed and Smokes Creek sub-watershed are just two of the eighteen sub-water sheds that are located within the Niagara River/Lake Erie watershed. These two sub-watersheds were then broken up into 38 drainage areas.

When the drainage of soils is considered, they are classified in hydrologic soil groups. Original assignment to hydraulic soil groups (Musgrave 1955) were based on measured rainfall, runoff, and infiltration data. Since this initial work was completed to establish these groupings, soil scientists use this as a baseline for further grouping of soils. Furthermore, establishing soils into hydrologic soil groups are based on the premise that soils found within a climatic region that are similar in depth to a restrictive layer or water table, transmission rate of water, texture, and structure and degree of swelling when saturated will have similar runoff responses.

For the purpose of this study, each of these drainage areas are classified as soil type D which is a cohesive soil in nature. These soils have a very slow infiltration rate which cause a high potential for runoff. Soil type D consists of a majority of clays with a high shrink-swell potential.

It is important to understand the Curve Number (CN) value of soils in the study area. This CN value is a driving factor in investigating the regularity of disposal of storm water runoff through subsurface drainage. This includes groundwater recharge and the speed in which the water will dissipate. The CN value is utilized in the hydraulic study TR-20 (SCS, 1983) which is a hydrologic model for simulation of direct runoff hydrographs resulting from natural or synthetic rainfall occurring over a watershed. The program can be used to model complex watersheds with multiple subareas, channel reaches, and reservoirs. Hydrographs are generated for subwatersheds, combined or separated at confluence points, and routed through downstream reaches or structures. The CN value for this area ranges from 61 to 90. Within the area of study, it is typical to have a shallow depth of bedrock. The bedrock is comprised of a variety of shale including Ludlowville shale along the lake shore;

Dunkirk shale, which falls under the Village of Hamburg; Angola shale which falls in the southern reaches of the town and Moscow shale, located inland in the eastern portions of the area. Within the plain, bedrock is as shallow as 2 feet from the surface and, generally speaking, within 10 feet of the surface. As you move east of the village, in some areas, bedrock lies in excess of 30 to 35 feet below the ground surface. Refer to Figure 3: Town of Hamburg Geology Map.

Although soil type B is relatively permeable, the presence of bedrock so close to the ground surface in a large portion of the region, creates an impermeable layer in which ground water runoff will sit above. This impedance to subsurface drainage can affect natural drainage and can cause flooded areas and ultimately subsurface drainage can be considered close to zero and is somewhat ignored when calculating natural drainage through recharge within the Town of Hamburg.

Sub-Watersheds

Eighteen Mile Creek Sub-Watershed drainage area is contributed by 76,834 acres or 120.1 square miles of land area in the southern most area of the Niagara River/Lake Erie watershed and includes 273.8 miles of waterways. Eighteen Mile creek begins through spring fed waters in the Town of Colden and meanders through the Town of North Collins, Boston, Eden and eventually draining to Lake Erie in the Town of Derby. The Creek flows through deep shale sided gorges ranging from 70-150 feet tall, turning to a gradual gradient with a broad flood plain creating the separation between the Town of Hamburg and Evans. The majority of Eighteen Mile Creek Sub-watershed is considered to be forest and agricultural accounting for 85.7% of the land and the rest being wetlands, open water and only 6.06% developed.

Smokes Creek Sub-Watershed drainage is contributed by 39,522.8 acres or 61.8 square miles of land area located just north of the Eighteen-mile Creek Sub-watershed and includes 120 miles of waterways. These waterways include Smokes Creek, Rush Creek, Berricks Creek along with many low-order tributaries and headwater streams. The sub-watershed encompasses the Town of Hamburg, Orchard Park, Aurora, and West Seneca. Refer to Figure 6: Watershed Map in the appendices. Beginning in the Town of Orchard Park, Smokes Creek flows westerly towards Lake Erie. The watershed is made up of many small tributaries which drain directly to Lake Erie in the Town of Hamburg. Smokes Creek Sub-watershed has the least number of waterway miles of the 18 sub-watersheds. This area is categorized by being 48.74% developed and the rest of which is considered agricultural, forest, wetland and open water. Smokes creek often suffers from major streambank erosion and flooding due to poor management and lack of maintenance of the creek.

5 Field Investigations and General Observations

In the Town of Hamburg Drainage study of 1962, the area was divided into 13 separate drainage areas. These drainage areas were designated by a capital letter A through M. Within these drainage areas approximately 300 culverts or bridges were studied because of their importance to the town wide drainage. This study does not use the same 13 drainage areas. In turn, 38 drainage areas were laid out. These drainage features were once again considered for this updated drainage study due to their importance of town wide drainage. Many features still existed in their original form, but many have been updated, removed, or replaced with larger structures.

Methodology:

The main goal in field reconnaissance was as follows:

a) To locate and establish the drainage features along the main drainage courses through the town.

b) Verify the structural integrity and condition of the bridge or culvert.

c) Consider water flow through the structure.

d) Consider upstream and downstream conditions of the ditch or stream flowing through the structure.

e) Documentation of relevant data describing these conditions with descriptions and photographs.

The software used to collect and record the field data was the ARCGIS Collector App. This software gave the ability to pinpoint the location of each feature and include all necessary data in one place. Mapping of the culverts can be found in Figure 10: Condition Assessment of Field Data Map in the appendices.

Field data collection occurred during winter months, beginning in November 2021 and finishing the reconnaissance in March 2022 to assess existing drainage patterns and hydrologic characteristics, and conveyance conditions. During this time, there were extremely wet conditions with typical frozen ground conditions and visible snow on the ground. The extremes of the drainage course's ability to transmit water during heavy rainfall events, often mixed with melting snowfall was shown during these wet conditions.

Although many of the drainage features, including culverts and bridges, were adequate in transferring stormwater runoff, many of these features have inadequate conditions. Many issues arise from heavy vegetation growth either upstream or downstream from the feature. The drainage system for the Town of Hamburg primarily consists of an extensive network of natural streams, man-made ditches, storm culvert crossings, and more recently storm sewer networks. Many (predominantly 18" Cast Iron Pipe (C.I.P.)) culvert crossings recorded from 1962 have since been replaced with extensive storm drain networks which outlet to nearby natural streams. Flooding in the Town of Hamburg is often attributed to combined heavy rainfall and rapid thaws, as well as the backwater effect from high water levels in the major creeks that dissect the Town. Current problematic "design storm" conditions include a lack of stormwater drainage capacity adjacent to creeks in residential properties and where road crossings are, where existing ditches or land masses in flowlines are either not sufficient in size or properly maintained, or both.

Heavy growth causes blockage of the natural water path and can cause sediment collection in undesirable locations. Within the pipe and over the invert of the pipe is where many of these issues arise. As sediment collects within the culverts or bridges, it can alter the feature's ability to transfer water. Many times, build up will slow this from its designed flowing state and therefore cause more problems. Also, within Corrugated Metal Pipe (CMP's) the sediment within the pipe can have corrosive properties which in turn can corrupt the invert of said pipe. Road salt, used to melt road ice can also increase corrosion of an invert. Culverts and bridges are designed with a roughness coefficient which explains the pipe's ability to transfer this water with a given resistance. As the invert of the pipe is either filled with sediment or deteriorated, the feature will no longer perform at the rate as it was designed causing levels of water to increase during heavy runoff events.

Another issue that was a regular observation was pinched or collapsed inlet or outlet of culverts. During winter months in Western New York, plows often hit these inlets and outlets and are in turn pinched or crushed. This directly effects the feature's ability to transfer water as it was designed, creating areas of pooling water in undesirable locations, and therefore causing flooding. The effective diameter of the pipes are severely reduced when pipes are damaged.

Often, while studying the concrete structures within the study area, including concrete box culverts, concrete bridges or Reinforced Concrete Pipe (RCP's) some structures were exactly the same size and material as recorded in the Hamburg Drainage Study of 1962. That being said, much time has passed creating many issues including:

- Dilapidated structures
- Exposed rebar
- Crumbling and cracking concrete
- Complete blockage of flow from sediment build up
- Drainage course redirection
- Drainage demand not met

Using the information collected during the field data collection process, necessary recommendations and planning techniques can be made in specific locations of interest. Firsthand experience of sixty-year-old structural damage of the drainage features produces incite and provides information that will give the opportunity to understand the problems that can occur in the future of the drainage system and reveal ways to improve the system and ultimately remedy these issues, restricting them from reoccurring.

Historical Ice Jams:

Western New York's climate contributes to flooding issues that can occur in the Town of Hamburg. Freezing temperatures in winter months cause mass amounts of ice to form in the area's drainage paths. Throughout the course of the winter months pushing into spring, temperatures fluctuate over a wide range. This fluctuation of temperature causes heavy freezes and rapid melt downs. Mass amounts of ice will break free in the streams and creeks that convey drainage. As the ice floats downstream, ice jams can form and cause backups and flooding for surrounding areas.

Smokes Creek: Historically, smokes creek has experienced ice jams causing problems for local residence. Although flooding in the area hasn't occurred since 1964 due to a project which straightened areas of the creek to allow for ice chunks to flow smoother, high flood insurance costs and heavy erosion of stream banks on residential properties effect local residences.

Eighteen Mile Creek: Ice jamming effects both up and downstream water conditions of the creek. Few major ice jamming events have occurred in Eighteen-mile creek. According to the Department of Environmental Conservation (DEC) and the National Centers for Environmental Information (NCEI) the major ice jamming events have occurred in the Town of Boston, the neighboring town of the Town of Hamburg. Although the events occur just outside of the Towns boundary, the Town of Hamburg can still feel the down stream effects due to this jamming. Jamming often occurs at the Patchin Road and Hillcroft Drive bridge crossing. Like

wise, along Eighteen-mile creek Heinrich and Eckhardt Roads have seen closures due to flooding resulting from ice jamming.

Culverts:

Approximately 300 culverts were brought to attention in the study of 1962. This was due to their major role in water transmission along the 13 major drainage routes of the town. As the major drainage courses have basically remained the same through time, the field study was focused on the same drainage paths and drainage features as the 1962 study. The condition of the paths and features was the main concern in this study. Approximately 450 culverts were considered in this study. These 450 culverts encompassed the 300 culverts from the 1962 study and expanded upon these with other features that could be considered important in the town wide drainage.

6 Areas with Inadequate Drainage or Flooding Issues

This section of the report will describe areas in the Town of Hamburg that were found to have drainage issues. A survey was taken by the Town where areas that the representatives felt had a problem with flooding and poor drainage. These areas will be under "Town Survey Responses." The next section, "1962 Town Drainage Study," will list the flooding areas from the 1962 study. In the section labeled, "Corresponding Flooding Areas From 1962 Study and Present-Day Study," the areas that correspond to the problem areas that still exist according to the town survey will be listed. The next section, "Culvert Field Date," will explain how the field data recorded by CPL correlates to the survey information and each problem area.

Town Survey Responses:

The areas that were considered to have drainage and flooding issues are as follows:

a. The neighborhood at McKinley rd. and Sowles rd. North towards Boy Scout Pond.
    - This area shows signs of periodic pooling of water in low lying areas. This area slopes east to west towards McKinley Rd. and collects between Bayview Rd. and Mckinley Rd. Flooding typically along Bayview Rd. extending into adjacent yards where lower elevations occur.

b. Lilydale Dr. along Draudt Farm to undersized box Culvert at the corner of

Knab Dr. and Lilydale Dr. crossing Clark St.

- Along Lilydale Dr., some pooling water was located in yards adjacent to Draught Farms. Runoff from the open fields drain towards residence property on Lilydale Dr. Underground drainage appear to have good flow with minimal blockage. Where Knab Dr. meets Clark St., the drainage path for the neighborhood runs under Clark St. through an undersized concrete box culvert. The culvert appears to be in poor crumbling condition. There is heavy erosion under outlet point and stream has some vegetation and sediment blockage.

c. Along Smokes Creek in the Hamlet of Windom at the end of Brookview Terr.

- Flooding occurs at the end of Brookview Terr. (bottom of the hill) adjacent to smokes creek. Underground drainage system runs from top of road near Abbott Rd. down the hill and empty into Smokes Creek through 12" CMP. The drainage system seems to be recently cleaned and free of debris with steady flow of runoff. Properties show heavy amounts of pooling water on side and backyards of residence. Two storm drains are located in wooded area located behind residences.

d. Down Electric Ave. backing up to main drainage ditch.

- Flooding occurring west of Electric Ave, between road and main drainage ditch. Area appears to be low lying. Main drainage ditch shows heavy vegetation growth and blockage.

e. The entire road of Engle Dr. down to the corner of Engle Dr. and Old Lakeview Rd.

- Along the entire stretch of Engle Rd. major flooding is occurring in residential yards. Pooling water often exists throughout local yards extending from the pavement of Lakeview rd. to the foundations of residences. The road appears to lack a sufficient drainage system with only one catch basin or intake point of runoff located at the top of the road. Catch basin was blocked and full of water with no apparent flow or movement of water. At the corner of Engle Dr. and Old Lakeview Road, the last point until the runoff drains into the north branch of 18 Mile Creek, the CMP running under Old Lakeview Rd. is undersized and completely crushed

prohibiting proper drainage.

f. Along Smith Rd. near Lakeview Rd. and Old Lakeview Rd.
    - Pooling of water seems to occur in residential properties along farm fields. Farm fields drain towards Smith Rd. ending in front yards. Lack of drainage ditches and culverts running under driveways give no exit point for farm field runoff.

g. Corner lots at the corner of Eckhardt Rd. and Schoellkopf Rd.
    - Corner lots show heavy pooling water creating swampy areas. These low-lying areas back up to residential properties.

h. Along South Bend Lane.
    - Along the entire street of South Bend Ln. pooling water is apparent in yards. Catch basins and an underground drainage system line the road. Through further inspection, catch basins appear to be clogged with no water movement.

i. Along Anslee Lane to the corner of Anslee Lane and Lakeshore Rd.
    - Even with regular cleanings of storm drains, issues of flooding occur all along Anslee Ln. Major flooding occurs at the corner of Anslee Ln. and Lakeshore Rd. During rainfall events and spring melting times, heavy collection of water accumulates. Water and often sewage will overflow and spew from the manhole and catch basin located at the corner of the road. Access water accumulates in roadway and heavy accumulation in residential yards creating a permanent wet area.

j. Fairway Ct. at the bottom of the hill past Pinehurst St.
    - Flooding occurs at the corner of Fairway Ct. and Lakecrest Dr. Catch Basins running the length of the road are also plugged and show slow water movement for drainage. Low areas in residential yards show signs of floodings.

k. The length of Columbia Ave.
    - Flooding occurs at the corner of Columbia Ave. and Lakeshore Rd. (Route 5) where culvert running from ditch under Lakecrest Dr. is plugged with debris. Catch basins running the length of the road are also plugged and show slow water movement for drainage. Low areas in residential yards show signs of flooding.

l. Overlook point off Cloverbank Rd.

- No signs of flooding were detected.

m. Along Briercliff Dr. across the railroad track northwest to Glendale Ave.
    - Flooding of residential yards is consistent along the stretch of the road. Drainage system appears to be clogged with debris.

n. Neighborhood between the railroad track and Lakeshore Rd. including Morgan Pkwy, Chapman Pkwy, Mt. Vernon Blvd, and Kennison Pkwy.
    - Flooding is occurring along the edge of pavements and in front yards of residential properties. Drainage systems appear to be clear of debris and free flowing. There is no clear cause of ponding in the area.

o. Mealou Dr. where it boarders South Park Ave. and the rear yards of 5407 and 5415 Mealou Dr.
    - Flooding present in residential back yards. No roadside ditches or underground storm water system along roadway. Possible ample runoff from nearby impervious area.

p. Grafton Ave. in the rear yards of 3602, 3590, and 3594 and the ditch between Mundy Ave. and Johnson St.
    - Flooding present in the rear yards of notes addresses. Appears to be lowing lying area between Grafton Ave. and the railroad tracks. Underground stormwater system present running parallel along both sides of Grafton Ave.

q. The ditch between Pine Lakes Community and Lakeview Rd. which discharges to 18 Mile Creek.
    - The lake's outlet is twin 30" RCP's which drain to a highly vegetated ditch line between the lake and Lakeview Rd. Lake levels raise in high level rainfall and melting events.

1962 Town Drainage Study:

This section will list the areas in the Town of Hamburg that the 1962 Drainage Study outlined as areas that have flooding issues, they are as follows:

a. The area where Smokes Creek makes u-bend and crosses the Railroad.

b. Glendale Heights Area

c. The corner of Milestrip Rd. and South Park Ave., North of Milestrip and East of South Park.

d. Backyard area between Highland Ave., Abbott Pkwy., South Park Ave.

and the N.Y.S. Thruway.

e. Along the South Branch of Smokes Creek from Sheldon Rd. to Milestrip Rd.
f. Triangular area bounded by Route 5, Lakeshore Rd. and Bayview Rd.
g. Along Sprague Ave. between South Park Ave. and Railroad.
h. Intersection of Quinby Dr. and Fairground Rd.
i. Low areas along South Park Ave., south of Quinby Dr.
j. From Route 5 to Big Tree Rd. along Traffic Cir.
k. Along Legion Dr. halfway between South Park Ave. and railroad.
l. The intersection of Camp Rd. and the railroad.
m. The intersection of Neuman Creek and Route 219.
n. Throughout Mt. Vernon from the railroad to Route 5.
o. Wanaka area west of the railroad around Route 5.
p. East and west of Route 5 in Wanaka.
q. The intersection of Pleasant Ave. and Route 5.
r. Between Lakecrest Dr. and Lakeshore Rd. west of Cresent Terr.
s. On Dover Dr. and Birchwood Dr. North of Route 5.
t. Along South Bend Ln.
u. Lakeview area along Lakeview Rd. between Center Street and Versailles Rd.
v. Flat plain area from the Village of Hamburg to Smith Rd.

Corresponding Flooding Areas From 1962 Study and Present-Day Study:

a. Along Smokes Creek in the Hamlet of Windom
b. Along Smith Rd. near Lakeview Rd. and Old Lakeview Rd.
c. Along South Bend Ln.
d. Along Anslee Lane to the corner of Anslee Lane and Lakeshore Rd.
e. The hamlet of Pinehurst
f. The length of Columbia Ave.
g. Along Briercliff Dr. across the railroad track Northwest to Glendale Ave.
h. Throughout Mt. Vernon from the railroad to Route 5.

7 Culvert Study

In this section, the report will comprise the findings and conclusion of the culvert, ditch and bridge field data collected throughout the Town of Hamburg and the condition of the culvert's visible issues. In most cases, these findings directly correlate to the flooding areas that show themselves in both the current study and the study in 1962. Refer to Figure 11: Town of Hamburg Condition Assessment of Field Data Including Current Flood Areas Map. There are several culverts that contribute to the failure of the drainage flow. Each culvert or bridge was represented by a letter, B or C to represent a bridge or a culvert. Followed by the letter of the drainage area it falls within and followed by the number of that structure within the drainage area. For example, the third culvert within drainage area B would be represented by CB-3.

a. The neighborhood at McKinley rd. and Sowles rd. North towards Boy Scout Pond.
    - From the field data collected, culverts CC17 and CC41-CC46 can be possible causes of the flooding in this area.
        - CC17: This drainage feature shows a high flowing area that may be under sized to conduct flow. Also, dense vegetation growth in swale blocks flow.
        - CC41: The area around this culvert is highly saturated and has a dense growth of vegetation along the ditch leading to and from the culvert. No visible flow was apparent during inspection.
        - CC42: Along with heavy vegetation growth in the ditch, poor flow was indicated as the culvert was full of foul-smelling water.
        - CC43: Pooling water at the culvert indicates an over capacitated culvert. The inlet was fully submerged. Dense vegetation growth was noted in ditches.
        - CC44: CC44 is a system of catch basins with an underground storm drainage pipe system that follows the path of the neighborhood. Possible blockage of the system is occurring.

- CC45: The location is surrounded by saturated areas. The culvert itself is fully submerged indicating an under sized feature. Heavy vegetation growth along ditch and concrete erosion is also apparent.
- CC46: Heavy sediment and blockage hinder flow causing a highly saturated surrounding area.

b. Along Smokes Creek in the Hamlet of Windom at the end of Brookview Terr.

- From the field data collected, culverts CB9, CB10, CB11 and a main drainage ditch can be possible causes of the flooding in this area.
  - CB9: Capacity issues of the culvert cause flooding in neighboring areas. Debris and blockage is occurring at the inlet and outlet of the feature. Ditches indicate heavy blockage and vegetation growth. Heavy flooding occurs periodically in the residential area adjacent to feature.
  - CB10: Poor conditions of crumbling concrete is contributing to lack of flow. Ditches indicate capacity issues.
  - CB11: Slow flow and sediment build up was indicated at this location.

c. Down Electric Ave. backing up to main drainage ditch.

- From the field data collected, culvert CD28 can be a possible cause of the flooding in this area.
  - CD28: Culvert is slightly crushed with build of debris. Area is saturated with vegetation growth in the ditches.

d. Along Smith Rd. near Lakeview Rd. and Old Lakeview Rd.

- From the field data collected, culverts CK41, CK42, CK43 and CK48 can be possible causes of the flooding in this area.
  - CK41: The concrete of this box culvert is in very poor condition. Approximately 50% of the culvert is blocked and full of sediment. Heavy vegetation growth exists up and downstream to the feature.
  - CK42: Concrete box culvert in poor condition, crumbling of the concrete is occurring.

- CK43: Moderate vegetation growth in ditches is building up and hindering flow. Blockage and sediment build up is occurring at the inlet, outlet, and invert of the feature.
- CK48: Culvert has minor inlet/outlet crushing.

e. Corner lots at the corner of Eckhardt Rd. and Schoellkopf Rd.

- From the field data collected, culverts CK5, CK6, CK7, and CK55 can be possible causes of the flooding in this area.
  - CK5: Concrete CMP is in very poor condition with visible cracking occurring. The invert is full of sediment build up and heavy debris build up occurring at the outlet.
  - CK6: Culvert appears to be in good condition, some debris collecting in the system. Flooding in this location may indicate an undersized feature.
  - CK7: Culvert has minor inlet/outlet crushing.
  - CK55: Culvert appears to be in good condition, but heavy vegetation growth downstream hinders flow.

f. Along South Bend Lane.

- From the field data collected, culverts CK1, CK4, CK10 And CK36 can be possible causes of the flooding in this area.
  - CK1: Heavy vegetation growth upstream from culvert.
  - CK4: Ditch leading up to culvert contains heavy blockage and debris.
  - CK10: Culvert shows partially blocked conditions with heavy vegetation growth up and down stream.
  - CK36: Conditions show heavy flowing water through the culvert. The invert is full of sediment build up and there is heavy vegetation up and down stream.

g. Along Anslee Lane to the corner of Anslee Lane and Lakeshore Rd.

- From the field data collected, culverts CJ13 and CJ14, can be possible causes of the flooding in this area. Problem features in the Fairway Ct. area could also be a contributing factor to the flooding of Anslee Lane.
  - CJ13: Heavy sediment build up in invert of culvert.
  - CJ14: Constant drainage in this location cause major

flooding in residential yards and roadway. Blockage of underground storm water system is consistent with the area.

h. Fairway Ct. at the bottom of the hill past Pinehurst St.
   - From the field data collected, CJ24, CJ27 and CJ28, can be possible causes of the flooding in this area. Problem Culverts that are related to Anslee Lane's flooding issue (CJ13 and CJ14) can also be considered to be a source of issues occurring in the Fairway Ct. area due to their close proximity and direction of drainage downhill towards Lake Erie.
     - CJ24: Build up of debris is causing blockage of the catch basin.
     - CJ27: Outlet of CIP is crushed limiting flow.
     - CJ28: Outlet has blockage and is crushed hindering flow.

i. The length of Columbia Ave.
   - From the field data collected, culvert CH13, can be possible causes of the flooding in this area. Issues occurring in the Chapman Pkwy, Cloverbank, Briercliff and Glendale area could also be a source of drainage interruption.
     - CH13: Culvert is in very poor condition accumulating heavy blockage and vegetation growth along drainage route.

j. Overlook point off Cloverbank Rd.
   - From the field data collected, culverts CG9, and CG10, can be possible causes of the flooding in this area.
     - CE9: This area was found to have aged catch basins with heavy sediment build up.
     - CG9: Consistent with CE9
     - CG10: Consistent with CE9. Features are fully blocked restricting flow.

k. Along Briercliff Dr. across the railroad track northwest to Glendale Ave.
   - From the field data collected, culverts CH2-CH6, CH16 and CH18, can be possible causes of the flooding in this area. Issues occurring in the Cloverbank, Chapman Pkwy area could also be a source of drainage interruption.

- CH2: Concrete culvert running under Railroad is in poor crumbling condition.
- CH3: Consistent with CH2.
- CH4: Concrete culvert is in poor crumbling condition at inlet. At outlet, rust is become an issue in invert. Heavy vegetation growth and blockage occurring both up and down stream.
- CH5: Large concrete culvert is in poor crumbling condition. Heavy vegetation and blockage are occurring up and down stream.
- CH6: Twin pip culverts at this location. Only one pipe is receiving flow. Heavy vegetation growth and blockage is occurring up and down stream.
- CH16: Culvert is in very poor condition causing heavy saturated and flooding conditions in this area. Culvert is 100% blocked.
- CH18: Heavy vegetation growth at this location.

l. Neighborhood between the railroad track and Lakeshore Rd. including Morgan Pkwy, Chapman Pkwy, Mt. Vernon Blvd, and Kennison Pkwy.

- From the field data collected, culverts CG30 and culverts related to the cloverbank, and Briercliff and Glendale area can be possible causes of the flooding in this area.
  - CG30: Inlet at culvert is crushed.

Hydrologic Model:

The objective of the hydrologic model is to identify areas within the Town of Hamburg that may be experiencing flooding issues due to undersized culverts or culverts with insufficient inlet/outlet elevations. The stormwater quantity analysis was conducted using the HydroCAD Stormwater Modeling System by HydroCAD Software Solutions. The SCS TR-20 runoff method was utilized to model the Towns drainage system, which is to be explained in the Calculations subsection of this section.

Modeling:

Watersheds were generated in ArcGIS with the use of lidar data provided by NYS Clearinghouse and utilizing the watersheds and sub watersheds from the 1962 town wide drainage study to provide continuity for comparison. Although the initial watershed generation provided hundreds of areas, the model was simplified into a total of thirty-eight (38) watersheds to reduce complexity. The watersheds were then modeled in HydroCAD using land slope, soil types and surface characteristics.

Area data for each watershed was included in ArcGIS with the generated of the watersheds. This provided the total acreage of each. For purposes of watershed runoff, additional information needed to be gathered, including percentage of impervious and pervious areas, watershed soil types and average land slopes.

ArcGIS provided an average land slope for each watershed, shown on a spectrum. Each watershed fell within a range of 0.001% - 1.72% slope. Therefore, each watershed was assigned an average land slope of 1.00%, this assumption was used throughout the calculations for simplicity.

Hydrologic Soils Group (HSG) classifications (A,B,C,D) were obtained from a USGS generated soil map report (Appendix A) which describes the soil types within the Town. Based on the Hydrologic Soils Group Map, it can be concluded that the Town of Hamburg HSG classification is predominantly a HSG D soil type. Below is the list of the four soil groups made available in HydroCAD and their descriptions:

1. **HSG A** soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands and gravels and have a high rate of water transmission (greater than 0.30 in/hr).

2. **HSG B** soils have moderate infiltration rates when thoroughly wetted, and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15-0.30 in/hr).

3. **HSG C** soils have low infiltration rates when thoroughly wetted, and consist chiefly of soils with a layer that impedes downward movement of water, and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05-0.15 in/hr).

4. **HSG D** soils have high runoff potential. They have very low infiltration rates when thoroughly wetted, and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0-0.05 in/hr).

Using arial imagery, the total percentage of imperious area (roads, driveways and roofs) were estimated. The estimated percentage of impervious area and type of pervious surface were estimated through areal imagery. The information gathered is included below:

Watershed	Area (acres)	Estimated % of Impervious Surface
1	57.523	40%
2	27.210	40%
3	41.942	10%
4	15.960	10%
5	49.329	20%
6	66.758	5%
7	104.211	5%
8	53.474	10%
9	20.454	20%
10	84.795	5%
11	65.122	5%
12	39.478	5%
13	33.740	5%
14	26.837	5%
15	107.265	5%

Watershed	Area (acres)	Estimated % of Impervious Surface
16	74.170	5%
17	85.264	5%
18	69.982	5%
19	27.700	5%
20	42.403	5%
21	55.577	5%
22	49.667	5%
23	93.319	5%
24	90.359	5%
25	16.58	10%
26	43.591	10%
27	13.127	10%
28	37.672	10%
29	59.186	0%
30	97.544	10%
31	44.343	10%
32	47.253	10%
33	60.540	10%
34	74.016	10%
35	47.877	10%
36	73.966	10%
37	70.470	10%
38	74.291	10%

Culvert information was collected from field observations and the original 1962 town wide drainage study to form, an accurate current hydrologic model. The model was simplified by modeling the final and limiting culvert in each of the thirty-eight (38) watersheds, which was determined by the observed field location of the culverts, the current flow of storm runoff generated in ArcGIS and the past field conditions outlined in the 1962 drainage study. The culvert elevation data was used from the 1962 study to model the inlet and outlet elevations, as a survey was not included in this study. There was only one elevation provided, so it was assumed that this elevation was the inlet elevation. The outlet elevation was calculated, assuming that each culvert had a slope of 1%.

Calculations:

Intensity and duration (IDF) curve data was collected from NOAA (National Oceanic and Atmospheric Administration) for the Town of Hamburg, which included various rainfall intensities for multiple storm events. A custom rainfall event was created from this IDF curve. A 25-year storm rainfall event was analyzed over a 24-hour rainfall period to appropriately observe the effects on the town's existing drainage system.

Runoff Hydrograph Generation:

The SCS unit hydrographs generated are based of the SCS TR-20 runoff equation, which determines the precipitation excess (runoff) that results from a given cumulative precipitation:

$$Q = \frac{(P - Ia)^2}{(P - Ia) + S}$$

$$S = \frac{1000}{CN} - 10$$

With Ia = 0.2S

$$Q = \frac{(P - .2S)^2}{(P + .8S)}$$

Where:

Q = Precipitation excess (runoff) [inches or mm]

P = Cumulative precipitation [inches or mm]. This variable is based on the rainfall distribution curve.

Ia = Initial Abstraction [inches or mm]. This variable is based on the soil types within a sub catchment.

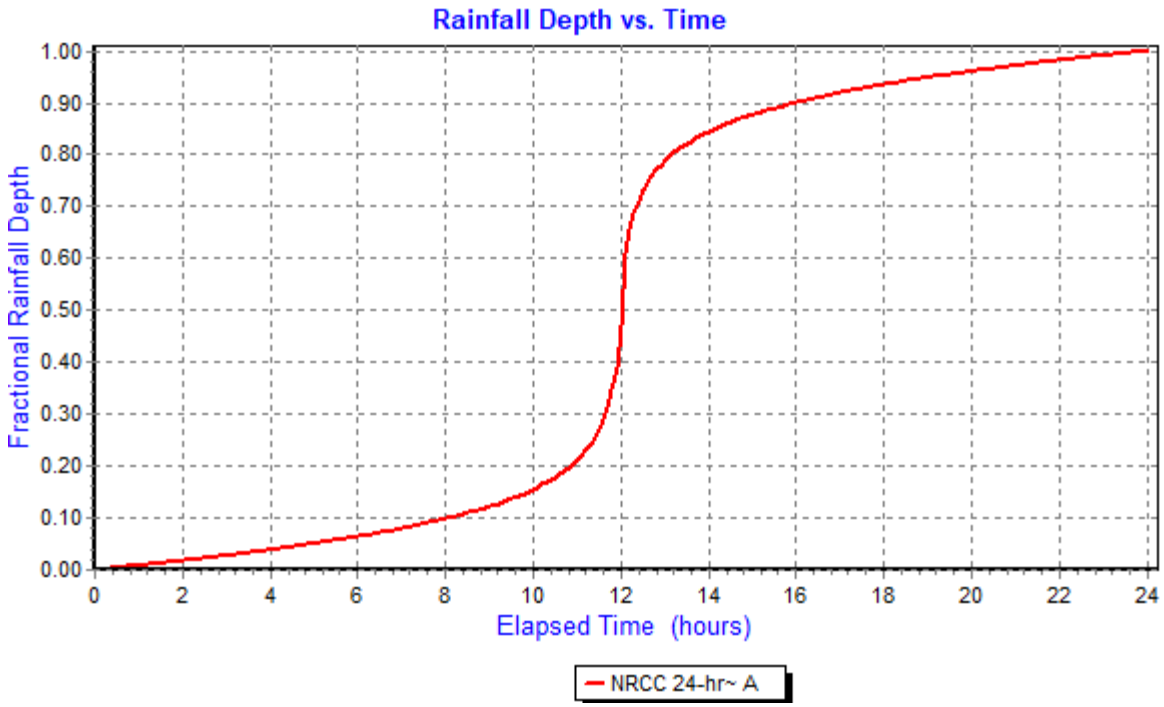
S = Potential maximum retention [inches]. This variable is based on the soil types within a sub catchment.

CN = Curve number. This is determined according to the soil group and ground cover (pervious and impervious surfaces). A weighted CN approach was utilized by summing the products of each CN multiplied by a percentage of the total area of

each sub catchment.

The time of concentration was determined for each separate watershed using the Lag/Curve Number Method, which requires the Hydraulic Length and Average land slope of the sub catchment. This data was obtained from the watershed generation in ArcGIS. This calculation also requires the overall CN value which is evaluated in HydroCAD.

The cumulative precipitation (P) is gathered from the rainfall distribution curve. Below is the rainfall distribution curve used for the Town of Hamburg, which is represented as rainfall depth vs. time over a 24-hour duration:



RAINFALL DISTRIBUTION GRAPH

The rainfall data that was collected from the NOAA website included storm depth data. The total accumulated depth is 3.14 inches. The rainfall distribution data indicates how the storm depth will be distributed over a standardized 24-hour period.

Reach Routing and Pond Routing Methods:

A reach routing simulates the changes that occur to a hydrograph as it passes through a channel or reach. A routing requires an inflow hydrograph and produces an outflow hydrograph. A secondary outflow can optionally be generated to handle reach overflow and act as the secondary outlet, which was done in some cases where overflows were expected.

The Storage-Indication method is the basic technique used for sequential reach routing. A simplified description of this procedure follows:

1) The reach's stage-discharge relationship is calculated using Manning's equation, assuming steady, normal flow.

2) The stage-storage relationship is determined from the reach cross-section multiplied by the length.

3) The stage-discharge and stage-storage curves are used to create a storage-indication curve based on the equation:

$$SI = S + \frac{O}{2}\,\mathrm{dt}$$

Where:

SI = Storage Indication Value

S = Reach Storage

O = Reach Overflow

dt = Time Increment

4) Routing is performed using the specified time span and time increment. At each point in time, a storage-indication value is calculated based on the equation:

$$SI = S1 - \frac{O1}{2}\,dt + \frac{I1 + I2}{2}\,dt$$

Where

S1 = Storage at start of time step

O1 = Outflow and start of time step

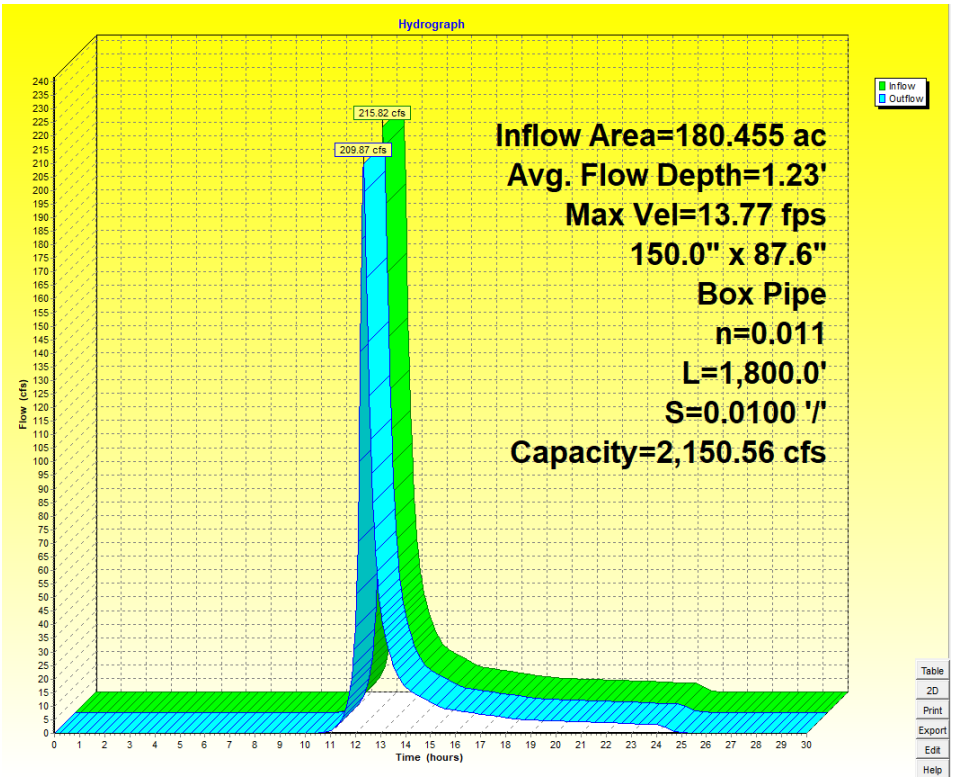
I1/I2 = Inflow and start of time step

5) The original storage-indication curve is consulted to determine the elevation that corresponds to the new storage-indication value.

6) Using the new elevation, the stage-storage and stage-discharge curves are consulted to determine the new storage and discharge.

7) This process is repeated for all points in the inflow hydrograph.

For improved accuracy with long reaches, the "Stor-Ind+Trans" was utilized. This adds a time lag or translation to the normal storage-indication routing. This routing method first performs a storage-indication routing, and then translates the resulting hydrograph by the travel time. A close examination of the resulting hydrograph will reveal that the peak discharge no longer corresponds to a point on the inflow curve, but is translated (delayed) by the prescribed amount. Below is an example of a generated hydrograph:



This hydrograph plot shows this nodes inflow and outflow with the interpolated peak flows shown above each curve.

The hydrologic model presented multiple culvert issues within the Town and specific watersheds. The following includes the error messages received from the model and the potential causes of such issues:

- Reach CA-1 submerged Pond CA-3 Primary Device #1 Outlet by 5.20': The message indicates that the nodes peak water surface elevation has submerged the specified pond outlet device.
- Reach CC-5 Exceeded Reach CC-5 Inlet depth by 0.05' @ 13.00 hrs: This message indicated that the nodes water surface elevation has exceeded the flow depth at the reach inlet and presents potential for a reverse flow.
- Reach BF-1 Exceeded Reach CC-7 Inlet depth by 0.17' @ 13.80 hrs: This message indicated that the nodes water surface elevation has exceeded the flow depth at the reach inlet and presents potential for a reverse flow.
- Reach CK-59 Detained 5.997 af (Pond w/culvert advised): This message indicates that the pipe has been filled with water and has caused the flow of water to be limited.
- Reach CK-59 Exceeded Reach BF-1 Inlet depth by 1.53' @ 22.85 hrs: This message indicated that the nodes water surface elevation has exceeded the flow depth at the reach inlet and presents potential for a reverse flow.
- Pond CK-33 Exceeded Pond CK-40 by 27.52' @ 12.45 hrs: This message indicated that the nodes water surface elevation has exceeded the flow depth at the reach inlet and presents potential for a reverse flow.
- Pond CI-4 Submerged Pond CJ-38 Primary device # 1 Outlet by 4.81': The message indicates that the nodes peak water surface elevation has submerged the specified pond outlet device.
- Reach CC-7 Detained 3.371 af (Pond w/culvert advised): This message indicates that the pipe has been filled with water and has caused the flow of water to be limited.
- Reach CG-5 Exceeded Pond CD-31 by 8.61' @ 29.95 hrs: This message indicated that the nodes water surface elevation has exceeded the flow depth at the reach inlet and presents potential for a reverse flow.

8 Conclusions and Recommendations

Throughout the course of this study, it has been verified that the town has a complete system of natural drainage courses. General flow trends East to West from the higher elevations of the inland farmlands through mostly residential areas and ending into Lake Erie. Due to the natural characteristics of the soil and land properties riddled with streams and creeks, wetland exist throughout. Existing drainage infrastructure does a moderate job at conveying flow through the town. Issues with flooding generally occur close to the coast of Lake Erie. Along with low lying areas occurring in the ravines and alongside the natural drainage courses. The general slope from East to West cause the majority of the low laying areas to occur along the coastline. Coastline areas of the Town of Hamburg receive the entirety of the drainage from the 120 square miles of the town and surrounding areas. In order to track drainage issues within the town, it is recommended to repeat similar drainage study practices every 15 years.

Another good practice to track and remediate on ongoing drainage issues is to introduce a drainage committee. Surrounding local communities have had success with creating this kind of committee to remediate problems. The highway super intendant is responsible for drainage concerns within the right of way, often drainage issues stem from privately owned property. The goal of this committee is to locate this drainage issues, procure the proper documentation, gain easement access, and complete the work needed to remediate the issues.

The underground storm water drainage system in multiple areas, including the Wanaka area, Lakeshore Rd. just north of Eighteen-mile creek and northeast in the Athol Springs area along the lake have deteriorated, limiting the flow of stormwater runoff. Although regular cleaning of the structures is already a procedure, they quickly return to a state of low flow and backup causing major flooding typically within two months of cleaning. It is suggested that a redesign of the underground storm water system is considered. Expanding the amount of storm water intake points of the system will allow for runoff to be alleviated from the ground level into the drainage system. Larger diameter pipes throughout the system will allow for more flow capacity of the system reducing the amount of blockage and backing up or flooding of the system.

Areas along the Buffalo Terminal Subdivision railroad running parallel to Route 5 have general flooding issues as well. This railway is owned by CSX Transportation. A majority of the culverts with paths underneath the railway are aging structures where poor conditions are evident. Crumbling concrete, exposed rebar, excessive settlement along foundations, scouring and erosion, heavy sediment buildup and rerouting of the drainage paths are all characteristics that can be seen along this railroad. Many of these concerns are related to the flooding that local residents have observed between the railway and Route 5. Reconstruction and resizing of these structures to accommodate the necessary runoff flow will eliminate the flooding in this area. Construction of clear drainage paths to and from the culverts will also create better flow through the system and restrict the back up of storm runoff.

Furthermore, scattered throughout the Town, there are several generic issues that cause flooding. These issues are generally undersized culverts, crushed culvert inlets and outlets, old and dilapidated culverts, a collection of debris and sediment, and vegetation growth along drainage paths that cause system failures during heavy storm water events.

While comparing the 1962 Town Wide Drainage study to the present study, it was found that many areas that had issues 60 years ago are still occurring today. This shows that proper techniques used to combat the flooding problems and previous recommendations were not utilized.

Recommendations to remediate these drainage issues are generalized as the issues causing the drainage problems are common across the board. Suggestions include, ditch cleanouts in the case of heavy sediment build up. Often times, deeper, wider ditches in areas that receive heavy flow would be beneficial. Heavy vegetation should be trimmed and removed, clearing natural drainage paths as they once were. As vegetation is removed, blockages of debris will decrease. Removing debris from the drainage paths will also allow for smoother flow.

Culverts that are submerged or collecting heavy amounts of runoff may be undersized. Localized studies of the flow in that feature can be utilized in the design of new appropriately sized feature to accommodate the flow demand of the area for the present and future.

Some areas in close proximity to farm fields gained recognition of having flooding problems. As the open land of a farm field does not always drain in the right direction, often during heavy run off events, excess runoff will flow towards neighboring properties which can cause pooling of water in residential yards. With consideration of the lakeview rd. area and the Lilydale rd. area and their close relation to neighboring farm fields, creating a series of drainage pathways to empty into a main drainage course nearby can help eliminate the flooding problems. These areas are consistent with low lying areas that naturally collect runoff.

Underground storm systems often become plugged and block flow. This prevents it from performing as designed. Regular cleanout of the system is necessary to contribute to a proper, well-maintained system in which conveys drainage successfully. Some places, especially the Anslee Lane area, regular maintenance is already in place. Although regular cleaning of the system in this area takes place, many flooding events still occur. Possible reconstruction of the drainage system may be necessary in order to gain the proper flow demand capacity and keep these flooding events from occurring. Installation of a larger diameter drainage system and more inlet points throughout the area can help eliminate the flooding issues. Beginning at the exit of the drainage to the lake and moving upstream can be useful in discovering the major issues of the system itself.

Many pipe culverts were found to have crushed inlets or outlet. Replacement of these culverts is necessary to allow for free-flowing movement through the feature. In a lot of cases, this will eliminate the buildup of debris at the intake or outtake points and allow for the proper design flow.

Concrete Culverts that are found to have poor, crumbling conditions should be considered in remediation or complete removal and replacement. These features show heavy signs of erosion and or sediment build up which can alter the path of flow.

Located in the Blasdell area, the drainage path just north of 1st street which runs west towards Lake Erie and draining into Rush Creek is seeing major issues. The culverts that are associated with this path are any culvert denoted with CA, CB and CC. There is evidence of major blockage near the outlet of the drainage path. Blockage is believed to be a large beaver dam restricting out flow, refer to Figure 414: CA9 Beaver Dam. It is recommended to remove the dam to allow for proper flow.

In the Pine Lakes Community, there are two retention lakes which drain at the southern end, through twin 30" RCP culverts to a highly vegetated ditch which crosses Lakeview Rd. and ultimately drains to 18 Mile Creek. The outlet culverts were observed to be more then 50% of their capacity at normal conditions. Also, the Ditch in which it drains was highly vegetated. Refer to Figure: 425. During higher rainfall events, the lake water levels raise. This system of lakes with a small outlet may have been designed in this fashion to let runoff into the larger drainage system in order to not overload the larger system, this is considered to be a retention pond system. Original engineering plans of the retention pond should be examined to understand the behavior that was designed for in the system. There was no overflow observed on site. Choosing an elevation for the max lake level height and routing an overflow at that elevation to the drainage ditch could relieve the problem for increasing lake levels. Also, the vegetated ditch should be cleaned and cleared of all vegetation and blockages. After consideration of the original engineering plans of the retention pond system, increasing the culvert size of the outlet point of the lake could also relieve increasing lake levels.

There are issues of standing water along Maelou Dr. which boarders South Park Ave. This area is a state DEC regulated freshwater wetland ID number HB-1. Refer to Figure 18: Maelou Dr. Wetland Map. The flat topography of the area allows for water to collect. The concern of standing water in the parking lots just north of the Town of Hamburg Town Hall is also a resultant from this natural wetland. The issues of standing water along Grafton Ave. is also contributed by wetlands resulting from the close proximity to Rush Creek and the lands natural low lying characteristics. Refer to Figure 19: Grafton Dr. Wetlands Map.

Eighteen Mile Creek Golf Course has had ongoing flooding issues for years. The main issue in this area is the location of the course falling into the fork of Eighteen Mile Creek and Neuman Creek. The golf course is within the flood plain zones of the creeks. See Figure 20 – Eighteen Mile Creek Wetlands Map. A previous drainage study was completed in 2010 by Wendel Duchscherer Architects & Engineers specifically for the drainage issues within the Eighteen Mile Creek Golf Course. Refer to Appendix G – Town of Hamburg Golf Course Flood Mitigation and Preliminary Designs of Drainage Improvements. A field visit was completed to verify conditions that the report had set forth and if the recommendation within the report were completed. Flooding of the area was noted on February 9th, 2023 and was contained within the flood plains of Eighteen Mile Creek and Neuman Creek.

The recommendations that were completed are as follows:

- The construction of the Eastern bypass channel which spans across hole 8 and hole 3's fairways.
- The placement of a berm along Eighteen Mile creek on the Southern portion of hole 15.
- Pump station improvements which include elevating the pump station house by atleast 1.5'.

The recommendations that were not completed are as follows:

- The construction of the Western bypass channel which spans across hole 12, hole 13, hole 14 and hole 16's fairways.
- The elevation of the 12th, 14th, and 15th greens by up to 2 ft in some locations.
- Erosion control measures along Eighteen Mile Creek near hole 3 and hole 8.

It is recommended to complete the recommendations outlined in the Wendel Duchscherer report that were not constructed. These recommendations are sufficient in protecting against a 25-year storm. Along with these recommendations ongoing cleaning and clearing of the creeks and the bridges/culverts within the golf course should take place to allow proper flow and eliminate blockage within the creeks.

Supporting Documents

1962 Town of Hamburg, New York Report on Drainage Study Housing & Home Finance Agency Project P-NY-3095

www.OSHA.gov

www.erie.gov

Bnwaterkeeper.org

Wesoilsurvey.com

FEMA.gov

NYSDEC.gov

Weather.com

Census.gov

gishydro.eng.umd.edu

CUGIR - Cornell University Geospatial Information Repository

TIGER/Line – Census.gov

USGS – U.S. Geological Survey

NYS GIS Clearinghouse – gis.ny.gov

ArcGIS – ArcGIS Online

Town of Hamburg – Data directly from town

ArcGIS Field Collector – Field Data form Project Team in Buffalo

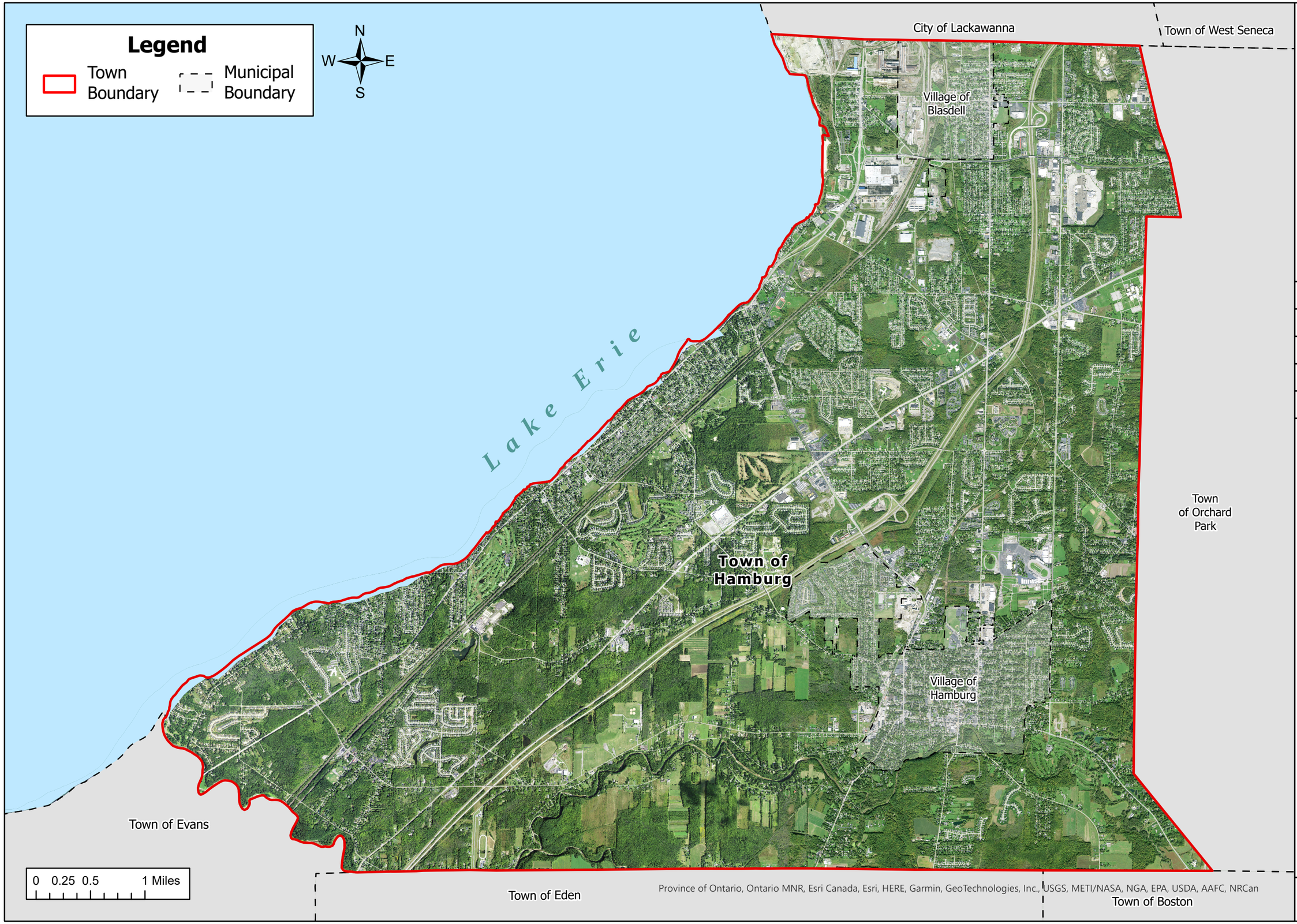
directives.sc.egov.usda.gov

Smokes Creek Conundrum Remains Unaddressed Along Smokes Creek – Artvoice

Resilient NY Flood Mitigation Initiative: Eighteen Mile Creek

Figure 1

TOWN OF HAMBURG PROJECT LOCATION AERIAL MAP



ARCHITECTURE
ENGINEERING
PLANNING
CPLteam.com

DATE:	March 2023
DRAWN:	KNL
CHECKED:	KNL
SCALE:	AS NOTED
PROJ. #:	16254.00

PROJECT LOCATION MAP

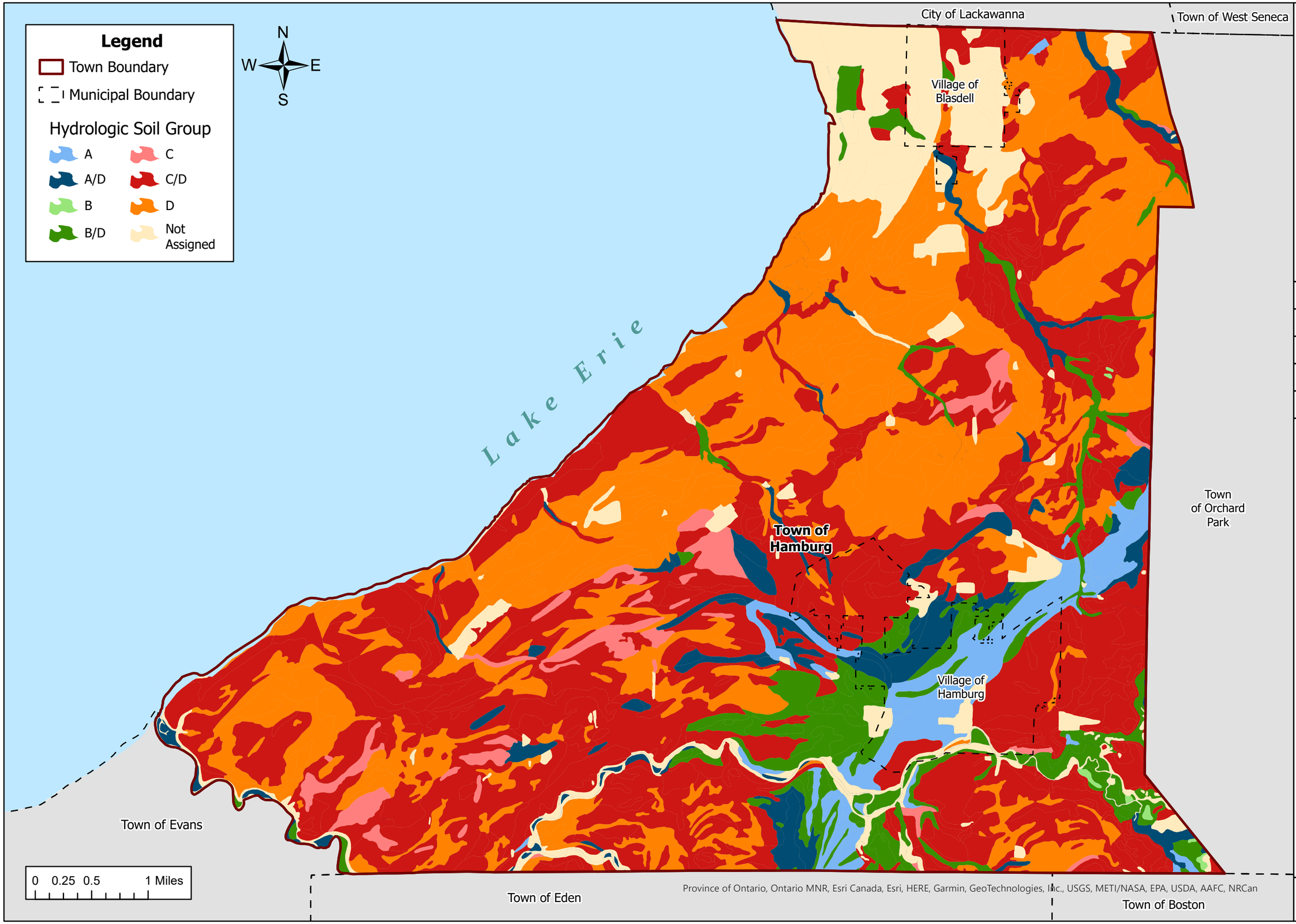
TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE #1

Figure 2

TOWN OF HAMBURG SOILS MAP



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PLANNING
CPLteam.com

DATE:	March 2023
DRAWN:	KNL
CHECKED:	KNL
SCALE:	AS NOTED
PROJ. #:	16254.00

SOILS MAP

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE # 2

Figure 3

TOWN OF HAMBURG BEDROCK GEOLOGY MAP

Legend

Town Boundary

Municipal Boundary

Geology

Sedimentary, clastic

Sedimentary, undifferentiated

N

W E

S

City of Lackawanna

Town of West Seneca

Village of Blasdell

Lake Erie

Town of Hamburg

Village of Hamburg

Town of Orchard Park

Town of Evans

Town of Eden

Town of Boston

0 0.25 0.5 1 Miles

Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, METI/NASA, NGA, EPA, USDA, AAFC, NRCan

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BEDROCK GEOLOGY MAP

TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE # 3

Figure 4

TOWN OF HAMBURG CENSUS TRACT MAP

Legend

Town Boundary

Municipal Boundary

U.S. Census

Census Tract 2010

Census Tract 2020

Census Block 2010

Census Block 2020

N

W E

S

City of Lackawanna

Town of West Seneca

Village of Blasdell

Lake Erie

Town of Hamburg

Village of Hamburg

Town of Orchard Park

Town of Evans

Town of Eden

Town of Boston

0 0.25 0.5 1 Miles

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CENSUS TRACT MAP

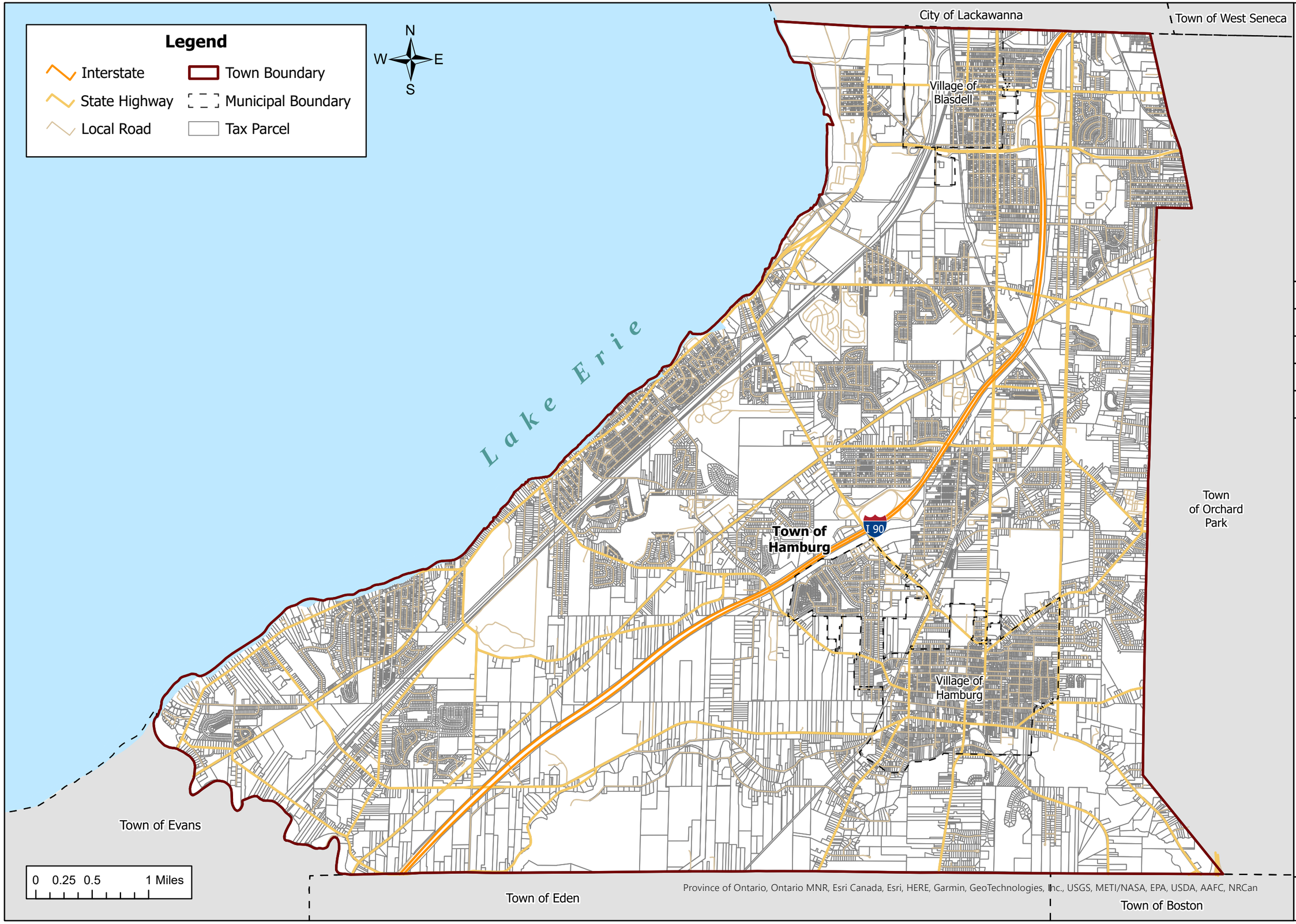
TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE # 4

Figure 5

TOWN OF HAMBURG TAX MAP



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TAX MAP

TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE # 5

Figure 6

TOWN OF HAMBURG WATERSHED MAP

Legend

- 10 Ft Contour
- Watercourse
- Waterbody
- Town Boundary
- Municipal Boundary

Tributary	Area (sq mi)
Beachwood Creek	2.504408
Berricks Creek	3.894085
Blasdell Creek	2.214097
Eighteenmile Creek	10.30887
Foster Brook	3.557204
Lake Erie	2.123037
Rush Creek	6.725799
Smoke Creek	1.686457
Wanakah Creek	1.14197
Wanakah Heights Creek	1.027405
Waterfalls Village Creek	1.31538

Watershed Key

- Beachwood Creek Watershed
- Berricks Creek Watershed
- Blasdell Creek Watershed
- Eighteenmile Creek Watershed
- Foster Brook Watershed
- Lake Erie Watershed
- Rush Creek Watershed
- Smoke Creek Watershed
- Wanakah Creek Watershed
- Wanakah Heights Creek Watershed
- Waterfalls Village Creek Watershed

N W E S

Lake Erie

City of Lackawanna

Town of West Seneca

Village of Blasdell

Town of Hamburg

Town of Orchard Park

Village of Hamburg

Town of Evans

Town of Eden

Town of Boston

0 0.25 0.5 1 Miles

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WATERSHED MAP

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #10

Figure 7

TOWN OF HAMBURG SUB-WATERSHED MAP

Legend

- 10 Ft Contour
- Watercourse
- Waterbody
- Town Boundary
- Municipal Boundary

Subwatershed Key

1	10	19	28
2	11	20	29
3	12	21	30
4	13	22	31
5	14	23	32
6	15	24	33
7	16	25	34
8	17	26	35
9	18	27	36
37			
38			

N W E S

Lake Erie

City of Lackawanna

Town of West Seneca

Village of Blasdell

Town of Hamburg

Village of Hamburg

Town of Orchard Park

Town of Evans

Town of Eden

Town of Boston

0 0.25 0.5 1 Miles

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SUBWATERSHED MAP

TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE # 7

Figure 8

TOWN OF HAMBURG WATERCOURSES MAP

Legend

- 10 Ft Contour
- Watercourse
- Waterbody
- Town Boundary
- Municipal Boundary

N
W E
S

City of Lackawanna

Town of West Seneca

Village of Blasdell

SMOKE CREEK

SA-1

RUSH CREEK

SD-1

SE-1

BERRICK CREEK

Lake Erie

SH-1

Town of Hamburg

Town of Orchard Park

SI-1

SJ-1

Village of Hamburg

EIGHTEENMILE CREEK

HAMPTON BROOK

NEUMAN CREEK

SOUTH BRANCH OF EIGHTEENMILE CREEK

Town of Evans

Town of Eden

Town of Boston

0 0.25 0.5 1 Miles

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WATERCOURSES MAP

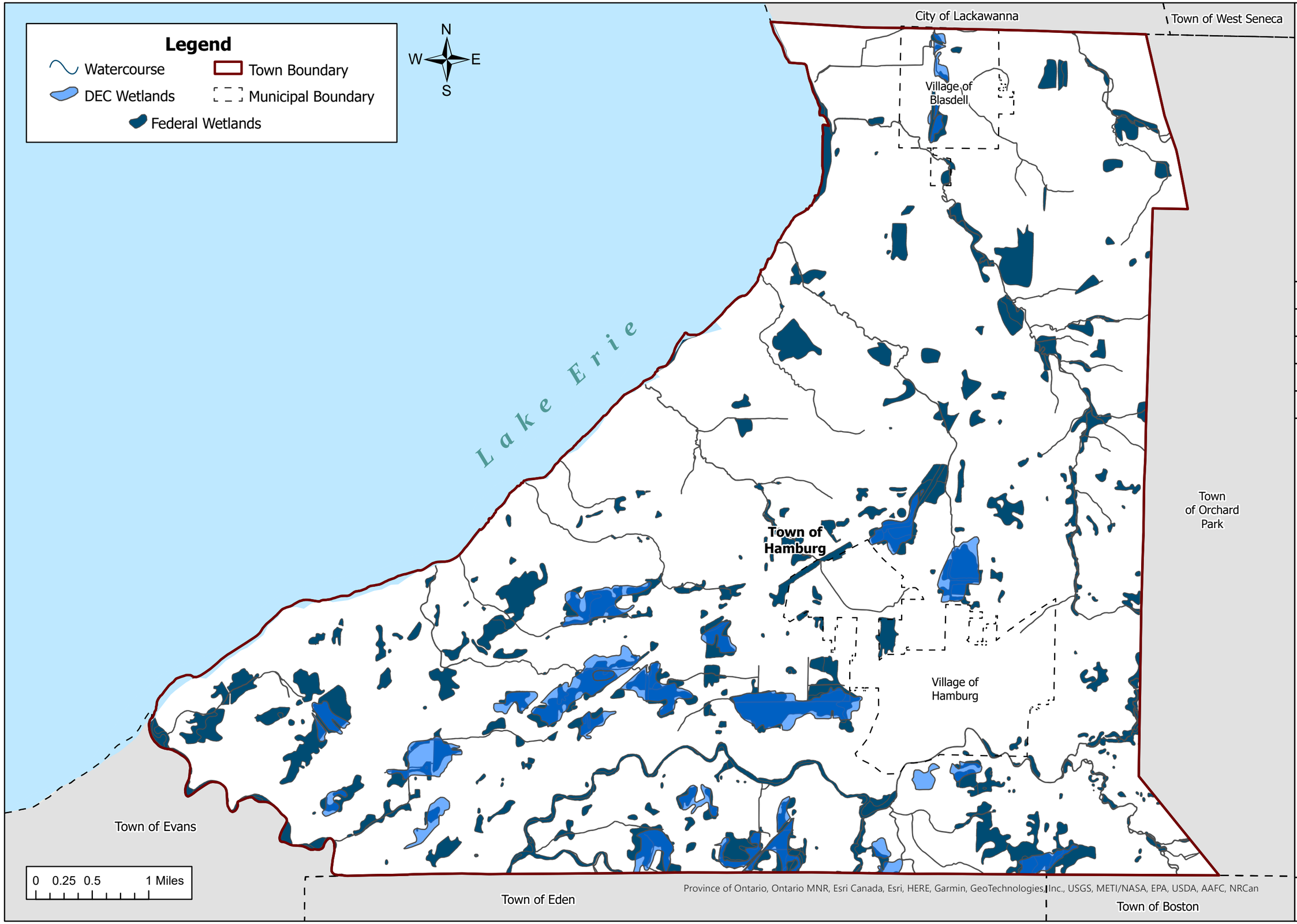
TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE # 8

Figure 9

TOWN OF HAMBURG WETLANDS MAP



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WETLANDS MAP

TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE # 9

Figure 10

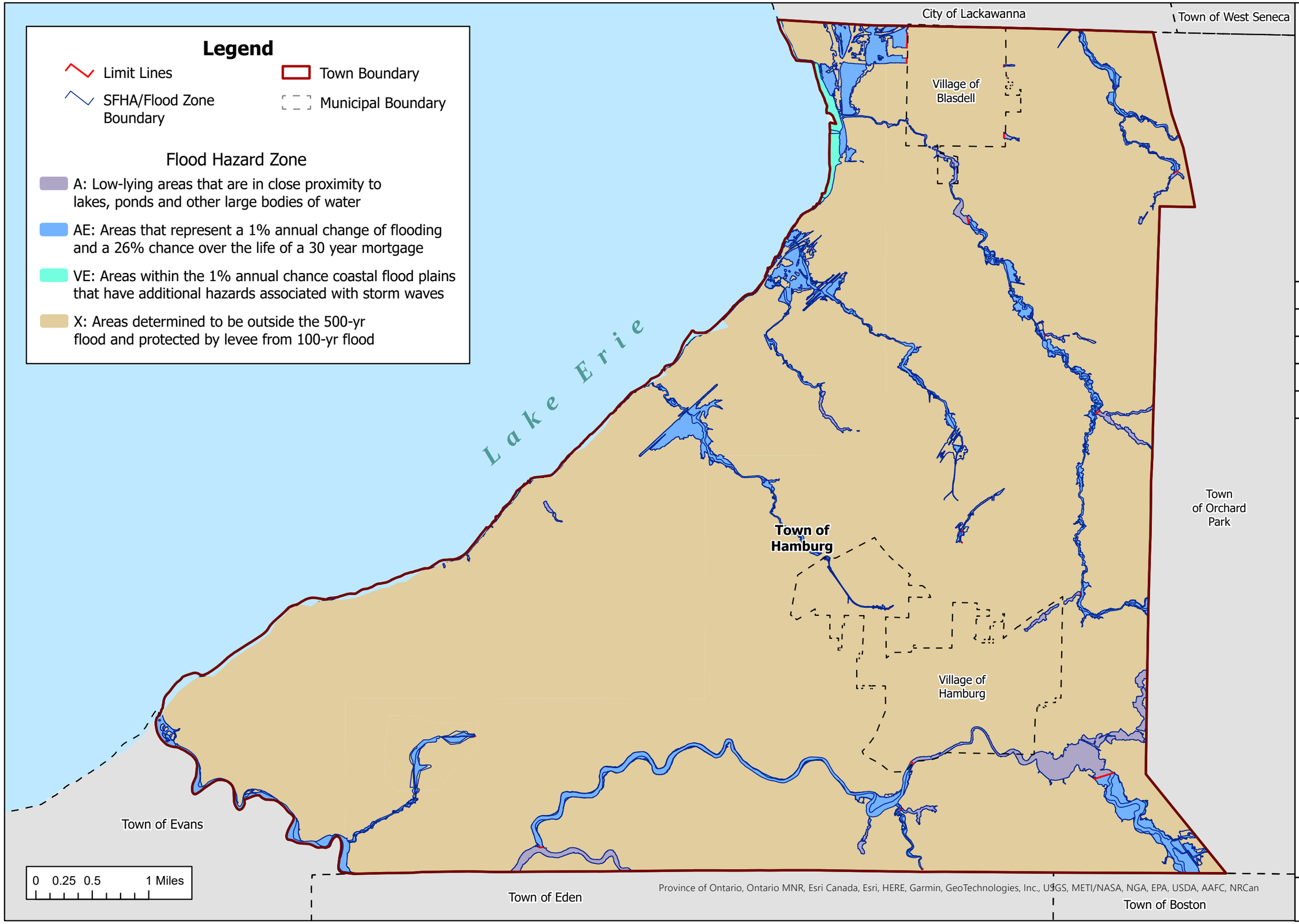
TOWN OF HAMBURG FEMA MAP

Legend

- Limit Lines
- SFHA/Flood Zone Boundary
- Town Boundary
- Municipal Boundary

Flood Hazard Zone

- A: Low-lying areas that are in close proximity to lakes, ponds and other large bodies of water
- AE: Areas that represent a 1% annual change of flooding and a 26% chance over the life of a 30 year mortgage
- VE: Areas within the 1% annual chance coastal flood plains that have additional hazards associated with storm waves
- X: Areas determined to be outside the 500-yr flood and protected by levee from 100-yr flood



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FEMA MAP

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE # 10

Figure 11

TOWN OF HAMBURG LAND USE MAP

Legend

Town Boundary

Municipal Boundary

Town Zoning

C1	M1	PR	R3
C2	M2	PRD	R4
C3	M3	PUD	RA
FG	M3P	R1	RE
HC	NC	R2	WC

No Zone

N

W E

S

City of Lackawanna

Town of West Seneca

Village of Blasdell

Lake Erie

Town of Hamburg

Town of Orchard Park

Village of Hamburg

Town of Evans

Town of Eden

Town of Boston

0 0.25 0.5 1 Miles

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ZONING MAP

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE # 11

Figure 12

TOWN OF HAMBURG DRAINAGE AND FLOOD AREAS MAP

Legend

Town Boundary

Municipal Boundary

Flooding Area

- Overlook Point off Cloverbank
- McKinley & Sowles Boy Scout Pond
- Chapman Pkwy parallel to R/R & Morgan at Shenandoah
- Lilydale Dr
- Eckhardt Rd at Schoellkopf Rd
- Anslee Ln
- Fairway Ct at bottom off hill past Pinehurst
- Briercliff into Glendale
- South Bend Ln
- Windom - Smokes Creek
- Electric Ave
- Engel Dr near intersection of Old Lakeview Rd
- Wooded Area South of Woodland Dr
- Columbia Ave
- Smith Rd near the Nike Base

N W E S

0 0.25 0.5 1 Miles

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CURRENT DRAINAGE AND FLOOD AREAS

TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE # 12

Figure 13

TOWN OF HAMBURG CONDITION ASSESSMENT OF FIELD DATA MAP

Legend

- Town Boundary
- Municipal Boundary

Feature Condition

- Excellent
- Good
- Fair
- Poor
- No Data

Watershed Key

- Beachwood Creek
- Berricks Creek
- Blasdell Creek
- Eighteenmile Creek
- Foster Brook
- Lake Erie
- Rush Creek
- Smoke Creek
- Wanakah Creek
- Wanakah Heights Creek
- Waterfalls Village Creek

N
W E
S

City of Lackawanna
Town of West Seneca
Village of Blasdell
Lake Erie
Town of Hamburg
Village of Hamburg
Town of Orchard Park
Town of Evans
Town of Eden

0 0.25 0.5 1 Miles

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CONDITION ASSESSMENT OF FIELD DATA

TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE #13

Figure 14

TOWN OF HAMBURG CONDITION ASSESSMENT OF FIELD DATA INCLUDING CURRENT FLOOD AREAS AND CULVERTS LABELS MAP

Legend

Town Boundary

Municipal Boundary

Flooding Area

- Overlook Point off Cloverbank
- McKinley & Sowles Boy Scout Pond
- Chapman Pkwy parallel to R/R & Morgan at Shenandoah
- Lilydale Dr
- Eckhardt Rd at Schoellkopf Rd
- Anslee Ln
- Fairway Ct at bottom off hill past Pinehurst
- Briercliff into Glendale
- South Bend Ln
- Windom - Smokes Creek
- Electric Ave
- Engel Dr near intersection of Old Lakeview Rd
- Wooded Area South of Woodland Dr
- Columbia Ave
- Smith Rd near the Nike Base

Watershed Key

- Beachwood Creek
- Berricks Creek
- Blasdell Creek
- Eighteenmile Creek
- Foster Brook
- Lake Erie
- Rush Creek
- Smoke Creek
- Wanakah Creek
- Wanakah Heights Creek
- Waterfalls Village Creek

Field Data Key

Feature Condition

- Excellent
- Good
- Fair
- Poor
- No Data

N W E S

City of Lackawanna

Town of West Seneca

Village of Blasdell

CB9
CB10
CB11
DITCH

CC17
CC41
CC42
CC43
CC44
CC45
CC46
CD28

CG10
CG9
CE9
CG30
POOR

Lake Erie

CH13
CH18
CH16
CH5
CH6
CH4
CH3
CH2

Town of Hamburg

Town of Orchard Park

CJ14
CJ13
CK1
CK4
CK5
CK6
CK7
CJ24
CJ27
CJ28
CK10
CK36
CK55

CK43
CK48
CK41
CK40

Village of Hamburg

Town of Evans

Town of Eden

Town of Boston

0 0.25 0.5 1 Miles

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CONDITION ASSESSMENT OF FIELD DATA INCLUDING CURRENT FLOOD AREAS

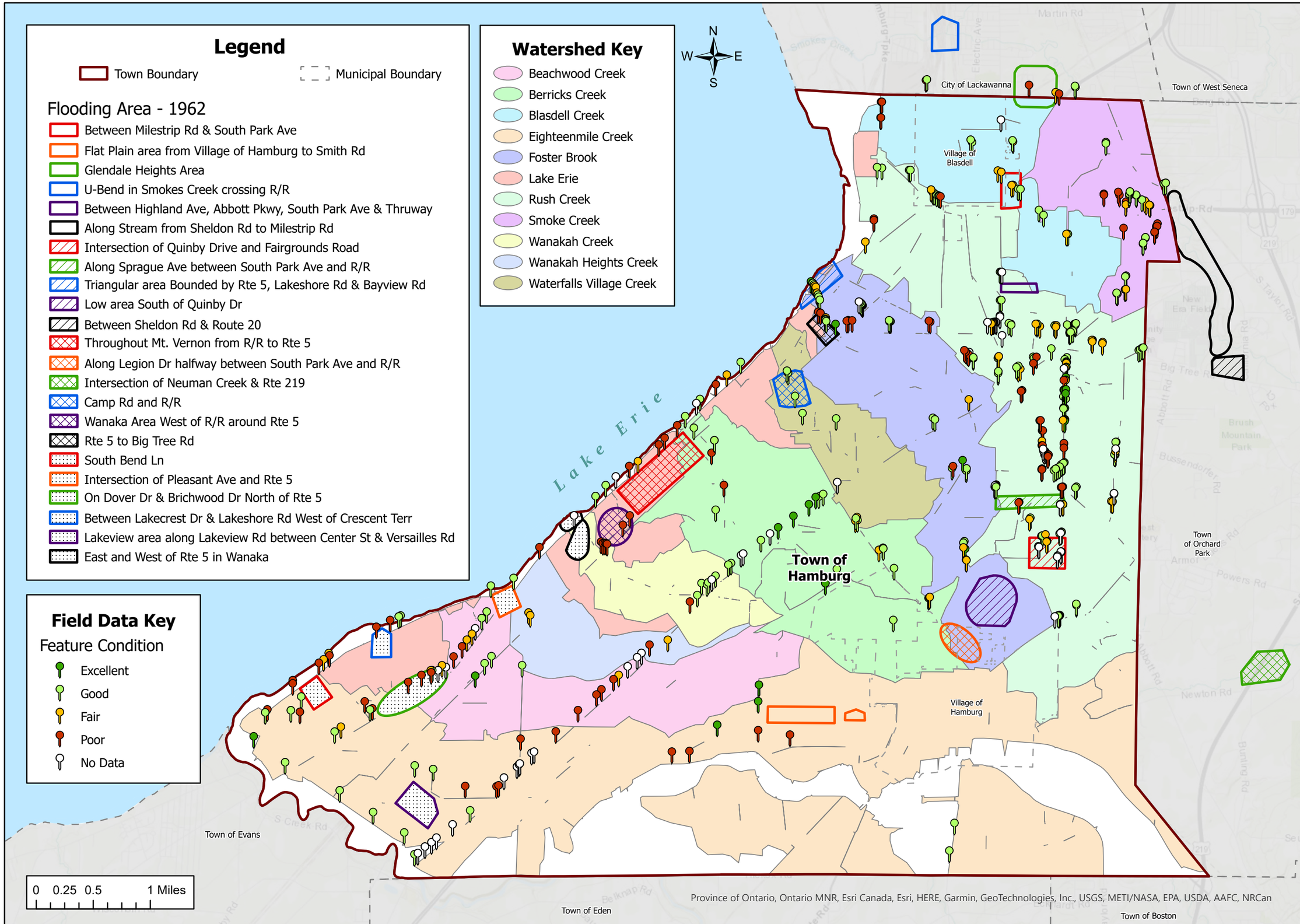
TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE # 14

Figure 15

TOWN OF HAMBURG DRAINAGE AND FLOOD AREAS AS OF THE 1962 DRAINAGE STUDY MAP



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CONDITION ASSESSMENT OF FIELD DATA INCLUDING 1962 FLOOD AREAS

TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE # 15

Figure 16

TOWN OF HAMBURG CURRENT DRAINAGE AND FLOOD AREAS OVERLAYING WET-LANDS MAP

Legend

- Watercourse
- DEC Wetlands
- Federal Wetlands
- Town Boundary
- Municipal Boundary

Flooding Area

- Overlook Point off Cloverbank
- McKinley & Sowles Boy Scout Pond
- Chapman Pkwy parallel to R/R & Morgan at Shenandoah
- Lilydale Dr
- Eckhardt Rd at Schoellkopf Rd
- Anslee Ln
- Fairway Ct at bottom off hill past Pinehurst
- Briercliff into Glendale
- South Bend Ln
- Windom - Smokes Creek
- Electric Ave
- Engel Dr near intersection of Old Lakeview Rd
- Wooded Area South of Woodland Dr
- Columbia Ave
- Smith Rd near the Nike Base

N
W E
S

0 0.25 0.5 1 Miles

City of Lackawanna
Town of West Seneca
Village of Blasdell
Lake Erie
Town of Hamburg
Village of Hamburg
Town of Orchard Park
Town of Evans
Town of Eden
Town of Boston

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CURRENT DRIANAGE AND FLOOD AREAS OVERLAYING WETLANDS MAP

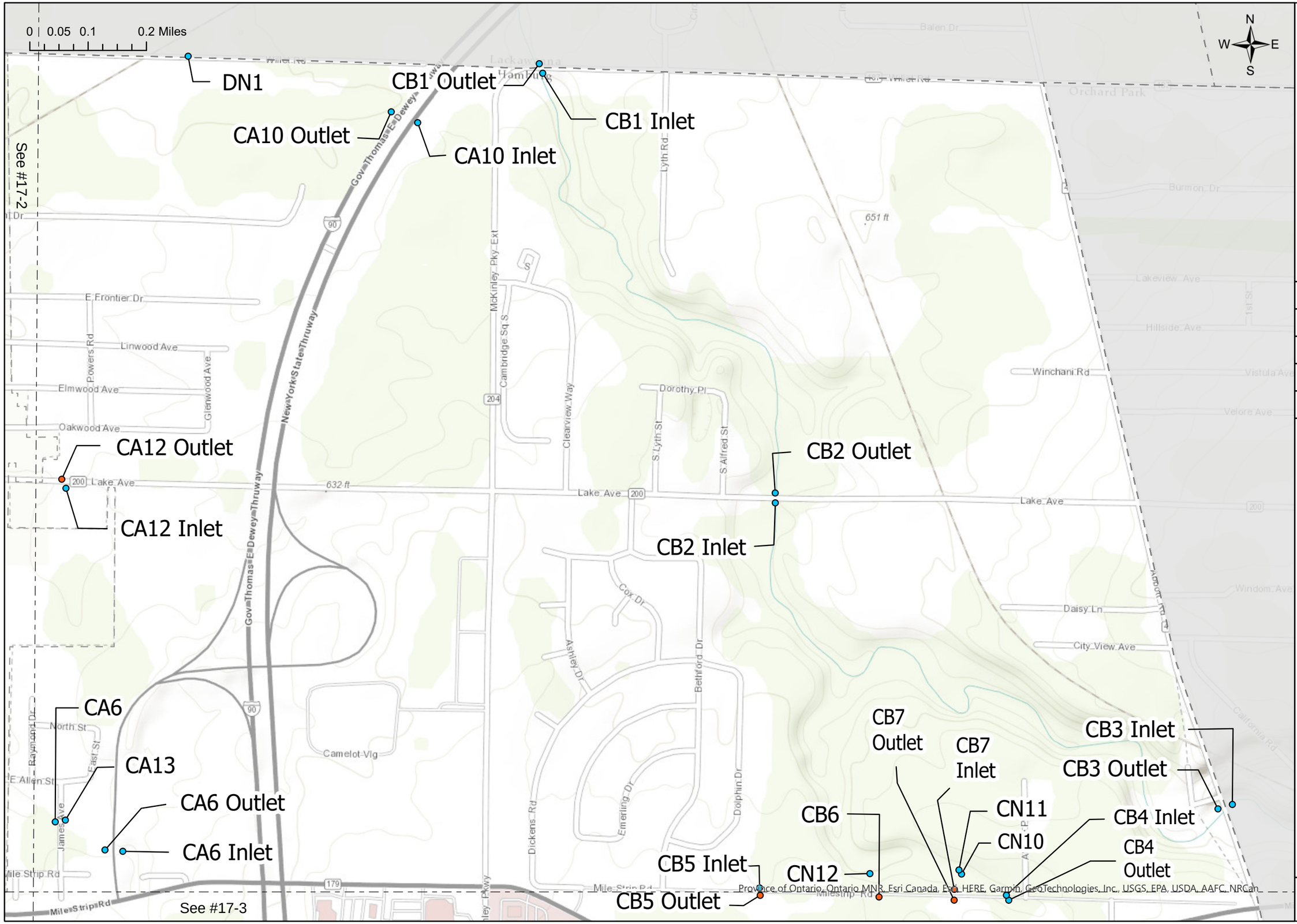
TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE # 16

Figure 17

TOWN OF HAMBURG FIELD DATA LOCATION MAPS



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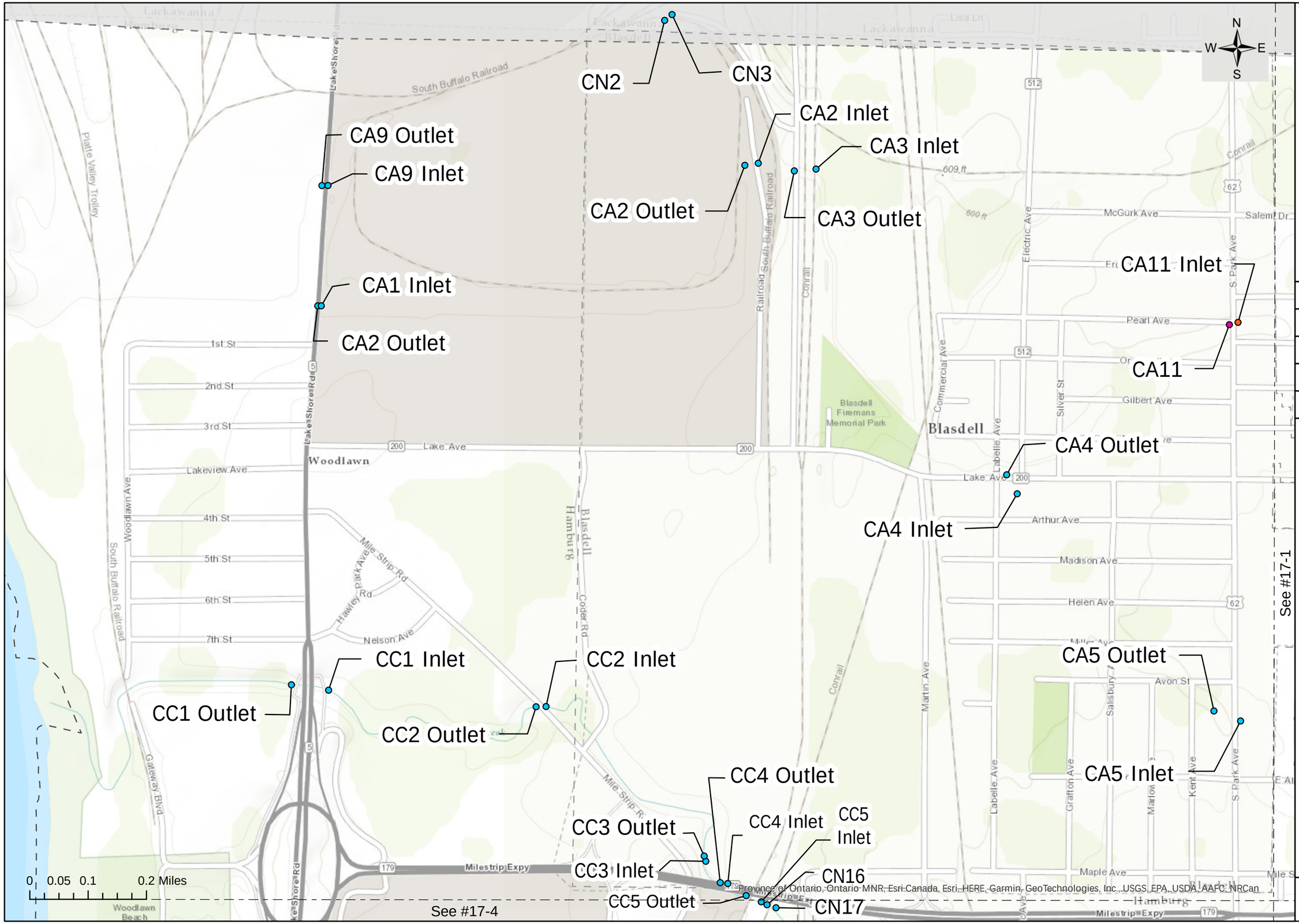
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-1



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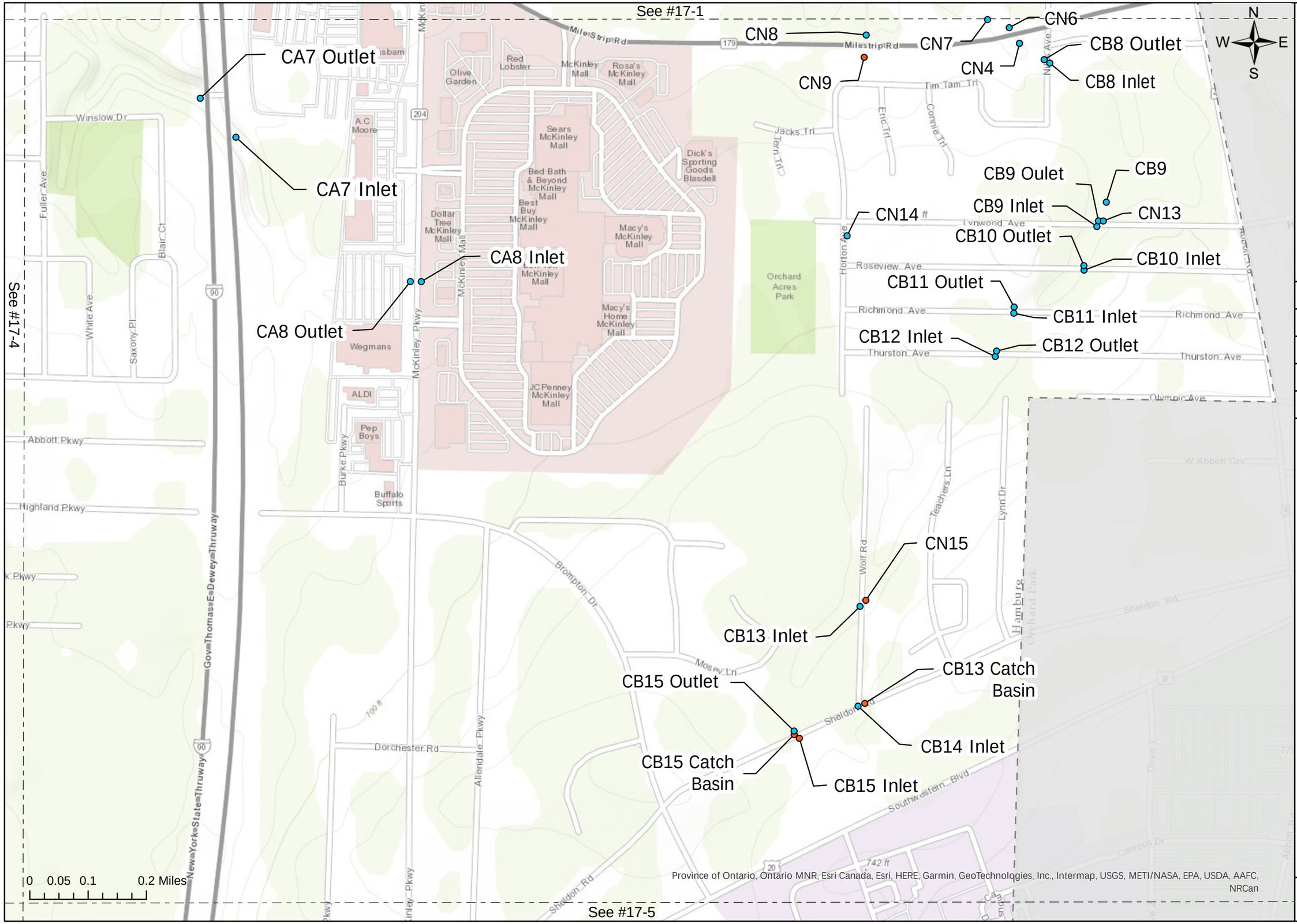
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-2



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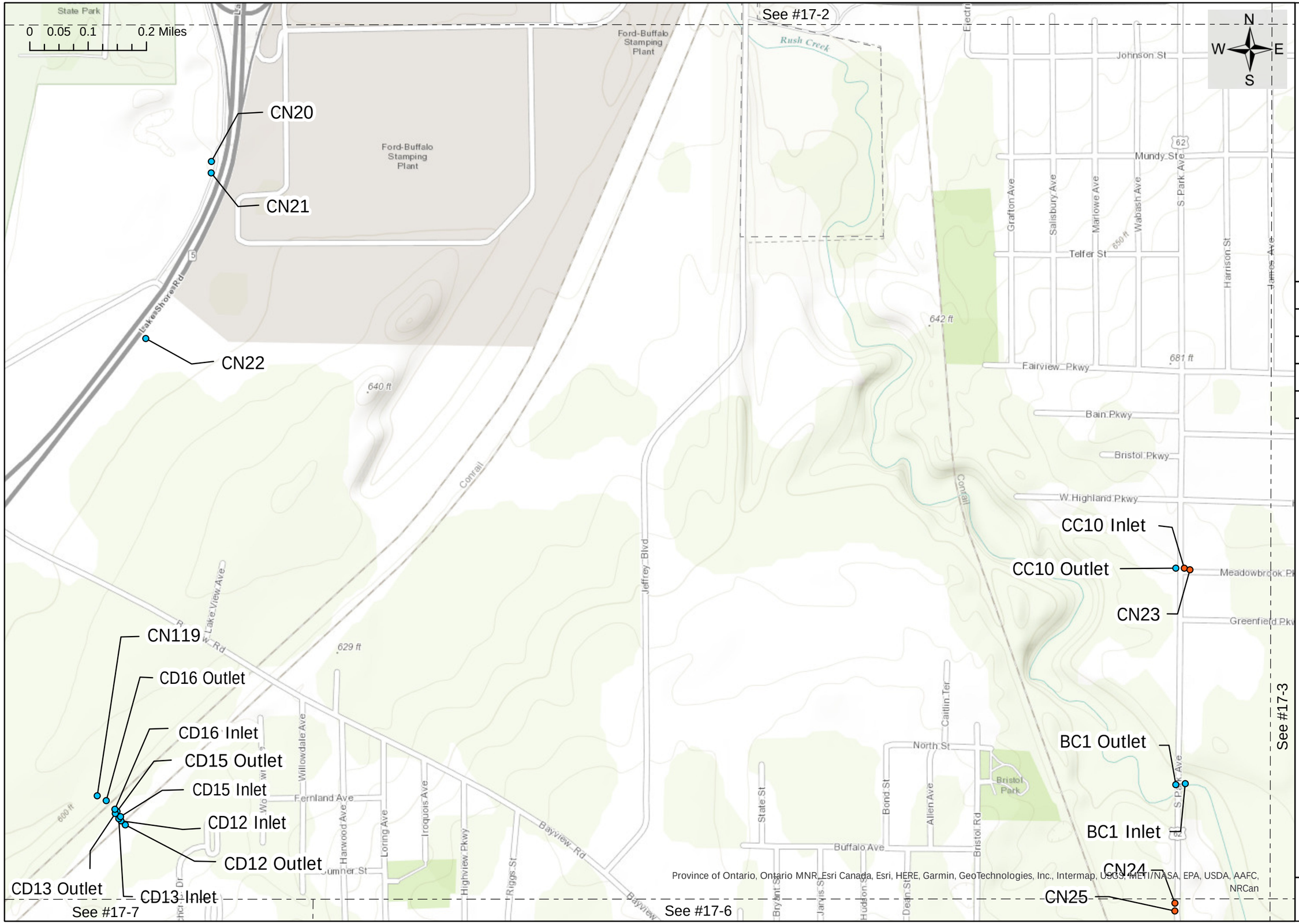
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-3



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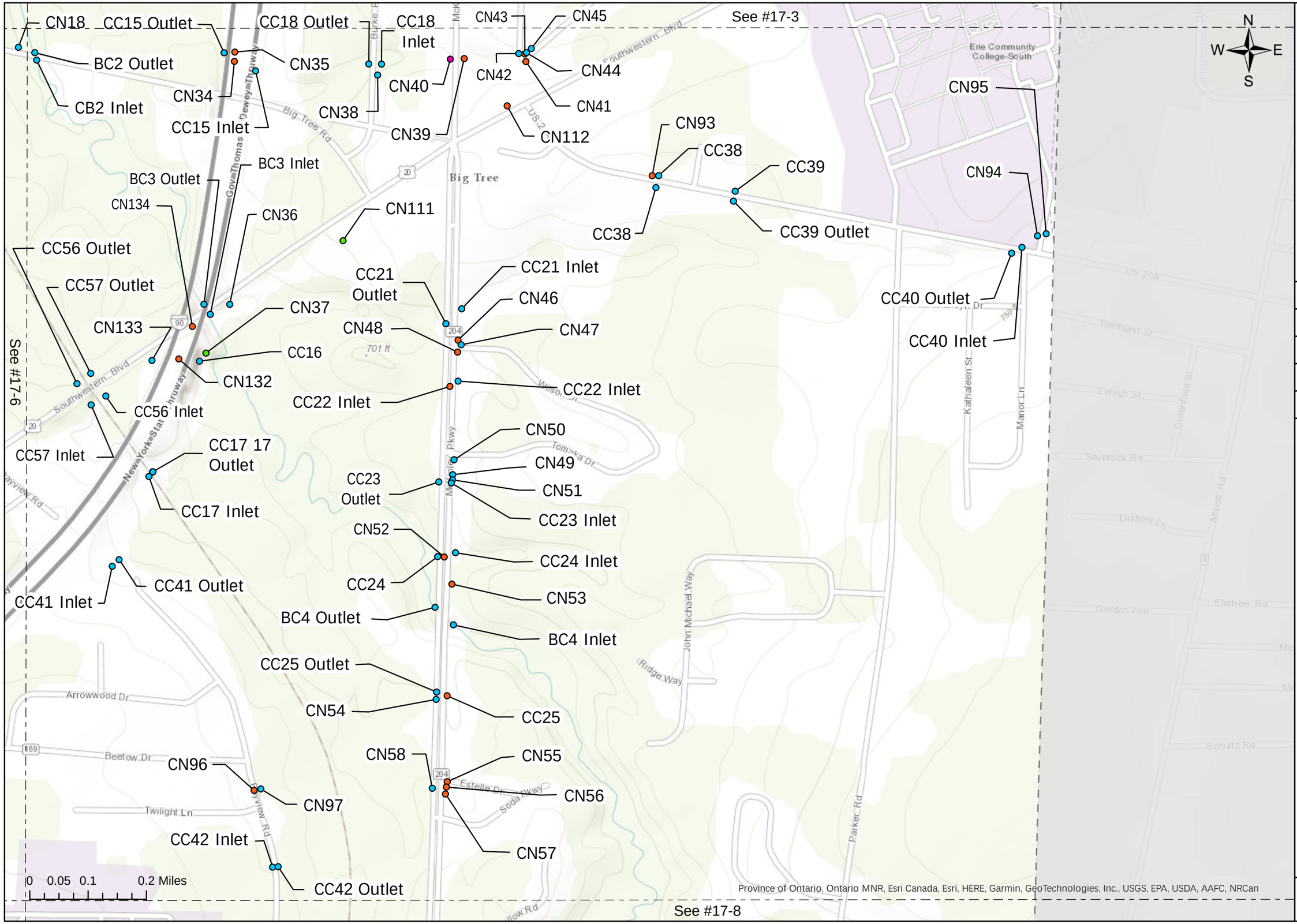
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-4



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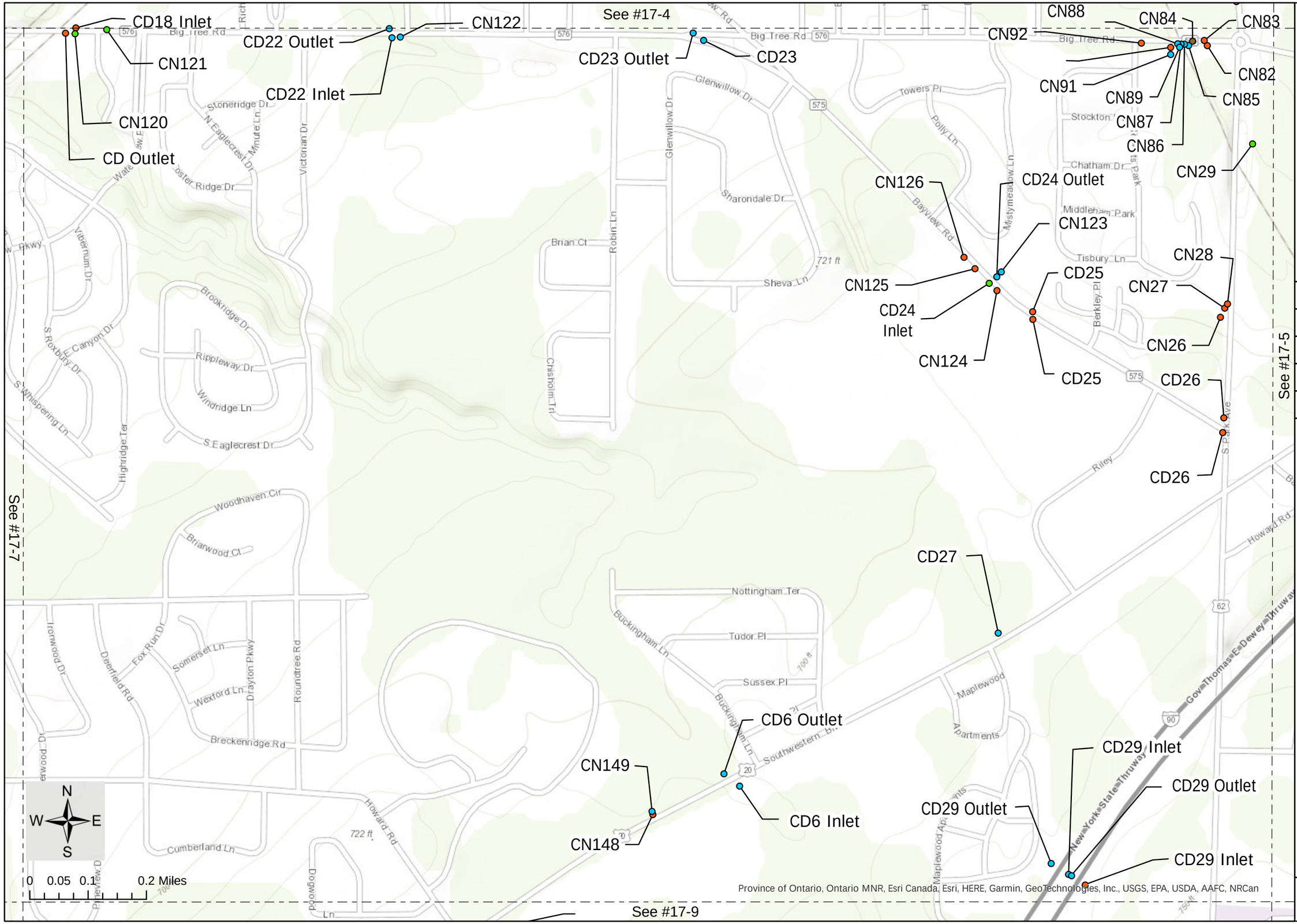
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-5



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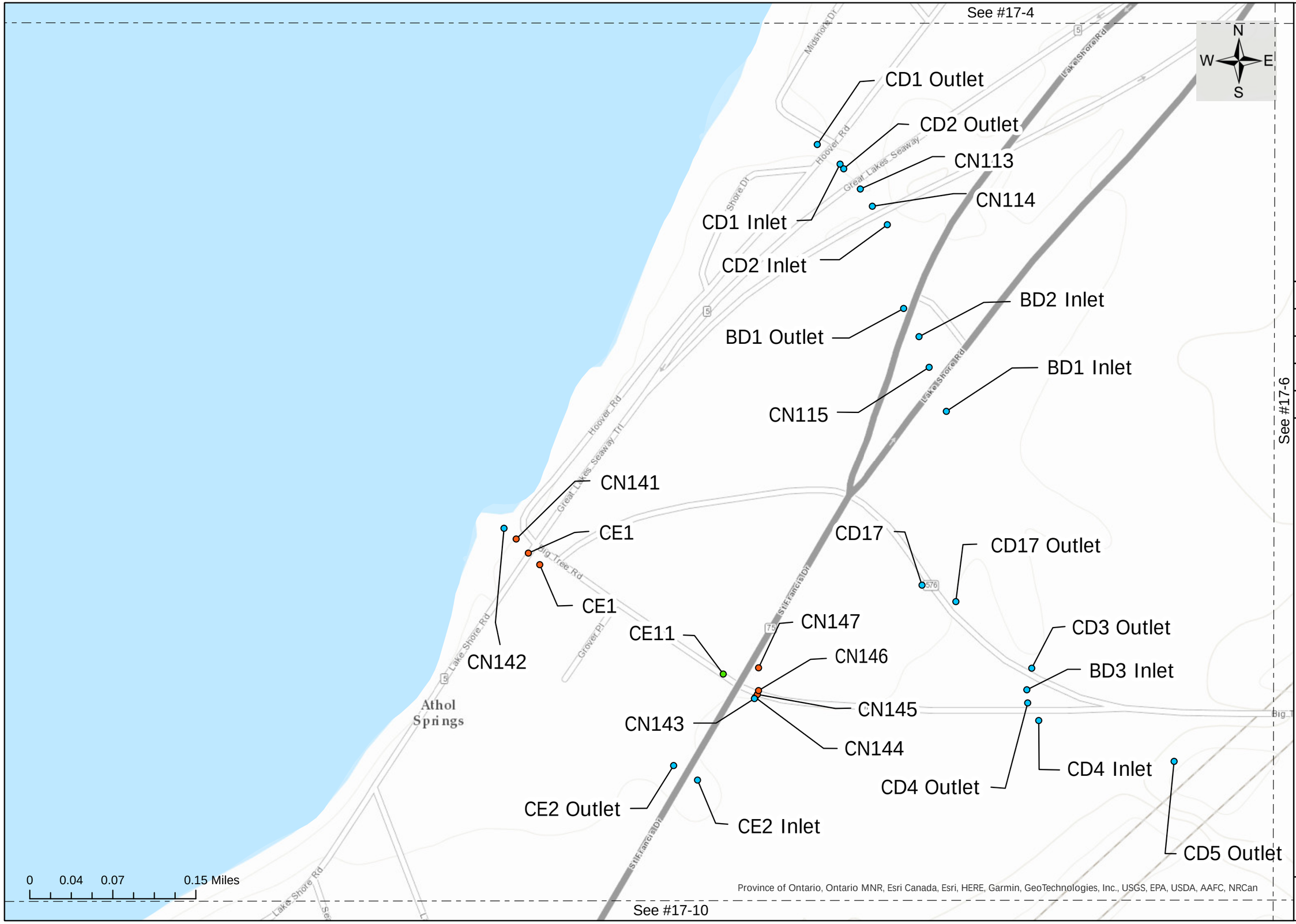
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE #17-6

See #17-4



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See #17-6

See #17-10

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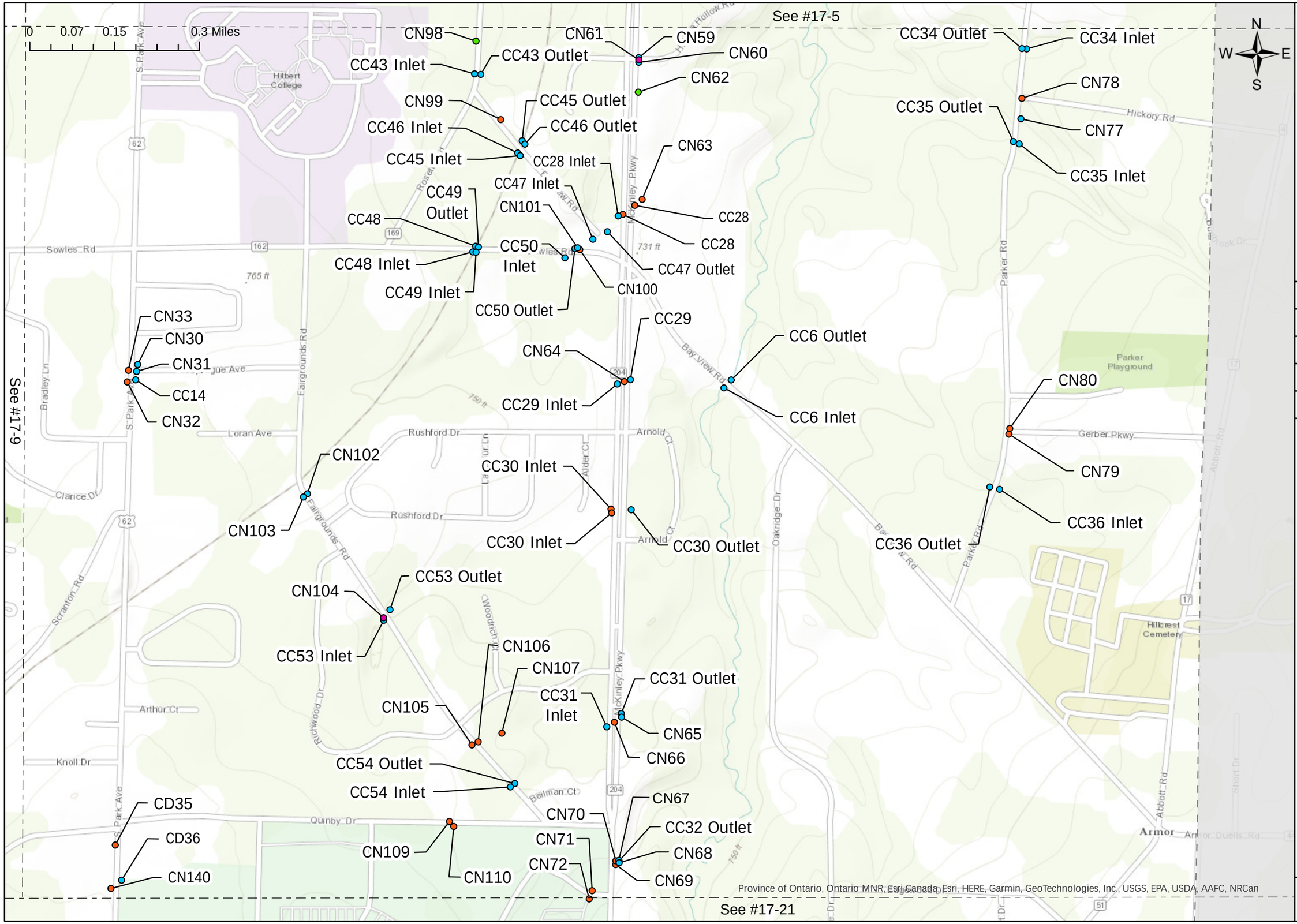
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-7



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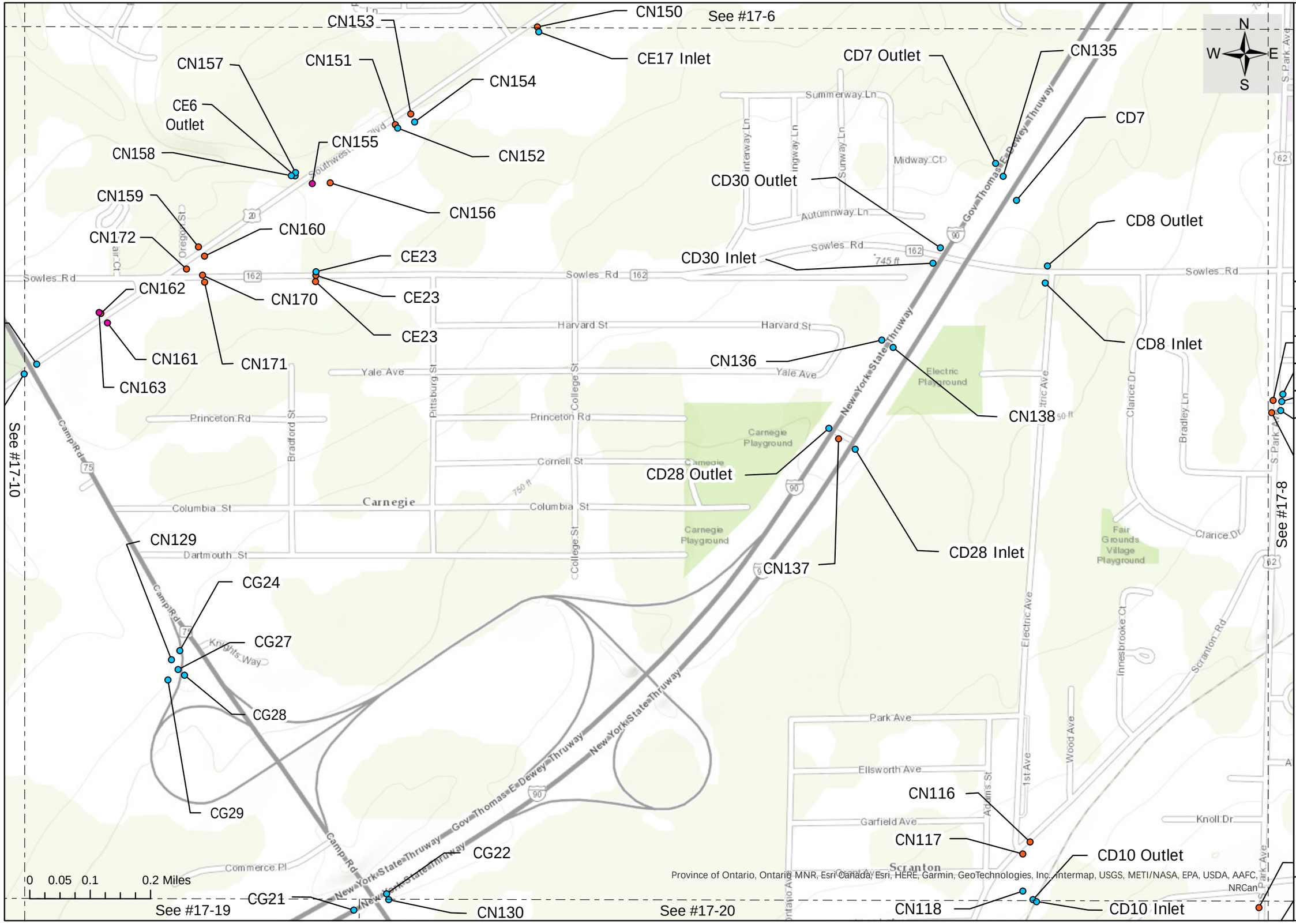
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-8



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FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-9



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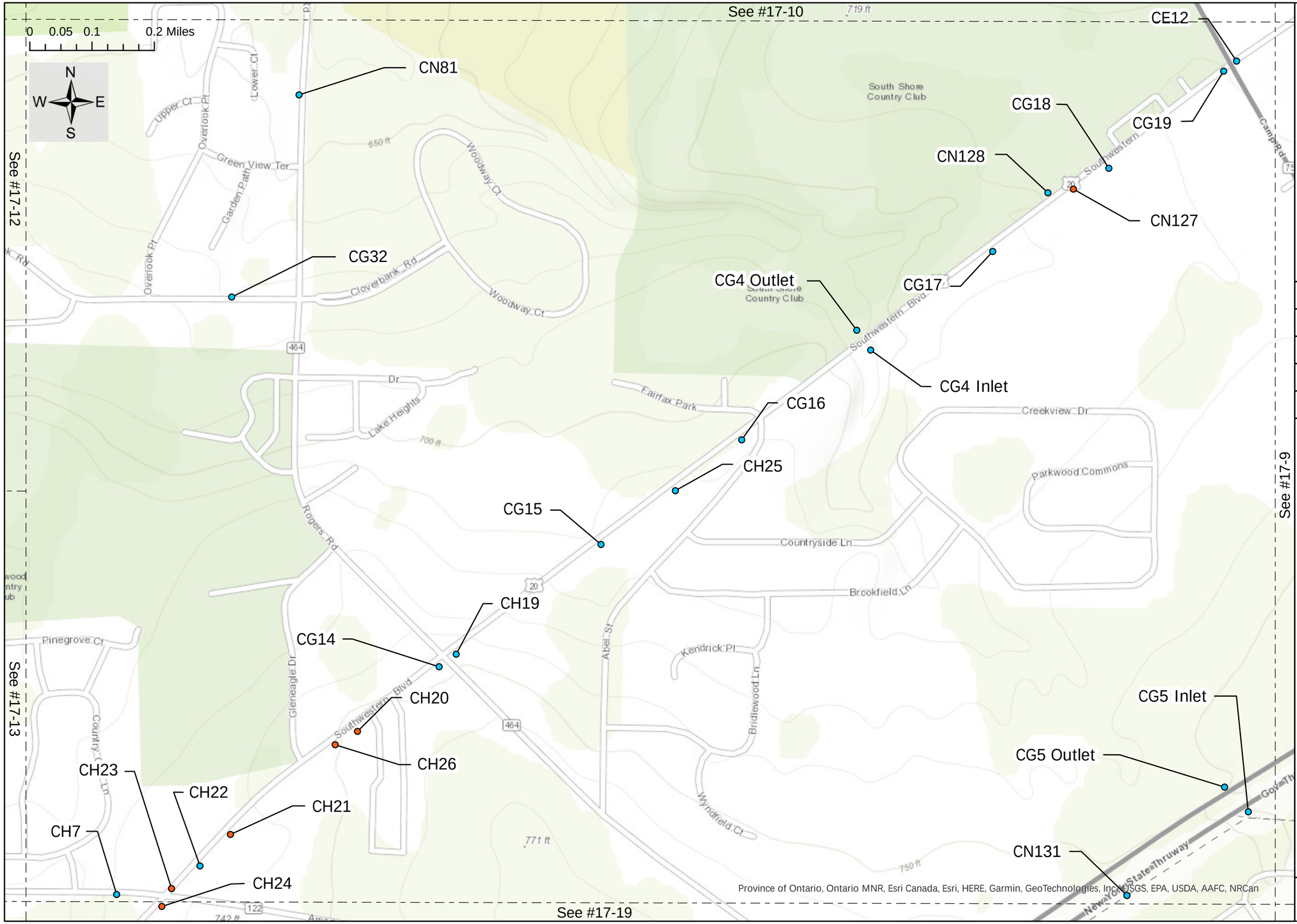
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-10



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CHECKED:	LS
SCALE:	1:8,900
PROJ. #:	16254.00

FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-11



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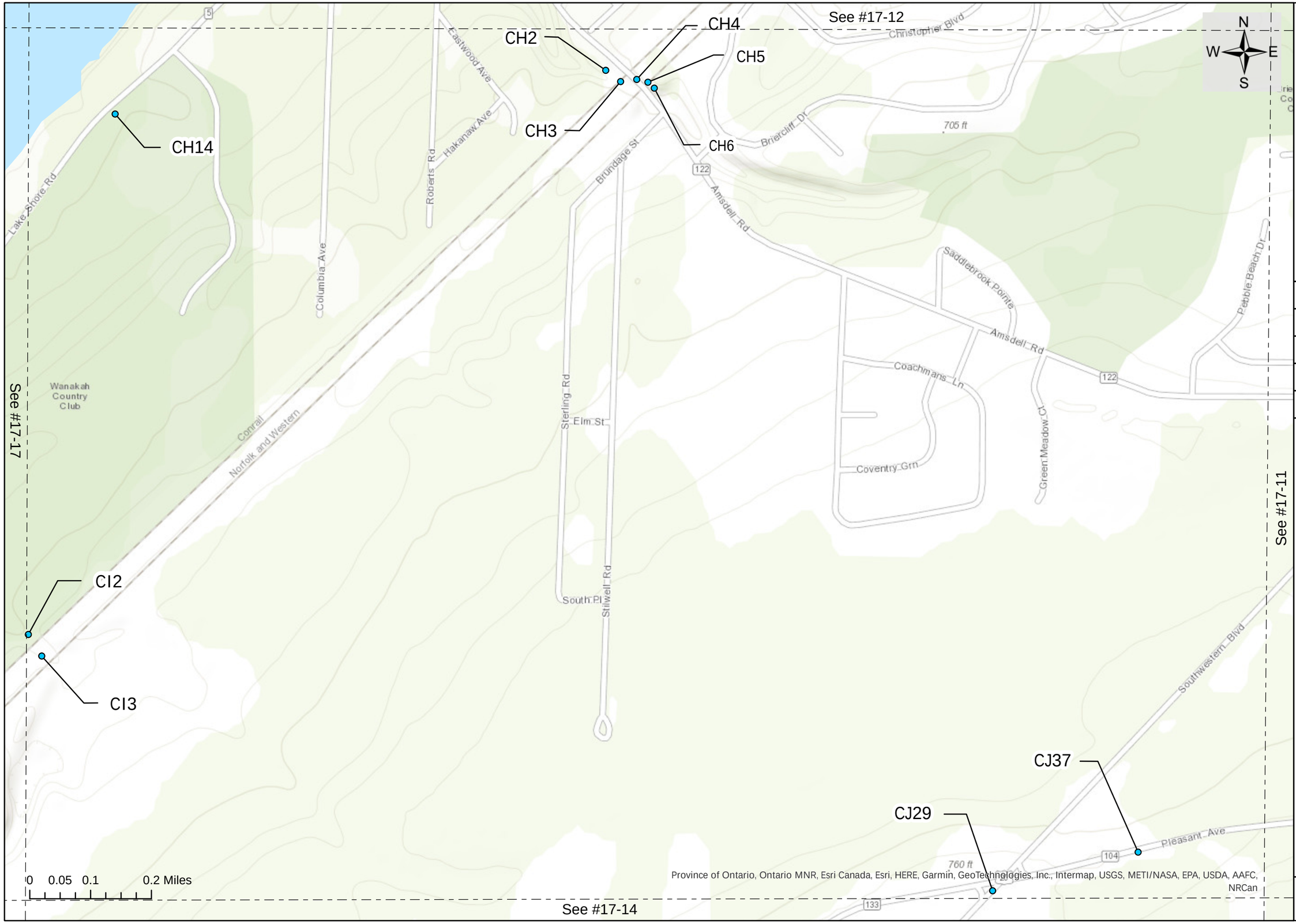
SCALE:	1:9,100
PROJ. #:	16254.00

FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-12



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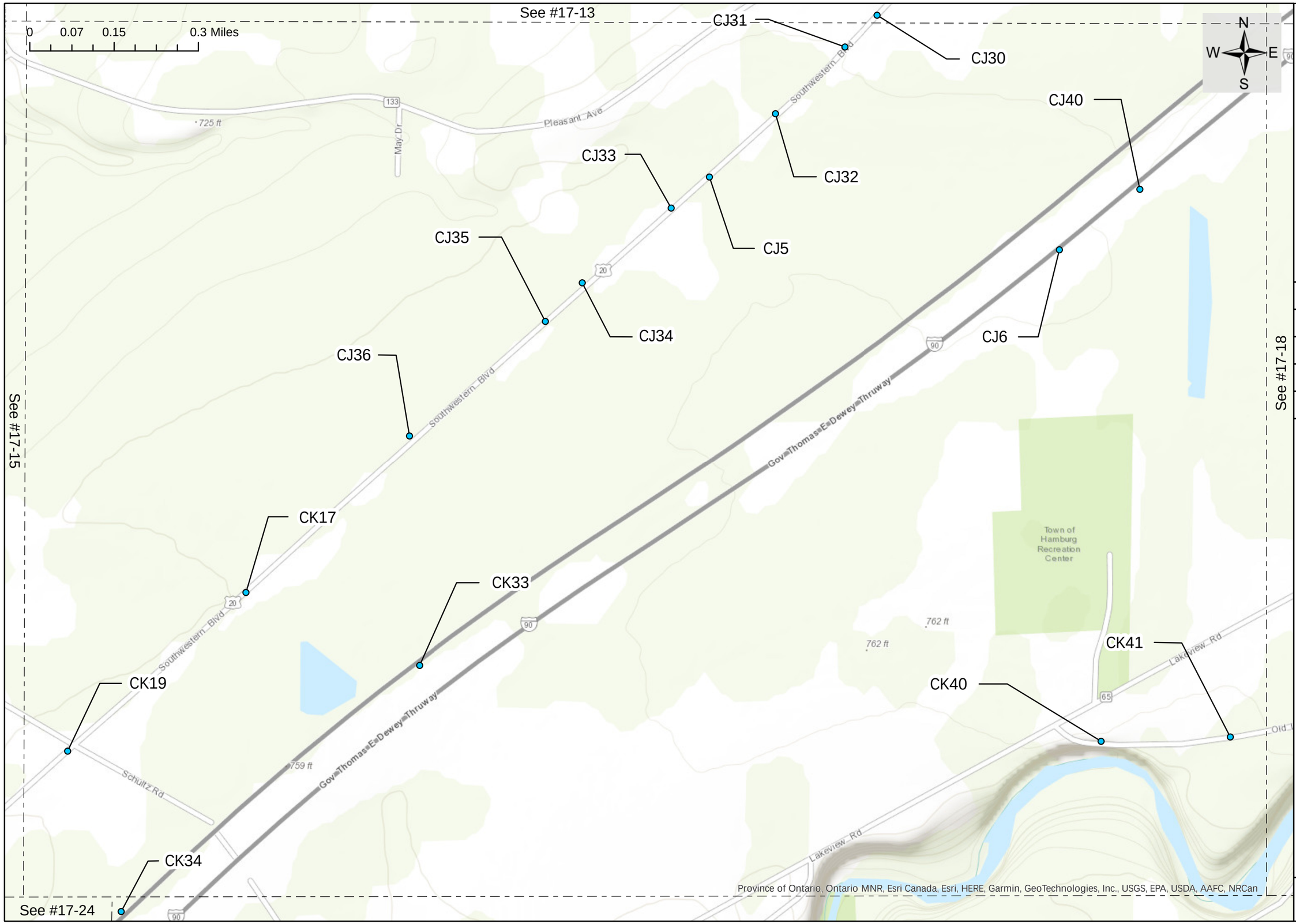
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE #17-13



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FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-14



City of Welland, Niagara Region, Regional Municipality of Niagara, Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA, USDA, AAFC, NRCan

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FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-15



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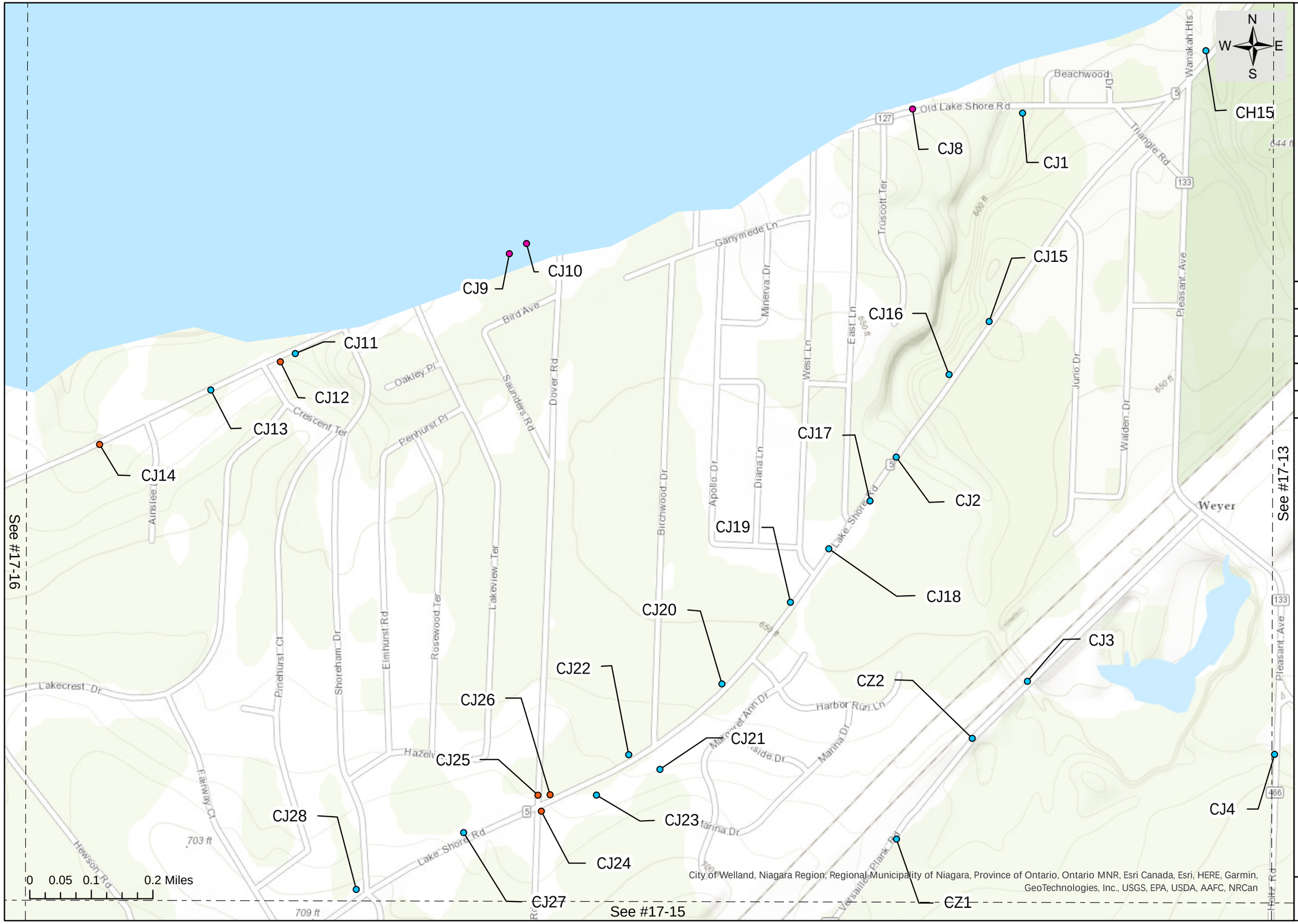
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-16



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FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY

TOWN OF HAMBURG, NY

FIGURE #17-17



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FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-18

See #17-11

See #17-13

See #17-9

See #17-20

See #17-18

CH8

CI5

CJ39

N

W

E

S

0 0.05 0.1 0.19 Miles

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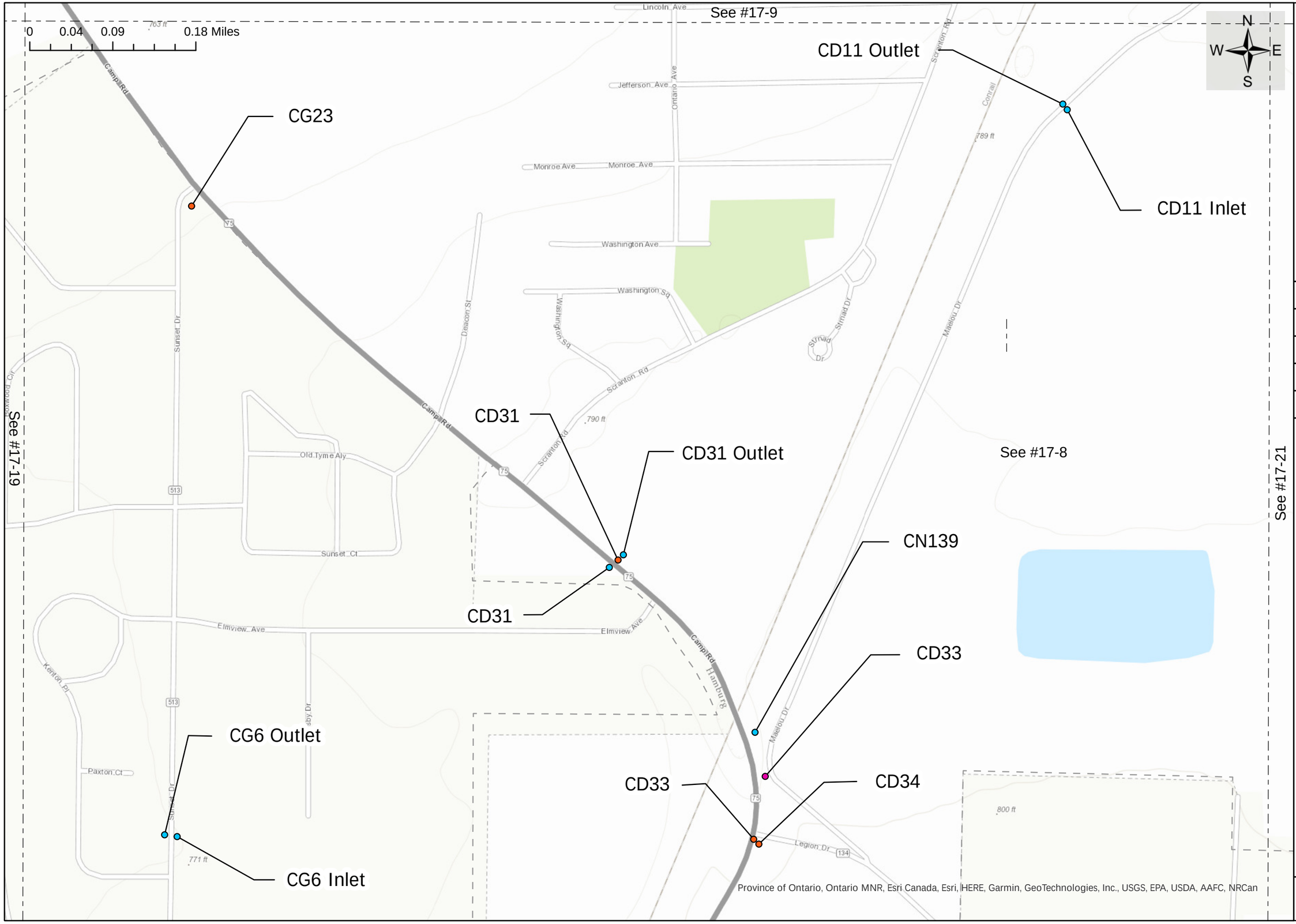
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-19



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CHECKED:	LS
SCALE:	1:6,000
PROJ. #:	16254.00

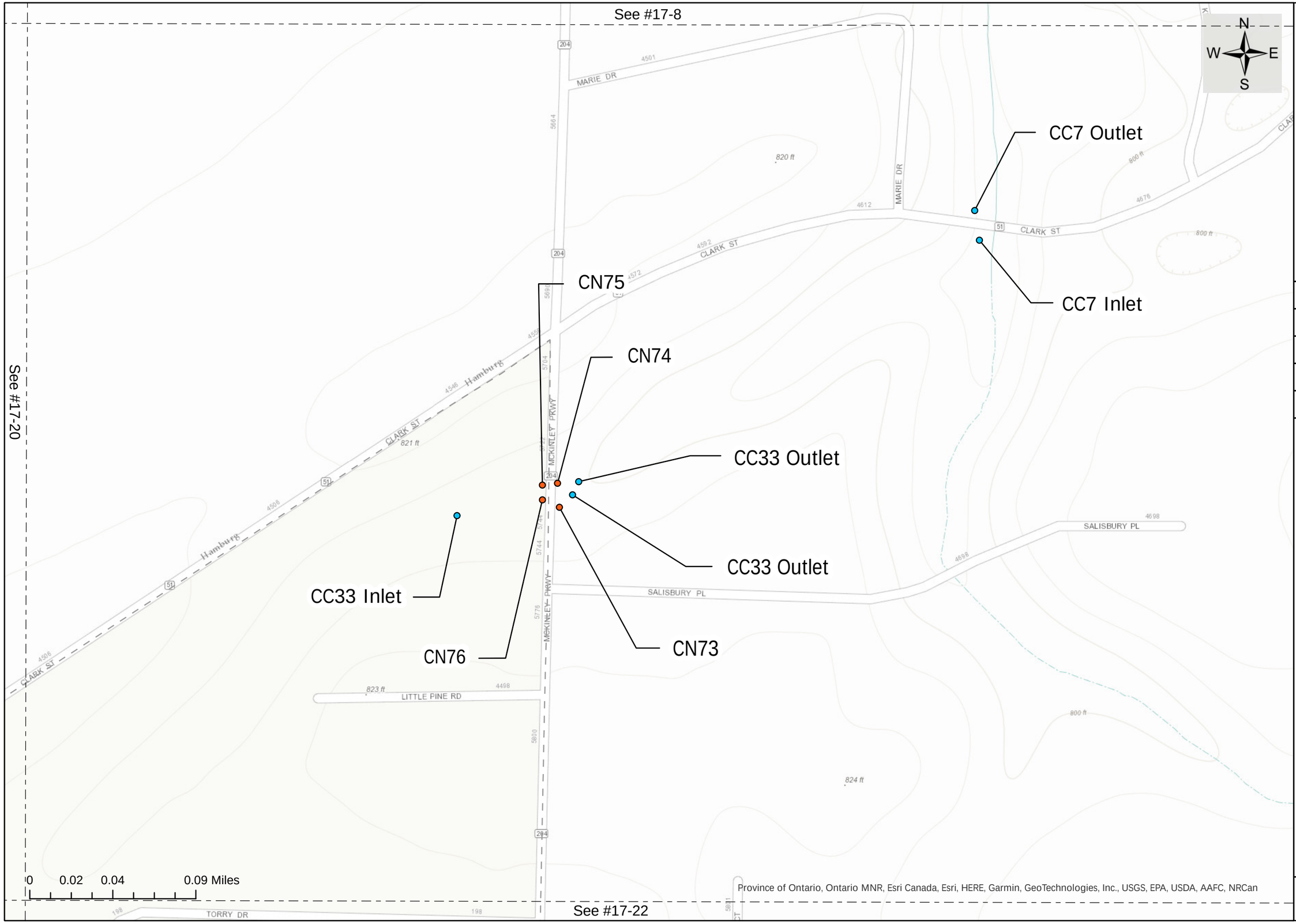
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-20

See #17-8

See #17-20



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See #17-22

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SCALE:	1:3,000
PROJ. #:	16254.00

FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-21

See #17-21

See #17-23

BF1 Inlet

BF1 Outlet

CN164

BK51

CK52

N

W E

S

391 Boston State Rd

Town of Hamburg Golf Course

Brenner Dr

Carpenter Rd

Lexington Ave

S Abbott Rd

Southern Expy

219

468 Taylor Rd

Crestridge Dr

Woodland Dr

Vail Dr

853 ft

0 0.07 0.15 0.3 Miles

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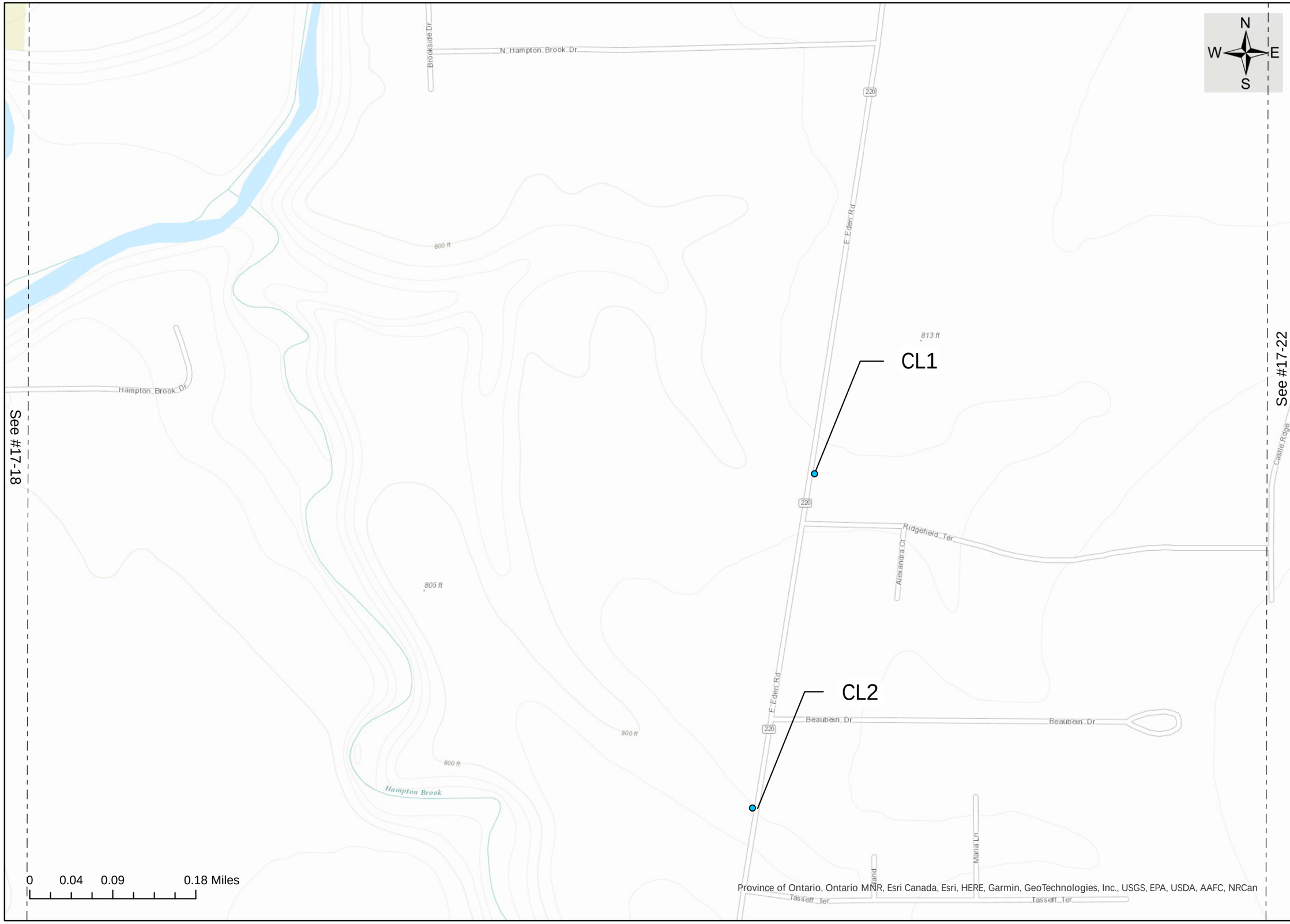
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-22



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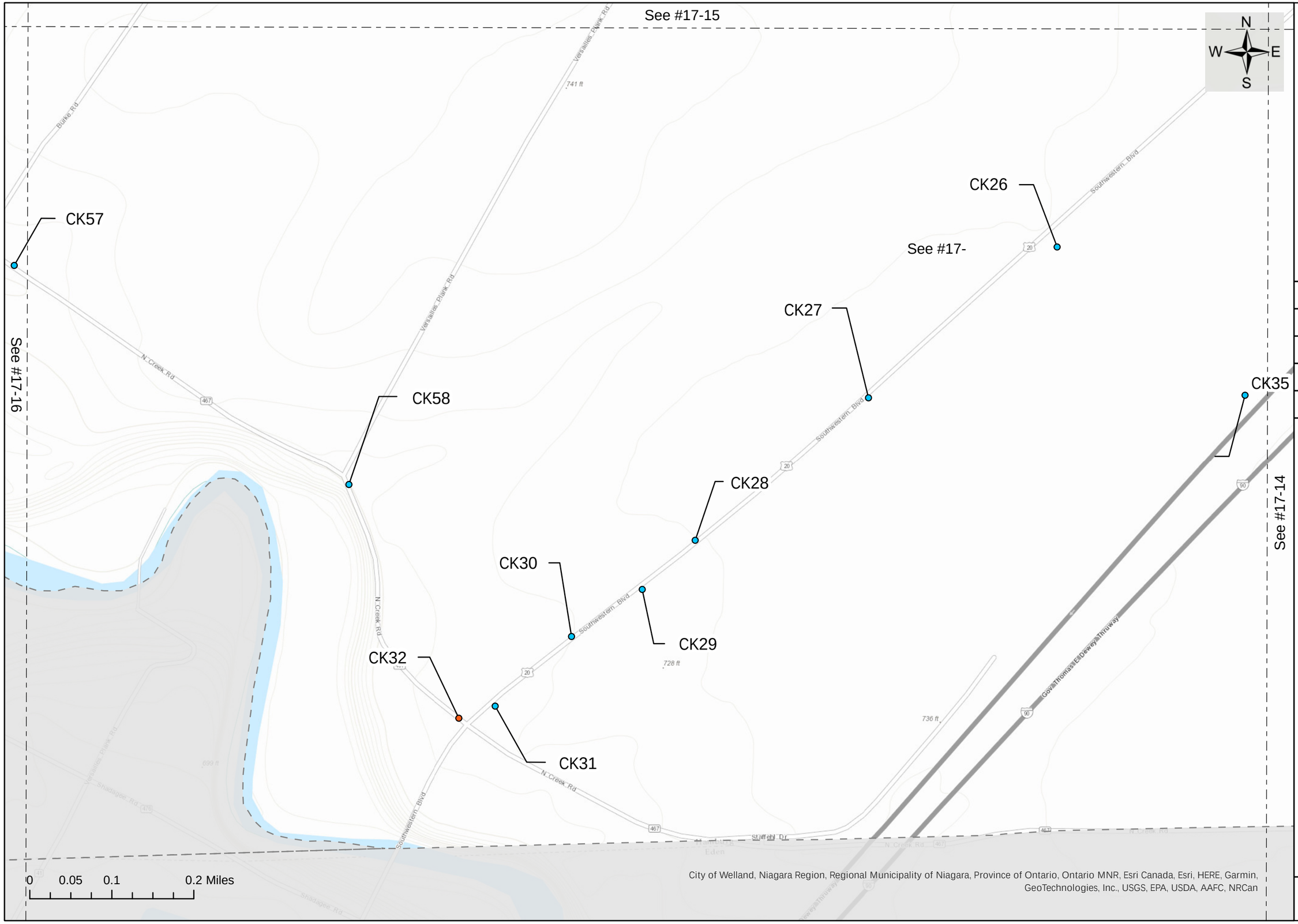
PROJ. #:	16254.00

FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-23



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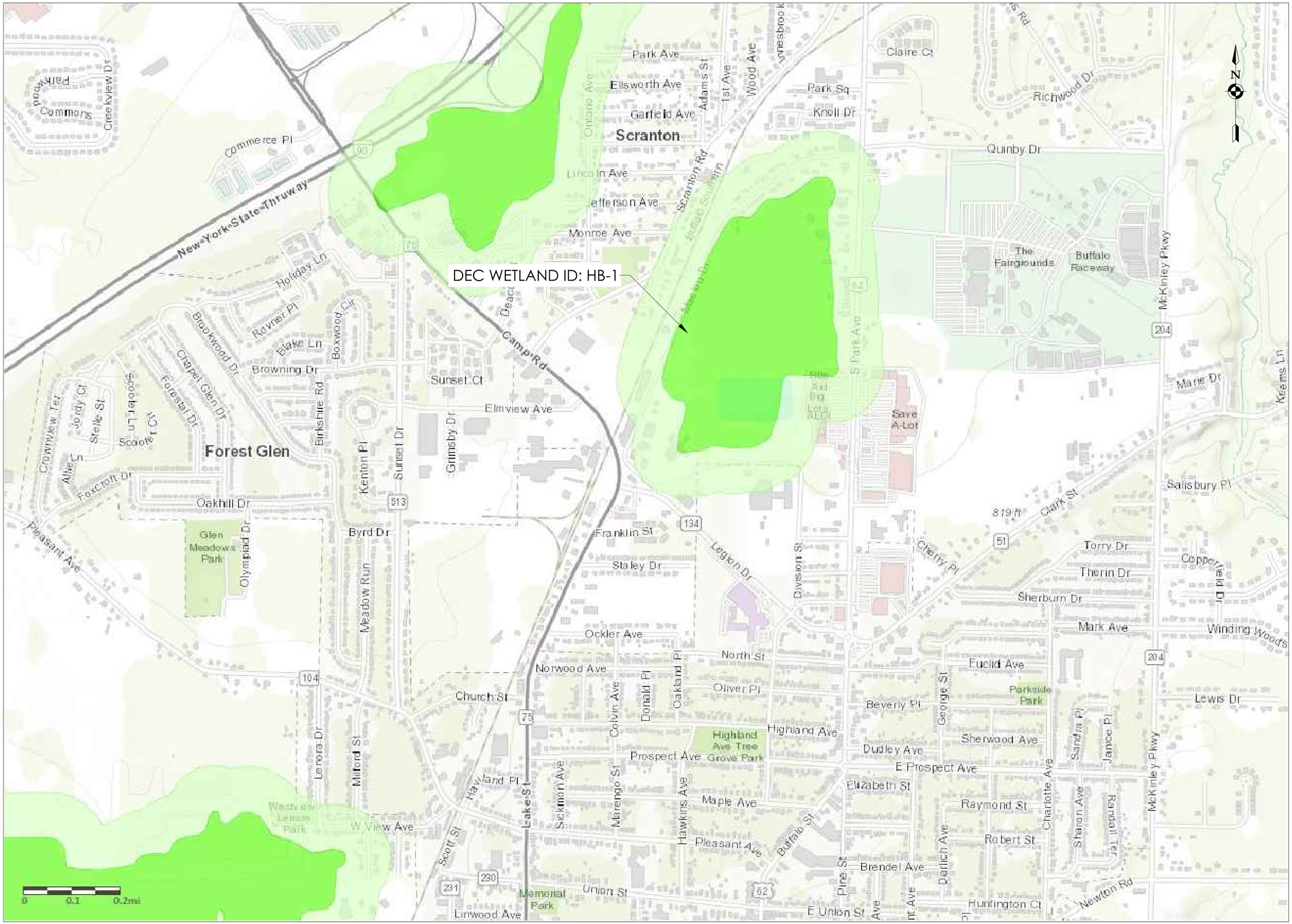
FIELD DATA LOCATION

TOWNWIDE DRAINAGE STUDY
TOWN OF HAMBURG, NY

FIGURE #17-24

Figure 18

Maelou Dr. Wetlands Map



Plotted By: Luke D Suleski

Date last plotted: 1/24/2023 3:36 PM

Date last accessed: 1/24/2023 3:35 PM

Sheet size: 22x34

Drawing Name: S:\Projects\Hamburg_TV\Town-wide Drainage Study\D Design\ACAD\Civil\Site\Grafton Ave. and Maelou Dr.Wetlands.dwg

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Client Name

TOWN OF HAMBURG

Project Name

TOWN-WIDE DRAINAGE STUDY

Project Address

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LDS	DHJ

Drawing title

MAELOU DR. WETLANDS MAP

Drawing Number

WL-01

Revision Number

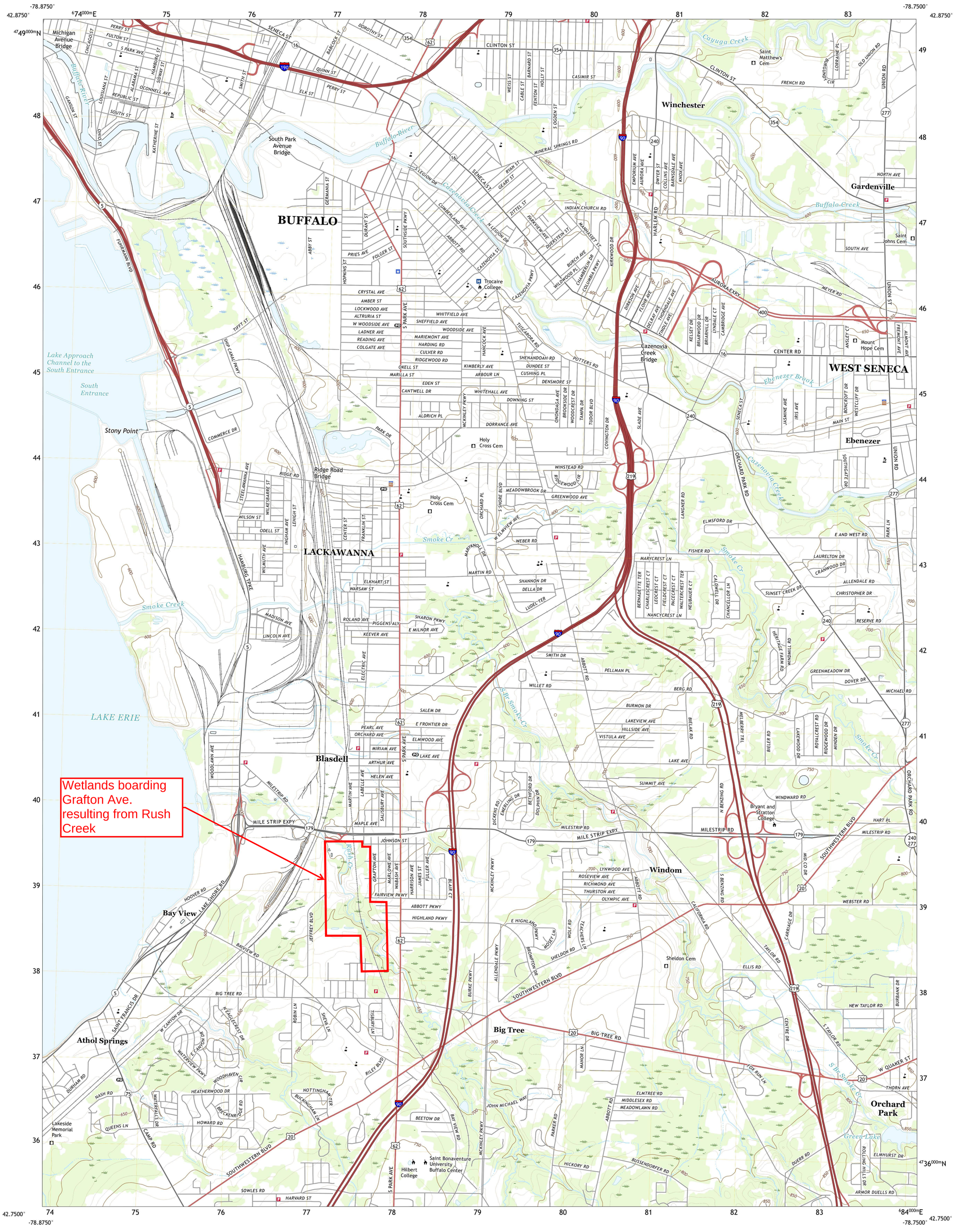
Figure 19

Grafton Ave. Wetlands Map

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

BUFFALO SE QUADRANGLE
NEW YORK - ERIE COUNTY
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid:Universal Transverse Mercator, Zone 17T

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, October 2017 - December 2017
Roads.....U.S. Census Bureau, 2016
Names.....GNIS, 1980 - 2019
Hydrography.....National Hydrography Dataset, 1899 - 2019
Contours.....National Elevation Dataset, 1995 - 1999
Boundaries.....Multiple sources; see metadata file 2017 - 2018

Wetlands.....FWS National Wetlands Inventory 2002

MN GN
10°37' 189 MILS
1°29' 26 MILS
UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
PH
Grid Zone Designation 17T

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

NEW YORK
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 Buffalo NW
2 Buffalo NE
3 Lancaster
4 Buffalo SE OE W
5 Orchard Park
6 Eden
7 Hamburg
8 Colden
ADJOINING QUADRANGLES

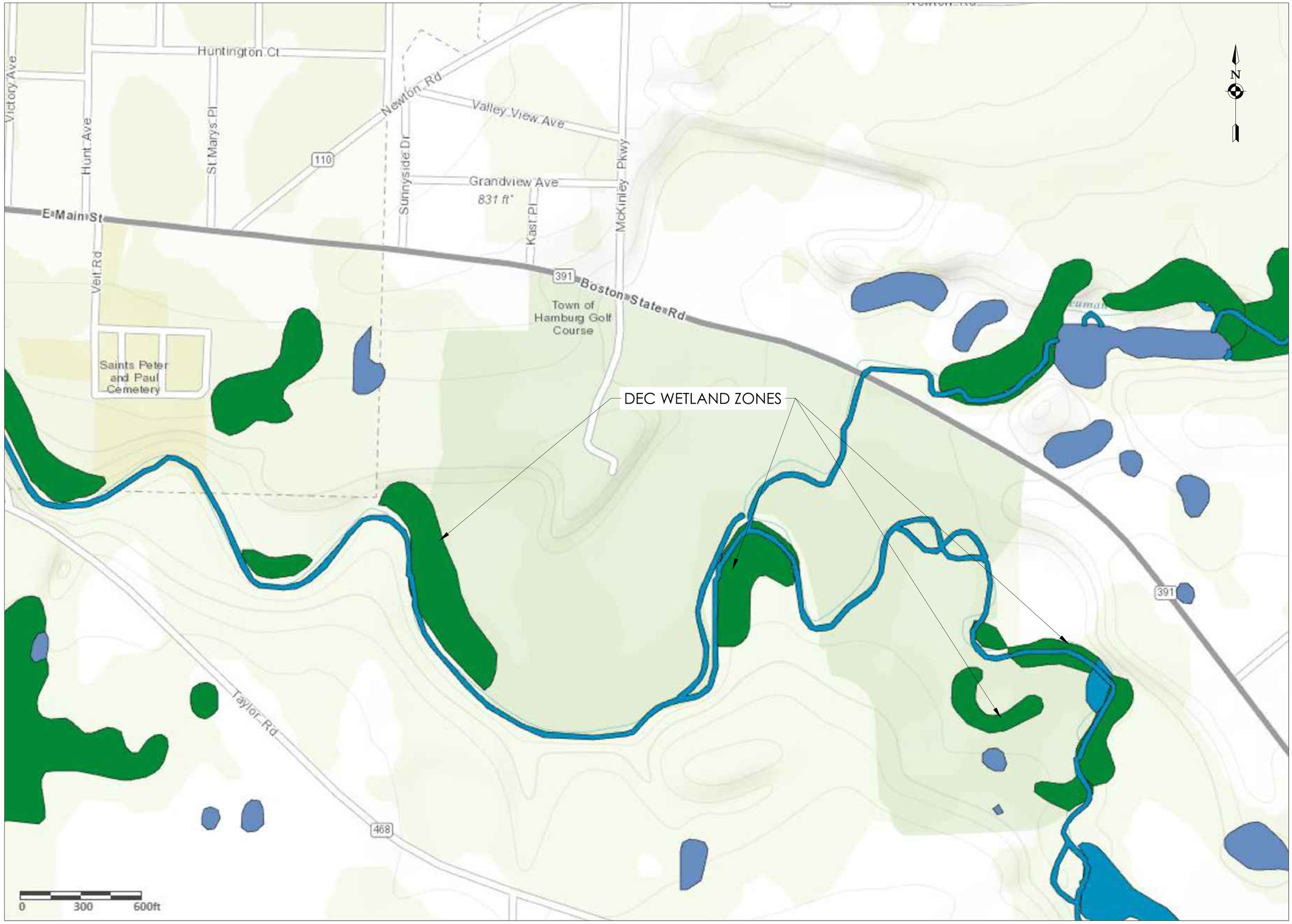
ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

BUFFALO SE, NY
2019

NSN. 7643016386508
NGA REF NO. USGSX24K6070

Figure 20

EIGHTEEN MILE CREEK WETLANDS MAP



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PROJECT INFORMATION

Project Number

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Client Name

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TOWN-WIDE DRAINAGE STUDY

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Drawing Title

EIGHTEEN MILE CREEK GOLF COURSE WETLANDS MAP

Drawing Number

WL-02

Revision Number

Appendix A

TOWN OF HAMBURG SOILS SURVEY

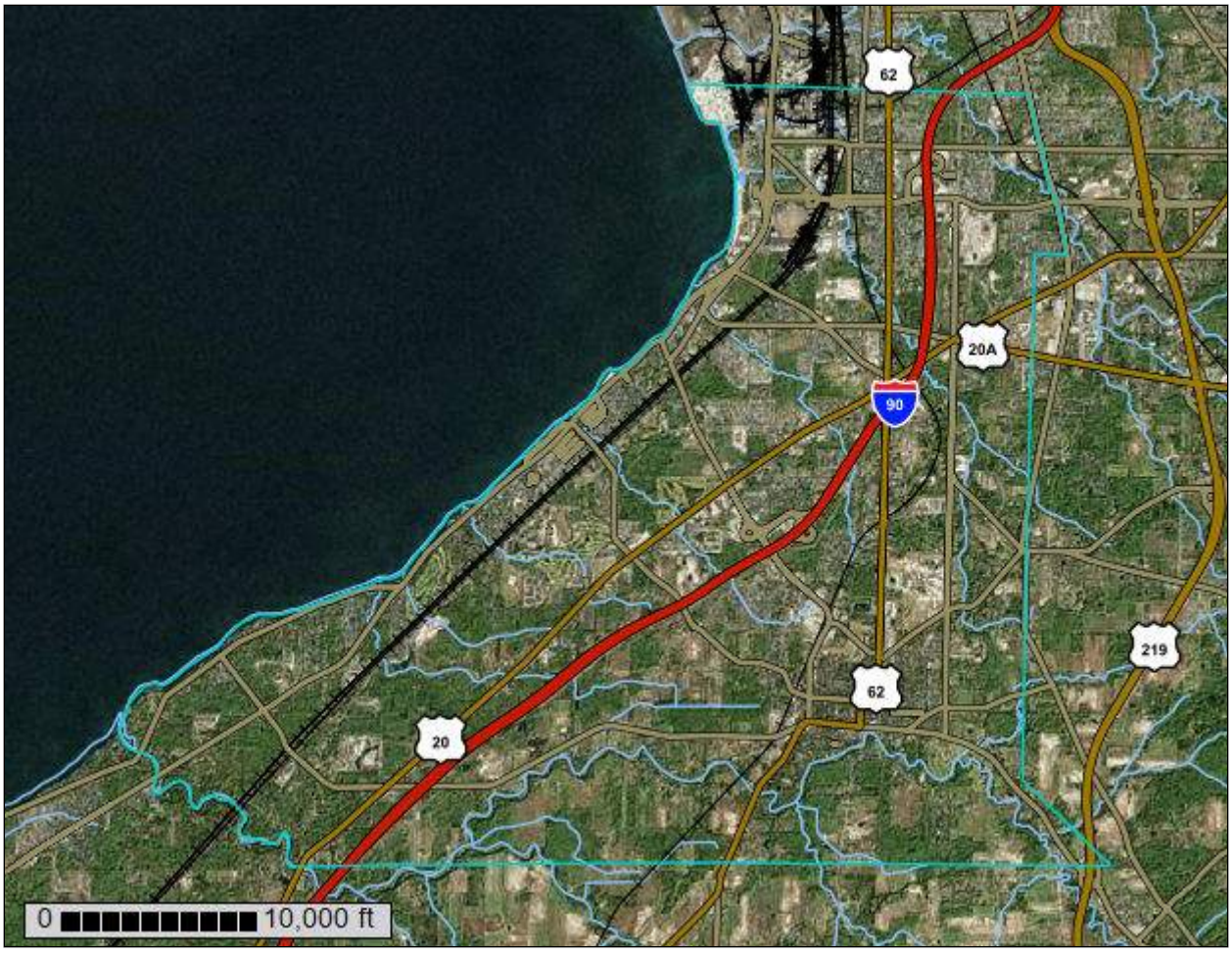
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Erie County, New York



July 8, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map (Town of Hamburg)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Erie County, New York
Survey Area Data: Version 21, Aug 29, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 19, 2014—May 18, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (Town of Hamburg)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AlB	Allard silt loam, 3 to 8 percent slopes	25.2	0.1%
AmA	Alton fine gravelly loam, 0 to 3 percent slopes	561.1	2.1%
AmB	Alton fine gravelly loam, 3 to 8 percent slopes	70.9	0.3%
AmC	Alton fine gravelly loam, 8 to 15 percent slopes	43.4	0.2%
AoA	Angola silt loam, 0 to 3 percent slopes	943.1	3.6%
AoB	Angola silt loam, 3 to 8 percent slopes	460.5	1.7%
ArC	Arkport very fine sandy loam, 8 to 15 percent slopes	3.1	0.0%
AuC	Aurora channery silt loam, 8 to 15 percent slopes	70.3	0.3%
Be	Beaches	122.4	0.5%
BlA	Blasdell channery silt loam, 0 to 3 percent slopes	93.0	0.4%
BlB	Blasdell channery silt loam, 3 to 8 percent slopes	113.8	0.4%
BlC	Blasdell channery silt loam, 8 to 15 percent slopes	19.8	0.1%
BlD	Blasdell channery silt loam, 15 to 25 percent slopes	7.3	0.0%
BrA	Brockport silty clay loam, 0 to 3 percent slopes	677.2	2.6%
BrB	Brockport silty clay loam, 3 to 8 percent slopes	473.4	1.8%
Ca	Canadice silt loam	50.6	0.2%
Cb	Canadice silt loam, channery till substratum	1,218.0	4.6%
Cc	Canandaigua silt loam	335.0	1.3%
Cd	Canandaigua mucky silt loam	25.1	0.1%
CfB	Cayuga silt loam, 3 to 8 percent slopes	146.7	0.6%
CfC	Cayuga silt loam, 8 to 15 percent slopes	2.3	0.0%
CmE	Chenango and Palmyra soils, 25 to 40 percent slopes	12.6	0.0%
CoA	Churchville silt loam, 0 to 3 percent slopes	1,934.9	7.3%
CoB	Churchville silt loam, 3 to 8 percent slopes	87.9	0.3%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CsA	Collamer silt loam, 0 to 3 percent slopes	67.3	0.3%
CsB	Collamer silt loam, 3 to 8 percent slopes	131.7	0.5%
CsC	Collamer silt loam, 8 to 15 percent slopes	8.0	0.0%
CtB	Collamer silt loam, till substratum, 3 to 8 percent slo pes	661.3	2.5%
CuB	Colonie loamy fine sand, 3 to 8 percent slopes	14.5	0.1%
Cv	Cosad loamy fine sand	2.9	0.0%
DaB	Danley silt loam, 3 to 8 percent slopes	106.9	0.4%
DaC	Danley silt loam, 8 to 15 percent slopes	20.6	0.1%
DaD	Danley silt loam, 15 to 25 percent slopes	138.3	0.5%
DbA	Darien silt loam, 0 to 3 percent slopes	1,223.8	4.6%
DbB	Darien silt loam, 3 to 8 percent slopes	263.0	1.0%
DdA	Derb silt loam, 0 to 3 percent slopes	98.7	0.4%
DdB	Derb silt loam, 3 to 8 percent slopes	8.8	0.0%
Dp	Dumps	17.3	0.1%
FaA	Farmington channery loam, 0 to 3 percent slopes	6.2	0.0%
FbA	Farnham channery silt loam, 0 to 3 percent slopes	361.3	1.4%
FbB	Farnham channery silt loam, 3 to 8 percent slopes	301.1	1.1%
Fu	Fluvaquents and Udifluvents, frequently flooded	334.3	1.3%
GaA	Galen very fine sandy loam, 0 to 3 percent slopes	3.1	0.0%
GaB	Galen very fine sandy loam, 3 to 8 percent slopes	9.7	0.0%
Ge	Getzville silt loam	90.9	0.3%
Ha	Halsey silt loam	96.8	0.4%
HrA	Hornell silt loam, 0 to 3 percent slopes	244.9	0.9%
HrB	Hornell silt loam, 3 to 8 percent slopes	83.9	0.3%
HuB	Hudson silt loam, 3 to 8 percent slopes	20.8	0.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HuC	Hudson silt loam, 8 to 15 percent slopes	1.3	0.0%
HvD	Hudson silty clay loam, 15 to 25 percent slopes	29.0	0.1%
HvE	Hudson silty clay loam, 25 to 40 percent slopes	79.2	0.3%
In	Ilion silt loam	203.9	0.8%
Lb	Lakemont mucky silt loam	2.1	0.0%
Lc	Lamson very fine sandy loam	80.9	0.3%
Ld	Lamson mucky very fine sandy loam	96.1	0.4%
Ly	Lyons soils, 0 to 3 percent slopes	18.0	0.1%
Lz	Lyons soils, 0 to 3 percent slopes, frequently ponded	51.0	0.2%
MaB	Manlius channery silt loam, 3 to 8 percent slopes	568.4	2.2%
MaC	Manlius channery silt loam, 8 to 15 percent slopes	18.0	0.1%
MaD	Manlius channery silt loam, 15 to 25 percent slopes	22.8	0.1%
MbF	Manlius very channery silt loam, 35 to 50 percent slope s	26.7	0.1%
MfA	Marilla channery silt loam, 0 to 3 percent slopes	5.4	0.0%
MfB	Marilla channery silt loam, 3 to 8 percent slopes	8.9	0.0%
MfC	Marilla channery silt loam, 8 to 15 percent slopes	7.6	0.0%
Mg	Middlebury silt loam	186.9	0.7%
Mh	Minoa very fine sandy loam	85.6	0.3%
NfA	Niagara silt loam, 0 to 3 percent slopes	423.8	1.6%
NfB	Niagara silt loam, 3 to 8 percent slopes	158.2	0.6%
Nh	Niagara silt loam, till substratum	1,613.4	6.1%
OrA	Orpark silt loam, 0 to 3 percent slopes	1,962.2	7.4%
OrB	Orpark silt loam, 3 to 8 percent slopes	290.1	1.1%
OrC	Orpark silt loam, 8 to 15 percent slopes	17.5	0.1%
Pa	Palms muck	5.5	0.0%
PbA	Palmyra gravelly loam, 0 to 3 percent slopes	8.1	0.0%
PbB	Palmyra gravelly loam, 3 to 8 percent slopes	15.8	0.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Pc	Patchin silt loam	839.2	3.2%
PhA	Phelps gravelly loam, 0 to 3 percent slopes	417.3	1.6%
PhB	Phelps gravelly loam, 3 to 8 percent slopes	87.6	0.3%
Pt	Pits, borrow	249.9	0.9%
Pu	Pits, gravel	11.3	0.0%
Qu	Quarry	58.1	0.2%
RaA	Raynham silt loam, 0 to 3 percent slopes	136.9	0.5%
RaB	Raynham silt loam, 3 to 8 percent slopes	35.3	0.1%
Re	Red Hook silt loam	249.0	0.9%
RfA	Remsen silty clay loam, 0 to 3 percent slopes	1,919.5	7.3%
RfB	Remsen silty clay loam, 3 to 8 percent slopes	1,420.2	5.4%
RfC	Remsen silty clay loam, 8 to 15 percent slopes	75.0	0.3%
RgA	Rhinebeck silt loam, 0 to 3 percent slopes	176.1	0.7%
RgB	Rhinebeck silt loam, 3 to 8 percent slopes	49.1	0.2%
RhC3	Rhinebeck silty clay loam, 8 to 15 percent slopes, seve relyeroded	12.7	0.0%
RkA	Rhinebeck gravelly loam, 0 to 3 percent slopes	30.0	0.1%
RkB	Rhinebeck gravelly loam, 3 to 8 percent slopes	27.6	0.1%
Ro	Rock outcrop	180.9	0.7%
ScD	Schuyler silt loam, 15 to 25 percent slopes	2.6	0.0%
Sd	Scio silt loam	23.0	0.1%
Sw	Swormville clay loam	41.0	0.2%
To	Tioga silt loam	12.7	0.0%
Uc	Udorthents, smoothed	268.3	1.0%
Ud	Urban land	822.4	3.1%
Ug	Urban land-Cayuga complex	96.2	0.4%
Uh	Urban land-Churchville complex	200.7	0.8%
UmA	Urban land-Collamer complex, 1 to 6 percent slopes	26.8	0.1%
Us	Urban land-Niagara complex	14.2	0.1%
Uv	Urban land-Swormville complex	5.4	0.0%
Uw	Urban land-Teel complex	30.0	0.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
VbB	Varysburg gravelly loam, 3 to 8 percent slopes	15.6	0.1%
VbC	Varysburg gravelly loam, 8 to 15 percent slopes	22.5	0.1%
VbD	Varysburg gravelly loam, 15 to 25 percent slopes	57.7	0.2%
VbE	Varysburg gravelly loam, 25 to 50 percent slopes	40.3	0.2%
W	Water	196.3	0.7%
WbB	Wassaic very stony loam, 3 to 8 percent slopes	23.3	0.1%
Wd	Wayland soils complex, 0 to 3 percent slopes, frequently flooded	450.8	1.7%
WeB	Williamson silt loam, 3 to 8 percent slopes	250.0	0.9%
WeC	Williamson silt loam, 8 to 15 percent slope	36.9	0.1%
Totals for Area of Interest		**26,425.2**	**100.0%**

Map Unit Descriptions (Town of Hamburg)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor

components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Erie County, New York

AlB—Allard silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rjh
Elevation: 620 to 1,590 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Allard and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Allard

Setting

Landform: Alluvial fans, outwash plains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty eolian, glaciolacustrine, or old alluvial deposits over sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 27 inches: silt loam
H3 - 27 to 60 inches: stratified very gravelly loamy sand to sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F140XY021NY - Dry Outwash
Hydric soil rating: No

Minor Components

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Middlebury
Percent of map unit: 5 percent
Hydric soil rating: No

Arkport
Percent of map unit: 5 percent
Hydric soil rating: No

Tioga
Percent of map unit: 5 percent
Hydric soil rating: No

Scio
Percent of map unit: 5 percent
Hydric soil rating: No

AmA—Alton fine gravelly loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 9rjj
Elevation: 250 to 650 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Alton and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alton

Setting
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, derived mainly from acidic rocks, with some limestone below 40 inches

Typical profile
H1 - 0 to 9 inches: fine gravelly loam
B21 - 9 to 18 inches: fine gravelly loam
B22 - 18 to 30 inches: very gravelly sandy loam
2C - 30 to 60 inches: very gravelly loamy sand

Properties and qualities
Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F101XY005NY - Dry Outwash
Hydric soil rating: No

Minor Components

Blasdell

Percent of map unit: 5 percent
Hydric soil rating: No

Colonie

Percent of map unit: 5 percent
Hydric soil rating: No

Phelps

Percent of map unit: 5 percent
Hydric soil rating: No

Palmyra

Percent of map unit: 5 percent
Hydric soil rating: No

Arkport

Percent of map unit: 5 percent
Hydric soil rating: No

AmB—Alton fine gravelly loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rjk
Elevation: 250 to 650 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Alton and similar soils: 75 percent
Minor components: 25 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alton

Setting

Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, derived mainly from acidic rocks, with some limestone below 40 inches

Typical profile

H1 - 0 to 9 inches: fine gravelly loam
B21 - 9 to 18 inches: fine gravelly loam
B22 - 18 to 30 inches: very gravelly sandy loam
2C - 30 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F101XY005NY - Dry Outwash
Hydric soil rating: No

Minor Components

Colonie

Percent of map unit: 5 percent
Hydric soil rating: No

Arkport

Percent of map unit: 5 percent
Hydric soil rating: No

Blasdell

Percent of map unit: 5 percent
Hydric soil rating: No

Palmyra

Percent of map unit: 5 percent
Hydric soil rating: No

Phelps

Percent of map unit: 5 percent

Hydric soil rating: No

AmC—Alton fine gravelly loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9rjl
Elevation: 250 to 650 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Alton and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alton

Setting

Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, derived mainly from acidic rocks, with some limestone below 40 inches

Typical profile

H1 - 0 to 9 inches: fine gravelly loam
B21 - 9 to 18 inches: fine gravelly loam
B22 - 18 to 30 inches: very gravelly sandy loam
2C - 30 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A

Ecological site: F101XY005NY - Dry Outwash
Hydric soil rating: No

Minor Components

Palmyra
Percent of map unit: 5 percent
Hydric soil rating: No

Colonie
Percent of map unit: 5 percent
Hydric soil rating: No

Phelps
Percent of map unit: 5 percent
Hydric soil rating: No

Blasdell
Percent of map unit: 5 percent
Hydric soil rating: No

Arkport
Percent of map unit: 5 percent
Hydric soil rating: No

AoA—Angola silt loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 9rjp
Elevation: 570 to 1,330 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Angola and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Angola

Setting
Landform: Benches, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived mainly from shale and siltstone

Typical profile
H1 - 0 to 11 inches: silt loam

H2 - 11 to 26 inches: silty clay loam
H3 - 26 to 30 inches: channery silt loam
H4 - 30 to 34 inches: weathered bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Ilion

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Brockport

Percent of map unit: 5 percent
Hydric soil rating: No

Orpark

Percent of map unit: 5 percent
Hydric soil rating: No

Ovid

Percent of map unit: 5 percent
Hydric soil rating: No

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Aurora

Percent of map unit: 5 percent
Hydric soil rating: No

AoB—Angola silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rjq
Elevation: 590 to 1,300 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 155 to 185 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Angola and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Angola

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived mainly from shale and siltstone

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 26 inches: silty clay loam
H3 - 26 to 30 inches: channery silt loam
H4 - 30 to 34 inches: weathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Brockport
Percent of map unit: 5 percent
Hydric soil rating: No

Aurora
Percent of map unit: 5 percent
Hydric soil rating: No

Orpark
Percent of map unit: 5 percent
Hydric soil rating: No

Darien
Percent of map unit: 5 percent
Hydric soil rating: No

Ovid
Percent of map unit: 5 percent
Hydric soil rating: No

Ilion
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

ArC—Arkport very fine sandy loam, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 9rjv
Elevation: 300 to 900 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 140 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Arkport and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arkport

Setting
Landform: Deltas on lake plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Glaciofluvial or deltaic deposits with a high content of fine and very fine sand

Typical profile

H1 - 0 to 4 inches: very fine sandy loam
H2 - 4 to 23 inches: very fine sandy loam
H3 - 23 to 56 inches: loamy very fine sand
H4 - 56 to 70 inches: stratified loamy fine sand to very fine sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F101XY005NY - Dry Outwash
Hydric soil rating: No

Minor Components

Colonie

Percent of map unit: 5 percent
Hydric soil rating: No

Minoa

Percent of map unit: 5 percent
Hydric soil rating: No

Allard

Percent of map unit: 5 percent
Hydric soil rating: No

Collamer

Percent of map unit: 5 percent
Hydric soil rating: No

Galen

Percent of map unit: 5 percent
Hydric soil rating: No

AuC—Aurora channery silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9rjy

Elevation: 1,000 to 1,300 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Aurora and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aurora

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived mainly from calcareous shale, with some limestone and sandstone

Typical profile

H1 - 0 to 9 inches: channery silt loam
H2 - 9 to 33 inches: channery silty clay loam
H3 - 33 to 37 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Angola

Percent of map unit: 5 percent
Hydric soil rating: No

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Orpark

Percent of map unit: 5 percent

Hydric soil rating: No

Manlius

Percent of map unit: 5 percent
Hydric soil rating: No

Danley

Percent of map unit: 5 percent
Hydric soil rating: No

Be—Beaches

Map Unit Setting

National map unit symbol: 9rjz
Elevation: 0 to 100 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Beaches: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beaches

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydric soil rating: Unranked

Minor Components

Minoa

Percent of map unit: 5 percent
Hydric soil rating: No

Colonie

Percent of map unit: 5 percent
Hydric soil rating: No

Cheektowaga

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Elnora

Percent of map unit: 5 percent
Hydric soil rating: No

BlA—Blasdell channery silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rk4
Elevation: 720 to 1,330 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Blasdell and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blasdell

Setting

Landform: Alluvial fans, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy glaciofluvial deposits derived mainly from local acid shale bedrock

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 36 inches: very channery silt loam
H3 - 36 to 60 inches: extremely channery loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Chenango
Percent of map unit: 5 percent
Hydric soil rating: No

Alton
Percent of map unit: 5 percent
Hydric soil rating: No

Farnham
Percent of map unit: 5 percent
Hydric soil rating: No

Manlius
Percent of map unit: 5 percent
Hydric soil rating: No

Marilla
Percent of map unit: 5 percent
Hydric soil rating: No

BIB—Blasdell channery silt loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9rk5
Elevation: 640 to 1,690 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Blasdell and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blasdell

Setting
Landform: Alluvial fans, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy glaciofluvial deposits derived mainly from local acid shale bedrock

Typical profile
H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 36 inches: very channery silt loam

H3 - 36 to 60 inches: extremely channery loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Manlius

Percent of map unit: 5 percent
Hydric soil rating: No

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Marilla

Percent of map unit: 5 percent
Hydric soil rating: No

Farnham

Percent of map unit: 5 percent
Hydric soil rating: No

Alton

Percent of map unit: 5 percent
Hydric soil rating: No

BIC—Blasdell channery silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9rk6
Elevation: 640 to 1,790 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Blasdell and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blasdell

Setting

Landform: Alluvial fans, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy glaciofluvial deposits derived mainly from local acid shale bedrock

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 36 inches: very channery silt loam
H3 - 36 to 60 inches: extremely channery loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Marilla

Percent of map unit: 5 percent
Hydric soil rating: No

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Farnham

Percent of map unit: 5 percent
Hydric soil rating: No

Alton

Percent of map unit: 5 percent
Hydric soil rating: No

Manlius

Percent of map unit: 5 percent

Hydric soil rating: No

BID—Blasdell channery silt loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 9rk7
Elevation: 750 to 1,540 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Blasdell and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blasdell

Setting

Landform: Alluvial fans, terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy glaciofluvial deposits derived mainly from local acid shale bedrock

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 36 inches: very channery silt loam
H3 - 36 to 60 inches: extremely channery loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Alton
Percent of map unit: 5 percent
Hydric soil rating: No

Chenango
Percent of map unit: 5 percent
Hydric soil rating: No

Marilla
Percent of map unit: 5 percent
Hydric soil rating: No

Farnham
Percent of map unit: 5 percent
Hydric soil rating: No

Manlius
Percent of map unit: 5 percent
Hydric soil rating: No

BrA—Brockport silty clay loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 9rk8
Elevation: 570 to 790 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Brockport and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brockport

Setting
Landform: Benches, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey till or congeliturbate derived mainly from neutral or calcareous shale

Typical profile
H1 - 0 to 8 inches: silty clay loam
H2 - 8 to 31 inches: silty clay

H3 - 31 to 35 inches: bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Churchville

Percent of map unit: 5 percent
Hydric soil rating: No

Angola

Percent of map unit: 5 percent
Hydric soil rating: No

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Remsen

Percent of map unit: 5 percent
Hydric soil rating: No

BrB—Brockport silty clay loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rk9
Elevation: 570 to 770 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Brockport and similar soils: 80 percent
Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brockport

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey till or congeliturbate derived mainly from neutral or calcareous shale

Typical profile

H1 - 0 to 8 inches: silty clay loam
H2 - 8 to 31 inches: silty clay
H3 - 31 to 35 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Angola

Percent of map unit: 5 percent
Hydric soil rating: No

Remsen

Percent of map unit: 5 percent
Hydric soil rating: No

Churchville

Percent of map unit: 5 percent
Hydric soil rating: No

Ca—Canadice silt loam

Map Unit Setting

National map unit symbol: 9rkb
Elevation: 570 to 1,610 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Canadice and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canadice

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 53 inches: silty clay
H3 - 53 to 65 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Canandaigua
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Lakemont
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Lamson
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Wayland
Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Rhinebeck
Percent of map unit: 5 percent
Hydric soil rating: No

Cb—Canadice silt loam, channery till substratum

Map Unit Setting
National map unit symbol: 9rkc
Elevation: 570 to 1,840 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Canadice, till substratum, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canadice, Till Substratum

Setting
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 44 inches: silty clay
H3 - 44 to 60 inches: channery silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Rhinebeck

Percent of map unit: 5 percent
Hydric soil rating: No

Lakemont

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Remsen

Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Cc—Canandaigua silt loam

Map Unit Setting

National map unit symbol: 9rkd
Elevation: 100 to 1,000 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Canandaigua and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canandaigua

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 37 inches: silt loam
H3 - 37 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY010NY - Wet Lake Plain Depression
Hydric soil rating: Yes

Minor Components

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Lakemont

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Lyons

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Lamson

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

Cd—Canandaigua mucky silt loam

Map Unit Setting

National map unit symbol: 9rkf
Elevation: 100 to 1,000 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Canandaigua and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canandaigua

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: mucky silt loam
H2 - 9 to 37 inches: silt loam
H3 - 37 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F101XY010NY - Wet Lake Plain Depression
Hydric soil rating: Yes

Minor Components

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Palms

Percent of map unit: 5 percent
Landform: Marshes, swamps
Hydric soil rating: Yes

Lamson

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Lakemont

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

CfB—Cayuga silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rkj
Elevation: 560 to 1,440 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cayuga and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cayuga

Setting

Landform: Lake plains, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest, tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey glaciolacustrine deposits over loamy till derived from limestone, dolomite, sandstone, or shale

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 26 inches: silty clay
H3 - 26 to 60 inches: gravelly loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Churchville

Percent of map unit: 5 percent
Hydric soil rating: No

Rhinebeck

Percent of map unit: 5 percent
Hydric soil rating: No

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

Collamer

Percent of map unit: 5 percent
Hydric soil rating: No

Schoharie

Percent of map unit: 5 percent
Hydric soil rating: No

CfC—Cayuga silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9rkk
Elevation: 570 to 1,440 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cayuga and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cayuga

Setting

Landform: Lake plains, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest, tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey glaciolacustrine deposits over loamy till derived from limestone, dolomite, sandstone, or shale

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 26 inches: silty clay
H3 - 26 to 60 inches: gravelly loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Odessa
Percent of map unit: 5 percent
Hydric soil rating: No

Hudson
Percent of map unit: 5 percent
Hydric soil rating: No

Schoharie
Percent of map unit: 5 percent
Hydric soil rating: No

Churchville
Percent of map unit: 5 percent
Hydric soil rating: No

Collamer
Percent of map unit: 5 percent
Hydric soil rating: No

CmE—Chenango and Palmyra soils, 25 to 40 percent slopes

Map Unit Setting
National map unit symbol: 9rkw
Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Chenango and similar soils: 50 percent
Palmyra and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chenango

Setting
Landform: Valley trains, terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, derived mainly from sandstone, shale, and siltstone

Typical profile
H1 - 0 to 8 inches: gravelly loam

H2 - 8 to 30 inches: very gravelly loam
H3 - 30 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 25 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: F140XY021NY - Dry Outwash
Hydric soil rating: No

Description of Palmyra

Setting

Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy over sandy and gravelly glaciofluvial deposits, derived mainly from limestone and other sedimentary rocks

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 28 inches: gravelly clay loam
H3 - 28 to 60 inches: stratified very gravelly sand

Properties and qualities

Slope: 25 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: F101XY005NY - Dry Outwash
Hydric soil rating: No

Minor Components

Arkport
Percent of map unit: 3 percent
Hydric soil rating: No

Alton
Percent of map unit: 3 percent
Hydric soil rating: No

Allard
Percent of map unit: 3 percent
Hydric soil rating: No

Valois
Percent of map unit: 3 percent
Hydric soil rating: No

Castile
Percent of map unit: 3 percent
Hydric soil rating: No

CoA—Churchville silt loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 9rky
Elevation: 560 to 1,480 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Churchville and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Churchville

Setting
Landform: Lake plains, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey glaciolacustrine deposits over loamy till

Typical profile
H1 - 0 to 11 inches: silt loam
H2 - 11 to 26 inches: silty clay

H3 - 26 to 60 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Ovid

Percent of map unit: 5 percent
Hydric soil rating: No

Odessa

Percent of map unit: 5 percent
Hydric soil rating: No

Remsen

Percent of map unit: 5 percent
Hydric soil rating: No

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Lakemont

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

CoB—Churchville silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rkz
Elevation: 590 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Churchville and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Churchville

Setting

Landform: Lake plains, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey glaciolacustrine deposits over loamy till

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 26 inches: silty clay
H3 - 26 to 60 inches: gravelly loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Remsen

Percent of map unit: 5 percent
Hydric soil rating: No

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Lakemont

Percent of map unit: 5 percent
Landform: Depressions

Hydric soil rating: Yes

Ovid

Percent of map unit: 5 percent
Hydric soil rating: No

CsA—Collamer silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rl2
Elevation: 570 to 890 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Collamer and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Collamer

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 15 inches: silt loam
H3 - 15 to 32 inches: silty clay loam
H4 - 32 to 60 inches: stratified silt loam to very fine sand to silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Niagara
Percent of map unit: 5 percent
Hydric soil rating: No

Scio
Percent of map unit: 5 percent
Hydric soil rating: No

Hudson
Percent of map unit: 5 percent
Hydric soil rating: No

Schoharie
Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed soils
Percent of map unit: 5 percent
Hydric soil rating: No

CsB—Collamer silt loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9rl3
Elevation: 570 to 1,510 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Collamer and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Collamer

Setting
Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 15 inches: silt loam
H3 - 15 to 32 inches: silty clay loam
H4 - 32 to 60 inches: stratified silt loam to very fine sand to silty clay loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Scio

Percent of map unit: 5 percent
Hydric soil rating: No

Hudson

Percent of map unit: 5 percent
Hydric soil rating: No

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

Schoharie

Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

CsC—Collamer silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9rl4

Elevation: 590 to 1,530 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Collamer and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Collamer

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 15 inches: silt loam
H3 - 15 to 32 inches: silty clay loam
H4 - 32 to 60 inches: stratified silt loam to very fine sand to silty clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

Schoharie

Percent of map unit: 5 percent
Hydric soil rating: No

Niagara

Percent of map unit: 5 percent

Hydric soil rating: No

Williamson

Percent of map unit: 5 percent
Hydric soil rating: No

Hudson

Percent of map unit: 5 percent
Hydric soil rating: No

CtB—Collamer silt loam, till substratum, 3 to 8 percent slo pes

Map Unit Setting

National map unit symbol: 9rl5
Elevation: 590 to 1,460 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Collamer, till substratum, and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Collamer, Till Substratum

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 15 inches: silt loam
H3 - 15 to 48 inches: silty clay loam
H4 - 48 to 60 inches: gravelly silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent

Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

Hudson

Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Scio

Percent of map unit: 5 percent
Hydric soil rating: No

Rhinebeck

Percent of map unit: 5 percent
Hydric soil rating: No

CuB—Colonie loamy fine sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rl6
Elevation: 150 to 1,000 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Colonie and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colonie

Setting

Landform: Beach ridges, deltas
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy glaciofluvial or eolian deposits

Typical profile

H1 - 0 to 7 inches: loamy fine sand
H2 - 7 to 60 inches: fine sand
H3 - 60 to 70 inches: fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F101XY005NY - Dry Outwash
Hydric soil rating: No

Minor Components

Arkport

Percent of map unit: 5 percent
Hydric soil rating: No

Galen

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

Elnora

Percent of map unit: 5 percent
Hydric soil rating: No

Cv—Cosad loamy fine sand

Map Unit Setting

National map unit symbol: 9rl8
Elevation: 200 to 800 feet
Mean annual precipitation: 36 to 48 inches

Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Cosad and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cosad

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Sandy glaciofluvial or deltaic deposits over clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: loamy fine sand
H2 - 9 to 21 inches: loamy fine sand
H3 - 21 to 24 inches: fine sandy loam
H4 - 24 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY006NY - Moist Outwash
Hydric soil rating: No

Minor Components

Cheektowaga

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Claverack

Percent of map unit: 5 percent
Hydric soil rating: No

Odessa

Percent of map unit: 5 percent

Hydric soil rating: No

Minoa

Percent of map unit: 5 percent
Hydric soil rating: No

Lamson

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

DaB—Danley silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rl9
Elevation: 610 to 1,490 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Danley and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Danley

Setting

Landform: Drumlinoid ridges, hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived predominantly from calcareous gray shale

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 36 inches: silty clay loam
H3 - 36 to 60 inches: channery clay loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent

Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Remsen

Percent of map unit: 5 percent
Hydric soil rating: No

Langford

Percent of map unit: 5 percent
Hydric soil rating: No

Aurora

Percent of map unit: 5 percent
Hydric soil rating: No

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

DaC—Danley silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9rlb
Elevation: 660 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Danley and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Danley

Setting

Landform: Drumlinoid ridges, hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest

Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived predominantly from calcareous gray shale

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 36 inches: silty clay loam
H3 - 36 to 60 inches: channery clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Remsen

Percent of map unit: 5 percent
Hydric soil rating: No

Langford

Percent of map unit: 5 percent
Hydric soil rating: No

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Aurora

Percent of map unit: 5 percent
Hydric soil rating: No

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

DaD—Danley silt loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 9rlc
Elevation: 570 to 1,590 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Danley and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Danley

Setting

Landform: Drumlinoid ridges, hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived predominantly from calcareous gray shale

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 36 inches: silty clay loam
H3 - 36 to 60 inches: channery clay loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Langford
Percent of map unit: 5 percent
Hydric soil rating: No

Remsen
Percent of map unit: 5 percent
Hydric soil rating: No

Aurora
Percent of map unit: 5 percent
Hydric soil rating: No

Darien
Percent of map unit: 5 percent
Hydric soil rating: No

DbA—Darien silt loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 9rld
Elevation: 570 to 1,720 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Darien and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Darien

Setting
Landform: Drumlinoid ridges, hills, till plains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived predominantly from calcareous gray shale

Typical profile
H1 - 0 to 13 inches: silt loam
H2 - 13 to 34 inches: silty clay loam
H3 - 34 to 60 inches: channery silty clay loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Angola
Percent of map unit: 5 percent
Hydric soil rating: No

Derb
Percent of map unit: 5 percent
Hydric soil rating: No

Erie
Percent of map unit: 5 percent
Hydric soil rating: No

Ilion
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Danley
Percent of map unit: 5 percent
Hydric soil rating: No

DbB—Darien silt loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9rlf
Elevation: 590 to 1,820 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Darien and similar soils: 75 percent
Minor components: 25 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Darien

Setting

Landform: Drumlinoid ridges, hills, till plains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived predominantly from calcareous gray shale

Typical profile

H1 - 0 to 13 inches: silt loam
H2 - 13 to 34 inches: silty clay loam
H3 - 34 to 60 inches: channery silty clay loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Ilion

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Angola

Percent of map unit: 5 percent
Hydric soil rating: No

Derb

Percent of map unit: 5 percent
Hydric soil rating: No

Erie

Percent of map unit: 5 percent
Hydric soil rating: No

Danley

Percent of map unit: 5 percent
Hydric soil rating: No

DdA—Derb silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rlj
Elevation: 610 to 1,710 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Derb and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Derb

Setting

Landform: Till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Silty till derived from soft shale and siltstone

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 38 inches: silty clay loam
H3 - 38 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Orpark
Percent of map unit: 5 percent
Hydric soil rating: No

Hornell
Percent of map unit: 5 percent
Hydric soil rating: No

Schuyler
Percent of map unit: 5 percent
Hydric soil rating: No

Ilion
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Unnamed soils
Percent of map unit: 5 percent
Hydric soil rating: No

DdB—Derb silt loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9rlk
Elevation: 610 to 1,900 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Derb and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Derb

Setting
Landform: Till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Silty till derived from soft shale and siltstone

Typical profile
H1 - 0 to 6 inches: silt loam
H2 - 6 to 38 inches: silty clay loam

H3 - 38 to 60 inches: silty clay loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Orpark

Percent of map unit: 5 percent
Hydric soil rating: No

Hornell

Percent of map unit: 5 percent
Hydric soil rating: No

Schuyler

Percent of map unit: 5 percent
Hydric soil rating: No

Ilion

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

Dp—Dumps

Map Unit Setting

National map unit symbol: 9rlm
Elevation: 100 to 1,600 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Dumps: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dumps

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydric soil rating: Unranked

Minor Components

Lakemont

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Mardin

Percent of map unit: 5 percent
Hydric soil rating: No

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Honeoye

Percent of map unit: 5 percent
Hydric soil rating: No

FaA—Farmington channery loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rlv
Elevation: 100 to 900 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Farmington and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Farmington

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or congeliturbate derived from limestone, dolomite, shale, and sandstone, and in many places mixed with wind and water deposits

Typical profile

H1 - 0 to 9 inches: channery loam
H2 - 9 to 16 inches: channery loam
H3 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Wassaic

Percent of map unit: 5 percent
Hydric soil rating: No

Benson

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

Honeoye

Percent of map unit: 5 percent
Hydric soil rating: No

Newstead

Percent of map unit: 5 percent
Hydric soil rating: No

FbA—Farnham channery silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rlx
Elevation: 590 to 1,460 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Farnham and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Farnham

Setting

Landform: Alluvial fans, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits dominated by shale fragments

Typical profile

H1 - 0 to 7 inches: channery silt loam
H2 - 7 to 38 inches: very channery loam
H3 - 38 to 60 inches: very channery loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A/D
Hydric soil rating: No

Minor Components

Red hook
Percent of map unit: 5 percent
Hydric soil rating: No

Chenango
Percent of map unit: 5 percent
Hydric soil rating: No

Blasdell
Percent of map unit: 5 percent
Hydric soil rating: No

Scio
Percent of map unit: 5 percent
Hydric soil rating: No

Castile
Percent of map unit: 5 percent
Hydric soil rating: No

FbB—Farnham channery silt loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9rly
Elevation: 570 to 1,770 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Farnham and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Farnham

Setting
Landform: Alluvial fans, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits dominated by shale fragments

Typical profile
H1 - 0 to 7 inches: channery silt loam
H2 - 7 to 38 inches: very channery loam

H3 - 38 to 60 inches: very channery loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A/D
Hydric soil rating: No

Minor Components

Red hook

Percent of map unit: 5 percent
Hydric soil rating: No

Scio

Percent of map unit: 5 percent
Hydric soil rating: No

Castile

Percent of map unit: 5 percent
Hydric soil rating: No

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Blasdell

Percent of map unit: 5 percent
Hydric soil rating: No

Fu—Fluvaquents and Udifluvents, frequently flooded

Map Unit Setting

National map unit symbol: 9rm1
Elevation: 100 to 3,000 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Fluvaquents and similar soils: 45 percent
Udifluvents and similar soils: 30 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fluvaquents

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium with highly variable texture

Typical profile

H1 - 0 to 5 inches: gravelly silt loam
H2 - 5 to 70 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 19.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Description of Udifluvents

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium with a wide range of texture

Typical profile

H1 - 0 to 4 inches: very gravelly loam
H2 - 4 to 70 inches: very gravelly sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 19.98 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Middlebury
Percent of map unit: 5 percent
Hydric soil rating: No

Wayland
Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Haplaquolls
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Palms
Percent of map unit: 5 percent
Landform: Marshes, swamps
Hydric soil rating: Yes

Canandaigua
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

GaA—Galen very fine sandy loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 9rm2
Elevation: 570 to 1,490 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Galen and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Galen

Setting

Landform: Deltas on lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Deltaic deposits with a high content of fine and very fine sand

Typical profile

H1 - 0 to 8 inches: very fine sandy loam
H2 - 8 to 24 inches: loamy fine sand
H3 - 24 to 36 inches: loamy fine sand
H4 - 36 to 60 inches: stratified fine sand to very fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A/D
Hydric soil rating: No

Minor Components

Elnora

Percent of map unit: 5 percent
Hydric soil rating: No

Arkport

Percent of map unit: 5 percent
Hydric soil rating: No

Claverack

Percent of map unit: 5 percent
Hydric soil rating: No

Minoa

Percent of map unit: 5 percent
Hydric soil rating: No

Williamson
Percent of map unit: 5 percent
Hydric soil rating: No

GaB—Galen very fine sandy loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9rm3
Elevation: 560 to 1,430 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Galen and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Galen

Setting
Landform: Deltas on lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Deltaic deposits with a high content of fine and very fine sand

Typical profile
H1 - 0 to 8 inches: very fine sandy loam
H2 - 8 to 24 inches: loamy fine sand
H3 - 24 to 36 inches: loamy fine sand
H4 - 36 to 60 inches: stratified fine sand to very fine sand

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: A/D
Hydric soil rating: No

Minor Components

Elnora
Percent of map unit: 5 percent
Hydric soil rating: No

Minoa
Percent of map unit: 5 percent
Hydric soil rating: No

Claverack
Percent of map unit: 5 percent
Hydric soil rating: No

Williamson
Percent of map unit: 5 percent
Hydric soil rating: No

Arkport
Percent of map unit: 5 percent
Hydric soil rating: No

Ge—Getzville silt loam

Map Unit Setting
National map unit symbol: 9rm5
Elevation: 560 to 1,200 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Getzville and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Getzville

Setting
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey glaciolacustrine deposits over sandy glaciolacustrine deposits

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 24 inches: silty clay loam
H3 - 24 to 60 inches: stratified fine sand to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Raynham

Percent of map unit: 5 percent
Hydric soil rating: No

Swormville

Percent of map unit: 5 percent
Hydric soil rating: No

Minoa

Percent of map unit: 5 percent
Hydric soil rating: No

Lamson

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Ha—Halsey silt loam

Map Unit Setting

National map unit symbol: 9rm6
Elevation: 610 to 1,610 feet

Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Halsey and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Halsey

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 20 inches: gravelly silt loam
H3 - 20 to 25 inches: very gravelly sandy loam
H4 - 25 to 60 inches: stratified very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Wayland

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Fluvaquents

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Unnamed soils

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Farnham

Percent of map unit: 5 percent
Hydric soil rating: No

Red hook

Percent of map unit: 5 percent
Hydric soil rating: No

HrA—Hornell silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rmc
Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Hornell and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hornell

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey till, or till and residuum, derived from acid shale and siltstone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 29 inches: silty clay loam
H3 - 29 to 40 inches: channery silty clay
H4 - 40 to 44 inches: weathered bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Chippewa

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Derb

Percent of map unit: 5 percent
Hydric soil rating: No

Orpark

Percent of map unit: 5 percent
Hydric soil rating: No

Marilla

Percent of map unit: 5 percent
Hydric soil rating: No

Schuyler

Percent of map unit: 5 percent
Hydric soil rating: No

HrB—Hornell silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rmd
Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hornell and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hornell

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey till, or till and residuum, derived from acid shale and siltstone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 29 inches: silty clay loam
H3 - 29 to 40 inches: channery silty clay
H4 - 40 to 44 inches: weathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Chippewa

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Derb

Percent of map unit: 5 percent
Hydric soil rating: No

Marilla

Percent of map unit: 5 percent
Hydric soil rating: No

Schuyler

Percent of map unit: 5 percent
Hydric soil rating: No

Orpark

Percent of map unit: 5 percent
Hydric soil rating: No

HuB—Hudson silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rmg
Elevation: 300 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Hudson and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hudson

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey and silty glaciolacustrine deposits

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 29 inches: silty clay
H3 - 29 to 60 inches: stratified clay to silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Rhinebeck
Percent of map unit: 5 percent
Hydric soil rating: No

Odessa
Percent of map unit: 5 percent
Hydric soil rating: No

Varysburg
Percent of map unit: 5 percent
Hydric soil rating: No

Cayuga
Percent of map unit: 5 percent
Hydric soil rating: No

Collamer
Percent of map unit: 5 percent
Hydric soil rating: No

HuC—Hudson silt loam, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 9rmh
Elevation: 300 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Hudson and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hudson

Setting
Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey and silty glaciolacustrine deposits

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 29 inches: silty clay
H3 - 29 to 60 inches: stratified clay to silt loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Varysburg

Percent of map unit: 5 percent
Hydric soil rating: No

Rhinebeck

Percent of map unit: 5 percent
Hydric soil rating: No

Collamer

Percent of map unit: 5 percent
Hydric soil rating: No

Cayuga

Percent of map unit: 5 percent
Hydric soil rating: No

Odessa

Percent of map unit: 5 percent
Hydric soil rating: No

HvD—Hudson silty clay loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 9rmj
Elevation: 300 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Hudson and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hudson

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey and silty glaciolacustrine deposits

Typical profile

H1 - 0 to 6 inches: silty clay loam
H2 - 6 to 29 inches: silty clay
H3 - 29 to 60 inches: stratified clay to silt loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Cayuga

Percent of map unit: 5 percent
Hydric soil rating: No

Collamer

Percent of map unit: 5 percent
Hydric soil rating: No

Rhinebeck

Percent of map unit: 5 percent
Hydric soil rating: No

Varysburg

Percent of map unit: 5 percent
Hydric soil rating: No

Odessa

Percent of map unit: 5 percent

Hydric soil rating: No

HvE—Hudson silty clay loam, 25 to 40 percent slopes

Map Unit Setting

National map unit symbol: 9rmk
Elevation: 300 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Hudson and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hudson

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey and silty glaciolacustrine deposits

Typical profile

H1 - 0 to 6 inches: silty clay loam
H2 - 6 to 29 inches: silty clay
H3 - 29 to 60 inches: stratified clay to silt loam

Properties and qualities

Slope: 25 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Cayuga
Percent of map unit: 5 percent
Hydric soil rating: No

Collamer
Percent of map unit: 5 percent
Hydric soil rating: No

Rhinebeck
Percent of map unit: 5 percent
Hydric soil rating: No

Varysburg
Percent of map unit: 5 percent
Hydric soil rating: No

Odessa
Percent of map unit: 5 percent
Hydric soil rating: No

In—Ilion silt loam

Map Unit Setting
National map unit symbol: 9rmm
Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Ilion and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ilion

Setting
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy till derived from calcareous dark shale

Typical profile
H1 - 0 to 9 inches: silt loam
H2 - 9 to 13 inches: silty clay loam
H3 - 13 to 29 inches: silty clay loam

H4 - 29 to 60 inches: channery silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F101XY014NY - Wet Till Depression
Hydric soil rating: Yes

Minor Components

Appleton

Percent of map unit: 5 percent
Hydric soil rating: No

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Lyons

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Lb—Lakemont mucky silt loam

Map Unit Setting

National map unit symbol: 9rmq
Elevation: 570 to 1,160 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Lakemont and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lakemont

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Reddish clayey and silty glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: mucky silt loam
H2 - 9 to 29 inches: silty clay
H3 - 29 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.02 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F101XY010NY - Wet Lake Plain Depression
Hydric soil rating: Yes

Minor Components

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Cheektowaga

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Wayland
Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Palms
Percent of map unit: 5 percent
Landform: Marshes, swamps
Hydric soil rating: Yes

Lc—Lamson very fine sandy loam

Map Unit Setting
National map unit symbol: 9rmr
Elevation: 50 to 1,100 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Lamson and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lamson

Setting
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Deltaic or glaciolacustrine deposits with a high content of fine and very fine sand

Typical profile
H1 - 0 to 9 inches: very fine sandy loam
H2 - 9 to 40 inches: fine sandy loam
H3 - 40 to 60 inches: loamy very fine sand

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Ecological site: F101XY007NY - Wet Outwash
Hydric soil rating: Yes

Minor Components

Canandaigua
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Cheektowaga
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Elnora
Percent of map unit: 5 percent
Hydric soil rating: No

Halsey
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Minoa
Percent of map unit: 5 percent
Hydric soil rating: No

Ld—Lamson mucky very fine sandy loam

Map Unit Setting
National map unit symbol: 9rms
Elevation: 50 to 1,100 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Lamson and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lamson

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Deltaic or glaciolacustrine deposits with a high content of fine and very fine sand

Typical profile

H1 - 0 to 9 inches: mucky very fine sandy loam
H2 - 9 to 40 inches: fine sandy loam
H3 - 40 to 60 inches: loamy very fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Ecological site: F101XY007NY - Wet Outwash
Hydric soil rating: Yes

Minor Components

Minoa

Percent of map unit: 5 percent
Hydric soil rating: No

Cheektowaga

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Unnamed soils

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Halsey

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Canandaigua

Percent of map unit: 5 percent

Landform: Depressions
Hydric soil rating: Yes

Ly—Lyons soils, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2spjy
Elevation: 250 to 1,900 feet
Mean annual precipitation: 31 to 57 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 100 to 190 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Lyons and similar soils: 75 percent
Lyons, frequently ponded, and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lyons

Setting

Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Calcareous loamy lodgment till derived from limestone and shale

Typical profile

Ap - 0 to 10 inches: silt loam
Bg1 - 10 to 19 inches: silt loam
Bg2 - 19 to 25 inches: silty clay loam
BCg - 25 to 34 inches: gravelly silt loam
C - 34 to 79 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F101XY014NY - Wet Till Depression
Hydric soil rating: Yes

Description of Lyons, Frequently Ponded

Setting

Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Calcareous loamy lodgment till derived from limestone and shale

Typical profile

Ap - 0 to 10 inches: mucky silt loam
Bg1 - 10 to 19 inches: silt loam
Bg2 - 19 to 25 inches: silty clay loam
BCg - 25 to 34 inches: gravelly silt loam
C - 34 to 79 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 40 percent
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F101XY014NY - Wet Till Depression
Hydric soil rating: Yes

Minor Components

Appleton

Percent of map unit: 3 percent
Landform: Drumlins, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Canandaigua

Percent of map unit: 3 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Kendaia

Percent of map unit: 2 percent
Landform: Drumlins, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Palms, undrained

Percent of map unit: 1 percent
Landform: Swamps, marshes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Ilion

Percent of map unit: 1 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Lz—Lyons soils, 0 to 3 percent slopes, frequently ponded

Map Unit Setting

National map unit symbol: 2trx1
Elevation: 250 to 1,900 feet
Mean annual precipitation: 31 to 57 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 100 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Lyons, frequently ponded, and similar soils: 75 percent
Lyons and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lyons, Frequently Ponded

Setting

Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Calcareous loamy lodgment till derived from limestone and shale

Typical profile

Ap - 0 to 10 inches: mucky silt loam
Bg1 - 10 to 19 inches: silt loam
Bg2 - 19 to 25 inches: silty clay loam
BCg - 25 to 34 inches: gravelly silt loam
C - 34 to 79 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 40 percent
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F101XY014NY - Wet Till Depression
Hydric soil rating: Yes

Description of Lyons

Setting

Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Calcareous loamy lodgment till derived from limestone and shale

Typical profile

Ap - 0 to 10 inches: silt loam
Bg1 - 10 to 19 inches: silt loam
Bg2 - 19 to 25 inches: silty clay loam
BCg - 25 to 34 inches: gravelly silt loam
C - 34 to 79 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F101XY014NY - Wet Till Depression
Hydric soil rating: Yes

Minor Components

Palms

Percent of map unit: 3 percent
Landform: Marshes, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Appleton

Percent of map unit: 3 percent
Landform: Drumlins, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ilion

Percent of map unit: 2 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Canandaigua

Percent of map unit: 2 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

MaB—Manlius channery silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rn5
Elevation: 200 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Manlius and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manlius

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from local acid shale bedrock

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 21 inches: very channery silt loam
H3 - 21 to 31 inches: very channery silt loam
H4 - 31 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F140XY026PA - Dry Till Uplands
Hydric soil rating: No

Minor Components

Farnham
Percent of map unit: 5 percent
Hydric soil rating: No

Hornell
Percent of map unit: 5 percent
Hydric soil rating: No

Marilla
Percent of map unit: 5 percent
Hydric soil rating: No

Schuyler
Percent of map unit: 5 percent
Hydric soil rating: No

Orpark
Percent of map unit: 5 percent
Hydric soil rating: No

MaC—Manlius channery silt loam, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 9rn6
Elevation: 200 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Manlius and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manlius

Setting
Landform: Benches, ridges, till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from local acid shale bedrock

Typical profile
H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 21 inches: very channery silt loam
H3 - 21 to 31 inches: very channery silt loam

H4 - 31 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F140XY026PA - Dry Till Uplands
Hydric soil rating: No

Minor Components

Farnham

Percent of map unit: 5 percent
Hydric soil rating: No

Hornell

Percent of map unit: 5 percent
Hydric soil rating: No

Orpark

Percent of map unit: 5 percent
Hydric soil rating: No

Marilla

Percent of map unit: 5 percent
Hydric soil rating: No

Schuyler

Percent of map unit: 5 percent
Hydric soil rating: No

MaD—Manlius channery silt loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 9rn7
Elevation: 200 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Manlius and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manlius

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from local acid shale bedrock

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 21 inches: very channery silt loam
H3 - 21 to 31 inches: very channery silt loam
H4 - 31 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F140XY026PA - Dry Till Uplands
Hydric soil rating: No

Minor Components

Blasdell

Percent of map unit: 4 percent
Hydric soil rating: No

Hornell

Percent of map unit: 4 percent
Hydric soil rating: No

Orpark

Percent of map unit: 4 percent
Hydric soil rating: No

Schuyler

Percent of map unit: 4 percent
Hydric soil rating: No

Aurora
Percent of map unit: 4 percent
Hydric soil rating: No

MbF—Manlius very channery silt loam, 35 to 50 percent slope s

Map Unit Setting
National map unit symbol: 9rn9
Elevation: 200 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Manlius and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manlius

Setting
Landform: Benches, ridges, till plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from local acid shale bedrock

Typical profile
H1 - 0 to 4 inches: very channery silt loam
H2 - 4 to 20 inches: very channery silt loam
H3 - 20 to 25 inches: very channery silt loam
H4 - 25 to 29 inches: unweathered bedrock

Properties and qualities
Slope: 35 to 50 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C

Ecological site: F140XY026PA - Dry Till Uplands
Hydric soil rating: No

Minor Components

Orpark
Percent of map unit: 5 percent
Hydric soil rating: No

Schuyler
Percent of map unit: 5 percent
Hydric soil rating: No

Aurora
Percent of map unit: 5 percent
Hydric soil rating: No

Blasdell
Percent of map unit: 5 percent
Hydric soil rating: No

Hornell
Percent of map unit: 5 percent
Hydric soil rating: No

MfA—Marilla channery silt loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 9rnj
Elevation: 670 to 1,440 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Marilla and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Marilla

Setting
Landform: Till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Channery loamy till derived predominantly from acid shale

Typical profile
H1 - 0 to 8 inches: channery silt loam

H2 - 8 to 18 inches: channery silt loam
H3 - 18 to 60 inches: channery silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 15 to 30 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Mardin

Percent of map unit: 5 percent
Hydric soil rating: No

Derb

Percent of map unit: 5 percent
Hydric soil rating: No

Manlius

Percent of map unit: 5 percent
Hydric soil rating: No

Farnham

Percent of map unit: 5 percent
Hydric soil rating: No

MfB—Marilla channery silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rnk
Elevation: 670 to 1,790 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Marilla and similar soils: 80 percent
Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Marilla

Setting

Landform: Till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Channery loamy till derived predominantly from acid shale

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 18 inches: channery silt loam
H3 - 18 to 60 inches: channery silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 15 to 30 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Mardin

Percent of map unit: 5 percent
Hydric soil rating: No

Farnham

Percent of map unit: 5 percent
Hydric soil rating: No

Derb

Percent of map unit: 5 percent
Hydric soil rating: No

Manlius

Percent of map unit: 5 percent
Hydric soil rating: No

MfC—Marilla channery silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9rnl
Elevation: 720 to 1,750 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Marilla and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Marilla

Setting

Landform: Till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Channery loamy till derived predominantly from acid shale

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 18 inches: channery silt loam
H3 - 18 to 60 inches: channery silt loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 15 to 30 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Derb
Percent of map unit: 5 percent
Hydric soil rating: No

Volusia
Percent of map unit: 5 percent
Hydric soil rating: No

Manlius
Percent of map unit: 5 percent
Hydric soil rating: No

Mardin
Percent of map unit: 5 percent
Hydric soil rating: No

Mg—Middlebury silt loam

Map Unit Setting
National map unit symbol: 9rnm
Elevation: 570 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Middlebury and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Middlebury

Setting
Landform: Flood plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy alluvium predominantly from areas of shale and sandstone with some lime-bearing material

Typical profile
H1 - 0 to 9 inches: silt loam
H2 - 9 to 37 inches: silt loam
H3 - 37 to 60 inches: stratified sand to fine sand

Properties and qualities
Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F140XY014NY - Low Floodplain
Hydric soil rating: No

Minor Components

Tioga

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

Teel

Percent of map unit: 5 percent
Hydric soil rating: No

Wayland

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Mh—Minoa very fine sandy loam

Map Unit Setting

National map unit symbol: 9rnn
Elevation: 250 to 800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Minoa and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Minoa

Setting

Landform: Deltas on lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Deltaic or glaciolacustrine deposits with a high content of fine and very fine sand

Typical profile

H1 - 0 to 9 inches: very fine sandy loam
H2 - 9 to 24 inches: loamy very fine sand
H3 - 24 to 40 inches: loamy very fine sand
H4 - 40 to 60 inches: loamy very fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F101XY006NY - Moist Outwash
Hydric soil rating: No

Minor Components

Lamson

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

Cosad

Percent of map unit: 5 percent
Hydric soil rating: No

Elnora

Percent of map unit: 5 percent
Hydric soil rating: No

Galen

Percent of map unit: 5 percent
Hydric soil rating: No

NfA—Niagara silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rnq
Elevation: 560 to 1,490 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Niagara and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Niagara

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 27 inches: silt loam
H3 - 27 to 72 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Cosad
Percent of map unit: 5 percent
Hydric soil rating: No

Raynham
Percent of map unit: 5 percent
Hydric soil rating: No

Collamer
Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Swormville
Percent of map unit: 5 percent
Hydric soil rating: No

NfB—Niagara silt loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9rnr
Elevation: 590 to 1,510 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Niagara and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Niagara

Setting
Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile
H1 - 0 to 11 inches: silt loam
H2 - 11 to 27 inches: silt loam

H3 - 27 to 72 inches: silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Swormville

Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Cosad

Percent of map unit: 5 percent
Hydric soil rating: No

Rhinebeck

Percent of map unit: 5 percent
Hydric soil rating: No

Collamer

Percent of map unit: 5 percent
Hydric soil rating: No

Nh—Niagara silt loam, till substratum

Map Unit Setting

National map unit symbol: 9rnt
Elevation: 570 to 1,530 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Niagara, till substratum, and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Niagara, Till Substratum

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 12 inches: silt loam
H2 - 12 to 26 inches: silt loam
H3 - 26 to 40 inches: silt loam
H4 - 40 to 60 inches: channery silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Odessa

Percent of map unit: 5 percent
Hydric soil rating: No

Collamer

Percent of map unit: 5 percent
Hydric soil rating: No

Raynham

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

OrA—Orpark silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rnx
Elevation: 570 to 1,510 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Orpark and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orpark

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived mainly from shale, siltstone, and sandstone

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 22 inches: silty clay loam
H3 - 22 to 27 inches: silty clay loam
H4 - 27 to 31 inches: weathered bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F140XY028NY - Moist Till Upland
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Derb

Percent of map unit: 5 percent
Hydric soil rating: No

Volusia

Percent of map unit: 5 percent
Hydric soil rating: No

Angola

Percent of map unit: 5 percent
Hydric soil rating: No

Hornell

Percent of map unit: 5 percent
Hydric soil rating: No

OrB—Orpark silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rny
Elevation: 570 to 1,640 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Orpark and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orpark

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope

Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived mainly from shale, siltstone, and sandstone

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 22 inches: silty clay loam
H3 - 22 to 27 inches: silty clay loam
H4 - 27 to 31 inches: weathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F140XY028NY - Moist Till Upland
Hydric soil rating: No

Minor Components

Angola

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed soils

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Derb

Percent of map unit: 5 percent
Hydric soil rating: No

Volusia

Percent of map unit: 5 percent
Hydric soil rating: No

Hornell

Percent of map unit: 5 percent
Hydric soil rating: No

OrC—Orpark silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9rnz
Elevation: 590 to 1,570 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Orpark and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orpark

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived mainly from shale, siltstone, and sandstone

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 22 inches: silty clay loam
H3 - 22 to 27 inches: silty clay loam
H4 - 27 to 31 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F140XY028NY - Moist Till Upland
Hydric soil rating: No

Minor Components

Unnamed soils
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Derb
Percent of map unit: 5 percent
Hydric soil rating: No

Hornell
Percent of map unit: 5 percent
Hydric soil rating: No

Schuyler
Percent of map unit: 5 percent
Hydric soil rating: No

Angola
Percent of map unit: 5 percent
Hydric soil rating: No

Pa—Palms muck

Map Unit Setting
National map unit symbol: 9rp2
Elevation: 250 to 1,500 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Palms and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Palms

Setting
Landform: Swamps, marshes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over loamy glacial drift

Typical profile
H1 - 0 to 38 inches: muck
H2 - 38 to 60 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F101XY004NY - Mucky Depression
Hydric soil rating: Yes

Minor Components

Lamson

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Edwards

Percent of map unit: 5 percent
Landform: Marshes, swamps
Hydric soil rating: Yes

Unnamed soils

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Halsey

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

PbA—Palmyra gravelly loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rp3
Elevation: 610 to 1,000 feet

Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Palmyra and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Palmyra

Setting

Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy over sandy and gravelly glaciofluvial deposits, derived mainly from limestone and other sedimentary rocks

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 28 inches: gravelly clay loam
H3 - 28 to 60 inches: stratified very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: A
Ecological site: F101XY005NY - Dry Outwash
Hydric soil rating: No

Minor Components

Arkport

Percent of map unit: 5 percent
Hydric soil rating: No

Phelps

Percent of map unit: 5 percent
Hydric soil rating: No

Halsey

Percent of map unit: 5 percent
Landform: Depressions

Hydric soil rating: Yes

Minoa

Percent of map unit: 5 percent
Hydric soil rating: No

PbB—Palmyra gravelly loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rp4
Elevation: 620 to 1,660 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Palmyra and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Palmyra

Setting

Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy over sandy and gravelly glaciofluvial deposits, derived mainly from limestone and other sedimentary rocks

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 28 inches: gravelly clay loam
H3 - 28 to 60 inches: stratified very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F101XY005NY - Dry Outwash
Hydric soil rating: No

Minor Components

Phelps
Percent of map unit: 5 percent
Hydric soil rating: No

Arkport
Percent of map unit: 5 percent
Hydric soil rating: No

Minoa
Percent of map unit: 5 percent
Hydric soil rating: No

Halsey
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Pc—Patchin silt loam

Map Unit Setting
National map unit symbol: 9rp5
Elevation: 800 to 1,400 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Patchin and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Patchin

Setting
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy till

Typical profile
H1 - 0 to 10 inches: silt loam
H2 - 10 to 23 inches: silty clay loam

H3 - 23 to 27 inches: weathered bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Hornell

Percent of map unit: 5 percent
Hydric soil rating: No

Lyons

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Derb

Percent of map unit: 5 percent
Hydric soil rating: No

Ilion

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Orpark

Percent of map unit: 5 percent
Hydric soil rating: No

PhA—Phelps gravelly loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rp6
Elevation: 570 to 1,130 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Phelps and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Phelps

Setting

Landform: Valley trains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, containing significant amounts of limestone

Typical profile

H1 - 0 to 10 inches: gravelly loam
H2 - 10 to 15 inches: gravelly loam
H3 - 15 to 28 inches: gravelly loam
H4 - 28 to 32 inches: gravelly sandy loam
H5 - 32 to 60 inches: stratified very gravelly loamy sand to sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Red hook

Percent of map unit: 5 percent
Hydric soil rating: No

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Palmyra

Percent of map unit: 5 percent
Hydric soil rating: No

Alton

Percent of map unit: 5 percent

Hydric soil rating: No

PhB—Phelps gravelly loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rp7
Elevation: 590 to 1,340 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Phelps and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Phelps

Setting

Landform: Valley trains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, containing significant amounts of limestone

Typical profile

H1 - 0 to 10 inches: gravelly loam
H2 - 10 to 15 inches: gravelly loam
H3 - 15 to 28 inches: gravelly loam
H4 - 28 to 32 inches: gravelly sandy loam
H5 - 32 to 60 inches: stratified very gravelly loamy sand to sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D

Hydric soil rating: No

Minor Components

Chenango
Percent of map unit: 5 percent
Hydric soil rating: No

Alton
Percent of map unit: 5 percent
Hydric soil rating: No

Palmyra
Percent of map unit: 5 percent
Hydric soil rating: No

Red hook
Percent of map unit: 5 percent
Hydric soil rating: No

Pt—Pits, borrow

Map Unit Setting
National map unit symbol: 9rp8
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Pits, borrow: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Langford
Percent of map unit: 5 percent
Hydric soil rating: No

Palmyra
Percent of map unit: 5 percent
Hydric soil rating: No

Mardin
Percent of map unit: 5 percent
Hydric soil rating: No

Udorthents
Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Pu—Pits, gravel

Map Unit Setting
National map unit symbol: 9rp9
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Pits, gravel: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Red hook
Percent of map unit: 5 percent
Hydric soil rating: No

Minoa
Percent of map unit: 5 percent
Hydric soil rating: No

Udorthents
Percent of map unit: 5 percent
Hydric soil rating: No

Chenango
Percent of map unit: 5 percent
Hydric soil rating: No

Galen
Percent of map unit: 5 percent
Hydric soil rating: No

Halsey
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Qu—Quarry

Map Unit Setting

National map unit symbol: 9rpb
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Quarry: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Appleton

Percent of map unit: 5 percent
Hydric soil rating: No

Manlius

Percent of map unit: 5 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: Unranked

Udorthents

Percent of map unit: 5 percent
Hydric soil rating: No

Lyons

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

RaA—Raynham silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rpc
Elevation: 50 to 500 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Raynham and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Raynham

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Glaciolacustrine, eolian, or old alluvial deposits, comprised mainly of silt and very fine sand

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 26 inches: silt loam
H3 - 26 to 42 inches: silt loam
H4 - 42 to 60 inches: stratified fine sand to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Scio

Percent of map unit: 5 percent
Hydric soil rating: No

Lamson

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Minoa

Percent of map unit: 5 percent
Hydric soil rating: No

Niagara

Percent of map unit: 5 percent

Hydric soil rating: No

Williamson

Percent of map unit: 5 percent
Hydric soil rating: No

RaB—Raynham silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rpd
Elevation: 50 to 500 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Raynham and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Raynham

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Glaciolacustrine, eolian, or old alluvial deposits, comprised mainly of silt and very fine sand

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 26 inches: silt loam
H3 - 26 to 42 inches: silt loam
H4 - 42 to 60 inches: stratified fine sand to silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Collamer

Percent of map unit: 5 percent
Hydric soil rating: No

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

Minoa

Percent of map unit: 5 percent
Hydric soil rating: No

Williamson

Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Re—Red Hook silt loam

Map Unit Setting

National map unit symbol: 9rpf
Elevation: 570 to 1,740 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Red hook and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Red Hook

Setting

Landform: Valley trains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave

Across-slope shape: Linear
Parent material: Loamy glaciofluvial deposits

Typical profile
H1 - 0 to 10 inches: silt loam
H2 - 10 to 23 inches: loam
H3 - 23 to 60 inches: stratified channery loam to sandy loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Farnham
Percent of map unit: 5 percent
Hydric soil rating: No

Castile
Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed soils
Percent of map unit: 5 percent
Hydric soil rating: No

Rhinebeck
Percent of map unit: 5 percent
Hydric soil rating: No

Halsey
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

RfA—Remsen silty clay loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 9rpg

Elevation: 590 to 1,230 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Remsen and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Remsen

Setting

Landform: Till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey till derived predominantly from calcareous or neutral shale

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 36 inches: clay
H3 - 36 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Brockport

Percent of map unit: 5 percent
Hydric soil rating: No

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Derb

Percent of map unit: 5 percent
Hydric soil rating: No

Churchville

Percent of map unit: 5 percent
Hydric soil rating: No

RfB—Remsen silty clay loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rph
Elevation: 570 to 1,480 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Remsen and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Remsen

Setting

Landform: Till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey till derived predominantly from calcareous or neutral shale

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 36 inches: clay
H3 - 36 to 60 inches: clay

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Darien
Percent of map unit: 5 percent
Hydric soil rating: No

Brockport
Percent of map unit: 5 percent
Hydric soil rating: No

Derb
Percent of map unit: 5 percent
Hydric soil rating: No

Canadice
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Churchville
Percent of map unit: 5 percent
Hydric soil rating: No

RfC—Remsen silty clay loam, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 9rpj
Elevation: 590 to 1,440 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Remsen and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Remsen

Setting
Landform: Till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey till derived predominantly from calcareous or neutral shale

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 36 inches: clay
H3 - 36 to 60 inches: clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Darien

Percent of map unit: 5 percent
Hydric soil rating: No

Danley

Percent of map unit: 5 percent
Hydric soil rating: No

Churchville

Percent of map unit: 5 percent
Hydric soil rating: No

Brockport

Percent of map unit: 5 percent
Hydric soil rating: No

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

RgA—Rhinebeck silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rpk
Elevation: 80 to 1,000 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Rhinebeck and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rhinebeck

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey and silty glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 37 inches: silty clay
H3 - 37 to 70 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Churchville

Percent of map unit: 5 percent
Hydric soil rating: No

Hudson

Percent of map unit: 5 percent
Hydric soil rating: No

Niagara

Percent of map unit: 5 percent

Hydric soil rating: No

Odessa

Percent of map unit: 5 percent
Hydric soil rating: No

RgB—Rhinebeck silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rpl
Elevation: 80 to 1,000 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Rhinebeck and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rhinebeck

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey and silty glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 37 inches: silty clay
H3 - 37 to 70 inches: silty clay

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Odessa
Percent of map unit: 5 percent
Hydric soil rating: No

Niagara
Percent of map unit: 5 percent
Hydric soil rating: No

Canadice
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Hudson
Percent of map unit: 5 percent
Hydric soil rating: No

Churchville
Percent of map unit: 5 percent
Hydric soil rating: No

RhC3—Rhinebeck silty clay loam, 8 to 15 percent slopes, seve relyeroded

Map Unit Setting
National map unit symbol: 9rpm
Elevation: 80 to 1,000 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Rhinebeck, severely eroded, and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rhinebeck, Severely Eroded

Setting
Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey and silty glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 37 inches: silty clay
H3 - 37 to 70 inches: silty clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D
Ecological site: F140XY018NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Churchville

Percent of map unit: 5 percent
Hydric soil rating: No

Collamer

Percent of map unit: 5 percent
Hydric soil rating: No

Varysburg

Percent of map unit: 5 percent
Hydric soil rating: No

Hudson

Percent of map unit: 5 percent
Hydric soil rating: No

RkA—Rhinebeck gravelly loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rpn
Elevation: 80 to 1,000 feet

Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Rhinebeck and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rhinebeck

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey and silty glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 37 inches: silty clay
H3 - 37 to 70 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Churchville

Percent of map unit: 5 percent
Hydric soil rating: No

Varysburg

Percent of map unit: 5 percent
Hydric soil rating: No

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

Red hook

Percent of map unit: 5 percent
Hydric soil rating: No

RkB—Rhinebeck gravelly loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rpp
Elevation: 80 to 1,000 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Rhinebeck and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rhinebeck

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey and silty glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 37 inches: silty clay
H3 - 37 to 70 inches: silty clay

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F140XY018NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Red hook

Percent of map unit: 5 percent
Hydric soil rating: No

Niagara

Percent of map unit: 5 percent
Hydric soil rating: No

Varysburg

Percent of map unit: 5 percent
Hydric soil rating: No

Churchville

Percent of map unit: 5 percent
Hydric soil rating: No

Canadice

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Ro—Rock outcrop

Map Unit Setting

National map unit symbol: 9rps
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Manlius
Percent of map unit: 10 percent
Hydric soil rating: No

Farmington
Percent of map unit: 10 percent
Hydric soil rating: No

Unnamed soils
Percent of map unit: 5 percent
Hydric soil rating: No

ScD—Schuyler silt loam, 15 to 25 percent slopes

Map Unit Setting
National map unit symbol: 9rpx
Elevation: 620 to 1,620 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Schuyler and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Schuyler

Setting
Landform: Drumlinoid ridges, hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived mainly from shale with some siltstone and sandstone

Typical profile
H1 - 0 to 6 inches: silt loam
H2 - 6 to 42 inches: channery silt loam
H3 - 42 to 48 inches: very channery silt loam
H4 - 48 to 52 inches: weathered bedrock

Properties and qualities
Slope: 15 to 25 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B/D
Ecological site: F140XY028NY - Moist Till Upland
Hydric soil rating: No

Minor Components

Hornell

Percent of map unit: 5 percent
Hydric soil rating: No

Orpark

Percent of map unit: 5 percent
Hydric soil rating: No

Marilla

Percent of map unit: 5 percent
Hydric soil rating: No

Derb

Percent of map unit: 5 percent
Hydric soil rating: No

Sd—Scio silt loam

Map Unit Setting

National map unit symbol: 9rpz
Elevation: 100 to 1,000 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Scio and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scio

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Glaciolacustrine deposits, eolian deposits, or old alluvium, comprised mainly of silt and very fine sand

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 34 inches: silt loam
H3 - 34 to 42 inches: silt loam
H4 - 42 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Collamer

Percent of map unit: 5 percent
Hydric soil rating: No

Allard

Percent of map unit: 5 percent
Hydric soil rating: No

Raynham

Percent of map unit: 5 percent
Hydric soil rating: No

Williamson

Percent of map unit: 5 percent
Hydric soil rating: No

Arkport

Percent of map unit: 5 percent
Hydric soil rating: No

Sw—Swormville clay loam

Map Unit Setting

National map unit symbol: 9rq0
Elevation: 250 to 650 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Swormville and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swormville

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Silty glaciolacustrine deposits overlying sandy glaciolacustrine, deltaic, or glaciofluvial deposits

Typical profile

H1 - 0 to 8 inches: clay loam
H2 - 8 to 20 inches: clay loam
H3 - 20 to 26 inches: loamy fine sand
H4 - 26 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Minoa
Percent of map unit: 5 percent
Hydric soil rating: No

Raynham
Percent of map unit: 5 percent
Hydric soil rating: No

Lamson
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Niagara
Percent of map unit: 5 percent
Hydric soil rating: No

Getzville
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

To—Tioga silt loam

Map Unit Setting
National map unit symbol: 9rq2
Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Tioga and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tioga

Setting
Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy alluvium

Typical profile
H1 - 0 to 10 inches: silt loam

H2 - 10 to 43 inches: silt loam
2B - 43 to 51 inches: sandy loam
H4 - 51 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Middlebury

Percent of map unit: 5 percent
Hydric soil rating: No

Udifluvents

Percent of map unit: 5 percent
Hydric soil rating: No

Hamlin

Percent of map unit: 5 percent
Hydric soil rating: No

Uc—Udorthents, smoothed

Map Unit Setting

National map unit symbol: 9rq3
Elevation: 560 to 1,390 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 75 percent

Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Properties and qualities
Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Depth to water table: About 36 to 72 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydric soil rating: No

Minor Components

Appleton
Percent of map unit: 5 percent
Hydric soil rating: No

Chippewa
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Langford
Percent of map unit: 5 percent
Hydric soil rating: No

Odessa
Percent of map unit: 5 percent
Hydric soil rating: No

Hudson
Percent of map unit: 5 percent
Hydric soil rating: No

Ud—Urban land

Map Unit Setting
National map unit symbol: 9rq4
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Urban land: 80 percent

Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Udorthents
Percent of map unit: 5 percent
Hydric soil rating: No

Getzville
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Mardin
Percent of map unit: 5 percent
Hydric soil rating: No

Odessa
Percent of map unit: 5 percent
Hydric soil rating: No

Ug—Urban land-Cayuga complex

Map Unit Setting
National map unit symbol: 9rq7
Elevation: 570 to 710 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Urban land: 60 percent
Cayuga and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Description of Cayuga

Setting
Landform: Lake plains, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest, tread
Down-slope shape: Concave
Across-slope shape: Convex

Parent material: Clayey glaciolacustrine deposits over loamy till derived from limestone, dolomite, sandstone, or shale

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 26 inches: silty clay
H3 - 26 to 60 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Collamer

Percent of map unit: 4 percent
Hydric soil rating: No

Udorthents

Percent of map unit: 2 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Unnamed soils

Percent of map unit: 2 percent
Hydric soil rating: No

Uh—Urban land-Churchville complex

Map Unit Setting

National map unit symbol: 9rq9
Elevation: 570 to 720 feet

Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 65 percent
Churchville and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Churchville

Setting

Landform: Lake plains, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey glaciolacustrine deposits over loamy till

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 26 inches: silty clay
H3 - 26 to 60 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Niagara

Percent of map unit: 3 percent
Hydric soil rating: No

Ovid

Percent of map unit: 3 percent
Hydric soil rating: No

Lakemont

Percent of map unit: 2 percent
Landform: Depressions

Hydric soil rating: Yes

Udorthents

Percent of map unit: 2 percent
Hydric soil rating: No

UmA—Urban land-Collamer complex, 1 to 6 percent slopes

Map Unit Setting

National map unit symbol: 9rqb
Elevation: 570 to 660 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 60 percent
Collamer and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Description of Collamer

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 15 inches: silt loam
H3 - 15 to 32 inches: silty clay loam
H4 - 32 to 60 inches: stratified silt loam to very fine sand to silty clay loam

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)

Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Udorthents

Percent of map unit: 3 percent
Hydric soil rating: No

Niagara

Percent of map unit: 3 percent
Hydric soil rating: No

Williamson

Percent of map unit: 2 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Us—Urban land-Niagara complex

Map Unit Setting

National map unit symbol: 9rqh
Elevation: 560 to 670 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 60 percent
Niagara and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Description of Niagara

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 27 inches: silt loam
H3 - 27 to 72 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY009NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Udorthents

Percent of map unit: 3 percent
Hydric soil rating: No

Raynham

Percent of map unit: 3 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Swormville

Percent of map unit: 2 percent

Hydric soil rating: No

Uv—Urban land-Swormville complex

Map Unit Setting

National map unit symbol: 9rql
Elevation: 250 to 650 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent
Swormville and similar soils: 25 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Description of Swormville

Typical profile

H1 - 0 to 8 inches: clay loam
H2 - 8 to 20 inches: clay loam
H3 - 20 to 26 inches: loamy fine sand
H4 - 26 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Udorthents
Percent of map unit: 2 percent
Hydric soil rating: No

Getzville
Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Raynham
Percent of map unit: 1 percent
Hydric soil rating: No

Uw—Urban land-Teel complex

Map Unit Setting
National map unit symbol: 9rqm
Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Urban land: 60 percent
Teel and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Description of Teel

Setting
Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Silty alluvium

Typical profile
H1 - 0 to 9 inches: silt loam

H2 - 9 to 48 inches: silt loam
H3 - 48 to 60 inches: stratified very fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Hamlin

Percent of map unit: 5 percent
Hydric soil rating: No

Udorthents

Percent of map unit: 5 percent
Hydric soil rating: No

Wayland

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

VbB—Varysburg gravelly loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rqt
Elevation: 570 to 1,620 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Varysburg and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Varysburg

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 21 inches: very gravelly loam
Bt - 21 to 28 inches: very gravelly loam
2Bt - 28 to 41 inches: silty clay
2C - 41 to 60 inches: stratified silty clay to silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 33 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Alton

Percent of map unit: 5 percent
Hydric soil rating: No

Rhinebeck

Percent of map unit: 5 percent
Hydric soil rating: No

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Hudson

Percent of map unit: 5 percent
Hydric soil rating: No

VbC—Varysburg gravelly loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9rqv
Elevation: 670 to 1,530 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Varysburg and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Varysburg

Setting

Landform: Lake plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 21 inches: very gravelly loam
Bt - 21 to 28 inches: very gravelly loam
2Bt - 28 to 41 inches: silty clay
2C - 41 to 60 inches: stratified silty clay to silt loam

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 33 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Rhinebeck
Percent of map unit: 5 percent
Hydric soil rating: No

Chenango
Percent of map unit: 5 percent
Hydric soil rating: No

Hudson
Percent of map unit: 5 percent
Hydric soil rating: No

Alton
Percent of map unit: 5 percent
Hydric soil rating: No

VbD—Varysburg gravelly loam, 15 to 25 percent slopes

Map Unit Setting
National map unit symbol: 9rqw
Elevation: 640 to 1,540 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Varysburg and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Varysburg

Setting
Landform: Lake plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over clayey glaciolacustrine deposits

Typical profile
H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 21 inches: very gravelly loam
Bt - 21 to 28 inches: very gravelly loam
2Bt - 28 to 41 inches: silty clay
2C - 41 to 60 inches: stratified silty clay to silt loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 33 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Rhinebeck

Percent of map unit: 5 percent
Hydric soil rating: No

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Hudson

Percent of map unit: 5 percent
Hydric soil rating: No

Alton

Percent of map unit: 5 percent
Hydric soil rating: No

VbE—Varysburg gravelly loam, 25 to 50 percent slopes

Map Unit Setting

National map unit symbol: 9rqx
Elevation: 690 to 1,560 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Varysburg and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Varysburg

Setting

Landform: Lake plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 21 inches: very gravelly loam
Bt - 21 to 28 inches: very gravelly loam
2Bt - 28 to 41 inches: silty clay
2C - 41 to 60 inches: stratified silty clay to silt loam

Properties and qualities

Slope: 25 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 33 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Hudson

Percent of map unit: 5 percent
Hydric soil rating: No

Rhinebeck

Percent of map unit: 5 percent
Hydric soil rating: No

Alton

Percent of map unit: 5 percent
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: 9rr2
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

WbB—Wassaic very stony loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rr5
Elevation: 800 to 1,750 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Wassaic, very stony, and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wassaic, Very Stony

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from limestone, with varying amounts of sandstone, shale, and crystalline rock

Typical profile

H1 - 0 to 10 inches: loam
H2 - 10 to 23 inches: gravelly silt loam
C - 23 to 28 inches: gravelly loam
R - 28 to 32 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 19 to 39 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Cazenovia

Percent of map unit: 5 percent
Hydric soil rating: No

Newstead

Percent of map unit: 5 percent
Hydric soil rating: No

Honeoye

Percent of map unit: 5 percent
Hydric soil rating: No

Lima

Percent of map unit: 5 percent
Hydric soil rating: No

Farmington

Percent of map unit: 5 percent
Hydric soil rating: No

Wd—Wayland soils complex, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2srgv
Elevation: 160 to 1,970 feet
Mean annual precipitation: 31 to 68 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Wayland and similar soils: 60 percent
Wayland, very poorly drained, and similar soils: 30 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wayland

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty and clayey alluvium derived from interbedded sedimentary rock

Typical profile

A - 0 to 6 inches: silt loam
Bg1 - 6 to 12 inches: silt loam
Bg2 - 12 to 18 inches: silt loam
C1 - 18 to 46 inches: silt loam
C2 - 46 to 72 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F139XY009OH - Wet Floodplain
Hydric soil rating: Yes

Description of Wayland, Very Poorly Drained

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey alluvium derived from interbedded sedimentary rock

Typical profile

A - 0 to 6 inches: mucky silt loam
Bg1 - 6 to 12 inches: silt loam
Bg2 - 12 to 18 inches: silt loam
C1 - 18 to 46 inches: silt loam
C2 - 46 to 72 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F139XY009OH - Wet Floodplain
Hydric soil rating: Yes

Minor Components

Wakeville

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

WeB—Williamson silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rr8
Elevation: 570 to 1,540 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Williamson and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Williamson

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Glaciolacustrine or eolian deposits with a high content of silt and very fine sand

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 18 inches: silt loam
H3 - 18 to 45 inches: very fine sandy loam
H4 - 45 to 60 inches: stratified silt loam to loamy very fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 15 to 24 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 13 to 22 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Collamer

Percent of map unit: 4 percent
Hydric soil rating: No

Niagara

Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed soils

Percent of map unit: 4 percent
Hydric soil rating: No

Scio

Percent of map unit: 4 percent
Hydric soil rating: No

Arkport

Percent of map unit: 4 percent
Hydric soil rating: No

WeC—Williamson silt loam, 8 to 15 percent slope

Map Unit Setting

National map unit symbol: 9rr9
Elevation: 720 to 1,530 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Williamson and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Williamson

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Glaciolacustrine or eolian deposits with a high content of silt and very fine sand

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 18 inches: silt loam
H3 - 18 to 45 inches: very fine sandy loam
H4 - 45 to 60 inches: stratified silt loam to loamy very fine sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 15 to 24 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 13 to 22 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Collamer
Percent of map unit: 4 percent
Hydric soil rating: No

Scio
Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed soils
Percent of map unit: 4 percent
Hydric soil rating: No

Niagara
Percent of map unit: 4 percent
Hydric soil rating: No

Arkport
Percent of map unit: 4 percent
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (Town of Hamburg)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

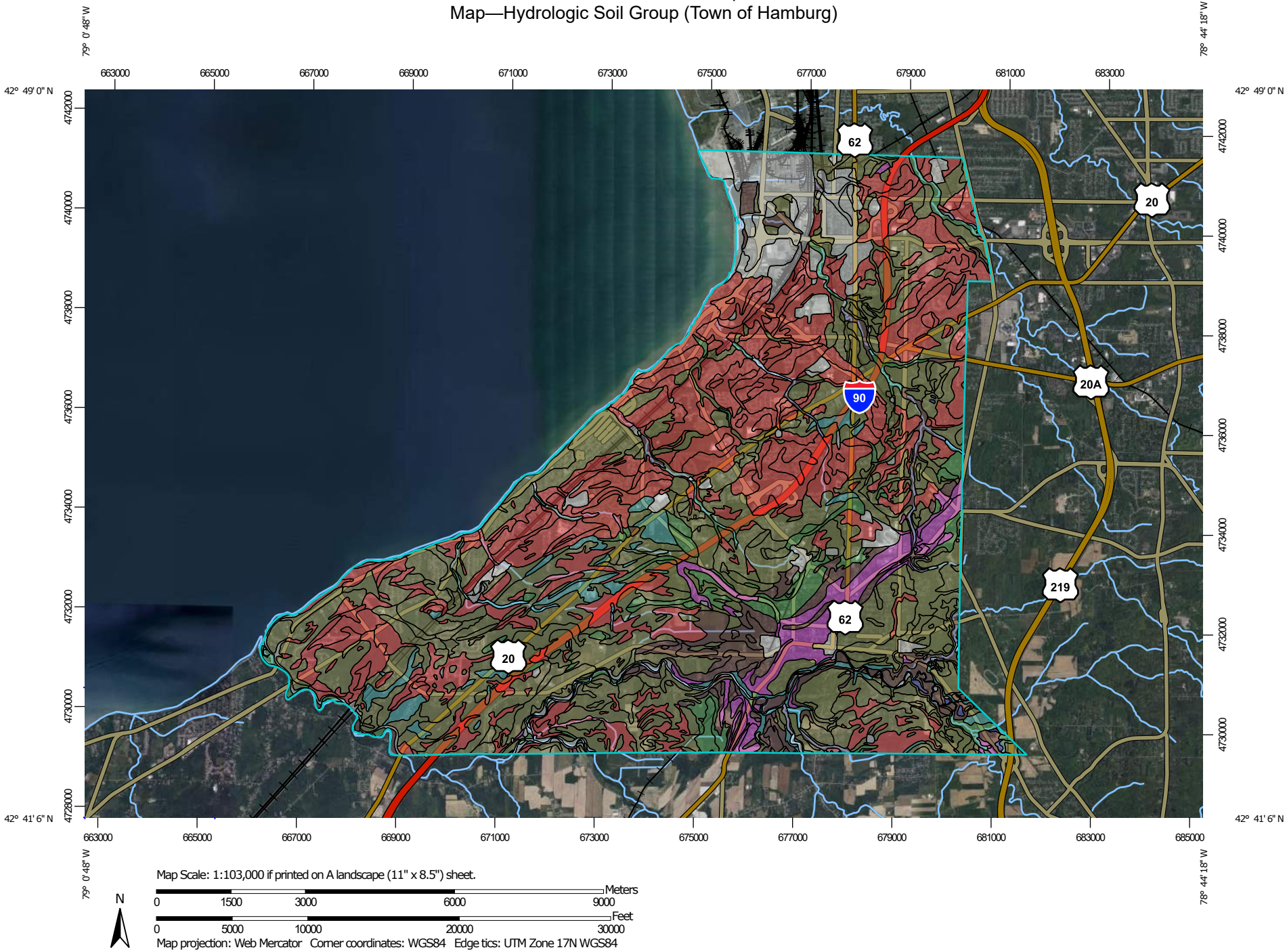
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group (Town of Hamburg)



Map Scale: 1:103,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 1500 3000 6000 9000

Feet
0 5000 10000 20000 30000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Erie County, New York
Survey Area Data: Version 21, Aug 29, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 19, 2014—May 18, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group (Town of Hamburg)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AlB	Allard silt loam, 3 to 8 percent slopes	B	25.2	0.1%
AmA	Alton fine gravelly loam, 0 to 3 percent slopes	A	561.1	2.1%
AmB	Alton fine gravelly loam, 3 to 8 percent slopes	A	70.9	0.3%
AmC	Alton fine gravelly loam, 8 to 15 percent slopes	A	43.4	0.2%
AoA	Angola silt loam, 0 to 3 percent slopes	D	943.1	3.6%
AoB	Angola silt loam, 3 to 8 percent slopes	D	460.5	1.7%
ArC	Arkport very fine sandy loam, 8 to 15 percent slopes	A	3.1	0.0%
AuC	Aurora channery silt loam, 8 to 15 percent slopes	D	70.3	0.3%
Be	Beaches		122.4	0.5%
BlA	Blasdell channery silt loam, 0 to 3 percent slopes	A	93.0	0.4%
BlB	Blasdell channery silt loam, 3 to 8 percent slopes	A	113.8	0.4%
BlC	Blasdell channery silt loam, 8 to 15 percent slopes	A	19.8	0.1%
BlD	Blasdell channery silt loam, 15 to 25 percent slopes	A	7.3	0.0%
BrA	Brockport silty clay loam, 0 to 3 percent slopes	D	677.2	2.6%
BrB	Brockport silty clay loam, 3 to 8 percent slopes	D	473.4	1.8%
Ca	Canadice silt loam	D	50.6	0.2%
Cb	Canadice silt loam, channery till substratum	D	1,218.0	4.6%
Cc	Canandaigua silt loam	C/D	335.0	1.3%
Cd	Canandaigua mucky silt loam	C/D	25.1	0.1%
CfB	Cayuga silt loam, 3 to 8 percent slopes	D	146.7	0.6%
CfC	Cayuga silt loam, 8 to 15 percent slopes	D	2.3	0.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CmE	Chenango and Palmyra soils, 25 to 40 percent slopes	A	12.6	0.0%
CoA	Churchville silt loam, 0 to 3 percent slopes	C/D	1,934.9	7.3%
CoB	Churchville silt loam, 3 to 8 percent slopes	C/D	87.9	0.3%
CsA	Collamer silt loam, 0 to 3 percent slopes	C/D	67.3	0.3%
CsB	Collamer silt loam, 3 to 8 percent slopes	C/D	131.7	0.5%
CsC	Collamer silt loam, 8 to 15 percent slopes	C/D	8.0	0.0%
CtB	Collamer silt loam, till substratum, 3 to 8 percent slo pes	C/D	661.3	2.5%
CuB	Colonie loamy fine sand, 3 to 8 percent slopes	A	14.5	0.1%
Cv	Cosad loamy fine sand	C/D	2.9	0.0%
DaB	Danley silt loam, 3 to 8 percent slopes	C/D	106.9	0.4%
DaC	Danley silt loam, 8 to 15 percent slopes	C/D	20.6	0.1%
DaD	Danley silt loam, 15 to 25 percent slopes	C/D	138.3	0.5%
DbA	Darien silt loam, 0 to 3 percent slopes	C/D	1,223.8	4.6%
DbB	Darien silt loam, 3 to 8 percent slopes	C/D	263.0	1.0%
DdA	Derb silt loam, 0 to 3 percent slopes	C/D	98.7	0.4%
DdB	Derb silt loam, 3 to 8 percent slopes	C/D	8.8	0.0%
Dp	Dumps		17.3	0.1%
FaA	Farmington channery loam, 0 to 3 percent slopes	D	6.2	0.0%
FbA	Farnham channery silt loam, 0 to 3 percent slopes	A/D	361.3	1.4%
FbB	Farnham channery silt loam, 3 to 8 percent slopes	A/D	301.1	1.1%
Fu	Fluvaquents and Udifluvents, frequently flooded	A/D	334.3	1.3%
GaA	Galen very fine sandy loam, 0 to 3 percent slopes	A/D	3.1	0.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GaB	Galen very fine sandy loam, 3 to 8 percent slopes	A/D	9.7	0.0%
Ge	Getzville silt loam	B/D	90.9	0.3%
Ha	Halsey silt loam	B/D	96.8	0.4%
HrA	Hornell silt loam, 0 to 3 percent slopes	C/D	244.9	0.9%
HrB	Hornell silt loam, 3 to 8 percent slopes	C/D	83.9	0.3%
HuB	Hudson silt loam, 3 to 8 percent slopes	C/D	20.8	0.1%
HuC	Hudson silt loam, 8 to 15 percent slopes	C/D	1.3	0.0%
HvD	Hudson silty clay loam, 15 to 25 percent slopes	C/D	29.0	0.1%
HvE	Hudson silty clay loam, 25 to 40 percent slopes	C/D	79.2	0.3%
In	Ilion silt loam	C/D	203.9	0.8%
Lb	Lakemont mucky silt loam	C/D	2.1	0.0%
Lc	Lamson very fine sandy loam	A/D	80.9	0.3%
Ld	Lamson mucky very fine sandy loam	A/D	96.1	0.4%
Ly	Lyons soils, 0 to 3 percent slopes	C/D	18.0	0.1%
Lz	Lyons soils, 0 to 3 percent slopes, frequently ponded	C/D	51.0	0.2%
MaB	Manlius channery silt loam, 3 to 8 percent slopes	C	568.4	2.2%
MaC	Manlius channery silt loam, 8 to 15 percent slopes	C	18.0	0.1%
MaD	Manlius channery silt loam, 15 to 25 percent slopes	C	22.8	0.1%
MbF	Manlius very channery silt loam, 35 to 50 percent slope s	C	26.7	0.1%
MfA	Marilla channery silt loam, 0 to 3 percent slopes	D	5.4	0.0%
MfB	Marilla channery silt loam, 3 to 8 percent slopes	D	8.9	0.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
MfC	Marilla channery silt loam, 8 to 15 percent slopes	D	7.6	0.0%
Mg	Middlebury silt loam	B/D	186.9	0.7%
Mh	Minoa very fine sandy loam	B/D	85.6	0.3%
NfA	Niagara silt loam, 0 to 3 percent slopes	C/D	423.8	1.6%
NfB	Niagara silt loam, 3 to 8 percent slopes	C/D	158.2	0.6%
Nh	Niagara silt loam, till substratum	C/D	1,613.4	6.1%
OrA	Orpark silt loam, 0 to 3 percent slopes	C/D	1,962.2	7.4%
OrB	Orpark silt loam, 3 to 8 percent slopes	C/D	290.1	1.1%
OrC	Orpark silt loam, 8 to 15 percent slopes	C/D	17.5	0.1%
Pa	Palms muck	B/D	5.5	0.0%
PbA	Palmyra gravelly loam, 0 to 3 percent slopes	A	8.1	0.0%
PbB	Palmyra gravelly loam, 3 to 8 percent slopes	A	15.8	0.1%
Pc	Patchin silt loam	D	839.2	3.2%
PhA	Phelps gravelly loam, 0 to 3 percent slopes	B/D	417.3	1.6%
PhB	Phelps gravelly loam, 3 to 8 percent slopes	B/D	87.6	0.3%
Pt	Pits, borrow		249.9	0.9%
Pu	Pits, gravel		11.3	0.0%
Qu	Quarry		58.1	0.2%
RaA	Raynham silt loam, 0 to 3 percent slopes	C/D	136.9	0.5%
RaB	Raynham silt loam, 3 to 8 percent slopes	C/D	35.3	0.1%
Re	Red Hook silt loam	B/D	249.0	0.9%
RfA	Remsen silty clay loam, 0 to 3 percent slopes	D	1,919.5	7.3%
RfB	Remsen silty clay loam, 3 to 8 percent slopes	D	1,420.2	5.4%
RfC	Remsen silty clay loam, 8 to 15 percent slopes	D	75.0	0.3%
RgA	Rhinebeck silt loam, 0 to 3 percent slopes	C/D	176.1	0.7%
RgB	Rhinebeck silt loam, 3 to 8 percent slopes	C/D	49.1	0.2%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
RhC3	Rhinebeck silty clay loam, 8 to 15 percent slopes, seve relyeroded	C/D	12.7	0.0%
RkA	Rhinebeck gravelly loam, 0 to 3 percent slopes	C/D	30.0	0.1%
RkB	Rhinebeck gravelly loam, 3 to 8 percent slopes	C/D	27.6	0.1%
Ro	Rock outcrop		180.9	0.7%
ScD	Schuyler silt loam, 15 to 25 percent slopes	B/D	2.6	0.0%
Sd	Scio silt loam	B/D	23.0	0.1%
Sw	Swormville clay loam	C/D	41.0	0.2%
To	Tioga silt loam	A	12.7	0.0%
Uc	Udorthents, smoothed		268.3	1.0%
Ud	Urban land		822.4	3.1%
Ug	Urban land-Cayuga complex		96.2	0.4%
Uh	Urban land-Churchville complex		200.7	0.8%
UmA	Urban land-Collamer complex, 1 to 6 percent slopes		26.8	0.1%
Us	Urban land-Niagara complex		14.2	0.1%
Uv	Urban land-Swormville complex		5.4	0.0%
Uw	Urban land-Teel complex		30.0	0.1%
VbB	Varysburg gravelly loam, 3 to 8 percent slopes	C	15.6	0.1%
VbC	Varysburg gravelly loam, 8 to 15 percent slopes	C	22.5	0.1%
VbD	Varysburg gravelly loam, 15 to 25 percent slopes	C	57.7	0.2%
VbE	Varysburg gravelly loam, 25 to 50 percent slopes	C	40.3	0.2%
W	Water		196.3	0.7%
WbB	Wassaic very stony loam, 3 to 8 percent slopes	C	23.3	0.1%
Wd	Wayland soils complex, 0 to 3 percent slopes, frequently flooded	B/D	450.8	1.7%
WeB	Williamson silt loam, 3 to 8 percent slopes	D	250.0	0.9%
WeC	Williamson silt loam, 8 to 15 percent slope	D	36.9	0.1%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Totals for Area of Interest			**26,425.2**	**100.0%**

Rating Options—Hydrologic Soil Group (Town of Hamburg)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Appendix B

1962 TOWN OF HAMBURG, NEW YORK REPORT ON DRAINAGE STUDY HOUSING & HOME FINANCE AGENCY PROJECT P-NY-3095

1962

TOWN OF HAMBURG, NEW YORK
REPORT ON
DRAINAGE STUDY
HOUSING & HOME FINANCE AGENCY PROJECT
P-NY-3095

VOLUME I

TOWN OFFICIALS

SUPERVISOR

Charles J. Gaughan

COUNCILMEN

Kenneth J. Barnes

Lester C. Burgwardt

John W. Lester

G.Benjamin Werner

Henry O. Leyh	-	Town Clerk
Harold M. Baumler	-	Town Attorney
Leonard M. Saunders	-	Supt. of Highways
William Harris	-	Town Engineer

NORMAN M. HERTHE,
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CONSULTING ENGINEERS
BUFFALO NEW YORK

TOWN OF HAMBURG - REPORT ON DRAINAGE STUDY
HOUSING & HOME FINANCE AGENCY PROJECT
P-NY-3095

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TOWN OF HAMBURG, NEW YORK

REPORT

ON

DRAINAGE STUDY

1. Introduction

A. General

The Town of Hamburg is located along Lake Erie due south of the City of Lackawanna and the City of Buffalo and is one of the oldest and largest of the Towns in Erie County. The Villages of Hamburg and Blasdell are the only two incorporated communities within the Town of Hamburg not under the governmental jurisdiction of the Town.

The Town of Hamburg is mainly residential and rural in nature and contains some heavy industry concentrated in the Blasdell area. Growth in the Town has been steady, almost doubling in population every 20 years to a population of 41,288 persons in 1960. Approximately 13,000 persons, or one-third of the above population resides in the Villages of Blasdell and Hamburg which represents about 10 percent of the land area in the Town. The remaining two-thirds of the population reside in the remaining 90 percent of the Town, with the most heavily concentrated population areas being along the lake shore.

In the past there has not been a strong coordinated Town Plan effecting the construction of drainage facilities within the Town. As a result most of the drainage facilities in the past have been constructed by land

developers and by the railroads and various highway agencies. Agencies, utilities and land developers solving a drainage problem with which it is immediately concerned often does not, or finds it difficult to relate that problem and solution to a major area. This has resulted in small non-coordinated systems of drainage facilities which has lead to inadequacies and flooding in many areas of the Town, notably in the concentrated residential areas along the lake shore In recent years, however, the Town has been constructing drainage improvements in troubled areas. This is being done as trouble arises and is not part of a coordinated plan.

It is almost certain that with the majority of Towns surrounding Buffalo approaching their maximum development, the Town of Hamburg will undergo much more residential, commercial and industrial development in the future. Along with development, drainage problems are sure to arise which can largely be avoided by adequate planning and coordination. It is likely that a land developer or builder providing drainage facilities required as a result of his own operations would construct facilities which may not be in accordance with a satisfactory general plan for the entire natural drainage area in which such a project is located.

An awareness of the overall drainage needs of the Town would allow planning of drainage permanently suitable at a minimum of ultimate cost, and would insure that the solution of local problems will not create other problems elsewhere.

In general, therefore, this report will deal with drainage on a Town wide basis by the study of individual watershed areas, with regard to present and future needs and will offer solutions for local areas which are presently subject to periodic flooding.

B. Scope of Report

The general objectives or scope of this Report on Drainage Study, as defined in the original directive, and as developed during the work, are as follows:

1. Study To study those features and characteristics of the Town, which have a bearing on, or are otherwise related to drainage outlined as follows:

a) Study of rainfall data for the area and preparation of rainfall curves.

b) Population study of Town related to zoning ordinances to forecast future growth.

c) Study and analysis of various watershed areas, ditches, streams, culverts and drainage structures.

d) Analyse ditches, culverts and drainage structures as to their adequacy for present and future consideration, indicating deficiencies where they exist.

e) Investigate areas where flooding now occurs.

f) Prepare general Town Map and show proposed and existing drainage and storm sewer improvements.

g) Local drainage systems within the Villages of Blasdell and Hamburg are excluded from the study.

2. Recommendations

a. A stage program of proposed construction improvements, classifying items as follows:

1) Improvements to existing storm drainage systems.

2) Stream channel improvements where needed to reduce flooding.

3) Remodeling, expansion or replacement of culverts, bridges or other existing drainage structures which are inadequate and thereby cause flooding.

b. Preparation of cost estimates for proposed construction.

c. To recommend specific action, including order of priority for relief of the more pressing drainage problems.

d. To recommend policies for planning which will meet present and future drainage requirements of the Town.

e. Make recommendations for land reservations which should be made along water courses so that future development will not encroach upon the needed drainage facilities.

C. Presentation of Report

In addition to the basic text contained within this volume, this Report also includes several separately bound volumes or folios containing all of the drainage study maps, and logs of soil borings taken throughout the Town.

Included within this volume are the various tables and exhibits supporting the text discussion, and also tabulating data taken from the drainage and other maps, the Appendices and tabulation of bench marks.

D. Preparation of Drainage Maps.

A total of fourteen (14) drainage maps containing all of the watersheds contributing to the water courses passing through the Town of Hamburg were prepared at a 1 inch = 1,000 feet scale. These maps, and also the various key maps, were reproduced, utilizing U.S.G.S. maps on tracing cloth The tracings were brought up to date utilizing latest Town tax maps and actual field surveys.

All major drainage structures and other drainage facilities were obtained from actual field survey and/or State and County records, and transposed to the maps. The drainage maps are, therefore, as up to date as possible and may readily be used by the Town as record drainage maps.

E. Study Procedure

The procedure followed in making this study included.

1. Review of past reports and published information relevant to drainage in this area.
2. Conferences with the Town Engineer and Highway Superintendent relative to existing drainage facilities and flooding conditions within the Town.
3. Field observations throughout the Town by members of our staff.

The study was initiated with a review of the general characteristics of the Town which are related to drainage. Because the study of storm drainage may most logically be made on the basis of natural catchment or drainage areas, the initial phase of this work was devoted to the description of the thirteen major drainage areas in the Town of Hamburg. These areas were established from United States Geological Survey topographical maps and from observations in the field.

II. Description of the Town of Hamburg.

A. General

The Town of Hamburg is situated due south of the City of Lackawanna in the west central part of Erie County. It is basicly triangular in shape and is bounded on the north by the City of Lackawanna, on the east by the Town of Orchard Park, on the south by 18 mile creek and the Towns of Eden and Boston and on the west by Lake Erie. The Lake Erie shoreline is approximately 10 miles in length and runs in a northeasterly and southwesterly direction. The Town measures 7.5 miles in a north-south direction, 3.5 miles in a east-west direction at its northern boundry and 8.5 miles in a east-west direction at its widest point at the southern boundry.

The land area on the Town of Hamburg is 26,480 acres or 41.4 square miles, as determined by summing up the areas of the 13 principal drainage areas. In addition to the land area enclosed by political boundries, approximately 76,340 acres or 120 square miles drain into and through the Town of Hamburg from the neighboring Towns of Orchard Park, Boston, and Eden.

B. Topography

The entire Town of Hamburg lies within a low land area that is known as the Erie-Ontario Plain. The extreme southeast portion of the Town however, is the beginning of the foot hills of the Allegany Plateau. This highland area extends south into Pennsylvania.

From a mean Lake level of elevation 573, the land rises abruptly along the lake shore to an elevation of about 600 and then the lake plain gently rises to the east and southeast reaching an elevation of about 900 in the extreme southeast corner of the Town. The entire Town drains to Lake Erie through 13 major drainage courses, the major ones of which are 18 Mile Creek and its tributaries to the south, and Rush Creek to the north. The drainage courses located between 18 Mile Creek and Rush Creek consist of short streams or creeks beginning well within the Plain and terminating in deep ravines at Lake Erie. Between the upper ends of the short streams and the foothills to the south lies a flat plain containing several marsh land areas. The Village of Hamburg is located in this plain.

The upper ends of both Rush Creek and 18 Mile Creek are located in hilly topography and the drainage passes through small valleys at steep slopes before discharging into the Plain area. For the most part these valleys are narrow and deep ravines and heavily wooded.

In general, therefore, the topography in the Town of Hamburg, except for certain locations in the flat plane areas, lends itself to good natural drainage conditions.

A Table of Bench Marks utilized for this Report appears in Appendix III and their locations are shown on Sheet No. 20 of the Drainage Maps.

C. Geology and Soil Cover

The following discussion of the geology and soil cover of the Town of Hamburg as it affects drainage is based upon U.S. Geological maps issued by the Department of Agriculture and actual soil borings taken throughout the Town.

1. Bedrock

The bedrock geology of the Town was obtained from geology maps and pamphlets and may be described as follows:

Bedrock in the Town of Hamburg consists of various different types and varieties of shale which lie very close to the ground surface in many parts of the Town area. In some instances in the lake shore and plain area, the bedrock is within two feet of the ground surface, while in the area east of the Village of Hamburg bedrock lies in excess of 30 to 35 feet below the ground surface.

The bedrock formation directly along the Lake is the Ludlowville Shale. This is a medium gray calcareous mudrock containing several very fossilferous argillaceous limestones in the middle and lower parts and a number of calcareous concretions of various sizes.

Proceeding inland, the bedrock is a Windom Member of the Moscow-Shale and is a medium gray to light gray calcareous cobbly to shaly weathering mudrock containing argillaceous limestone concretions in the upper and lower parts.

The next group of shales encountered, lying approximately along the New York Central Railroad tracks is the West River and Geneseo shales. The West River Shale is dark brown mudrock containing thin beds of black shale and siltstone and the Geneseo Shale is a very dark brown to black slightly calcareous shale including a light gray limestone.

Next in line is the Middlesex Shale which is a petroliferrous black shale.

Next to the Middlesex Shale is the Cashaqua Shale which is a medium gray and medium olive gray mudrock containing some thin argillaceous limestones and many discoidal calcareous concretions.

The next formation of shale encountered is the Dunkirk Shale. This shale is the most widely distributed bedrock in the Town and lies beneath the entire center portion of the Town. The Dunkirk Shale is a medium gray shale containing many siltstones and calcareous modules.

The under lying bedrock in the south east portion of the Town is the Angola Shale. This is a medium gray shale and mudrock containing a little black shale, a few thin siltstones and many calcareous modules and concretions of various sizes.

The greater portion of this bedrock is very close to the ground surface and presents an impervious barrier to the passage of ground water. This of course results in areas of poor sub-surface drainage. In general, bedrock is located within ten feet of the ground surface in areas lying to the northwest of Southwestern Boulevard, and between 10 and 20 feet below

the ground surface in the area bounded by Southwestern Boulevard, the Erie Railroad and Rogers Road. In general, bedrock was not encountered with 20 foot borings in the area to the south of Southwestern Boulevard and to the east of the Erie Railroad.

2. Soil Cover

From soil borings taken throughout the Town of Hamburg it was found that, in general, the soil cover to the north of Southwestern Boulevard and to the west of the Erie Railroad consists mainly of a silty sand and/or gravel with traces to small amounts of clay and that the soil cover to the south of Southwestern Boulevard and to the east of the Erie Railroad consists mainly of loose sand and gravel with some silt, beneath which lies soft silty clay. A large area of hard clay was found along Rogers Road, extending from about the Thruway to the Lake.

3. Summary

For drainage purposes, a study of the geology of an area offers an opportunity to investigate the possibility of disposal of storm runoff by subsurface disposal, thus minimizing the need for surface disposal facilities. In general, the presence of a porous or permeable formation which will accept appreciable quantities of storm water indicates that subsurface disposal of storm water by recharge of the ground water may be feasible. The existance of an aquifer suitable for water supply purposes is usually a positive indication of such a permeable formation.

From the geologic descriptions summarized above and due to the closeness of the bedrock to the ground surface, for all practical drainage

purposes, therefore, it appears that the successful disposal of storm water by ground water recharge cannot be achieved.

Location of borings taken in the Town of Hamburg are shown on Sheet No 21 of the plans entitled "Drainage Maps for the Town of Hamburg", and the logs of these borings are contained in a booklet, both accompanying this report.

D. Climate

The mean temperatures in the Town of Hamburg ranges from a low of 18° F. in January to a high of about 82° F in July and August with a mean annual temperature of about 48° F. Temperature has a bearing upon drainage since the rate of runoff may be expected to increase when the ground is frozen, but the effect of freezing and thawing as a cycle could act to increase the seepage rates through certain types of soils. Temperature also greatly influences the rates of evaporation from land and water surfaces and therefore plays an important part in the relationship between rainfall and runoff.

In general, the total yearly evaporation rates is equal to the total yearly precipitation, being below the precipitation rate in January and above it in July and August.

The total annual precipitation in the Town of Hamburg has varied from 29 to 45 inches during the past ten years. The annual snowfall averages just over 75 inches and the prevailing winds are from the northwest or southwest.

E. Population and Land Use

A study of population and land use is most significant when related to a drainage study and therefore must be considered to a large extent. Population and its distribution together with resultant land use usually alter topography and change land characteristics, which in turn, determine runoff coeficients and subsequent design of drainage facilities.

As previously stated, the offical census bureau population figures for the Town of Hamburg for 1960 indicates a population 41,288 persons, with the Villages of Hamburg and Blasdell containing a total of 13,000 persons. Therefore, two-thirds of the population reside in the Town outside of the Villages. The most heavily concentrated population area in the Town is located along the lake shore from Athol Springs southward to the Wanakah Country Club. The remainder of the Town is sparsely populated and has room for expansion. Excluding the Villages, the northern industrial area and the Lake Shore area, approximately 22,000 acres of land is available for further development. Assuming that two-thirds of this area, or 17,000 acres, is available for residential use, this land could ultimately contain 90,000 persons assuming an average population density of 6 persons per acre. As near as can be determined, approximately 20,000 persons now reside in this area with the remaining 21,288 persons residing in the areas mentioned above. Therefore the Town of Hamburg, excluding the Villages, Lake Shore and northern industrial areas, has the potential of approximately 70,000 additional persons. It is difficult however to ascertain when or if this potential will be realized and only intelligent estimates can be made based on available statistics.

Some comparison with the growth in the Towns of Cheektowaga and Tonawanda could be of some benefit in forcasting the growth in the Town of Hamburg. Each of these Towns roughly doubled in population in the 10 years between 1950 and 1960. This was probably on account of a number of reasons among which are:

a) Improved highways and transportation.

b) Influx of new industries.

c) Availability of municipal utilities such as sanitary sewers, water and drainage.

d) Availability of schools.

e) Availability of large scale subdivision developers who have built large blocks of houses.

The following Table No. 1 tabulates the past population for the Towns of Cheektowaga and Tonawanda.

TABLE NO. 1
POPULATION TABLE
FOR TOWNS CHEEKTOWAGA AND TONAWANDA *

Year	Cheektowaga Persons	Tonawanda Persons	Remarks
1890	2,974	7,666	
1900	5,156	8,626	
1905	6,671	1,511	Kenmore deducted
1910	7,650	2,175	
1915	9,405	3,062	
1920	11,923	5,505	
1925	15,708	11,292	
1930	20,849	25,006	
1940	25,006	32,155	
1950	45,354	55,270	
1960	84,056	105,032	

* Includes Incorporated Cites and Villages.

The following Table No. 2 shows the past population growth for the Town of Hamburg.

TABLE NO. 2
POPULATION TABLE
FOR TOWN OF HAMBURG

Year	Village of Hamburg	Village of Blasdell	Total Town	Non-Incorporated Area
1890	1,331		3,802	
1900			4,673	
1905	1,967		5,879	
1910	2,134		6,059	
1915	2,744		7,374	
1920	3,185	1,401	8,656	4,070
1925	3,932		10,956	
1930	4,731	2,105	13,058	6,222
1940	5,467	2,322	17,190	9,401
1950	6,938	3,127	25,067	15,002
1960	9,143	3,909	41,228	28,234

From the foregoing tables and Exhibit No. 1, it can be seen that the past population growth in the Town of Hamburg has lagged behind that experienced by the Towns of Cheektowaga and Tonawanda. With the Towns of Cheektowaga, Tonawanda and the other so-called "first ring Towns" approaching their ultimate development and beginning to taper off in their rate of growth, it is very likely that the Town of Hamburg will now begin to experience its own rapid growth in population

Assuming that the Town of Hamburg experiences the same type of growth from 1962 to 1980 as the Towns of Cheektowaga and Tonawanda had experienced from 1940 to 1960, it is estimated that the total Town of Hamburg population will be approximately 105,000 persons, by year 1980.

This may be broken down into approximately 20,000 persons in the Villages of Hamburg and Hasdell and 85,000 persons in the unincorporated area of the Town. This is shown graphically on Exhibit No. 1. Therefore, by year 1980 the Town of Hamburg could be within 13,000 persons of reaching its ultimate development. The above agrees favorably with the recent Town Planning Report.

III Related Studies

A. Precipitation

The study of precipitation in the Town of Hamburg area included the following:

1. Study of long time annual average precipitation.
2. Study of frequency and intensity of excessive storms.
3. Study of recent storms of unusual magnitude.

The records utilized in making the precipitation study were obtained from the U.S. Weather Bureau for the City of Buffalo and date back to the turn of century. Exhibit No. 2 tabulates the more significant information relating to monthly, hourly, daily and 15 minute rainfall rates for the past 10 years. The curves of rainfall intensity, as derived from the rainfall data, is shown on Exhibit No. 3. This was utilized to select the rainfall intensity which was considered appropriate for the runoff characteristics of the area, being consistant with the desired safety

factor related to the frequency at which the storm will be exceeded.

In the past ten years, the total annual precipitation in the Town of Hamburg has varied from about 29 to 45 inches. During the previous 10 years the maximum 24 hour rainfall rate was 3.11 inches in October of 1955, the maximum 2 hour rainfall rate was 2.27 inches in July of 1953 and the maximum 15 minute rainfall rate was 1.52 inches in July of 1953. The next highest 15 minute rainfall rate was 0.70 inches, or an average of 2.8 inches per hour which is below the 3.4 inches per hour indicated for the 10 year frequency curve for 15 minutes duration. The 1.52 inches rate for 15 minutes or average of 6.08 inches per hour is in excess of the 100 year frequency curve for a 15 minute duration. From the above data, and from past experience, it appears that 10 year frequency curve represents the most practical design frequency and will, therefore, be used as our subsequent basis of design.

B. Drainage Design Procedure

The foremost objective of a Drainage Study of this type is the collection and codification of information and data for the design of drainage facilities, and the development of a design procedure which would insure that drainage structures and systems would be adequate for future requirements.

The most critical aspect of drainage design in a rapidly developing area such as the Town of Hamburg is the necessity to provide properly and thoroughly for future requirements, since failure to do so will

result in repeated failures of the drainage system, with constant annoyance and inconvenience to those affected, in addition to the possibility of property damage. Eventually, it is likely that the inadequate drainage system will require additional construction work to provide the required capacity, at a cost in excess of that which would be required to provide proper capacity when the system was first built.

For areas which are fully developed at the time the drainage facilities are being designed, it is no problem to assign proper runnoff coeficients and apply existing data to obtain a proper design. However, for areas which are not fully developed or rural, it becomes necessary to determine the type of development the land is likely to undergo from the use of zoning maps and other available data and apply the proper design criteria thereto.

Development of land has a two fold effect on storm runoff: (a) less water is retained on the land, so a larger proportion of the total rainfall is discharged to the drainage system, and (b) the runoff occurs in a shorter time, so that the critical storm is one of short duration and high intensity, further increasing the rate at which storm water is discharged from the area. It is, therefore, necessary in cases where storm flow originates in undeveloped or partially developed sections which are tributary to developing area downstream to design the system to allow for the increase in flow which will result when the upland portion of the drainage area is also fully developed.

Applying the above information and data to present zoning maps runoff coeficients were developed ranging from 0.15 for rural undeveloped land to 0.90 to highly industrialized areas. A complete tabulation of runoff coeficients and total storm water runoff for each subdrainage area is subsequently tabulated in this report. Since stream gaging records are not available, coeficients to determine present runoffs were developed from observation of existing conditions.

C. Streams

Storm water runoff in the Town of Hamburg is carried to Lake Erie through 13 major streams. These streams drain 13 major drainage areas comprising total area of 26,480 acres within the Town of Hamburg and 76,340 acres outside of the Town. Stream bed profiles of the thirteen major streams are shown on drawings in the attached folio containing the drainage maps. The average slopes of these streams as can be seen are fairly good and the length of the streams within the Town vary from 1.18 miles for Neuman Creek to 12 miles for 18 Mile Creek.

With the exception of the sand and gravel area to the south and east of the Village of Hamburg, disposal of storm water by recharge into the ground cannot be depended upon due to the nature of the soil and the nearness of rock to the ground surface. Therefore, these thirteen major streams must be depended upon as drainage courses. It is, therefore, imperative that nothing be done to impede storm water flow in these streams.

A summary of the major drainage areas are contained in the following Table No. 3. It will be noted that since these streams do not contain gauging stations all stream flows were calculated utilizing selected coeficients.

TABLE Nº 3

SUMMARY OF MAIN DRAINAGE AREAS

DRAINAGE AREA	ACRES WITHIN TOWN	ACRES OUTSIDE TOWN	STREAM OR WATERCOURSE	LENGTH WITHIN TOWN LIMITS (MILES)	AVE. SLOPE WITHIN TOWN LIMITS (FT. PER 100)	LENGTH OUTSIDE OF TOWN LIMITS (MILES)	AVE. SLOPE OUTSIDE OF TOWN LIMITS (FT. PER 100)	STREAM OR WATERCOURSE OUTLET	TOTAL RUNOFF AT OUTLET C.F.S.*	RUNOFF OUTSIDE TOWN LIMITS C.F.S.*
A	1,720	125	SA-1	3.12	0.64	0	—	LAKE ERIE	544	—
B	855	7,330	SMOKE CRK.	1.5	0.56	7.6	1.40	LAKE ERIE	1,840**	1,520
C	4,445	1,190	RUSH CRK.	6.23	0.80	0	—	LAKE ERIE	1,770	—
D	2,550	0	SD-1	3.54	1.10	0	—	LAKE ERIE	520	—
E	1,205	0	SE-1	2.08	1.20	0	—	LAKE ERIE	480	—
F	465	3,745	NEUMAN CRK.	1.18	0.22	4.40	1.65	18 MI. CREEK	580	500
G	2,560	0	BERRICK CRK.	3.31	1.00	0	—	LAKE ERIE	1,130	—
H	1,365	0	SH-1	2.46	1.35	0	—	LAKE ERIE	370	—
I	555	0	SI-1	2.03	1.60	0	—	LAKE ERIE	350	—
J	2,365	0	SJ-1	4.02	1.05	0	—	LAKE ERIE	450	—
K	6,830	33,255	18 MI. CRK.	12.00	0.30	12.50	0.53	LAKE ERIE	5,500	2,820
L	750	4,410	HAMPTON BRK.	0.68	0.70	5.47	1.60	18 MI. CREEK	1,100	700
M	815	26,285	So. Br. 18 MI. CRK.	0.90	0.42	12.60	0.83	18 MI. CREEK	3,050	2,950

* RUNOFFS COMPUTED UTILIZING ESTIMATED FUTURE RUNOFF FACTORS
** RUNOFF COMPUTED AT EXIT FROM TOWN (N. TOWN LINE)

IV. Drainage

A. Existing Streams and Drainage Areas

1. General

The Town of Hamburg is divided into thriteen (13) "principal or main drainage areas" each of which is self sufficient and independent of the others, with no interconnecting or natural surface drainage routings. Each thus represents a separate entity for drainage purposes. The principal drainage areas vary in size from 18 Mile Creek, with a total 6,830 acres within the Town, to Neuman Creek with a total of 465 acres within the Town. A summary of the main drainage areas within the Town of Hamburg, indicating acreage, length,slope, runoff and other pertinent facts appears in Table No. 3.

In order to provide a reasonable means of reference on the maps and in the tables, each main drainage area has been designated by a capital alphabetical letter and the stream or watercourse by a two letter symbol. This method of designation of drainage areas and streams has been used throughout the Report, Tables, Appendixes and drainage maps.

Six of the thirteen main drainage areas are entirely within the Town of Hamburg and do not receive flow from areas outside the Town, while the remaining seven drainage areas receive flow from outside the Town. All of the streams discharge either directly or indirectly to Lake Erie.

Each of the thirteen main drainage areas have been broken down or separated into sub-drainage areas for study purposes. All of these subdrainage areas, with a few exceptions, are tributary to the main stream of the principal drainage area. The sub-drainage areas are designated in this Report by the letter of the main drainage area and a number, such as A-1, C-3, etc.

The following Table No. 4 designates all of the sub-drainage areas and their assigned runoff factors. These runoff factors are average for the entire sub-drainage area, and are based upon future development as determined from present zoning maps and information, and should be utilized as a guide for computing future storm drainage facilities in the area. The runoff coefficients assigned to the different types of areas are as follows:

a) Rural, Residential and Agricultural	0.15
b) Low Density Residential	0.25
c) Medium Density Residential	0.35
d) Residential-Administrative Business	0.50
e) Public and institutional	0.35
f) Business	0.70
g) Light Manufacturing	0.80
h) General Manufacturing	0.90

The drainage areas are shown on the drainage maps as follows:

Drainage Area	Sheet No.
A	3
B	3 & 4
C	5
D	5
E	7
F	6
G	7
H	7
I	7
J	7
K	8, 9, 10, 11 and 12
L	13
M	14, 15 and 16

TABLE NO. 4
SUB DRAINAGE AREAS AND RUNOFF FACTORS

Drainage Area	Drainage Sub-Area	Acres Within Town	Acres Outside Town	Run-off Coef. (c)	Acres X C
A		1,720	125		923
WATERCOURSE SA.1	A-1	215		.90	194
	A-2	80		.70	56
	A-3	115		.70	80
	A-4	20		.50	10
	A-5		35	.40	14
	A-6		90	.50	45
	A-7	50		.50	25
	A-8	80		.25	20
	A-9	45		.50	23
	A-10	90		.50	45
	A-11	150		.35	53
	A-12	120		.50	60
	A-13	70		.70	49
	A-14	50		.70	35
	A-15	50		.70	35
	A-16	35		.70	25
	A-17	180		.25	45
	A-18	110		.40	44
	A-19	260		.25	65
TOTALS		1,720	125		

TABLE NO. 4 (CONTINUED)

Drainage Area	Drainage Sub-Area	Acres Within Town	Acres Outside Town	Run-off Coef. (c)	Acres X C
B		855	7,330		1,414
WATERCOURSE SB1 SMOKE CREEK	B-1	260		.55	143
	B-2	275		.25	69
	B-3	220		.30	66
	B-4	100		.25	25
	B-5		110	.25	28
	B-6		7,220	.15	1,083
Totals		855	7,330		
C		4,445	1,190		2,077
WATERCOURSE SC1 (RUSH CREEK)	C-1	215		.90	195
	C-2	495		.85	420
	C-3	70		.50	35
	C-4	190		.80	152
	C-5	240		.35	84
	C-6	200		.25	50
	C-7	165		.30	50
	C-8	90		.25	23
	C-9	205		.30	62
	C-10		140	.25	35
	C-11	105		.25	26
	C-12	130		.30	39
	C-13	50		.30	15

TABLE NO. 4 (CONTINUED)

Drainage Area	Drainage Sub-Area	Acres Within Town	Acres Outside Town	Run-off Coef (c)	Acres X C
	C-14	25		.25	6
	C-15	95		.25	24
	C-16	60		.25	15
	C-17	180		.30	54
	C-18	170		.25	43
	C-19	290		.25	73
	C-20	160		.25	40
	C-21		245	.25	61
	C-22		150	.25	38
	C-23	55		.25	14
	C-24	75		.25	19
	C-25		655	.25	164
	C-26	80		.25	20
	C-27	125		.25	31
	C-28	95		.25	24
	C-29	340		.30	102
	C-30	50		.30	15
	C-31a *	170		.40	68
	C-32	320		.25	80
TOTALS		4,445	1,190		

* For C-31 see D-12. Drainage From D-12 to be diverted to Drainage Area C under Recommended Improvements.

TABLE NO. 4 (CONTINUED)

Drainage Area	Drainage Sub-Area	Acres Within Town	Acres Outside Town	Run-off Coef (c)	Acres X C
D		2,550			967
WATERCOURSE SD1	D-1	90		.50	45
	D-2	155		.90	140
	D-3	105		.35	37
	D-4	185		.25	46
	D-5	525		.25	131
	D-6	210		.30	63
	D-7	70		.30	21
	D-8	35		.25	9
	D-9	335		.25	84
	D-10	230		.40	92
	D-11	275		.60	165
	D-12 *	335		.40	134
TOTALS		2,550			
E		1,205			415
WATERCOURSE SE1	E-1	30		.25	8
	E-2	155		.25	39
	E-3	95		.60	57
	E-4	180		.50	90
	E-5	255		.25	64
	E-6	215		.30	65
	E-7	105		.30	41
	E-8	170		.30	51
TOTALS		1,205			

* D-12 becomes C-31 under Recommended Improvements.

TABLE NO. 4 (CONTINUED)

Drainage Area	Drainage Sub-Area	Acres Within Town	Acres Outside Town	Run-off Coef. (c)	Acres X C
F		465	3,745		665
WATERCOURSE SF1 (NEUMAN CRK)	F-1	220		.25	55
	F-2	245		.20	49
	F-3		605	.15	91
	F-4		3,140	.15	470
TOTALS		465	3,745		

G		2,560			1,273
WATERCOURSE SG1	G-1	75		.25	19
	G-2	105		.25	26
	G-3	195		.25	49
	G-4	220		.30	66
	G-5	570		.60	342
	G-6	130		.80	104
	G-7	115		.30	35
	G-8	120		.70	84
	G-9	365		.65	248
	G-10	665		.45	300
TOTALS		2,560			

TABLE NO. 4 (CONTINUED)

Drainage Area	Drainage Sub-Area	Acres Within Town	Acres Outside Town	Run-off Coef. (c)	Acres X C
H		1,365			430
WATERCOURSE SH1	H-1	55		.25	14
	H-2	90		.25	23
	H-3	60		.25	15
	H-4	200		.30	60
	H-5	140		.60	84
	H-6	240		.35	84
	H-7	90		.30	27
	H-8	220		.25	55
	H-9	270		.25	68
TOTALS		1,365			

I		555			253
WATERCOURSE SI1	I-1	10		.25	3
	I-2	95		.35	33
	I-3	190		.80	152
	I-4	260		.25	65
TOTALS		555			

TABLE NO. 4 (CONTINUED)

Drainage Area	Drainage Sub-Area	Acres Within Town	Acres Outside Town	Run-off Coef. (C)	Acres X C
J		2,365			688
WATERCOURSE SJ-1	J-1	85		.25	21
	J-2	70		.25	18
	J-3	230		.30	69
	J-4	150		.25	38
	J-5	260		.25	65
	J-6	210		.25	53
	J-7	285		.15	43
	J-8	295		.15	44
	J-9	405		.60	243
	J-10	375		.25	94
TOTALS		2,365			[illegible]

K		6,830	33,255		6,988
WATERCOURSE SK-1 (18 Mile Creek)	K-1	140		.25	35
	K-2	115		.25	29
	K-3	155		.25	39
	K-4	105		.25	26
	K-5	125		.25	31
	K-6	125		.25	31
	K-7	75		.25	19
	K-8	290		.25	73

TABLE NO. 4 (CONTINUED)

Drainage Area	Drainage Sub-Area	Acres Within Town	Acres Outside Town	Run-off Coef (C)	Acres X C
WATERCOURSE SK1 (18 Mile Creek)	K-9	180		.30	54
	K-10	285		.25	71
	K-11	330		.25	83
	K-12	165		.25	41
	K-13	60		.15	9
	K-14	80		.15	12
	K-15	75		.80	60
	K-16	505		.70	354
	K-17	485		.25	121
	K-18	265		.15	40
	K-19	365		.15	55
	K-20	890		.15	134
	K-21	140		.25	35
	K-22	270		.25	68
	K-23	715		.50	358
	K-24	890		.25	223
	K-25		2,195	.15	329
	K-26		525	.15	79
	K-27		865	.15	130
	K-28		4,300	.15	645
	K-29		295	.15	44
	K-30		25,075	.15	3,760
TOTALS		6,830	33,255		

TABLE NO. 4 (CONCLUDED)

Drainage Area	Drainage Sub-Area	Acres Within Town	Acres Outside Town	Run-off Coef (c)	Acres X C
L		750	4,410		850
SL 1 Hampton Brook	L-1	230		.25	58
	L-2	295		.25	74
	L-3	225		.25	56
	L-4		250	.15	38
	L-5		4,160	.15	624
TOTALS		750	4,410		
M		815	26,285		4,065
SM 1 So. Branch 18 Mi. Creek	M-1	640		.15	96
	M-2	175		.15	26
	M-3		26,285	.15	3,943
TOTALS		815	26,285		

An analysis of all the streams of the main drainage areas appears in the following Table No. 5. It will be noted that the runoff coeficients shown on Table No. 5 are based on future developement. Streams flows utilizing present runoff conditions are reflected in Appendix II - Culvert Analysis.

TABLE NO. 5
STREAM ANALYSIS

Stream	From	To	Ave. Grade	n	Hyd Rad.	Velo-city	Dist.	Time of Flow	Inlet Time	TC	Remarks
SA1	McKinley	Thruway	1.60	.040	3.0	9.7	1,900'	3.3	7.0	7.0	
"	Thruway	Mi.Strip	1.30	"	"	8.8	1,700'	3.2		73.	
"	Mi.Strip	So.Park	1.50	"	"	9.5	1,200'	2.1		77.	
"	So.Park	Lake Ave.	0.40	"	"	4.9	2,500'	8.5		79.	
"	Lake Ave.	Railroad	0.33	"	"	4.4	2,500'	9.5		87.	
"	Railroad	Route 5	0.16	"	"	3.1	4,200'	22.0		97.	
"	Route 5	Lake Erie	0.16	"	"	3.1	2,500'	13.4		119.	
	Lake Erie									132.	
SB1	Source	Powers	3.40	.035	2.0	12.6	5,900'	7.8	5'	5'	
"	Powers Rd.	Freeman Rd.	1.65	"	3.0	11.5	5,000'	7.2		12.8	
"	Freeman Rd.	Green Lake	0.80	"	4.0	9.7	9,700'	16.7		20.0	
"	Green Lake	Route 20	0.95	"	5.0	12.3	13,000'	17.6		36.7	
"	Route 20	Abbott Rd.	0.87	"	5.0	11.7	5,200'	7.4		54.3	
"	Abbott Rd.	Lake Ave.	0.65	"	5.0	10.1	4,000'	6.6		61.7	
"	Lake Ave.	Willett	0.47	"	5.0	8.7	3,800'	7.3		68.3 75.6	
SC1	Source	Clarke	1.95	.035	3.5	13.9	3,000'	3.6	30'	30'	
"	Clarke	Bayview	1.00	"	"	9.9	5,900'	9.8		33.6	
"	Bayview	McKinley	0.75	"	"	8.6	5,200'	10.0		43.4	
"	McKinley	Thruway	0,68	"	"	8.2	2,500'	5.0		53.4	
"	Thruway	Big Tree	0.50	"	"	7.0	2,400'	5.7		58.4	

TABLE NO. 5 (CONTINUED)

Stream	From	To	Ave. Grade	n	Hyd Rad.	Velo-city	Dist.	Time of Flow	Inlet Time	TC	Remarks
SC1	Big Tree	So.Park	0.36	.035	3.5	6.0	1,400'	3.9		64.1	
"	So.Park	Erie R.R.	1.00	"	"	9.9	2,800'	4.7		68.0	
"	Erie R.R.	N.Y.C.R.R.	0.57	"	"	7.5	4,200'	9.3		72.7	
"	N.Y.C.R.R.	Mile Strip	0.44	"	"	6.6	2,500'	6.3		82.0	
"	Mile Strip	Route 5	0.33	"	"	5.7	1,500'	4.4		88.3	
"	Route 5	Lake Erie	0.33	"	"	5.7	1,500'	4.4		92.7 97.1	
SD1	Maelou	Scranton	1.18	.040	2.5	7.4	950'	2.1	150'	150'	
"	Scranton	Sowles	1.00		"	6.8	3,750'	9.2		152.1	
"	Sowles	Thruway	"		"	6.8	600'	1.4		161.3	
"	Thruway	Route 20	"		"	6.8	2,500'	6.1		162.7	
"	Route 20	Sta.73+00	"		"	6.8	3,600'	8.8		168.8	
"	Sta.73+00	N.Y.C.R.R.	1.80		"	9.1	4,100'	7.5		177.6	
"	N.Y.C.R.R.	Big Tree	0.50		"	4.8	600'	2.1		185.1	
"	Big Tree	Route 5	0.83		"	6.2	1,200'	3.2		187.2	
"	Route 5	Lake Shore	0.89		"	6.4	900'	2.3		190.4	
"	Lake Shore	Lake Erie			"		500'			192.7	
SE1	At Sowles			.040							
"	Sowles	Route 20	1.34	"	1.0	4.3	700'	2.7	30	30	
"	Route 20	Howard	"	"	"	4.3	3,000'	11.5		32.7	
"	Howard	Railroad	"	"	"	4.3	3,700'	14.2		44.2	

TABLE NO. 5 (CONTINUED)

Stream	From	To	Ave. Grade	n	Hyd Rad.	Velo-city	Dist.	Time of Flow	Inlet Time	TC	Remarks
SE1	Railroad	Myrtle	1.00	.040	1.0	3.7	2,650'	12.0		58.4	
"	Myrtle	Route 5	1.00	"	"	3.7	850'	3.8		70.4 74.2	
SF1	Source	Sheriff Rd.	5.00	.035	1.5	12.6	4,100'	5.4	55'	55	
"	Sheriff	Route 277	2.30	"	2.0	10.4	4,400'	7.0		60.4	
"	Route 277	Sta.172+00	1.30	"	2.5	9.0	3,800'	7.0		67.4	
"	Sta.172+00	Town Line	0.43	"	3.0	5.7	10,800'	32.0		74.4	
"	Town Line	Main St.	0.36	"	3.0	5.2	5,500'	18.0		106.4	
"	Main St.	18 Mi.Creek	0.33	"	3.0	5.0	900'	3.0		124.4 127.4	
SG1	At Sunset			.040							
"	Sunset	Thruway	0.52		2.5	4.9	4,200'	14.3	65'	65	
"	Thruway	Route 20	1.50		2.5	8.3	4,150'	8.3		79.3	
"	Route 20	Railroad	1.00		"	6.8	6,400'	15.6		87.6	
"	Railroad	Mt.Vernon Blvd.	1.00		"	6.8	1,100'	2.7		103.2	
"	Mt.Vernon Blvd.	Route 5	2.35		"	10.4	850'	1.3		105.9	
"	Route 5	Lake Erie	3.60		"	12.9	500'	0.6		107.2 107.8	
SH1	Source	Route 20	1.20	.040	2.5	7.5	3,150'	7.0	35'	35	
"	Route 20	Amsdell	1.30		"	7.7	600'	1.3		42	
"	Amsdell	Railroad	1.42		"	8.1	6,200'	12.8		43.3	
"	Railroad	Route 5	2.25		"	10.3	2,350'	3.8		56.1	

TABLE NO. 5 (CONTINUED)

Stream	From	To	Ave. Grade	n	Hyd Rad.	Velo-city	Dist.	Time of Flow	Inlet Time	TC	Remarks
SH1	Route 5	Lake Erie	2.00		2.5	9.6	700'	1.2		59.9 61.1	
SI1	At Route 20			.040							
"	Route 20	North Dr.	0.35		3.0	4.6	4,800'	17.5	35'	35	
"	North Dr.	Railroad	2.50		"	12.2	2,600'	3.5		52.5	
"	Railroad	Route 5	2.50		"	12.2	2,300'	3.1		56.0	
"	Route 5	Lake Erie	6.00		"	18.8	500'	0.4		59.1 59.5	
SJ1	At Smith Rd.			.040							
"	Smith	Thruway	0.25	"	2.3	3.2	5,600'	29.0	30'	30	
"	Thruway	Route 20	0.16	"	2.3	2.6	2,450'	15.7		59.0	
"	Route 20	Heltz Rd.	1.30	"	2.3	7.4	5,400'	12.2		74.7	
"	Heltz	Railroad	2.00	"	2.3	9.2	1,700'	3.1		86.9	
"	Railroad	Route 5	1.70	"	2.3	8.5	1,850'	3.6		90.0	
"	Route 5	Lake Shore	1.80	"	2.3	8.7	2,250'	4.3		93.6	
"	Lake Shore	Lake Erie	1.80	"	2.3	8.7	450'	0.9		97.9 98.8	
SK1	Sta.1294+00	Snyder Rd.	1.16	.030	2.0	7.3	5,400'	12.3	40'	40	
"	Snyder Rd.	Polish Hill	0.67	"	4.5	9.6	25,500'	45.0		52.3	
"	Polish Hill	Town Bndry	0.30	"	7.0	8.6	26,500'	51.0		97.3	
"	Town Bndry	Sisson	0.14	"	7.0	5.9	24,800'	70.0		148.3	
"		400 + 00	0.70	"	7.0	13.2	7,200'	1.0		218.3	
"		145 + 00	0.40	"	7.5	10.5	25,500'	40.0		219.3	
"		Lake Sh.Rd.	0.19	"	7.5	7.2	12,000'	28.0		259.3	
"		Lake Erie	0.19	"	7.5	7.2	2,500'	6.0		287.3 293.3	

TABLE NO. 5 (CONCLUDED)

Stream	From	To	Ave. Grade	n	Hyd Rad	Velo-city	Dist.	Time of Flow	Inlet Time	TC	Remarks
S11	Sta.325+00	Sta.250+00	1.50	.030	2.0	8.3	7,500'	15.0	40'	40	
"	Sta.250+00	Sta.170+00	2.45	"	2.5	12.4	8,000'	10.7		55	
"	Sta.170+00	Sta.105+00	1.55	"	3.0	11.0	6,500'	9.8		65.7	
"	Sta.105+00	Sta.0+00	0.90	"	3.5	9.4	10,500'	18.6		75.5 94.1	
SM1	Sta.713+00	Sta.590+00	1.55	.030	2.0	8.5	12,300'	20.5	40'	40	
"	Sta.590+00	Sta.500+00	0.90	"	4.0	10.3	9,000'	14.5		60.5	
"	Sta.500+00	Sta.400+00	1.20	"	5.0	13.9	10,000'	12.0		75.0	
"	Sta.400+00	Sta.320+00	0.62	"	6.0	11.2	8,000'	11.9		87.0	
"	Sta.300+00	Sta.0+00	0.38	"	6.5	9.2	30,000'	54.4		98.9 153.3	

2. Description of Main Drainage Areas

Drainage Area A

Drainage Area A comprises an area of approximately 1,720 acres within the Town and 125 acres outside of the Town limits and is located at the extreme north end of the Town. It also includes the Village of Blasdell. Area A drains to Lake Erie through stream SA1, the profile of which is shown on sheet No. 17 of the drainage study maps. Drainage Area A contains two additional streams, SA2 and SA3 which are both tributary to Stream S.A1. The upper reaches of SA1, from its beginning to about Milestrip Road, is contained within a steep ravine and its slope is also rather steep. From Milestrip Road to the Lake, the slop of the stream bed is shallower and the land flattens out considerably. The stream bed from the New York Central Railroad tracks to Lake Erie has been relocated and the channel reconstructed through the industrial area. The stream is comparatively straight in its course and contains one bad bend which occurs at the New York Central Railroad. The tributaries SA2 and SA3 are likewise rather shallow and drain through relatively flat land.

Drainage Area A contains a total of 19 subdrainage areas contributing runoff to streams SA1, SA2 and SA3. Subdrainage area A-19 includes all of the area outside of the Town limits. Flooding in drainage area A has been reported in subdrainage areas A-17, A-15, A-11, A-9 and A-3. These areas are shown on sheet No. 3 of the drainage study maps.

Drainage Area B

Drainage area B is located in the northeast corner of the Town of Hamburg and includes an area of approximately 855 acres within the Town and 7,330 acres outside of the Town. The area is drained by the South Branch of Smoke Creek which originates in the Town of Orchard Park above Ellicott and flows northwesterly through the Town of Hamburg joining with Smoke Creek in Lackawanna. In the upper reaches of the watershed the slope of the creek bed is steep, becoming much shallower when it reaches the Town of Hamburg. A profile of the stream bed is shown on Sheet No. 18 of the drainage study maps. Except for parts of its upper reaches in Orchard Park, the stream bed is contained within deep, and rather steep banks. The South Branch of Smoke Creek, or stream SB1, takes a winding, meandering course through the Town having many short horseshoe bends. Since the banks are high, steep and wooded, the velocity of the stream does not seem to have much effect on the banks, and flow is not impeded therefrom. Only one stream, SB2 is tributary to SB1 within the Town of Hamburg. Tributary SB2 is shallow in slope and bank and contains a considerable amount of weeds and other plant growth.

Drainage Area B contains a total of six subdrainage areas contributing runoff to streams SB1 and SB2. Subdrainage Area B-6 includes all of the area outside of the Town limits. Flooding in drainage area B occurs in subdrainage areas B-2, B-3, B-4 and B-5 which is along the entire route of tributary stream SB2.

Drainage Area C

Drainage Area C is located in the north and easterly portion of the Town of Hamburg and includes an area of approximately 4,445 acres within the Town and 1,190 acres outside of the Town limits. The area is drained by Rush Creek (SC1) which originates to the west of the Erie County Fair Grounds and flows north and northwest to Lake Erie. A profile of the stream bed of SC1 is shown on Sheet No. 18 of the Drainage Maps. Between the origin and McKinley Road the slope of the Creek bed is steep and it is contained within high, steep, wooded banks. The slope and banks become shallower and smaller in the flat plain area between McKinley Road and Route 20A and the N.Y.C.R.R. and the Lake. Between the N.Y.C.R.R. and Route 20A there occurs a sharp increase in slope and height of bank. The course of Rush Creek is irregular and winding and contains many horseshoe bends. Here again, the bends do not seem to be an obstruction to flow. Streams SC2, SC3, SC4, SC5, SC6, SC7, SC8 and SC9 are all tributary to Rush Creek and with the exception of SC8 and SC9, they all have good slopes and shallow banks. SC8 and SC9 are shallow in both slope and bank. The only reported flooding in the Rush Creek watershed has occured in the subdrainage areas drained by tributary stream SC8.

Drainage area C contains a total of 32 subdrainage areas contributing runoff to Rush Creek and streams SC2 through SC9. Subdrainage areas C-21, C-22 and C-25 are outside the Town limits. Flooding in drainage area C occurs in subdrainage areas C-26, C-27, C-28 and C-31 in the flat

plain area around the Erie County Fair Grounds and also in subdrainage area C-1 and C-2.

Drainage Area D

Drainage Area D is located in the north central portion of the Town of Hamburg and includes an area of approximately 2,550 acres all of which is entirely within the Town proper. The area is drained by a stream designated as SD1 which originates near the Scranton Area and outfalls in Lake Erie at Bay View. The average slope of SD1 is good and its channel varies from a shallow section from its origin to Southwestern Boulevard to a deep section between Southwestern Boulevard and the N.Y.C.R.R.and back to a shallower section from the railroad to the Lake. A profile of the stream bed of SD1 is shown on Sheet No.17 of the drainage maps. Various parts of the channel bed are overgrown with vegetation. The course of SD1 is generally fairly straight, however two bad bends do occur, one to the west of Southwestern Boulevard and the other near the N.Y.C.R.R. and Route 5. These bends together with the vegetation, have caused obstructions to flow. Only one stream SD2 is tributary to SD1, their confluence being just south of Route 5.

Drainage Area D contains a total of 12 subdrainage areas contributing runoff to SD1 and SD2. Flooding in drainage area D occurs in subdrainage area D-2.

Drainage Area E

Drainage Area E is located in the west central portion of the Town of Hamburg and includes an area of approximately 1,205 acres all of which is entirely within the Town proper. The area is drained by a stream designated as SE1 which originates near the Carnegie area south of Southwestern Boulevard and outfalls in Lake Erie at Athol Springs. The Locksley Park area in drainage area E is drained by a separate short ravine which empties directly into the Lake. No other streams are tributary to stream SE1. A profile of the stream bed of SE1 is shown on Sheet No. 17. The average slope of stream SE1 is very good and its channel is not too deep but satisfactory for the slope. Vegetation growth occurs along the banks and in the channel in some areas. The course of stream SE1 is fairly straight but takes two 90 degree bends between the N.Y.C.R.R. and Route 5. Flooding now occurs at the first bend and both these bends could become more troublesome in the future as the area developes.

Drainage area E contains a total of 8 subdrainage areas which contribute runoff to SE1. The flooding in Drainage Area E occurs in subdrainage areas E-2 and E-3. There are no tributary streams to stream SE1.

Drainage Area F

Drainage area F is located to the east of the Village of Hamburg in the southern part of the Town and includes an area of 465 acres within the Town and 3,745 acres outside of the Town limits. The area is drained by Neuman Creek (SF1) which originates in the Town of Orchard Park to the east of Chestnut Ride Park and discharges into 18 Mile Creek, southeast of the Village of Hamburg. Within the Town of Hamburg the slope of Neuman Creek flattens out considerably and flows through rather flat land. Its channel is fairly deep at the Town Line and becomes much shallower as it approaches 18 Mile Creek. A profile of the bed of Neuman Creek is shown on Sheet No. 18 of the Drainage maps. The course of Neuman Creek within the Town is somewhat winding, changing direction many times. The banks of Neuman Creek near the Town Limits contains wooded areas. No other streams are tributary to Neuman Creek within the Town. Flooding of Neuman Creek has occured at Hamburg-Springville Road on vacant land, and since no property damage has resulted therefrom, it may be disregarded as far as improvements are concerned for the present.

Drainage Area F contains a total of four subdrainage areas contributing runoff to Neuman Creek. Subdrainage areas B-3 and B-4 includes all of the area outside of the Town limits. The flooding in drainage area F occurs in subdrainage area F-2.

Drainage Area G

Drainage Area G is located in the west central portion of the Town of Hamburg and includes an area of approximately 2,560 acres, all of which is entirely within the Town. The area is drained by Berricks Creek (SG1) which originates to the northwest of the Village of Hamburg and empties into Lake Erie at Mount Vernon. No other streams are tributary to Berricks Creek. A profile of the Creek bed is shown on Sheet No. 17 of the drainage maps. The average slope of the Creek is good from its beginning to Mt. Vernon Boulevard, and from Mt. Vernon Boulevard to the Lake, the grade becomes much steeper. The channel is well defined throughout its fairly straight course and is contained in a ravine from Route 5 to Lake Erie. The Creek flows through several ponding areas, one of which is located just to the north of Southwestern Boulevard, the second is a gravel pit to the South of the N.Y.C.R.R. and the third is an impounded area, complete with dam, in the Mount Vernon Area. While these ponding areas do act as reservoirs and retain a volume of water, they are not necessarily required. Instead they raise the water level in the Creek which can add to the difficulty in discharging ditches and storm sewers to the Creek in the future during heavy rainfalls. This is particularly true in the case of the Mount Vernon impounded area. Flooding now occurs along the N.Y.C.R.R. to the west of Rogers Road.

Drainage area G contains a total of 10 subdrainage areas which contribute runoff to Berricks Creek. The above described flooding occurs in subdrainage area G-3. Subdrainage areas G-1, G-2 and G-3 presently contain storm sewers.

Drainage Area H

Drainage Area H is located in the southwest portion of the Town of Hamburg and includes an area of approximately 1,365 acres, all of which is entirely within the Town. The area is drained by three streams the major one being designated as SH1, which originates to the east of Southwestern Boulevard and discharges into Lake Erie at Wanakah. A profile of the stream bed is shown on sheet No. 17 of the drainage maps. The origin of SH1 is in the flat plain area and its channel in this area is shallow with a fair slope. About halfway between Route 20 and the N.Y.C.R.R. the stream bed enters a steep ravine and continues at a rather steep slope to the Lake. In addition to SH1, two other streams, SH2 and SH3, which are to the north and south of SH1, originate to the east of the N.Y.C.R.R. and flow directly to the Lake. They also flow in a well defined channel at a good slope to the Lake. Both SH2 and SH3 are subject to flooding west of the N.Y.C.R.R. Both vegetation and debris are prevalent in the channel of SH2 and SH3. All of the streams in drainage area H are more or less independent of each other. Stream SH1 assumes an easy winding course through drainage area H.

Drainage area H contains a total of 9 subdrainage areas contributing runoff to streams SH1, SH2 and SH3. Flooding in drainage area H occurs in sub-drainage area H-1 and H-4, which drain to stream SH2 and in subdrainage area H-2 and H-3 which drain to stream SH3.

Drainage Area I

Drainage Area I comprises an area of approximately 555 acres, all of which is entirely within the Town of Hamburg. It is located in the southwest portion of the Town and is the smallest of the drainage areas within the Town. The area is drained by a single stream designated as SI1, which originates just east of Southwestern Boulevard and flows westward to Lake Erie, outfalling at Clifton Heights. The stream bed is well defined starting out at a very shallow slope which slowly becomes steeper at the N.Y.C.R.R. from which point it becomes very steep ravine discharging into the Lake. No additional tributary streams are located in drainage area I. A profile of the stream bed is shown on sheet No. 17 of the drainage maps. The course of stream SI1 is fairly straight and the stream bed is covered with a growth of vegetation.

Drainage Area I contains a total of four subdrainage areas contributing runoff to stream SI1. Flooding in drainage area I occurs in subdrainage area I-2, just southeast of Route 5.

Drainage Area J.

Drainage area J is located in the southwestern portion of the Town of Hamburg and includes an area of approximately 2,365 acres, all of which is entirely within the Town. The area is drained by a stream designated as SJ1, a profile of which is shown on sheet No. 18 of the drainage plans. Stream SJ1 originates in the plain area to the west of the Village of Hamburg and outfalls to Lake Erie in the Pinehurst Area.

The stream bed becomes well defined to the west of Route 20, at which point the grade also increase substantially. Upsteam from Route 20 the grade is much shallower and the channel is not too well defined. From Route 5 to the Lake the channel becomes a deep ravine and the slope is quite steep. The course of the stream is due west until it reaches the N.Y.C.R.R. tracks, at which point it takes a sharp bend to the north and flows into Lake Erie. These is only one stream, SJ2, which is tributary to SJ1. However, there are also several ravines along the Lake, southwest of SJ1, which discharge directly and independently to Lake Erie. The channel and banks of stream SJ1 is covered with vegetation.

Drainage area J contains a total of 10 well defined subdrainage areas. Flooding in drainage area J has occured in subdrainage area J-5 and J-4.

Drainage Area K

Drainage area K is located along the entire southern end of the Town of Hamburg and includes an area of 6,830 acres within the Town and 33,255 acres outside of the Town limits. The area is drained by 18 Mile Creek, which originates about 12 miles to the southwest of the Town of Hamburg in the Boston Hills area of the Town of Concord and discharges to Lake Erie at Pinehurst. The length of 18 Mile Creek within the Town of Hamburg is also about 12 miles and is the largest stream or watercourse in the Town. A profile of 18 Mile Creek appears on sheet No. 19 of the drainage plans. Except for a small portion of 18 Mile Creek,in a flat plain area to the southeast of the Village of Hamburg at the intersection

of Neuman Creek, the slope of 18 Mile Creek is fairly steep and the stream bed is contained at the bottom of a Valley at the supper reaches, and a gorge-like ravine from the Village of Hamburg to Lake Erie. A dam has also been constructed across 18 Mile Creek at the Village of Hamburg for water supply purposes. The entire course of 18 Mile Creek is fairly winding, containing many reverse bends. A total of four streams are tributary to 18 Mile Creek in the Town of Hamburg, all of which, except SK3, are contained in well defined channels, flowing at good slopes. Tributary SK3 is in the flat plain area and flows at a shallow slope to 18 Mile Creek. This tributary is also the route of the Village of Hamburg main sanitary sewer conveying sewage to the Village disposal plant at the intersection of SK3 and 18 Mile Creek. Flooding has occured along SK3 in the flat plain area near the Village of Hamburg.

Drainage area K contains a total of 24 well defined subdrainage area within the Town of Hamburg and 6 subdrainage areas outside of the Town limits. Flooding in drainage area K has occured in subdrainage area K-17 as previously described.

Drainage Area L

Drainage area L is located at the south end of the Town of Hamburg and includes an area of 750 acres within the Town of Hamburg and 4,410 acres outside of the Town limits. The area is drained by Hampton Brook, which originates to the south of the Town of Hamburg in the Town of Eden. A profile of Hampton Brook appears on Sheet No. 18 of the drainage plans. The entire course of Hampton Brook winds and turns

considerably before discharging into 18 Mile Creek south of the Village of Hamburg. Its slope is extremely steep and the stream bed is contained at the bottom of a valley or ravine for the most part. Two additional streams are tributary to Hampton Brook in the Town of Hamburg. Drainage area L contains a total of 3 subdrainage areas within the Town and the remainder of the area outside of the Town has been broken down into 2 subdrainage areas. No flooding or drainage problems has been reported in drainage area L.

Drainage Area M

Drainage area M is located at the southwest end of the Town of Hamburg, and includes an area of 815 acres within the Town of Hamburg and 26,285 acres outside of the Town limits. The area is drained by the South Branch of 18 Mile Creek, which originates to the south of the Town of Hamburg in the Town of Concord. A profile of the South Branch of 18 Mile Creek appears on Sheet No. 19 of the drainage plans. The grade of the creek is extremely steep and the creek bed is deep, being contained in either a valley or ravine. The South branch of 18 Mile Creek meanders and winds throughout its entire course, from its origin to where it meets with 18 Mile Creek southeast of the Thruway. No additional streams are tributary to the South Branch of 18 Mile Creek in the Town of Hamburg. Drainage Area M contains a total of 2 subdrainage areas within the Town and subdrainage area M-3 includes the entire area outside of the Town.

No flooding has been reported in this drainage area. However, a swampy flat plain is situated in subdrainage area M-1 which could be troublesome if the area developes.

B. Culvert Studies

To obtain indication of the capacity of existing drainage structures in the Town of Hamburg, and to relate existing capacity to present and future requirements, approximately 300 culverts, which were considered to be important, were selected for study. For each culvert analyzed, the tributary area was determined from the drainage maps and the recommended coeficients and procedures were used in computing the required present and future capacity. The culvert capacity was computed by assuming a hydraulic "critical depth" condition by the use of the nomograph in Exhibit IV. This capacity was then compared with the actual flow conditions for both the present and future. The detailed results of this culvert study is given in Appendix I - Location and Size of Existing Drainage Structures and Appendix II - Analysis of Existing Culverts. Appendix II also indicates the culverts which are considered to be inadequate at the present time.

The culverts studied are also noted on the drainage maps, Sheet Nos. 3 through 16, designated by a letter C or B, denoting either C for culvert, or B for bridge, the letter of the drainage area and the number of the culvert.

It is also important to note that culverts are not hydraulic entities in themselves and their success or failure depends upon proper evaluation of upstream and downstream conditions as well as upon the size and slope of the culvert. A number of culverts which would otherwise be adequate, have become partially or totally inoperative as a result of silting action or debris. It is, therefore, imperative that a certain amount of maintenance must be performed to insure continued successful operation.

C. Areas with Inadequate Drainage

1. General Description

a. Drainage Area A.

There are four locations in drainage area A where flooding is known to have occured, described as follows:

1) Sub Drainage Area A-9

Stream SA1 makes a U-bend where it crosses the N.Y.C.R.R. tracks and the culvert under the tracks at this location has settled and drains in the wrong direction.

2) Sub Drainage Area A-11

Flooding has occured in the Glendale Heights area from stream SA2. Plans are presently being drawn up by the developer of this area to remedy this situation. This is being done under the supervision of the Town Engineer.

3) Sub Drainage Area A-15

Spring flooding occurs on stream SA1 between South Park and Mile Strip Road.

4) Sub Drainage Area A-17

Flooding occurs in the backyard area between Highland Avenue, Abbott Parkway, South Park and the Thruway.

b. Drainage Area B

1) Sub Drainage Area B-2, B-3 and B-4

General flooding occurs along stream SB2 from Sheldon Road to Mile Strip Road.

2) Sub Drainage Area B-4 and B-5.

Flooding occurs between Sheldon Road and Route 20.

c. Drainage Area C

1) Sub Drainage Area C-1

Water stands in the triangular area bounded by Route 5, Lake Shore Road and Bay View Road.

2) Sub Drainage Area C-26

Flooding occurs along Sprague Avenue between the Erie Railroad and South Park.

3) Sub Drainage Area C-27, 28 and 31.

Flooding occurs around the intersection of Fairground Road and Quinby Drive.

4) Sub Drainage Area C-31 (D-12)

Water stands in the low area along South Park to the South of Quinby Drive. Drainage from D-12 is recommended to be diverted to Rush Creek and Sub-drainage area will then become C-31.

d. Drainage Area D

1) Sub Drainage Area D-2

Flooding occurs from Route 5 back to Big Tree Road along stream SD1.

2) Sub Drainage Area D-10

Water stands in the low area along South Park to the South of Quinby Drive.

3) Sub Drainage Area D-11

Flooding occurs along Legion Drive about halfway between South Park and the Erie Railroad.

e. Drainage Area E

1) Sub Drainage Area E-2 and E-3

Flooding occurs at Camp Road and the N.Y.C.R.R.

f. Drainage Area F

1) Sub drainage Area F-2

Flooding has occured at the intersection of Neuman Creek and Route 219. This is not considered to be serious at this time, and hence, will not be considered further.

g. Drainage Area G

1) Sub Drainage Area G-1, G-2 and G-3.

Flooding and backup of storm water has occured in general throughout the Mount Vernon area from the N.Y.C.R.R. to Route 5.

h) Drainage Area H

1) Sub Drainage Area H-2

Flooding has occured along stream SH3 to the west of the N Y.C.R.R. and around Route 5.

2) Sub Drainage Area H-1 and H-4

Flooding has occured along stream SH2 both to the east and west of Route 5 in the Wanakah area.

i. Drainage Area I

1) Sub Drainage Area I-1

Flooding has occured at Route 5 and Heltz Road in the Clifton Heights area.

j. Drainage Area J

1) Sub Drainage Area I-4.

Backyard flooding occurs between Lakecrest Drive and Lake Shore Road to the west of Cresent Drive.

2) Sub Drainage Area J-3 and J-5.

Flooding occurs on Dover Drive and Birchwood Drive north of Route 5 due to storm drainage from Route 5.

k. Drainage Area K

1) Sub Drainage Area K-3

Stream SK6 is subject to flooding in the Walden Cliffs area.

2) Sub Drainage Area K-7 and K-9.

Flooding has occured in the Lakeview area along Lakeview Road between Center Street and Versailles Road.

3) Sub Drainage Area K-17

Flooding occurs along stream SK3 in the flat plain area from the Village of Hamburg to Smith Road.

l. Drainage Area L

No flooding of any concern has been reported in Drainage Area L.

m. Drainage Area M

No flooding of any concern has been reported in Drainage Area M.

V. Recommendations

A. Administrative and Technical

The prevention and correction of drainage problems involve three basic distinct functions: (a) general drainage planning and watershed management; (b) review of proposed plans involving the construction of drainage and storm water facilities, and (c) maintenance of existing drainage structures, together with correction of existing deficient structures.

The general drainage planning and development of watershed management policy is essentially an executive function, which depends upon knowledge of other related and affected Town policy requirements, in addition to technical understanding of drainage matters. This function could adequately be handled jointly by the Town Engineer and Highway Superintendent. The final adoption of a watershed management policy would of course, be the responsibility of the Town Board. The review of proposed plans is essentially a technical office procedure which will require field inspections and could be carried out by the Engineers office. The maintenance and correction of existing structures are essentially a field procedure which requires some construction equipment and an appropriately selected field and design staff. This function could be carried out jointly by the Town Engineering and Highway departments.

The Town of Hamburg is quite fortunate to have a large number separate main drainage areas containing a large number of natural streams and sub drainage areas. Soil and sub-soil conditions in the Town are such that the streams must be depended upon to carry off storm drainage. Due to the large number and frequency of these streams, large storm water conduits and ditches, such as are required in the Towns of Tonawanda and Amhurst will probably not be necessary in the Town of Hamburg. Instead, short runs of smaller size sewers will most likely be required. It is, therefore, of prime importance

that all of the streams designated on the accompanying drainage maps be retained for drainage purposes. It is also important that these streams be placed under a regular inspection and maintenance program to insure that the stream is kept open at all times, just as highways and roads are kept open. At present, a large majority of the Town's drainage network of streams is beyond the limits of jurisdiction of any regulatory agency and maintenance is solely dependent upon action by private property owners.

There are several instances, one on the upper end of Rush Creek and the other in Berricks Creek in the Mt. Vernon area where obstructions are located or are to be built in the natural stream bed. While these particular items are not presently of serious nature, they do tend to establish a precident. It is, therefore, recommended that the Town Board adopt the necessary ordinances, if legally possible, to insure that the stream beds are kept open. If this is not possible, it may be necessary to start a program of acquisition of stream channel rights-of-way. This, perhaps, could be worked into a park and recreation construction program.

It is further recommended that the Town adopt necessary legislation to permit the Town forces to clear or cause to be cleared obstruction to natural drainage streams which are now and will be on private property; this authorization should be limited to instances in

which damage or genuine inconvenience would occur on neighboring properties, to minimize the possibility of the Town engaging in the improvement of private property with a genuine public benefit.

It should be emphasized that the Town should ultimately acquire by direct purchase or easement the entire width of the stream channel plus about 10 to 15 feet minimum on each bank for maintenance operations and that these rights-of-way should be preserved for drainage only and no construction take place thereon.

In addition to the above, the following technical land development and subdivision regulations should be followed:

1) All plans involving the construction of drainage and storm water facilities should be submitted to the Town Engineer for review and approval.

2) Design criteria, as presented in this Report, should be used as a general basis of design. Run-off coefficients and rainfall intensity curves as presented herein, together with the rational formula, $Q = AIc$, where "Q" is the flow in cubic feet per second, "A" is the tributary area in acres, to the point of design, "I" is the rainfall intensity, in inches per hour, and "c" is the run-off coefficient, should be utilized for the computing of run-off. Storms should be computed on a minimum return period of 10 years.

3) Pipe sizes for collection systems should be a minimum of 12 inches in diameter for laterals, and 18 inches in diameter for trunks, and velocities should be from 2.5 to 15 feet per second, with 10 feet per second as the desirable maximum.

4) Construction standards for drainage and storm water facilities should be adopted.

5) Drainage ditches in excess of 18 inches in depth should not be permitted in subdivisions because of its being a hazard for children. If deeper ditches are necessary, pipe should be used in lieu thereof.

6) All new land development should be complete with paved streets, curbs, inlets and storm sewers. Excessive street grades should be avoided, if possible, since they create erosion problems and inlets should generally be located so as to drain not more than three acres, and should be more closely spaced on steeply graded streets subject to greater run-off and silting action.

Utilization of the Stream Flow Analysis, Table No. 5, and the Culvert Analysis, Appendix II, should be useful in determining the basic design for future drainage improvements.

B. Drainage Improvements

The following drainage improvements are recommended for the areas where inadequate drainage now prevails, and construction of these improvements should be undertaken as soon as possible. The following recommended improvements are shown on Exhibits V-A thru V-I, inclusive:

1. Drainage Area A (Exhibit No. V-A)

(a) Sub Drainage Area A-11 (Exhibit No. V-A)

(1) Clean and grade 800 ± Lin. Ft. of existing ditch.

(2) Construct 500 Lin. Ft. of new twin 36 in. C.M.P. including one headwall and one manhole. (Plans have been prepared for this item.)

(b) Sub Drainage Area A-17

(1) Construct 1,800 Lin. Ft. of new drainage ditch as shown on Exhibit No. V-A from South Park to Stream SA1.

(2) Clean 1,800 Lin. Ft. of existing Stream SA1 and culvert at Abbott, as shown on Exhibit No. V-A.

(c) Sub Drainage Area A-15

(1) Construct new twin 36 in. culvert and 2 headwalls in Stream SA1 at James Street as shown on Exhibit No. V-A.

(2) Clean 1,200 Lin. Ft. of Stream SA1 from Mile Strip Road to South Park.

(3) Clean Culvert QA5 on Stream SA1 at South Park.

(d) Sub Drainage Area A-9

(1) Construct new twin 66 in. R.C.P. culvert, 60 ft. long, including 2 headwalls under New York Central Railroad, in Stream SA1.

2. Drainage Area B (Exhibit No. V-B)

(a) Sub Drainage Area B-2, B-3 and B-4

(1) Clean 8,500 Lin. Ft. of Stream SB2 from Sheldon to junction of Smokes Creek as shown on Exhibit No. V-B.

(2) Construct 15 in. R.C.P. culvert, 30 ft. long adjacent to CB14.

(3) Clean road ditch along Sheldon Road from Wolf Road to Abbott Road.

(4) Clean existing culverts CB4 thru CB15 inclusive.

3. Drainage Area C (Exhibit Nos. V-C and V-D)

(a) Sub Drainage Area C-1

(1) Construct 1,500 Lin. Ft. of ditch along Bay View Road from Route 5 to Lake Shore Road and along Lake Shore Road to the low point between Bay View Road and Route 5 as shown on Exhibit No. V-C.

(2) Construct 1,000 Lin. Ft. of 18 inch storm sewer along Lake Shore Road from Route 5 to the above

mentioned low point, including 3 inlets and 2 manholes, as shown on Exhibit No. V-C.

(3) Construct 600 Lin. Ft. of 24 in. storm sewer and concrete headwall from the above low point to the Lake, including 3 manholes, as shown on Exhibit No V-C.

(b) Sub Drainage Area C-26

The Town is presently constructing a 12 in. storm sewer in Sprague Avenue, which should alleviate the flooding problem in this area. In addition, Culvert CC14 should be cleaned.

(c) Sub Drainage Area C-27, C-28 and C-31

(1) Construct 1,100 Lin. Ft. of 30 in. storm sewer, including 4 inlet manholes at the west boundary of the Fair Grounds property, as shown on Exhibit No. V-D.

(2) Construct 1,100 Lin. Ft. of 36 in. storm sewer, including 4 inlet manholes at the west boundary of the Fair Grounds property, as shown on Exhibit No. V-D.

(3) Construct 1,100 Lin. Ft. of 42 in. storm sewer, including 4 inlet manholes at the west boundary of the Fair Grounds property, as shown on Exhibit No. V-D.

* Drainage diverted from Area D to C under these Improvements, hence Sub-Drainage area D-12 becomes C-31.

(4) Construct 2,500 Lin. Ft. of 48 in. storm sewer, including 7 inlet manholes and one headwall south of Quinby Drive to Rush Creek.

(5) Clean existing Culverts CC31, CC54, CC55 and CC32.

4. Drainage Area D (Exhibit No. V-C and V-D)

(a) Sub Drainage Area D-1 and D-2

(1) Clean culverts and rebuild upstream wing walls at the intersection of Stream SD1 and Big Tree Road, as shown on Exhibit No. V-C.

(2) Clean 2,500 Lin. Ft. of stream channel SD1 from Big Tree Road to Lake Shore Road, as shown on Exhibit No. V-C.

(b) Sub Drainage Area D-10 and D-11

(1) Construct 1,500 Lin. Ft. of 36 in. storm sewer, including 5 inlet manholes and one headwall along Leginn Drive from the Village of Hamburg Limits to the Erie Railroad.

(2) Construct 3,200 Lin. Ft. of new ditch along the Erie Railroad from Legion Drive to Stream SD-1.

(3) Construct new twin 54 in. culvert on Stream SD-1 beneath Erie Railroad.

5. Drainage Area E (Exhibit No. V-C)

(a) Sub Drainage Area E-2 and E-3

(1) Clean 3,000 Lin. Ft. of stream bed SE1 from the New York Central Railroad to existing Bar Rack Chamber as shown on Exhibit No. V-C.

(2) Remove, clean and rebuild existing Bar Rack Chamber.

(3) Clean 400 Lin. Ft. of existing pipe downstream of bar rack chamber, as shown on Exhibit No. V-C.

(4) Clean 3,000 Lin. Ft. of stream bed SE1 from Myrtle Avenue to Route 5, as shown on Exhibit No. V-C.

6. Drainage Area F

No improvements recommended for present construction.

7. Drainage Area G (Exhibit No. V-E)

(a) Sub Drainage Area G-1, G-2 and G-3 (Mount Vernon Area)

(For the following improvements, see Exhibit No. V-E)

(1) Clean all driveway culverts and road ditches in the entire area.

(2) Construct 1,000 Lin. Ft. of new ditch along New York Central Railroad as shown on Exhibit No. V-E.

(3) Construct concrete headwall and 2,500 Lin. Ft. of 24 in. storm sewer to Stream SG1, including crossing under Rogers Road.

(4) Morgan Parkway - 1,500 Lin. Ft. 12 in. storm sewer from Clifton to Norton, and from Roanoke to Norton, including 12 inlets and 5 manholes.

(5) Norton Parkway - 300 Lin. Ft. 15 in. storm sewer from Morgan to Chapman, including 2 inlets and one manhole.

(6) Chapman Parkway - 1,400 Lin. Ft. 12 in. storm sewer from Clifton to Norton and from Roanoke to Norton, including 12 inlets and 4 manholes.

(7) Norton Parkway - 300 Lin. Ft. 18 in. storm sewer from Chapman to Vernon, including 2 inlets and one manhole.

(8) Norton Parkway - 300 Lin. Ft. 24 in. storm sewer from Vernon to Kennison, including 2 inlets and one manhole.

(9) Kennison and Roakoke Parkways - 1,100 Lin. Ft. 27 in. storm sewer from Norton to the existing 30 in. sewer at Route 5 as shown on Exhibit No. V-E, including 8 inlets and 4 manholes.

(10) Chapman Parkway - 600 Lin. Ft. 12 in storm sewer from Kirschner to Kelsey, including 6 inlets and 3 manholes.

(11) Kelsey Drive - 300 Lin. Ft. 12 in. storm sewer from Morgan to Chapman, including 2 inlets and one manhole.

(12) Chapman Parkway - 800 Lin. Ft. 15 in. storm sewer from Kelsey to SG1 (Berrick Creek), including 6 inlets, 2 manholes and a headwall.

(13) Kennison - 900 Lin. Ft. 15 in. storm sewer from Kelsey to SG1 (Berrick Creek) including 6 inlets, 3 manholes and a headwall.

8. Drainage Area H (Exhibit No. V-F)

(a) Sub Drainage Area H-2

(1) Construct concrete headwall and 1,500 Lin. Ft. of 30 in. storm sewer, including 8 inlets, in Stream SH-3 as shown on Exhibit No. V-F. Also clean 400 $\pm$ Lin. Ft. of ditch from railroad to proposed headwall.

(b) Sub Drainage Area H-1 and H-4

(1) Clean culvert CH13 and outlet to Lake and install one inlet and 300 Lin. Ft. of 12 in.. storm sewer as shown on Exhibit No. V-F.

(2) Construct 600 Lin. Ft. of 30 inch storm sewer and connect to Culvert CH1.

9. Drainage Area I (Exhibit No. V-G)

(a) Sub Drainage Area I-1

(1) Construct new inlets at southwest corner of Pleasant and Triangle, southeast corner of Walden and Triangle, northeast corner of Walden and Route 5, and southwest corner of Pleasant and Route 5.

(2) Construct 800 Lin. Ft. of 18 in. storm sewer from southwest corner of Pleasant and Triangle running north along Triangle to Walden, across Triangle at Walden and thence north to Route 5, then northeast along Route 5 to new headwall on east side of Pleasant.

(3) Clean existing 18 in. culvert under Pleasant.

(4) Clean 300 Lin. Ft. of road ditch on south side of Route 5 from Pleasant to Stream SI1.

10. Drainage Area J (Exhibit No. V-G)

(a) Sub Drainage Area J-4

(1) Construct 300 Lin. Ft. of 24 in. storm sewer along Lake Shore Road from existing catch basin at Ainslee to Culvert CJ-14, including one inlet and one headwall, as shown on Exhibit No. V-G.

(2) Construct 400 Lin. Ft, of 18 in. storm sewer along Lake Shore Road from Ainslee to Culvert CJ-13, including 2 inlets as shown on Exhibit No. V-G.

(3) Construct 300 Lin. Ft. of 15 in. storm sewer along Ainslee to Lake Shore Road, including one inlet as shown on Exhibit No. V-G.

(4) Construct 400 Lin. Ft. of new ditch as shown on Exhibit No. V-G.

(5) Clean all existing sewers and culverts in Ainslee Lane area.

(6) Clean approximately 2,000 Lin. Ft. of stream bed from Lake Shore Road to Lake in Ainslee Lane Area, as shown on Exhibit No. V-G.

(b) Sub Drainage Area J-3 and J-5

(1) Construct 2,600 Lin. Ft. of 15 in. storm sewer on Dover Road, Apollo Road, Diana Road, and Lakewood Road, including 14 inlets and 9 manholes, as shown on Exhibit No. V-G.

(2) Construct 3,200 Lin. Ft. of 18 in. storm sewer between Dover Road and Lakewood Road, and on Lakewood Road, and also on Elmhurst and Rosemont to existing 30 inch sewer, including 16 inlets and

11 manholes, all as shown on Exhibit No. V-G.

(3) Construct 1,200 Lin. Ft. of 24 in. storm sewer between Lakewood and Birchwood, on Birchwood, and between Birchwood and Apollo, including 6 inlets and 4 manholes as shown on Exhibit No. V-G.

(4) Construct 1,500 Lin. Ft. of 30 in. storm sewer between Apollo and Diana, Diana and West, West and East, and from East to Stream SJ1, including 8 inlets and 5 manholes as shown on Exhibit No. V-G.

(5) Construct one 24 in. culvert, 50 ft. long at West and Lake Shore Road.

(6) Clean road ditches and culverts on both sides of Route 5 from Dover to Stream SJ-1.

(7) Clean all existing storm sewers, culverts and ditches in the Pinehurst Area.

11. Drainage Area K (Exhibit Nos. V-H and V-I)

(a) Sub Drainage Area K-3

(1) Construct 1,200 Lin. Ft. of 12 in. storm sewer, including 4 inlets, in the Walden Cliffs Area as shown on Exhibit No. V-H.

(2) Construct 25 Lin. Ft. of 48 in. R.C.P. culvert under existing Access Road to Sewage Treatment Plant.

(3) Construct 250 Lin. Ft. of 18 in. storm sewer from drain inlets to Stream SK6.

(b) Sub Drainage Area K-7 and K-9

(1) Construct 1,500 Lin. Ft. of 24 in. storm sewer, including 10 inlets and 5 manholes, along Lakeview Road, as shown on Exhibit No. V-H.

(2) Clean Culverts CK62 and CK61 and adjacent ditches.

(c) Sub Drainage Area K-17 (Exhibit No. V-I)

(1) Construct 1,200 Lin. Ft. of 30 in. storm sewer, including one headwall and 4 inlets from the south end of Wright Place to Stream SK-3.

(2) Clean, shape and grade 9,000 Lin. Ft. of Stream SK-3 from new headwall to 18 Mile Creek.

(3) Clean Culverts CK42, CK46 and CK47.

12. Drainage Area L

No improvements recommended for present construction.

13. Drainage Area M

No improvements recommended for present construction.

14. General Culvert Improvements

In addition to the improvements recommended above for immediate construction, there are many culverts which are not included with the above recommendations that have a capacity less than the present computed flows. These culverts will need eventual replacement or will have to be supplemented and are denoted in Appendix II - Analysis of Existing Culverts and are itemized in Section VI - Estimate of Cost of this Report under future construction.

15. Curb Installation

Very few of the presently built-up areas in the Town of Hamburg contain curbing in the streets. For adequate drainage, these areas should all, eventually, be provided with street curbing. An estimate of cost for the installation of curbing in the various highly built-up areas in the Town appears in Section VI of this Report, under future construction.

VI. Estimate of Cost

The following estimates of construction costs for the proposed drainage improvements are based on recent price quotations from manufacturers and suppliers, and on historical prices for comparable construction from our engineering practice. Historical costs have been trended for price index change, based on the "Engineering News-Record" Construction Cost Index, to that of about 876 (1913=100) for July, 1962. The estimated construction costs, shown in the following tabulations, cover materials and equipment in place and include construction contractor's estimated profits. Various percentages have been added to the estimated construction costs to cover the other necessary project costs, such as engineering, financing, legal and administrative and also for unforeseen construction contingencies and possible future increases in prices for materials and labor. The following tabulated construction costs are given for the recommended improvements by drainage areas and are listed according to our recommended construction priority. It will also be noted that the following unit prices for pipe and culverts include rock excavation and pavement replacement where applicable.

A. First Priority Project

1. Drainage Area G. (Mt. Vernon Area)

Sub-Drainage Area	Exh. No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
G1,G2, G3	V-E	Clean Road Ditches & culverts	50,000 LF	$ 0.15	$7,500.00	1
"	"	New Drainage Ditch	1,000 LF	1.50	1,500.00	2
"	"	New 24" R.C.P.	2,500 LF	22.00	55,000.00	3
"	"	Rogers Rd.Crossing	60 LF	50.00	3,000.00	3
"	"	12" Storm Drain	3,800 LF	15.00	57,000.00	5,7,11
"	"	15" " "	2,000 LF	17.00	34,000.00	6,12,13
"	"	18" " "	300 LF	20.00	6,000.00	8
"	"	24" " "	300 LF	26.50	7,950.00	9
"	"	27" " "	1,100 LF	29.00	31,900.00	10
"	"	Headwalls	2	75.00	150.00	12, 13
"	"	Drop Inlets	58	150.00	8,700.00	5 to 13 inc.
"	"	Manholes	25	300.00	7,500.00	5 to 13 inc.
"		Inlet M.H.	7	300.00	2,100.00	3
		Total Estimated Construction Cost			222,300.00	
		Financing, Legal, Administrative and Engineering @ 10%			22,200.00	
		Contingencies @ 15%			33,500.00	
		Total Estimated Project Cost			$278,000.00	

2. Drainage Area H.

Sub-Drainage Area	Exh. No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
H2, H3	V-F	12" Pipe	300 LF	$11.00	$3,300.00	1
		30" Pipe	2,100 LF	27.00	56,700.00	2,3
		Clean Culvert & Outlet	300 LF	0.40	120.00	1
		Clean Field Ditch	400 LF	1.00	400.00	3
		Headwall	1	100.00	100.00	3
		Inlet M H.	8	350.00	2,800.00	3
		Inlet	1	150.00	150.00	1
		Total Estimated Construction Cost			63,570.00	
		Financing, Legal, Administrative and Engineering @ 10%			6,350.00	
		Contingencies @ 15%			9,580.00	
		Total Estimated Project Cost			$79,500.00	

3. Drainage Area J

Sub-Drainage Area	Exh No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
J4	V-G	15" Pipe	300 LF	$ 13.50	$4,050.00	12
		18" Pipe	400 LF	16.00	6,400.00	11
		24" Pipe	300 LF	22.00	6,600.00	10
		Headwalls	1 Ea.	50.00	50.00	10
		Inlets	4 Ea.	150.00	600.00	10,11,12
		Clean Exist. Sewer	300 LF	0.30	90.00	14
		Clean Exist. Ditch	2,000 LF	0.15	300.00	15
		Clean Exist. Culvert	100 LF	0.30	30.00	15
		New Field Ditch	400 LF	1.50	600.00	13
				Sub-Total	$18,720.00	
J2	V-G	15" Pipe	2,600 LF	17.50	45,500.00	1
		18" Pipe	3,200 LF	20.00	64,000.00	2
		24" Pipe	1,200 LF	26,50	31,800.00	3
		30" Pipe	1,500 LF	32.00	48,000.00	4
		Inlets	44 Ea	150.00	6,600.00	1,2,3,4
		Manholes	29 Ea	300.00	8,700.00	1,2,3,4
		24" Culvert -50' long	1 Ea	2,500.00	2,500.00	5
		Clean Road Ditch	6,000 LF	0.25	1,500.00	6,7
		Clean Sewer	3,500 LF	0.30	1,050.00	8
		Clean Field Ditch	2,000 LF	1.00	2,000.00	9
				Sub-Total	211,650.00	

J4 Sub Total	$ 18,720.00
J2 Sub Total	$211,650.00
Total Estimated Construction Cost	$230,370.00
Financing, Legal, Administrative and Engineering @ 10%	23,030.00
Contingencies @ 15%	34,600.00
Total Estimated Project Cost	$288,000.00

4. Drainage Area B

Sub-Drainage Area	Exh No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
B3,B4,B5	V-B	Clean Stream	8,500 LF	$ 1.75	$14,875.00	1
		Clean Road Ditch	8,000 LF	0.15	1,200.00	3
		Clean Culverts	400 LF	0.50	200.00	4
		15" Culvert	30 LF	17.50	525.00	2
		Total Estimated Construction Cost			16,800.00	
		Financing, Legal, Administrative and Engineering @ 10%			1,700.00	
		Construction Contingencies @ 15%			2,500.00	
		Total Estimated Project Cost			$ 21,000.00	

5. Drainage Area K

Sub-Drainage Area	Exh. No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
K-3	V-H	18" Pipe	250 LF	$ 16.00	$4,000.00	4
		12" Pipe	1,200 LF	11.00	13,200.00	5
		48" Culvert	25 LF	50.00	1,250.00	3
		Inlets	4	150.00	600.00	5
				Sub Total	19,050.00	
K-7	V-H	24" Pipe	1,500 LF	22.00	33,000.00	1
		Inlets	10 Ea.	150.00	1,500.00	1
		Manholes	5 Ea.	300.00	1,500.00	1
		Clean Field Ditch	2,500 LF	1.00	2,500.00	2
		Clean Culverts	100 LF	0.30	30.00	2
				Sub Total	38,530.00	
		Total Estimated Construction Cost			$57,580.00	
		Financing, Legal, Administrative and Engineering @ 10%			5,760.00	
		Contingencies @ 15%			8,660.00	
		Total Estimated Project Cost			$72,000.00	

6. Drainage Area C

Sub-Drainage Area	Exh. No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
C-1	V-C	New Road Ditch	1,500 LF	$ 0.75	$1,125.00	7
"	"	Driveway Culverts	200 LF	1.00	200.00	7
"	"	24" R.C.P Sewer	600 LF	22.00	13,200.00	9
"	"	18" R.C.P.Sewer	1,000 LF	16.00	16,000.00	8
"	"	Headwall (24" Pipe)	ONE	75.00	75.00	9
"	"	Drop Inlets	3 Ea.	150.00	450.00	8
"	"	M.H. (18")	2 Ea.	300.00	600.00	8
"	"	M.H. (24")	3 Ea.	300.00	900.00	9
		Total Estimated Construction Cost			$32,550.00	
		Financing, Legal, Administrative and Engineering @ 10%			3,250.00	
		Contingencies @ 15%			4,850.00	
		Total Estimated Project Cost			$40,650.00	

General

7. Drainage Area C

Sub-Drainage Area	Exh. No.	Items	Quantity	Unit Cost	Cost	Remarks & Item No.
C-31	V-D	48" Pipe	2,500 LF	$ 50.00	$125,000.00	1
		42" Pipe	1,100 LF	40.00	44,000.00	2
		36" Pipe	1,100 LF	33.00	36,300.00	3
		30" Pipe	1,100 LF	27.00	29,700.00	4
		Headwall (48")	1 Ea.	175.00	175.00	1
		Inlet M.H. (48")	7 Ea.	400.00	2,800.00	1
		Inlet M.H. (42")	4 Ea.	400.00	1,600.00	2
		Inlet M.H. (36")	4 Ea.	350.00	1,400.00	3
		Inlet M.H. (30")	4 Ea.	350.00	1,400.00	4
		Clean Exist.Culv.	200 LF	0.40	80.00	5, 6
		Estimated Construction Cost			$242,455.00	
		Financing, Legal, Administrative and Engineering @ 10%			24,245.00	
		Contingencies @ 15%			36,300.00	
		Total Estimated Project Cost			$303,000.00	

8. Summary

Total Estimated Projects Costs, First Priority Construction 1 through 7 $1,082,150.00

B. Second Priority Project

1. Drainage Area A

Sub-Drainage Area	Exh. No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
A-11	V-A	Twin 36" C.M.P.	500 LF			2)) To Be 2) Con-) structed 2) by dev-) eloper 1)
		Headwall	1			
		Manhole (Chamber)	1			
		Clean Exist.Ditch	800 LF			
A-17		New Field Ditch	1,800 LF	$ 1.50	$2,700.00	3
		Clean Exist.Ditch & culvert	1,800 LF	1.00	1,800.00	4
A-15		Twin 36" Culvert	50 LF	60.00	3,000.00	5
		Headwalls	2	250.00	500.00	5
		Stream Cleaning	1,200 LF	1.75	2,100.00	6
		Clean Culv.CA5	100 LF	.50	50.00	7
A-9		Twin 66" Culv.	160 LF	300.00	48,000.00	Tunnel under R.R. 8
		Headwalls (Twin 66")	2	400.00	800.00	8
		Total Estimated Construction Cost			$58,950.00	
		Financing, Legal, Administrative and Engineering @ 10%			5,900.00	
		Contingencies @ 15%			9,450.00	
		Total Estimated Project Cost			$74,300.00	

2. Drainage Area I

Sub-Drainage Area	Exh No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
I-2	V-G	18" Pipe	800 LF	$16.00	$12,800.00	16
		Inlets	4 Ea	130.00	600.00	16
		Clean Culvert	200 LF	0.30	60.00	16
		Clean Road Ditch	300 LF	0.25	75.00	16
		Total Estimated Construction Cost			$13,535.00	
		Financing,Legal, Administrative and Engineering @ 10%			1,355.00	
		Contingencies @ 15%			2,010.00	
		Total Estimated Project Cost			$16,900.00	

3. Drainage Area E and D

Sub-Drainage Area	Exh No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
E-3	V-C	Clean 400 LF 54" Pipe	400 LF	$0.40	$ 160.00	1
		Remove & Rebuild Rack CHB	1	LS	2,500.00	2
D-2		Clean Box Culv.(6'x20')	1	LS	50.00	50% filled with silt 3
		Clean Box Culv.(4'x18')	1	LS	75.00	75% filled with silt 4
		Rebuild Wing Walls	12 CY	60.00	720.00	Inc.Removal old walls 4
E3 & D2		Clean Stream	5,500 LF	1.75	9,625.00	5, 6
E-3		Repair Exist.Culvert	1	LS	500.00	10
		Total Estimated Construction Cost			$13,630.00	
		Financing, Legal, Administrative and Engineering @ 10%			1,360.00	
		Contingencies @ 15%			2,010.00	
		Total Estimated Project Cost			$17,000.00	

4. Drainage Area D

Sub-Drainage Area	Exh. No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
D-11	V-D	36" Pipe	1,500 LF	$33.00	$49,500.00	7
		Inlet M.H.'s	5	350.00	1,750.00	7
		Headwalls (36")	1	125.00	125.00	7
		Twin 54" Culv.	40 LF	240.00	9,600.00	Bore Under RR.9.
		Headwall (54")	2	200.00	400.00	9
		New Field Ditch	3,200 LF	1.50	4,800.00	8
		Total Estimated Construction Cost			$66,175.00	
		Financing, Legal, Administrative and Engineering @ 10%			6,620.00	
		Contingencies @ 15%			9,905.00	
		Total Estimated Project Cost			$82,700.00	

5. Drainage Area K

Sub-Drainage Area	Exh. No.	Item	Quantity	Unit Cost	Cost	Remarks & Item No.
K-17	V-I	30" Pipe	1,200 LF	$ 27.00	$32,400.00	1
		Clean Field Ditch	9,000 LF	1.00	9,000.00	2
		Clean Culverts	150 LF	0.50	75.00	3
		Headwalls	1	100.00	100.00	1
		Inlet Manholes	4	350.00	1,400.00	1
Total Estimated Construction Cost					$42,975.00	
Financing, Legal, Administrative and Engineering @ 10%					4,300.00	
Contingencies @ 15%					6,425.00	
Total Estimated Project Cost					$53,700.00	

6. Summary, Second Priority Project

The total estimated project cost for the above items 1 through 5 for the second priority project is $244,600.00

C. General Culvert Improvements (Future Construction)

1. First Priority Culvert Improvements

Culvert No.	Required Improvement for Future Flow	Cost
CA1	Add Twin 48 in. Culvert	$ 5,000.00
CA5	Add 48 in. Culvert	3,100.00
CC6	Add Twin 60 in. Culvert	6,800.00
CC24	Add 36 in. Culvert	2,200.00
CC13	Add 24 in. Pipe Culvert	1,500.00
CD11	Add Twin 42 in. Culvert	4,100.00
CD12	Replace 24 in. with 48 in. Culvert	8,300.00
CD32	Replace 24 in. with 42 in. Culvert	6,000.00
CE4	Add Twin 60 in. Culvert	16,000.00
CG6	Replace 24 in. Culvert with Twin 42 in. Culvert	4,100.00
CG23	Replace 18 in. Culvert with 36 in. Culvert	2,100.00
CG30	Replace 18 in. Culvert with 30 in. Culvert	1,800.00
CH1	Add 4 ft. x 5 ft. Box Culvert	6,300.00
CH3	Add 60 in. Pipe Culvert	11,000.00
CH6	Add 54 in. Pipe Culvert	3,700.00
CH17	Add 24 in. Pipe Culvert	1,500.00
CH18	Add 24 in. Pipe Culvert	4,800.00
CI1	Add 3 ft. x 8 ft. Box Culvert	6,500.00
CI3	Add Twin 60 in. Pipe Culvert	16,000.00
CI4	Add 42 in. Pipe Culvert	2,600.00

Culvert No.	Required Improvement for Future Flow	Cost
CJ1	Add 66 in. Pipe Culvert	$ 4,900.00
CJ3	Add 4 ft. x 7 ft. Box Culvert	7,300.00
CJ23	Replace 12 in. Culvert with 18 in. Culvert	1,100.00
CJ29	Replace 12 in. Culvert with 21 in. Culvert	1,300.00
CJ30	Replace 12 in. Culvert with 21 in. Culvert	1,300.00
CJ31	Replace 12 in. Culvert with 21 in. Culvert	1,300.00
CJ32	Replace 12 in. Culvert with 21 in. Culvert	1,300.00
CK36	Add 3 ft. x 4 ft. Box Culvert	4,600.00
CK17	Add Twin 36 in. Pipe Culvert	3,400.00
CK37	Add 30 in. Pipe Culvert	4,300.00
CK38	Add 30 in. Pipe Culvert	4,300.00
CK53	Add 42 in. Pipe Culvert	2,600.00
CK54	Add 3 ft. x 5 ft. Box Culvert	5,600.00
CK55	Add 30 in. Pipe Culvert	1,800.00
CK57	Add 24 in. Pipe Culvert	1,500.00
CK1	Add 2 ft. x 3 ft. Box Culvert	3,200.00
CK3	Add 18 in. Pipe Culvert	1,100.00
CK4	Add 18 in. Pipe Culvert	1,100.00
CK7	Add 18 in. Pipe Culvert	1,100.00
CK8	Add 3 ft. x 4 ft. Box Culvert	4,700.00
	Total Estimated Construction Cost	$171,200.00

Total Estimated Construction Cost - Brought Forward	$171,200.00
Financing, Legal, Administration & Engineering @ 10%	17,200.00
Contingencies @ 15%	25,600.00
TOTAL ESTIMATED PROJECT COST	$214,000.00

2. Future Culvert Improvements

Culvert No.	Required Improvement for Future Flow	Cost
CC4	Widen Arch If Future Developments Make Necessary	
CC7	Add 48 in. Pipe Culvert	$ 3,100.00
CC9	Add 30 in. x 48 in. Box Culvert	3,800.00
CC11	Add 30 in. Pipe Culvert	1,800.00
CC14	Add 18 in. Pipe Culvert	1,100.00
CC17	Add 42 in. Pipe Culvert	6,300.00
CC37	Add 30 in. Pipe Culvert	1,800.00
CC43	Add 24 in. Pipe Culvert	1,500.00
CD5	Add 4 ft. x 5 ft. Box Culvert	11,000.00
CD13	Add 30 in. Pipe Culvert	4,200.00
CD14	Add 36 in. Pipe Culvert	5,300.00
CD35	Add Twin 24 in. Pipe Culvert	2,400.00
CD36	Add Twin 24 in. Pipe Culvert	2,400.00
CE3	Add 66 in. Pipe Culvert	12,500.00
CE11	Add 16 in. Pipe Culvert	900.00
CG15	Add 24 in. Pipe Culvert	1,500.00
CG16	Add 18 in. Pipe Culvert	1,100.00
CG17	Add 21 in. Pipe Culvert	1,300.00
CG18	Add 30 in. Pipe Culvert	1,800.00
CG19	Add 21 in. Pipe Culvert	1,300.00
CG21	Add 48 in. Pipe Culvert	3,100.00

Culvert No.	Required Improvement for Future Flow	Cost
CG22	Add 30 in. Pipe Culvert	$ 1,800.00
CG32	Add 18 in. Pipe Culvert	1,100.00
CH10	Add 36 in. Pipe Culvert	2,200.00
CH12	Add 24 in. Pipe Culvert	1,500.00
CH13	Add 18 in. Pipe Culvert	1,100.00
CH16	Add Twin 30 in. Pipe Culvert	6,200.00
CI2	Add 60 in. Pipe Culvert	11,000.00
CI5	Add 16 in. Pipe Culvert	900.00
CJ7	Adequate with 12 in. Surcharge	--
CJ22	Add 18 in. Pipe Culvert	1,100.00
CK10	Add 2 ft. x 4 ft. Box Culvert	3,800.00
CK16	Add 42 in. Pipe Culvert	2,600.00
CK40	Add 36 in. Pipe Culvert	2,200.00
CK41	Add 30 in. Pipe Culvert	1,800.00
CK42	Adequate with 6 in. Surcharge	--
CK46	Adequate with 6 in. Surcharge	--
CK58	Adequate with 6 in. Surcharge	--
	Total Estimated Construction Cost	$105,500.00
	Financing, Legal, Administrative and Engineering @ 10%	10,500.00
	Contingencies @ 15%	15,000.00
	TOTAL ESTIMATED PROJECT COST	$131,000.00

D. Stream and Street Improvements (Future Construction)

1. First Priority Stream Cleaning

Stream	From	To	Length in Feet	Cost
SD1	Route 5	New York Cen. R.R.	2,000 ±	$ 3,500.00
SE1	Route 5	Howard Road	7,000 ±	12,200.00
SG1	Route 5	Rogers Road	4,000 ±	7,000.00
SI1	Route 5	North Drive	5,000 ±	8,700.00
SJ1	Lake Shore	Heltz Road	5,500 ±	9,600.00
SK6	Lake Shore	Lakeview	5,000 ±	8,700.00
			Total Estimated Cost	$49,700.00
			Financing, Legal, Administrative & Engineering @ 10%	4,900.00
			Contingencies @ 15%	7,400.00
			TOTAL ESTIMATED PROJECT COST	$62,000.00

2. Construction of Street Curbing (Future)

Location	Length	Cost
Pinehurst Area	42,000 Lin. Ft.	$ 63,000.00
Wanakah Area	40,000 Lin. Ft.	60,000.00
Mt. Vernon Area	84,000 Lin. Ft.	126,000.00
	Total Estimated Cost	$249,000.00
	Financing, Legal, Administrative & Engineering @ 10%	25,000.00
	Contingencies @ 15%	37,500.00
	TOTAL ESTIMATED PROJECT COST	$311,500.00

3. Future Stream Cleaning

Stream	Length in Feet	Cost
Rush	25,000	$ 44,000.00
SA1	10,000	17,500.00
SD1	12,000	21,000.00
SE1	3,000	5,300.00
SG1	10,000	17,500.00
SH1	5,000	8,800.00
SI1	4,000	7,000.00
SJ1	10,000	17,500.00
	Total Estimated Cost	$138,600.00
Financing, Legal, Administrative & Engineering @ 10%		13,900.00
	Contingencies @ 15%	20,500.00
	TOTAL ESTIMATED PROJECT COST	$173,000.00

E. Estimated Project Cost Summary

A. First Priority Project

(1) Drainage Area G	$ 278,000
(2) Drainage Area H	79,500
(3) Drainage Area J	288,000
(4) Drainage Area B	21,000
(5) Drainage Area K	72,000
(6) Drainage Area C	40,650
(7) Drainage Area C	303,000
TOTAL	$1,082,150

B. Second Priority Project

(1)	Drainage Area A	$ 74,300
(2)	Drainage Area I	16,900
(3)	Drainage Areas E and D	17,000
(4)	Drainage Area D	82,700
(5)	Drainage Area K	53,700
	TOTAL	$244,600

C. General Culvert Improvements

(1)	First Priority Culvert Improvements	$214,000
(2)	Future Culvert Improvements	131,000
	TOTAL	$345,000

D. Stream and Street Improvements

(1)	First Priority Stream Cleaning	$ 62,000
(2)	Street Curbing	311,500
(3)	Future Stream Cleaning	173,000
	TOTAL	$546,500

G R A N D T O T A L A THRO D $2,218,250.

The projects under "A" above should be undertaken immediately. The first priority culvert improvements should be undertaken in the near future to avoid possible trouble, since these culverts are presently calculated to be under-capacity for present flows. The remainder of the project should be undertaken in the future when possible, to prevent future drainage problems.

VII. Financing

Suitable procedures for financing drainage work must necessarily depend upon the nature and scope of the Drainage Program adopted by the Town. Drainage improvements of the type outlined in this Report can be financed by several different methods, outlined as follows:

1) By the issuance of special assessment bonds assessing only the property owners directly benefited by the improvement.
2) By the issuance of general obligation bonds added to the general tax base on a Townwide basis.
3) By joint participation with County or State governments where County and State Highway Departments are involved and with Railroad and other Utility Companies where their properties are involved.

In some instances it may be possible to have the cost of the entire improvement borne by the County, State, Railroad or Utility Company. This might be possible where culverts are involved which are inadequate and are causing trouble and possible property damage.

The cost of local drainage facilities in new developments should definitely be borne by the developer. There may be some instances, however, where the Town might want the developer to construct larger

facilities to take care of future developments upstream from the area being developed. In these cases, the Town may have to pay the difference between the local improvements and the overall trunk improvements. Another solution would be to have the developers each pay a share of the trunk improvements.

The aquisition of rights-of-way on property along the streams for drainage purposes might possibly be made part of a general Town or County park construction program, with some of the cost being borne by the County, State or Federal governments.

The cost of engineering for final plans and specifications could be advanced through the Housing and Home Finance Agency in the same manner as is this Report.

VIII. Conclusions and Acknowledgements.

The above discussions and recommendations, together with the accompanying Volume II - Drainage Maps, and Volume III - Log of Borings, constitute the drainage study and report for the Town of Hamburg.

This Report has been prepared in accordance with our agreement for engineering services dated April 9, 1962 for a Drainage Study for the Town of Hamburg, designated as Housing and Home Finance Agency Project P-NY-3095.

The assistance of Mr. William Allen, past Town Engineer, Mr. William Harris, present Town Engineer and Mr. Leonard M. Saunders, Superintendent of Highways is hereby gratefully acknowledged.

Respectfully submitted,

NUSSBAUMER, CLARKE & VELZY



Newell L. Nussbaumer

NORMAN M. HERTHE

Norman M. Herthe

July 30, 1962

E X H I B I T S

TOWN OF HAMBURG
POPULATION CURVES

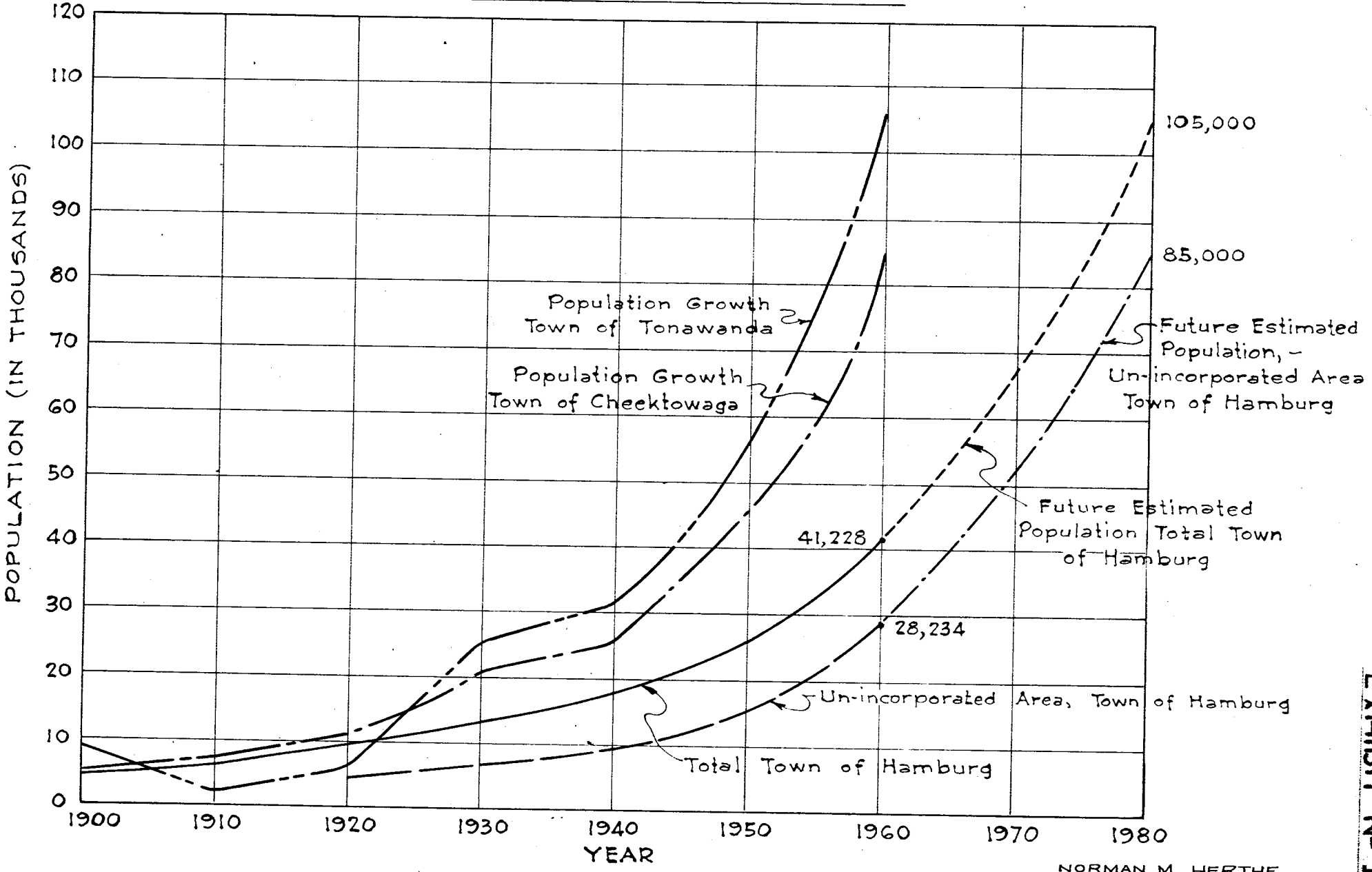


EXHIBIT № 1

NC-17844
DWG. № A-979-1

NORMAN M. HERTHE
NUSSBAUMER, CLARKE & VELZY
CONSULTING ENGINEERS
BUFFALO, N.Y.

TABULATION OF RAINFALL RATES – 1952 TO 1962

EXHIBIT NO. II

YEAR		INCHES OF PRECIPITATION												ANNUAL
		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	
1952	TOTAL FOR MONTH	3.75	2.02	2.51	2.56	3.91	1.13	1.28	3.12	2.72	0.68	2.89	2.57	29.14
	MAX. FOR 24 HRS.	0.77	0.93	0.72	0.69	1.41	0.40	0.53	0.88	1.28	0.37	0.90	0.71	
	MAX. FOR 2 HRS.	0.59	0.35	0.25	0.19	0.34	0.40	0.30	0.37	0.58	0.13	0.26	0.28	
	MAX. FOR 15 MINS.	0.39	0.05	0.09	0.05	0.13	0.14	0.20	0.24	0.39	0.12	0.08	0.09	
1953	TOTAL FOR MONTH	2.81	1.46	3.76	2.24	6.39	0.98	3.60	3.21	3.09	0.32	4.94	3.08	35.88
	MAX. FOR 24 HRS.	0.62	0.35	0.88	0.53	1.54	0.68	2.28	1.85	1.56	0.11	1.60	0.97	
	MAX. FOR 2 HRS.	0.26	0.10	0.43	0.21	0.79	0.55	2.27	0.47	0.75	0.07	0.75	0.47	
	MAX. FOR 15 MINS.	0.07	0.05	0.11	0.07	0.45	0.48	1.52	0.18	0.36	0.02	0.39	0.17	
1954	TOTAL FOR MONTH	2.94	3.72	5.24	3.95	1.35	2.57	2.08	2.45	2.20	9.13	3.32	5.83	44.78
	MAX. FOR 24 HRS.	0.81	2.31	2.14	1.07	0.55	0.74	0.84	0.65	0.71	1.66	0.97	1.04	
	MAX. FOR 2 HRS.	0.29	0.46	0.56	0.35	0.22	0.71	0.49	0.65	0.21	0.78	0.17	0.56	
	MAX. FOR 15 MINS.	0.06	0.12	0.13	0.22	0.08	0.34	0.28	0.32	0.15	0.62	0.08	0.15	
1955	TOTAL FOR MONTH	2.61	2.42	4.60	3.35	1.65	0.11	2.13	4.81	2.97	8.12	4.20	2.82	39.79
	MAX. FOR 24 HRS.	0.43	0.61	0.95	0.71	0.67	0.09	1.09	2.73	1.26	3.11	1.86	0.92	
	MAX. FOR 2 HRS.	0.19	0.26	0.45	0.38	0.30	0.03	1.08	1.51	0.82	0.68	0.69	0.23	
	MAX. FOR 15 MINS.	0.05	0.04	0.10	0.08	0.19	0.02	0.60	0.56	0.43	0.30	0.15	0.06	
1956	TOTAL FOR MONTH	2.12	3.33	5.25	3.69	4.61	0.99	3.54	5.89	3.95	0.86	2.88	4.82	41.93
	MAX. FOR 24 HRS.	0.64	0.93	1.62	1.16	1.02	0.45	1.86	1.50	0.94	0.55	1.06	2.05	
	MAX. FOR 2 HRS.	0.33	0.30	0.65	0.52	0.65	0.45	1.43	0.78	0.87	0.49	0.53	0.63	
	MAX. FOR 15 MINS.	0.08	0.07	0.17	0.18	0.40	0.30	0.58	0.54	0.27	0.15	0.15	0.13	
1957	TOTAL FOR MONTH	4.92	1.65	2.23	4.86	4.03	2.92	2.97	1.11	3.84	1.12	5.30	3.74	38.69
	MAX. FOR 24 HRS.	2.40	0.96	0.74	1.44	2.03	1.73	0.83	0.59	0.82	0.89	1.14	1.16	
	MAX. FOR 2 HRS.	0.54	0.30	0.30	0.80	0.47	0.58	0.75	0.59	0.50	0.26	0.53	0.60	
	MAX. FOR 15 MINS.	0.10	0.07	0.08	0.41	0.13	0.21	0.41	0.34	0.28	0.07	0.10	0.20	
1958	TOTAL FOR MONTH	3.81	4.78	1.36	3.95	1.79	2.91	1.49	3.16	4.59	1.40	3.49	1.66	34.39
	MAX. FOR 24 HRS.	1.44	1.13	0.23	1.02	0.60	0.91	0.40	0.98	1.33	0.45	1.01	0.39	
	MAX. FOR 2 HRS.	0.37	0.15	0.08	0.59	0.35	0.63	0.22	0.98	0.70	0.16	0.52	0.14	
	MAX. FOR 15 MINS.	0.07	0.04	0.02	0.28	0.10	0.18	0.13	0.57	0.38	0.10	0.12	0.03	
1959	TOTAL FOR MONTH	6.47	3.45	3.87	3.21	2.10	1.94	1.98	4.78	2.52	4.93	3.58	3.98	42.81
	MAX. FOR 24 HRS.	1.88	0.91	1.19	0.75	0.98	0.94	0.77	1.79	2.68	1.42	0.51	1.17	
	MAX. FOR 2 HRS.	0.45	0.36	0.38	0.38	0.37	0.61	0.63	1.46	1.24	0.34	0.25	0.44	
	MAX. FOR 15 MINS.	0.11	0.07	0.10	0.16	0.20	0.33	0.52	0.70	0.38	0.15	0.08	0.11	
1960	TOTAL FOR MONTH	3.90	5.80	2.35	2.34	4.05	2.48	1.89	3.75	1.20	1.89	2.94	2.57	35.16
	MAX. FOR 24 HRS.	1.17	1.42	0.48	0.67	0.94	0.62	1.14	0.97	0.50	0.55	1.01	0.94	
	MAX. FOR 2 HRS.	0.35	0.28	0.33	0.43	0.31	0.42	0.65	0.68	0.50	0.29	0.36	0.17	
	MAX. FOR 15 MINS.	0.13	0.07	0.22	0.22	0.14	0.40	0.28	0.45	0.29	0.10	0.10	0.06	
1961	TOTAL FOR MONTH	1.41	2.63	2.59	5.91	3.01	3.66	3.02	4.03	2.53	2.41	3.30	2.62	37.12
	MAX. FOR 24 HRS.	0.31	1.22	0.65	1.25	1.02	1.14	0.89	1.74	2.12	1.30	1.08	0.70	
	MAX. FOR 2 HRS.	0.15	0.49	0.35	0.31	0.53	0.69	0.49	1.44	1.62	0.36	0.40	0.28	
	MAX. FOR 15 MINS.	0.03	0.08	0.15	0.15	0.22	0.34	0.39	0.63	0.47	0.12	0.12	0.07	
1962	TOTAL FOR MONTH	2.78	2.65	1.23	2.25	2.36								
	MAX. FOR 24 HRS.	0.53	1.05	0.43	0.49	1.46								
	MAX. FOR 2 HRS.	0.35	0.37	0.18	0.31	0.99								
	MAX. FOR 15 MINS.	0.09	0.07	0.05	0.07	0.23								

NORMAN M. HERTHE
NUSSBAUMER CLARKE & VELZY
CONSULTING ENGINEERS
BUFFALO, N.Y.

ANALYSIS

APPENDIX II

ANALYSIS OF EXISTING CULVERTS

ANALYSIS

APPENDIX II

ANALYSIS OF EXISTING CULVERTS

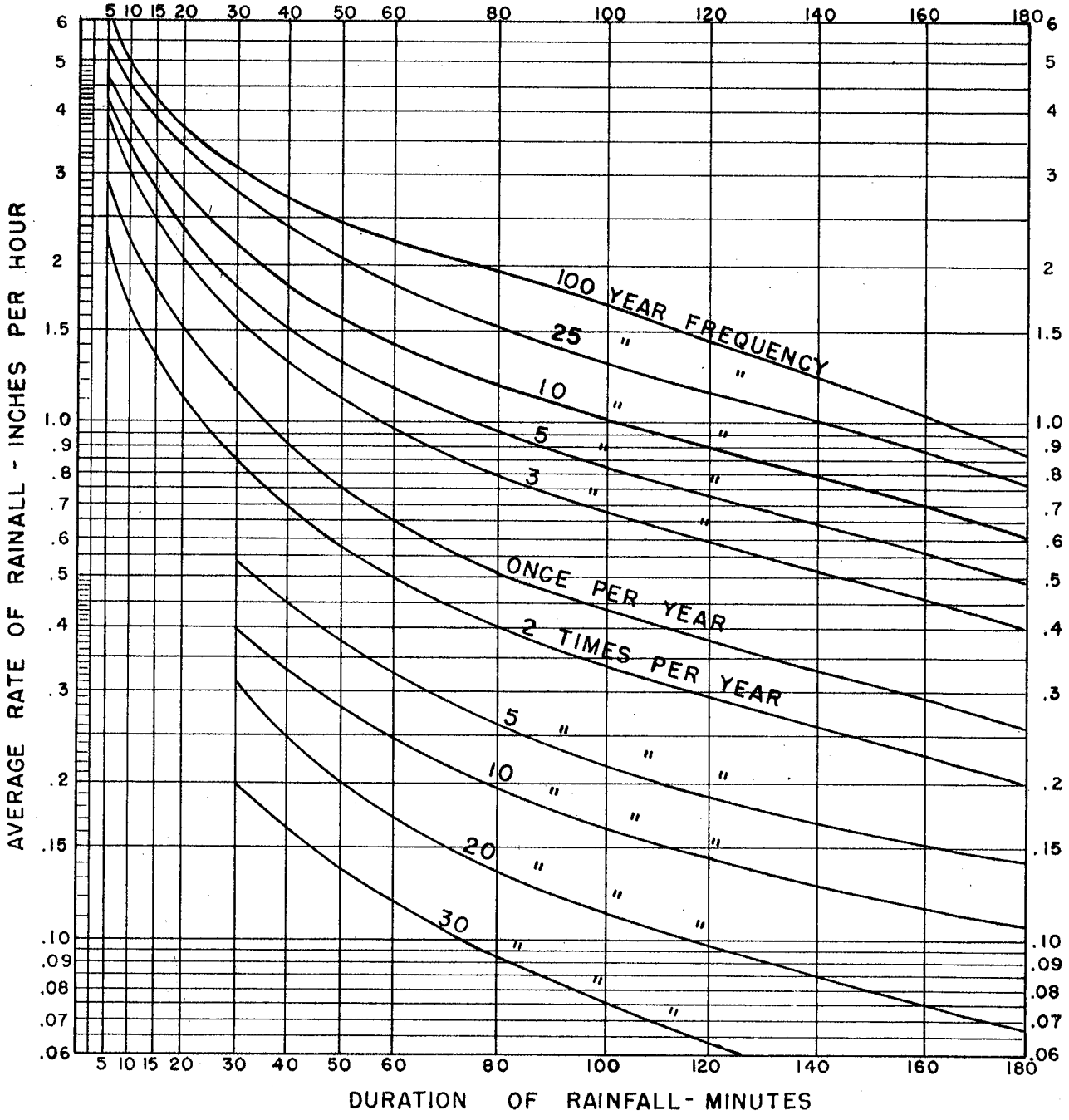
LOCATION + SIZE

APPENDIX I

LOCATION AND SIZE OF

EXISTING DRAINAGE STRUCTURES

EXHIBIT NO. III



CURVES OF RAINFALL INTENSITIES

BASED ON U. S. W. B. RECORDS

NORMAN M. HERTHE
NUSSBAUMER, CLARKE & VELZY
CONSULTING ENGINEERS
BUFFALO, N.Y.

NC 17844

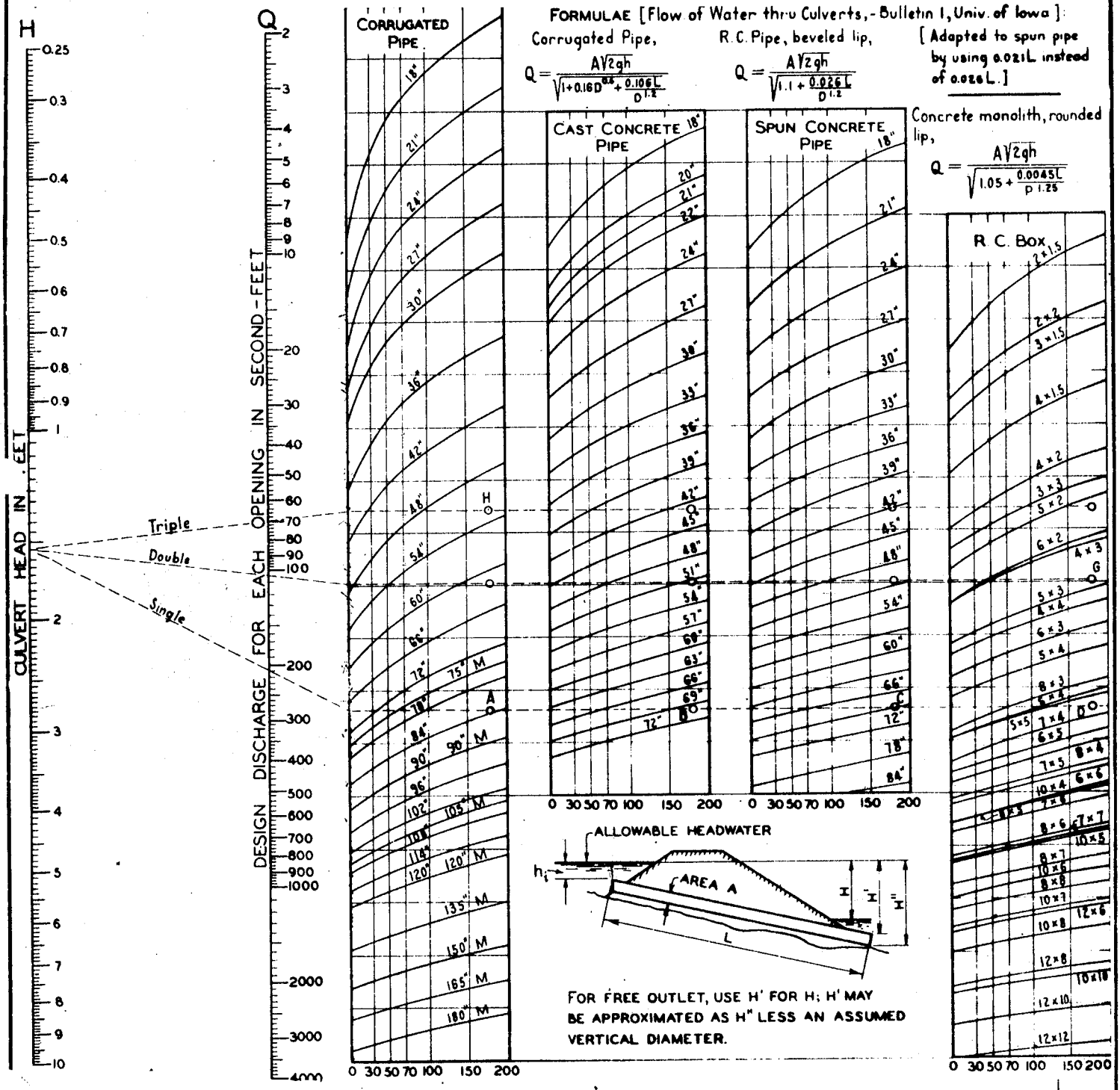
DWG. NO. A-979-3

EXHIBIT NO. IV

TOWN OF HAMBURG

GRAPHS FOR DESIGN OF CULVERTS RUNNING FULL UNDER HEAD

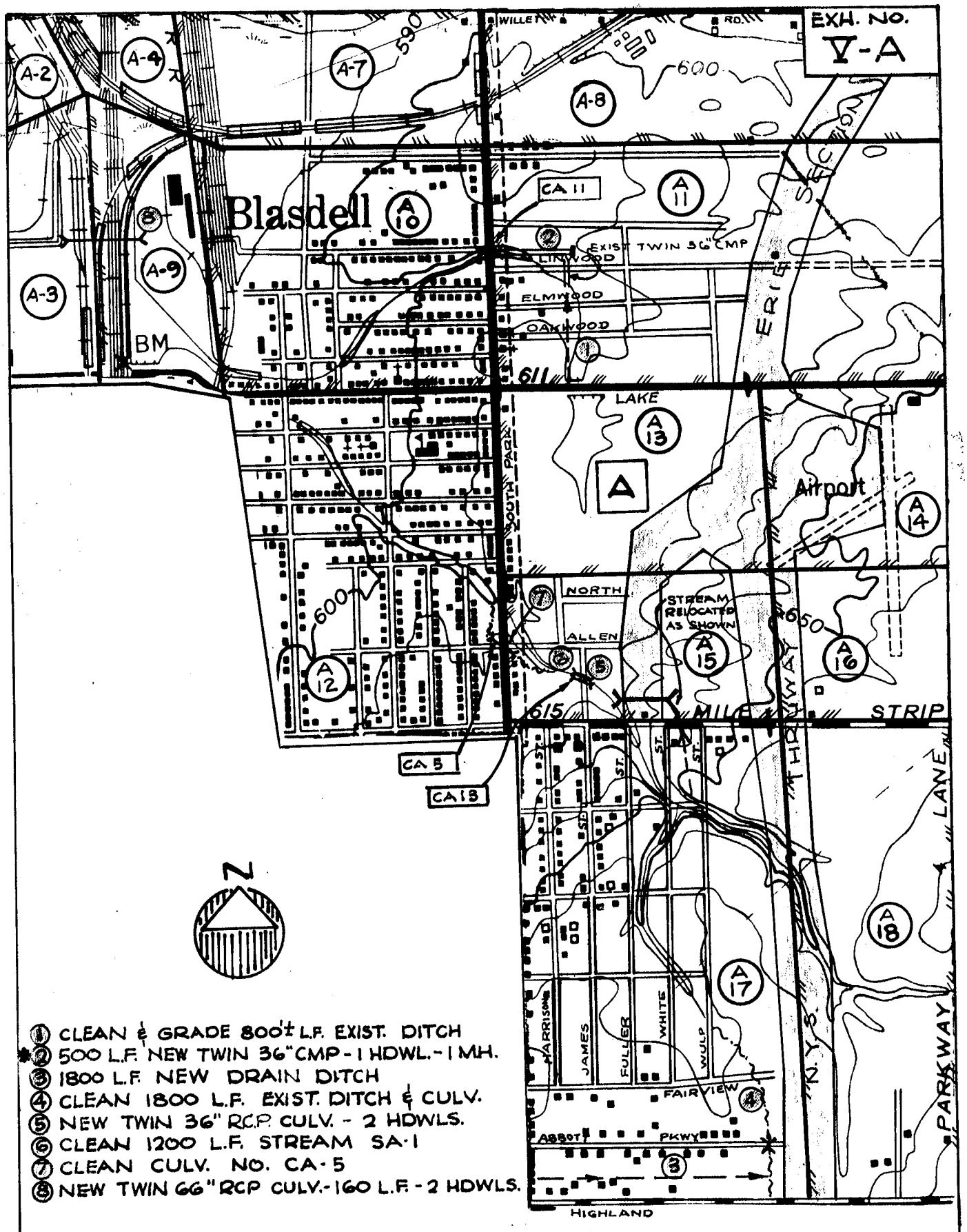
NORMAN M. HERTHE
NUSSBAUMER, CLARKE & VELZY
CONSULTING ENGINEERS



PREPARED FROM CALIFORNIA DIVISION OF HIGHWAYS REPORT ON PERFORMANCE OF CULVERTS & CULVERT PRACTICE - JUNE 1943

LENGTH OF CULVERT IN FEET = L

NC-17844
DWG. Nº A-979-4

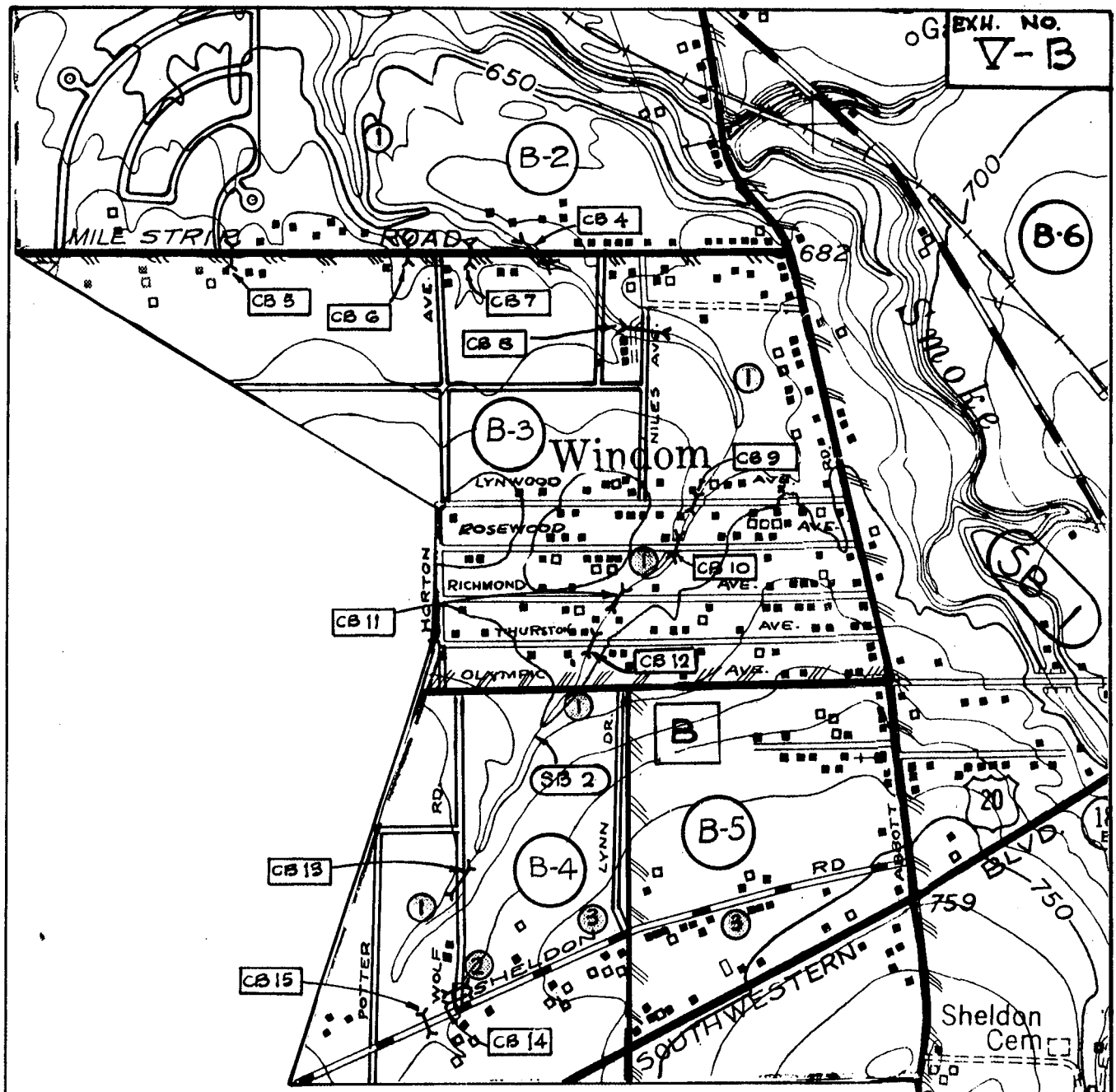


1. CLEAN & GRADE 800'± L.F. EXIST. DITCH
2. 500 L.F. NEW TWIN 36" CMP - 1 HDWL. - 1 MH.
3. 1800 L.F. NEW DRAIN DITCH
4. CLEAN 1800 L.F. EXIST. DITCH & CULV.
5. NEW TWIN 36" RCP CULV. - 2 HDWLS.
6. CLEAN 1200 L.F. STREAM SA-1
7. CLEAN CULV. NO. CA-5
8. NEW TWIN 66" RCP CULV. - 160 L.F. - 2 HDWLS.

*TO BE INSTALLED BY DEVELOPER

RECOMMENDED IMPROVEMENT LOCATIONS - NUSSBAUMER, CLARKE & VELZY

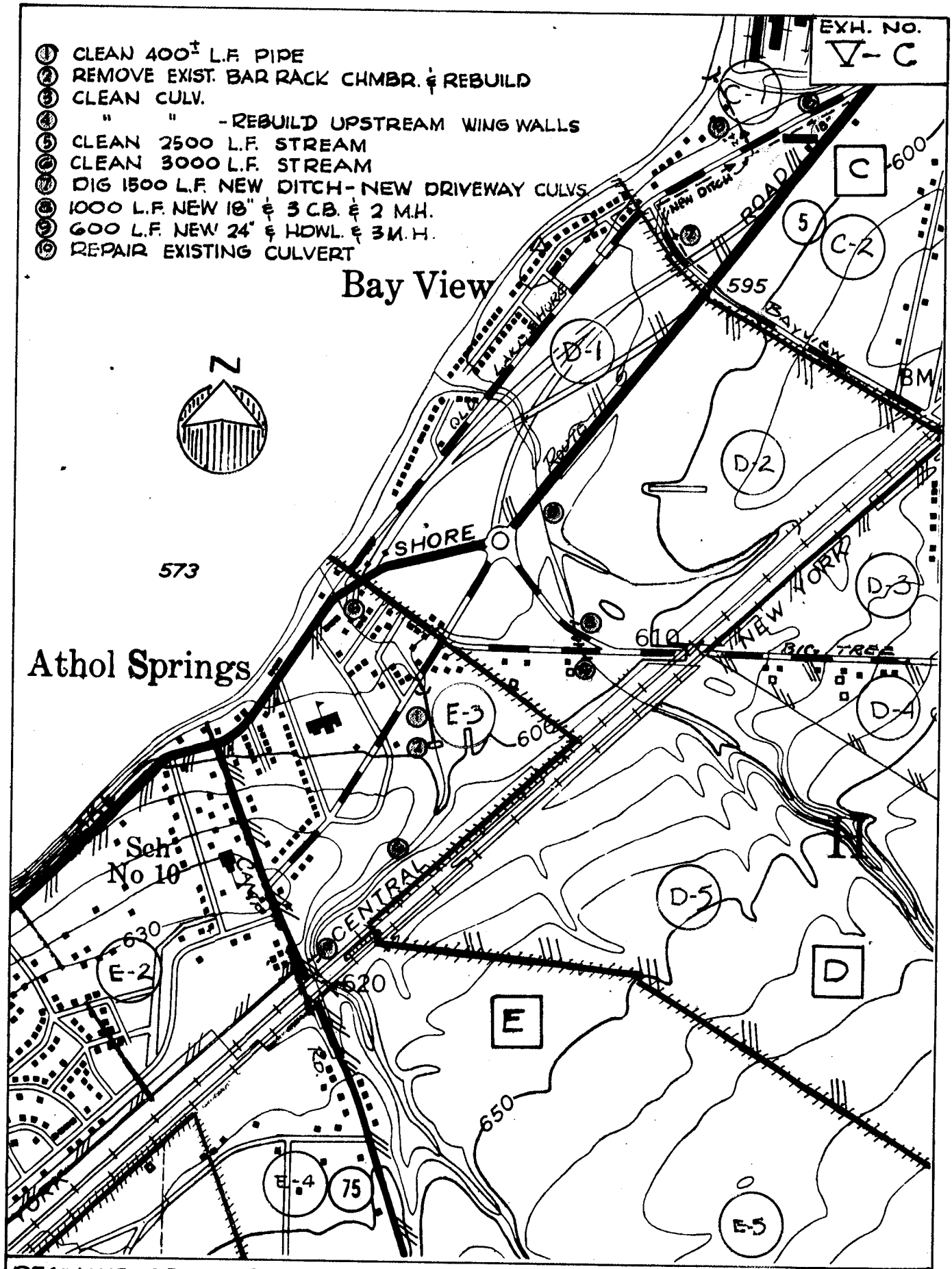
SCALE : 1" = 1000' NORMAN M. HERTHE NC 17844 DWG. NO. A-979-5



① CLEAN 8500 L.F. OF STREAM SB 2 (TO SMOKE CRK. JCT)
② NEW 15" R.C.P. CULV. 30± L.F. (NEXT TO CB 14)
③ CLEAN 8000± L.F. ROAD DITCH
④ CLEAN 400± L.F. OF EXIST. CULVERTS (CB 4 TO CB 15 INCLUSIVE)

RECOMMENDED IMPROVEMENT LOCATIONS - NUSSBAUMER, CLARKE & VELZY
SCALE: 1" = 1000' NORMAN M. HERTHE

NC 17844 DWG. No. A-979-6



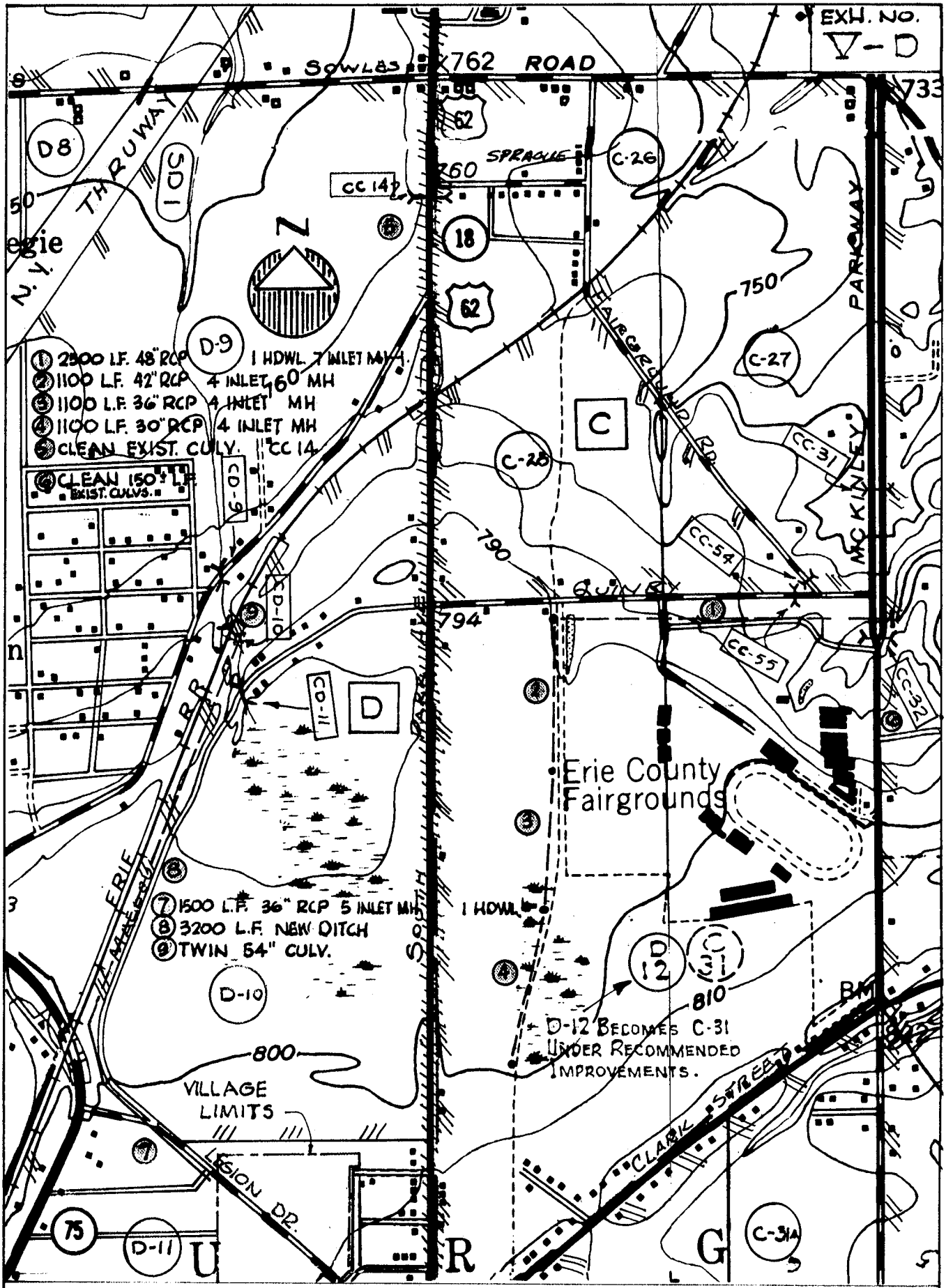
RECOMMENDED IMPROVEMENT LOCATIONS - NUSSBAUMER, CLARKE, & VELZY

SCALE: 1" = 1000'

NORMAN M. NERTHE

NC 17844

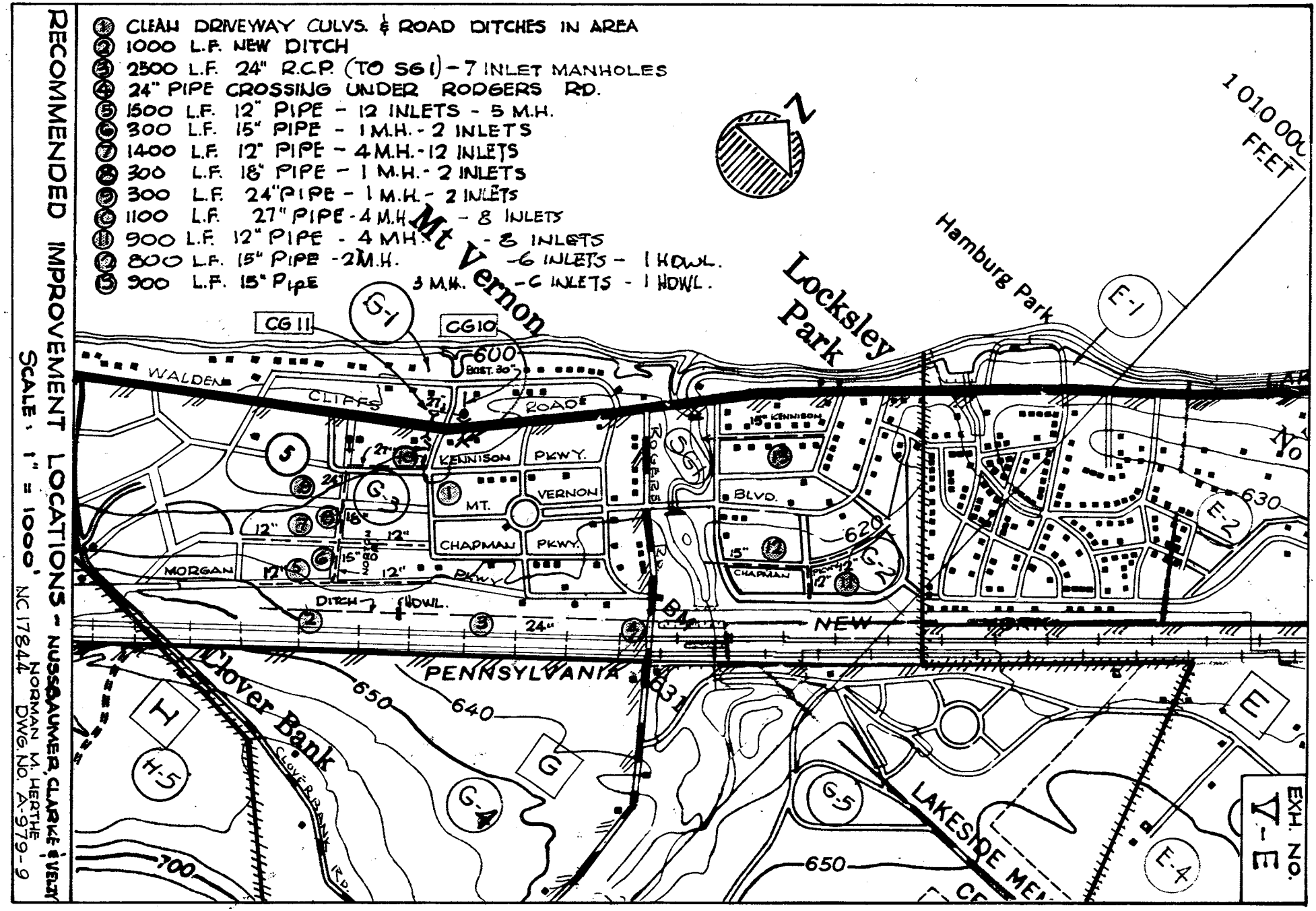
DWG. NO. A-979-7



RECOMMENDED IMPROVEMENT LOCATIONS - NUSSBAUMER, CLARKE & VELZY

SCALE: 1" = 1000'

NORMAN M. HERTHE
NC 17844 DWG. NO. A-979-8



RECOMMENDED IMPROVEMENT LOCATIONS - NUSS & AUMER, CLARKE & VELEY

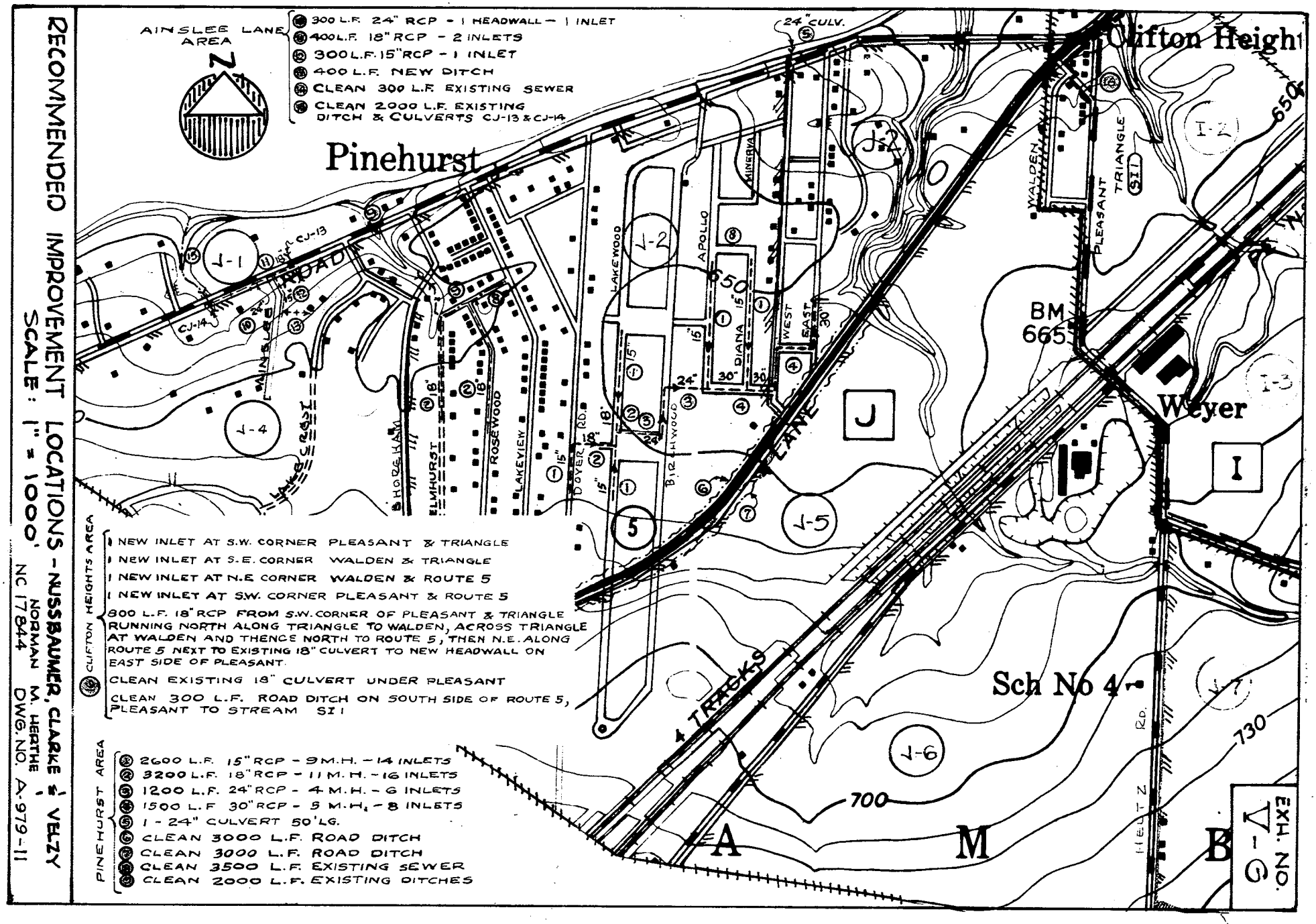
SCALE: 1" = 1000'

NORMAN M. HERTHE NC 17844
DWG. NO. A-979-9

EXH. NO. V-F

① CLEAN CULV. CH 13 & OUTLET TO LAKE
INSTALL (1) INLET & 300± L.F. 12" PIPE
② 600± L.F. 30" PIPE - CONNECT TO CH 1
③ 1500 L.F. 30" R.C.P. - 1 HDWL. - 8 INLETS
CLEAN 400± L.F. DITCH

RECOMMENDED IMPROVEMENT LOCATIONS - NUSSBAUMER, CLARKE, & VELZY
SCALE: 1" = 1000'
NORMAN M. HERTHE
NC 17844 DWG. NO. A-979-10



RECOMMENDED IMPROVEMENT LOCATIONS - NUSSBAUMER, CLARKE & VELZY

SCALE: 1" = 1000'

NORMAN M. HERTHE
NC 17844

DWG. NO. A-979-11

EXH. NO. V-H

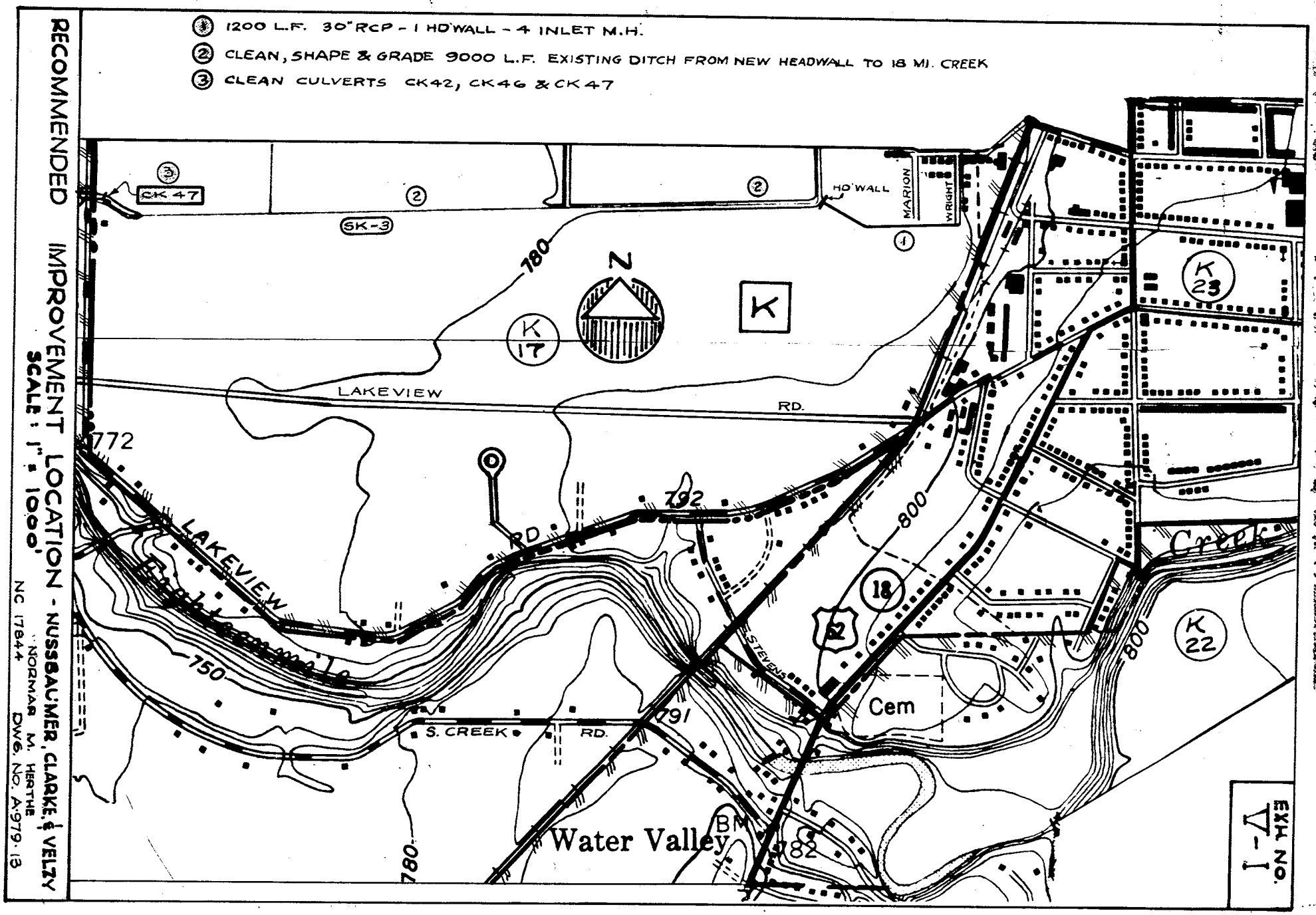
(1) 1500 L.F. OF 24" RCP - 10 INLETS - 5 M.H.
(2) CLEAN CULV. CK61, CK62 AND ADJACENT DITCHES
(3) 25 L.F. NEW 48" RCP CULVERT
(4) 250 L.F. 18" RCP PIPE
(5) 1200 L.F. 12" PIPE - 4 INLETS

Lake View

RECOMMENDED IMPROVEMENT LOCATIONS - NUSSBAUMER, CLARKE, & VELZY
SCALE: 1" = 1000'

NORMAN M. HERTHE
NC 17844

DWG. No. A-979-12



1 1200 L.F. 30" RCP - 1 HD'WALL - 4 INLET M.H.
2 CLEAN, SHAPE & GRADE 9000 L.F. EXISTING DITCH FROM NEW HEADWALL TO 18 MI. CREEK
3 CLEAN CULVERTS CK42, CK46 & CK47
CK 47
SK-3
HD'WALL
MARION
WRIGHT
N
K
K 17
K 23
K 22
LAKEVIEW
RD.
772
792
791
780
750
800
LAKEVIEW
RD
STEVENS
S. CREEK
RD.
18
52
Cem
Creek
Water Valley
BM
782
EXH. NO. V-1
RECOMMENDED IMPROVEMENT LOCATION - NUSSBAUMER, CLARKE, & VELZY
SCALE: 1" = 1000'
NORMAN M. HERTHE
NC 17844
DWG. NO. A-979-13

A P P E N D I C E S

LOCATION + SIZE

APPENDIX I

LOCATION AND SIZE OF

EXISTING DRAINAGE STRUCTURES

ANALYSIS

APPENDIX II

ANALYSIS OF EXISTING CULVERTS

ANALYSIS

APPENDIX II

ANALYSIS OF EXISTING CULVERTS

APPENDIX I
LOCATION AND SIZE OF
EXISTING DRAINAGE STRUCTURES

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CA1	Route 5	1,000'	N	Lake Ave.	Twin 48" C.I.P.	573.3.
CA2	Road & So. Buff. R.R.	1,500'	N	Lake Ave.	Twin 48" R.C.P.	577.8
CA3	N.Y.C.R.R.	1,500'	N	Lake Ave.	60" R.C.P.	587.9
CA4	Lake Ave.	100'	W	Electric Ave.	5'H x 11' Conc. Box	584.3
CA5	So. Park	300'	S	Avon Street	48" R.C.P.	601.3
CA6	Milestrip	900'	E	So. Park Ave.	66" R.C.P.	619.4
CA7	Thruway	1,000'	S	Milestrip Rd.	66" R.C.P.	643.7
CA8	McKinley	2,000'	S	Milestrip Rd.	3.6' S.R. 12/12/79 ~~3'~~H x 6' Conc. Box	671.6
CA9	Route 5	1,700'	N	Lake Ave.	Twin 48" C.I.P.	752.8
CA10	Thruway	420'	S	Willet Rd.	Twin 24" R.C.C.P.	597.3
CA11	So. Park	1,000'	N	Lake Ave.	42" C.M.P.	598.0

STREAM ANALYSIS ON PG. 33-37

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CA12	Lake Ave.	600'	E	So. Park	24"H x 48" Conc. Box	606.0
CB1	Willet	100'	E	McKinley	10'H x 40' Conc. Br.	Str. Bed
CB2	Lake Ave.	1,600'	E	McKinley	9.5'H x 36' Bridge	609.4
CB3	Abbott	500'	N	Milestrip	9'H x 24'	641 ±
CB4	Milestrip CB-7 See Pg. 27	1,500'	W	Abbott	3.75'H x 5.8'	655 ±
CC1	Route 5	1,600'	S	Lake Ave.	(2) 10'H x 13'	573.7
CC2	Milestrip	2,000'	SE	Route 5	11.5'H x 22' Conc. Br.	580.3
CC3	Milestrip	100'	N	N.Y.C.R.R.	8'H x 30' Conc. Br.	591.0
CC4	N.Y.C.R.R.	250'	S	Milestrip	8'H x 16' Conc. Arch	588.3
CC5	N.K.P.R.R.	250'	S	Milestrip	11'H x 17' Conc. Br.	588.6
BC1	So. Park Ave.	1,150'	N	Big Tree Rd.	44' CL. - 18' Span	641.8
BC2	Big Tree Rd.	550'	E	So. Park Ave.	10' Clear, 27' Span	Str. Bed

CB-5 to CB-15
Pg. 27

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
BC3	Thruway	AT		Route 20	6' C[illegible]. x 34' W.	661.3
BC4	McKinley	3,165'	S	Big Tree	8'H x 30'	684.3
CC6	Bayview Road	1,050'	SE	McKinley	5'H x 6' Conc. Box	715 ±
CC7	Clark Street	1,000'±	E	McKinley	4.5'H x 6' Conc. Box	780.3
CC8	Route 5	3,000'±	S	Lake Ave.	66" R.C.P.	576.0
CC9	Route 5	2,235'	N	Bayview	30" C.I.P.	586.4
CC10	So. Park Ave.	4,000'	S	Milestrip	3' x 5' Conc.	660.5
CC11	So. Park Ave.	2,900'	N.	Bayview	30" C.I.P.	658.0
CC12	So. Park Ave.	2,480'	N	Bayview	18" C.I.P.	662.0
CC13	So. Park Ave.	1,150'	N	Bayview	18" C.I.P.	677.5
CC14	So. Park Ave.	3,200'	N	Maelou	18" C.I.P.	757.6
CC15	Thruway	300'	N	Big Tree Rd.	3'H x 6' Conc.	657.2
CC16	Thruway	500'±	N	Erie R.R.	24" C.M.P.	670.8

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CC17	Erie R.R.	(Along E.	Side	Thruway)	42" R.C.C.P.	687.5
CC18	Burke	400'	N	Big Tree	36" Conc.	696.0
CC19	McKinley	500'	N	Big Tree	4'H x 4' Conc.	708.4
CC20	Sheldon	400'	NE	Big Tree	24" V.T.P.	714.7
CC21	McKinley	900'	S	Big Tree	8'H x 8'	696.2
CC22	McKinley	1,635'	S	Big Tree	24" R.C.P.	696.2
CC23	McKinley	2,245'	S	Big Tree	18" C.I.P.	691.5
CC24	McKinley	2,845'	S	Big Tree	24" R.C.P.	685.2
CC25	McKinley	3,650'	S	Big Tree	24" C.M.P.	696.3
CC26	McKinley	2,575'	N	Sowles	24" R.C.P.	706.5
CC27	McKinley	1,330'	N	Sowles	18" C.I.P.	722.0
CC28	McKinley	250'	N	Sowles	3'H x 3'	725.8
CC29	McKinley	900'	S	Sowles	16" C.I.P.	730.6
CC30	McKinley	1,770'	S	Sowles	48" R.C.P.	726.2

Culv. No.	Under	Location Dist.	Brg.	From	Size	Inv. El.
CC31	McKinley	800'	N	Maelou Dr.	24" R.C.P.	738.9
CC32	McKinley	220'	S	Maelou Dr.	2'H x 3'	748.1
CC33	McKinley	250'	S	Clark	5.5'Dia. CMP in conc.	787.8
CC34	Parker	300'	N	Hickory Rd.	36" R.C.P.	733.0
CC35	Parker	300'	S	Hickory Rd.	Twin 42"	725.9
CC36	Parker	800'	N	Bayview	36" R.C.P.	751.6
CC37	Big Tree	25'±	W	So. Park Ave.	30" C.I.P	660.0±
CC38	Big Tree	1,400'	E	McKinley	2' x 2' Conc.	721.5
CC39	Big Tree	1,950'	E	McKinley	2' x 2' conc.	721.7
CC40	Big Tree	3,600'	E	McKinley	5'H x 6' Conc. Box	733.6
CC41	Bayview	(Along E Side Thruway)			42" R.C.C.P.	706.7
CC42	Bayview	2,740'	SE	S. Park Ave.	18" C.I.P.	Covered
CC43	Bayview	4,580'	S.E.	So. Park Ave.	24" C.I.P.	708.6

Culv No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CC44	Bayview	1,370'	NW	McKinley	18" C.I.P	721.0
CC45	Bayview	1,150'	N.W	McKinley	18" C.I.P.	721.2
CC46	Bayview	1,125'	N.W	McKinley	18" C.I.P.	722.6
CC47	Bayview	320'	N.W.	McKinley	36" R.C.P.	719.4
CC48	Sowles	2,310'	E	So. Park	18" C.I.P.	736.5
CC49	Sowles	2,340'	E.	So. Park	18" C.I.P.	737.3
CC50	Sowles	340'	W	McKinley	24"H x 42"	730.0
CC51	Fairground Rd.	15'±	SE	Erie R.R.	18" V.T.P.	753.7
CC52	Fairground Rd.	30'±	SE	Erie R.R.	12" C.M.P.	753.5
* CC53	Fairground Rd.	1,500'±	SE	Erie R.R.	24" 4/11/86 JK 18" C.M.P.	747.8
CC54	Fairground Rd.	100'±	NW	Maelou	30" dia. Conc.	756.7
CC55	Maelou	150'	W	Fairground Rd.	18" C.M.P.	765.1
CC56	Route 20	816'	N	Bayview	30" R.C.P.	684.5

* CC53 TOWN HIGHWAY DEPT. REPLACED 18" CMP WITH 24" CMP COATED - 46 LF - 4/10/86

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CC57	Route 20	870'	N	Bayview	24" R.C.P.	681.7
CC58	Route 20	2,920'	N	Bayview	12" C.I.P.	703.2
CC59	Route 20	400'	NE	McKinley	24" CMP & 16" C.I.P.	275.0
CC60	Route 20	1,980'	NE	McKinley	18" C.I.P.	281.4 ?
CC61	Route 20	2,650'	NE	McKinley	18" C.I.P.	288.7 ?
CC62	Route 20	3,700'	NE	McKinley	18" C.I.P.	294.8 ?
CD1	Lakeshore Rd.	1,800'	S	Bayview Rd.	7.3'H x 12.5'	581.2
CD2	Route 5	450'	N	Camp Dr, Traffic Circle & Route 5	3 Twin CMP 6.4'H x 9.5'	580.1
CD3	Big Tree Conn. to Traffic Circle	900'	E	Traffic Circle	6' Clear, 20' Span	587.8
CD4	Big Tree Rd.	800'	W	N.Y.C.R.R.	4.0'H x 18' Bridge	589.4
CD5	Railroad	450'	SW	Big Tree Rd.	6.8'H x 5.0' Stone Box	592.64

CC63 see page 20

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CD6	Route 20	3,700'	SW	So. Park Ave.	3'H x 12'(4'Hx12' Ec)	706.0
CD7	Thruway	650'	N	Sowles Rd.	2'x4' Conc. Box	732.5
CD8	Sowles Rd.	500'	E	Thruway	5' x 5' Conc. Box	736.4
CD9	ScrantonRd.	2,500'	SW	S. Park	3.5'H x 9' Conc. Box	673.8
CD10	Erie R.R.	2,300'	SW	So. Park	36" C.I.P.	680.2
CD11	Maelou	1,500'	W	So. Park	3'H x 5' Conc. Box	785.0
CD12	N.K.P.R.R.	1,200'	N	Big Tree	24" Conc.	600.8
CD13	X Over	1,200'	N	Big Tree	36" Conc.	601.6
CD14	N.Y.C.R.R.	1,200'	N	Big Tree	33" C.I.P.	601.3
CD15	X Over	1,210'	N	Big Tree	72" R.C.P.	601.1
CD16	N.Y.C.R.R.	1,210'	N	Big Tree	4.6'H x 6' Conc. Box	601.2
CD17	Big Tree Conn. to Traffic Circle	450'	E	Traffic Circle	2.5' x 5' Conc.	586.5

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CD18	Big Tree	2,165'	E	Rte. 5 & Traffic Circle	10" V. T. P.	601. 2
CD19	Big Tree	2,340'	E	Rte. 5 & Traffic Circle	24" C. I. P.	604. 0
CD20	Big Tree	2,640'	E	Rte. 5 & Traffic Circle	18" C. I. P.	610. 8
CD21	Big Tree	3,190'	E	Rte. 5 & Traffic Circle	18" C. I. P.	627. 4
CD22	Big Tree	4,180'	E	Rte. 5 & Traffic Circle	36" C. I. P.	648. 0
CD23	Big Tree	6,295'	E	Rte. 5 & Traffic Circle	18" C. I. P.	676. 0
CD24	Bayview	2,270'	SE	Big Tree	18" C. I. P.	709. 5
CD25	Bayview	2,660'	SE	Big Tree	18" C. I. P.	709. 8
CD26	Bayview	40'	NW	So. Park Ave.	18" C. I. P.	715. 0
CD27	Route 20	1,900'	SW	So. Park Ave.	3'CL 6' Span	710. 0
CD28	Thruway	1,470'	S	Sowles Rd.	30" R. C. P.	742. 9

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CD29	Thruway	2,280'	N	Sowles Rd.	36" R.C.P.	730.1
CD30	Sowles Rd.	20'±	W	S.B. Lane	42" R.C.P.	732.0
CD31	Camp Road	500'	SE	Scranton	36" R.C.P.	787.2
CD32	Erie R.R.	At	N Side	Camp	24" C.I.P.	789.1
CD33	Maelou Rd.	25'±	N	Camp Rd.	18" C.I.P.	798.3
CD34	Legion Dr.	25'±	E	Camp Rd.	18" R.C.P.	795.0
CD35	So. Park Ave.	550'	S	Maelou Rd.	Twin 24" C.I.P.	789.4
CD36	So. Park Ave.	1,000'	S	Maelou Rd.	Twin 24" C.I.P.	789.6
CE1	Route 5 (HOOKS)	1,450'	N	Camp Rd.	10.5'H x 14.2	568.5
CE2	Myrtle (ST. FRANCIS DR)	1,900'	NE	Camp Rd.	4'Hx 14' Conc. Br.	586.9
CE3	N.Y.C.R.R.	50'±	NE	Camp Rd.	7'H x 5.5' Stn. Box	609.7
CE4	N.K.P.R.R.	50'±	NE	Camp Rd.	5.5' x 4 Stn. Box	611.9

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CE5	Howard Rd.	2,000'	E	Camp Rd.	4'H x 10.5' Conc. Box	662.2
CE6	Route 20	1,200'	NW	Sowles Rd.	2'H x 8'(4'Hx12' Ec)	700.5
CE7	Route 5	1,950'	SW	Camp Rd.	2' x 2' Conc.	606.8
CE8	Route 5	3,000'	SW	Camp Rd.	1.5' x 2' Conc.	612.8
CE9	Route 5	3,600'	SW	Camp Rd.	36" C.I.P.	605.8
CE10	Big Tree	25'±	W	Myrtle	18" R.C.P.	587.2
CE11	Big Tree	25'±	E	Myrtle	15" C.I.P.	585.8
CE12	Route 20	30'	N	Camp Rd.	18" C.I.P.	718.7
CE13	Route 20	650'	N	Camp Rd.	30" R.C.P.	708.7
CE14	Route 20	985'	N	Camp Rd.	18" C.I.P.	712.4
CE15	Route 20	1,340'	N	Camp Rd.	30" R.C.P.	710.9
CE16	Route 20	2,825'	N	Camp Rd.	12" C.I.P.	708.5
CE17	Route 20	3,925'	N	Camp Rd.	18" C.I.P.	712.7

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CE18	Route 20	5,125'	N	Camp Rd.	Twin 18" C.I.P.	709.6
CE19	Camp Rd.	3,240'	SE	Route 5	18" R.C.P.	642.4
CE20	Camp Rd.	400'	NW	Howard Rd.	3' x 3' Conc.	648.7
CE21	Sowles Rd.	25'±	E	Camp Rd.	18" C.I.P.	705.5
CE22	Sowles Rd.	850'	E	Camp Rd.	2'H x 4' Conc.	707.8
CE23 REPLACED BY 42"x29" CMP BY COUNTY - SPRING '82	Sowles Rd.	1,000'	E	Route 20	2'H x 4' Conc.	710.8
BF1	Main St(HMBG. Spring Rd)	1,200'	SE	McKinley	8'Hx30' Conc.	780.0
CG1	Route 5	300'	N	Rogers	18.7'Hx18.2'(18.5'x20.75)	588.0
CG2	Mt. Vernon Blvd.	140'	NE	Rogers Rd.	6'H x 24' Bridge	607.74
CG3	Railroad	460'	NE	Rogers Rd.	11.5' x 9.5' w Stne Arch	616.33
CG4	Route 20	2,800'	SW	Camp Rd.	~~10'H x 8'~~	630.0

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CG5	Thruway	2,460'	S	Camp Rd.	6' x 13' Conc. Box	747.5
CG6	Sunset	2,400'	S	Camp Rd.	24" R.C.P.	769.9
CG7	Route 5	1,470'	N	Rogers Rd.	24" C.I.P.	605.1
CG8	Route 5	5,000'	SW	Camp Rd.	2' x 2' Conc. Culv.	608.5
CG9	Route 5	350'	SW	Rogers Rd.	2' x 2' Conc.	606.7
CG10	Route 5	1,315'	S	Rogers Rd.	2' x 2' Conc.	601.8
CG11	Route 5	1,600'	SW	Rogers Rd.	1.7' x 2' Conc.	601.2
CG12	Route 5	3,126'	S	Rogers Rd.	24" C.I.P.	592.5
CG13	Route 5	3,500'	SW	Rogers Rd.	2' x 2' Conc.	594.8
CG14	Route 20	At	-	Rogers Rd.	14" C.I.P. (N)	746.0
CG15	Route 20	1,225'	N	Rogers Rd.	24" C.I.P.	709.3
CG16	Route 20	2,280'	N	Rogers Rd.	14" C.I.P.	704.9
CG17	Route 20	4,250'	N	Rogers Rd.	24" C.I.P.	702.0

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CG18	Route 20	1,350'	SW	Camp Rd.	2.6'H x 6'(4' x 5' Ec)	705.4
CG19	Route 20	6,085'	N	Rogers Rd.	18" C.I.P.	718.0
CG20	Thruway	2,620'	S	Camp Rd.	48" R.C.P.	750.1
CG21	Thruway	Along	S. Side	Camp Rd.	30" R.C.P.	746.7
CG22	Thruway	Along	N. Side	Camp Rd.	48" R.C.P.	745.9
CG23	Sunset	25'+	S	Camp Rd.	18" C.I.P.	765.7
CG24	Camp Rd.	2,000'±	W	S.B. Thwy. Lane	Twin 24" R.C.P.	735.8
CG25	Ent. Ramp From Camp	2,000'±	W	S.B. Thwy. Lane	Twin 24" R.C.P.	735.3
CG26	Ent. Ramp From Camp	S. Side	Of	Camp Rd.	Twin 42" R.C.P.	734.1
CG27	Exit Ramp to Camp (EB)	S. Side	Of	Camp Rd.	Twin 42" R.C.P.	736.3
CG28	(Along So. Side Camp Rd. From S.B. Lane to W. Side Main Ramp)				54" R.C.P.	744.1

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CG29	Camp Rd.	Along	W. Side	S. B. Lane	48" R. C. P.	744. 5
CG30	Rogers Rd.	280'	SE	Penna R. R.	18" C. M. P.	629. 1
CG31	Rogers Rd.	1, 200'	N	Cloverbank	2. 5' x 2. 5' Conc.	641. 8
CG32	Cloverbank	500'	W	Rogers	24"dia. Conc. C. B. Ea. end	669. 9
CH1	Route 5	100'	SW	Amsdell Rd.	4' x 5' Conc.	583. 8
		30'±	NW	N. Y. C. R. R.		
CH2	Service Rd	50'±	SW	Amsdell	9'H x 6' Conc. Arch	624. 1
CH3	N. Y. C. R. R.	25'±	SW	Amsdell	5'H x 4. 75'Conc. Arch	634. 6
CH4	Amsdell	At	-	R. R.	5. 3'H x 7. 5' Conc. Box	637. 1
CH5	N. K. P. R. R.	25'±	NE	Amsdell	7'H x 5'Conc. Box	635. 6

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
		25'±	SE	N.K.P.R.R.		
CH6	Stone Road	25'±	NW	Amsdell	Twin 48" Pipes	636.3
CH7	Amsdell	390'	W	Route 20	36" R.C.P.	725.1
CH8	Route 20	800'	SW	Amsdell	30" C.I.P.	733.1
CH9	Route 5	2,140'	N	Amsdell	2' x 2' Conc. Box	589.5
CH10	Route 5	1,500'	NE	Amsdell	2' x 2' Conc. & 24" C.I.P.	591.5 593.2
CH11	Route 5	900'	NE	Amsdell	2' x 2' Conc. 2'X3' Box	587.8
CH12	Route 5	550'	SW	Amsdell	2' x 2' Conc.	590.0
CH13	Route 5	1,600'	SW	Amsdell	1.5' x 2' Conc.	598.4
CH14	Route 5	3,000'	SW	Amsdell	2' x 2' Conc.	592.0
CH15	Route 5	4,000'	SW	Amsdell	2' x 2' Conc.	591.8

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CH 16	N. K. P. & N. Y. C.	1,500'	NE	Amsdell	24" C. I. P Under Both M. H. BTWN.	633.5
CH17	North Drive	2,000'	SW	Amsdell	24" C. I. P.	664.4
* CH18	N. K. P. R. R.	2,000'	SW	Amsdell	24" C. I. P. Box Culv.	661.1
CH19	Route 20	At	-	Rogers	14" C. I. P (S)	745.1
CH20	Route 20	1,730'	N	Amsdell	24" C. I. P.	744.3
CH21	Route 20	870'	N	Amsdell	14" C. I. P.	736.0
CH22	Route 20	560'	N	Amsdell	14" C. I. P.	734.6
CH23	Route 20	30'	N	Amsdell	18" C. I. P.	737,9
CH24	Route 20	30'	S	Amsdell	18" C. I. P.	738.4
CH25	Route 20	3,930'	N	Amsdell	12" C. I. P.	736.5
CH26	Route 20	1,675'	N	Amsdell	12" C. I. P.	744.3

* CH18 3' W x 4' H Box

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CI1	Route 5	300'	N	Pleasant	3'H x 5'	602.3
CI2	N.Y.C.R.R.	1,350'	NE	Pleasant	7'Hx4' Conc. Box	654.5
CI3	N.K.P.R.R.	1,350'	NE	Pleasant	24" C.I.P.	655.8
CI4	North Dr.	1,000'	N	Pleasant	15"CMP & 18" CIP	727.0
CI5	Route 20 CHANGED TO	1,200'	NE	Pleasant	16" C.I.P.	743.0
CJ1	Lake Shore	930'	W	Triangle	5'H x 5' Box	577.8
CJ2	Route 5	2,700'	SW	Pleasant	7.6'H x 10.6'	618.9
CJ3	Versailles	1,500'	SW	Pleasant	4'H x 6' Conc. Box	651.3
CJ4	Heltz	350'	S	Pleasant	7'H x 6.5 Conc. Box	684.97
CJ5	Route 20	2,250'	SW	Pleasant	3'H x 8'	755.3
CJ6	Thruway	8,060'	N	Lakeview Rd.	Two 24" R.C.P.	758.8
CJ7	Smith Rd.	3,000'	N	Lakeview Rd.	24" C.I.P.	768.9
CJ8?	Old Lake Shore	1,400'	S	Triangle	2' x 2' Conc. Box	594.7
CJ8?	#5433 "	1100'±	S	"	30" RCP	

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CJ9	Old Lake Shore	100'	N	Lakeview Terr.	1.5' x 2' Conc. Box	641.6
CJ10	Lakeview Terrace	20'±	E	Old Lake Shore	12" C.M.P.	637.7
CJ11	Lake Shore	820'	SW	Lakeview Terr.	7'H x 4' Conc. Box 1/22/81 S.L. 4'H x 5'W Conc Box - Also 72" RCP Extended 40' South	600.6
CJ12	Old Lake Shore	1,000'	S	Lakeview Terr.	12" V.T.P.	615.0
CJ13	Old Lake Shore	440'	N	Ainslee Lane	2'H x 3' Conc. Box	613.0
CJ14	Old Lake Shore	250'	S	Ainslee Lane	2.25'H x 3' Conc. Box	607.7
CJ15	Route 5	1,000'	S	Pleasant	18" C.I.P.	624.3
CJ16	Route 5	1,900'	SW	Pleasnat	3'H x 3'	620.5
CJ17	Route 5	2,965'	N	Dover Rd.	24" C.I.P.	638.4
CJ18	Route 5	2,570'	N	Dover Rd.	18" C.I.P.	641.7
CJ19	Route 5	2,005'	N	Dover Rd.	18" C.I.P.	645.9
CJ20	Route 5	1,360'	N	Dover Rd.	18" C.I.P.	653.7
CJ21	Birchwood Dr.	25'±	E	Route 5	18" C.I.P.	661.3

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CJ22	Route 5	500'	N	Dover Rd.	18" C.I.P.	664.0
CJ23	Lakewood Drive	25'±	E	Route 5	12" C.I.P.	671.0
CJ24	Dover Rd.	25'±	E	Route 5	18" C.I.P.	676.3
CJ25	Dover Rd.	25'±	W	Route 5	24" C.I.P.	677.4
CJ26	R oute 5	80'	N	Dover Rd.	24" C.I.P.	673.1
CJ27	Route 5	535'	S	Dover Rd.	18" C.I.P.	685.9
CJ28	Route 5	2,315'	N	Lakeview	18" C.I.P.	697.7
CJ29	Route 20	140'	S	Pleasant	12" C.I.P.	764.8
CJ30	Route 20	915'	S	Pleasant	12" C.I.P.	761.3
CJ31	Route 20	1,190'	S	Pleasant	12" C.I.P.	760.1
cJ32	Route 20	1,750'	S	Pleasant	12" C.I.P.	759.0
CJ33	Route 20	2,690'	S	Pleasant	18" C.I.P.	757.6
CJ34	Route 20	3,440'	S	Pleasant	18" C.I.P.	757.0

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CJ35	Route 20	3,800'	S	Pleasant	18" C.I.P.	754.5
CJ36	Route 20	5,040'	S	Pleasant	18" C.I.P.	754.4
CJ37	Pleasant	1,200'	E	Route 20	18" R.C.P.	765.0
CJ38	S.B. Lane Thruway	4,300'	S	Amsdell Rd.	Twin 24" R.C.P.	768.0
CJ39	N.B. Lane Thruway	4,300'	S	Amsdell Rd.	5' x 5' Conc. Box	766.9
CJ40	N.B. Lane Thruway	7,040'	S	Amsdell Rd.	24" R.C.P.	758.7
CJ41	S.B. Lane Thruway	7,040'	S	Amsdell Rd.	4' x 6' Conc. Box	757.8
CK1	Old Lake Shore	40'	N	Lakeview Rd.	2' x 2' Conc. Box	643.8
CK2	Lakeview Rd.	20'±	E	Old Lake Shore	1.75'H x 2' Conc. Box	644.1
CK3	North Drive	20'±	E	Old Lake Shore	12" Conc.	645.6
CK4	South Bend Lane	20'±	E	Old Lake Shore	12" Conc.	648.8
CK5	Old Lake Shore	50'	N	Eckhardt	18" Conc.	646.8

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CK6	Eckardt	20'±	E	Old Lake Shore	15" C.M.P.	646.6
CK7	Schoellkopf	20'±	E	Old Lake Shore	12" V.T.P.	632.8
CK8	Lake Shore	300'	SW	Schoellkopf	4'H x 3' Conc. Box	619.3
CK9	Lake Shore	1,500'	S	Schoellkopf	5.2'H x 6'	599.1
CK10	Route 5	150'	NE	Lakeview	2' x 4' Conc.	677.9
CK11	Route 5	65'	S	Lakeview	24" C.I.P.	678.6
CK12	Route 5	1,800'	S	Lakeview	18" C.I.P.	677.0
CK13	Route 5	2,210'	S	Lakeview	18" C.I.P.	674.0
CK14	Route 5	3,280'	S	Lakeview	18" C.I.P.	670.71
CK15	Route 5	800'	SW	Eckhardt	3' x 4' Conc) 54"x38" Arch	641.2
CK16	Heltz	1,300'	N	Route 20	48" x 30" Ellipse	738.4
cK17	Route 20	2,500'	NE	Heltz	16" C.I.P.	760.2
CK18	Route 20	2,600'	N	Lakeview	14" C.I.P.	753.9

Replaced by State D.O.T Project 5/88 JR

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CK19	Route 20	2,560'	N	Lakeview	14" C.I.P.	753.2
CK20	Route 20	1,700'	N	Lakeview	18" C.I.P.	747.0
CK21	Route 20	1,650'	N	Lakeview	18" C.I.P.	746.8
CK22	Route 20	1,270'	N	Lakeview	12" C.I.P.	746.9
CK23	Route 20	513'	N	Lakeview	16" C.I.P.	739.8
CK24	Route 20	30'	N	Lakeview	24" C.I.P.	734.2
CK25	Route 20	25'	S	Lakeview	18" C.I.P.	737.0
CK26	Route 20	1,785'	S	Lakeview	30" C.I.P.	730.8
CK27	Route 20	2,940'	S	Lakeview	18" C.I.P.	731.9
CK28	Route 20	4,020'	S	Lakeview	16" C.I.P.	728.5
CK29	Route 20	4,375'	S	Lakeview	16" C.I.P.	723.5
CK30	Route 20	4,720'	S	Lakeview	16" C.I.P.	719.3
CK31	Route 20	5,320'	S	Lakeview	12" C.I.P.	717.1

Culv. No.	Under	Location			Size	Inv. El.
		Dist.	Brg.	From		
CK32	Route 20	5,730'	S	Lakeview	16" C.I.P.	695.8
CK33	S.B. Lane Thruway	3,680'	N	Lakeview	48" R.C.P.	754.4
CK34	Thruway	780'	N	Lakeview	24" R.C.P.	751.5
CK35	Thruway	2,660'	S	Lakeview	Twin 24" R.C.P.	736.7
CK36	Lakeview	400'	N	Route 5	2'H x 4' Conc. Box	671.3
CK37	N.Y.C.R.R.	25'±	N	Lakeview	36" C.I.P.	698.7
CK38	Lakeview & N.K.P.	At	-	N.K.P.R.R.	36" C.I.P.	704.7
CK39	Lakeview Rd.	1,700'	E	Versailles	5'H x 8' Br.	622.3
CK40	Old Lakeview Rd.	500'	E	New Lakeview	30" C.M.P.	752.6
CK41	Old Lakeview Rd.	800'	W	Sew. Treat. Pl.	24" x 24"	750.1
CK42	Old Lakeview Rd.	2,000'	W	Smith Rd.	66" H. x 60" W	726.0
CK43	Old Lakeview Rd.	At	-	Smith Rd.	21"H x 26" Box	766.3
CK44	Old Lakeview Rd	90'	E	So. Creek Rd.	36"H x 42"	765.5
CK45	Old Lakeview Rd.	AT	-	Stevens Rd.	24"H x 26"	785.3

Culv. No.	Under	Location			Size	Inv. El
		Dist.	Brg.	From		
CK46	New Lakeview Rd.	2,400'	W	Smith Rd.	72" dia. Conc.	755.8
CK47	Smith Rd.	2,000'	N	Lakeview	36"H x5'-10" Conc. Br.	765.5
CK48	New Lakeview Rd.	1,600'	E	Smith Rd.	18" R.C.P.	780.0
CK49	Main St.	4,600'	SE	McKinley	2' x 2' Conc. Culv.	807.3
CK50	Main St.	5,200'	SE	McKinley	3' x 2' Conc. Culv.	793.0
BK51	Main St.	7,400'	SE	McKinley	6.5'CL x 23.3' Span	792.5
CK52	Main St.	8,000'	SE	McKinley	4.5' H x 15'	704.0
CK53	Schoellkopf	450'	W	Eckhardt	3' H x 4' Box	638.7
CK54	Schoellkopf	500'	SW	Eckhardt	36" R.C.P.	636.1
CK55	Eckhardt	900'	S	Schoellkopf	24" C.M.P.	655.5
CK56	North Creek Rd.	600'	W	N.Y.C.R.R.	48" C.I.	665.9
CK57	North Creek Rd.	300'	E	Burke	24" Conc.	701.0
CK58	North Creek Rd.	25'-100'	SE	Versailles	4'H x 6' Br.	696.9

Culv. No.	Under	Location			Size	Inv. El
		Dist.	Brg.	From		
CK59	So. Creek Rd.	3,300'	N	So. Town Bndry.	1.5' x 2.0' Conc.	780.1
CK60	Sisson Hwy.	At	-	So. Town Bndry	1.5' x 2.0' Conc.	806.4
CL1	Hmbg. E. Eden Rd.	2,000'	N	Town Line	4' x 4' Conc. Box	803 ±
CL2	Hmbg. E. Eden Rd	600'	N	Town Line	30" H x 4' Conc. Box	808 ±

Culv. No.	Location				Size	Inv. El.
	Under	Dist.	Brg.	From		
CA13	James	250'	N	Milestrip Rd.	Twin 30" C. M. P.	610.0 ±
CA6	Milestrip Rd.	1,100'	E	So. Park Ave.	66" R. C. P. (Revised)	619.4
CB5	Milestrip Rd.	1,800'	E	McKinley	24" C. M. P.	663.0 ±
CB6	Milestrip Rd.	2,800'	E	McKinley	24" R. C. P.	667.0 ±
CB7	Milestrip Rd.	1,800'	W	Abbott Rd.	24" R. C. P.	671.0 ±
CB8	Niles Ave.	500'	S	Milestrip	48" R. C. P. ✓ Twin 48"	672.0 ±
CB9	Lynwood Ave.	1,000'	W	Abbott Rd.	3' x 6' Conc. Box	685.0 ±
CB10	Roseview Ave.	1,200'	W	Abbott Rd.	3' x 6' Conc. Box	687.0 ±
CB11	Richmond Ave.	1,600'	W	Abbott Rd.	3' x 6' Conc. Box	691.0 ±
CB12	Thurston Ave.	1,900'	W	Abbott Rd.	3' x 6' Conc. Box	696.0 ±
CB13	Wolf Ave.	600'	N	Sheldon Rd.	48" C. M. P.	715.0 ±
CB14	Wolf Ave.	AT	--	Sheldon Rd.	12" C. M. P.	730.0 ±
CB15	Sheldon Rd.	200'	W	Wolf Ave.	36" C. I. P.	727.0 ±

Culv. No.	Location				Size	Inv. El.
	Under	Dist.	Brg.	From		
CC63	Erie Railroad	3,300'	N	Big Tree Rd.	14'Hx10' Arch	615.0 ±
BD1	Old Route 5	300'	N	Traffic Circle	4.5'H x 19.5'	583.0 ±
CK61	Versailles Rd.	500'±	N	Lakeview Rd.	15" C.M.P.	
CK62	Lakeview Rd.	1,000'±	W	Versailles Road	18" Pipe	Covered

ANALYSIS

APPENDIX II

ANALYSIS OF EXISTING CULVERTS

ANALYSIS

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ANALYSIS OF EXISTING CULVERTS

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CA1	A3, A9, A10, 1/2 A11, A12, 3/4 A13, 1/2A15, A17 to A19	1,072	443	400	180	265	235 *
CA2	A9, A10, 1/2 A11, A12, 3/4A13, 1/2A15, A17 to A19	957	363	375	180	240	235 *
CA3	A9, A10, 1/2 A11, A12, 3/4A13, 1/2A15, A17 to A19	957	363	375	145	240	235 *
CA4	A12, 3/4 A13, 1/2 A15, A17 to A19	747	269	300	430	172	187
CA5	1/2A15, A17 to A19	575	172	200	90	110	129 *
CA6	A17 to A19	550	154	185	145	105	126
CA7	A18, A19	370	109	135	160	70	88
CA8	A19	260	65	85	133	50	65
CA9	A2, A4, A5, A6, A7, 1/2A8	315	160	192	178	93	86
CA10	1/2A8	40	10	20	34	8	13
CA11	1/2 A11, 3/4A13	127	62	93	68	30	36

* Denotes culvert capacity to be less than present computed flow.

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CA12	3/4 A 13	52	36	61	54	12	16
CB1	B1 to B6	8,185	1,414	1,838	3,500	1,250	1,188
CB2	B2 to B6	7,925	1,271	1,652	1,880	1,145	1,145
CB3	B6	7,220	1,083	1,516	2,500	1,000	1,100
CB4	B3, B4, B5 CB-1 See Pg. 26	430	119	167	189	90	99
CC1	1/3 C2, C3 to C32	5,090	1,602	1,762	1,480	1,255	1,079
CC2	1/3 C2, C3 to C32	5,090	1,602	1,762	1,650	1,255	1,130
CC3	C3 to C32	4,925	1,462	1,754	1,580	1,120	1,008
CC4	C3 to C32	4,925	1,462	1,754	960	1,120	1,086 *
CC5	C3 to C32	4,925	1,462	1,754	1,280	1,120	1,086
BC1	1/2 C7, C8 to C32	4,143	1,116	1,451	1,200	855	958
BC2	1/2C9, C10, 1/2C12, 1/2C13, C14 to C32	3,573	985	1,379	1,200	760	912
BC3	1/2C13, C14 to C32	3,265	900	1,260	1,680	695	904

Culvert Number	Contributing Sub Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.	
BC4	C19, C22 to C25, C27 to C32	2,325	628	942	2,000	585	790	
CC6	1/2C27, C28, C29, C31, C32	988	290	493	220	220	352	*
CC7	C31, C32	490	148	296	200	115	230	*
CC8	1/4 C2	124	105	105	120	50	38	
CC9	1/4 C2	124	105	105	33	50	38	*
CC10	1/2 C7	83	25	25	110	20	15	
CC11	1.2 C11, 1/4 C12	85	23	69	33	16	40	*
CC12	12 Acres of C12	12	4	8	10	3	5	
CC13	1/4 C12	33	10	35	10	7	21	*
CC14	1/2 C26	40	10	22	10	8	14	*
CC15	1/2 C8, 1/2 C9	148	42	15	133	30	28	
CC16	6 Acres of C12	6	2	6	13	2	5	
CC17	1/2 C26, 3/4 C17, 1/3 C18	232	65	104	48	46	58	*
CC18	1/2 C9	103	31	40	48	20	20	

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (acres)	Future Sum of Axc. Upstream	Future Computed Flow C. F. S.	Capacity C. F. S.	Present Sum of Axc Upstream	Present Computed Flow C. F. S.
CC19	1/2 C9	103	31	40	83	20	20
CC20	8 Acres C9	8	3	6	20	2	3
CC21	1/2 C9, C10, C15, C21	583	151	196	345	120	114
CC22	C16	60	15	20	20	12	12
CC23	10 Acres of C16	10	2	3	10	2	3
CC24	C20	160	40	64	20	32	42 *
CC25	10 Acres of C19	10	3	8	26	2	4
CC26	5 Acres of C19	5	1	3	20	1	2
CC27	4 Acres of C18	4	1	2	10	1	2
CC28	16 Acres of C27, 25 Acres of C28	41	10	10	63	8	6
CC29	5 Acres of C27	5	1	3	8	1	2
CC30	1/2 C28, 1/2 C27	110	27	23	85	22	12
CC31	5 Acres of D12, 10Acres of C28, 10 Acres of C27	25	7	14	20	6	10

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CC32	40 Acres of D12	40	16	14	39	8	14
CC33	C31	170	68	109	100	50	63
CC34	C22, C23	205	52	78	48	40	48
CC35	C24, C25	730	183	113	96	145	68
CC36	27 Acres of C19, C30	77	22	24	48	16	13
CC37	1/2 C11, 1/4 C12	85	23	69	33	16	40 *
CC38	1/4 C9	51	15	27	26	10	14
CC39	1/4 C9	51	15	24	26	10	14
CC40	C10, C21	385	96	144	160	80	96
CC41	1/4 C17, 1/2 C26	85	23	41	48	17	24
CC42	1/4 C17	45	14	13	11	9	6
CC43	1/4 C17, 1/2 C26	85	24	50	20	17	27 *
CC44	4 Acres of C18	4	1	2	11	1	2
CC45	1/4 C26, 5 Acres of C18	25	6	13	11	5	8

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (acres)	Future Sum of Axc Upstream	Future Computed Flow C. F. S.	Capacity C. F. S.	Present Sum of Axc Upstream	Present Computed Flow C. F. S.
CC46	5 Acres of C27, 5 Acres of C28, 3 Acres of C18	13	3	6	11	3	5
CC47	16 Acres of C27, 25 Acres of C28	41	10	10	48	8	6
CC48	1/4 C26	20	5	11	11	4	7
CC49	5 Acres of C28, 5 Acres of C27	10	3	7	11	2	3
CC50	16 Acres of C27, 25 Acres of C28	41	10	10	46	8	6
CC51	25 Acres of C28	25	6	8	11	5	5
CC52	25 Acres of C28	25	6	8	3	5	5 *
* CC53	25 Acres of C28	25	6	8	7	5	5
CC54	5 Acres of D12, 10 Acres of C28	15	5	19	33	4	14
CC55	5 Acres of D12	5	2	9	7	2	8 *
CC56	8 Acres of C12	8	3	8	33	2	4

* See Note Appendix I - Pg. 6

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CC57	5 Acres of C12	5	2	6	20	1	2
CC58	8 Acres of C13	8	3	8	4	2	4
CC59	8 Acres of C9	8	3	6	22	2	3
CC60	8 Acres of C9	8	3	6	11	2	3
CC61	8 Acres of C9	8	3	6	11	2	3
CC62	8 Acres of C9	8	3	6	11	2	3
CD1	2/3 D1, D2 to D12	2,520	952	520	550	583	297
CD2	D2 to D12	2,460	922	500	600	570	296
CD3	D5 to D12	2,015	700	375	720	465	246
CD4	D5 to D12	2,015	700	375	430	465	246
CD5	D5 to D12	2,015	700	375	200	465	251 *
CD6	1/2 D6, 1/2 D7, D8 to D11, 285 Acres of D12	1,300	506	329	252	320	198

Culvert Number	Contributing Sub-Drainage Area.	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CD7	265 Acres of D9, D10 to D12	1,105	497	348	54	275	179 *
CD8	265 Acres of D9, D10 to D12	1,105	497	348	190	275	182
CD9	D10, D11, D12	840	391	293	225	220	165
CD10	D10, D11, D12	840	391	293	48	220	165 *
CD11	D10, D11, D12	840	391	293	110	220	161 *
CD12	D3, D4	290	83	83	20	73	53 *
CD13	D3, D4	290	83	83	48	73	53 *
CD14	D3, D4	290	83	83	41	73	53 *
CD15	65 Acres of D2 & C2	65	58	128	145	15	26
CD16	65 Acres of D2 & C2	65	58	128	147	15	26
CD17	25 Acres of D2	25	23	74	88	5	13

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CD18	4 Acres of D3	4	1	3	2	1	3 *
CD19	4 Acres of D3	4	1	3	20	1	3
CD20	4 Acres of D3	4	1	3	11	1	3
CD21	4 Acres of D3	4	1	3	11	1	3
CD22	135 Acres of D4, 20 Acres of D3	155	41	45	48	35	29
CD23	5 Acres of D4	5	1	3	11	1	3
CD24	5 Acres of D5	5	1	3	11	1	3
CD25	5 Acres of D5	5	1	3	11	1	3
CD26	5 Acres of D5	5	1	3	11	1	3
CD27	1/2 D6, 1/2 D7	140	42	134	133	32	80
CD28	40 Acres of D9	40	10	21	33	8	13
CD29	D7	70	21	29	48	15	15

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CD30	D8, 40 Acres of D9	75	19	30	48	15	19
CD31	30 Acres of D9	30	8	14	48	6	8
CD32	50 Acres of D11	50	30	66	20	20	34 *
CD33	10 Acres of D10	10	4	7	11	2	3
CD34	25 Acres of D10	25	10	18	11	5	7
CD35	142 Acres of D12	142	56	78	40	28	31
CD36	142 Acres of D12	142	56	78	40	30	33
CE1	E3 to E8 (Hoaks)	1,020	368	478	766	255	268
CE2	1/2 E3, E4 to E8	973	340	442	420	235	259
CE3	E4 to E8	925	311	435	290	215	280
CE4	E4 to E8	925	311	435	165	215	280 *
CE5	E6, E7, E8 Howard Rd.	490	157	267	214	120	192

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area Acres	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CE6	E7, 1/2 E8	190	67	141	104	45	90
CE7	40 Acres of E2	40	10	32	26	8	21
CE8	20 Acres of E2	20	5	16	19	4	10
CE9	20 Acres of E2	20	5	16	48	4	10
CE10	10 Acres of E3	10	6	16	11	4	9
CE11	10 Acres of E3	10	6	16	7	4	9 *
CE12	7 Acres of E8	7	2	6	11	2	6
CE13	73 Acres of E8	73	22	40	33	18	25
CE14	5 Acres of E8	5	2	6	11	2	5
CE15	6 Acres of E7	6	2	5	33	2	4
CE16	7 Acres of E7	7	2	6	4	2	5 *
CE17	15 Acres of E7	15	5	8	11	4	5
CE18	32 Acres of E7	32	10	16	21	6	8

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area Acres	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CE19	12 Acres of E4	12	6	15	11	3	6
CE20	2/3 E4	120	60	55	63	30	19
CE21	5 Acres of E6	5	2	6	11	1	3
CE22	78 Acres of E8	78	23	39	54	20	27
CE23	1/2 E8	85	26	52	54	20	40
BF1	F1 to F4	4,210	665	579	1,290	665	466
CG1	1/2 G2, G4 to G6, 1/2 G7, G8 to G10	2,179	1,163	1,128	1,300	510	434
CG2	1/4 G2, G4 to G6, 1/2 G7, G8 to G10	2,153	1,157	1,134	860	505	434
CG3	G4 to G6, 1/2 G7, G8 to G10	2,127	1,150	1,150	900	500	450
CG4	335 Acres of G9, 585 Acres of G10	920	480	528	480	215	217
CG5	580 Acres of G10	580	260	312	416	145	165

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area Acres	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CG6	1/3 G10	220	100	140	20	55	76 *
CG7	1/4 G2	26	6	11	20	5	7
CG8	1/4 G2	26	6	16	26	5	10
CG9	39 Acres of G3	39	10	30	26	8	20
CG10	39 Acres of G3	39	10	30	26	8	20
CG11	39 Acres of G3	39	10	30	22	8	20
CG12	39 Acres of G3	39	10	30	20	8	20
CG13	39 Acres of G3	39	10	30	26	8	20
CG14	5 Acres of G9	5	3	8	6	1	3
CG15	20 Acres of G9	20	13	46	20	4	11
CG16	8 Acres of G9	8	5	20	6	2	7 *
CG17	50 Acres of G6	50	40	36	20	14	9
CG18	1/2 G7, G8, 72 Acres of G6	250	160	141	109	70	41

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CG19	8 Acres of G6	8	7	26	11	3	9
CG20	80 Acres of G10	80	36	36	64	20	15
CG21	75 Acres of G10	75	34	85	33	20	38 *
CG22	G8	120	84	120	90	30	57
CG23	40 Acres of G10, 30 Acres of D9	70	25	45	11	16	22 *
CG24	1/2 G7	60	18	23	40	13	13
CG25	1/2 G7	60	18	23	40	13	13
CG26	G8, 75 Acres of G10, 35 Acres of G6	230	146	190	136	60	69
CG27	G8, 75 Acres of G10, 35 Acres of G6	230	146	190	136	60	75
CG28	G8, 75 Acres of G10	195	118	160	112	50	85
CG29	G8	120	84	120	90	30	51
CG30	1/2 G3	110	33	33	11	20	15 *

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CG31	65 Acres of G4	65	20	30	43	16	18 *
CG32	65 Acres of G4	65	20	32	20	16	20
CH1	H3, H6, H8, H9	790	222	311	150	162	211 *
CH2	H6, H8, H9	730	207	333	220	150	207
CH3	H6, H8, H9	730	207	333	180	150	207 *
CH4	H6, H8, H9	730	207	333	300	150	207
CH5	H6, H8, H9	730	207	333	260	150	207
CH6	H6, H8, H9	730	207	228	128	150	207 *
CH7	1/2 H9	135	34	58	48	28	46
CH8	1/3 H9	90	23	39	33	19	32
CH9	25 Acres of H2	25	6	18	26	5	13
CH10	40 Acres of H2, H5	180	94	113	46	40	35
CH11	25 Acres of H2	25	6	18	26	5	13
CH12	40 Acres of H4, H7	130	39	50	26	7	15

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CH13	40 Acres of H4	40	12	32	19	10	25 *
CH14	30 Acres of H4	30	9	12	26	7	7
CH15	30 Acres of H4	30	8	11	26	7	7
CH16	H5	140	84	92	20	30	25 *
CH17	H7	90	27	36	20	20	64 *
CH18 ⊛	H7 3'x4' Box Culv.	90	27	36	~~20~~	20	64 *
CH19	25 Acres of H9	25	6	10	6	5	6
CH20	25 Acres of H9	25	6	10	20	5	6
CH21	25 Acres of H9	25	6	10	6	5	6
CH22	25 Acres of H9	25	6	10	6	5	6
CH23	25 Acres of H9	25	6	10	11	5	6
CH24	25 Acres of H9	25	6	10	11	5	6
CH25	25 Acres of H9	25	6	10	4	5	6 *
CH26	20 Acres of H9	20	5	8	4	4	5 *

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C. F. S.	Capacity C. F. S.	Present Sum of Axc Upstream	Present Computed Flow C. F. S.
CI1	I2, I3, I4	545	250	350	110	110	143 *
CI2	I3, I4	450	217	326	210	90	122
CI3	I3, I4	450	217	326	20	90	122 *
CI4	I4	260	65	98	20	50	70 *
CI5	14 Acres of I4, 18 Acres of J8	32	7	14	8	5	10 *
CJ1	57 Acres of J2, 1/2 J5, J6 to J9, 51 Acres of J10	1,433	443	443	190	360	299 *
CJ2	50 Acres of J5, J6 to J9, 51 Acres of J10	1,296	409	450	500	330	281
CJ3	J6 to J9, 51 Acres of J10	1,246	396	436	180	320	285 *
CJ4	J7 to J9, 51 Acres of J10	1,036	343	377	340	275	259
CJ5	1/9 J8, 1/3 J9, 51 Acres of J10	219	99	119	180	55	66
CJ6	1/5 J9,	80	48	38	40	20	16
CJ7	51 Acres of J10	51	13	29	20	11	24 *

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CJ8	7 Acres of J2	7	2	7	26	2	6
CJ9	16 Acres of J3	16	5	14	19	4	9
CJ10	6 Acres of J3	6	2	6	3	2	4 *
CJ11	1/2 J3	115	35	88	150	25	50
CJ12	7 Acres of J3	7	2	6	4	2	4
CJ13	1/2 J4	75	19	32	39	6	8
CJ14	1/2 J4	75	19	32	47	11	15
CJ15	10 Acres of J5	10	3	7	11	2	3
CJ16	30 Acres of J5	30	8	18	63	7	12
CJ17	16 Acres of J5	16	4	9	20	4	7
CJ18	16 Acres of J5	16	4	9	11	4	7
CJ19	16 Acres of J5	16	4	9	11	4	7
CJ20	16 Acres of J5	16	4	9	11	4	7

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CJ21	16 Acres of J5	16	4	9	11	4	7
CJ22	32 Acres of J5	32	8	18	11	7	12 *
CJ23	16 Acres of J5	16	4	9	4	4	7 *
CJ24	16 Acres of J5	16	4	9	11	4	7
CJ25	32 Acres of J5	32	8	18	20	7	12
CJ26	32 Acres of J5	32	8	18	20	7	12
CJ27	16 Acres of J5	16	4	9	11	3	5
CJ28	16 Acres of J5	16	4	9	11	3	5
CJ29	30 Acres of J8	30	5	14	4	5	11 *
CJ30	30 Acres of J8	30	5	14	4	5	11 *
CJ31	30 Acres of J8	30	5	14	4	5	11 *
CJ32	30 Acres of J8	30	5	14	4	5	11 *
CJ33	30 Acres of J8	30	5	14	11	5	11
CJ34	30 Acres of J8	30	5	14	11	5	11

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CJ35	30 Acres of J8	30	5	14	11	5	11
CJ36	30 Acres of J8	30	5	14	11	5	11
CJ37	30 Acres of J8	30	5	11	11	5	9
CJ38	15 Acres of J8	15	2	4	40	2	3
CJ39	1/3 J9	135	81	113	134	30	33
CJ40	25 Acres of J9	25	15	18	20	6	7
CJ41	2/3 J9	270	90	178	133	57	49
CK1	27 Acres of K3, 47 Acres of K2	74	19	61	26	19	48 *
CK2	27 Acres of K3	27	7	27	23	7	22
CK3	14 Acres of K3	14	4	16	4	4	14 *
CK4	10 Acres of K3	10	3	14	4	3	11 *
CK5	14 Acres of K3	14	4	15	11	4	13 *

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CK6	10 Acres of K4	10	3	12	7	3	11 *
CK7	10 Acres of K4	10	3	12	4	3	11 *
CK8	1/2 K2, K3, K4, K6, K7 1/2 K9	607	157	170	85	157	149 *
CK9	20 Acres of K4, K5	145	36	58	166	36	44
CK10	K6, K7, 1/2 K9	290	77	105	54	77	64 *
CK11	36 Acres of K8	36	9	11	20	9	8
CK12	36 Acres of K8	36	9	11	11	9	8
CK13	36 Acres of K8	36	9	11	11	9	8
CK14	36 Acres of K8	36	9	11	11	9	8
CK15	140 Acres of K10, 140 Acres of K8	280	70	32	85	70	36
CK16	K13, K14, K15	215	81	105	48	40	38
CK17	K14, K15	155	72	101	8	32	36 *

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CK18	13 Acres of K18	13	2	4	6	2	3
CK19	13 Acres of K18	13	2	4	6	2	3
CK20	13 Acres of K18	13	2	4	11	2	3
CK21	13 Acres of K18	13	2	4	11	2	3
CK22	13 Acres of K18	13	2	4	4	2	3
CK23	13 Acres of K18	13	2	4	8	2	3
CK24	13 Acres of K18	13	2	4	20	2	3
CK25	13 Acres of K18	13	2	4	11	2	3
CK26	13 Acres of K18	13	2	4	33	2	3
CK27	13 Acres of K18	13	2	4	11	2	3
CK28	13 Acres of K18	13	2	4	8	2	3
CK29	13 Acres of K18	13	2	4	8	2	3
CK30	13 Acres of K18	13	2	4	8	2	3

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CK31	13 Acres of K18	13	2	4	4	2	3
CK32	5 Acres of K18	5	1	3	8	1	3
CK33	K15	75	60	120	64	20	32
CK34	30 Acres of K16	30	21	34	20	6	7
CK35	60 Acres of K19	60	9	15	40	9	12
CK36	K6, K7, 1/2 K9	290	77	105	54	77	105 *
CK37	K7, 1/2 K9	165	44	80	48	44	75 *
CK38	K7, 1/2 K9	165	44	80	48	44	75 *
CK39	K11, K13, K14, K15	545	164	153	220	125	81
CK40	115 Acres of K16	115	80	72	23	30	19
CK41	25 Acres of K16	25	18	58	26	6	16
CK42	340 Acres of K17, 115 Acres of K16, 324 Acres of J10	779	247	182	147	200	162 *
CK43	55 Acres of K17	55	14	22	21	14	17

Culvert Number	Contributing Sub-Drainage Area.	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CK44	70 Acres of K17	70	18	34	74	18	27
CK45	20 Acres of K17	20	5	16	28	5	14
CK46	340 Acres of K17, 115 Acres of K16, 324 Acres of J10	779	247	182	145	200	162 *
CK47	340 Acres of K17, 324 Acres of J10	664	166	160	133	150	147 *
CK48	15 Acres of K17	15	4	10	11	4	8
CK49	40 Acres of K25	40	6	10	26	6	7
CK50	80 Acres of K25	80	12	19	39	12	15
BK51	K25	2,195	329	151	780	329	151
CK52	K26	525	79	75	345	79	51
CK53	1/2 K2, K3, K6, K7, 1/2 K9	502	131	155	85	131	147 *
CK54	1/2 K2, K3, K6, K7, 1/2 K9	502	131	155	48	131	131 *

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	present Sum of Axc Upstream	Present Computed Flow C.F.S.
CK55	144 Acres of K8, K5	269	67	45	14	67	30 *
CK56	1/2 K8	145	36	50	64	36	40
CK57	1/2 K9	90	27	38	20	27	30 *
CK58	K11, K12, K13, K14, K15, K18	975	245	184	133	200	98
CK59	8 Acres of K20	8	1	3	19	1	3
CK60	8 Acres of K21	8	2	6	19	2	5
CL1	L2	295	74	74	83	74	74
CL2	L3, L4	475 GOOD	93	61	68	93	61

OK TASSOFF SOR

Culvert Number	Contributing Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CA6	A17 to A19	550	154	185	170	105	126
CA13	A17 to A19, 10 Acres of A15	560	161	194	66	107	128 *
CB5	25 Acres of B3	25	8	20	20	5	13
CB6	25 Acres of B3	25	8	20	20	5	13
CB7	20 Acres of B3	20	6	15	20	4	11
CB8	110 Acres of B3, B4, B5	330	86	146	90	66	112 *
CB9	70 Acres of B3, B4, B5	290	74	130	133	58	102
CB10	53 Acres of B3, B4, B5	273	69	120	133	55	96
CB11	36 Acres of B3, B4, B5	256	64	112	133	51	90
CB12	20 Acres of B3, B4, B5	240	59	103	133	48	84
CB13 WOLF RD.	15 Acres of C19, 70 A. of B5, 28 A. of B4	113	28	46	64	23	30
CB14 WOLF RD	15 Acres of B5	15	4	10	4	3	8 *
CB15 SHELDON	15 Acres of C19, 70 Acres of B5	85	21	35	48	17	21

Culvert Number	Contribution Sub-Drainage Area	Upstream Drainage Area (Acres)	Future Sum of Axc Upstream	Future Computed Flow C.F.S.	Capacity C.F.S.	Present Sum of Axc Upstream	Present Computed Flow C.F.S.
CC63	64 Acres of C6, C7 to C32	4,290	1,157	1,447	980	890	1,000 *
BD1	D2 to D12	2,460	922	500	600	570	296
CK61	16 Acres of K7	16	4	13	7	4	13 *
CK62	22 Acres of K7	22	6	20	10	6	20

APPENDIX III

TABULATION OF BENCH MARKS

Note: Bench marks included herein are compiled from bench marks utilized for the Master Sewer District, Lakeview-Pinehurst Sewer Survey and those established especially for this Report. The bench mark numbers contained herein have been designated for this Report only and do not necessarily correspond to those given for the Master Sewer District and Lakeview-Pinehurst Sewer Survey.

Master benches to which all surveying is related are:

(a) Master Sewer District:

Department of Public Works of the State of New York for the Lake Shore Highway Project - Bayview and Old Lake Shore Road -- Top of Lower Concrete Step of Bayview Hotel: Elevation 594.75.

(b) Lakeview-Pinehurst Sewer Survey:

U.S.G.S. Monument with bronze disc No. WSM-8-1947 Southwest Corner of Shadagee Road and Southwestern Boulevard

Location of Bench Marks is shown on Sheet No. 20 of Drainage Maps.

TABULATION OF BENCH MARKS

B.M.	ELEV.	DESCRIPTION
No.1	594.75	Bayview & Old Lake Shore Rd. - S.W.Corner Lower Step Bayview Hotel
No.2	618.33	Top of Flange S. Leg Tower #94 125'± N of Lakeview Ave. on Bayview.
No.3	619.60	Willowdale & Bayview - N. Nut Hydrant #106
No. 4	685.26	Big Tree & Bayview - Chisel Mark in N.W.Corner of Headwall.
No.5	585.45	Old Lake Shore Rd.-N.Side - N.W.Corner Conc Headwall 1,900' W of Bayview
No.6	586.20	Lake Shore Rd- Top End of Sea Wall just West of Hoaks Tavern.
No.7	595.06	Big Tree - 1,000' E. of Myrtle - N.W.Corner Bridge - Top Conc. Curb.
No.8	633.36	Big Tree - W. Nut Hydrant #90 @ 385 Big Tree Road.
No.9	669.09	Big Tree & Loring - Chisel Cut N.E.Corner of Headwall.
No.10	687.70	Big Tree & Bristol - S. Nut Hyd.#95.
No.11	660.25	S. Park - S.E.Corner - N.W.Wingwall of Erie R.R. Bridge.
No.12	720.86	S.Park & Southwestern Blvd. S.E. Corner Texaco Sign Base.
No.13	711.75	Bay View - E. Side of Rd. - X Cut, S.W. Corner of Headwall opp. Front Door Frontier School.

B.M.	ELEV.	DESCRIPTION
No.14	741.07	South Park & Beetow Dr. - South West Corner of South Headwall.
No.15	762.31	S. Park & Sowles - S. End Gas Pump Island.
No.16	761.82	S. Park - N.Nut Hyd. 85'± S. of Sprague.
No.17	778.90	S. Park - W. Side - X Cut Ctr. Conc. Headwall 500'± S. of R.R.
No.18	794.25	S.Park & Maelou - X Cut Ctr.S.W.Conc. Headwall
No.19	795.05	S.Park - W. Side - S.E.Corner Red Brick House @ Pole #128-1
No.20	597.55	Lake Shore - N.E.Nut Shell Sign 100'± E. of Camp Road.
No.21	632.23	Camp Rd. - N.Nut Hyd. S of School.
No.22	647.93	Camp & Nash - E. Nut Hyd.
No.23	659.61	Camp Rd. - S.E.Cor.Howard - Center Conc. Headwall
No.24	708.30	Camp Rd. - N.E.Cor.Sowles - Center Conc. Headwall
No.25	726.31	Camp Rd. - S.E.Cor.Columbia - Center Line Conc. Headwall
No.26	770.44	Sunset & Camp - W. Nut Hydrant.
No.27	790.75	Camp & Deacon - S.Nut Hydrant.
No.28	717.80	Sowles Rd. - N. Nut Hydrant #6 600'E of Southwestern Boulevard.
No.29	735.56	Sowles Rd. - S.W.Nut Hydrant #16 At College.
No.30	751.11	Sowles Rd. - Nut Hydrant #12, 75' W. of Electric.

B.M.	ELEV.	DESCRIPTION
No.31	755 89	Columbia & College - N.W.Corner - Nut Hydrant #29.
No.32	711.53	Southwestern Blvd. - X Cut in S. Headwall 1,340' W of Camp Road.
No.33	695.02	Southwestern Blvd. - X Cut in Center of W. Headwall 350' N. of Able.
No.34	766.10	Rogers Rd. - X Cut in Center of Headwall N. of Amsdell Rd. W of Pleasant Ave.
No.35	764.94	Rogers Rd. - S.W.Corner Bottom Step Front Ent. Brick No. 55493
No.36	747.62	Rogers Rd.& Southwestern Blvd. - S.W. Corner - X Cut in Center of Conc. Headwall.
No.37	633.10	Rogers Rd. at PRR, N.E.Cor. Chlorine pit
No.38	675.86	Rogers & Clover Bank - S.W Corner Rim of M.H.
No.39	658.00	Cloverbank Rd. @ P.R.R. - N.W. Nut on Control Box S of Crossing.
No.40	629.78	Morgan - 100'N of Cloverbank M H.Rim in Sidewalk.
No.41	596.32	Cloverbank & Lake Shore - N. End Sunoco Gas Pump Island.
No.42	799.89	Maelou Rd. - 1,200'± S. of South Park E. Nut Hyd. #47.
No.43	640.14	Nash Rd. - N.E.Cor. of Porch Ho.#159
No.44	778.03	Wood & Scranton - S. Nut Hyd. #87.
No.45	785.42	Scranton & Jefferson - S.W.Nut.Hyd.#73.
No.46	766.47	Ellsworth - E.of Ontario - S.E.Nut Hyd.#82.

B.M.	ELEV.	DESCRIPTION
No.47	783.46	Ontario & Monroe - N Nut Hyd.#71
No.48	615.66	Myrtle N.E.Cor.LaSalle - Top of Mon.
No.49	624.95	Durham - N.Side - Rim of M.H. opp. Ho.#154.
No.50	599.89	S. Nut Hydrant Beach & Lake Shore.
No.51	646.14	Penn.RR Tracks - 2,200'± East of Rogers Rd. Top of Mile Post #11.
No.52	628.59	Penn. RR Bridge Camp Rd. - S.W.Cor. - Top Wing above 10/39 Bridge No.
No.53	590.51	X Cut, N.E.Cor. Conc.Hdwl. Route #5 N. of Amsdell.
No.54	601.36	W. nut hydrant. Route #5 and Columbia
No.55	604.28	N.E. Nut Hydrant @ 5949 Lake Shore @ 250' N. of Wanakah Country Club.
No.56	610.80	X Cut in Headwall. E. Side Int. of Route #5, Old Lake Shore Road and Pleasant Ave.
No.57	649.56	N.Nut Hydrant Route 5 and West Lane Drive.
No.58	684.31	X cut in Headwall. 200' S. of Dover Rd. E. side Route #5.
No.59	681.38	X cut in S.W.cor.Conc.Headwall. N.W. corner Route #5. and Lakeview Road.
No.60	675.80	S.E.Corner Bottom Step Ent. to Log Cabin Inn Route #5.
No.61	697.191	U.S.G.S.Mon.No.WSM-8-1947 S.W. cor. Shadagee Road and Southwestern Blvd.
No.62	706.15	N.cor.N.W.end top of conc.bridge rail S.W. side N.Creek Rd. S.E. of Versailles Rd.

B.M.	ELEV.	DESCRIPTION
No.63	743.43	North Lug Fire Hydrant West Side Versailles Road 1,160' Northeast of North Creek Road.
No.64	744.56	North Lug Fire Hydrant West Side Versailles Road 502' southwest of Lakeview Road.
No.65	739.65	West Lug Fire Hydrant Lakeview Road 653' Northwest of Versailles.
No.66	711.28	West Lug Fire Hydrant Soutside Lakeview Road Near Lakeview Hotel.
No.67	676.08	West Lug Fire Hydrant Lakeview Road 1820' Southeast of Old Lake Shore Road.
No.68	647.99	Southwest corner concrete headwall at southeast corner Lakeview Road and Old Lake Shore Road.
No.69	654.98	East Lug Fire Hydrant Northwest side Lake Shore Road 819' southwest of Lakeview Road.
No.70	651.55	East Lug Fire Hydrant Northwest side Lake Shore Road opposite Eckhardt Road.
No.71	636.16	Southeast corner conc. headwall at southeast corner Lake Shore Road and Schoellkoph Road.
No.72	628.95	East lug fire hydrant Northwest side Lake Shore Road opposite North Creek Road.
No.73	639.43	East end concrete headwall soutside North Creek Road 1480' East of Old Lake Shore Road.
No.74	665.92	Northeast corner concrete headwall at Northwest corner Route 5 and North Creek Road.

B.M.	ELEV.	DESCRIPTION
No.75	685.68	Northwest corner Bridge abutment west end N.Y.C.R.R. on south side North Creek Road.
No.76	617.37	South Lug Fire Hydrant Old Lake Shore Road and House #7033.
No.77	617.17	R.R.Spike in stump soutside Old Lake Shore Road 150' E. of Cresent Court at Culvert.
No.78	660.18	North Lug Fire Hydrant Old Lake Shore Road and Dover Road.
No.79	639.72	Northeast Lug Fire Hydrant Old Lake Shore Road and West Lane.
No.80	600.12	North Lug Fire Hydrant at Brick Post on Old Lake Shore Road 1,000' ± West of Route 5.
No.81	755.45	N.W.Corner Headwall N.E. corner Route 20 and Schultz Road.
No.82	582.25	Floor of Pump Station @ Doorway 100' S. of Lake Avenue 1,300' E of center line Hamburg Turnpike.

Appendix C

TOWN OF HAMBURG FIELD DATA INFORMATION

Asset Point Description/Notes	x	y	Culvert ID	Figure	Map	Ownership
BC1. Inlet. Good condition. Densely wooded very difficult to access. Branches, sediment, organics observed floating stagnant at the inlet.	-78.82371269	42.77496693	BC1 Inlet	74	17-4	State
BC1 outlet. Good condition. Densely wooded and difficult to access.	-78.82394733	42.77494817	BC1 Outlet	73	17-4	State
Bc2 outlet. Good condition. 12" cpp entering from directly east and 24" enters from concrete structure in good condition next to wingwall from a 36" w end section seen about 50' west good condition some sediment seen settled at 36".	-78.82188797	42.77165347	BC2 Outlet	xx	17-5	Town
Bc3 inlet. Good condition 2x7x11. A stream entering from the east too about 30' upstream from inlet	-78.81753809	42.76689279	BC3 Inlet	78	17-5	State
BC3 outlet good condition. 2x11x7. Enter at another 2x7x11	-78.81769455	42.76707596	BC3 Outlet	77	17-5	State
Bc4 inlet good condition. 48" cpp entering from north. A few branches and trees near here, but a large tree from southern bank to the Center wall of bridge water way. many logs and branches leaves and sediments and the tree blocking inlet at Center wall.	-78.81151292	42.76124293	BC4 Inlet	xx	17-5	County
Bc4 outlet good condition flow clear water 2x~8x8	-78.81196853	42.76156226	BC4 Outlet	xx	17-5	County
BD1 inlet, and inlet of the upstream of 2 box culverts consisting of "BD1" (crossing Northbound Lake Shore Rd. See asset points. 2 streams conjoin at inlet. Good looks new ~19.5x4. Some breakage in headwalls left rebar visible.	-78.85808076	42.77500375	BD1 Inlet	265	17-7	State
BD1 outlet. Appears "BD1" crosses "Lake Shore Rd" in line with CD1 and CD2. This box culvert is under the southbound Lake Shore Rd. Appears new ~19.5x4. Ditch from south entering saturated.	-78.8586383	42.77598951	BD1 Outlet	262	17-7	State
Bd2 inlet appears new	-78.8584377	42.77571946	BD2 Inlet	263	17-7	State
BD3 inlet. Appears as outlet. Very high inflow.	-78.85703014	42.77233609	BD3 Inlet	xx	17-7	County
BF1 inlet. 8x30 conc. Fair condition, some decay on exterior. Slightly turbid, high flow. 36" cpp with large end section enters inlet here from West	-78.80879102	42.71349791	BF1 Inlet	385	17-22	State
BF1 outlet. Same as inlet; some decay on exterior as shown. High flow. Moderate sediment build up.	-78.80883677	42.7132879	BF1 Outlet	386	17-22	State
BK51-BRIDGE 8'x30' concrete arch bridge. Great condition	-78.7929207	42.70129576	BK51	410	17-22	State
CA1 inlet (under water)	-78.84658712	42.80032285	CA1 Inlet	1	17-2	State
CA10 inlet. Concrete structure visible. Fully submerged. Vegetative ditch along thruway. Chamber and grate in thruway median. Low saturation in median.	-78.81277435	42.80364615	CA10 Inlet	31	17-1	State
CA10 outlet. Twin CMP (study states RCCP) Moderate corrosion and sediments on bottom of end sections and inverts. 6" CPP w/ stone bedding from south and some flow from north (Thru-Way ditch).	-78.81342939	42.80384328	CA10 Outlet	30	17-1	State
CA 11 outlet side storm MH. No culvert seen.	-78.82399866	42.79998064	CA11	xx	17-2	State
CA11 inlet side catch basin. No culvert seen here.	-78.82378419	42.80002272	CA11 Inlet	33	17-2	State
CA12 inlet. 36" metal end section, pipe appears as reinforced concrete corrugated metal pipe. Covered w rebar. Fair condition. 3x18" (somewhat crushed, sediments) enter collection pit from SE. one 24" metal (same condition) from west and 1 from east.	-78.82149162	42.79699845	CA12 Inlet	xx	17-1	County
CA12 outlet side catch basin. Top appears good condition.	-78.82159508	42.7971622	CA12 Outlet	34	17-1	County
CA-13 is over James in the study, and CA-8 is shown at 2 locations in Drainage Area A, one of them over James, and CA-13 is not found on the map. Referring to this as "CA-13". CMP Inlet end section.	-78.82150609	42.79096318	CA13	21	17-1	Town
CA2 inlet; large ponded inlet area toward NYCRR (single RCP outlet seen between CA2/CA3, fair condition). CA2 has broken end sections, debris, turbidity and near capacity.	-78.83567228	42.80291697	CA2 Inlet	353	17-2	Town
CA1 Outlet (under water)	-78.84649917	42.8003235	CA2 Outlet	2	17-2	State
CA2 outlet. Condition not "good". Near capacity, high water level and debris. Water enters sheet walled area directed downstream along So. Buff. RR. Entire rail yard very saturated on this rain day.	-78.83600432	42.80287911	CA2 Outlet	354	17-2	Town
CA3 inlet. Highly ponded area and a dam structure featured, fair condition cmp lined RCP (60")	-78.83424023	42.80281029	CA3 Inlet	352	17-2	Town
CA3 outlet. 60" RCP. Corrugated metal lining. Good condition high flow, slightly turbid foamy water	-78.83477801	42.80277775	CA3 Outlet	351	17-2	Town
CA4 inlet (box) inlet seen from Arthur. Goes under a house/structure and crosses Lake Ave on an angle	-78.8292557	42.79690542	CA4 Inlet	17	17-2	County
CA4 outlet (box). Enters another box downstream	-78.82951613	42.79725099	CA4 Outlet	18	17-2	County
CA5 inlet 8" CIP in line with DI (shallow ditch upstream, vegetation upstream highly saturated from rain)	-78.82372088	42.79277428	CA5 Inlet	20	17-2	State
CA5 outlet CMP	-78.82438079	42.79295601	CA5 Outlet	19	17-2	State
CA6 Outlet (Large grate and chamber) saturated ground downstream, high vegetation.	-78.82175686	42.79093111	CA6	22	17-1	Town
CA-6 inlet RCP: good condition. Thru-way on/off ramp	-78.82008287	42.79039614	CA6 Inlet	xx	17-1	Town
CA-6 RCP OUTLET. Good condition. Thru-way on/off ramp.	-78.8205246	42.79042059	CA6 Outlet	xx	17-1	Town
CA-7 inlet. Good condition. Roadside ditches lead to it as well.	-78.81570855	42.78677803	CA7 Inlet	28	17-3	State
CA-7 outlet. Good condition. Roadside ditches surrounding CA-7 on either side of Thru-Way	-78.81659314	42.78748584	CA7 Outlet	27	17-3	State
CA8 inlet. Good condition. Large amount of vegetation/some garbage upstream. 66" CMP upstream from McKinley Mall plaza. An identical box adjacent appears dry. McKinley has roadside ditch on the east side with small culverts, observed CMP in fair condition.	-78.81111357	42.78415092	CA8 Inlet	xx	17-3	County
CA8 outlet. Storm MH seen across McKinley. Appears to exit across entire Wegman's lot from large steel end section to another 66" RCP in ditch between Thru-Way. Condition appears fair.	-78.8113851	42.78415268	CA8 Outlet	29	17-3	County
CA9 inlet. Appears to be old twin CIP pipes, appears damaged at end section	-78.84633306	42.80251197	CA9 Inlet	6	17-2	State
CA9 outlet (submerged)	-78.84648315	42.80251056	CA9 Outlet	5	17-2	State
CB1 inlet 40x10 concrete bridge, good condition	-78.80967563	42.8045453	CB1 Inlet	xx	17-1	County
CB1 outlet 40x10 concrete bridge. Good condition.	-78.80976171	42.80471814	CB1 Outlet	35	17-1	County
CB10 inlet. Concrete is breaking down. 12 roadside ditches on either side. 3x6 box.	-78.79468928	42.78436038	CB10 Inlet	52	17-3	Town
CB10 outlet. Same condition as inlet. Roadside ditches 12" also seen on both sides CMP	-78.79469361	42.78444199	CB10 Outlet	53	17-3	Town
Cb11 inlet. 3x6 box. Good condition. Slow flow. Sediments at bottom of box.	-78.79642928	42.78357686	CB11 Inlet	54	17-3	Town
Cb11 outlet. Same as inlet condition. More debris seen sitting here. Headwalls on both sides appear corroding.	-78.79642247	42.78368932	CB11 Outlet	55	17-3	Town
Cb12 inlet. Fair condition. Sediments sitting at bottom slow flow. 12" CMP entering here roadside ditches	-78.79688973	42.78278933	CB12 Inlet	56	17-3	Town
Cb12 outlet. Sediments and more shallow, water appears flowing. 12" pipe from either ditch roadside. Plastic on west CMP on east, appear in good condition	-78.79685581	42.78288888	CB12 Outlet	57	17-3	Town
Cb13 catch basin on east outlet side. Very full of leaves.	-78.80012253	42.77647865	CB13 Catch Basin	xx	17-3	Town
Cb13 48 CMP inlet. Good condition. High vegetation. Roadside ditch w 12" pipe entering and a manhole located from the south.	-78.8002407	42.77824397	CB13 Inlet	xx	17-3	Town
Cb14 12" CMP inlet crossing Wolf from west to east at Sheldon. Full of debris metal appears good condition. Leaves and water sitting in ditch	-78.80028942	42.7764291	CB14 Inlet	xx	17-3	Town
Cb15 outlet side catch basin leading to outlet pipe	-78.80187258	42.77591167	CB15 Catch Basin	xx	17-3	Town
Cb15 inlet side catch basin (south side) Nothing else observed.	-78.80174476	42.77584358	CB15 Inlet	59	17-3	Town
Cb15 outlet. 36" CMP (CIP). Has flow, high vegetation surrounding. See catch basin asset point also on this side (north)	-78.80187515	42.77597706	CB15 Outlet	60	17-3	Town
CB2 inlet concrete bridge. Appears to be ~9.5x36. Good condition.	-78.80391202	42.79673262	CB2 Inlet	37	17-1	Town
CB2 inlet good condition 12 CMP entering from east. Water is clear some sediments collected on one side	-78.82184068	42.77151771	CB2 Inlet	76	17-1	Town
CB2 outlet concrete bridge. Appears as ~9.5x36. Good condition.	-78.80391393	42.79691229	CB2 Outlet	36	17-1	Town
CB3 inlet. Appears to be 18x28 concrete bridge rather than 9x24. Good condition. 24 drain pipe in wingwall and ovular CMP (~90") enters stream at inlet (both North side)	-78.79258393	42.79124772	CB3 Inlet	xx	17-1	County
CB3 outlet. Appears to be 18x28 concrete bridge rather than 9x24. Good condition.	-78.7929408	42.79116712	CB3 Outlet	38	17-1	County
CB4 inlet 8'x4' box, fair condition some concrete breakage on walls. Good flow.	-78.79812631	42.78950623	CB4 Inlet	xx	17-1	Town
CB4 8'x4' box outlet. Same as inlet. Fully ponded. Good flow.	-78.79818465	42.78959724	CB4 Outlet	40	17-1	Town
CB5 inlet side catch basin. Full of debris. 12" CMP under drain from east and west. RCP across road. All Dry. Don't appear to be collecting any ground water.	-78.80428611	42.78959437	CB5 Inlet	xx	17-1	Town
CB5 outlet box w/ 12" RCP. No flow. Vegetative ditch.	-78.80430143	42.78972968	CB5 Outlet	xx	17-1	Town

CB6 I/L catch basin. Upstream has 8" CPP and ditch from old mile strip to new mile strip. Water in ditch but not flowing. Homeowner says property east of ditch always very flooded. Underground pipe downstream, 24" RCP visible.	-78.80134137	42.78956502	CB6	45	17-1	Town
CB7 inlet side catch basin good condition.	-78.79947939	42.78950715	CB7 Inlet	41	17-1	Town
CB7 outlet side catch basin good condition	-78.79947497	42.78970393	CB7 Outlet	42	17-1	Town
CB8 inlet. 1 48" CMP and 1 48" RCP, only RCP (north) is taking water. CMP rotting on bottom.	-78.79553831	42.78812611	CB8 Inlet	47	17-3	Town
CB8 outlet. Same as inlet.	-78.79567779	42.78818842	CB8 Outlet	48	17-3	Town
CB9 pipe placed over 30 years ago from outlet to creek behind back yard. Homeowner said inlet always floods and ends up in his yard.	-78.79413802	42.7855956	CB9	xx	17-3	Town
CB9 inlet has some debris floating in front of gate and entering 3x6 box culvert in good condition. Resident at outlet stated res. across street always floods (capacity issue at inlet) then water goes across and road enters his property	-78.79437127	42.78515381	CB9 Inlet	49	17-3	Town
CB9 outlet. Appears blocked up with debris.	-78.79433118	42.78525621	CB9 Oulet	50	17-3	Town
Cc1 inlet. Dual 10x13 good condition. branches stuck at Center wall. Water flowing, sediments seen at bottom. Dual 10x13 box culvert under rte 5.	-78.84631712	42.79333396	CC1 Inlet	61	17-2	State
Cc1 outlet. Good condition. Dual 10x13 box. Lots of leaves and sediment seen settled at bottom. Water flowing.	-78.84723938	42.79343236	CC1 Outlet	62	17-2	State
CC10 inlet east side of s park	-78.82373681	42.7788862	CC10 Inlet	93	17-4	State
CC10 box outlet very hard to observe w vegetation. Enters 48" CMP directly west. Water seen enter from north stream roadside as well.	-78.82394688	42.77888658	CC10 Outlet	92	17-4	State
CC14 18" CIP GOOD CONDITION NO FLOW OBSERVED BUT INVERT SATURATED. Larger up to 24 inch roadside culverts along both sides of South Park observes south from here all along South Park	-78.82471859	42.74902386	CC14	106	17-8	State
Cc15 inlet water entering from ditches north and south. South ditch inlet has more blockage but ditch could be cleared, lots of branches and dead vegetation and some garbage. Can get good view of thruway x-Ing inside. Box is corroding	-78.81641516	42.77132167	CC15 Inlet	xx	17-5	State
Cc15 chamber outlet from e side of thruway. High vegetation, some garbage. box is corroding.	-78.8171962	42.77165054	CC15 Outlet	xx	17-5	State
CC16 inlet. High vegetation, some garbage. Appears over capacity. Cannot observe pipe condition. Only some concrete wall observable.	-78.81780617	42.76604006	CC16	355	17-5	State
CC17 inlet. Breaking head/wingwall. Pipe good condition.small stream along RR from SE has good flow in. Another rcp observed upstream. A light flow comes from north thruway bank, elevated RCP w concrete swale. See photos.	-78.81905951	42.76394243	CC17 Inlet	358	17-5	State
CC17 outlet; good condition, high flow. Dense vegetation and swale downstream along thruway	-78.81896337	42.76402708	CC17 Outlet	357	17-5	State
Cc18 inlet side. From south roadside a 6-8" CMP enters stream clay pipe fragments seen, flow comes from under CMP not through it. Looks like a 4" cast iron pipe crossing over the RCP. Water entering from north ditch. Debris. Some turbid. Good RCP; older	-78.81329443	42.77144455	CC18 Inlet	119	17-5	Town
Cc18 outlet good condition high flow 36" rcp. 12" roadside cpp enter from south at top of bank, good, low drip	-78.81361137	42.77144772	CC18 Outlet	118	17-5	Town
Cc2 inlet. Measured and must be close to 2 x 11' dia. CMP. Appear very good condition. Little to no sediments.	-78.84093007	42.79303685	CC2 Inlet	64	17-2	Town
Cc2 outlet. 2 x 11' dia. CMP. Good condition. Good flow. Little to no sediments.	-78.84117676	42.79303248	CC2 Outlet	63	17-2	Town
4'cmp inlet cc21 location good flow	-78.81130846	42.76699267	CC21 Inlet	xx	17-5	County
Cc21 outlet 4' CMP good flow	-78.81169998	42.76672234	CC21 Outlet	xx	17-5	County
CC22 inlet. 24" RCP w structure at inlet good condition. 24" CMP entering from East b/w 2 properties (torn top, poor condition, high flow). 12" cpp enter from the north, east McKinley roadside, and from south. high flow from north. Vegetation around here.	-78.81139757	42.7656775	CC22 Inlet	130	17-5	County
CC23 inlet 18" CIP encased in concrete (eroding conc). Light movement seen in water but pipe >1/2 full.	-78.81156662	42.76382531	CC23 Inlet	132	17-5	County
CC23 outlet side. Outlet pipe encasement seen fully submerged (high ditch water level) and water flowing south. Deep roadside ditches both E and W southbound from here on McKinley w under dway w culverts in varying condition. High blockage/leaves	-78.81187494	42.76384358	CC23 Outlet	133	17-5	County
CC 24, 24" CMP high outflow, invert appears to be rotting	-78.81190394	42.76248437	CC24	134	17-5	County
Cc24 inlet location 24" CPP good shape, high inflow. Turbid looking water. Pipe doesn't face outlet side CMP/median catch basin but facing southwest, steep angle x-ing McKinley and appears to head directly to the bridge, but no outlet of this pipe observed	-78.81146146	42.76255595	CC24 Inlet	136	17-5	County
CC25 location catch basin w 12" cpp from residential property from the east. High flow heard	-78.81166862	42.75995292	CC25	xx	17-5	County
Cc25 outlet concrete encasement with 18" CMP seen inside high flow directly west into another 18" CMP w end section. Roadside ditches on this side of McKinley as usual, cmps under driveways. poor condition ditch pipes in this area with low to no flow seen	-78.81192871	42.76001967	CC25 Outlet	138	17-5	County
Cc28: just north of Bayview. Catch basin in gutter tied to Church basin across road.	-78.81226359	42.75212985	CC28	162	17-8	County
Cc28 catch basin in gutter, tied to large grated top catch basin in church property just northeast	-78.81195819	42.75230132	CC28	xx	17-8	County
Cc28 inlet good clean flow ~4' end section and looks to me like fair condition slip lined culvert with flowable around.	-78.81238262	42.7521017	CC28 Inlet	xx	17-8	County
Cc 29 just south of Sowles. Concrete structure submerged with no visibility of the culvert: water appears still. Roadside ditch to the south saturated w increasing vegetation, buried 12" cpp to the north 1/2 full, no movement seen in water.	-78.81206916	42.74902629	CC29	164	17-8	County
Cc29 inlet 18" RCP. Water seen flowing from south ditch. Ditch to north saturated no flow, no pipe seen under driveway directly north. Ditches north and south.	-78.81240335	42.74894611	CC29 Inlet	165	17-8	County
CC3 inlet good flow. Fair condition. This is now a small bridge to the railway yard.	-78.8369715	42.79022284	CC3 Inlet	71	17-2	Town
CC3 outlet. Same as inlet info.	-78.8370113	42.79031821	CC3 Outlet	72	17-2	Town
CC30 inlet side, no outlet seen in ditch, ~4' roadside ditches on this side of McKinley. Catch basin seen at edge of residential property line in backyard.	-78.81256672	42.74659877	CC30 Inlet	167	17-8	County
CC30 inlet side. No outlet seen in roadside ditch 4 foot roadside ditches on this side of McKinley catch basin seen on edge of property line and residential backyard adjacent to ditch	-78.81254978	42.746527	CC30 Inlet	xx	17-8	County
CC30 outlet, 48" concrete structure at outlet. Mild turbidity condition appears good	-78.81204998	42.74658523	CC30 Outlet	xx	17-8	County
Cc31 inlet, 36" RCP appears good condition, concrete headwall is eroding. Little stream flowing in from west, and small stream enters this stream from north. Clean good flows streams are dense w veg upstream	-78.81267494	42.74251073	CC31 Inlet	168	17-8	County
Outlet of CC31. Good clean flow headwalls eroding/crumbling. RCP appears good. Flowing east good amount of water. Another end section/culvert outlet just south, lots of debris see asset point	-78.81230454	42.74276085	CC31 Outlet	169	17-8	County
Cc32 outlet. 3x2 concrete. Appears good condition, good clean flow. 12" CMP built into same structure just north of culvert: low flow coming out, breakage seen in CMP. Just south of culvert: 1/2 a 24" CMP with flow out.	-78.8123642	42.73998811	CC32 Outlet	171	17-8	County
It appears CC33 inlet (5.5' CMP) is in this large ditch where it appears 3 residential properties intersect. Cannot access currently.	-78.81357943	42.73097291	CC33 Inlet	183	17-21	County
CC33 outlet (1 of 2) 48" CMP. Good clean flow flows into swale w buffers.	-78.81267451	42.73109255	CC33 Outlet	178	17-21	County
CC33 outlet 2. 5.5' dia. CMP as in study. Clean flow out. Main stream. The other outlet enters this stream. Goes east.	-78.81262632	42.73116822	CC33 Outlet	xx	17-21	County
CC34 inlet. 12 inch CMP from the south 18 inch CMP from the north with flow good condition exterior inverts visibly corroding and rotting with holes stream from east also enters. 36" RCP end piece is dislodged. Otherwise good looking condition. See photos.	-78.80193953	42.75523874	CC34 Inlet	185	17-8	Town
CC34 outlet. Condition appears a good large ponding deep on this side 12 inch CPP from north no outflow good condition and a 3 inch PVC seen from north and south properties down stream. See photos.	-78.80206006	42.75524406	CC34 Outlet	186	17-8	Town

CC35 inlet. Hi hello in from stream from East 18 at CMP from South enters at inlet: good condition exterior, interior highly corroding and rotting visibly. Inlet is about a 7 x 3 rectangular. outlet appears circular. See asset point.	-78.80213099	42.7534552	CC35 Inlet	188	17-8	Town
CC35 outlet. Hi clean flow looks like a 7 to 8 foot CIP. Rusting exterior interior looks good stone and sediments inside the culvert invert.	-78.80228019	42.75349945	CC35 Outlet	189	17-8	Town
CC36 inlet 36" RCP. Condition looks good, 12" CMP good ext., corroding invert enters from North, low flow. Mainstream enters from SE direction with very high vegetation. CMP goes north to High Point, Southbound is highly vegetated ditch. Abandoned 3" gas.	-78.80263065	42.74696902	CC36 Inlet	193	17-8	Town
CC36 outlet 36" RCP. Appears good, slowly flowing. Water level is > 1/2 outlet pipe. Water follows stream west.	-78.80288211	42.74701312	CC36 Outlet	192	17-8	Town
CC38. 12" CMP under road. Dry. Ditch from north; dry.	-78.80642695	42.7694156	CC38	205	17-5	State
CC38, 12" CMP w end section (fair condition). saturation seen, ditch goes south, very highly vegetated. hard to even see saturated area(s).	-78.80649406	42.76919872	CC38	207	17-5	State
CC39 24" CMP inlet. With end section. Very low flow entering seen saturated, high vegetation roadside ditch from east and west.	-78.80453008	42.76913256	CC39	xx	17-5	State
CC39 outlet. 24 inch CMP rusty slow flow out very high vegetation and saturated area some ponding some garbage	-78.8045737	42.76895151	CC39 Outlet	204	17-5	State
Cc4 inlet 2x11' CMP and a 24" CMP entering from south. Good condition flow quality. Appears a 2x10x13 bridge is just upstream under next railroad (cc5)	-78.83642578	42.78981619	CC4 Inlet	66	17-2	State
Cc4 outlet 2x CMP good condition good flow no sediments.	-78.83661387	42.78983388	CC4 Outlet	65	17-2	State
CC40 inlet. Highly vegetated around Inlet. Most water comes from north east ECC entrance crossing. Built-in to outlet structure is 1. a good condition 12" CPP from highly vegetated roadside ditch from west, 2. Good condition 24" CMP travelling north.	-78.7974232	42.76811126	CC40 Inlet	209	17-5	State
CC40 outlet. Good condition 5x6 box. Largely ponded water downstream. See photos.	-78.79767832	42.76800553	CC40 Outlet	208	17-5	State
Cc41 inlet. Inlet path comes from southeast area, far too vegetated and saturated looking to observe, but the outlet appears good with some clean flow coming out. Bayview no longer intersects thruway.	-78.81996917	42.76230842	CC41 Inlet	213	17-5	Town
CC41 outlet. Bayview is no longer a road intersecting with Thruway. Saturated area at outlet no flow seen on this side. a vegetated ditch goes north. Condition looks good, 42" reinforced concrete CIP.	-78.81979867	42.76242811	CC41 Outlet	212	17-5	Town
CC42 inlet. 1/2 full good condition 18" CIP. Just NW a 12" cpp w end section, and medium stone, 1/2 full, slowly flows in. A 24" cpp in line w north stream under stone driveway to an empty lot faces inlet as well. Ditches N and S. S saturated, vegetated.	-78.81599446	42.75683371	CC42 Inlet	214	17-5	Town
CC42 outlet. Only about 1" reveal of pipe; submerged. Water seen, heard flowing east; high vegetation.	-78.81585683	42.75684218	CC42 Outlet	215	17-5	Town
CC43 inlet. Submerged. Very high in sediment, debris, vegetation garbage. Appears almost clogged. Just north, the outlet of under stone driveway (18" cpp) 1/2 full. No flow seen going through culvert. Water enters from S roadside & path from W direction.	-78.81605497	42.75476905	CC43 Inlet	219	17-8	Town
CC43 outlet. Submerged like inlet. Culvert appears over capacity. Pooled water flows NE, highly vegetated path.	-78.81589785	42.75475849	CC43 Outlet	220	17-8	Town
CC45 inlet. CIP. Visible unlike outlet; water flowing from very saturated SW train tracks side ditch. Condition fair, concrete beginning to erode.	-78.81495057	42.75328386	CC45 Inlet	224	17-8	Town
CC45 outlet. CIP. Concrete eroding. NW side of tracks. Submerged. Clean water seen flowing along vegetated train track side ditch.	-78.81483707	42.75351506	CC45 Outlet	222	17-8	Town
CC46 inlet. CIP. Concrete eroding, cast-iron appears rusty but good condition lots of leaves and sediments inside pipe. no flow seen but high saturation coming from south east train track side ditch.	-78.81488685	42.75323405	CC46 Inlet	225	17-8	Town
CC46 outlet. CIP. Concrete eroding. Condition appears good but rocks and vegetation inside. Very slowly heads towards N/E train track side ditch.	-78.81476907	42.75344965	CC46 Outlet	223	17-8	Town
CC47 inlet. Can see it's now a 36" CMP in good condition. Very saturated ditch from west enters. Current Bayview dead end. Crosses small path created. High vegetation in ditch and at outlet, good clean flow.	-78.81302956	42.75166411	CC47 Inlet	226	17-8	Town
CC47 outlet. Seen at inlet its now a 36" CMP, good condition. Follow (very deep on this side) very saturated ditch toward east (can't observe). Current Bayview dead end. Crosses small path created. High vegetation in ditch and at outlet, good clean flow.	-78.81265869	42.75180617	CC47 Outlet	227	17-8	Town
CC48. Submerged cannot observe. Highly vegetated saturated roadside ditch, north train track side. Roadside ditch on souls to West, highly vegetated.	-78.81602649	42.75153383	CC48	xx	17-8	County
CC48, inlet it appears. Only about 2" pipe reveal. Light flow scene from west souls roadside, highly saturated/vegetated. Saturated SW train tracks side ditch enters too. Slow flow. Leaves, garbage and vegetation floating.	-78.81609956	42.75142685	CC48 Inlet	xx	17-8	County
CC49 inlet. No flow. Full of leaves. Lightly saturated upstream and downstream under the leaves. Concrete eroding, CMP does not appear good, crushing, breaking. Nearly dry.	-78.81601662	42.75141993	CC49 Inlet	xx	17-8	County
CC49 outlet. Chock full of leaves. Saturated, no flow. Follows train tracks side ditch. CMP in concrete appears fair, not good.	-78.81595475	42.75151763	CC49 Outlet	xx	17-8	County
CC5 2x10x13 good condition bridge inlet over next east railroad upstream of cc4 (this should be CC5). Southern water passage blocked with very large amount of sediment; no flow. A 3rd older looking bridge is upstream as seen.	-78.83559751	42.78948463	CC5 Inlet	68	17-2	State
CC5 Bridge outlet 2x10x13 good condition just upstream of cc4 (this should be CC5) under the next railroad east	-78.83597146	42.78959783	CC5 Outlet	67	17-2	State
CC50 inlet. Clean flow coming mostly from SW drainage path, maybe some water from Western Sowles roadside ditch. All highly vegetated but not obstructed.	-78.81374462	42.75131491	CC50 Inlet	229	17-8	County
CC50 outlet. ~36" CMP w end section. Appears good. Good clean flow (quite high water level), heading toward under Bayview dead end (NE)	-78.81349059	42.7514862	CC50 Outlet	228	17-8	County
CC 53 inlet. 20" perforated CMP, fair condition. Crosses Fairground on steep angle. Water enter from stream from S direction.	-78.81837577	42.74451018	CC53 Inlet	236	17-8	Town
CC53 outlet. Appears a old 4" gas crosses right in front. Follows stream directly NE in deep, highly vegetated ditch. Good clean flow culvert looks OK. Good 10" perforated CPP from N roadside.	-78.81821691	42.74470894	CC53 Outlet	235	17-8	Town
CC54 inlet side. Rectangular inlet. Must also be privately owned. Cross pipe appears to have lots of leaves seen from inlet.	-78.81513836	42.74138155	CC54 Inlet	244	17-8	Town
Must be CC54 outlet. Fair condition RCP. Small outflow. Faces ditch to east. Homeowner said technically this pipe and the whole stream is her property. Retired DOT lady. 10" perforated CPP w steel end section she says is illegally placed; fights in past.	-78.81502688	42.74144533	CC54 Outlet	243	17-8	Town
CC56 inlet. Rte 20 roadside ditch from west side enters. From South direction, railway ditch enters as well. Good condition 24" cpp w steel end section. Light flow.	-78.82049173	42.76524499	CC56 Inlet	251	17-5	State
CC56 outlet. Good condition 24" cpp. Extremely vegetated. Saturated path appears to head north east toward RR side, and come from W Rte 20 roadside.	-78.82084234	42.76563108	CC56 Outlet	256	17-5	State
CC57 inlet. Rte 20 roadside ditch from east ends here. From South direction, railway ditch enters as well. Good condition 24" cpp w steel end section. No flow seen saturated. Concrete blocks and large vegetation at inlet & in drainage paths.	-78.82012769	42.76540581	CC57 Inlet	253	17-5	State
CC57 outlet. Good condition 24" CPP. Extremely vegetated back here. Appears to follow drainage ditch North/East	-78.82050167	42.76581853	CC57 Outlet	255	17-5	State
Cc6 inlet 5x6 box good condition. Small Ice rink built over makeshift bridge on west side small amount of leaves on invert	-78.80967938	42.74887332	CC6 Inlet	xx	17-8	County
Cc6 outlet good condition box some sediments/leaves observed at outlet clear water 5x6	-78.8094924	42.74902262	CC6 Outlet	84	17-8	County

Cc7 inlet. 48" plastic entering from west. Small stream entering from east roadside. Good condition box good flow clean water	-78.8094879	42.73255718	CC7 Inlet	86	17-21	County
Cc7 outlet. 12" cpp entering from west wing wall. Good flow clean water.	-78.80952472	42.73272793	CC7 Outlet	88	17-21	County
CD18 location, Outlet side. Seen further west down Big Tree than study shows. Significant vegetation and garbage in this area. Old gutter carries low water from east. Cant even really see this DI.	-78.85299026	42.77207459	CD Outlet	xx		
CD1 inlet. Crosses Hoover. Long wingwalls in decent condition, concrete decaying quite significantly in inner box walls. Good flow, see next culvert upstream.	-78.85946812	42.7773721	CD1 Inlet	258	17-7	Town
CD1 outlet. Appears "CD1" crosses what is now Hoover Rd. ~7.3x7 at (decent condition, high flow). Good cond. RCP 12-18" from north. Enters large brook and residential area to Lake Erie.	-78.85976594	42.77756032	CD1 Outlet	257	17-7	Town
CD10 inlet. Same description as outlet. Very good. High clean flow.	-78.83056293	42.74039422	CD10 Inlet	277	17-9	Town
CD10 outlet. Very good. Rebuilt by homeowner.36" CIP.	-78.83064683	42.74043087	CD10 Outlet	276	17-9	Town
CD11 inlet. Still appears close to 3x5. This side looks better than outlet, appears monolithic concrete. at a dead end now. 4" residential pvc entering from N roadside. Slow flow in stream.	-78.83032062	42.73880983	CD11 Inlet	280	17-20	Town
CD11 outlet. This culvert is at a dead end now. Looks built of masonry blocks with signs of corrosion and porosity. 12" CMP appears good entering from the SW. good clean flow. Still appears close to 3x5. Slow flow in stream.	-78.8303891	42.73887505	CD11 Outlet	279	17-20	Town
Cd12 inlet. Good condition 24" concrete. Directly east upstream is 12" RCP slow flow in, chipped at the end. Upstream high vegetation.	-78.84997623	42.77421653	CD12 Inlet	281	17-4	Railway
CD12 outlet. Good flow/condition. Vegetated here. Leads to between rails (about 15' away). enters another structure between rails with 2 openings. See downstream points.	-78.85008328	42.77429028	CD12 Outlet	282	17-4	Railway
CD13 inlet. Large concrete structure between rails. Good condition 36" concrete pipe, but large buildup at inlet. Less, slower flow than other larger opening. Southern opening.	-78.85013763	42.77432978	CD13 Inlet	283	17-4	Railway
CD13 outlet. Worse blockage than inlet. Can barely see pipe. No surface flow, only saturation in area that must travel to main stream.	-78.85022476	42.77442307	CD13 Outlet	286	17-4	Railway
CD15 inlet. Clean pipe, good condition, good clean flow. 72" concrete, carries most water. Most upstream water comes from north direction and ponds slightly at inlet.	-78.85009401	42.7743665	CD15 Inlet	284	17-4	Railway
CD15 outlet. As good as inlet. Carries all surface flowing water.	-78.85018049	42.77446009	CD15 Outlet	285	17-4	Railway
CD16 inlet. Condition and flow appear good, doing it's job. No significant erosion. Headwall says "1937".	-78.850234	42.77450027	CD16 Inlet	287	17-4	Railway
CD16 outlet. Condition and flow appear good, doing it's job. No significant erosion. Headwall says "1937". Downstream high vegetation.	-78.85044895	42.77465762	CD16 Outlet	288	17-4	Railway
CD17. Low to no flow; high water level. Only a few" from top of box. Assuming 2.5x5 as I'm study. Looks very eroded/is eroding. (Inlet?) follows high vegetation roadside ditch toward L. Erie (ditch decrease in size).	-78.85839843	42.77333859	CD17	266	17-7	County
CD17 (outlet?). Water level more like 1' from top here. From here the interior looks quite good. However there is low to no flow, very high vegetation and debris in and around inlet and outlet side. Entering is a saturated roadside ditch from south. 2.5x5.	-78.85795661	42.77318083	CD17 Outlet	xx	17-7	County
CD18 location, inlet. Seen further west than study shows. Catch basin collecting from old looking East roadside gutter. High flow. Debris and some garbage surrounding.	-78.8527346	42.7721711	CD18 Inlet	289	17-6	County
CD2 inlet. Also Inlet of first pair of pipes (twin ~6' CMPs) crossing Rte 5 northbound. From north a low flowing stream about 6' from inlet and about 30' from inlet from south is a ~50' culvert. Inlets as 32" cpp, outlets as wing wall structure. Looks new.	-78.85885135	42.77679185	CD2 Inlet	261	17-7	State
CD2 outlet. Appears "CD2" is the crossing under both northbound and southbound Rte 5/Great Lakes Seaway Trl. Consists of 2 pairs of culverts. Good condition 2x8' CMPs. From south, saturated no flow ditch. North, a flowing ditch.	-78.85942068	42.77732747	CD2 Outlet	259	17-7	State
CD22 inlet, fair condition 36" CIP. Water damming at inlet due to logs and vegetation. High clean flow. Crack in headwall/wingwall.	-78.84489899	42.77199128	CD22 Inlet	292	17-6	County
CD22 outlet. Condition appears good. Very clean. Lots of fish seen. Downstream appears to go adjacent or in residential properties. Slightly saturated ditch (private looking) enters outlet from east	-78.8449672	42.77215762	CD22 Outlet	293	17-6	County
CD23 area. Looks like 12" CMP very full, stone, leaves and mud seen inside. No flow. Saturated ditch from east.	-78.83717565	42.77194445	CD23	294	17-6	County
CD23 area (outlet). This side appears as a 12" CIP w concrete structure at outlet. Fair condition. Vegetated ditches west and east. 12" cpp w plastic end section just west. Saturated, no flow. Garbage in ditch.	-78.83743568	42.77207737	CD23 Outlet	xx	17-6	County
Couldn't see anything on roadside in front of school (inlet side CD24)	-78.83009915	42.76752433	CD24 Inlet	xx	17-6	County
Cd24 outlet. 18" CIP appears good. Saturated ditch, vegetation in ditch and pipe. Enters roadside ditch heading NW. In line to the NE is inlet to underground 12" cpp. Breakage in portion exposed. Goes into the park across Frontier Central School	-78.8299098	42.76764261	CD24 Outlet	295	17-6	County
CD25 location, catch basin. Crosspipe appears as CMP. Many catch basins in this area are clogged/not flowing/full of sediments/need cleaning	-78.8290168	42.76686812	CD25	xx	17-6	County
CD25 location, catch basin in sidewalk with crossing. Water heard and seen flowing here, appears better than other DI's in this area. Sidewalk slabs create a crown at structure.	-78.82902112	42.76700684	CD25	xx	17-6	County
CD26 crossing area. Catch basin looks good.	-78.82431126	42.76480927	CD26	299	17-6	County
CD26 crossing area, catch basin looks good.	-78.82428373	42.76507635	CD26	xx	17-6	County
CD27-Twin 36" CMP. Fair condition, invert filling with sediment. Some vegetation growth	-78.8298758	42.76116063	CD27	345	17-6	State
CD28 outlet. Ok condition 30" CMP, steel end section, grate; stone bedding ditch side. Some garbage and debris, pipe slightly crushed	-78.83553081	42.74871207	CD28 Outlet	366	17-9	State
Cd28 inlet: same as outlet condition. Bedding ditch south, saturated vegetative ditch north.	-78.83490055	42.74834446	CD28 Inlet	367	17-9	State
CD29 inlet (outlet portion of thruways). Stagnant water. Some odor. Saturated ditches both directions in median enter here. No active flow seen, appears to be capacity issue. No plastic observed on this side., just concrete end section.	-78.82813142	42.75676882	CD29 Inlet	364	17-6	State
CD29 inlet (inlet portion). Catch basin observed with stoned path and flow in from both get directions. Active flow only observed from the south; on both sides, 24" CMPs collect, good condition with steel end sections and cages.	-78.82771878	42.75657633	CD29 Inlet	xx	17-6	State
CD29 outlet. Cage, steel end section, 24" cpp, near capacity. Bad odor. Saturated Ditches appear to enter from both direction.	-78.82856258	42.75696759	CD29 Outlet	363	17-6	State
Cd 29 outlet (inlet portion). Same as immediate downstream. Low to no flow observed but high water level.	-78.82805694	42.75674549	CD29 Outlet	xx	17-6	State
CD3 outlet. Now doesn't look like 6x20, more like ~3.5x20. Looks good but lots of stone sediment inside box culvert. Follow stream north. Roadside small stream enter from east.	-78.85696606	42.77254287	CD3 Outlet	xx	17-7	County
CD30 inlet. Appears as a good 24" RCP along west thruway roadside, under (new) Sowles road. Appears to be inlet. See photo of old Sowles dead end adjacent. No 42" pipe or any pipe seen at Old Sowles.	-78.83304007	42.75161231	CD30 Inlet	300	17-9	County
CD30 outlet. Under new Sowles, west thruway roadside. High flow, very high vegetation in ditch downstream.	-78.83286247	42.751883	CD30 Outlet	301	17-9	County
CD31 Camp Rd crossing location. Catch basin looks good. Crosspipe appears as larger than 24" CIP.	-78.83749354	42.73354481	CD31	302	17-20	State
CD31 location Camp Rd crossing looks good, large crosspipe appears CIP >24". Outlets to stream just NE.	-78.8373561	42.73363	CD31	xx	17-20	State
Outlet of "CD31" RCP ~32". Condition appears functional. Flows NE in stream. Smaller stream enters from SW Camp roadside. Garbage in both streams. Flowing; sediment and dead vegetation. A cpp enters from Tim Hortons.	-78.83727329	42.73369002	CD31 Outlet	303	17-20	State
Manhole seen here at CD33; no longer any culvert seen here.	-78.83505084	42.73114075	CD33	369	17-20	State
CD33 on-curb storm catch basin	-78.83523185	42.73041714	CD33	372	17-20	State
CD34; Legion here at Camp is all drained in a network of storm sewer	-78.83515052	42.73036163	CD34	371	17-20	State
CD35; no culvert seen. Network of storm drain.	-78.82523963	42.74029033	CD35	xx	17-8	State
CD36 area. Not a crossing. Cpp seen inside carrying water along roadside	-78.82535031	42.73947494	CD36	xx	17-8	State

Cd4 inlet. Appears in size as described. Same as inlet. Rebar seen in headwall, more erosion in headwall here. Water is ponding and flowing in. From S property a submerged ~24" cpp. Water comes from east along roadside and stream then turns south upstream	-78.85687492	42.77204163	CD4 Inlet	268	17-7	Town
Cd4 outlet. Good high clean flow. Lots of stone/gravel/sediments built up in box. Inner walls/headwall appear ok but eroding.	-78.85701932	42.77221012	CD4 Outlet	267	17-7	Town
CD5 outlet. Appears made of masonry blocks.~5x3. Good condition. Flow high. Clean. Stream enters here from NE. Downstream goes west. The inlet side, and structure under eastern rail is too hard to access.	-78.85510783	42.77165027	CD5 Outlet	269	17-7	Railway
CD6 inlet. Same description as outlet, including pipes in wingwalls.	-78.83628372	42.75837553	CD6 Inlet	271	17-6	State
CD6 outlet 12x4 box. Good clean flow and condition a 36 edge built into wing wall CPP from north from south at 12 inch CPP	-78.83667181	42.7585996	CD6 Outlet	270	17-6	State
CD7-12'x5' box culvert great condition, good flow, natural stream bottom	-78.83104099	42.75271665	CD7	344	17-9	State
CD7 outlet. Good condition and flow. Bad odor. Proceeds NW. Small flows in to this low point from N and S thruway roadside.	-78.83154105	42.75336652	CD7 Outlet	361	17-9	State
Cd8 inlet. 24"-36" cpp from east entering with flow. Condition and flow appear good	-78.83035425	42.7512646	CD8 Inlet	272	17-9	County
CD8 outlet side difficult to observe closely due to very high vegetation. Ditch appears fine, good flow observed concrete looks ok. Off Sowles roadside is a broken (dangerous) manhole. Bottom of flowing culvert visible inside.	-78.8303013	42.75156399	CD8 Outlet	273	17-9	County
CE1; no more box culvert seen. Catch basin in Center of road crown	-78.86353738	42.77364583	CE1	373	17-7	State
CE1: catch basin	-78.86338853	42.77353473	CE1	xx	17-7	State
CE11, no big tree rd crossing as in study.	-78.8609935	42.77248691	CE11	376	17-7	Town
CE12 does not exist. SS network.	-78.85448587	42.7498388	CE12	xx	17-11	State
CE17 direct area (inlet). No 18" CIP, new looking 18" CPP w steel end section, flow is high and clean. New SS network as shown. No more Rt. 20 crossing as in study.	-78.84247222	42.75567684	CE17 Inlet	378	17-9	State
CE19 area: Nash Rd crossing catch basin-good	-78.86280852	42.76166125	CE19	252	17-10	State
CE2 inlet. Gated, but good condition and flow seen.	-78.86132899	42.77147102	CE2 Inlet	375	17-7	State
CE2, outlet. 4x14 conc., good condition & flow: foam lots of foam just downstream see picture	-78.86164097	42.77161013	CE2 Outlet	374	17-7	State
CE20 Camp Rd crossing catch basin-good condition/flowing. However the sidewalk here has a drainage problem.	-78.86136548	42.75925399	CE20	254	17-10	State
CE20 Camp crossing; catch basin appears good, lid crumbling	-78.86167298	42.75924904	CE20	388	17-10	State
CE20 outlet. Great condition 36" CPP w steel end section. Good, high clean flow and good channel downstream	-78.86128776	42.75954129	CE20 Outlet	390	17-10	State
CE23 Sowles crossing just E of Bradford. catch basin-good. Note: Bradford intersects with Sowles, not showing on this map.	-78.84780545	42.75139832	CE23	391	17-9	County
CE23 Sowles crossing outlet; fair condition, slightly crushing 36" CMP w steel end section. Overall good condition flow and downstream channel	-78.84780226	42.75146287	CE23	xx	17-9	County
CE3-7.5'x5.5' stone box culvert. Good condition good flow	-78.86430783	42.76515216	CE3	250	17-10	State
CE4- 5' and 4' CMP's . Good condition good flow. Retaining wall above culverts starting to crumble	-78.86410136	42.76483678	CE4	249	17-10	State
CE5- outlet. Box culvert on this side. good condition here and high flow.	-78.85499646	42.75851313	CE5	xx	17-10	Town
Ce5 inlet. 5' CMP, invert not good condition. Good high flow.	-78.85495079	42.75840557	CE5 Inlet	377	17-10	Town
CE6 outlet. Appears as 2'x8' concrete box w wingwalls. Good condition. Clean high flow. Moderate invert buildup. Outlets into a concrete encased twin 18" CIP under KFC lot. 2 small culverts w end sections outlet into this area as well, downstream of box	-78.84830276	42.7531465	CE6 Outlet	381	17-9	State
CE7-good condition catch basin low point	-78.87307033	42.76636087	CE7	247	17-10	State
CE7 outlets at cliff toward Lake. Steep, hard to observe.	-78.87326264	42.76650559	CE7 Outlet	xx	17-10	State
CE8- no longer Lake Shore Rd crossing observed here. fair condition, sediment build-up. SS network.	-78.87570095	42.76459935	CE8	245	17-10	State
CG1 inlet. High fast good clean flow/good condition large box culvert. 18.7'x18.2'.	-78.88382895	42.75883114	CG1 Inlet	393	17-12	State
CG1 outlet. Extreme flow, good. Outlet to lake (Berricks Creek). Large boulder riprap.	-78.88399876	42.75884523	CG1 Outlet	394	17-12	State
CG10-poor condition, fully blocked	-78.88748096	42.75581679	CG10	241	17-12	State
CG10 inlet catch basin. Appears aged, no flow heard.	-78.88728976	42.75571339	CG10	403	17-12	State
CG11 catch basin- Lake Shore crossing. Sediment build-up.	-78.88844472	42.75492211	CG11	406	17-12	State
CG11 lakeshore crossing catch basin fair condition some sediments seen	-78.88856161	42.75504154	CG11	xx	17-12	State
CG12 Lake Shore crossing inlet catch basin. Fair (aged grate) condition, not much sediments. Low point in road bank.	-78.89250226	42.75246658	CG12 Inlet	xx	17-12	State
Cg12 Lake Shore crossing outlet catch basin. Fair condition. No flow seen, saturated leaves at the bottom.	-78.89258444	42.75259146	CG12 Outlet	xx	17-12	State
CG13-2'x2' culvert fair condition	-78.89417736	42.75190051	CG13	237	17-12	State
CG14-could not locate	-78.87300173	42.73951098	CG14	xx	17-11	State
CG15-24"CIP good condition	-78.86924266	42.74159606	CG15	327	17-11	State
CG16-14"VTP great condition	-78.8659758	42.74337958	CG16	328	17-11	State
CG17-12"VTP great condition	-78.86014801	42.74659248	CG17	330	17-11	State
CG18-12'x4' box culvert turns into twin 3' CIP, good condition	-78.85745159	42.74801062	CG18	331	17-11	State
CG19- Does not exist	-78.85478567	42.74966714	CG19	xx	17-11	State
CG2 outlet-6'h x 24' bridge. Good condition, good flow. Some breakage in east wingwall, some odor. Roadside culverts, with entry inlet at outlet.	-78.8819149	42.75721165	CG2	197	17-10	Town
CG2 inlet, 6x24 bridge. Large stream, waterfalls in inlet: good condition, looks nice.	-78.88180488	42.75712335	CG2	400	17-10	Town
CG20-48" VTP, great condition, no blockage, good flow. Moderate vegetation growth	-78.85703307	42.73561108	CG20	xx		
CG21-30" RCP. Fair condition. Some blockage, some vegetation growth	-78.84689802	42.74024686	CG21	337	17-9	Town
CG22- 48" RCP good condition. Good flow. Light sediment in invert	-78.84611333	42.74053314	CG22	338	17-9	Town
CG23- 18" CIP CMP Good condition	-78.84403704	42.73770197	CG23	341	17-20	State
CG24-Twin 24" CIP, Heavy vegetation growth, concrete in fair condition. 90% with sediment and debris	-78.8510604	42.74480587	CG24	332	17-9	Town
CG27-Twin 42" CIP, heavy vegetation growth. Concrete in poor condition, rebar exposed, large cracks. Sediment filling invert	-78.85110229	42.74447421	CG27	333	17-9	Town
CG28-Single 42" VTP, heavy vegetation growth. Pipe in good condition, good flow through culvert	-78.85094814	42.74437334	CG28	334	17-9	Town
CG29-48"CIP, concrete in good condition, heavy vegetation growth and sediment in invert	-78.85134528	42.74429096	CG29	335	17-9	Town
CG3 (2nd arch) inlet. High clean flow, condition looks good structurally. Under NYCRR 9.5x11.5 STONE ARCH	-78.87816783	42.75557183	CG3 Inlet	402	17-10	Railway
CG 3 (1st arch) outlet. Medium stone channel, good condition. High clean flow. Under NYCRR 9.5x11.5 stone arch.	-78.87804125	42.75539282	CG3 Outlet	xx	17-10	Railway
CG30-24"CMP FAIR CONDITION, some crushing on inlet	-78.87859083	42.75374054	CG30	196	17-10	County
CG32-box culvert, good condition good flow	-78.87781829	42.74581571	CG32	194	17-11	Town
CG4 inlet -8.5'H x 12'W CMP elliptical great condition. 24" great CPP w steel end section enters inlet from east.	-78.8629824	42.74491128	CG4 Inlet	329	17-11	State
CG4 outlet. -8.5'H x 12'W CMP elliptical great condition. Photos all on inlet point. Downstream of outlet is bridge photo.	-78.86330499	42.74524919	CG4 Outlet	412	17-11	State
CG5 inlet. -13'x6' concrete box, great condition, good flow.	-78.85421421	42.73703802	CG5 Inlet	413	17-11	State
CG5 outlet. 13'x6' concrete box, great condition, good flow	-78.8547651	42.73745929	CG5 Outlet	340	17-11	State
CG6 inlet -5'w x 4'h. Box culvert great condition, good flow, no blockage. Concrete swale channel up to inlet. 24" CPP very good w plastic end section enters from south. Slightly upstream great 8" cpp enters swale. Built in wall: South: 24" cpp/north: 12"	-78.84426338	42.73044794	CG6 Inlet	342	17-20	Town
CG6 outlet -5'w x 4'h. Box culvert great condition, good flow, no blockage. Enters a swale/chamber with a grate on top followed by narrow natural stream. Built into culvert wall: 18" CPP enters from South sunset/North: 12" cpp, all good.	-78.84445938	42.73046871	CG6 Outlet	xx	17-20	Town
CG8 crossing, nearly fully covered manhole seen.	-78.88050921	42.76155104	CG8	392	17-10	State

CG8 outlet cliff toward Lake (double fenced)	-78.88065919	42.76169082	CG8 Outlet	xx	17-10	State
CG9 location - catch basin: Lake Shore crossing. aged condition, high sediment buildup-poor	-78.88509371	42.75756055	CG9	242	17-12	State
CG9 lake shore crossing. Fair condition catch basin. Light flow observed, water level covers pipe and appears nearly non-moving	-78.88524819	42.75766037	CG9	395	17-12	State
CH10-2'x2' conc. And 24" CIP. Good condition. Good flow	-78.89864113	42.74924736	CH10	187	17-12	State
CH11-24"CIP good condition	-78.90055971	42.74772194	CH11	184	17-12	State
CH12- good condition	-78.90462375	42.74502793	CH12	146	17-12	State
CH13-good condition	-78.90785742	42.74317847	CH13	147	17-12	State
CH14- 2'x2' culvert. Poor condition. Heavy blockage and vegetation growth	-78.91118467	42.74061261	CH14	148	17-13	State
CH15- 6'x8' elliptical VTP. Good condition, good flow, no blockage	-78.91608045	42.73634303	CH15	149		
CH16- terrible condition, totally blocked resident says bad flooding conditions in this area	-78.8953897	42.74372279	CH16	191	17-12	Railway
CH18- HEAVY VEGETATION GROWTH, could not locate culvert	-78.89407747	42.74502823	CH18	xx	17-12	Railway
CH19-could not locate	-78.87260567	42.73972494	CH19	xx	17-11	State
CH2- poor condition, concrete culvert, good flow. 9'x6' conc. Arch	-78.89952906	42.74137473	CH2	97	17-13	Railway
CH20-12" CIP VTP good condition	-78.87489739	42.73840901	CH20	325	17-11	State
CH21-14" VTP good condition	-78.87784659	42.7366511	CH21	324	17-11	State
CH22-could not locate	-78.87855417	42.7361145	CH22	xx	17-11	State
CH23-good condition	-78.87921377	42.73572841	CH23	xx	17-11	State
CH24- good condition	-78.87944019	42.73542356	CH24	323	17-11	State
CH25-could not locate	-78.86751666	42.74251306	CH25	xx	17-11	State
CH26-18"CIP VTP good condition	-78.87541498	42.73818096	CH26	326	17-11	State
CH3- poor condition, concrete culvert, good flow 5'x4.75' conc. Arch	-78.89917584	42.74117888	CH3	98	17-13	Railway
CH4- 24" CMP fair condition outlet. Invert beginning to rust. Inlet is a 4'x6' concrete culvert in very poor condition. Concrete crumbling.Heavy vegetation growth and blockage upstream and down stream	-78.89879258	42.74121559	CH4	99	17-13	Railway
CH5-7'x5' conc. Box culvert. Poor condition. Invert collecting sediment. Vegetation growth and blockage up and down stream	-78.89852731	42.74116747	CH5	100	17-13	Railway
CH6- twin 48" concrete pipe culvert. Only one was receiving flow. Fair condition. Invert clear. Good flow. Heavy vegetation growth upstream	-78.89837599	42.74106459	CH6	102	17-13	Railway
CH7-36" RCP. Good condition. Good flow. Heavy vegetation growth down stream	-78.8804889	42.7356275	CH7	107	17-11	County
CH8- 30" CIP inlet mad outlet crushed. Invert deteriorated. Fair vegetation growth up stream. Water still flowing	-78.88128843	42.73395665	CH8	322	17-19	State
CH9-could not locate	-78.89672553	42.75044967	CH9	xx	17-12	State
CI2- 7'x4' conc box. Fair condition. Lots of vegetation growth. Good flow	-78.9132467	42.7315317	CI2	121	17-13	Railway
CI3- 24"w x 48" box culvert, fair condition. Good flow. Eastern tracks has 36" CIP great condition	-78.91292835	42.73115591	CI3	xx	17-13	Railway
CI5-16" CMP, poor condition, outlet crushed. Invert filling with sediment	-78.88268543	42.73305239	CI5	343	17-19	State
CJ1-twin 7' CMP. Good condition. Good flow. Clear up and down stream, invert clear	-78.92038753	42.73526677	CJ1	111	17-17	County
CJ10-good condition 12" CMP INVERT COLLECTING SEDIMENT, lots of blockage down stream	-78.93204041	42.73301625	CJ10	xx	17-17	County
CJ11-5' conc. Pipe culvert. Good condition. Light vegetation growth up and downstream. Invert clear, good flow	-78.93747196	42.73111715	CJ11	110	17-17	County
CJ12-good condition	-78.93782306	42.73097508	CJ12	xx	17-17	County
CJ13- 2'x3' box culvert. Fair condition. Invert collecting sediment. Clear up and down stream. AND 24" concrete pipe culvert, poor condition, sediment collecting in invert	-78.93945647	42.73048785	CJ13	109	17-17	County
CJ14-good condition good flow	-78.94206908	42.72954853	CJ14	108	17-17	County
CJ15- outlet is a 3'x3' box culvertgood condition, invert is filling with sediment. Good flow, moderate vegetation growth downstream. Inlet is a 36" CMP GOOD CONDITION. Heavy vegetation growth upstream	-78.92117196	42.73167062	CJ15	150	17-17	State
CJ16-could not access, appears to be good flow	-78.92211442	42.73075478	CJ16	151	17-17	State
CJ17- 24" CIP. Good condition, light blockage	-78.92397098	42.72857354	CJ17	153	17-17	State
CJ18- 18" CIP good condition, light blockage	-78.9249396	42.7277476	CJ18	154	17-17	State
CJ19- 18" CIP, heavy blockage poor condition	-78.92584048	42.72682482	CJ19	155	17-17	State
CJ2	-78.92335509	42.72933032	CJ2	152	17-17	State
CJ20- 18" CIP, fair condition, heavy blockage	-78.92744982	42.72541639	CJ20	156	17-17	State
CJ21- Does not exist	-78.92890656	42.72394058	CJ21	xx	17-17	State
CJ22- 18" CIP. Some crushing at inlet/outlet. Fair condition, some blockage upstream.	-78.92963949	42.72419367	CJ22	157	17-17	State
CJ23-does not exist	-78.93039709	42.72349704	CJ23	xx	17-17	State
CJ24-good condition, some blockage in catch basin	-78.93169242	42.72321909	CJ24	160	17-17	State
CJ25-good condition	-78.93177123	42.72349492	CJ25	159	17-17	State
CJ26-good condition	-78.93148672	42.72350315	CJ26	158	17-17	State
CJ27-18" CIP. Good condition. Outlet is crushing. Good flow	-78.9335174	42.72284918	CJ27	161	17-17	State
CJ28-18" CIP. Poor condition, outlet has extreme crushing and flow blockage. Inlet is fair condition	-78.93604046	42.72186839	CJ28	163	17-17	State
CJ29-16" CMP, beginning to crush, heavy sediment in invert	-78.89033774	42.72705978	CJ29	314	17-13	State
CJ3-4'h x 12'w great condition, moderate vegetation growth. Invert is clear, creek bottom. Good flow	-78.92027371	42.7254609	CJ3	117	17-17	County
CJ30-could not locate	-78.89186395	42.72590319	CJ30	xx	17-14	State
CJ31-could not locate	-78.89268947	42.72530305	CJ31	xx	17-14	State
CJ32-could not locate	-78.89447634	42.7240428	CJ32	xx	17-14	State
CJ33-18"CMP , poor condition, heavy vegetation blockage	-78.89715871	42.72226023	CJ33	316	17-14	State
CJ34-18"CMP, crushed, heavy blockage, poor flow, heavy rotting	-78.89944541	42.72084835	CJ34	317	17-14	State
CJ35-18"CMP, crushed, heavy blockage, poor flow, heavy rotting	-78.90039399	42.72011957	CJ35	318	17-14	State
CJ36-18"CMP poor condition, invert rotting. Heavy vegetation growth up and down stream	-78.90388806	42.71795495	CJ36	319	17-14	State
CJ37- 16"VTP GOOD CONDITION. Some debris blocking flow, heavy vegetation growth up stream	-78.88688096	42.72773376	CJ37	313	17-13	County
CJ39-5'x5' box culvert good condition good flow	-78.87732486	42.72709508	CJ39	398	17-19	State
CJ4-4'h x 12'w box culvert. Good condition, good flow, light vegetation growth up and downstream, invert clear	-78.91446734	42.72420008	CJ4	124	17-17	County
CJ40-24" Cpp good condition, minimal blockage good flow	-78.88510605	42.7226143	CJ40	397	17-14	State
CJ5- 4'x8' concrete culvert. Good condition. Clear flow. Light blockage up stream	-78.89617501	42.72284651	CJ5	315	17-14	State
CJ6-24" Cpp good condition, no blockage. Good flow	-78.8871753	42.72147184	CJ6	396	17-14	State
CJ7-24" VTP, excellent condition. Good flow	-78.86961552	42.72148177	CJ7	320	17-18	Town
CJ8- good condition	-78.92297121	42.735337	CJ8	112	17-17	County
CJ9-good condition, culvert not visible	-78.93244362	42.73284053	CJ9	xx	17-17	County
Ck1-24"x24" concrete box culvert and 24" concrete tub culvert. Invert is good. Condition is good. Lots of vegetation growth upstream	-78.95109444	42.72589695	CK1	7	17-16	County
CK10-fair condition, partially blocked. Vegetation growth both up and down stream	-78.942834	42.71820217	CK10	24	17-15	State
CK11- good condition. Heavy vegetation growth on either side 18" CMP	-78.94326767	42.7180345	CK11	25	17-15	State
CK13- 18" CMP Fair condition, minor crushing at outlet. Some build up in invert	-78.94878572	42.71564412	CK13	304	17-16	State
CK14-18" CMP. Crushing at inlet. Invert collecting sediment. Good flow	-78.94996909	42.71497101	CK14	305	17-16	State
CK15- 36"h x 48"w elliptical CMP. Good condition. Light sediment in invert. Good flow, light vegetation blockage	-78.95935541	42.71070577	CK15	306	17-16	State
CK16-48"x36" elliptical CIP CMP, poor condition, concret beginning to crumble. CMP invert rusting away. Vegetation growth up and down stream	-78.9147559	42.71397932	CK16	311	17-15	County

CK17-36"x48" elliptical CMP. Heavy vegetation growth up and down stream. Invert is ful of sediment. Culvert in poor condition	-78.90809393	42.7149982	CK17	312	17-14	State
CK19-could not locate	-78.91267857	42.71200083	CK19	xx	17-14	State
CK20-could not locate	-78.91490076	42.71052563	CK20	xx	17-15	State
CK21-could not locate	-78.91505826	42.71040651	CK21	xx	17-15	State
CK22-could not locate	-78.9154415	42.71009198	CK22	xx	17-15	State
CK23-could not locate	-78.91790304	42.7085671	CK23	xx	17-15	State
CK24- 24"x 36" elliptical CMP. Poor condition, heavy crushing. Invert in poor condition	-78.91892507	42.70749336	CK24	310	17-15	County
CK25- 18" CMP invert poor condition, rotting	-78.9193195	42.70735389	CK25	309	17-15	County
CK26- 24" VTP, good condition. Mild crushing at inlet, moderate vegetation growth up and down stream, good flow	-78.92431396	42.70401315	CK26	308	17-24	State
CK27- could not locate	-78.92763725	42.70205993	CK27	xx	17-24	State
CK28-could not locate	-78.93069064	42.70021534	CK28	xx	17-24	State
CK29-could not locate	-78.93162377	42.69957881	CK29	xx	17-24	State
CK3 unblocked. Fair condition	-78.95205892	42.72502134	CK3	8	17-16	Town
CK30-could not locate	-78.93286969	42.6989693	Ck30	xx	17-24	State
CK31-could not locate	-78.93421454	42.69806753	CK31	xx	17-24	State
CK32- 24" CIP GOOD CONDITION	-78.93485517	42.6979111	CK32	307	17-24	County
CK33-48" RCP good condition good flow, light vegetation blockage	-78.90362554	42.71362017	CK33	xx	17-14	State
CK34-24" Cpp good condition, moderate blockage preventing flow	-78.91130231	42.70897051	CK34	401	17-14	State
CK35-Twin 24" CPP GOOD CONDITION GOOD FLow. Light blockage	-78.9210029	42.70209327	CK35	399	17-24	State
CK36- poor condition, heavy vegetation growth ups no down stream. Invert full of sediment. Heavy flowing water	-78.94427228	42.71917548	CK36	26	17-16	County
CK38-good condition	-78.93770281	42.71226322	Ck38	85	17-15	County
CK39 5'x8' box culvert. Some vegetation build up. Condition, poor rebar sticking out. Good flow through culvert	-78.92524479	42.70739906	CK39	23	17-15	County
CK4 12" concrete pipe. Fair condition. Heavy debris in ditch leading up to pipe	-78.95295691	42.72453699	CK4	11	17-16	Town
CK40- 30" CMP. Concrete in poor condition with rebar exposed. Pipe in good condition. Clear, no blockage	-78.88610287	42.71218678	CK40	349	17-14	Town
CK41- 24"x24" Box. Concrete in poor condition. %50 of culvert is blocked. Invert is full of sediment. Vegetation growth up and down stream	-78.88277993	42.7122687	CK41	350	17-14	Town
CK42-48"RCP GOOD CONDITION. Pre existing box culvert beginning to crumble. Good flow no blockage	-78.87835343	42.71285228	CK42	405	17-18	Town
CK43- 16" CMP, fair condition, some blockage and invert build up, moderate vegetation growth downstream and upstream.	-78.86976564	42.71516496	CK43	347	17-18	Town
CK44-30" CMP great condition good flow no blockage	-78.86720931	42.71187991	CK44	407	17-18	Town
CK45-28"x18" box culvert poor condition. Invert full of debris, moderate flow, moderate blockage in inlet	-78.85274705	42.71227171	CK45	409	17-18	Town
CK46- 72" RCP, great condition, good flow	-78.87751834	42.71592022	CK46	346	17-18	County
CK47-4'x14' concrete box. Excellent condition, good clear flow	-78.86975831	42.71919853	CK47	321	17-18	Town
CK48- 18" RCP fair condition. Minor crushing. No blockage	-78.8637368	42.71454513	CK48	348	17-18	County
CK5-18" concrete CMP. Poor condition big crack in concrete. Invert full of sediment. Outflow full of debris	-78.9579051	42.72212475	CK5	12	17-16	County
CK50- 48" CMP IN GOOD CONDITION, invert is clean. Heavy vegetation growth upstream, clear down stream. Good flow	-78.94901548	42.70679887	CK50	xx	17-16	County
CK52-5'x15' box culvert. Great condition great flow	-78.79120715	42.69924504	CK52	411	17-22	State
CK53- 36"x48" elliptical CMP. Clean invert. Clear vegetation. Good condition	-78.95630135	42.71984341	CK53	80	17-16	Town
CK54- 36"x48" elliptical CMP. Good condition. Clean invert. Heavy vegetation growth downstream, clean up stream. Good flow	-78.95826377	42.71793065	CK54	79	17-16	Town
CK55- clean in good condition	-78.95654787	42.71771775	CK55	81	17-16	Town
CK57- 24" concrete culvert. Light vegetation growth upstream and downstream. Clean invert. Good flow	-78.94268848	42.70377431	CK57	82	17-24	County
CK58-4'x13' concrete culvert. Good condition. Good flow. Moderate vegetation growth upstream	-78.93679169	42.70093745	CK58	89	17-24	County
CK6-15" VTP in good condition. Some debris in system. Small flooding with heavy rain	-78.9579105	42.72168175	CK6	13	17-16	Town
CK-60 good condition	-78.93480669	42.71026085	CK60	83	17-15	County
CK61- good condition, some debris in bottom	-78.93131717	42.70975347	CK61	87	17-15	County
CK7 - north end (outlet)12" CMP. Slightly crushed. South end(inlet) 12" VMP good condition	-78.96271939	42.71805674	CK7	14	17-16	Town
CK8- 48" CMP good condition. Good flow down stream, Minimum vegetation. Some vegetation growth upstream	-78.96311844	42.71763811	CK8	15	17-16	County
CK9- 48" CMP AND BOX CULVERT. Great condition. Natural flow	-78.96530387	42.7143135	CK9	16	17-16	County
CL1 - culvert condition: good. Ditch has lots of vegetation growth. C.M.P : 2x 24" and 1x 60"	-78.83258773	42.70226395	CL1	3	17-23	County
CL2 (CMP) lots of vegetation growth up and down stream. Pipe in good condition. Invert collecting sediment. 1x 48" and 2x 24"	-78.83355973	42.69841657	CL2	4	17-23	County
24" CMP. Unblocked, Fair condition	-78.95095707	42.7255709	CN1	xx	17-16	County
Stream north roadside of old mile strip w concrete box under residential driveway	-78.79929598	42.78998204	CN10	43	17-1	Town
Adjacent CC50, Catch basin N side of Sowles where gutter starts. Outlets to stream north. See asset point.	-78.8133642	42.75146859	CN100	230	17-8	County
Outlet from catch basin in gutter. 12" cpp, good, with steel end section. Enters stream just north, stream where CC50 outlets.	-78.81341992	42.75150418	CN101	231	17-8	County
CC51 location. Buried, likely full of mud, inlet and outlet side. From SE, a 12" pipe outlets from ground to clean ditch w light saturation. Most water follow NE Fairground roadside. CC52 not seen.	-78.82032727	42.74688554	CN102	232	17-8	Town
CC51 location. Buried, likely full of mud, inlet and outlet side. From S, a saturated roadside ditch. From W, less saturated, more vegetated ditch. Both very vegetated. No flow or pipe visible. CC52 not seen.	-78.8204284	42.74682466	CN103	233	17-8	Town
Manhole b/w CC53 I/L and O/L. Can see that this manhole is full to the top with water.	-78.81838069	42.74455873	CN104	234	17-8	Town
Near CC54, catch basin w crossing noted here.	-78.81612178	42.74217068	CN105	238	17-8	Town
Near CC54. Catch basin with a crossing noted here.	-78.81596268	42.74222764	CN106	239	17-8	Town
Another catch basin here well off the road in CC54 area. No outlet pipe seen but outlets to pond. See photos.	-78.81535494	42.74239154	CN107	240	17-8	Town
CE9 direct area. I do not see a manhole, catch basin, any drainage structure on this side/radius of Warwick Terr.	-78.87779239	42.7632543	CN108	xx	17-10	State
No crossing seen at CC55 location. This is nearest seen down the road.	-78.81669526	42.74073393	CN109	246	17-8	Town
Outlet.	-78.79936017	42.79005576	CN11	44	17-1	Town
Couldn't see a crossing at CC55 location. This nearest crossing up the road is tied into roadside storm drainage pipe	-78.81658745	42.740639	CN110	248	17-8	Town
Immediate area of CC58. Many stormsewer crossings through Rte 20 now exist here. Fenced off ponded area next to Tops. Catch basin and small culvert seen on either side of pond.	-78.81424912	42.7682324	CN111	xx	17-5	State
Catch basin in curb in CC59 area. Rte 20 X-Ing just east of McKinley.	-78.81018127	42.77068602	CN112	xx	17-5	State
The other side (inlet) of this downstream pair of CMPs within "CD2". Good. Appears "CD2" is the crossing under both northbound and southbound Rte 5/Great Lakes Seaway Trl. Consists of 2 pairs of culverts.	-78.85920381	42.77713373	CN113	xx	17-7	State
Upstream pair of ~6' CMPs within "CD2" crossing. Appears "CD2" is the crossing under both northbound and southbound Rte 5/Great Lakes Seaway Trl. Consists of 2 pairs of culverts. Saturated low flow ditches north and south here.	-78.85904691	42.77696869	CN114	260	17-7	State
Outlet of the upstream of 2 box culverts consisting of "BD1" (crossing Northbound Lake Shore Rd. See asset points. Good, looks new ~19.5x4.	-78.85830535	42.77542584	CN115	264	17-7	State
There is a catch basin here in CD9 area. Not sure how it's tied. Water seen inside with movement.	-78.83071661	42.74144476	CN116	274	17-9	Town
CD9 area catch basin. As shown in map, this brings all water straight across.	-78.83089067	42.74123325	CN117	275	17-9	Town
Downstream of CD10 fair condition CMP w end section. No outlet. Catch basin downstream. Appears privately owned.	-78.8308902	42.7405811	CN118	278	17-9	Town

Inlet: someone place twin 12”-18” cpp under a small gravel walkway.	-78.8506724	42.77474576	CN119	xx	17-4	Railway
There is underground pipe from CB6 catch basin to stream north of (old) mile strip. A 24” CMP is here but outlet appears to be 8” CPP (no perforation seen). No outflow from either observed. See photos. Homeowner on this side building a bridge over creek.	-78.80156705	42.78998998	CN12	46	17-1	Town
Nothing but lots of trash and vegetation and a saturated roadside gutter	-78.85275366	42.77206478	CN120	xx	17-6	County
Eastbound from “CD18” where study says CD19-21 are (were?) as CIP x-ings, no more crosspipes or catch basins seen in area. Nothing on GIS. An old gutter ends at the catch basins shown on both sides, with increasing vegetation/debris east, gutter-to-ditch.	-78.85196825	42.77213946	CN121	290	17-6	County
A (good) 36” RCP outlets at top of bank to a stream at bottom of bank, right into “CD22” inlet. See point.	-78.84469384	42.77200433	CN122	291	17-6	County
That 12” cpp	-78.82979909	42.76773177	CN123	xx	17-6	County
Catch basin just SE of CD24, roadside in front of School. Appears non functional completely full of stone and sediment, no flow at all.	-78.82990604	42.7673913	CN124	296	17-6	County
Another catch basin here. Full of sediment, was buried w leaves	-78.83045078	42.7677902	CN125	297	17-6	County
Full of sediments. Appears non functional. Right in front of Frontier school	-78.83072302	42.76799792	CN126	298	17-6	County
Good condition	-78.85827478	42.74765558	CN127	xx	17-11	State
New culvert - 3’x5’ box culvert	-78.85886778	42.74759288	CN128	xx	17-11	State
30” concrete pipe, good condition. Heavy vegetation growth, invert is clean, good flow	-78.85126124	42.74464581	CN129	336	17-9	Town
Roadside ditch adjacent CB9 outlet plastic and CMP (slightly crushed). Debris sitting inside.	-78.79421162	42.78525394	CN13	xx		Town
New culvert-28” VTP, good condition good flow	-78.84606288	42.74043033	CN130	339	17-9	State
48” VTP, great condition, no blockage, good flow. Moderate vegetation growth	-78.85703307	42.73561108	CN131	xx	17-11	State
In Center of thruway between cc16 I/o. Dark but slightly see CMP.	-78.8183193	42.76608065	CN132	356	17-5	State
The only feature seen on this side of cc 16 is this CPP 24 inch light flow (inlet) from along thruway. with high vegetation and obstruction, features a steel and section.	-78.8189832	42.76605386	CN133	359	17-5	State
Medium stone from top of Highway Bank median falls down onto concrete swale to a catch basin here between Thruway roadways	-78.81798314	42.76667227	CN134	360	17-5	State
There is actually a identical box culvert under northbound and southbound Thruway roadways. (CD7 location). High flow under thruway here. Saturated streams from N and S median ditch enters here.	-78.83136048	42.75313848	CN135	362	17-9	State
Culvert outlet seen here in Cd28 area. Steel end section, grate; CMP in fair condition (18”). Stone bedding in thruway ditch	-78.83426422	42.75026191	CN136	365	17-9	State
Catch basin in median at cd28. More flow from south ditch.	-78.83529733	42.7485277	CN137	xx	17-9	State
Same as outlet side. Inlets from median, mostly from South direction (nb and sb median ditches. Not shown in study. No outlet inlets, outlets, basins observed	-78.83399336	42.7501328	CN138	368	17-9	State
CD33 area. Seems a private 24 and 18 cpp outlet toward ERIE RR. Water travels to railway support wall/abutment to some inlet. Covered with snow so that was not observable.	-78.83521093	42.73164808	CN139	370	17-20	State
Roadside ditch 8” CMP here, full of leaves. Turns onto Roseview. Ditches all throughout area on either side in similar state.	-78.80056207	42.78498509	CN14	51	17-3	Town
CD36 area. No crossing seen. Stagnant, foul odor, turbid looking water. High vegetation and garbage. Roadside ditches along both roadsides	-78.82507905	42.73963004	CN140	xx	17-8	State
CE1 area. Catch basin just on Hoak’s lot.	-78.86369625	42.77378075	CN141	xx	17-7	Town
Rusty 8-10” CMP outlet to Lake	-78.86385501	42.77388326	CN142	xx	17-7	Town
CE10 area, no more RCP. Small cpp inlet directly to catch basin.	-78.86058621	42.77225214	CN143	xx	17-7	Town
CE10 area, no RCP seen	-78.86057601	42.77226371	CN144	xx	17-7	Town
CE10 area no RCP seen. Catch basin in curb, flow heard	-78.86054817	42.7722912	CN145	xx	17-7	Town
CE10 area no RCP seen. Catch basin in curb. Must be other MH data point, nothing else seen there	-78.86053242	42.77232841	CN146	xx	17-7	Town
a CE10 area, no RCP seen.	-78.86053192	42.77254668	CN147	xx	17-7	State
CE18 area: no twin 18” CIP seen; SS network now here as shown. Only crossing in direct area of “CE18”	-78.83843399	42.7578581	CN148	xx	17-6	State
24” CMP outlet w/ steel end section. CE18 area: no twin 18” CIP seen; SS network now here as shown. Only crossing in direct area of “CE18”. Outlet off-road. Almost non moving high water level. High vegetation, cannot see much of downstream. Invert sediment	-78.83845509	42.75791573	CN149	xx	17-6	State
Appears to be the catch basin on outlet side water heard flowing.	-78.80009644	42.77835471	CN15	58	17-3	Town
Catch basin tied to Culvert outlet in CE 17 area	-78.84250506	42.75576321	CN150	xx	17-9	State
CE16 area. SS network. No 12” CIP seen. Basin tied to small pond in front of Uncle Joe’s Diner	-78.84590355	42.75404641	CN151	xx	17-9	State
4” CPP / 8” PVC inlet from pond in front of Uncle Joe’s Diner	-78.84584823	42.75398566	CN152	379	17-9	State
Also directly by CE16 area (SS network), tied to a culvert inlet. See point.	-78.84553479	42.75423416	CN153	xx	17-9	State
Broken end, poor condition CMP (~24”). High vegetation upstream. Enters SS network. Cannot see invert of pipe past broken end piece.	-78.84544289	42.75409339	CN154	380	17-9	State
CE6 direct area. No concrete box on this side. See outlet. SS network as shown.	-78.84789187	42.7530112	CN155	xx	17-9	State
CE6 direct area. Catch basin in Wellnow parking lot.	-78.84746295	42.75302442	CN156	xx	17-9	State
New 36” CPP outlets at CE6 outlet	-78.84829268	42.75320359	CN157	xx	17-9	State
Good condition CPP outlet just downstream of CE6 outlet.	-78.84839245	42.75315102	CN158	382	17-9	State
Direct CE15 area	-78.85061454	42.75189842	CN159	xx	17-9	State
2nd bridge upstream of CC4 bridge (outlet). The furthest bridge downstream may be new and this is “CC5”; one of 3 bridges not shown in study. Poorest condition. Good flow.	-78.83545509	42.78943209	CN16	69	17-2	State
Direct CE15 area; only crossing here. SS network	-78.85047037	42.75173642	CN160	xx	17-9	State
The only crossing in direct area of both CE14, CE13. No RCP seen. Southwestern Boulevard is predominantly a SS network.	-78.85279277	42.7505636	CN161	383	17-9	State
CE14, CE13 area’s crossing. SS network. No RCP’s	-78.85295142	42.7507295	CN162	xx	17-9	State
CE14, CE13 area’s crossing. SS network. No RCP’s. Manhole in West Herr Ford building driveway apron	-78.85299198	42.7507465	CN163	xx	17-9	State
Roadside ditches with below driveway culverts	-78.80915711	42.71362751	CN164	384	17-22	State
CE9 direct area. Don’t see anything here either.	-78.87797446	42.76338479	CN165	xx	17-10	State
(CE9 direct area) aged catch basin sediment buildup seen. this is the nearest drainage structure seen in CE9 area; I did not see the other highlighted Stormsewer points.	-78.87797033	42.76315177	CN166	387	17-10	State
CE19 area. Nash Rd (and Camp Rd) crossing catch basin, condition appears good. Camp Rd crossing in direct CE 19 area now appears here; directly north of Nash as opposed to south (1962).	-78.86286432	42.76175978	CN167	xx	17-10	State
Direct CE19 area- Camp Rd crossing catch basin -appears good condition.	-78.86256741	42.76186745	CN168	xx	17-10	State
Good condition basin in Cleve-Hill Auto lawn tied to “CE20”	-78.86175988	42.75920485	CN169	389	17-10	State
CC17 outlet; good condition, high flow. Dense vegetation and swale downstream along thruway	-78.81896337	42.76402708	CC17 17 Outlet	xx	17-5	State
CC17 outlet; good condition, high flow. Dense vegetation and swale downstream along thruway	-78.81896337	42.76402708	CC17 Outlet	xx	17-5	State
2nd bridge upstream of CC4 (inlet). Poorest condition, good flow. Drain pipe from Thruway along column eroding near column going downhill inlet of this bridge entering stream. 24” RCP draining in from wingwall.	-78.83523125	42.78937722	CN17	70	17-2	State
CE22 location; Sowles crossing-good catch basin in line with curb: Center of 7/11 entrance.	-78.8505173	42.75140219	CN170	xx	17-9	County
CE22 location; Sowles crossing-good catch basin	-78.8504672	42.75127972	CN171	xx	17-9	County
CE21 location- tied to Sowles crossing	-78.85090126	42.75151006	CN172	xx	17-9	State
CG8 location-Lake Shore crossing directly S of Kelsey. Good catch basin.	-78.88047776	42.76133241	CN173	xx	17-10	State
CG7 location; Lake Shore crossing denoted here. (2nd crossing South of Kelsey as in 1962).Fair condition, sediment buildup observed. However, nothing indicating crossing on other side. Perhaps it all crosses at CG8?	-78.88070824	42.76117645	CN174	xx	17-10	State
CG7 location: don’t see any structure here where a crossing is denoted nor any other crossing observed	-78.88087014	42.7613003	CN175	xx	17-10	State
Just east of cg10 tied catch basin full of sediment, appears nonfunctional.	-78.88738414	42.75567524	CN176	404	17-12	State
Tied to cg11- west Roanoke roadside ditch culvert CMP 12” fair condition, sediment inside	-78.88836913	42.75481022	CN177	408	17-12	State

Cpp outlet to Rush Creek	-78.82229291	42.77175075	CN18	75	17-5	Town
C.i.p. Good condition	-78.94624436	42.71676623	CN19	xx	17-16	State
Culvert outlet observed here (appears 24" rcp). Submerged. Vegetation.	-78.83799027	42.80551443	CN2	9	17-2	Town
Could not locate CC8, no water flowing in rt5 roadside ditch on west, some still freezing water and high vegetation. Newly built mile strip portion may have storm drainage in place. This structure is seen with debris inside and no flow thru a driveway	-78.84784324	42.78628416	CN20	90	17-4	State
Near cc8 (could not locate cc8) South side of concrete drainage structure (12", dry, debris, vegetation). Chamber nearby as shown.	-78.84784819	42.78607602	CN21	91	17-4	State
18" CMP with rebar gate and end section near CC9 location. Slow low flow high vegetation. Appear to tie into catch basin just west. Water flowing in basin	-78.84946919	42.78306395	CN22	xx	17-4	State
Another catch basin appears tied in after Northern Meadowbrook radius.	-78.82359678	42.77885731	CN23	xx	17-4	State
Catch basin near cc11 location	-78.82396888	42.7727922	CN24	xx	17-4	State
Catch basin near cc11 location.	-78.82397087	42.77265041	CN25	xx	17-4	State
Catch basin just south of cc13 weat side of road. 6" pvc enter from west, 12" carrying east	-78.82436727	42.76690683	CN26	94	17-6	State
Old catch basin just south of cc13, west side of s park. Covered w silt fence	-78.82426154	42.76707255	CN27	95	17-6	State
Catch basin on west side of s park at cc13 location. Not the best condition full of sediments. No culvert or natural waterway observed here at cc13 location but there is a ditch east-west here, lots of vegetation, no water observed.	-78.82419265	42.76714876	CN28	96	17-6	State
Near cc12 on east side of s park freezing ponded water no culvert located raised property on east assuming storm drainage is in place	-78.82357146	42.77006051	CN29	101	17-6	State
Culvert inlet observed here. >3/4 pipe capacity. Appears as 24" rcp. Vegetation	-78.83780764	42.80561979	CN3	10	17-2	Town
Cc14 location 18" CIP w leaves, rusty, in cleared N-S ditch. Cannot see where it crosses s park, saturated	-78.82466681	42.74931137	CN30	103	17-8	State
18" cpp seen enter southern s park roadside ditch from the east leaves seen inside saturated	-78.82469456	42.74918245	CN31	104	17-8	State
Cc14 location catch basin across from 18" CIP. (West side of s park). Roadside ditches all along s park w 12" cpp observed and pvc residential drains entering	-78.82493554	42.74898571	CN32	xx	17-8	State
Catch basin near cc14 west side of s park across from sprague south radius	-78.8249016	42.74920237	CN33	105	17-8	State
Flow in all directions	-78.81694089	42.77149491	CN34	113	17-5	State
Flow from north ditch, and more flow E-W	-78.81693043	42.77166434	CN35	114	17-5	State
Appear to be 24" cpp w end section entering turbid looking foul smelling stream	-78.81705523	42.76707386	CN36	115	17-5	State
Swale along east side of thru way extremely dense and hard to traverse	-78.81764503	42.76618758	CN37	116	17-5	State
12" CMP corroding but flowing into cc18	-78.81339201	42.77124595	CN38	120	17-5	Town
Cc19 location storm crossing basin. Good condition can hear high flow	-78.81124578	42.77154556	CN39	xx	17-5	County
CB4? (New mile strip) inlet. Twin ~40"x6', appear slightly crushed but fair condition. Only west pipe has flowing water. East dry with still water inside, obstructed by large amount of dead vegetation.	-78.79628931	42.78848469	CN4	xx	17-3	State
Appear to be storm manhole across from Basin at cc19 location. McKinley has catch basins all along; relatively new looking stormdrainage	-78.81158945	42.77153495	CN40	122	17-5	County
Cc20 location catch basin hear light flow	-78.80971693	42.77149073	CN41	xx	17-5	Town
Cc20 location roadside ditch along allendale, garbage and leaves and some vegetation, water is flowing into 12" CMP (south tip of Sheldon) invert torn at inlet not great shape	-78.80989444	42.77163724	CN42	xx	17-5	Town
Catch basin in road at Sheldon/Allendale (3 directions: from E roadside ditch of Allendale, from W roadside ditch of Sheldon, heading West , all 3 12" cpp good condition good Flow seen	-78.80974377	42.77162896	CN43	123	17-5	Town
Cc20 location 12" cpp inlet to basin from weat roadside of Sheldon. Another culvert upstream under commercial driveway	-78.80970292	42.77165374	CN44	xx	17-5	Town
Cc20 location west roadside Sheldon 12" CMP flowing to next cpp to basin	-78.80958252	42.77172751	CN45	xx	17-5	Town
Between CC21 and CC22 location. catch basin on east side of McKinley, north side of Wilson. high vegetation high inflow.	-78.81139931	42.76642305	CN46	127	17-5	County
Between CC21 and CC22 location. 12" CMP heading to catch basin from north roadside of Wilson. Vegetation in stream, some garbage. High flow	-78.81132064	42.76633895	CN47	128	17-5	County
Between CC21 and CC22 location. catch basin, E side of McKinley, S side of Wilson. Low flow heard and seen from north basin.	-78.8114099	42.76620576	CN48	129	17-5	County
12" cast iron under dway high inflow from north, east side McKinley	-78.81153014	42.76397493	CN49	xx	17-5	County
CB inlet. Twin oval CMPs (45"x6'). Western has live stream. East no water entering but still water inside and lots of dead vegetation in front.	-78.79628931	42.78848469	CN5	xx		
12" CMP N-S high flow east side McKinley; poor shape. Tomaka crossing at McKinley.	-78.81149776	42.7642465	CN50	xx	17-5	County
No outlet pipe seen on S side of dway but water ponded and flowing. 18" CIP CC 23 inlet just upstream	-78.81153579	42.7638812	CN51	131	17-5	County
High flow heard in catch basin in median: lots of overgrown grass surrounding	-78.81174019	42.76247763	CN52	135	17-5	County
Catch basin with high flow geared flow seen entering from north roadside and ditch in east direction	-78.81155015	42.76198408	CN53	137	17-5	County
12" CMPs corroding north flowing water. Water from up on roadside falls into ditch here eroding roadside. Crosses small bridge to cc25 outlet area	-78.81194092	42.75988624	CN54	xx	17-5	County
Just south of Estelle (CC25 should be RCP just north of Estelle; nothing located).	-78.81166584	42.7583884	CN55	139	17-5	County
Same as north most basin here	-78.81168663	42.75829168	CN56	xx	17-5	County
Same as north most basin here. Water heard and seen in all basins from S-N	-78.81171042	42.7581646	CN57	140	17-5	County
Near CC26 location just south of Estelle. High inflow from west entering a 24" cpp. 12" cpp low flow from the north. All cpp good.	-78.81203611	42.7582687	CN58	141	17-5	County
Near "CC27". 24" RCP hidden hollow crossing w end section inlet good condition, slow flow, high water level	-78.81185658	42.75498625	CN59	142	17-8	Town
CB4? (New mile strip) O/L. Same as I/L. High dead vegetation especially in front of inactive eastern pipe. ~24" CMP enters O/L end from west. O/L end goes into another 2 CMPs. (See first, non-crushed, CMP attachment photos). Obstructed by vegetation.	-78.79654355	42.78876999	CN6	xx	17-3	State
Same as other side but more debris and no flow observed. Near "CC27", no pipe seen immediately at CC27.	-78.81185752	42.75507321	CN60	143	17-8	Town
Storm manhole in Center of hidden hollow rd	-78.81185539	42.75503254	CN61	xx	17-8	Town
Appears to be location of cc27, no CIP or culvert seen. Areas ditch is highly saturated with no flow.	-78.81186886	42.75442528	CN62	144	17-8	County
Large basin/chamber. Very high inflow to 3x24" cpp good condition everything, flowing north east and church owner said it goes back into Rush Creek N/E. Inflow from 12" cpp from SE. high inflow from SW ~36-48" oval CMP.	-78.81176941	42.75241262	CN63	145	17-8	County
Catch basin in median at CC29. Poor condition top. Dangerous: frame and grate not structurally sound, can be all removed, someone could fall in. Ditch channel observed from South, saturated	-78.81222648	42.74899277	CN64	166	17-8	County
24" CMP w end section covered with dead veg and busted concrete - on top of pipe end; nothing really in stream. Lots of stone and sediment seen on invert and appears to be corroding. Good amount of flow coming out.	-78.8122962	42.74269165	CN65	xx	17-8	County
Catch basin in median appears to be tied to the CMP just south of CC31. Not sure if this ties to our CP or CMP covert both appear to tie into catch basins either at curb or this one	-78.81247789	42.74259555	CN66	170	17-8	County
The north 12" CMP. See Center asset point for info. See attached.	-78.81236426	42.74000347	CN67	172	17-8	County
The south 1/2 24" CMP. See Center asset point for info. See attached.	-78.81235814	42.73995742	CN68	173	17-8	County
This app storm info seems to indicate the south outlet is tied to this catch basin in curb.	-78.81244727	42.73992325	CN69	174	17-8	County
Twin 5' SICPUP with end sections, outlet, good new condition. Along North roadside ditch of Mile strip just west of "CB4"	-78.79708042	42.78891751	CN7	39	17-3	State
North most outlet appears to tie into this catch basin in curb.	-78.81244307	42.73999453	CN70	175	17-8	County
This app MH info indicated Center culvert (CC32) ties into this catch basin (entrance to fairgrounds)	-78.81304857	42.73943299	CN71	176	17-8	Town

This app MH info indicates this culvert (CC32) is also tied into this catch basin. Another smaller CB just wear. Assuming it also ties. See attached.	-78.8131228	42.73927803	CN72	177	17-8	Town
Southern catch basin upstream of CC33 outlets. Flow heard. Needs cleaning.	-78.81277746	42.73102095	CN73	179	17-21	County
North catch basin in curb upstream of CC33 outlets. Needs cleaning. Cannot hear the flow.	-78.81279218	42.73115907	CN74	180	17-21	County
West side of McKinley, north catch basin. Clean.	-78.81291072	42.73114859	CN75	181	17-21	County
West side of McKinley, south catch basin. Clean.	-78.81291041	42.73106356	CN76	182	17-21	County
12 inch CMP rotting invert east roadside ditch heading south to cc 35. Goes under driveway just north.	-78.8020872	42.75392584	CN77	190	17-8	Town
High point.	-78.80206195	42.75430964	CN78	xx	17-8	Town
High point catch basin (south)	-78.80239489	42.74800583	CN79	xx	17-8	Town
CB5? (New Mile Strip) outlet CMP w end section. Fully ponded. Slightly crushed (~24")	-78.80008786	42.78863621	CN8	xx	17-3	State
High point catch basin (north)	-78.80237138	42.74811255	CN80	xx	17-8	Town
18" CMP poor condition, inlet totally blocked. Outlet some crushing and lots of blockage	-78.87625396	42.74926235	CN81	195	17-11	County
CC37 area (South side of Big tree, no CIP X-ing found).	-78.82469334	42.77184874	CN82	xx	17-6	Town
CC37 area (north side of Big Tree, no CIP X-ing found).	-78.82476842	42.77194354	CN83	xx	17-6	Town
It appears there was something crossing here (or is). Could be where the CC37 CIP was.	-78.82505837	42.77192825	CN84	xx	17-6	Town
Looks like 36-48" RCP W end section (condition looks good, debris within rebar) and rebar cover. Inlet. Along south roadside of Big Tree. Water goes east toward roundabout. Water comes from 2x ~18" RCP directly west. See asset points.	-78.82515641	42.77184983	CN85	198	17-6	Town
Twin 18-24" corroding RCP under R.R. Outlet.	-78.82525891	42.77187505	CN86	xx	17-6	Town
Inlet. 2x ~18-24" corroding RCP under R.R. Rebar in RCP visible poor shape, water is flowing. Comes from twin 18 to 24 inch CMP's with end sections directly west. See photos.	-78.82534235	42.77187573	CN87	199	17-6	Town
North CMP 18-24" fair condition outlet toward South Park.	-78.82542694	42.77188202	CN88	200	17-6	Town
South CMP 18-24" fair condition outlet toward South Park.	-78.82537958	42.77181962	CN89	201	17-6	Town
CB5? (New Mile Strip) inlet side catch basin along mile strip south roadside. Ditch has no water but saturated. High vegetation in ditch.	-78.80013797	42.78823109	CN9	xx	17-3	State
catch basin, appears to be off public ROW. Water seen entering from south; see asset point.	-78.82560104	42.77181568	CN90	202		
Connected to catch basin. ponding water from the south; high debris and dying/dead vegetation covering, but an end sectior is visible. water is flowing in	-78.82560054	42.77168723	CN91	203	17-6	Town
Catch basin.	-78.82632705	42.771894	CN92	xx	17-6	Town
Catch basin in gutter actually just south of CC38 inlet (tied in line)	-78.806586	42.76941481	CN93	206	17-5	State
4x36" cmps (outlets). Good. X-Ing ECC entrance. Mostly what feeds CC 40.	-78.79703732	42.76832086	CN94	210	17-5	Town
Inlet for the 4 x cmps Crossing ECC entrance. Water comes from north east culverts on ECC property.	-78.79682371	42.7683584	CN95	211	17-5	Town
Near CC42, just north. Catch basin and culvert on other side. See photos.	-78.81645323	42.75823163	CN96	216	17-5	Town
Just north of CC42. ~42" rcp. Bubbly, slightly foul-smelling still water (slow flow) 1/4 full at the time, heading east into residential property highly saturated and vegetated. The same thing appears north; not in Hamburg study.	-78.81628672	42.75825734	CN97	217	17-5	Town
Didn't see a crossing here I only observed roadside ditches on east and west sides, west highly saturated, leads under stone driveway, good condition 12" CIP near CC43 (at my car)	-78.81601802	42.7553839	CN98	218	17-8	Town
Appears this is the CC44 area, and now only this system of catch basins is observed, and assuming it follows the system shown in this app.	-78.81538526	42.75391044	CN99	221	17-8	Town
CZ1-24" VTP great condition, clear good flow, heavy vegetation growth downstream	-78.92334935	42.72273775	CZ1	125	17-17	County
CZ2-24" VTP great condition, heavy vegetation growth up stream, invert filling with vegetation and sediment, good flow	-78.92156937	42.72447562	CZ2	126	17-17	County
Roadside ditch on south and North (primarily south) of Willet Rd. w/ driveway culverts (plastic, CMP, 8"-24"). RCP structure noted on south near asset point. Metal pipes appear to have rotted inverts. Homeowner said ditches never flood or rise greatly.	-78.81846285	42.8048542	DN1	32	17-1	County

Appendix D

TOWN OF HAMBURG DRAINAGE PHOTOGRAPHS



Figure 1: CA inlet

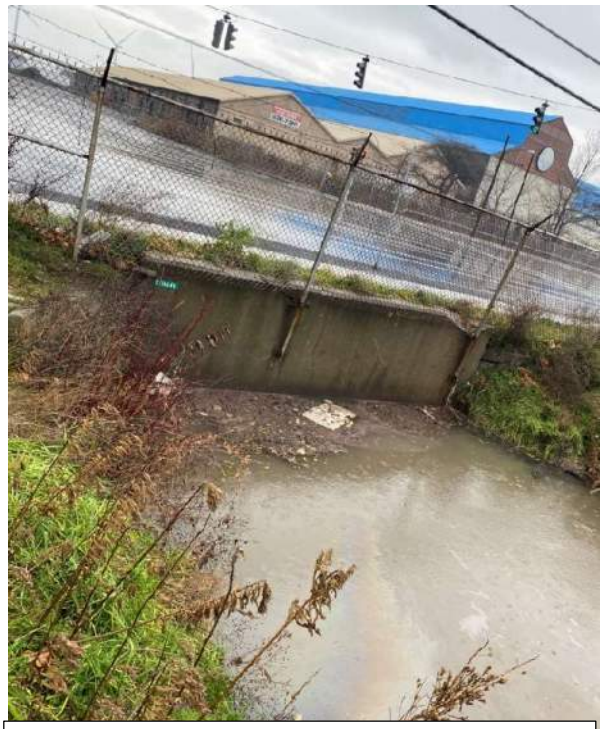


Figure 2: CA outlet



Figure 3: CL 1



Figure 4: CL 2



Figure 5: CA9 outlet



Figure 6: CA9 inlet



Figure 7: CK1



Figure 8: CK3



Figure 9: CN2



Figure 10: CN3

.



Figure 11: CK4



Figure 12: CK5



Figure 13: CK6



Figure 14: CK7



Figure 15: CK8



Figure 16: CK9



Figure 17: CA4 inlet



Figure 18: CA4 Outlet



Figure 19: CA5 Outlet



Figure 20: CA5 Inlet



Figure 21: CA13



Figure 22: CA6



Figure 23: CK39



Figure 24: CK10



Figure 25: CK11



Figure 26: CK36

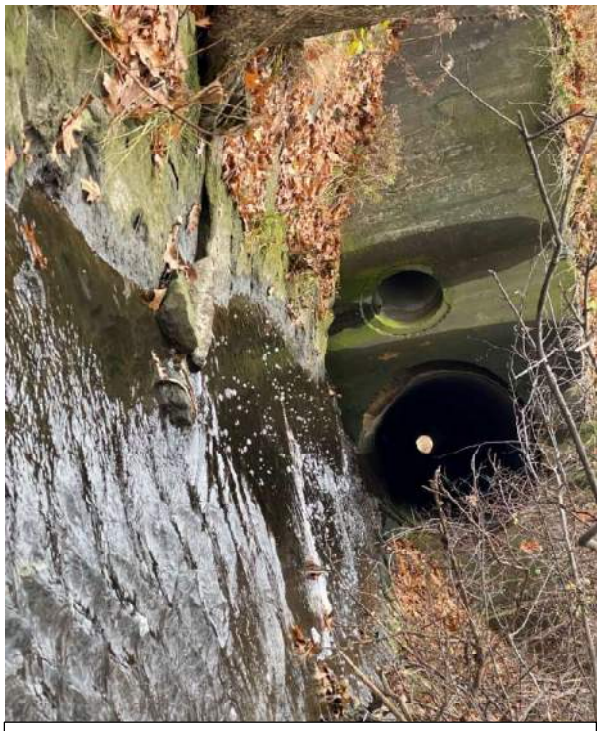


Figure 27: CA7 Outlet



Figure 28: CA7 Inlet



Figure 29: CA8 Outlet



Figure 30: CA10 Outlet



Figure 31: CA10 Inlet



Figure 32: DN1



Figure 33: CA11 Inlet



Figure 34: CA12 Outlet



Figure 35: CB1 Outlet



Figure 36: CB2 Outlet



Figure 37: CB2 Inlet



Figure 38: CB3 Outlet



Figure 39: CN7

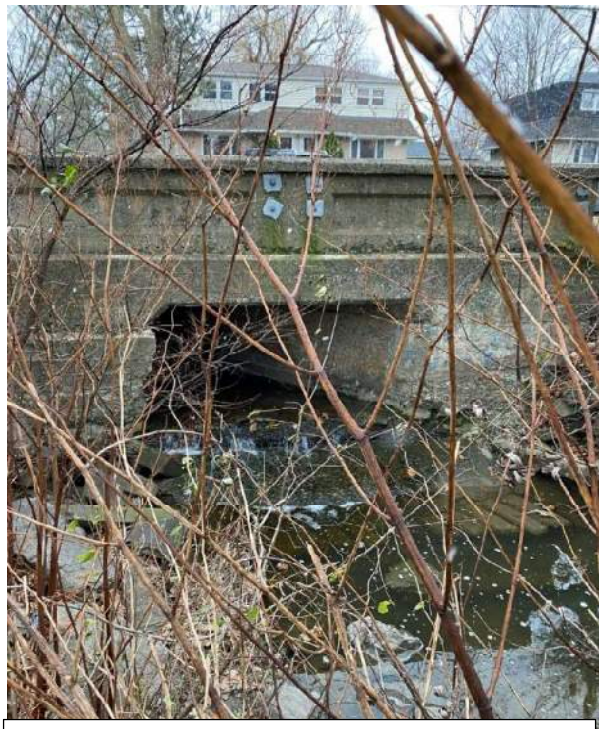


Figure 40: CB4 Outlet



Figure 41: CB7 Inlet



Figure 42: CB7 Outlet

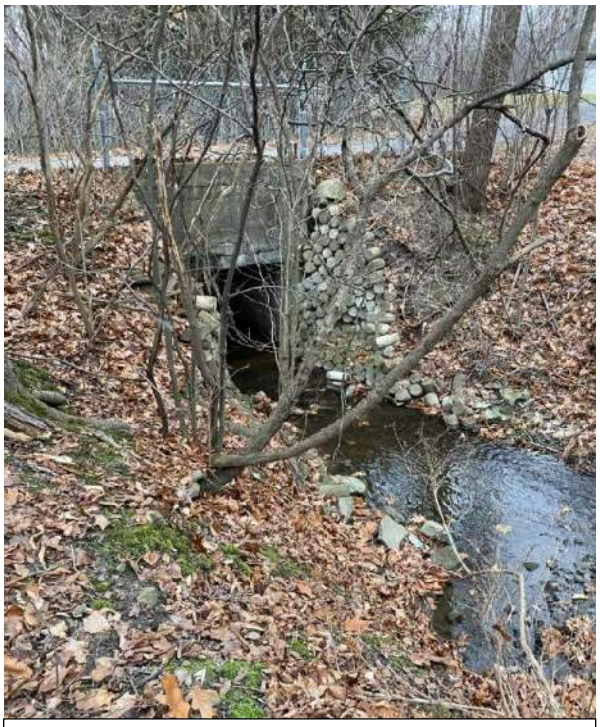


Figure 43: CN10



Figure 44: CN11



Figure 45: CB6



Figure 46:CN12



Figure 47: CB8 Inlet



Figure 48: CB8 Outlet



Figure 49: CB9 Inlet



Figure 50: CB9 Outlet



Figure 51: CN14



Figure 52: CB10 Inlet



Figure 53: CB10 Outlet



Figure 54: CB11 Inlet



Figure 55: CB11 Outlet



Figure 56: CB12 Inlet



Figure 57:CB12 Outlet



Figure 58: CN15



Figure 59: CB15 Inlet



Figure 60:CB15 Outlet



Figure 61: CC1 Inlet



Figure 62:CC1 Outlet



Figure 63: CC2 Outlet



Figure 64: CC2 Inlet



Figure 65: CC4 Outlet



Figure 66: CC4 Inlet



Figure 67: CC5 Outlet



Figure 68: CC5 Inlet



Figure 69: CN16



Figure 70: CN17



Figure 71: CC3 Inlet

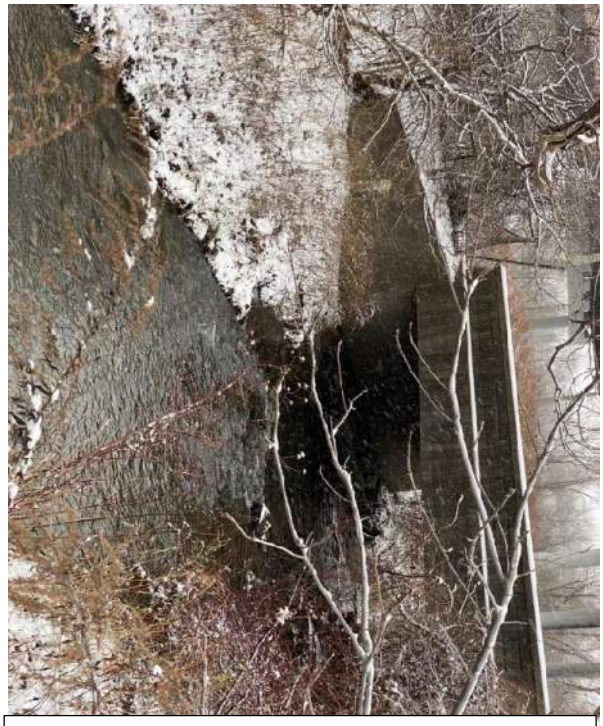


Figure 72: CC3 Outlet



Figure 73: BC1 Outlet



Figure 74: BC1 Inlet



Figure 75: CN18



Figure 76: CB2 Inlet



Figure 77: BC3 Outlet



Figure 78: BC3 Inlet



Figure 79: CK54



Figure 80: CK53



Figure 81: CK55



Figure 82: CK 57



Figure 83: CK 60



Figure 84: CC6 Outlet



Figure 85: CK38



Figure 86: CC7 Inlet



Figure 87: CK61



Figure 88: CC7 Outlet



Figure 89: CK 58



Figure 90: CN20



Figure 91: CN21



Figure 92: CC10 Outlet

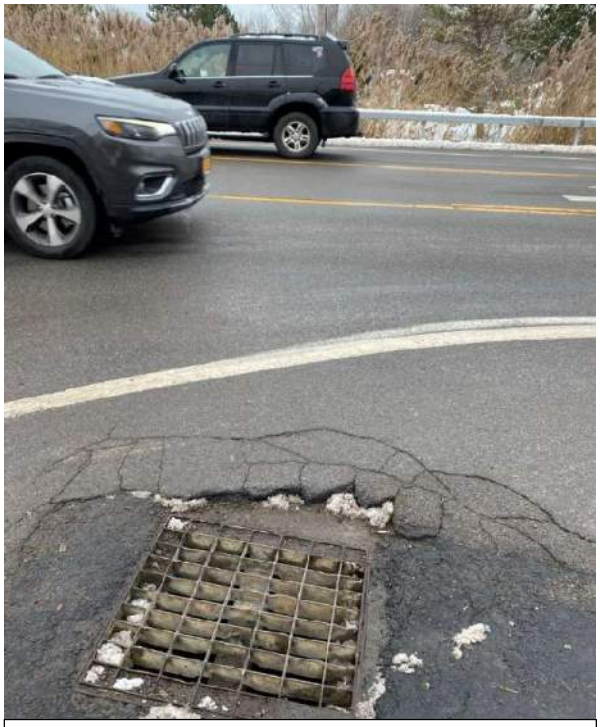


Figure 93: CC10 Inlet



Figure 94: CN 26



Figure 95: CN27



Figure 96: CN28



Figure 97: CH2



Figure 98: CH3



Figure 99: CH4



Figure 100: CH5



Figure 101: CN29



Figure 102: CH6



Figure 103: CN30



Figure 104: CN31



Figure 105: CN33



Figure 106: CC14



Figure 107: CH7



Figure 108: CJ14



Figure 109: CJ 13



Figure 110: CJ11



Figure 111: CJ1



Figure 112: CJ8



Figure 113: CN34



Figure 114: CN35



Figure 115: CN36



Figure 116: CN37



Figure 117: CJ3



Figure 118: CC18 Outlet



Figure 119: CC18 Inlet



Figure 120: CN38



Figure 121: CL2



Figure 122: CN40



Figure 123: CN43



Figure 124: CJ4



Figure 125: CZ1



Figure 126: CZ2



Figure 127: CN46



Figure 128: CN47



Figure 129:CN48



Figure 130: CC22 Inlet



Figure 131: CN51



Figure 132: CC23 Inlet



Figure 133: CC23 Outlet



Figure 134: CC24



Figure 135: CN52



Figure 136: CC24 Inlet



Figure 137: CN53



Figure 138: CC25 Outlet



Figure 139: CN55



Figure 140: CN57



Figure 141: CN58



Figure 142: CN59



Figure 143: CN60



Figure 144: CN62



Figure 145: CN63



Figure 146: CH12



Figure 147: CH13



Figure 148: CH14



Figure 149: CH15



Figure 150: CJ15



Figure 151: CJ16



Figure 152: CJ2

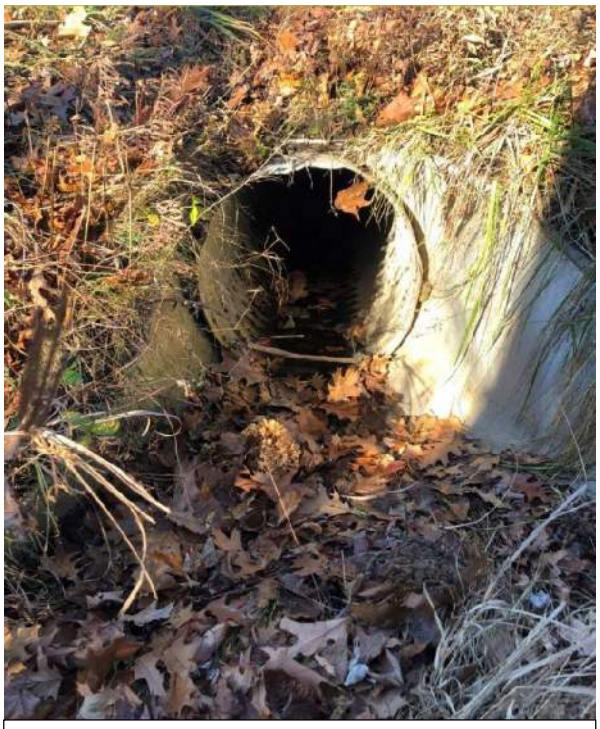


Figure 153: CJ17



Figure 154: CJ18



Figure 155: CJ19



Figure 156: CJ20



Figure 157: CJ22



Figure 158: CJ26



Figure 159: CJ25



Figure 160: CJ24



Figure 161: CJ27



Figure 162: CC28



Figure 163: CJ28

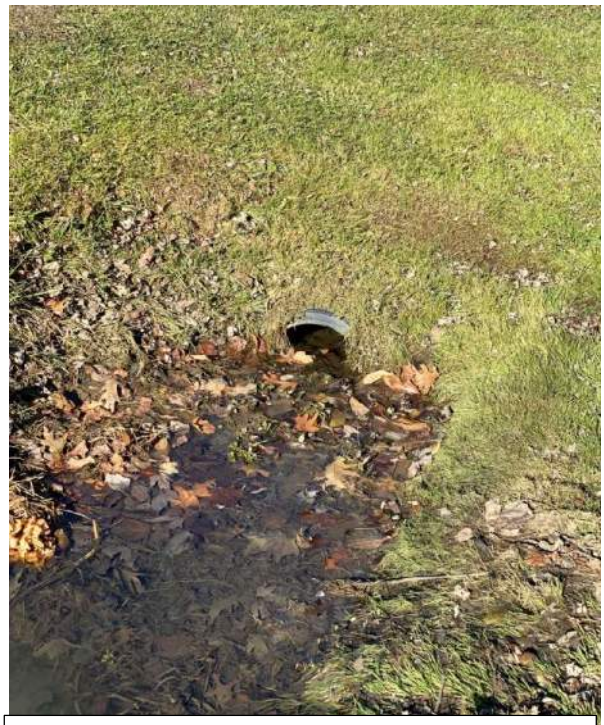


Figure 164: CC29



Figure 165: CC29 Inlet



Figure 166: CN64

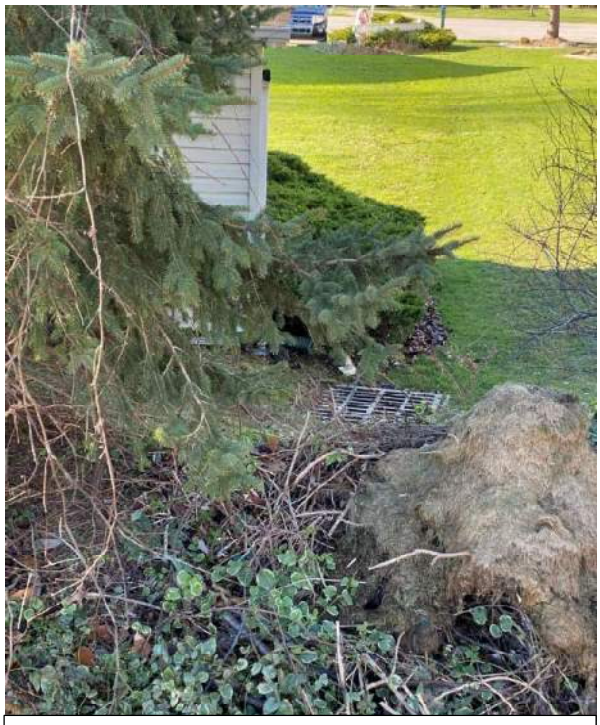


Figure 167: CC30 Inlet



Figure 168: CC31 Inlet

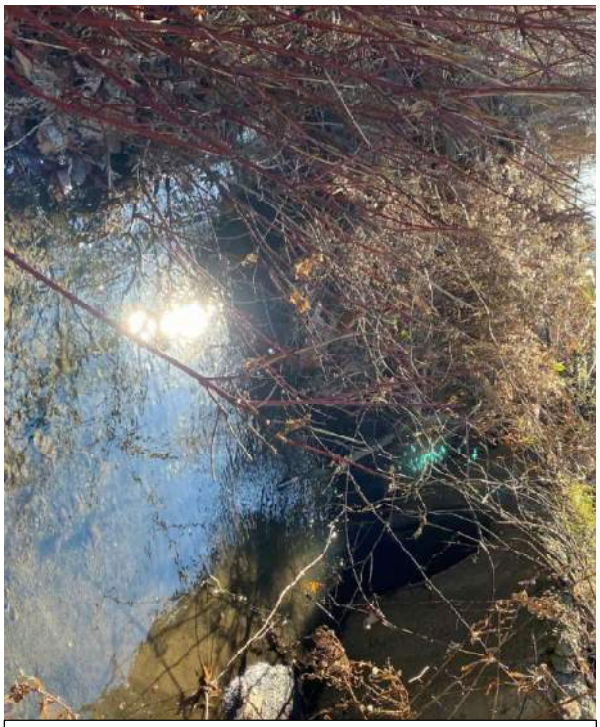


Figure 169: CC31 Outlet



Figure 170: CN66



Figure 171: CC32 Outlet



Figure 172: CN67



Figure 173: CN68



Figure 174: CN69



Figure 175: CN70



Figure 176: CN71



Figure 177: CN72



Figure 178: CC33 Outlet



Figure 179: CN73

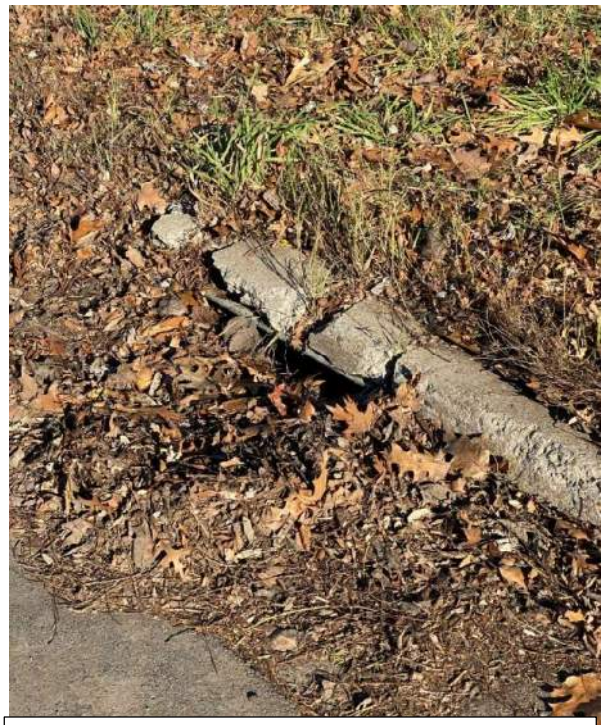


Figure 180: CN74



Figure 181: CN75



Figure 182: CN76



Figure 183: CC33 Inlet



Figure 184: CH11



Figure 185: CC34 Inlet

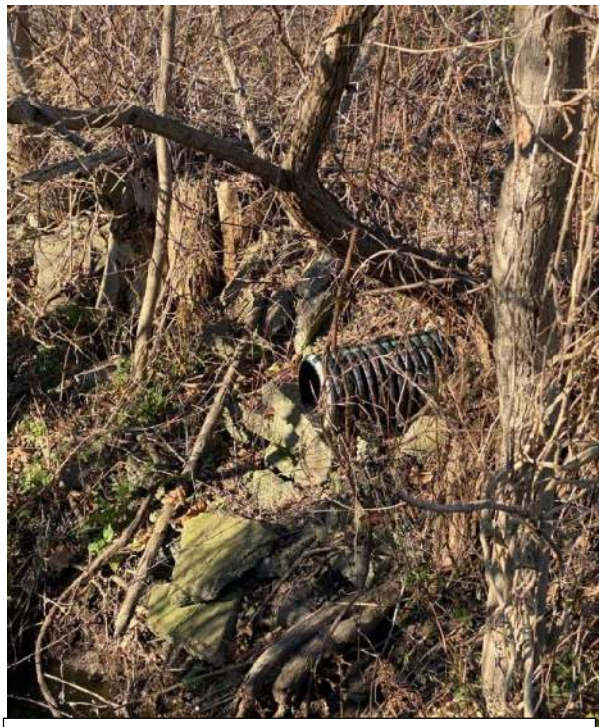


Figure 186: CC34 Outlet



Figure 187: CH10



Figure 188: CC35 Inlet



Figure 189: CC35 Outlet



Figure 190: CN77



Figure 191: CH16



Figure 192: CC36 Outlet



Figure 193: CC36 Inlet



Figure 194: CG32



Figure 195: CN81



Figure 196: CG30



Figure 197: CG2



Figure 198: CN85



Figure 199: CN87



Figure 200: CN88



Figure 201: CN89



Figure 202: CN90



Figure 203: CN91



Figure 204: CC39 Outlet



Figure 205: CC38

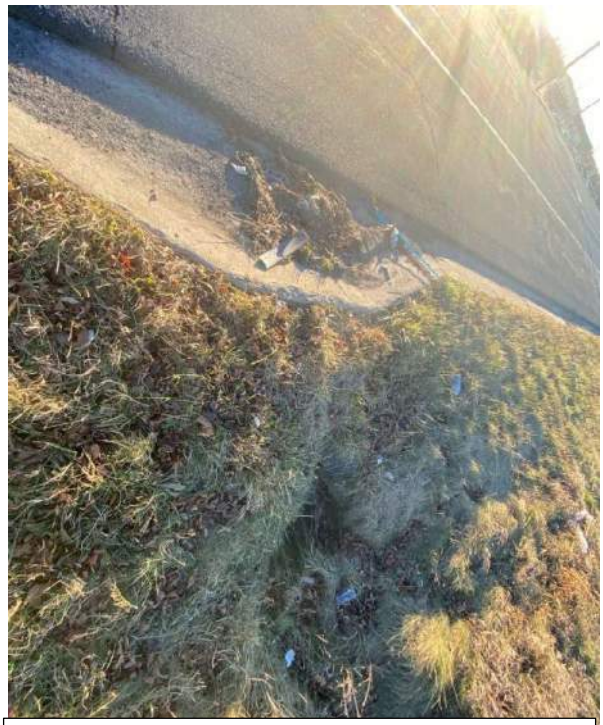


Figure 206: CN93



Figure 207: CC38



Figure 208: CC40 Outlet



Figure 209: CC40 Inlet



Figure 210: CN94



Figure 211: CN95



Figure 212: CC41 Outlet



Figure 213: CC41 Inlet

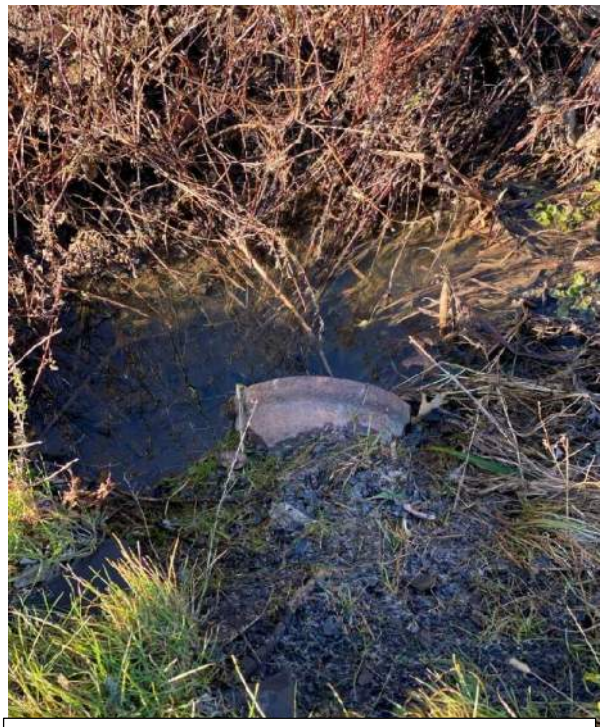


Figure 214: CC42 Inlet



Figure 215: CC42 Outlet



Figure 216: CN96

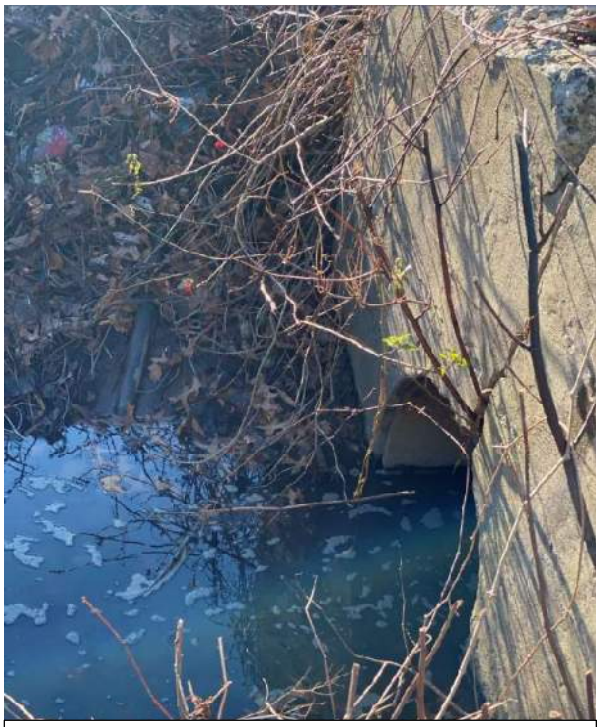


Figure 217: CN97



Figure 218: CN98



Figure 219: CC43 Inlet



Figure 220: CC43 Outlet



Figure 221: CN99



Figure 222: CC45 Outlet



Figure 223: CC46 Outlet



Figure 224: CC45 Inlet



Figure 225: CC46 Inlet



Figure 226: CC47 Inlet



Figure 227: CC47 Outlet



Figure 228: CC50 Outlet

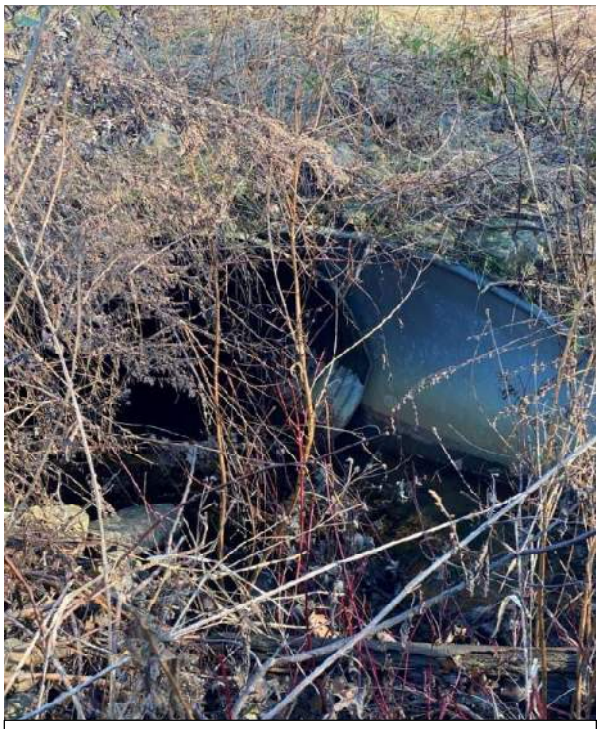


Figure 229: CC50 Inlet



Figure 230: CN100



Figure 231: CN101



Figure 232: CN102



Figure 233: CN103

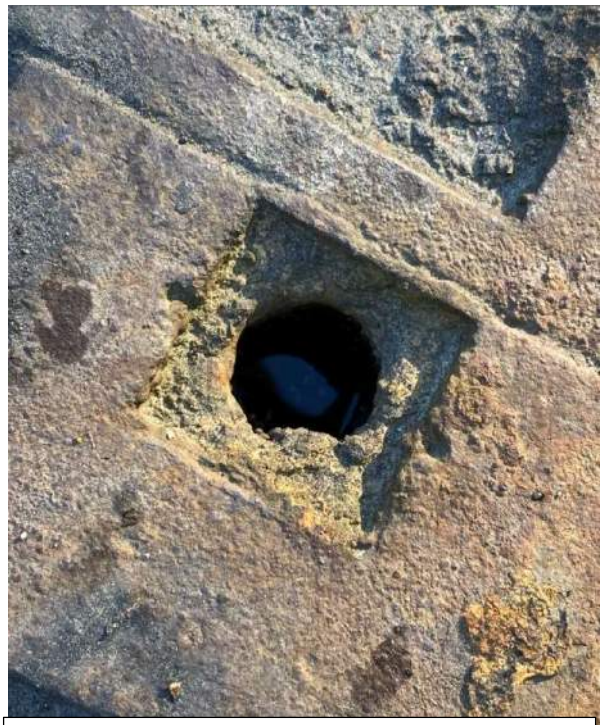


Figure 234: CN104



Figure 235: CC53 Outlet



Figure 236: CC53 Inlet



Figure 237: CG13



Figure 238: CN105



Figure 239: CN106



Figure 240: CN107



Figure 241: CG10



Figure 242: CG9



Figure 243: CC54 Outlet



Figure 244: CC54 Inlet



Figure 245: CE8



Figure 246: CN109



Figure 247: CE7



Figure 248: CN110



Figure 249: CE4



Figure 250: CE3



Figure 251: CC56 Inlet



Figure 252: CE19



Figure 253: CC57 Inlet



Figure 254: CE20



Figure 255: CC57 Outlet



Figure 256: CC56 Outlet

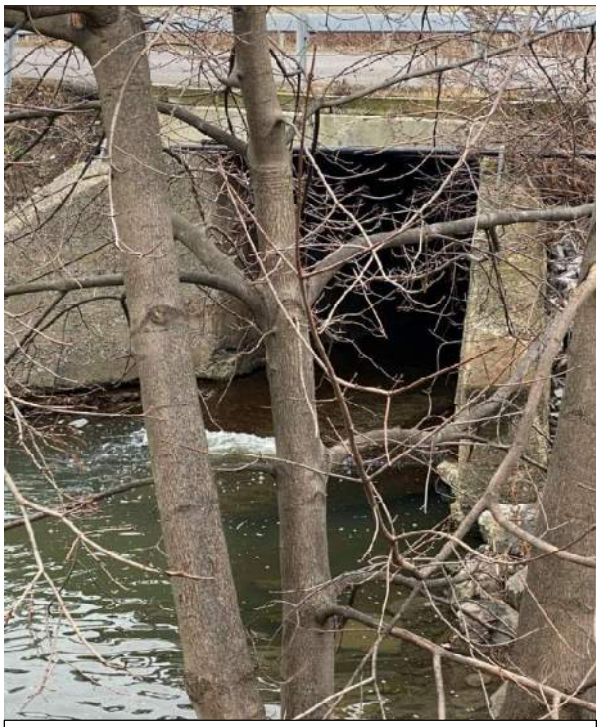


Figure 257: CD1 Outlet



Figure 258: CD1 Inlet



Figure 259: CD2 Outlet



Figure 260: CN114

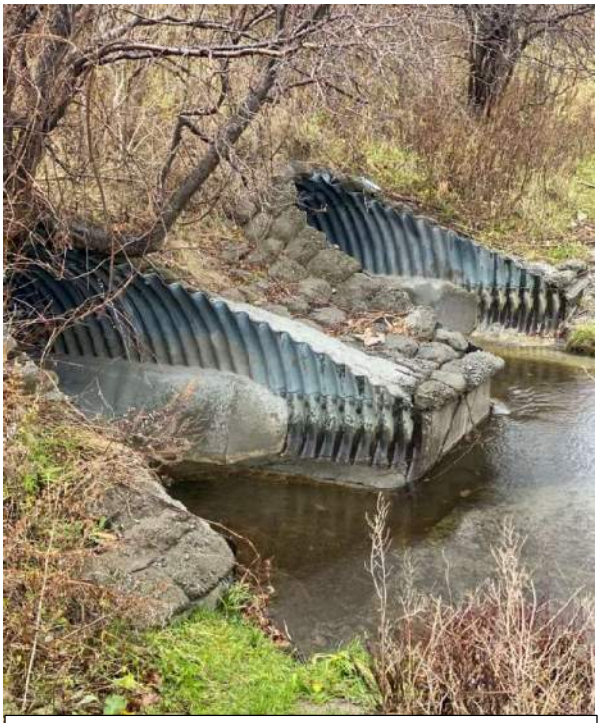


Figure 261: CD2 Inlet



Figure 262: BD1 Outlet



Figure 263: BD2 Inlet



Figure 264: CN115



Figure 265: BD1 Inlet



Figure 266: CD17



Figure 267: CD4 Outlet



Figure 268: CDP Inlet



Figure 269: CD5 Outlet



Figure 270: CD6 Outlet



Figure 271: CD6 Inlet



Figure 272: CD8 Inlet



Figure 273: CD8 Outlet



Figure 274: CN116



Figure 275: CN117

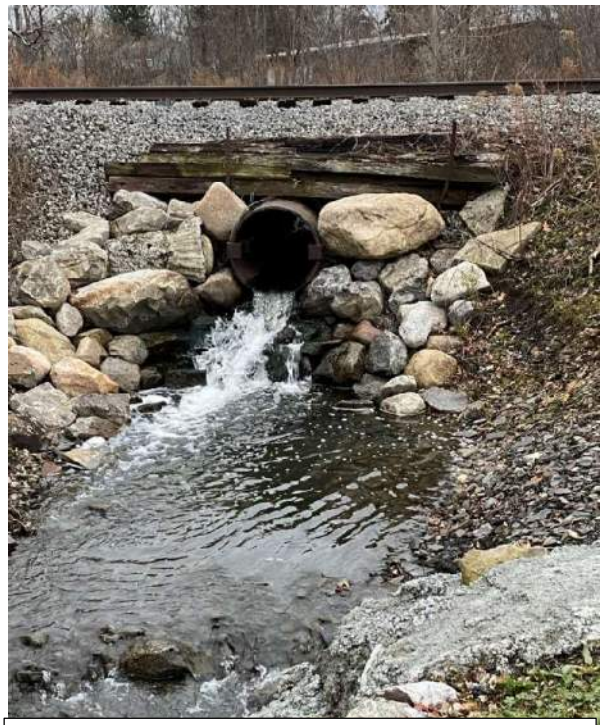


Figure 276: CD10 Outlet



Figure 277: CD10 Inlet



Figure 278: CN118

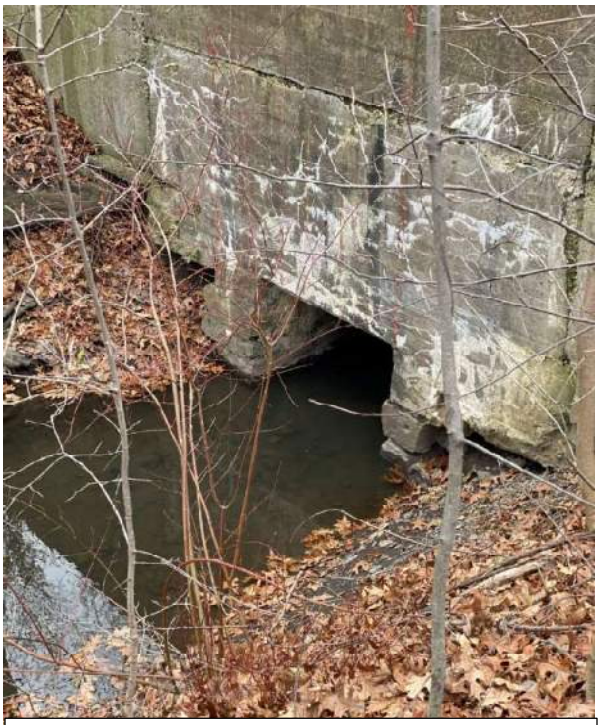


Figure 279: CD11 Outlet



Figure 280: CD11 Inlet



Figure 281: CD12 Inlet



Figure 282: CD12 Outlet



Figure 283: CD13 Inlet



Figure 284: CD15 Inlet



Figure 285: CD15 Outlet



Figure 286: CD13 Outlet



Figure 287: CD16 Inlet



Figure 288: CD16 Outlet



Figure 289: CD18 Inlet



Figure 290: CN 121



Figure 291: CN122



Figure 292: CD22 Inlet



Figure 293: CD22 Outlet



Figure 294: CD23



Figure 295: CD24 Outlet



Figure 296: CN124



Figure 297: CN125



Figure 298: CN126



Figure 299: CD26



Figure 300: CD30 Inlet



Figure 301: CD30 Outlet



Figure 302: CD31



Figure 303: CD31 Outlet



Figure 304: CK13



Figure 305: CK14



Figure 306: CK15



Figure 307: CK32



Figure 308: CK26



Figure 309: CK25



Figure 310: CK24



Figure 311: CK16



Figure 312: CK17



Figure 313: CJ37



Figure 314: CJ29



Figure 315: CJ5



Figure 316: CJ33



Figure 317: CJ34



Figure 318: CJ35



Figure 319: CJ36



Figure 320: CJ7



Figure 321: CK47



Figure 322: CH8



Figure 323: CH24



Figure 324: CH21



Figure 325: CH20



Figure 326: CH26



Figure 327: CG15



Figure 328: CG16



Figure 329: CG4 Inlet



Figure 330: CG17



Figure 331:CG18



Figure 332: CG24



Figure 333: CG27



Figure 334: CG28



Figure 335: CG29



Figure 336: CN129



Figure 337: CG21



Figure 338: CG22



Figure 339: CN130



Figure 340: CG5 Outlet



Figure 341: CG23`



Figure 342: CG 6 Inlet



Figure 343: CI5



Figure 344: CD7



Figure 345: CD27



Figure 346: CK46



Figure 347: CK43



Figure 348: CK48



Figure 349: CK40



Figure 350: CK41

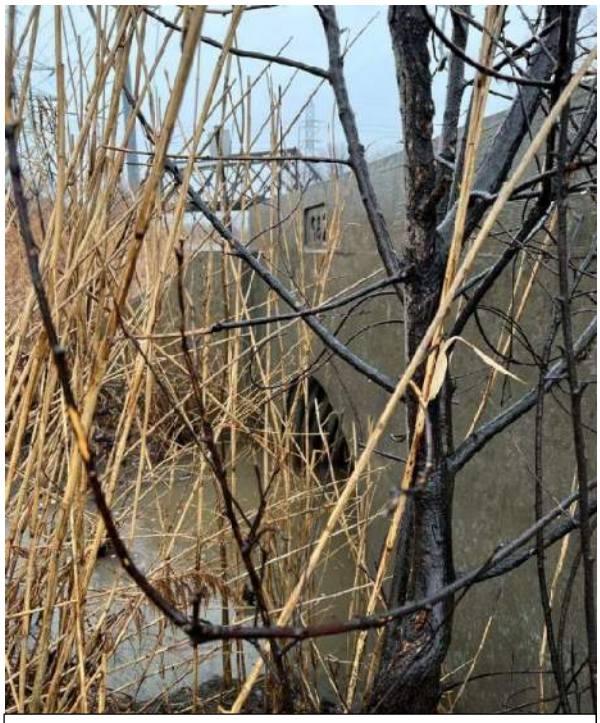


Figure 351: CA3 Outlet



Figure 352: CA3 Inlet



Figure 353: CA2 Inlet



Figure 354: CA2 Outlet



Figure 355: CC16



Figure 356: CN132

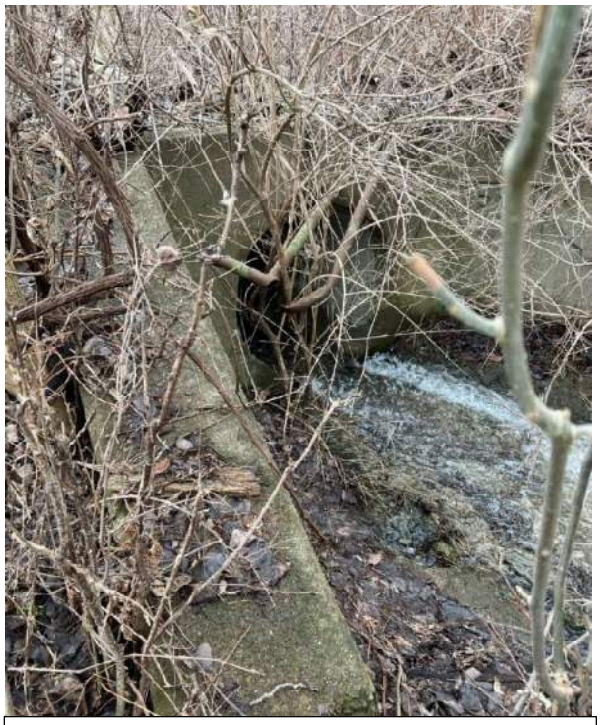


Figure 357:CC17 outlet



Figure 358: CC17 Inlet



Figure 359: CN133



Figure 360: CN134



Figure 361: CD7 Outlet



Figure 362: CN135



Figure 363: CD29 Outlet



Figure 364: CD29 Inlet



Figure 365: CN136



Figure 366: CD28 Outlet



Figure 367: CD28 Inlet



Figure 368: CN138



Figure 369: CD33



Figure 370: CN139



Figure 371: CD34



Figure 372: CD33



Figure 373: CE1

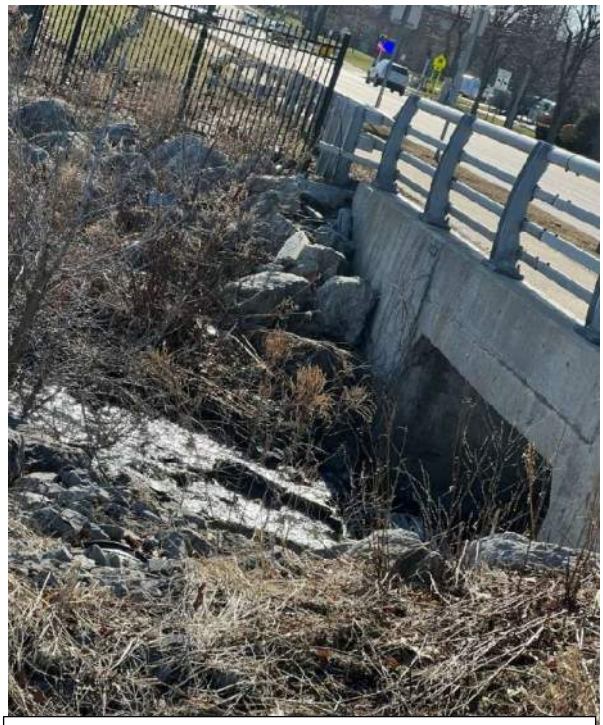


Figure 374: CE2 Outlet



Figure 375: CE2 Inlet



Figure 376: CE11



Figure 377: CE5 Inlet



Figure 378: CE17 Inlet



Figure 379: CN152



Figure 380: CN154



Figure 381: CE6 Outlet



Figure 382: CN158



Figure 383: CN161



Figure 384: CN164



Figure 385: BF1 Inlet



Figure 386: BF1 Outlet



Figure 387: CN166



Figure 388: CE20



Figure 389: CN169



Figure 390: CE20 Outlet



Figure 391: CE23



Figure 392: CG8



Figure 393: CG1 Inlet

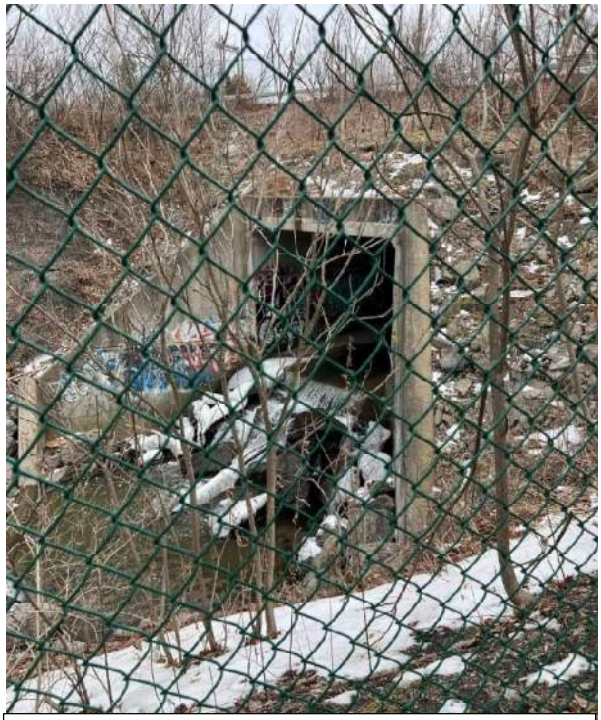


Figure 394: CG1 Outlet



Figure 395: CG9



Figure 396: CJ6



Figure 397: CJ40



Figure 398: CJ39



Figure 399: CK35



Figure 400: CG2



Figure 401: CK34



Figure 402: CG3 Inlet



Figure 403: CG10



Figure 404: CN176



Figure 405: CK42



Figure 406: CG11



Figure 407: CK44



Figure 408: CN177



Figure 409: CK45



Figure 410: BK51



Figure 411: CK52



Figure 412: CG4 Outlet



Figure 413: CG5 Inlet

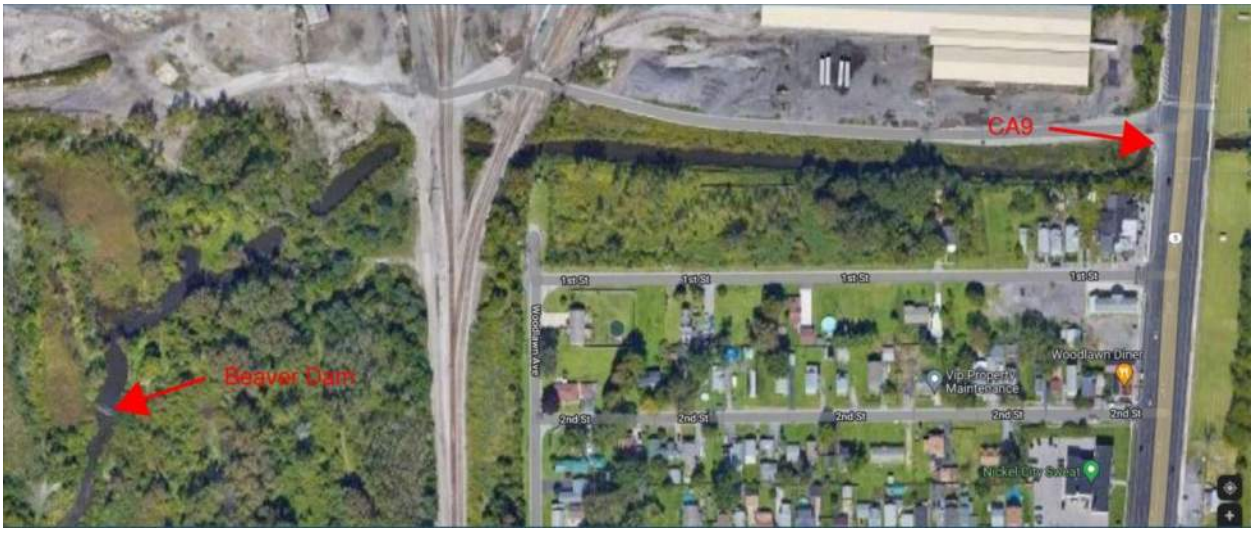


Figure 414: CA9 Beaver Dam

The neighborhood at McKinley rd. and Sowles rd. North towards Boy Scout Pond



CC17



CC41



CC42



CC43



CC44



CC45



CC46



CN178



CN179



CN180



CN181



CN182

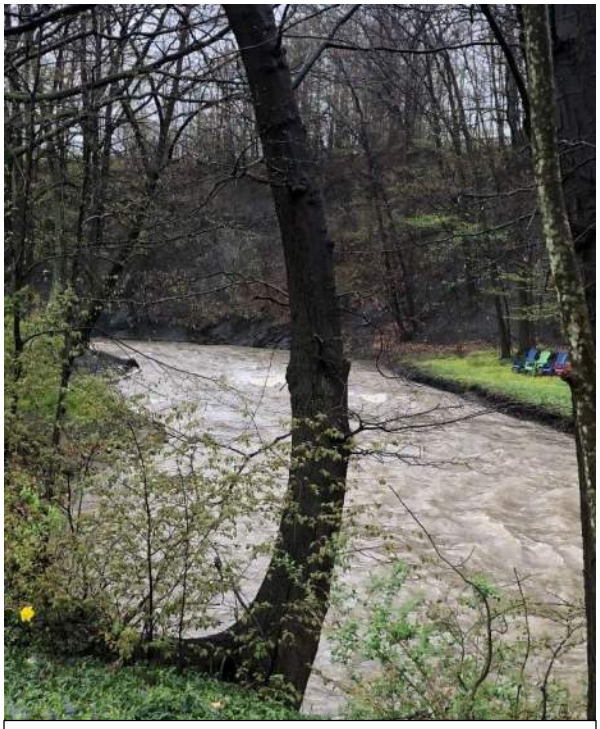
Along Smoke's Creek in the Hamlet of Windom at the end of Brookview Terr.



CB10



CB11



CN183



CN182



CN184



CN185



CN186



CN187



CN187



CN188



CN189

Down Electric Ave. Backing up to Main Drainage Ditch



CD28



CN190



CN191



CN192



CN193



CN194

Along Smith rd. near Lakeview rd. and Old Lakeview rd.



CK40



CK41



CK43



CK48



CN195



CN196



CN197

Corner Lots at the corner of Eckhardt rd. and Schoellkopf rd.



CK5



CK6



CK7



CK55

Along South Bend Lane



CK1



CK4



CK10



CN36



CN198



CN199



CN200



CN201

Along Anslee Ln. to the Corner of Anslee Lane and Lakeshore Rd.



CJ13



CJ14



CN202



CN203



CN204



CN205

Fairway Ct. at the bottom of the hill past Pinehurst St.



CJ24



CJ27



CJ28



CN206



CN207



CN208



CN209



CN210



CN211

The Length of Columbia Ave.



CH13



CN212



CN213



CN214



CN215



CN216

Overlook point off Cloverbank Rd.



CG9



CG10

Along Briercliff Dr. across the railroad tracks Northwest to Glendale Ave.



CH2



CH3



CH4



CH5



CH6



CH16



CN217



CN218



CN219



CN220



CN221



CN222



CN223



CN224

Neighborhood between the railroad track and Lakeshore Rd. including Morgan Pkwy, Chapman Pkwy, Mt. Vernon Blvd, and Kennison Pkwy.



CG30



CN225



CN226



CN227



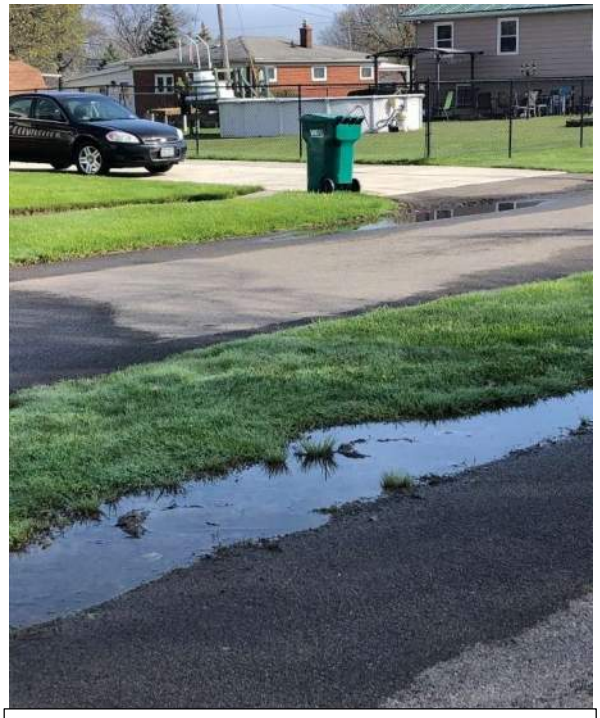
CN228



CN229



CN230



CN231

Mealou Dr. where it boarders South Park Ave. and the rear yards of 5407 and 5415 Mealou Dr.

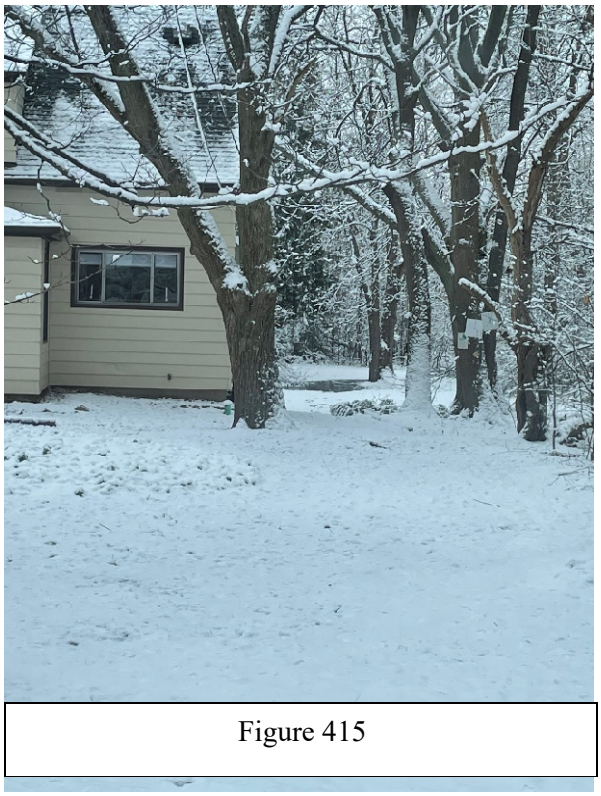


Figure 415



Figure 416



Figure 417



Figure 418

Grafton Ave. in the rear yards of 3602, 3590, and 3594 and the ditch between Mundy Ave. and Johnson St.



Figure 417



Figure 418



Figure 419



Figure 420

The ditch between Pine Lakes Community and Lakeview Rd. which discharges to 18 Mile Creek.



Figure 421



Figure 422



Figure 423



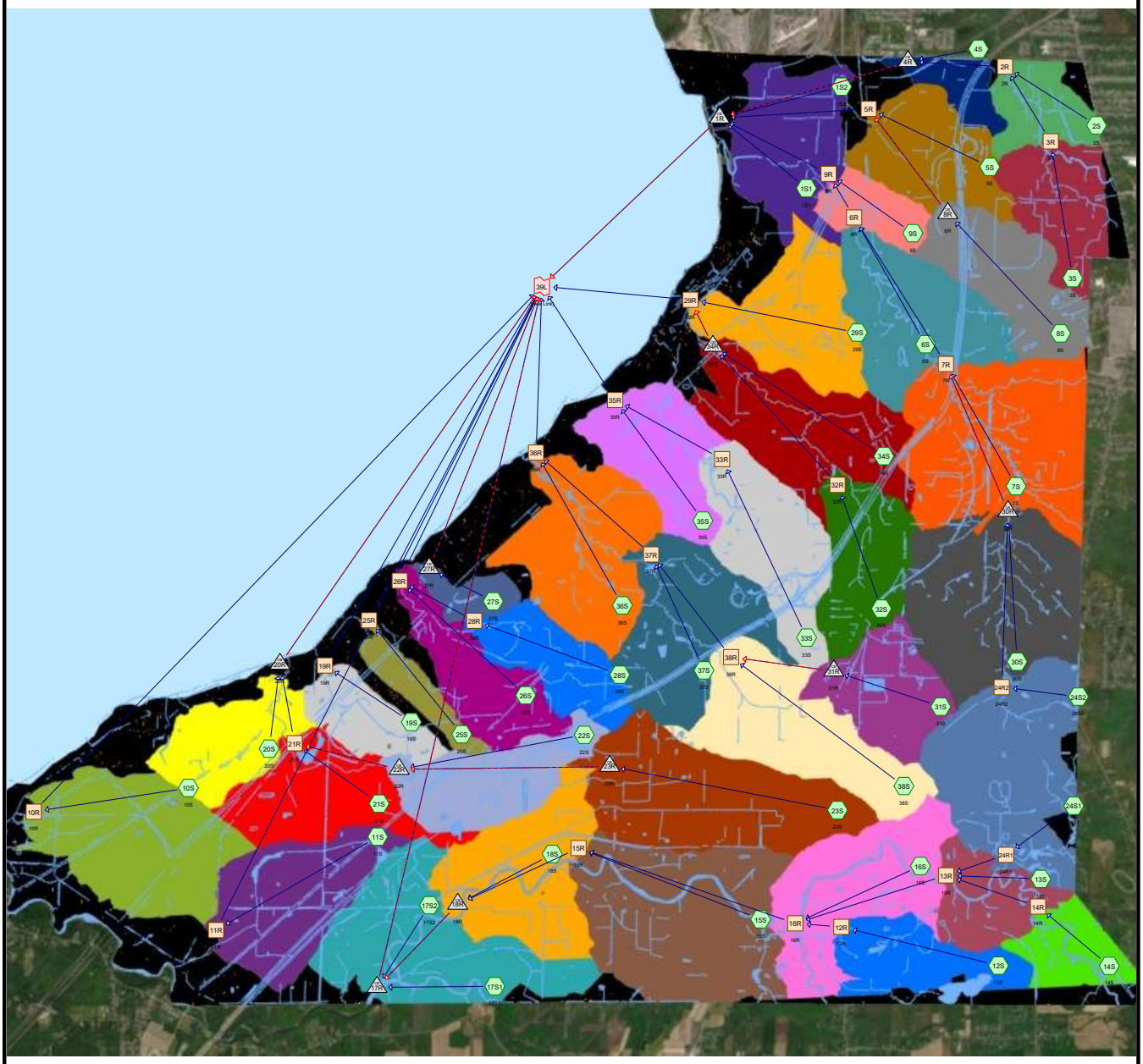
Figure 424



Figure 425

Appendix E

TOWN OF HAMBURG
HYDROLOGY REPORT



Subcat Reach Pond Link

Routing Diagram for Town of Hamburg 6.30.2022
Prepared by CPL, Printed 7/8/2022
HydroCAD® 10.10-7a s/n 04018 © 2021 HydroCAD Software Solutions LLC

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 7041 NY Erie

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1,946.214	80	>75% Grass cover, Good, HSG D (1S1, 1S2, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S1, 17S2, 18S, 19S, 20S, 21S, 22S, 23S, 24S1, 24S2, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 38S)
23.010	98	Paved parking, HSG D (1S1, 1S2)
173.776	98	Unconnected pavement, HSG D (2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S1, 17S2, 18S, 19S, 20S, 21S, 22S, 23S, 24S1, 24S2, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 38S)
2,143.000	**82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
2,143.000	HSG D	1S1, 1S2, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S1, 17S2, 18S, 19S, 20S, 21S, 22S, 23S, 24S1, 24S2, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 38S
0.000	Other	
2,143.000		**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
0.000	0.000	0.000	1,946.214	0.000	1,946.214	>75% Grass cover, Good	1S1, 1S2, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S1, 17S2, 18S, 19S, 20S, 21S, 22S, 23S, 24S1, 24S2, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 38S
0.000	0.000	0.000	23.010	0.000	23.010	Paved parking	1S1, 1S2
0.000	0.000	0.000	173.776	0.000	173.776	Unconnected pavement	2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S,

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**	**2,143.000**	**0.000**	**2,143.000**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	2R	600.00	599.00	100.0	0.0100	0.012	480.0	120.0	0.0
2	3R	609.40	593.40	1,600.0	0.0100	0.030	432.0	114.0	0.0
3	5R	584.30	583.30	100.0	0.0100	0.013	132.0	60.0	0.0
4	6R	588.60	586.10	250.0	0.0100	0.022	312.0	240.0	0.0
5	7R	661.30	651.30	100.0	0.1000	0.022	264.0	168.0	0.0
6	9R	588.60	587.60	100.0	0.0100	0.022	312.0	240.0	0.0
7	10R	599.10	597.60	150.0	0.0100	0.025	0.0	48.0	0.0
8	11R	696.90	695.90	100.0	0.0100	0.022	156.0	48.0	0.0
9	12R	803.00	783.00	2,000.0	0.0100	0.025	0.0	69.0	0.0
10	13R	780.00	768.00	1,200.0	0.0100	0.022	264.0	168.0	0.0
11	14R	792.50	718.50	7,400.0	0.0100	0.025	360.0	96.0	0.0
12	15R	765.50	745.50	2,000.0	0.0100	0.012	168.0	48.0	0.0
13	16R	780.10	747.10	3,300.0	0.0100	0.012	24.0	18.0	0.0
14	19R	654.50	641.00	1,350.0	0.0100	0.022	84.0	48.0	0.0
15	21R	651.30	636.30	1,500.0	0.0100	0.012	144.0	48.0	0.0
16	24R1	780.00	768.00	1,200.0	0.0100	0.022	360.0	96.0	0.0
17	24R2	780.30	770.30	1,000.0	0.0100	0.012	72.0	54.0	0.0
18	25R	661.10	641.10	2,000.0	0.0100	0.012	36.0	48.0	0.0
19	26R	583.80	582.80	100.0	0.0100	0.012	60.0	48.0	0.0
20	28R	635.60	635.35	25.0	0.0100	0.012	60.0	84.0	0.0
21	29R	581.20	563.20	1,800.0	0.0100	0.011	150.0	87.6	0.0
22	32R	732.50	726.00	650.0	0.0100	0.012	48.0	24.0	0.0
23	33R	662.20	642.20	2,000.0	0.0100	0.022	126.0	48.0	0.0
24	35R	609.70	609.20	50.0	0.0100	0.012	66.0	84.0	0.0
25	36R	588.00	585.00	300.0	0.0100	0.022	249.0	222.0	0.0
26	37R	630.00	602.00	2,800.0	0.0100	0.022	96.0	120.0	0.0
27	38R	747.50	722.90	2,460.0	0.0100	0.022	156.0	72.0	0.0
28	1R	573.30	563.30	1,000.0	0.0100	0.025	0.0	33.6	0.0
29	4R	587.90	572.90	1,500.0	0.0100	0.013	0.0	60.0	0.0
30	8R	643.70	641.20	250.0	0.0100	0.012	0.0	66.0	0.0
31	17R	780.10	743.30	3,680.0	0.0100	0.012	0.0	48.0	0.0
32	18R	752.60	747.60	500.0	0.0100	0.025	0.0	30.0	0.0
33	20R	577.80	568.50	930.0	0.0100	0.025	0.0	120.0	0.0
34	22R	727.00	717.00	1,000.0	0.0100	0.025	0.0	23.5	0.0
35	23R	768.00	725.00	4,300.0	0.0100	0.022	60.0	60.0	0.0
36	27R	591.50	576.50	1,500.0	0.0100	0.012	24.0	24.0	0.0
37	30R	696.20	687.20	900.0	0.0100	0.025	0.0	48.0	0.0
38	31R	738.90	733.90	500.0	0.0100	0.012	0.0	36.0	0.0
39	34R	587.20	586.95	25.0	0.0100	0.012	0.0	18.0	0.0

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S1: 1S1 Runoff Area=28.762 ac 40.00% Impervious Runoff Depth=1.86"
Flow Length=4,188' Slope=0.0100 '/' Tc=78.8 min CN=87 Runoff=23.81 cfs 4.463 af

Subcatchment1S2: 1S2 Runoff Area=28.762 ac 40.00% Impervious Runoff Depth=1.86"
Flow Length=5,462' Slope=0.0100 '/' Tc=97.5 min CN=87 Runoff=20.65 cfs 4.463 af

Subcatchment2S: 2S Runoff Area=27.210 ac 40.00% Impervious Runoff Depth=1.86"
Flow Length=4,424' Slope=0.0100 '/' Tc=82.4 min CN=87 Runoff=21.88 cfs 4.222 af

Subcatchment3S: 3S Runoff Area=41.941 ac 10.00% Impervious Runoff Depth=1.42"
Flow Length=5,435' Slope=0.0100 '/' Tc=115.5 min UI Adjusted CN=81 Runoff=19.91 cfs 4.970 af

Subcatchment4S: 4S Runoff Area=15.960 ac 10.00% Impervious Runoff Depth=1.42"
Flow Length=2,388' Slope=0.0100 '/' Tc=59.8 min UI Adjusted CN=81 Runoff=11.88 cfs 1.891 af

Subcatchment5S: 5S Runoff Area=49.330 ac 20.00% Impervious Runoff Depth=1.49"
Flow Length=5,176' Slope=0.0100 '/' Tc=103.9 min UI Adjusted CN=82 Runoff=26.76 cfs 6.125 af

Subcatchment6S: 6S Runoff Area=66.758 ac 5.00% Impervious Runoff Depth>1.36"
Flow Length=5,605' Slope=0.0100 '/' Tc=122.2 min UI Adjusted CN=80 Runoff=29.13 cfs 7.543 af

Subcatchment7S: 7S Runoff Area=104.212 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=5,416' Slope=0.0100 '/' Tc=118.9 min UI Adjusted CN=80 Runoff=46.21 cfs 11.776 af

Subcatchment8S: 8S Runoff Area=53.473 ac 10.00% Impervious Runoff Depth>1.42"
Flow Length=6,330' Slope=0.0100 '/' Tc=130.5 min UI Adjusted CN=81 Runoff=23.41 cfs 6.336 af

Subcatchment9S: 9S Runoff Area=20.454 ac 20.00% Impervious Runoff Depth=1.49"
Flow Length=3,730' Slope=0.0100 '/' Tc=79.9 min UI Adjusted CN=82 Runoff=13.22 cfs 2.540 af

Subcatchment10S: 10S Runoff Area=84.795 ac 5.00% Impervious Runoff Depth>1.36"
Flow Length=6,772' Slope=0.0100 '/' Tc=142.2 min UI Adjusted CN=80 Runoff=33.03 cfs 9.581 af

Subcatchment11S: 11S Runoff Area=65.122 ac 5.00% Impervious Runoff Depth>1.36"
Flow Length=7,376' Slope=0.0100 '/' Tc=152.3 min UI Adjusted CN=80 Runoff=24.10 cfs 7.358 af

Subcatchment12S: 12S Runoff Area=39.478 ac 5.00% Impervious Runoff Depth>1.36"
Flow Length=6,348' Slope=0.0100 '/' Tc=135.1 min UI Adjusted CN=80 Runoff=15.98 cfs 4.461 af

Subcatchment13S: 13S Runoff Area=33.740 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=3,532' Slope=0.0100 '/' Tc=84.5 min UI Adjusted CN=80 Runoff=18.98 cfs 3.812 af

Subcatchment14S: 14S Runoff Area=26.837 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=3,231' Slope=0.0100 '/' Tc=78.7 min UI Adjusted CN=80 Runoff=15.79 cfs 3.032 af

Subcatchment15S: 15S Runoff Area=107.265 ac 5.00% Impervious Runoff Depth>1.36"
Flow Length=7,895' Slope=0.0100 '/' Tc=160.8 min UI Adjusted CN=80 Runoff=37.93 cfs 12.118 af

Subcatchment16S: 16S Runoff Area=74.171 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=5,184' Slope=0.0100 '/' Tc=114.8 min UI Adjusted CN=80 Runoff=33.87 cfs 8.381 af

Subcatchment17S1: 17S1 Runoff Area=42.633 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=4,679' Slope=0.0100 '/' Tc=105.8 min UI Adjusted CN=80 Runoff=20.61 cfs 4.817 af

Subcatchment17S2: 17S2 Runoff Area=42.633 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=3,564' Slope=0.0100 '/' Tc=85.1 min UI Adjusted CN=80 Runoff=23.88 cfs 4.817 af

Subcatchment18S: 18S Runoff Area=69.982 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=3,954' Slope=0.0100 '/' Tc=92.5 min UI Adjusted CN=80 Runoff=37.07 cfs 7.908 af

Subcatchment19S: 19S Runoff Area=27.700 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=3,754' Slope=0.0100 '/' Tc=88.7 min UI Adjusted CN=80 Runoff=15.08 cfs 3.130 af

Subcatchment20S: 20S Runoff Area=42.403 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=3,071' Slope=0.0100 '/' Tc=75.5 min UI Adjusted CN=80 Runoff=25.64 cfs 4.791 af

Subcatchment21S: 21S Runoff Area=55.577 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=3,857' Slope=0.0100 '/' Tc=90.7 min UI Adjusted CN=80 Runoff=29.74 cfs 6.280 af

Subcatchment22S: 22S Runoff Area=49.667 ac 5.00% Impervious Runoff Depth>1.36"
Flow Length=7,590' Slope=0.0100 '/' Tc=155.8 min UI Adjusted CN=80 Runoff=17.91 cfs 5.611 af

Subcatchment23S: 23S Runoff Area=93.319 ac 5.00% Impervious Runoff Depth>1.36"
Flow Length=9,445' Slope=0.0100 '/' Tc=185.6 min UI Adjusted CN=80 Runoff=29.83 cfs 10.539 af

Subcatchment24S1: 24S1 Runoff Area=45.180 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=2,948' Slope=0.0100 '/' Tc=73.1 min UI Adjusted CN=80 Runoff=28.07 cfs 5.105 af

Subcatchment24S2: 24S2 Runoff Area=45.180 ac 5.00% Impervious Runoff Depth=1.36"
Flow Length=2,699' Slope=0.0100 '/' Tc=68.1 min UI Adjusted CN=80 Runoff=29.36 cfs 5.105 af

Subcatchment25S: 25S Runoff Area=16.580 ac 10.00% Impervious Runoff Depth=1.42"
Flow Length=5,589' Slope=0.0100 '/' Tc=118.1 min UI Adjusted CN=81 Runoff=7.74 cfs 1.965 af

Subcatchment26S: 26S Runoff Area=43.591 ac 10.00% Impervious Runoff Depth>1.42"
Flow Length=6,644' Slope=0.0100 '/' Tc=135.6 min UI Adjusted CN=81 Runoff=18.41 cfs 5.165 af

Subcatchment27S: 27S Runoff Area=13.127 ac 10.00% Impervious Runoff Depth=1.42"
Flow Length=2,563' Slope=0.0100 '/' Tc=63.3 min UI Adjusted CN=81 Runoff=9.41 cfs 1.556 af

Subcatchment28S: 28S Runoff Area=37.672 ac 10.00% Impervious Runoff Depth>1.42"
Flow Length=6,350' Slope=0.0100 '/' Tc=130.8 min UI Adjusted CN=81 Runoff=16.51 cfs 4.464 af

Subcatchment29S: 29S Runoff Area=59.186 ac 20.00% Impervious Runoff Depth>1.49"
Flow Length=6,443' Slope=0.0100 '/' Tc=123.8 min UI Adjusted CN=82 Runoff=28.14 cfs 7.349 af

Subcatchment30S: 30S Runoff Area=97.544 ac 10.00% Impervious Runoff Depth>1.42"
Flow Length=5,878' Slope=0.0100 '/' Tc=123.0 min UI Adjusted CN=81 Runoff=44.37 cfs 11.559 af

Subcatchment31S: 31S Runoff Area=44.343 ac 10.00% Impervious Runoff Depth=1.42"
Flow Length=4,276' Slope=0.0100 '/' Tc=95.3 min UI Adjusted CN=81 Runoff=24.12 cfs 5.255 af

Subcatchment32S: 32S Runoff Area=47.253 ac 10.00% Impervious Runoff Depth=1.42"
Flow Length=4,981' Slope=0.0100 '/' Tc=107.7 min UI Adjusted CN=81 Runoff=23.77 cfs 5.599 af

Subcatchment33S: 33S Runoff Area=60.540 ac 10.00% Impervious Runoff Depth>1.42"
Flow Length=7,858' Slope=0.0100 '/' Tc=155.1 min UI Adjusted CN=81 Runoff=23.11 cfs 7.173 af

Subcatchment34S: 34S Runoff Area=74.016 ac 10.00% Impervious Runoff Depth>1.42"
Flow Length=8,101' Slope=0.0100 '/' Tc=158.9 min UI Adjusted CN=81 Runoff=27.96 cfs 8.769 af

Subcatchment35S: 35S Runoff Area=47.877 ac 10.00% Impervious Runoff Depth>1.42"
Flow Length=5,878' Slope=0.0100 '/' Tc=123.0 min UI Adjusted CN=81 Runoff=21.78 cfs 5.673 af

Subcatchment36S: 36S Runoff Area=73.966 ac 10.00% Impervious Runoff Depth>1.42"
Flow Length=6,960' Slope=0.0100 '/' Tc=140.8 min UI Adjusted CN=81 Runoff=30.67 cfs 8.764 af

Subcatchment37S: 37S Runoff Area=70.470 ac 10.00% Impervious Runoff Depth=1.42"
Flow Length=4,941' Slope=0.0100 '/' Tc=107.0 min UI Adjusted CN=81 Runoff=35.50 cfs 8.351 af

Subcatchment38S: 38S Runoff Area=74.291 ac 10.00% Impervious Runoff Depth>1.42"
Flow Length=8,556' Slope=0.0100 '/' Tc=166.0 min UI Adjusted CN=81 Runoff=27.13 cfs 8.801 af

Reach 2R: 2R Avg. Flow Depth=0.20' Max Vel=4.23 fps Inflow=34.01 cfs 9.192 af
480.0" x 120.0" Box Pipe n=0.012 L=100.0' S=0.0100 '/' Capacity=12,481.62 cfs Outflow=34.00 cfs 9.192 af

Reach 3R: 3R Avg. Flow Depth=0.27' Max Vel=2.05 fps Inflow=19.91 cfs 4.970 af
432.0" x 114.0" Box Pipe n=0.030 L=1,600.0' S=0.0100 '/' Capacity=4,094.93 cfs Outflow=19.59 cfs 4.970 af

Reach 5R: 5R Avg. Flow Depth=0.59' Max Vel=7.52 fps Inflow=48.87 cfs 12.462 af
132.0" x 60.0" Box Pipe n=0.013 L=100.0' S=0.0100 '/' Capacity=902.08 cfs Outflow=48.85 cfs 12.462 af

Reach 6R: 6R Avg. Flow Depth=0.88' Max Vel=5.99 fps Inflow=137.60 cfs 35.983 af
312.0" x 240.0" Box Pipe n=0.022 L=250.0' S=0.0100 '/' Capacity=11,144.91 cfs Outflow=137.55 cfs 35.983 af

Reach 7R: 7R Avg. Flow Depth=0.42' Max Vel=11.74 fps Inflow=109.06 cfs 28.440 af
264.0" x 168.0" Box Pipe n=0.022 L=100.0' S=0.1000 '/' Capacity=17,336.40 cfs Outflow=109.05 cfs 28.440 af

Reach 9R: 9R Avg. Flow Depth=0.92' Max Vel=6.15 fps Inflow=147.78 cfs 38.523 af
312.0" x 240.0" Box Pipe n=0.022 L=100.0' S=0.0100 '/' Capacity=11,144.91 cfs Outflow=147.76 cfs 38.523 af

Reach 10R: 10R Avg. Flow Depth=1.86' Max Vel=5.76 fps Inflow=33.03 cfs 9.581 af
48.0" Round Pipe n=0.025 L=150.0' S=0.0100 '/' Capacity=74.69 cfs Outflow=33.01 cfs 9.581 af

Reach 11R: 11R Avg. Flow Depth=0.47' Max Vel=3.92 fps Inflow=24.10 cfs 7.358 af
156.0" x 48.0" Box Pipe n=0.022 L=100.0' S=0.0100 '/' Capacity=466.25 cfs Outflow=24.08 cfs 7.358 af

Reach 12R: 12R Avg. Flow Depth=1.11' Max Vel=4.55 fps Inflow=15.98 cfs 4.461 af
69.0" Round Pipe n=0.025 L=2,000.0' S=0.0100 '/' Capacity=196.60 cfs Outflow=15.89 cfs 4.460 af

Reach 13R: 13R Avg. Flow Depth=0.51' Max Vel=4.20 fps Inflow=47.02 cfs 11.936 af
264.0" x 168.0" Box Pipe n=0.022 L=1,200.0' S=0.0100 '/' Capacity=5,482.25 cfs Outflow=46.78 cfs 11.934 af

Reach 14R: 14R Avg. Flow Depth=0.18' Max Vel=1.89 fps Inflow=15.79 cfs 3.032 af
360.0" x 96.0", R=228.0" Arch Pipe n=0.025 L=7,400.0' S=0.0100 '/' Capacity=1,964.79 cfs Outflow=10.03 cfs 3.018 af

Reach 15R: 15R Avg. Flow Depth=0.54' Max Vel=7.81 fps Inflow=59.04 cfs 36.884 af
168.0" x 48.0" Box Pipe n=0.012 L=2,000.0' S=0.0100 '/' Capacity=931.00 cfs Outflow=58.98 cfs 36.874 af

Reach 16R: 16R Avg. Flow Depth=1.50' Max Vel=8.66 fps Inflow=90.72 cfs 24.774 af
24.0" x 18.0" Box Pipe n=0.012 L=3,300.0' S=0.0100 '/' Capacity=21.12 cfs Outflow=24.20 cfs 24.766 af

Reach 19R: 19R Avg. Flow Depth=0.53' Max Vel=4.03 fps Inflow=15.08 cfs 3.130 af
84.0" x 48.0" Box Pipe n=0.022 L=1,350.0' S=0.0100 '/' Capacity=222.11 cfs Outflow=15.00 cfs 3.130 af

Reach 21R: 21R Avg. Flow Depth=0.62' Max Vel=8.44 fps Inflow=62.85 cfs 22.430 af
144.0" x 48.0" Box Pipe n=0.012 L=1,500.0' S=0.0100 '/' Capacity=778.88 cfs Outflow=62.81 cfs 22.427 af

Reach 24R1: 24R1 Avg. Flow Depth=0.31' Max Vel=3.04 fps Inflow=28.07 cfs 5.105 af
360.0" x 96.0" Box Pipe n=0.022 L=1,200.0' S=0.0100 '/' Capacity=3,489.31 cfs Outflow=27.79 cfs 5.105 af

Reach 24R2: 24R2 Avg. Flow Depth=0.62' Max Vel=7.92 fps Inflow=29.36 cfs 5.105 af
72.0" x 54.0" Box Pipe n=0.012 L=1,000.0' S=0.0100 '/' Capacity=395.33 cfs Outflow=29.26 cfs 5.105 af

Reach 25R: 25R Avg. Flow Depth=0.43' Max Vel=5.97 fps Inflow=7.74 cfs 1.965 af
36.0" x 48.0" Box Pipe n=0.012 L=2,000.0' S=0.0100 '/' Capacity=134.09 cfs Outflow=7.72 cfs 1.965 af

Reach 26R: 26R Avg. Flow Depth=0.79' Max Vel=8.82 fps Inflow=34.86 cfs 9.629 af
60.0" x 48.0" Box Pipe n=0.012 L=100.0' S=0.0100 '/' Capacity=265.69 cfs Outflow=34.86 cfs 9.629 af

Reach 28R: 28R Avg. Flow Depth=0.49' Max Vel=6.80 fps Inflow=16.51 cfs 4.464 af
60.0" x 84.0" Box Pipe n=0.012 L=25.0' S=0.0100 '/' Capacity=557.37 cfs Outflow=16.51 cfs 4.464 af

Reach 29R: 29R Avg. Flow Depth=0.64' Max Vel=9.44 fps Inflow=76.07 cfs 21.718 af
150.0" x 87.6" Box Pipe n=0.011 L=1,800.0' S=0.0100 '/' Capacity=2,150.56 cfs Outflow=76.02 cfs 21.717 af

Reach 32R: 32R Avg. Flow Depth=0.73' Max Vel=8.15 fps Inflow=23.77 cfs 5.599 af
48.0" x 24.0" Box Pipe n=0.012 L=650.0' S=0.0100 '/' Capacity=75.60 cfs Outflow=23.73 cfs 5.599 af

Reach 33R: 33R Avg. Flow Depth=0.53' Max Vel=4.15 fps Inflow=23.11 cfs 7.173 af
126.0" x 48.0" Box Pipe n=0.022 L=2,000.0' S=0.0100 '/' Capacity=363.14 cfs Outflow=23.03 cfs 7.170 af

Reach 35R: 35R Avg. Flow Depth=0.84' Max Vel=9.21 fps Inflow=42.35 cfs 12.843 af
66.0" x 84.0" Box Pipe n=0.012 L=50.0' S=0.0100 '/' Capacity=635.79 cfs Outflow=42.35 cfs 12.843 af

Reach 36R: 36R Avg. Flow Depth=0.88' Max Vel=5.89 fps Inflow=107.25 cfs 31.158 af
249.0" x 222.0" Box Pipe n=0.022 L=300.0' S=0.0100 '/' Capacity=7,470.21 cfs Outflow=107.20 cfs 31.157 af

Reach 37R: 37R Avg. Flow Depth=1.39' Max Vel=6.89 fps Inflow=76.95 cfs 22.402 af
96.0" x 120.0" Box Pipe n=0.022 L=2,800.0' S=0.0100 '/' Capacity=920.19 cfs Outflow=76.60 cfs 22.394 af

Reach 38R: 38R Avg. Flow Depth=0.69' Max Vel=4.93 fps Inflow=44.41 cfs 14.056 af
156.0" x 72.0" Box Pipe n=0.022 L=2,460.0' S=0.0100 '/' Capacity=850.94 cfs Outflow=44.16 cfs 14.051 af

Pond 1R: 1R Peak Elev=579.28' Inflow=275.38 cfs 70.992 af
Primary=32.25 cfs 25.509 af Secondary=243.13 cfs 45.483 af Outflow=275.38 cfs 70.992 af

Pond 4R: 4R Peak Elev=590.03' Inflow=40.64 cfs 11.083 af
Primary=39.52 cfs 11.026 af Secondary=1.12 cfs 0.057 af Outflow=40.64 cfs 11.083 af

Pond 8R: 8R Peak Elev=645.25' Inflow=23.41 cfs 6.336 af
Primary=23.41 cfs 6.336 af Secondary=0.00 cfs 0.000 af Outflow=23.41 cfs 6.336 af

Pond 17R: 17R Peak Elev=783.61' Inflow=124.20 cfs 54.416 af
Primary=74.63 cfs 45.271 af Secondary=49.57 cfs 9.145 af Outflow=124.20 cfs 54.416 af

Pond 18R: 18R Peak Elev=756.33' Inflow=83.60 cfs 44.782 af
Primary=23.42 cfs 24.407 af Secondary=60.82 cfs 20.375 af Outflow=83.60 cfs 44.782 af

Pond 20R: 20R Peak Elev=580.34' Inflow=77.88 cfs 27.218 af
Primary=67.17 cfs 25.704 af Secondary=10.71 cfs 1.514 af Outflow=77.88 cfs 27.218 af

Pond 22R: 22R Peak Elev=730.21' Inflow=46.79 cfs 16.150 af
Primary=12.07 cfs 8.861 af Secondary=35.19 cfs 7.288 af Outflow=46.79 cfs 16.150 af

Pond 23R: 23R Peak Elev=769.51' Inflow=29.83 cfs 10.539 af
Primary=29.83 cfs 10.539 af Secondary=0.00 cfs 0.000 af Outflow=29.83 cfs 10.539 af

Pond 27R: 27R Peak Elev=592.79' Inflow=9.41 cfs 1.556 af
Primary=9.41 cfs 1.556 af Secondary=0.00 cfs 0.000 af Outflow=9.41 cfs 1.556 af

Pond 30R: 30R Peak Elev=699.08' Inflow=64.31 cfs 16.664 af
Primary=42.16 cfs 13.932 af Secondary=22.14 cfs 2.732 af Outflow=64.31 cfs 16.664 af

Pond 31R: 31R Peak Elev=740.90' Inflow=24.12 cfs 5.255 af
Primary=24.12 cfs 5.255 af Secondary=0.00 cfs 0.000 af Outflow=24.12 cfs 5.255 af

Pond 34R: 34R Peak Elev=590.40' Inflow=48.22 cfs 14.369 af
Primary=13.33 cfs 8.006 af Secondary=34.89 cfs 6.362 af Outflow=48.22 cfs 14.369 af

Link 39L: (new Link) Inflow=795.80 cfs 251.562 af
Primary=795.80 cfs 251.562 af

Total Runoff Area = 2,143.000 ac Runoff Volume = 251.619 af Average Runoff Depth = 1.41"
90.82% Pervious = 1,946.214 ac 9.18% Impervious = 196.786 ac

Summary for Subcatchment 1S1: 1S1

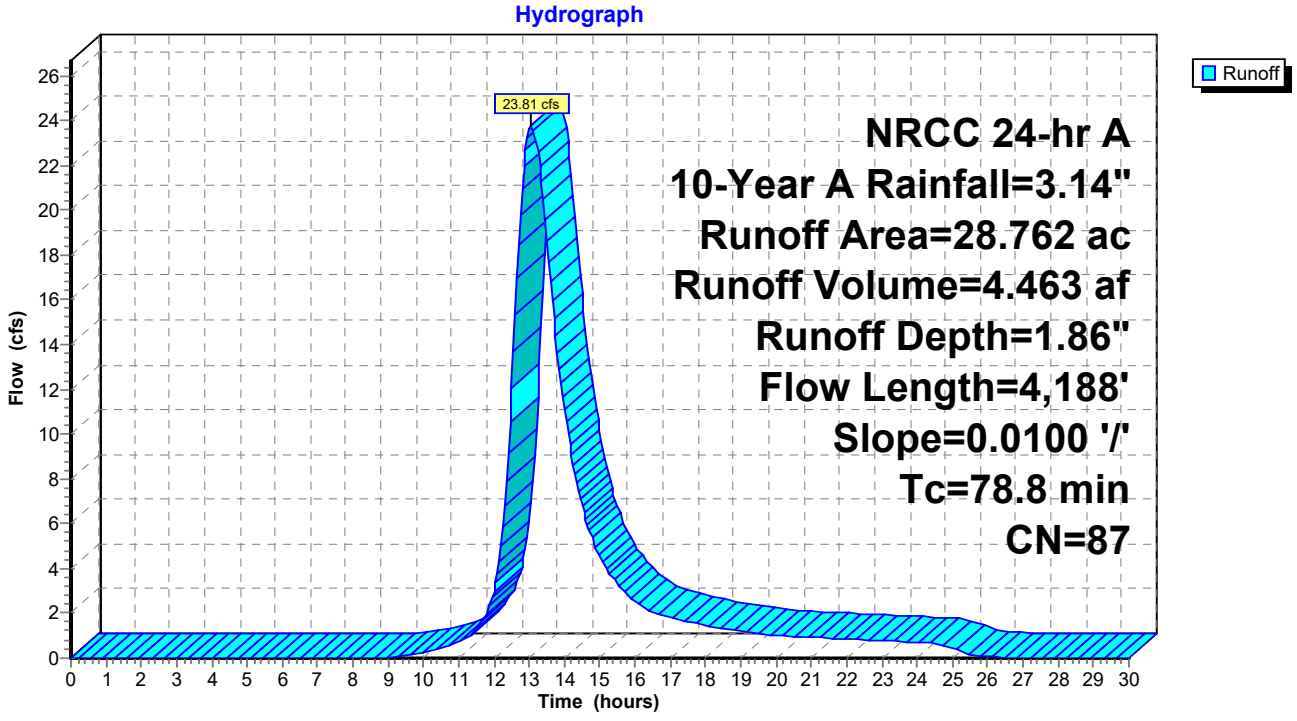
Runoff = 23.81 cfs @ 13.06 hrs, Volume= 4.463 af, Depth= 1.86"
Routed to Pond 1R : 1R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Description
17.257	80	>75% Grass cover, Good, HSG D
11.505	98	Paved parking, HSG D
28.762	87	Weighted Average
17.257	80	60.00% Pervious Area
11.505	98	40.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
78.8	4,188	0.0100	0.89		**Lag/CN Method,**

Subcatchment 1S1: 1S1



Summary for Subcatchment 1S2: 1S2

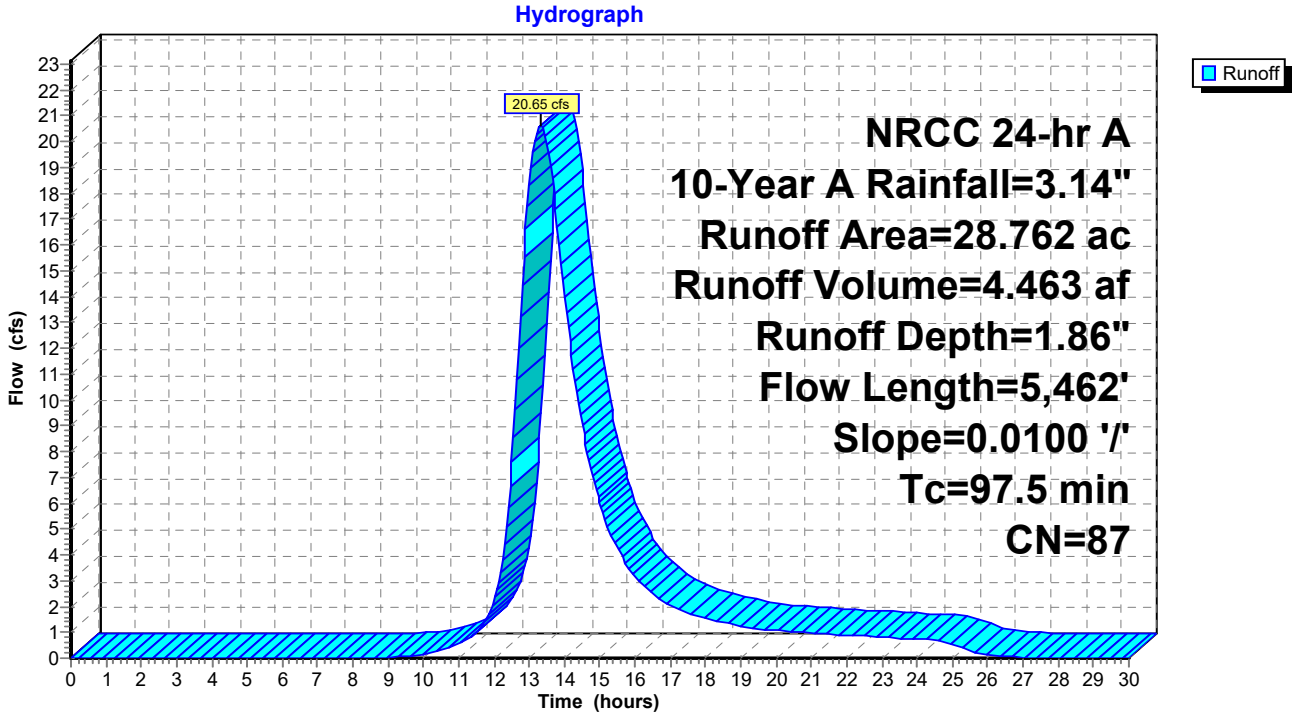
Runoff = 20.65 cfs @ 13.32 hrs, Volume= 4.463 af, Depth= 1.86"
Routed to Pond 1R : 1R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Description
17.257	80	>75% Grass cover, Good, HSG D
11.505	98	Paved parking, HSG D
28.762	87	Weighted Average
17.257	80	60.00% Pervious Area
11.505	98	40.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
97.5	5,462	0.0100	0.93		**Lag/CN Method,**

Subcatchment 1S2: 1S2



Summary for Subcatchment 2S: 2S

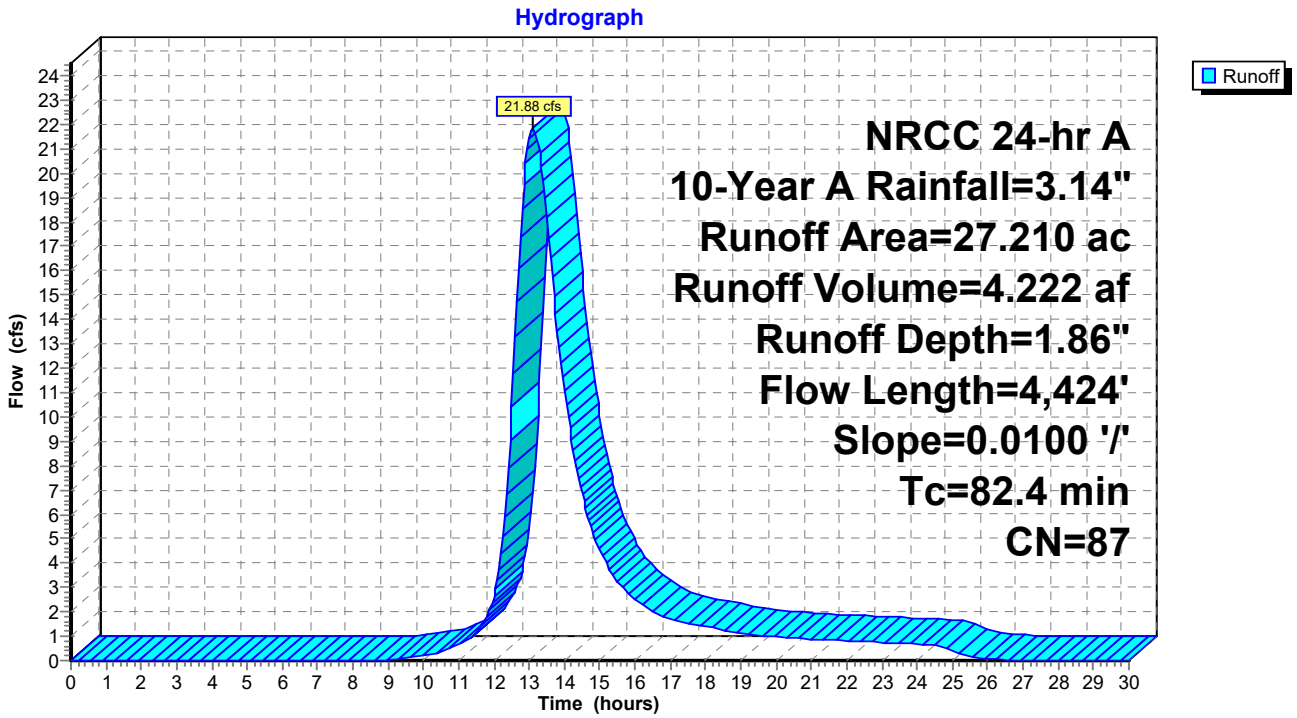
Runoff = 21.88 cfs @ 13.10 hrs, Volume= 4.222 af, Depth= 1.86"
Routed to Reach 2R : 2R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Description
16.326	80	>75% Grass cover, Good, HSG D
10.884	98	Unconnected pavement, HSG D
27.210	87	Weighted Average
16.326	80	60.00% Pervious Area
10.884	98	40.00% Impervious Area
10.884		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
82.4	4,424	0.0100	0.90		**Lag/CN Method,**

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S

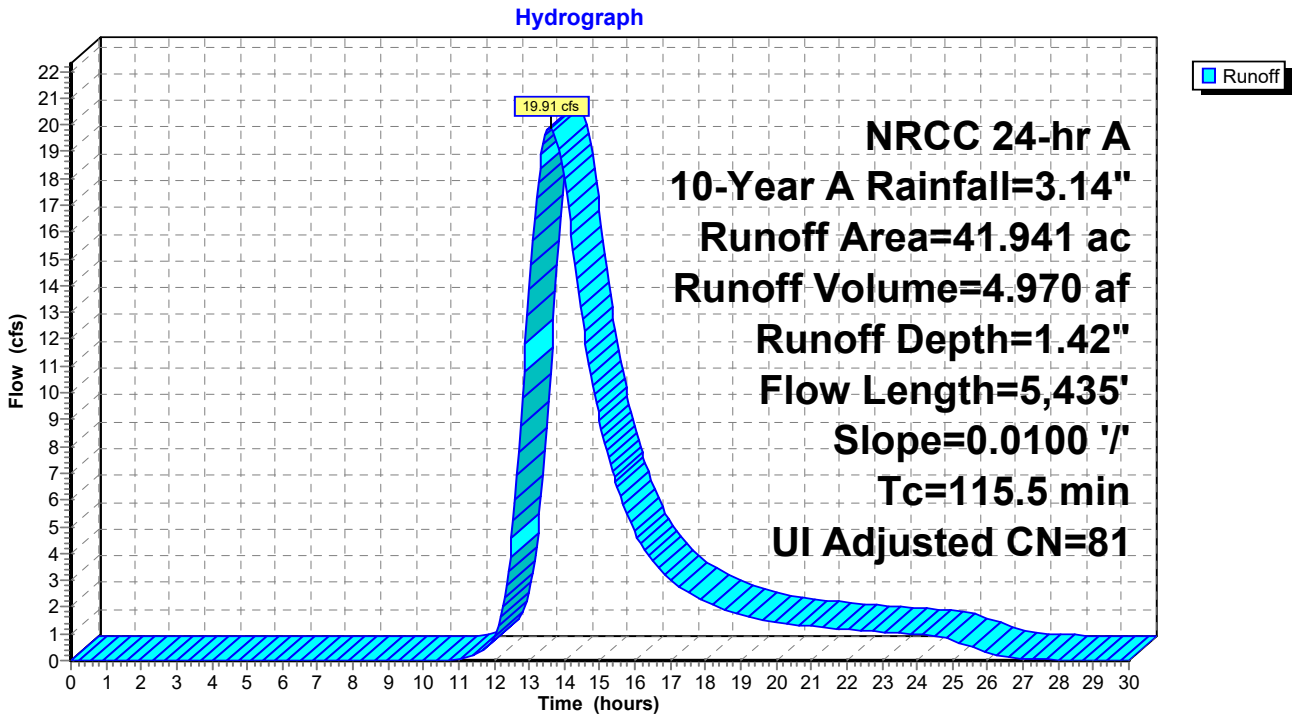
Runoff = 19.91 cfs @ 13.60 hrs, Volume= 4.970 af, Depth= 1.42"
Routed to Reach 3R : 3R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
37.747	80		>75% Grass cover, Good, HSG D
4.194	98		Unconnected pavement, HSG D
41.941	82	81	Weighted Average, UI Adjusted
37.747	80	80	90.00% Pervious Area
4.194	98	98	10.00% Impervious Area
4.194			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
115.5	5,435	0.0100	0.78		**Lag/CN Method,**

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

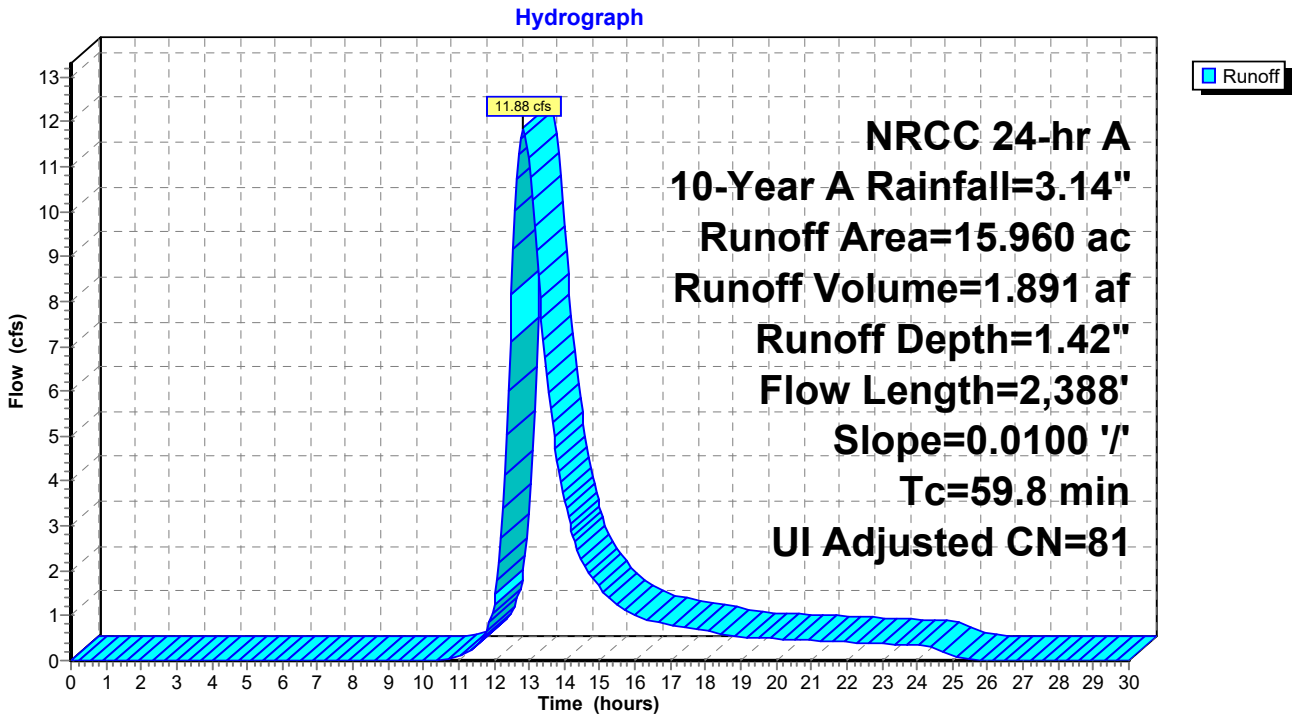
Runoff = 11.88 cfs @ 12.84 hrs, Volume= 1.891 af, Depth= 1.42"
Routed to Pond 4R : 4R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
14.364	80		>75% Grass cover, Good, HSG D
1.596	98		Unconnected pavement, HSG D
15.960	82	81	Weighted Average, UI Adjusted
14.364	80	80	90.00% Pervious Area
1.596	98	98	10.00% Impervious Area
1.596			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
59.8	2,388	0.0100	0.67		**Lag/CN Method,**

Subcatchment 4S: 4S



Summary for Subcatchment 5S: 5S

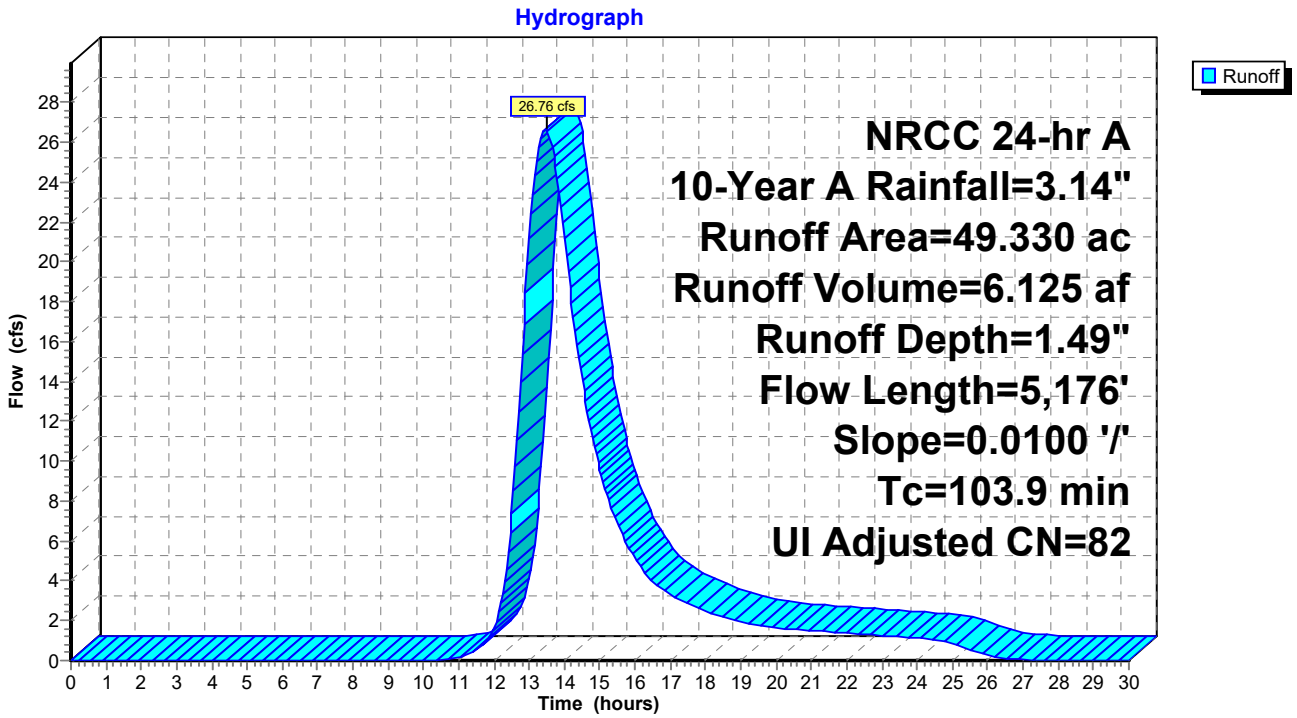
Runoff = 26.76 cfs @ 13.48 hrs, Volume= 6.125 af, Depth= 1.49"
Routed to Reach 5R : 5R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
39.464	80		>75% Grass cover, Good, HSG D
9.866	98		Unconnected pavement, HSG D
49.330	84	82	Weighted Average, UI Adjusted
39.464	80	80	80.00% Pervious Area
9.866	98	98	20.00% Impervious Area
9.866			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
103.9	5,176	0.0100	0.83		**Lag/CN Method,**

Subcatchment 5S: 5S



Summary for Subcatchment 6S: 6S

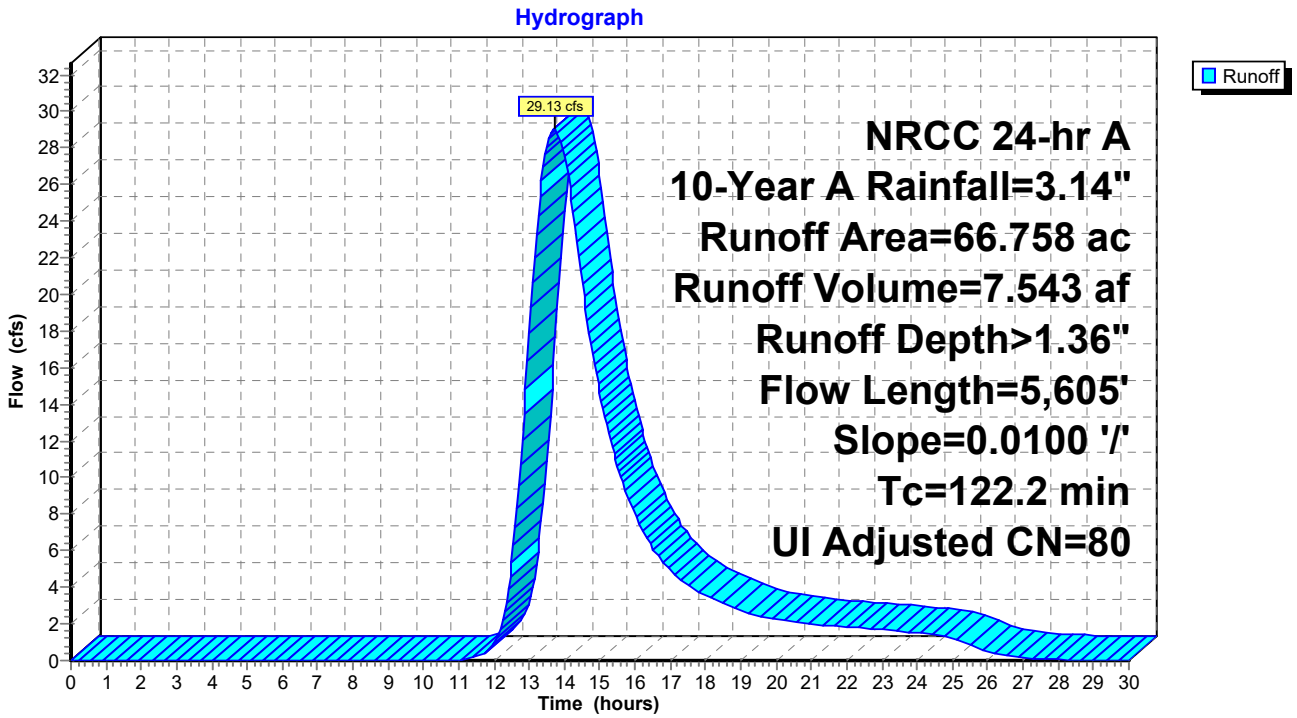
Runoff = 29.13 cfs @ 13.71 hrs, Volume= 7.543 af, Depth> 1.36"
Routed to Reach 6R : 6R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
63.420	80		>75% Grass cover, Good, HSG D
3.338	98		Unconnected pavement, HSG D
66.758	81	80	Weighted Average, UI Adjusted
63.420	80	80	95.00% Pervious Area
3.338	98	98	5.00% Impervious Area
3.338			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
122.2	5,605	0.0100	0.76		**Lag/CN Method,**

Subcatchment 6S: 6S



Summary for Subcatchment 7S: 7S

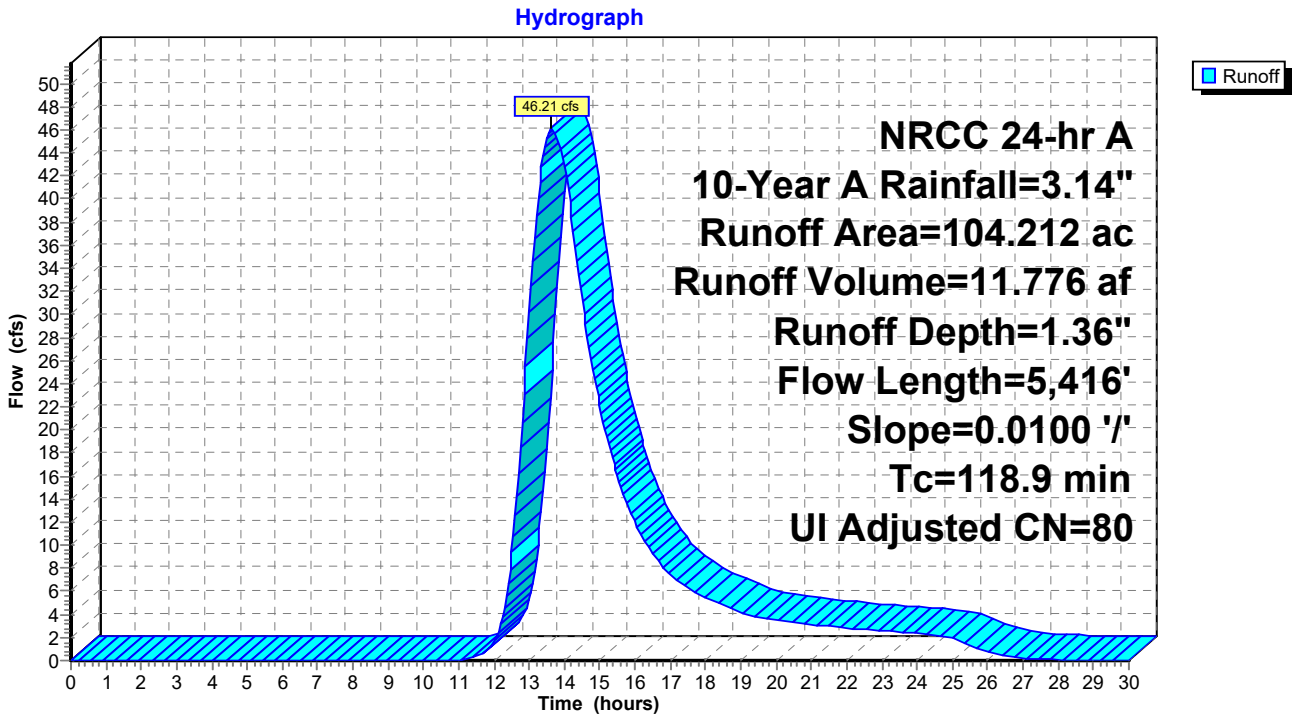
Runoff = 46.21 cfs @ 13.62 hrs, Volume= 11.776 af, Depth= 1.36"
Routed to Reach 7R : 7R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
99.001	80		>75% Grass cover, Good, HSG D
5.211	98		Unconnected pavement, HSG D
104.212	81	80	Weighted Average, UI Adjusted
99.001	80	80	95.00% Pervious Area
5.211	98	98	5.00% Impervious Area
5.211			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
118.9	5,416	0.0100	0.76		**Lag/CN Method,**

Subcatchment 7S: 7S



Summary for Subcatchment 8S: 8S

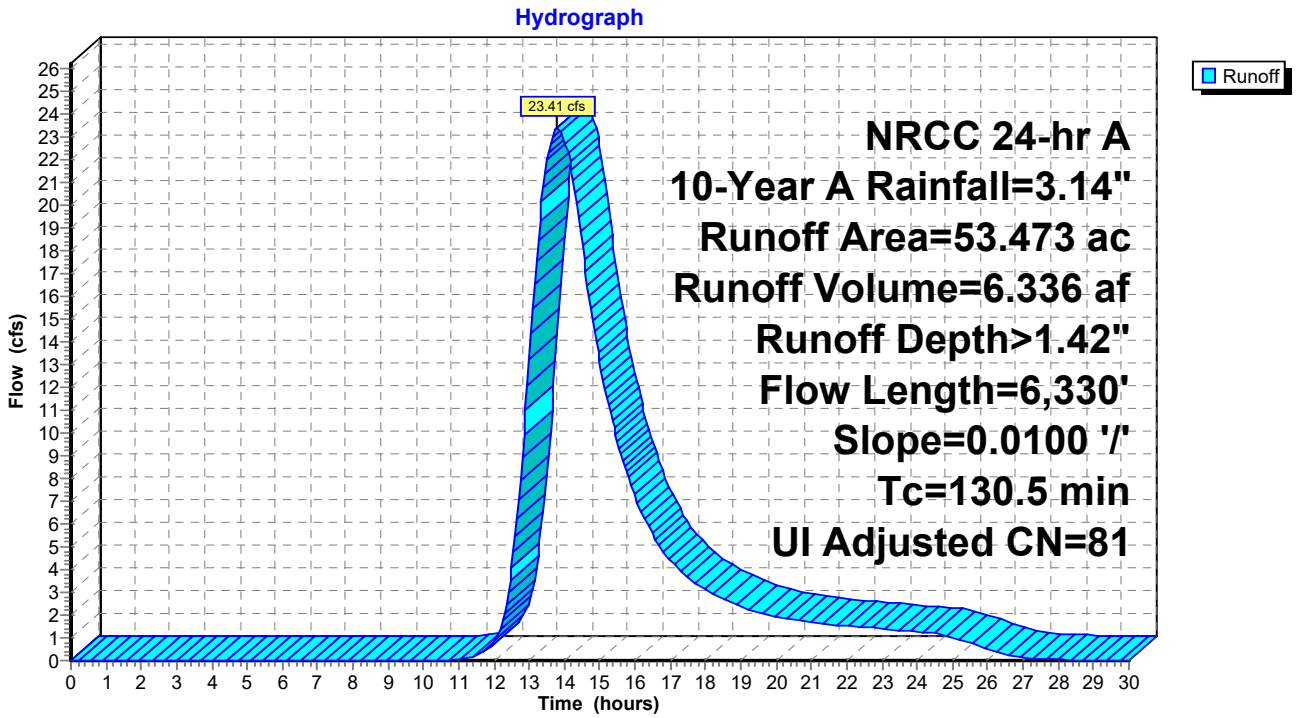
Runoff = 23.41 cfs @ 13.79 hrs, Volume= 6.336 af, Depth> 1.42"
Routed to Pond 8R : 8R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
48.126	80		>75% Grass cover, Good, HSG D
5.347	98		Unconnected pavement, HSG D
53.473	82	81	Weighted Average, UI Adjusted
48.126	80	80	90.00% Pervious Area
5.347	98	98	10.00% Impervious Area
5.347			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
130.5	6,330	0.0100	0.81		**Lag/CN Method,**

Subcatchment 8S: 8S



Summary for Subcatchment 9S: 9S

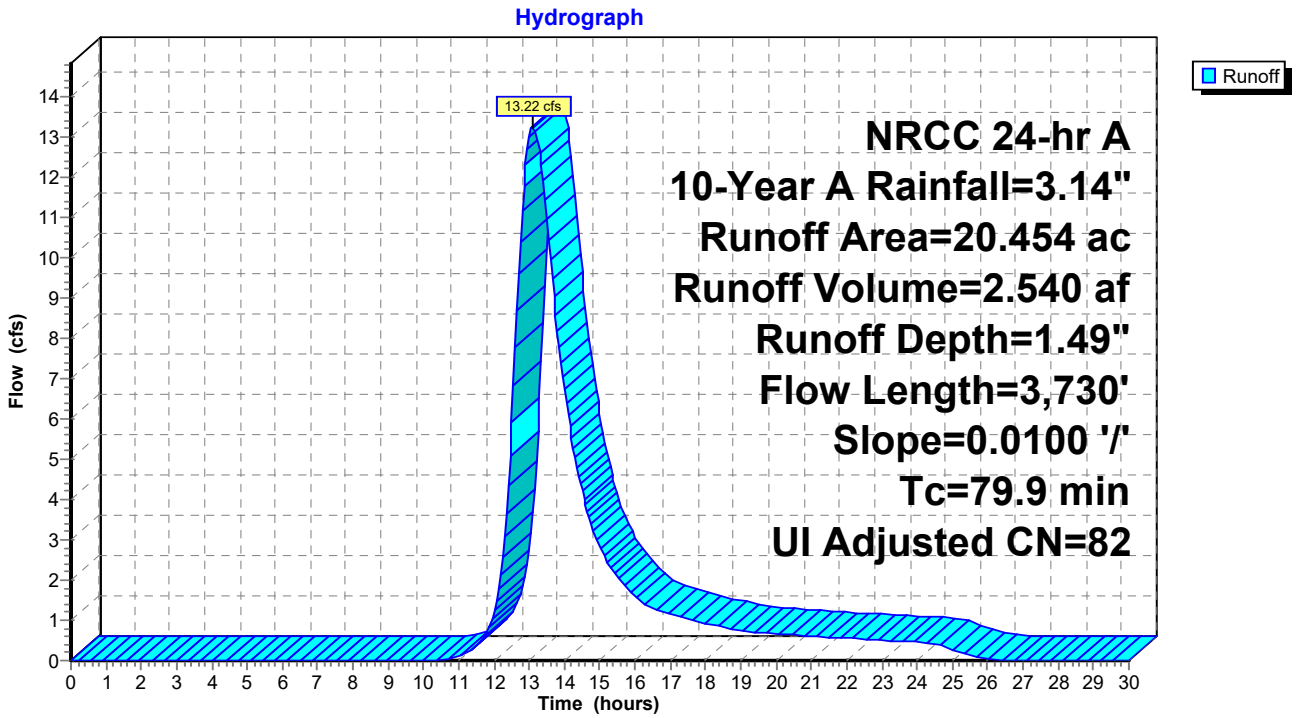
Runoff = 13.22 cfs @ 13.10 hrs, Volume= 2.540 af, Depth= 1.49"
Routed to Reach 9R : 9R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
16.363	80		>75% Grass cover, Good, HSG D
4.091	98		Unconnected pavement, HSG D
20.454	84	82	Weighted Average, UI Adjusted
16.363	80	80	80.00% Pervious Area
4.091	98	98	20.00% Impervious Area
4.091			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
79.9	3,730	0.0100	0.78		**Lag/CN Method,**

Subcatchment 9S: 9S



Summary for Subcatchment 10S: 10S

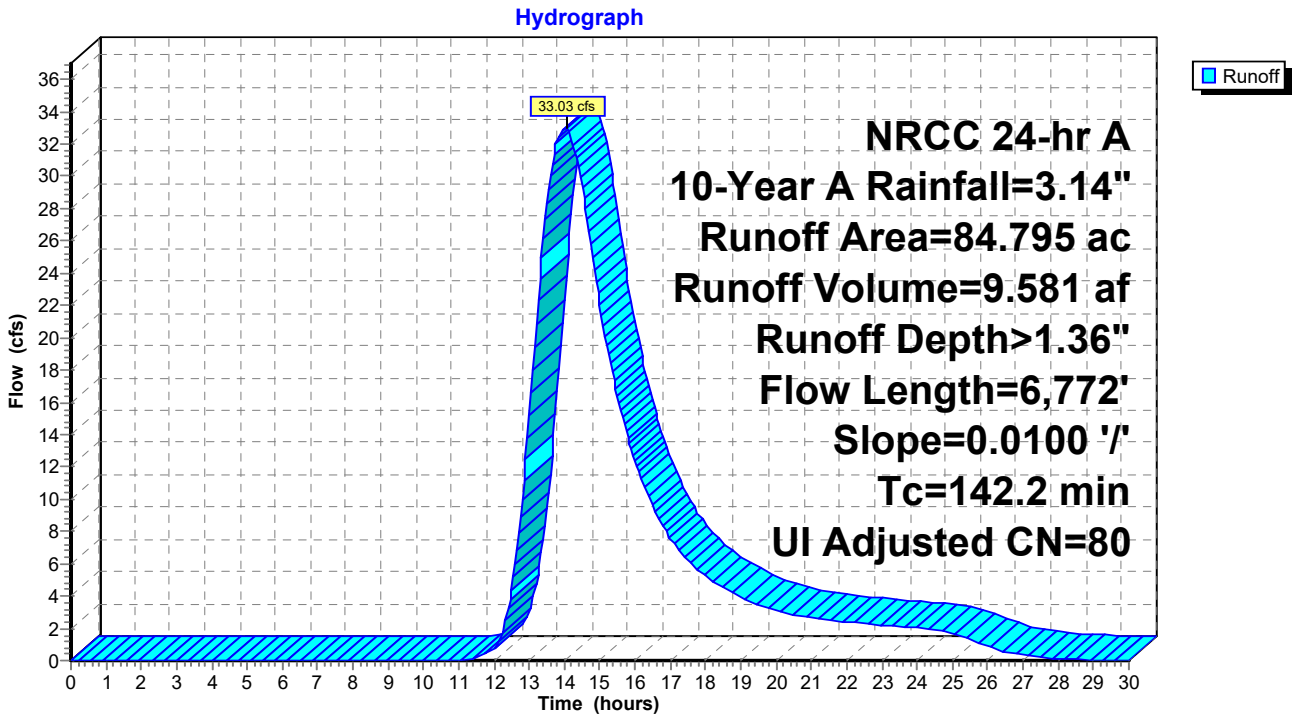
Runoff = 33.03 cfs @ 14.04 hrs, Volume= 9.581 af, Depth> 1.36"
Routed to Reach 10R : 10R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
80.555	80		>75% Grass cover, Good, HSG D
4.240	98		Unconnected pavement, HSG D
84.795	81	80	Weighted Average, UI Adjusted
80.555	80	80	95.00% Pervious Area
4.240	98	98	5.00% Impervious Area
4.240			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
142.2	6,772	0.0100	0.79		**Lag/CN Method,**

Subcatchment 10S: 10S



Summary for Subcatchment 11S: 11S

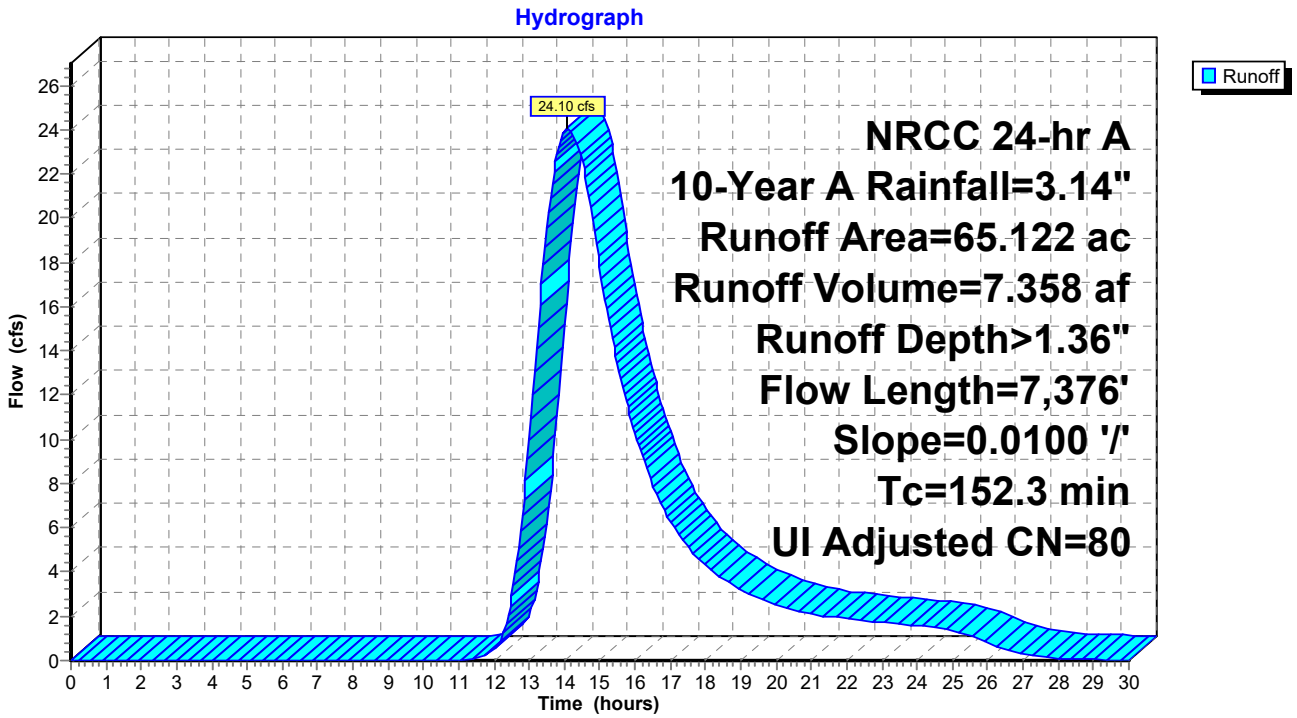
Runoff = 24.10 cfs @ 14.06 hrs, Volume= 7.358 af, Depth> 1.36"
Routed to Reach 11R : 11R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
61.866	80		>75% Grass cover, Good, HSG D
3.256	98		Unconnected pavement, HSG D
65.122	81	80	Weighted Average, UI Adjusted
61.866	80	80	95.00% Pervious Area
3.256	98	98	5.00% Impervious Area
3.256			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
152.3	7,376	0.0100	0.81		**Lag/CN Method,**

Subcatchment 11S: 11S



Summary for Subcatchment 12S: 12S

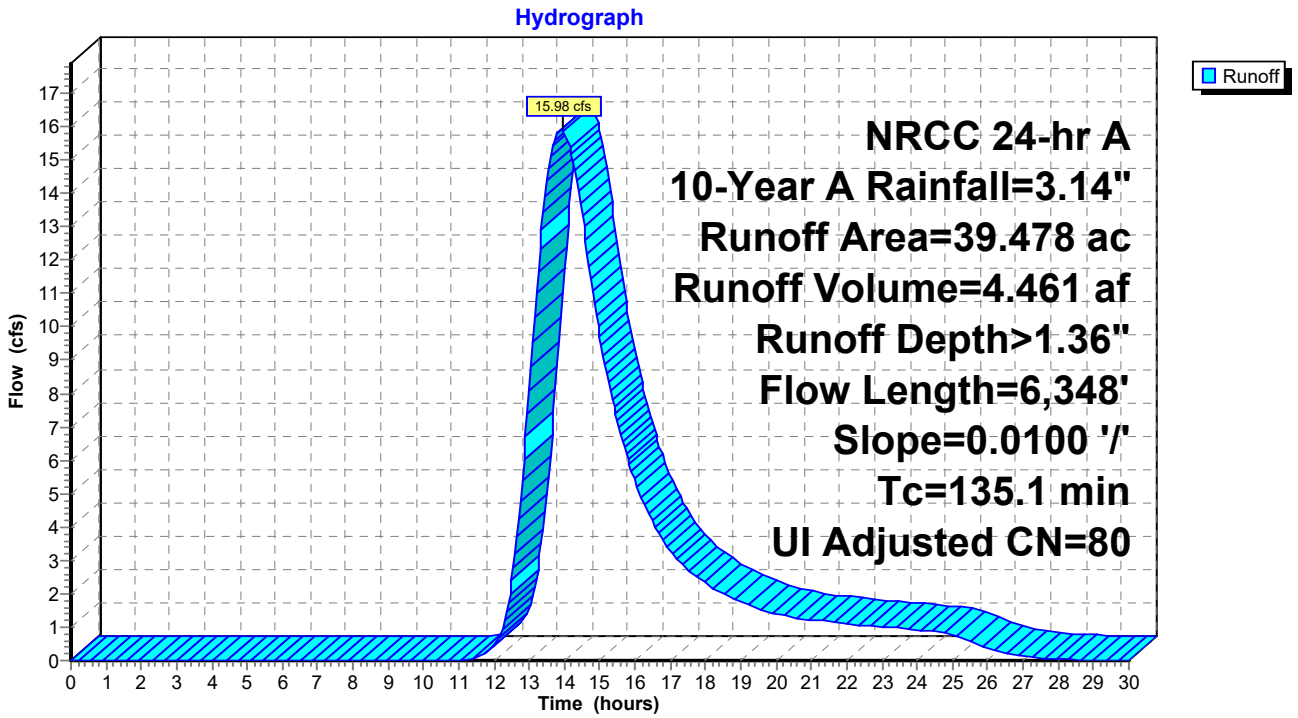
Runoff = 15.98 cfs @ 13.94 hrs, Volume= 4.461 af, Depth> 1.36"
Routed to Reach 12R : 12R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
37.504	80		>75% Grass cover, Good, HSG D
1.974	98		Unconnected pavement, HSG D
39.478	81	80	Weighted Average, UI Adjusted
37.504	80	80	95.00% Pervious Area
1.974	98	98	5.00% Impervious Area
1.974			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
135.1	6,348	0.0100	0.78		**Lag/CN Method,**

Subcatchment 12S: 12S



Summary for Subcatchment 13S: 13S

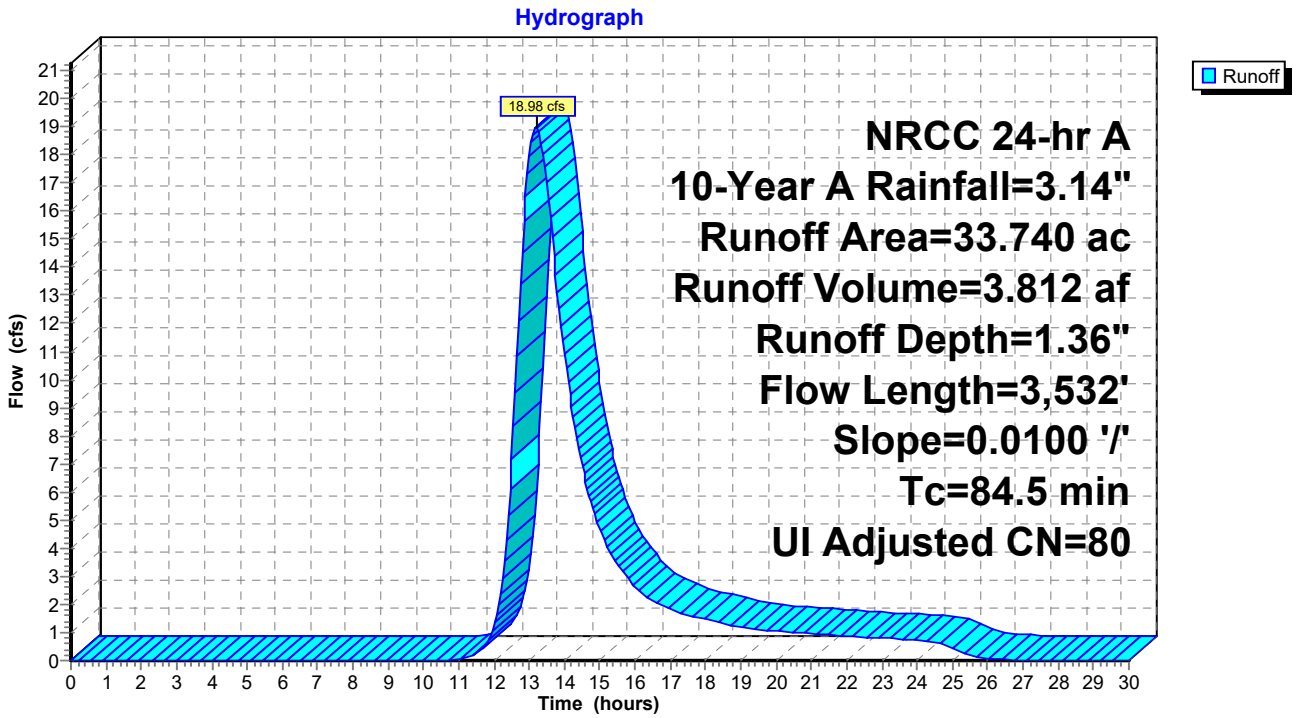
Runoff = 18.98 cfs @ 13.21 hrs, Volume= 3.812 af, Depth= 1.36"
Routed to Reach 13R : 13R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
32.053	80		>75% Grass cover, Good, HSG D
1.687	98		Unconnected pavement, HSG D
33.740	81	80	Weighted Average, UI Adjusted
32.053	80	80	95.00% Pervious Area
1.687	98	98	5.00% Impervious Area
1.687			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
84.5	3,532	0.0100	0.70		**Lag/CN Method,**

Subcatchment 13S: 13S



Summary for Subcatchment 14S: 14S

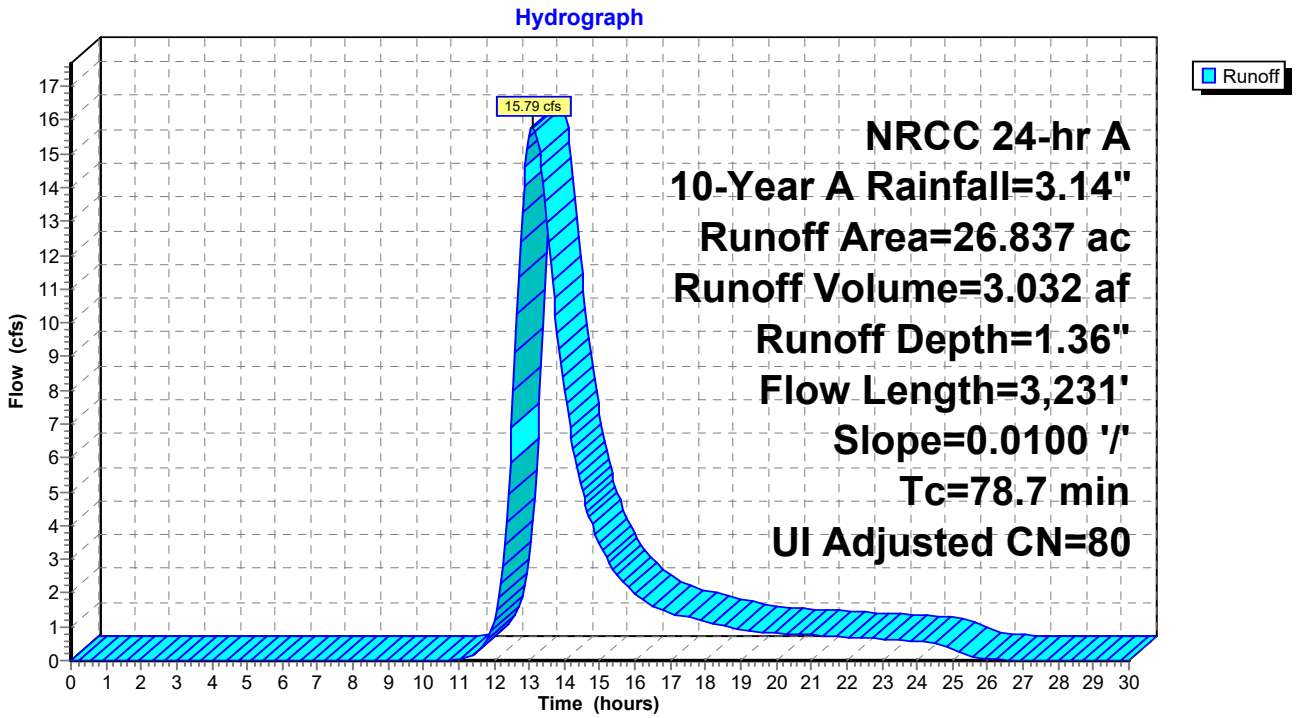
Runoff = 15.79 cfs @ 13.10 hrs, Volume= 3.032 af, Depth= 1.36"
Routed to Reach 14R : 14R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
25.495	80		>75% Grass cover, Good, HSG D
1.342	98		Unconnected pavement, HSG D
26.837	81	80	Weighted Average, UI Adjusted
25.495	80	80	95.00% Pervious Area
1.342	98	98	5.00% Impervious Area
1.342			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
78.7	3,231	0.0100	0.68		**Lag/CN Method,**

Subcatchment 14S: 14S



Summary for Subcatchment 15S: 15S

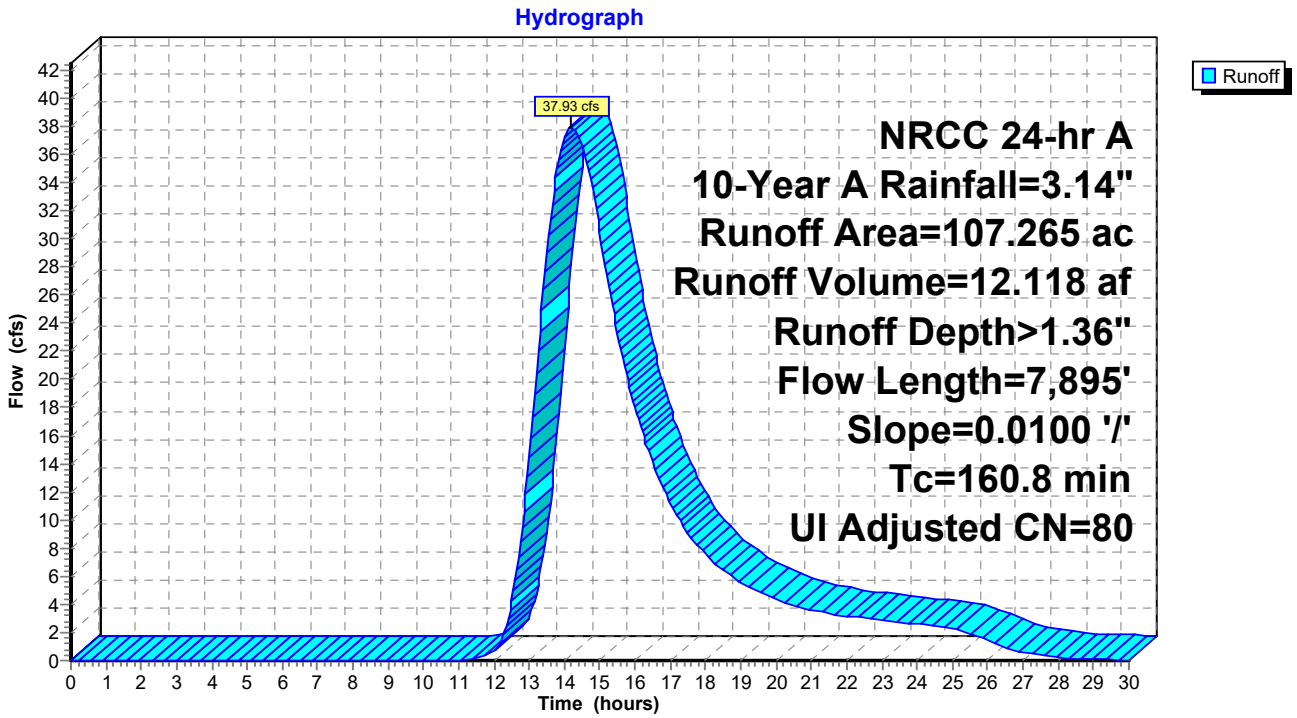
Runoff = 37.93 cfs @ 14.16 hrs, Volume= 12.118 af, Depth> 1.36"
Routed to Reach 15R : 15R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
101.902	80		>75% Grass cover, Good, HSG D
5.363	98		Unconnected pavement, HSG D
107.265	81	80	Weighted Average, UI Adjusted
101.902	80	80	95.00% Pervious Area
5.363	98	98	5.00% Impervious Area
5.363			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
160.8	7,895	0.0100	0.82		**Lag/CN Method,**

Subcatchment 15S: 15S



Summary for Subcatchment 16S: 16S

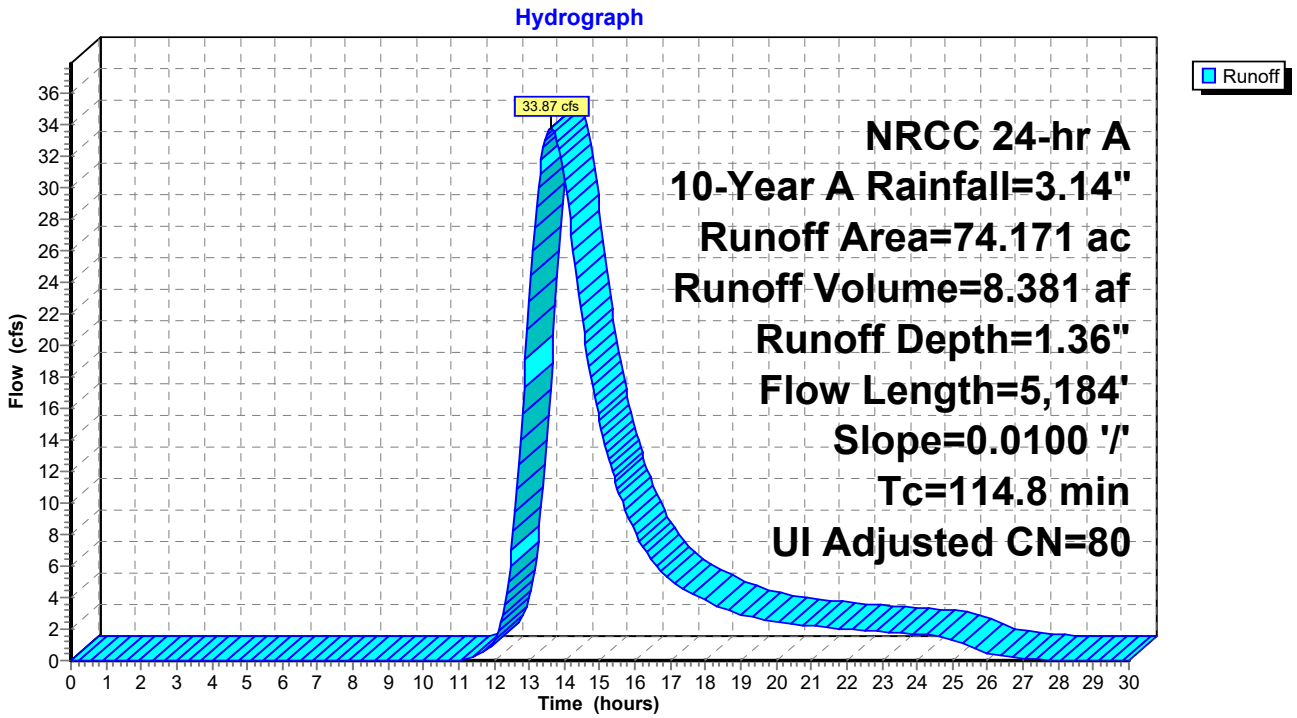
Runoff = 33.87 cfs @ 13.64 hrs, Volume= 8.381 af, Depth= 1.36"
Routed to Reach 16R : 16R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
70.462	80		>75% Grass cover, Good, HSG D
3.709	98		Unconnected pavement, HSG D
74.171	81	80	Weighted Average, UI Adjusted
70.462	80	80	95.00% Pervious Area
3.709	98	98	5.00% Impervious Area
3.709			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
114.8	5,184	0.0100	0.75		**Lag/CN Method,**

Subcatchment 16S: 16S



Summary for Subcatchment 17S1: 17S1

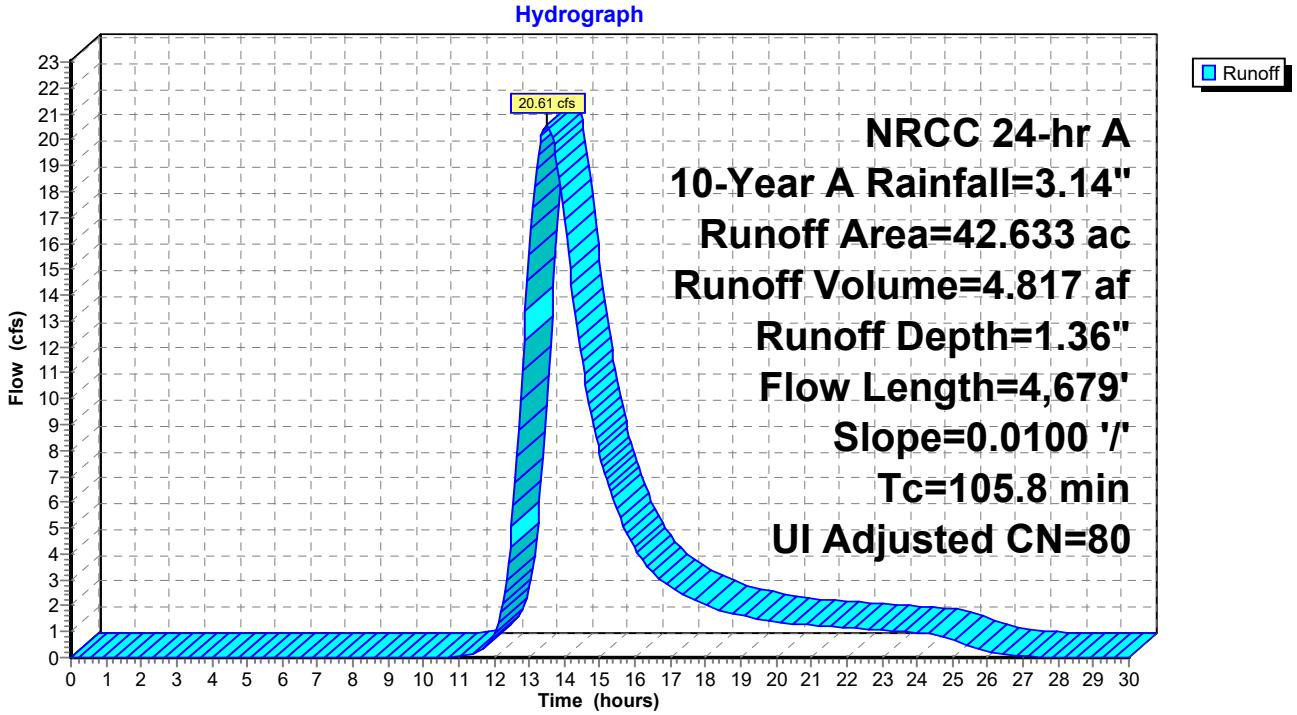
Runoff = 20.61 cfs @ 13.50 hrs, Volume= 4.817 af, Depth= 1.36"
Routed to Pond 17R : 17R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
40.501	80		>75% Grass cover, Good, HSG D
2.132	98		Unconnected pavement, HSG D
42.633	81	80	Weighted Average, UI Adjusted
40.501	80	80	95.00% Pervious Area
2.132	98	98	5.00% Impervious Area
2.132			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
105.8	4,679	0.0100	0.74		**Lag/CN Method,**

Subcatchment 17S1: 17S1



Summary for Subcatchment 17S2: 17S2

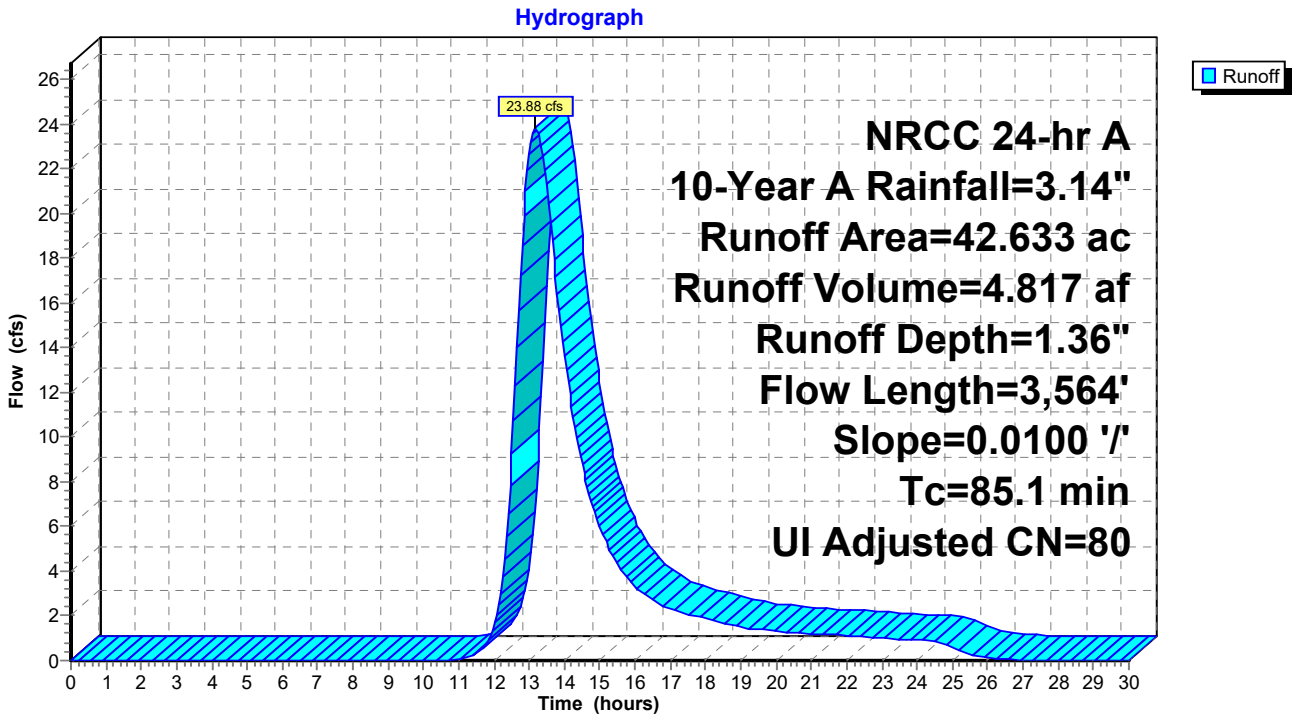
Runoff = 23.88 cfs @ 13.17 hrs, Volume= 4.817 af, Depth= 1.36"
Routed to Pond 17R : 17R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
40.501	80		>75% Grass cover, Good, HSG D
2.132	98		Unconnected pavement, HSG D
42.633	81	80	Weighted Average, UI Adjusted
40.501	80	80	95.00% Pervious Area
2.132	98	98	5.00% Impervious Area
2.132			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
85.1	3,564	0.0100	0.70		**Lag/CN Method,**

Subcatchment 17S2: 17S2



Summary for Subcatchment 18S: 18S

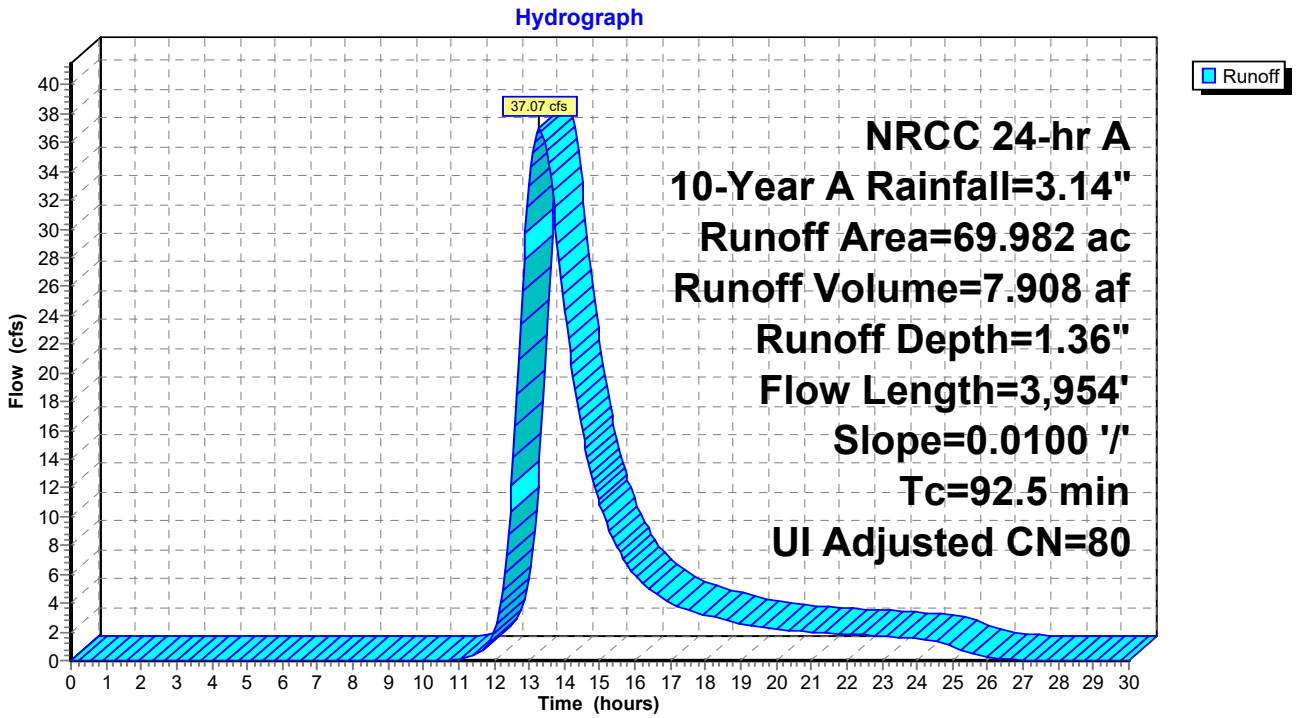
Runoff = 37.07 cfs @ 13.27 hrs, Volume= 7.908 af, Depth= 1.36"
Routed to Pond 18R : 18R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
66.483	80		>75% Grass cover, Good, HSG D
3.499	98		Unconnected pavement, HSG D
69.982	81	80	Weighted Average, UI Adjusted
66.483	80	80	95.00% Pervious Area
3.499	98	98	5.00% Impervious Area
3.499			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
92.5	3,954	0.0100	0.71		**Lag/CN Method,**

Subcatchment 18S: 18S



Summary for Subcatchment 19S: 19S

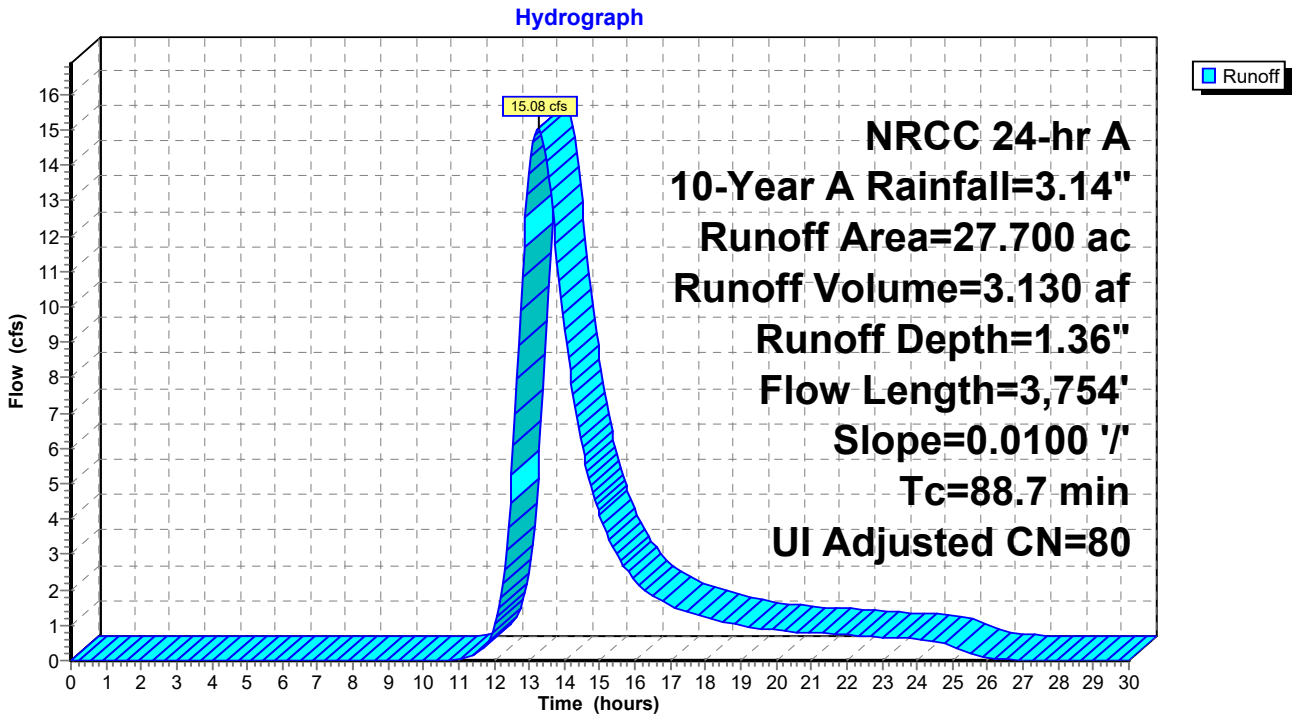
Runoff = 15.08 cfs @ 13.28 hrs, Volume= 3.130 af, Depth= 1.36"
Routed to Reach 19R : 19R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
26.315	80		>75% Grass cover, Good, HSG D
1.385	98		Unconnected pavement, HSG D
27.700	81	80	Weighted Average, UI Adjusted
26.315	80	80	95.00% Pervious Area
1.385	98	98	5.00% Impervious Area
1.385			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
88.7	3,754	0.0100	0.71		**Lag/CN Method,**

Subcatchment 19S: 19S



Summary for Subcatchment 20S: 20S

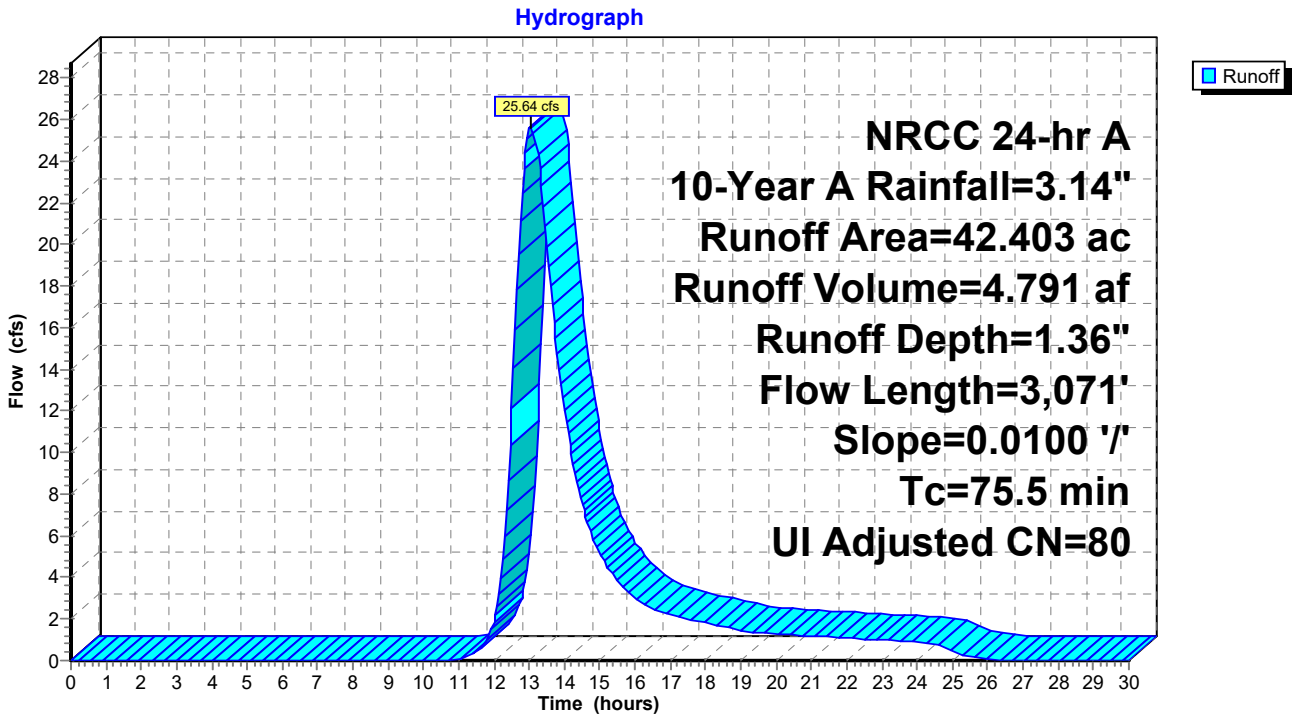
Runoff = 25.64 cfs @ 13.05 hrs, Volume= 4.791 af, Depth= 1.36"
Routed to Pond 20R : 20R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
40.283	80		>75% Grass cover, Good, HSG D
2.120	98		Unconnected pavement, HSG D
42.403	81	80	Weighted Average, UI Adjusted
40.283	80	80	95.00% Pervious Area
2.120	98	98	5.00% Impervious Area
2.120			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
75.5	3,071	0.0100	0.68		**Lag/CN Method,**

Subcatchment 20S: 20S



Summary for Subcatchment 21S: 21S

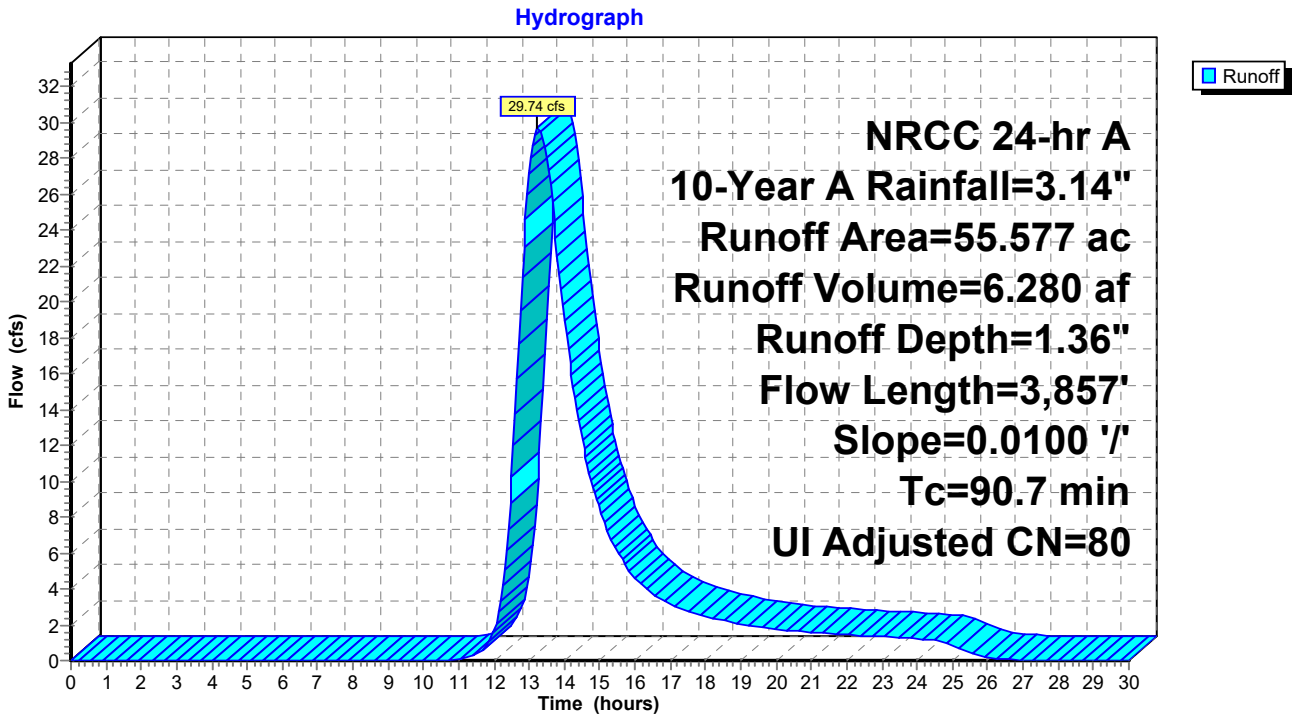
Runoff = 29.74 cfs @ 13.24 hrs, Volume= 6.280 af, Depth= 1.36"
Routed to Reach 21R : 21R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
52.798	80		>75% Grass cover, Good, HSG D
2.779	98		Unconnected pavement, HSG D
55.577	81	80	Weighted Average, UI Adjusted
52.798	80	80	95.00% Pervious Area
2.779	98	98	5.00% Impervious Area
2.779			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
90.7	3,857	0.0100	0.71		**Lag/CN Method,**

Subcatchment 21S: 21S



Summary for Subcatchment 22S: 22S

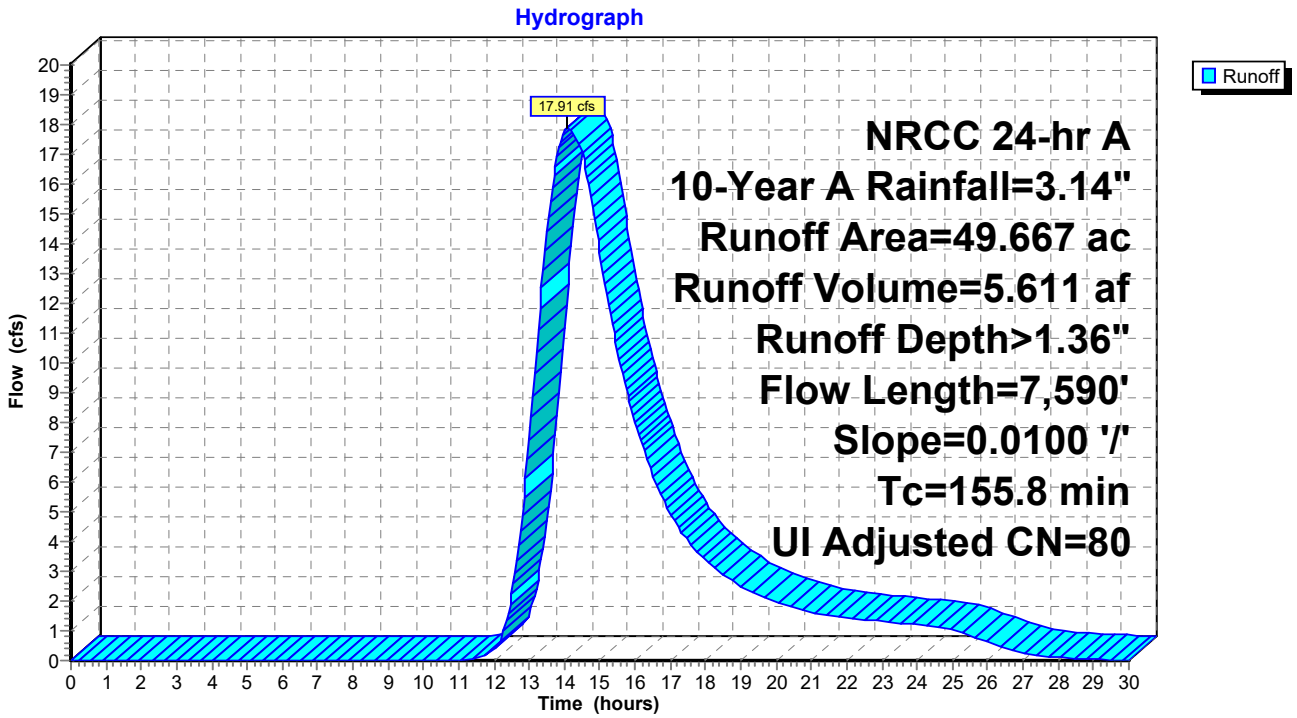
Runoff = 17.91 cfs @ 14.05 hrs, Volume= 5.611 af, Depth> 1.36"
Routed to Pond 22R : 22R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
47.184	80		>75% Grass cover, Good, HSG D
2.483	98		Unconnected pavement, HSG D
49.667	81	80	Weighted Average, UI Adjusted
47.184	80	80	95.00% Pervious Area
2.483	98	98	5.00% Impervious Area
2.483			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
155.8	7,590	0.0100	0.81		**Lag/CN Method,**

Subcatchment 22S: 22S



Summary for Subcatchment 23S: 23S

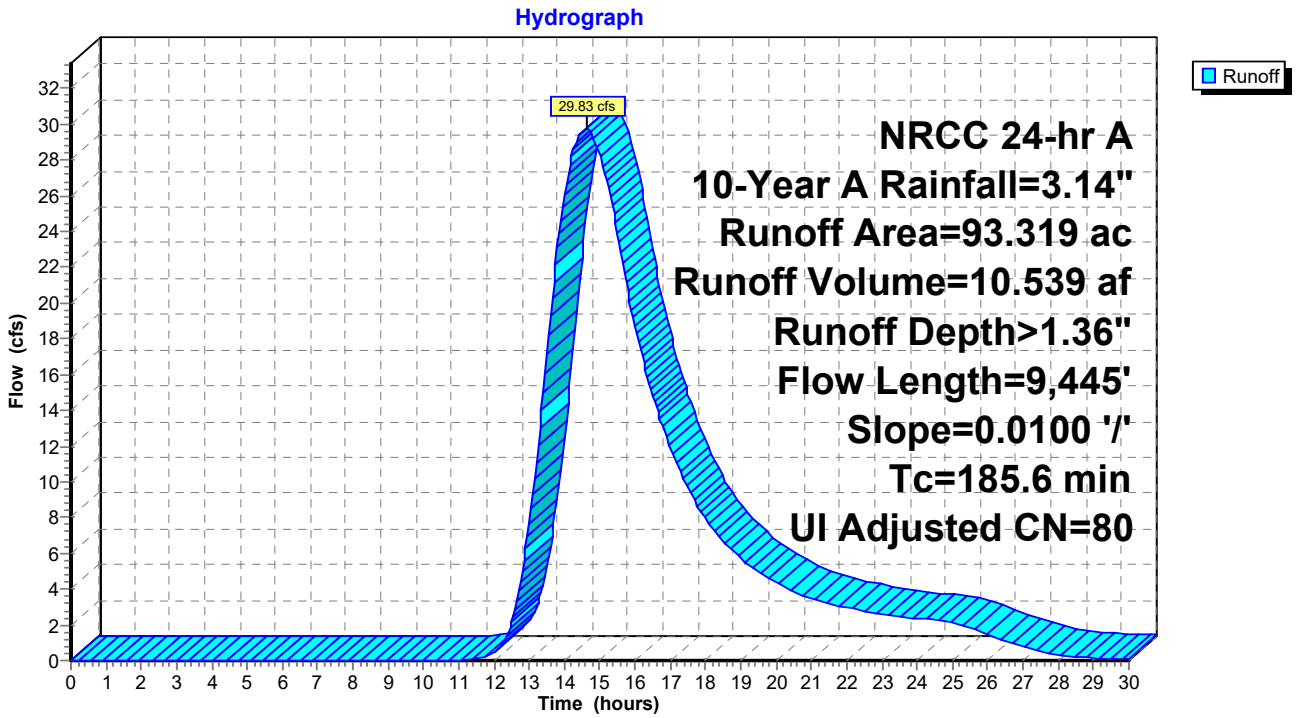
Runoff = 29.83 cfs @ 14.63 hrs, Volume= 10.539 af, Depth> 1.36"
Routed to Pond 23R : 23R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
88.653	80		>75% Grass cover, Good, HSG D
4.666	98		Unconnected pavement, HSG D
93.319	81	80	Weighted Average, UI Adjusted
88.653	80	80	95.00% Pervious Area
4.666	98	98	5.00% Impervious Area
4.666			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
185.6	9,445	0.0100	0.85		**Lag/CN Method,**

Subcatchment 23S: 23S



Summary for Subcatchment 24S1: 24S1

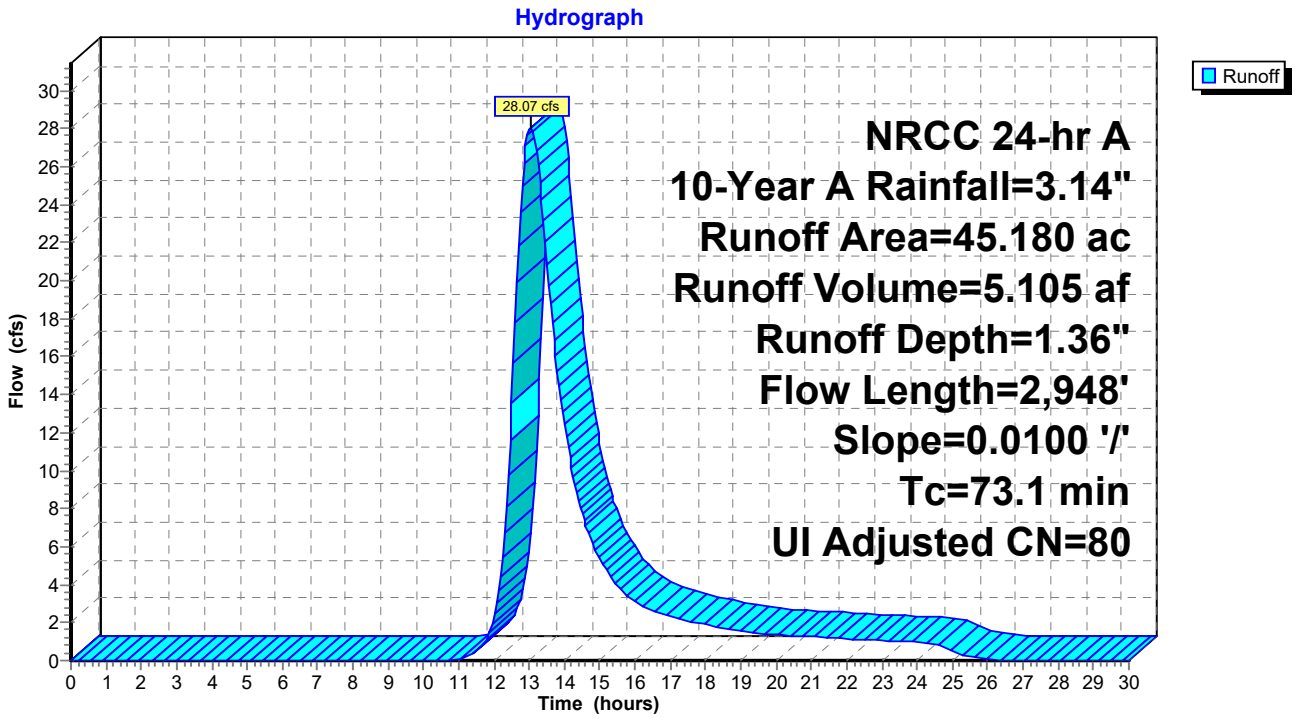
Runoff = 28.07 cfs @ 13.04 hrs, Volume= 5.105 af, Depth= 1.36"
Routed to Reach 24R1 : 24R1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
42.921	80		>75% Grass cover, Good, HSG D
2.259	98		Unconnected pavement, HSG D
45.180	81	80	Weighted Average, UI Adjusted
42.921	80	80	95.00% Pervious Area
2.259	98	98	5.00% Impervious Area
2.259			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
73.1	2,948	0.0100	0.67		**Lag/CN Method,**

Subcatchment 24S1: 24S1



Summary for Subcatchment 24S2: 24S2

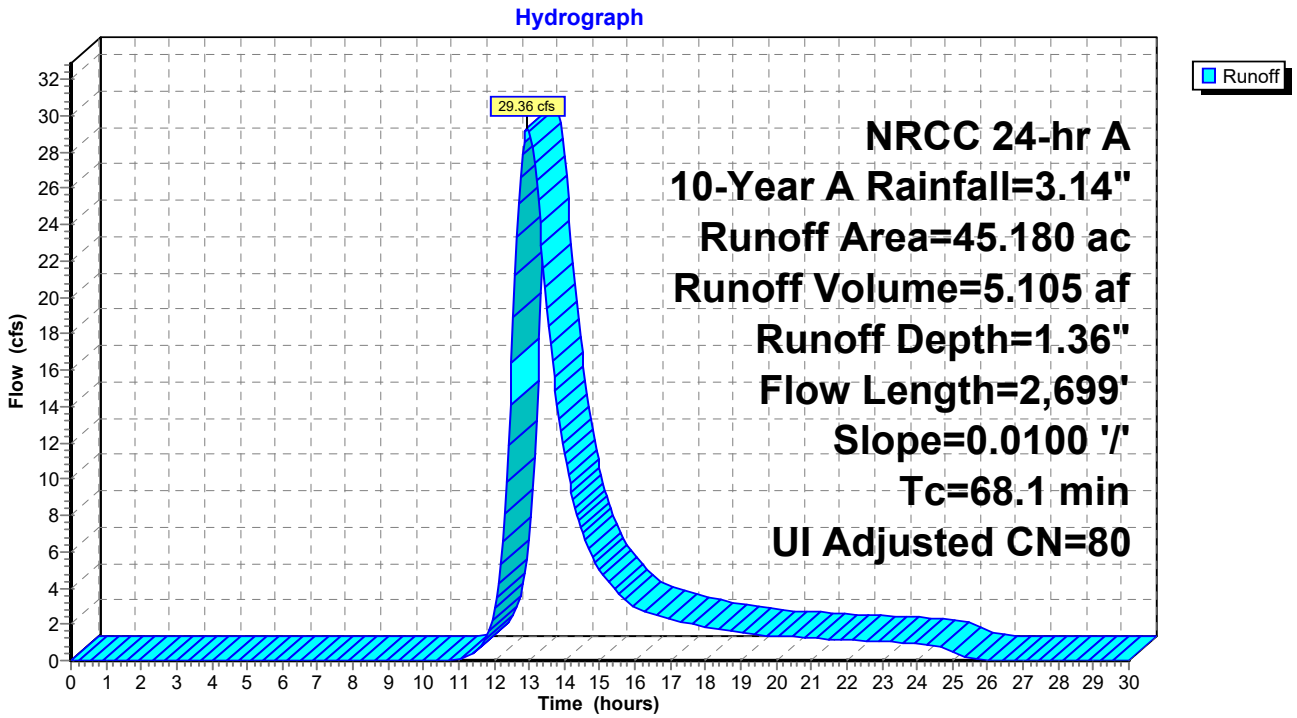
Runoff = 29.36 cfs @ 12.95 hrs, Volume= 5.105 af, Depth= 1.36"
Routed to Reach 24R2 : 24R2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
42.921	80		>75% Grass cover, Good, HSG D
2.259	98		Unconnected pavement, HSG D
45.180	81	80	Weighted Average, UI Adjusted
42.921	80	80	95.00% Pervious Area
2.259	98	98	5.00% Impervious Area
2.259			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
68.1	2,699	0.0100	0.66		**Lag/CN Method,**

Subcatchment 24S2: 24S2



Summary for Subcatchment 25S: 25S

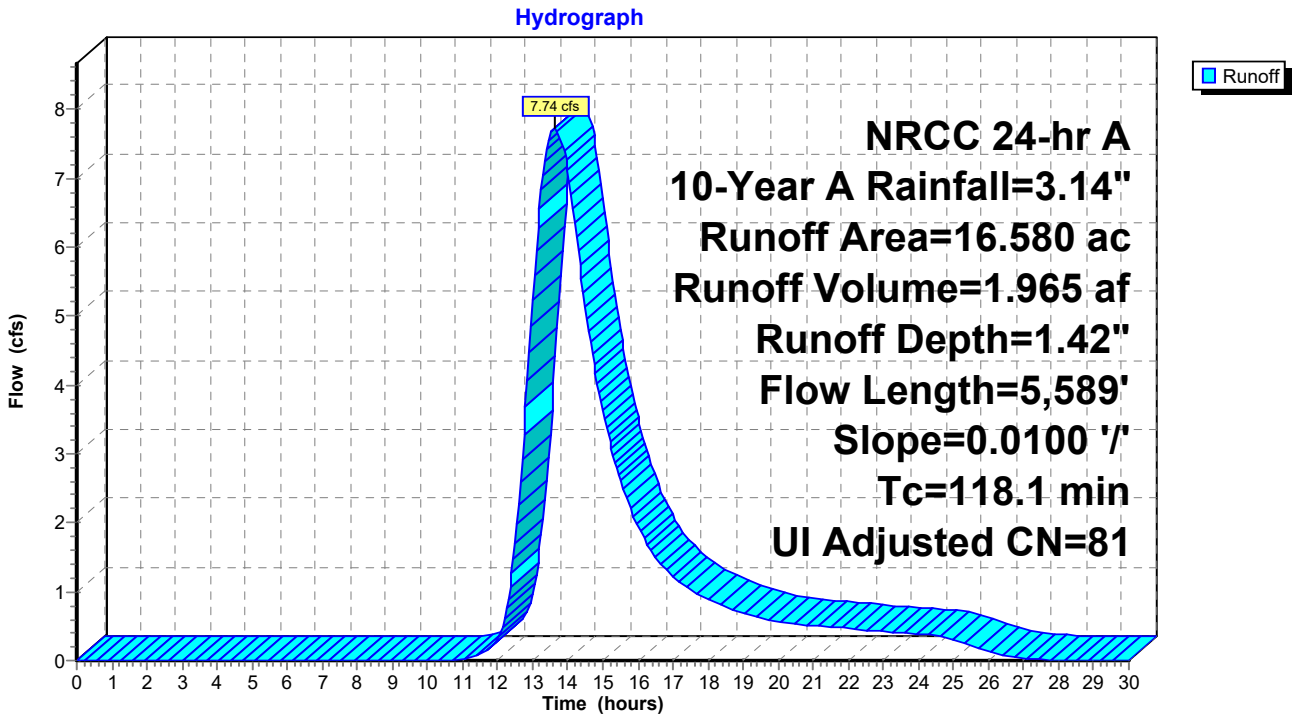
Runoff = 7.74 cfs @ 13.64 hrs, Volume= 1.965 af, Depth= 1.42"
Routed to Reach 25R : 25R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
14.922	80		>75% Grass cover, Good, HSG D
1.658	98		Unconnected pavement, HSG D
16.580	82	81	Weighted Average, UI Adjusted
14.922	80	80	90.00% Pervious Area
1.658	98	98	10.00% Impervious Area
1.658			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
118.1	5,589	0.0100	0.79		**Lag/CN Method,**

Subcatchment 25S: 25S



Summary for Subcatchment 26S: 26S

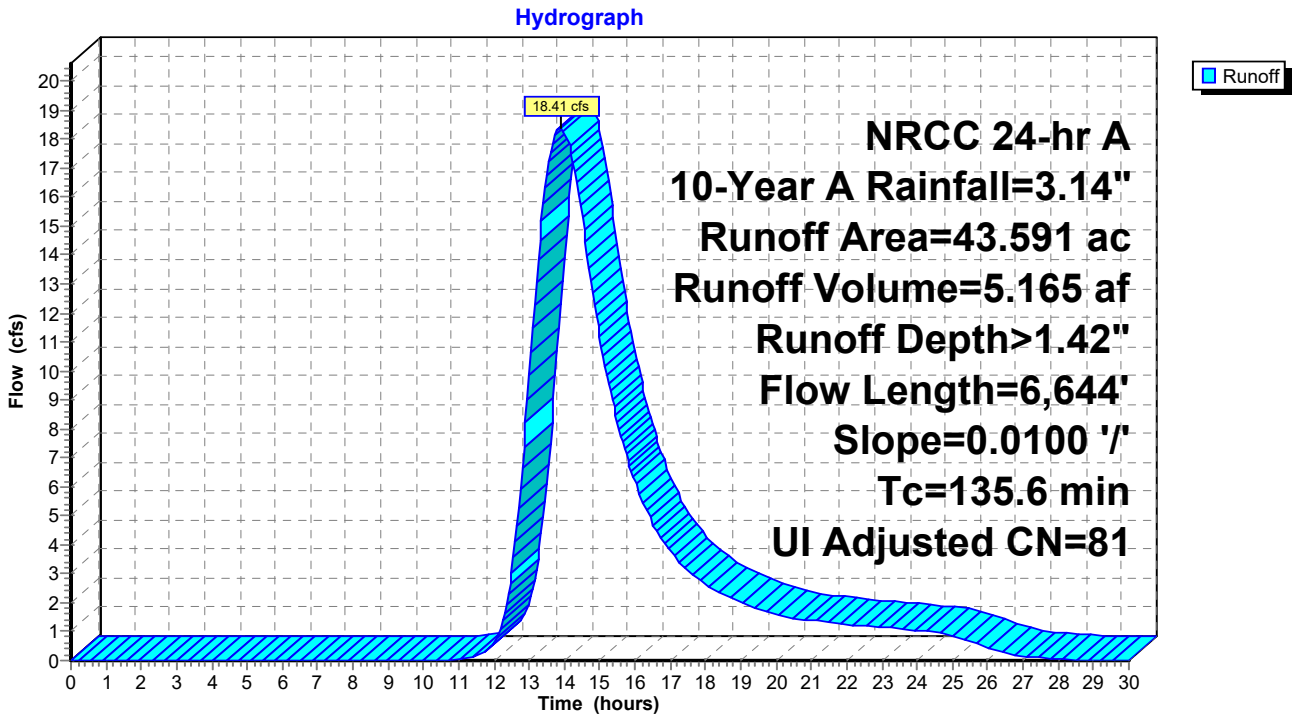
Runoff = 18.41 cfs @ 13.87 hrs, Volume= 5.165 af, Depth> 1.42"
Routed to Reach 26R : 26R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
39.232	80		>75% Grass cover, Good, HSG D
4.359	98		Unconnected pavement, HSG D
43.591	82	81	Weighted Average, UI Adjusted
39.232	80	80	90.00% Pervious Area
4.359	98	98	10.00% Impervious Area
4.359			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
135.6	6,644	0.0100	0.82		**Lag/CN Method,**

Subcatchment 26S: 26S



Summary for Subcatchment 27S: 27S

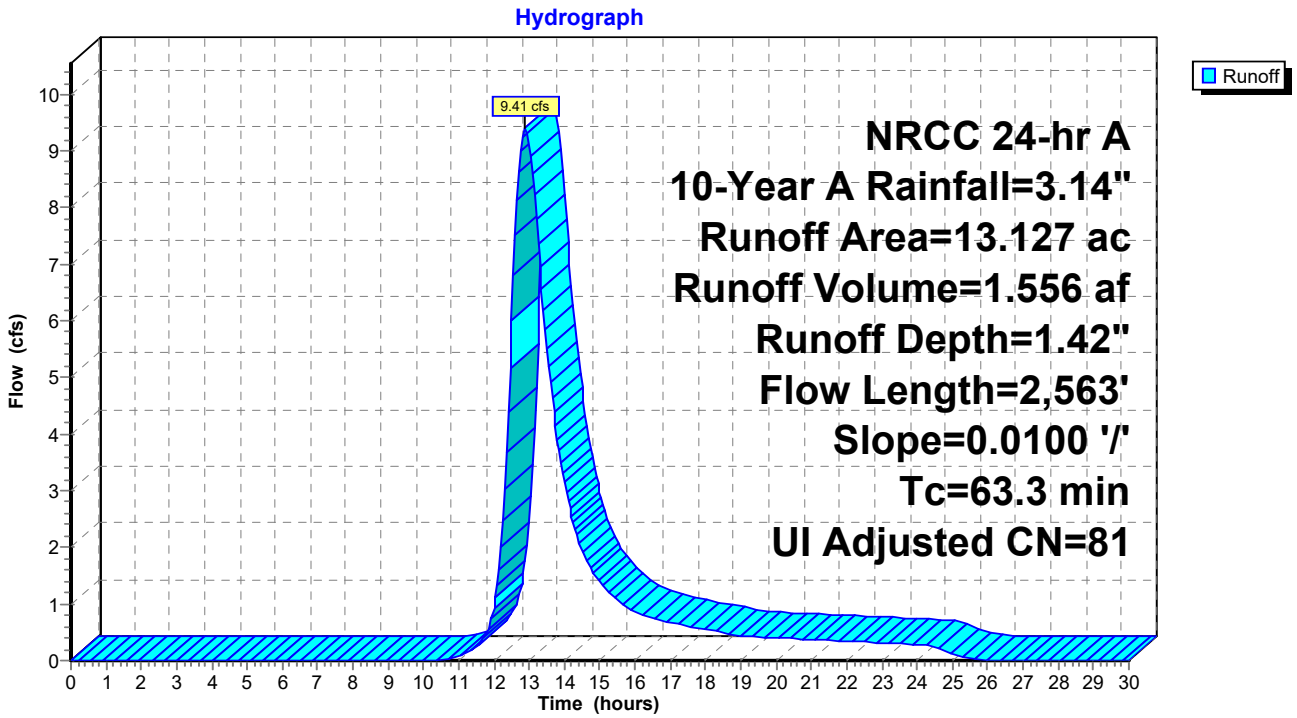
Runoff = 9.41 cfs @ 12.88 hrs, Volume= 1.556 af, Depth= 1.42"
Routed to Pond 27R : 27R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
11.814	80		>75% Grass cover, Good, HSG D
1.313	98		Unconnected pavement, HSG D
13.127	82	81	Weighted Average, UI Adjusted
11.814	80	80	90.00% Pervious Area
1.313	98	98	10.00% Impervious Area
1.313			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
63.3	2,563	0.0100	0.67		**Lag/CN Method,**

Subcatchment 27S: 27S



Summary for Subcatchment 28S: 28S

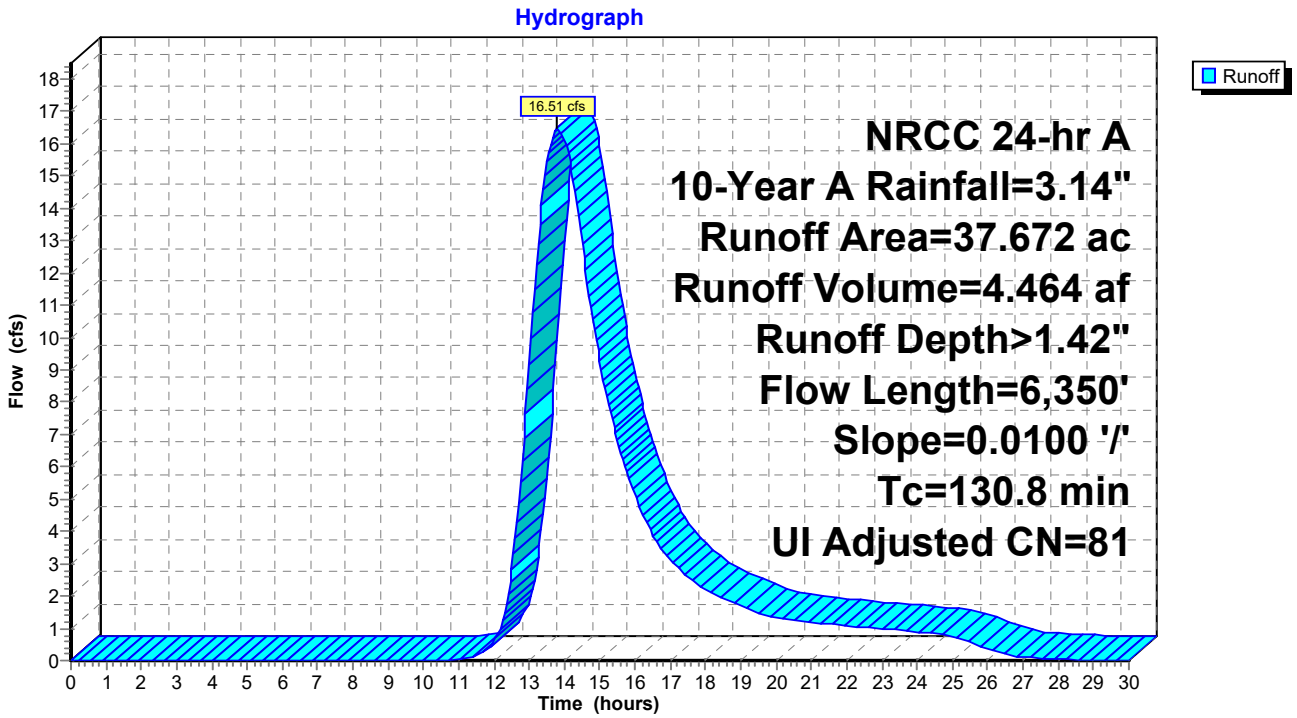
Runoff = 16.51 cfs @ 13.81 hrs, Volume= 4.464 af, Depth> 1.42"
Routed to Reach 28R : 28R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
33.905	80		>75% Grass cover, Good, HSG D
3.767	98		Unconnected pavement, HSG D
37.672	82	81	Weighted Average, UI Adjusted
33.905	80	80	90.00% Pervious Area
3.767	98	98	10.00% Impervious Area
3.767			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
130.8	6,350	0.0100	0.81		**Lag/CN Method,**

Subcatchment 28S: 28S



Summary for Subcatchment 29S: 29S

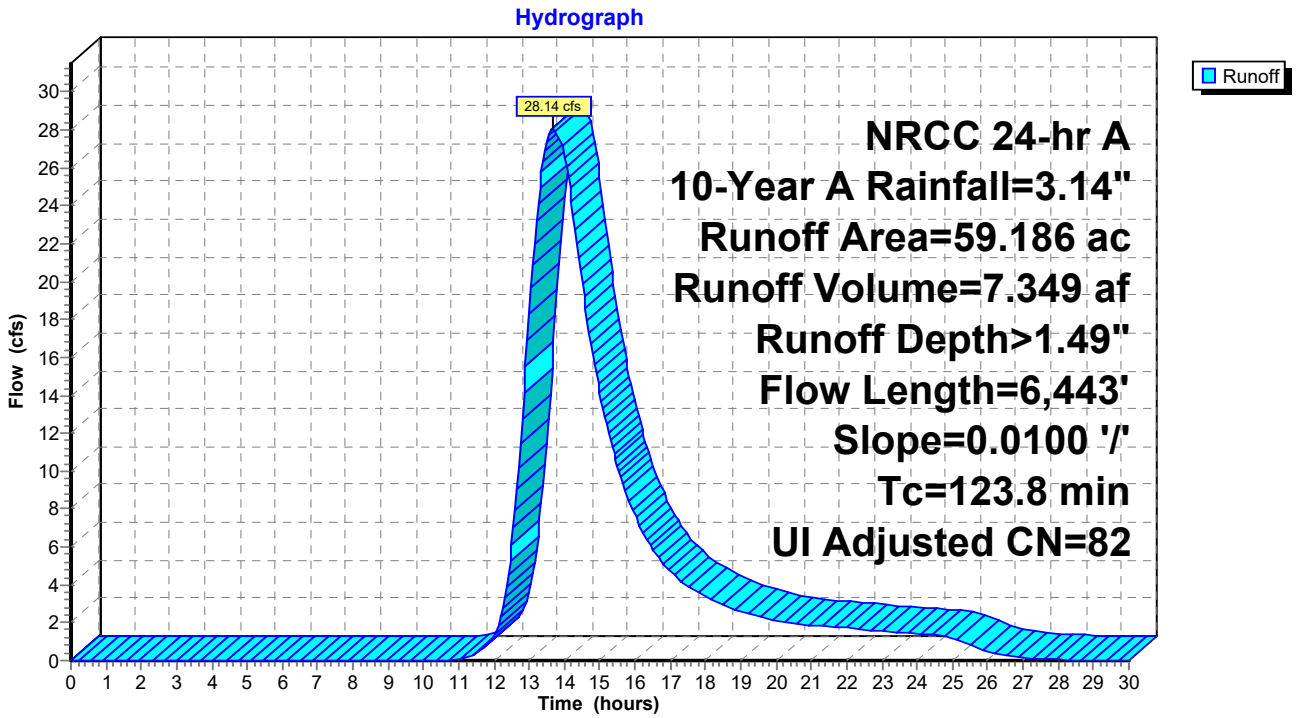
Runoff = 28.14 cfs @ 13.66 hrs, Volume= 7.349 af, Depth> 1.49"
Routed to Reach 29R : 29R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
47.349	80		>75% Grass cover, Good, HSG D
11.837	98		Unconnected pavement, HSG D
59.186	84	82	Weighted Average, UI Adjusted
47.349	80	80	80.00% Pervious Area
11.837	98	98	20.00% Impervious Area
11.837			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
123.8	6,443	0.0100	0.87		**Lag/CN Method,**

Subcatchment 29S: 29S



Summary for Subcatchment 30S: 30S

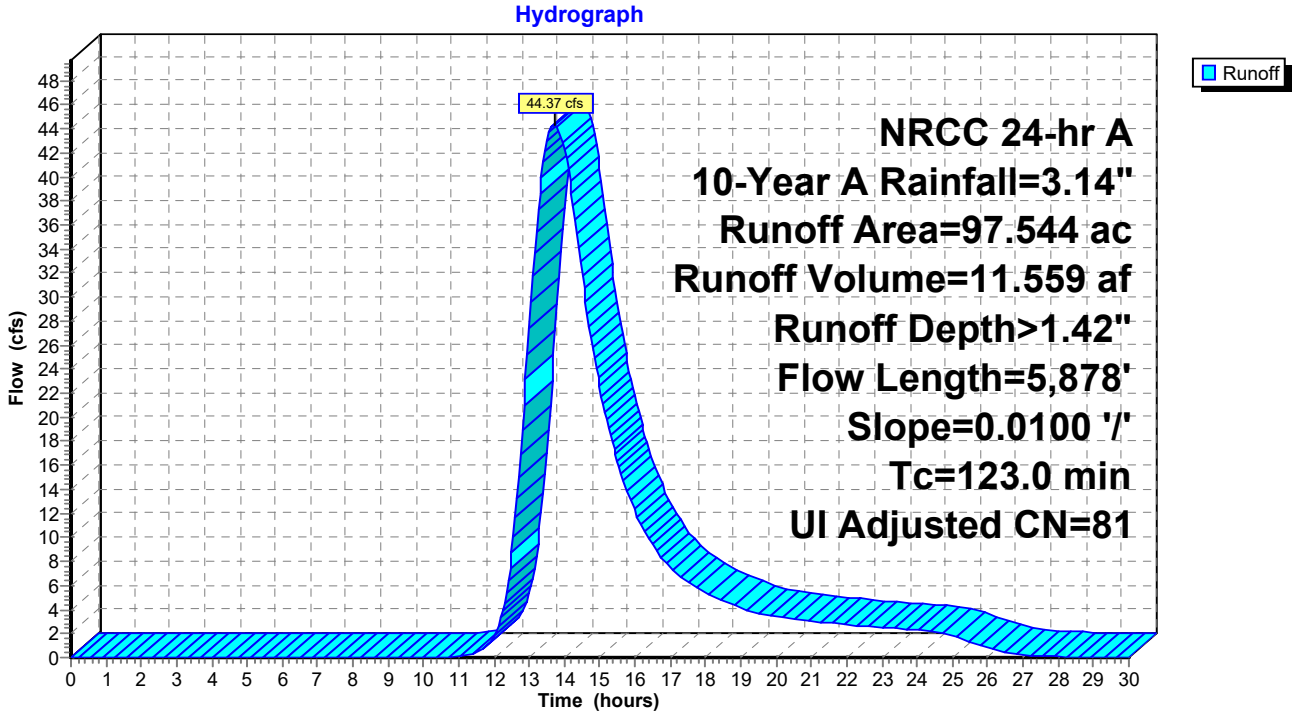
Runoff = 44.37 cfs @ 13.74 hrs, Volume= 11.559 af, Depth> 1.42"
Routed to Pond 30R : 30R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
87.790	80		>75% Grass cover, Good, HSG D
9.754	98		Unconnected pavement, HSG D
97.544	82	81	Weighted Average, UI Adjusted
87.790	80	80	90.00% Pervious Area
9.754	98	98	10.00% Impervious Area
9.754			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
123.0	5,878	0.0100	0.80		**Lag/CN Method,**

Subcatchment 30S: 30S



Summary for Subcatchment 31S: 31S

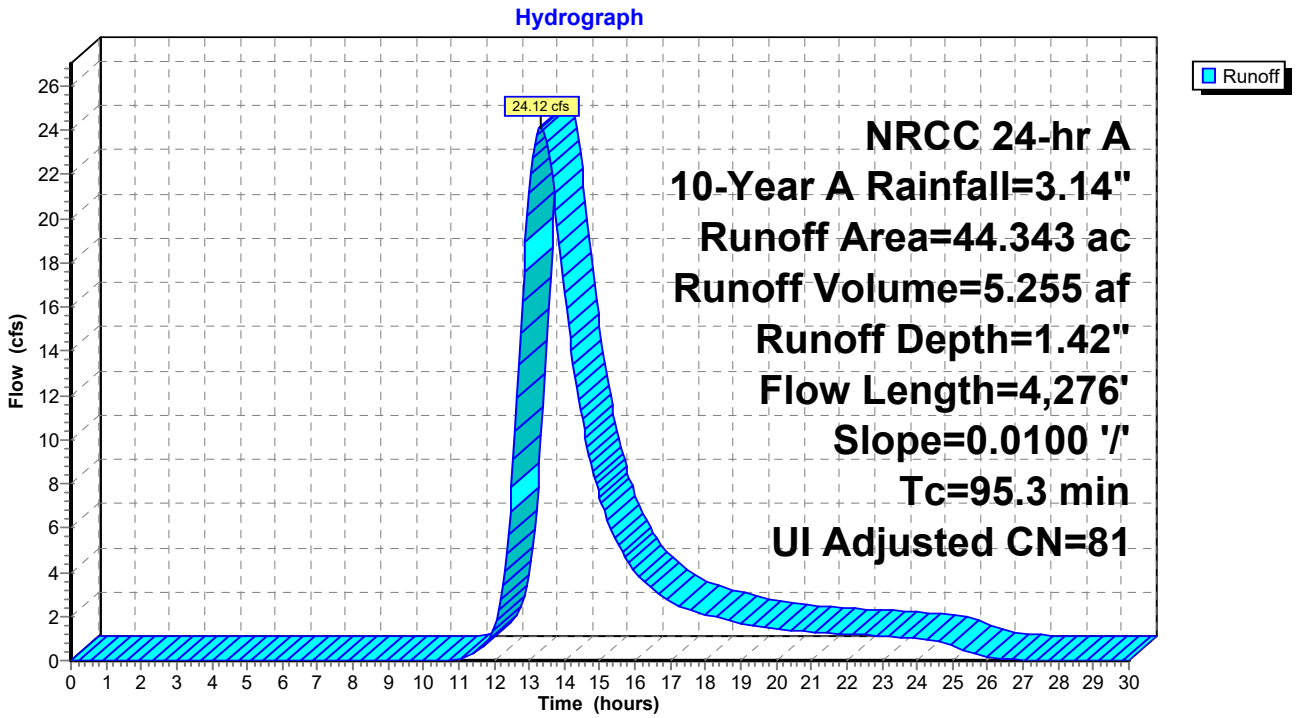
Runoff = 24.12 cfs @ 13.32 hrs, Volume= 5.255 af, Depth= 1.42"
Routed to Pond 31R : 31R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
39.909	80		>75% Grass cover, Good, HSG D
4.434	98		Unconnected pavement, HSG D
44.343	82	81	Weighted Average, UI Adjusted
39.909	80	80	90.00% Pervious Area
4.434	98	98	10.00% Impervious Area
4.434			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
95.3	4,276	0.0100	0.75		**Lag/CN Method,**

Subcatchment 31S: 31S



Summary for Subcatchment 32S: 32S

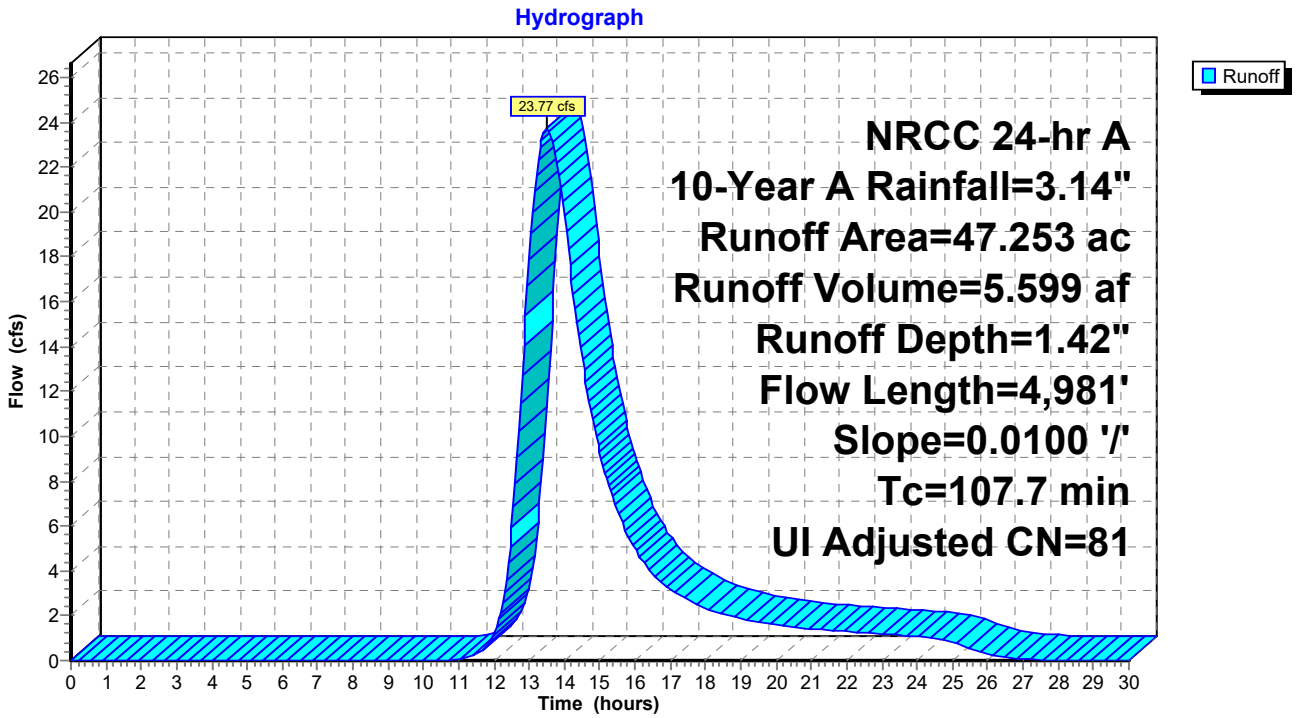
Runoff = 23.77 cfs @ 13.51 hrs, Volume= 5.599 af, Depth= 1.42"
Routed to Reach 32R : 32R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
42.528	80		>75% Grass cover, Good, HSG D
4.725	98		Unconnected pavement, HSG D
47.253	82	81	Weighted Average, UI Adjusted
42.528	80	80	90.00% Pervious Area
4.725	98	98	10.00% Impervious Area
4.725			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
107.7	4,981	0.0100	0.77		**Lag/CN Method,**

Subcatchment 32S: 32S



Summary for Subcatchment 33S: 33S

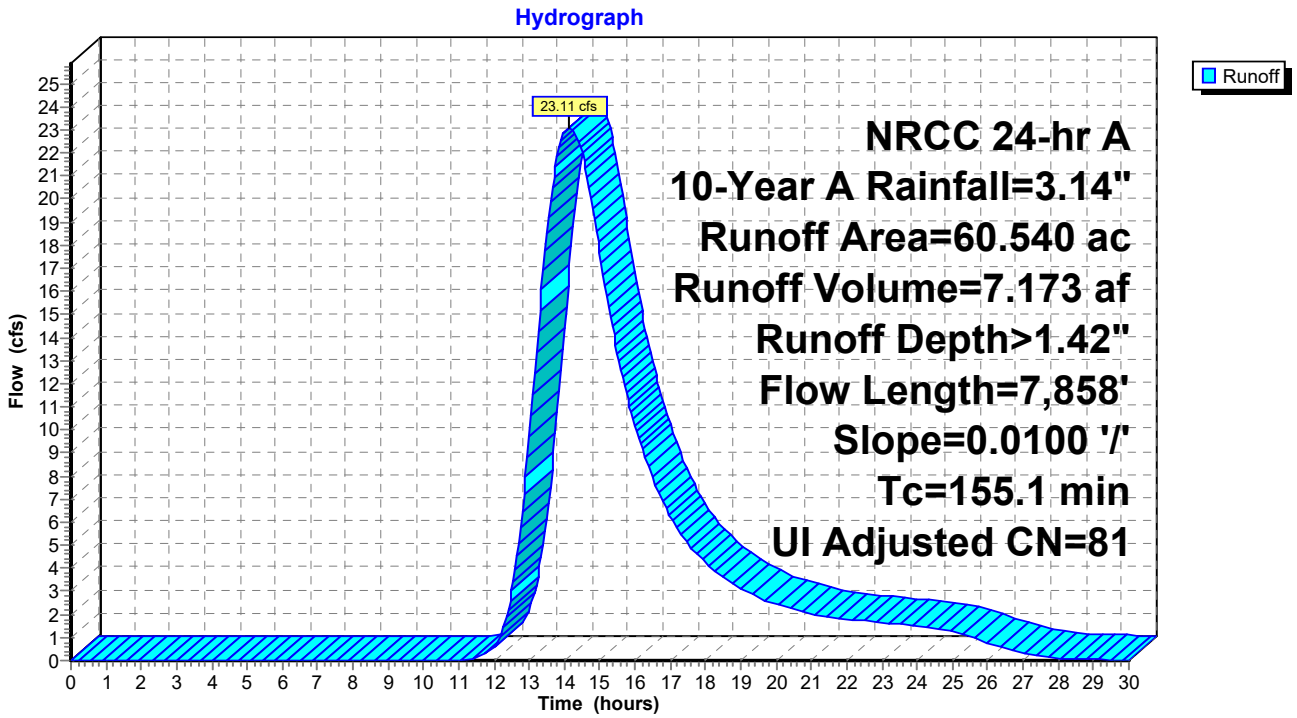
Runoff = 23.11 cfs @ 14.14 hrs, Volume= 7.173 af, Depth> 1.42"
Routed to Reach 33R : 33R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
54.486	80		>75% Grass cover, Good, HSG D
6.054	98		Unconnected pavement, HSG D
60.540	82	81	Weighted Average, UI Adjusted
54.486	80	80	90.00% Pervious Area
6.054	98	98	10.00% Impervious Area
6.054			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
155.1	7,858	0.0100	0.84		**Lag/CN Method,**

Subcatchment 33S: 33S



Summary for Subcatchment 34S: 34S

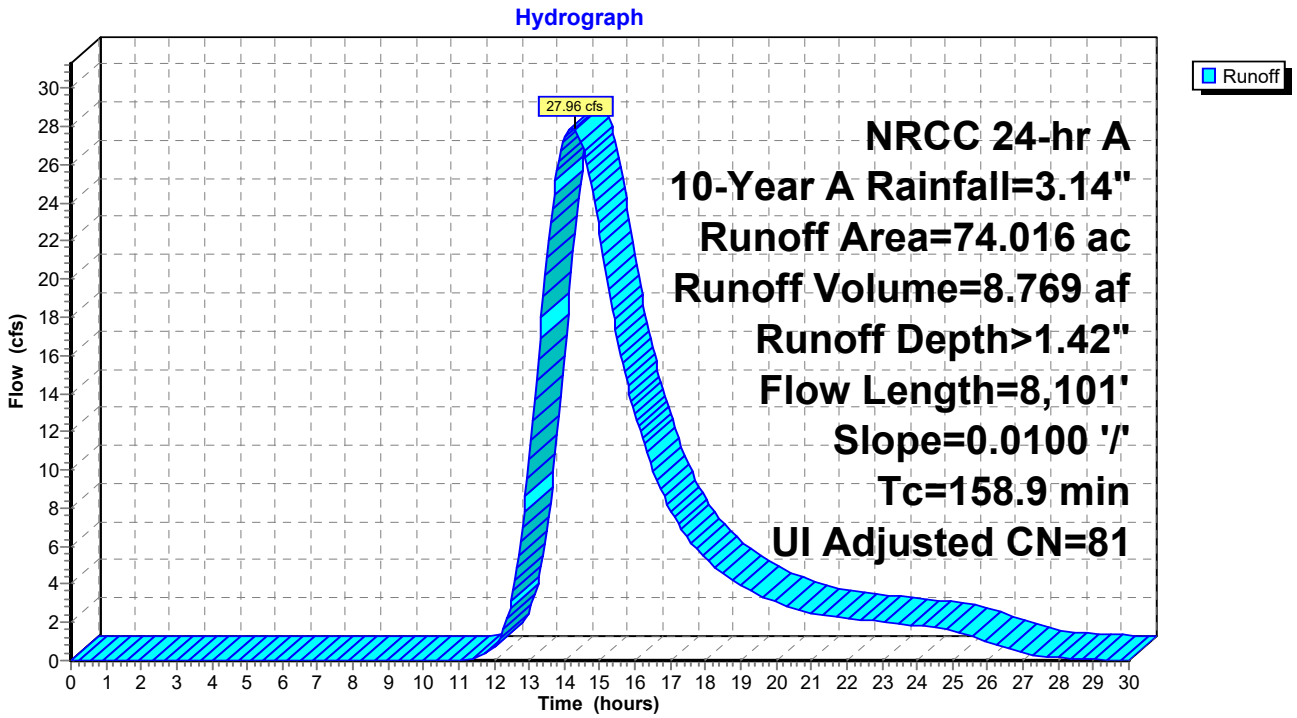
Runoff = 27.96 cfs @ 14.28 hrs, Volume= 8.769 af, Depth> 1.42"
Routed to Pond 34R : 34R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
66.614	80		>75% Grass cover, Good, HSG D
7.402	98		Unconnected pavement, HSG D
74.016	82	81	Weighted Average, UI Adjusted
66.614	80	80	90.00% Pervious Area
7.402	98	98	10.00% Impervious Area
7.402			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
158.9	8,101	0.0100	0.85		**Lag/CN Method,**

Subcatchment 34S: 34S



Summary for Subcatchment 35S: 35S

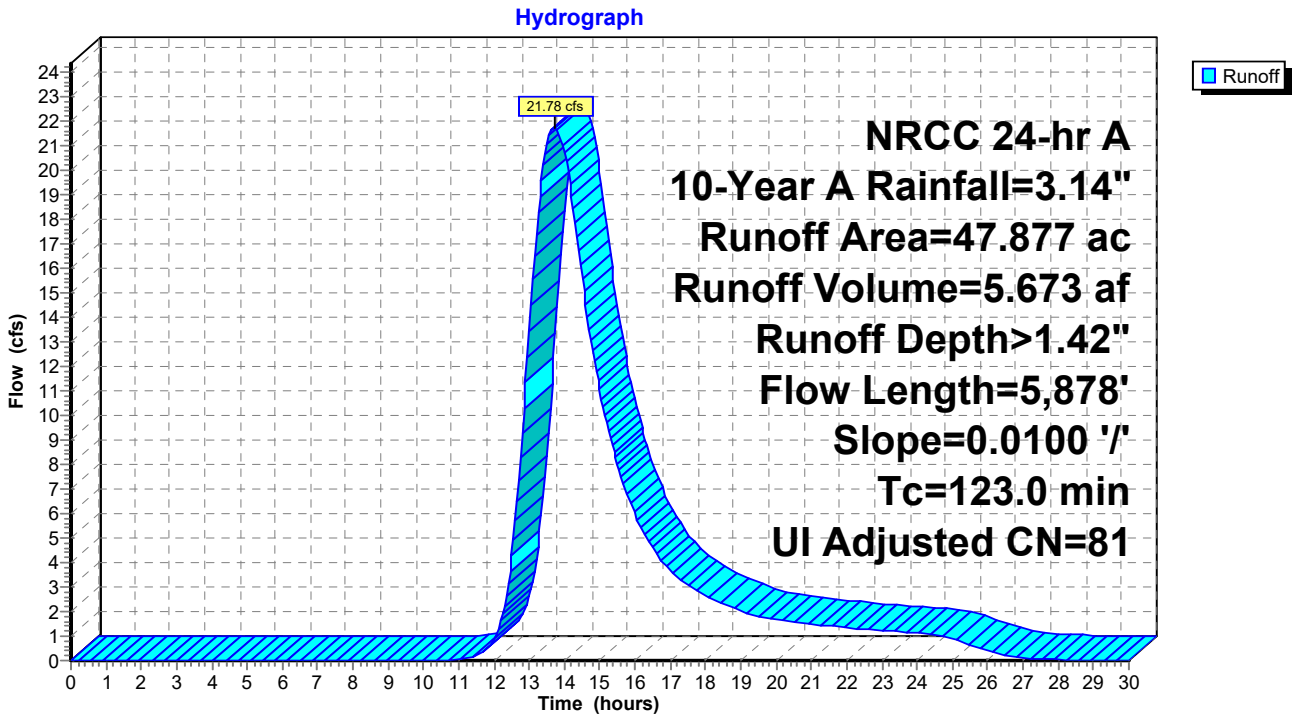
Runoff = 21.78 cfs @ 13.74 hrs, Volume= 5.673 af, Depth> 1.42"
Routed to Reach 35R : 35R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
43.089	80		>75% Grass cover, Good, HSG D
4.788	98		Unconnected pavement, HSG D
47.877	82	81	Weighted Average, UI Adjusted
43.089	80	80	90.00% Pervious Area
4.788	98	98	10.00% Impervious Area
4.788			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
123.0	5,878	0.0100	0.80		**Lag/CN Method,**

Subcatchment 35S: 35S



Summary for Subcatchment 36S: 36S

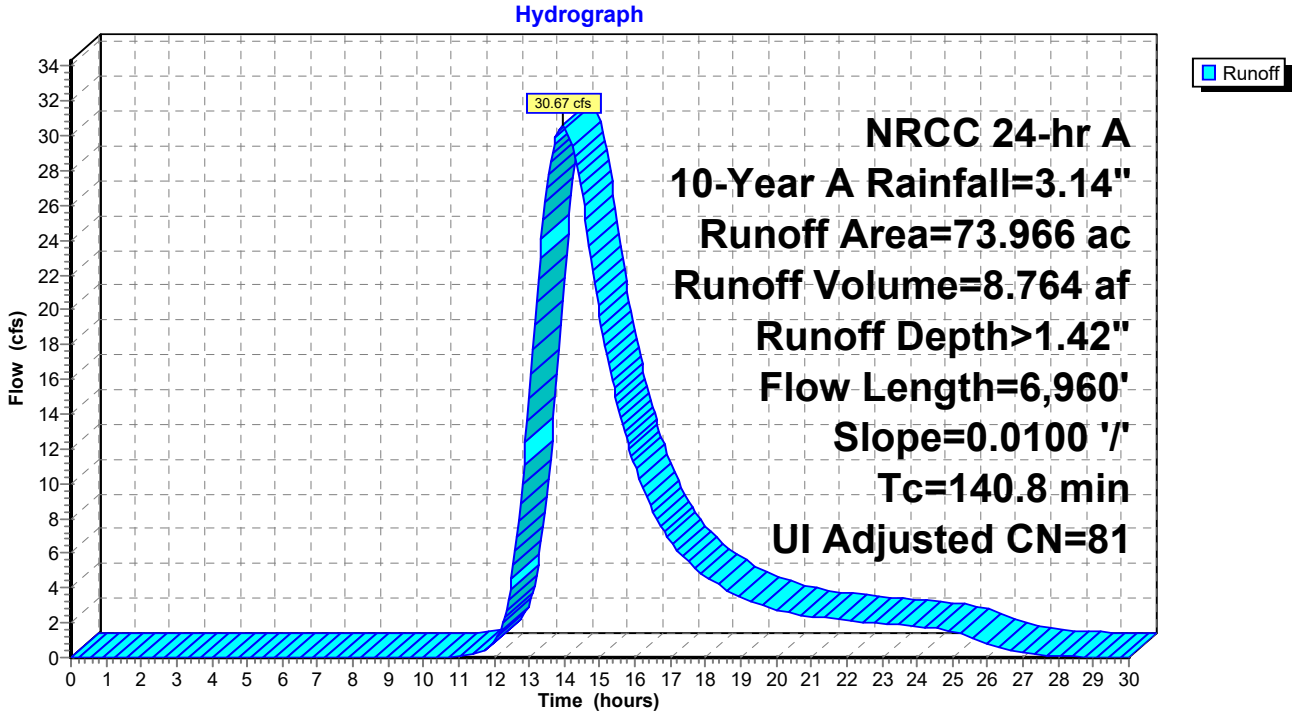
Runoff = 30.67 cfs @ 13.93 hrs, Volume= 8.764 af, Depth> 1.42"
Routed to Reach 36R : 36R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
66.569	80		>75% Grass cover, Good, HSG D
7.397	98		Unconnected pavement, HSG D
73.966	82	81	Weighted Average, UI Adjusted
66.569	80	80	90.00% Pervious Area
7.397	98	98	10.00% Impervious Area
7.397			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
140.8	6,960	0.0100	0.82		**Lag/CN Method,**

Subcatchment 36S: 36S



Summary for Subcatchment 37S: 37S

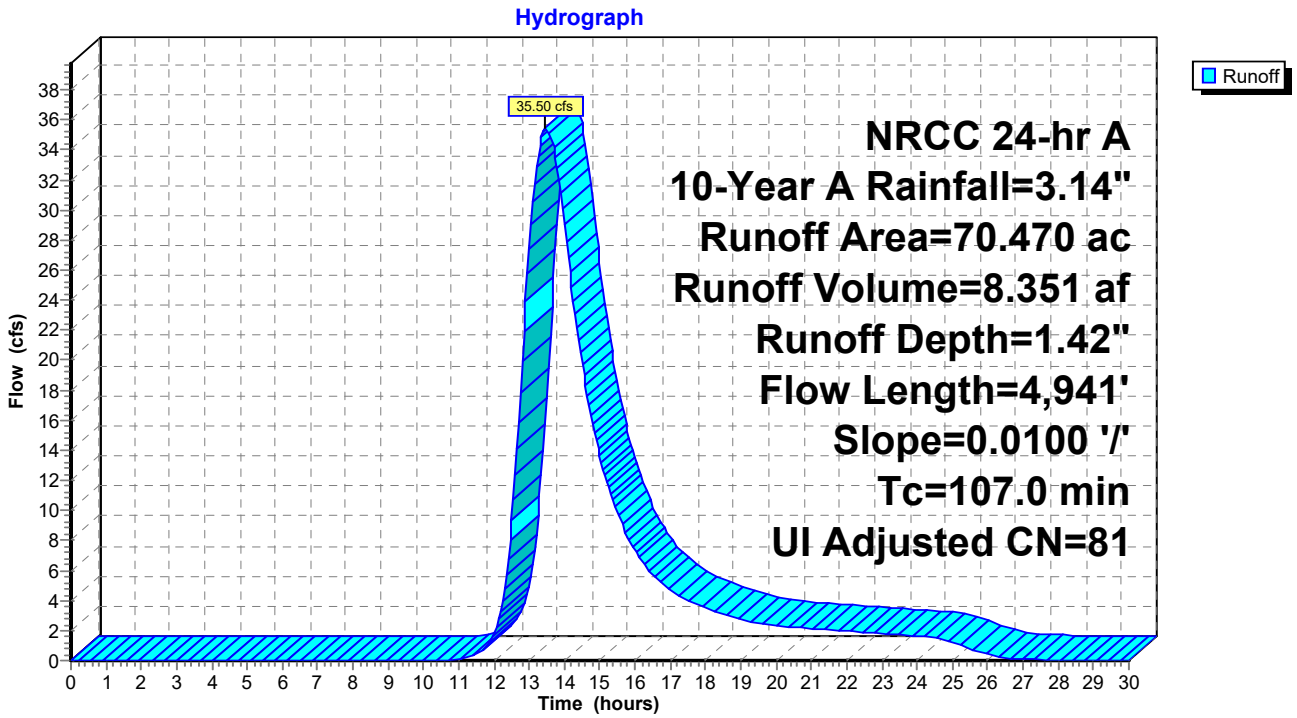
Runoff = 35.50 cfs @ 13.46 hrs, Volume= 8.351 af, Depth= 1.42"
Routed to Reach 37R : 37R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
63.423	80		>75% Grass cover, Good, HSG D
7.047	98		Unconnected pavement, HSG D
70.470	82	81	Weighted Average, UI Adjusted
63.423	80	80	90.00% Pervious Area
7.047	98	98	10.00% Impervious Area
7.047			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
107.0	4,941	0.0100	0.77		**Lag/CN Method,**

Subcatchment 37S: 37S



Summary for Subcatchment 38S: 38S

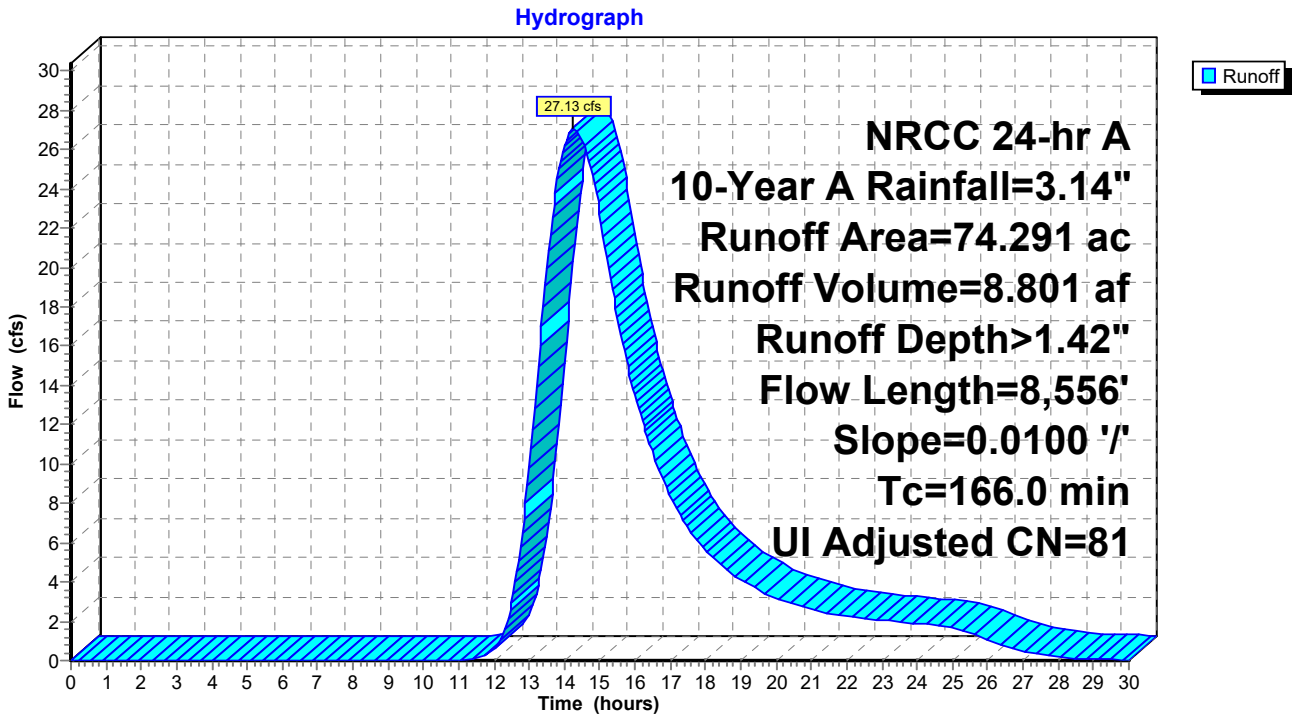
Runoff = 27.13 cfs @ 14.22 hrs, Volume= 8.801 af, Depth> 1.42"
Routed to Reach 38R : 38R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year A Rainfall=3.14"

Area (ac)	CN	Adj	Description
66.862	80		>75% Grass cover, Good, HSG D
7.429	98		Unconnected pavement, HSG D
74.291	82	81	Weighted Average, UI Adjusted
66.862	80	80	90.00% Pervious Area
7.429	98	98	10.00% Impervious Area
7.429			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
166.0	8,556	0.0100	0.86		**Lag/CN Method,**

Subcatchment 38S: 38S



Summary for Reach 2R: 2R

[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 3R OUTLET depth by 6.65' @ 12.50 hrs

Inflow Area = 69.151 ac, 21.80% Impervious, Inflow Depth > 1.60" for 10-Year A event
Inflow = 34.01 cfs @ 13.50 hrs, Volume= 9.192 af
Outflow = 34.00 cfs @ 13.52 hrs, Volume= 9.192 af, Atten= 0%, Lag= 0.7 min
Routed to Pond 4R : 4R

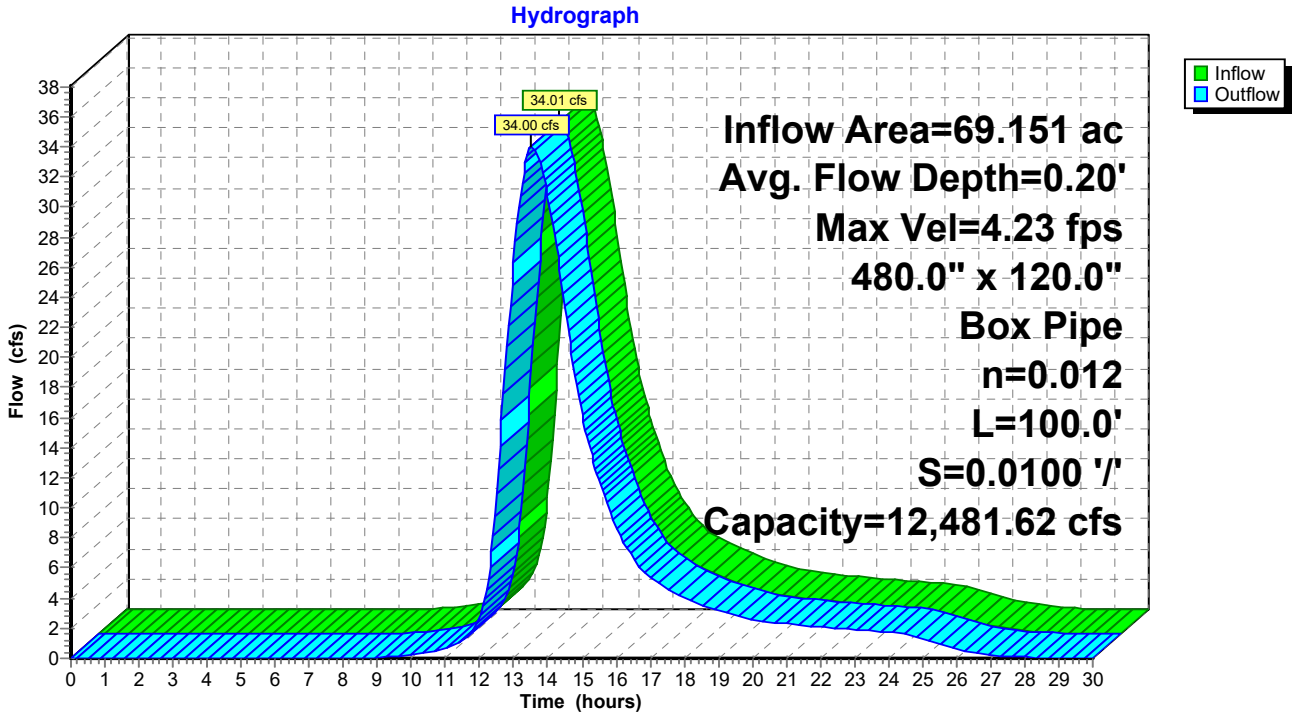
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.23 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.80 fps, Avg. Travel Time= 0.6 min

Peak Storage= 804 cf @ 13.51 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 40.00'
Bank-Full Depth= 10.00' Flow Area= 400.0 sf, Capacity= 12,481.62 cfs

480.0" W x 120.0" H Box Pipe
n= 0.012 Concrete pipe, finished
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 600.00', Outlet Invert= 599.00'



Reach 2R: 2R


Hydrograph
Inflow
Outflow
34.01 cfs
34.00 cfs
Inflow Area=69.151 ac
Avg. Flow Depth=0.20'
Max Vel=4.23 fps
480.0" x 120.0"
Box Pipe
n=0.012
L=100.0'
S=0.0100 '/'
Capacity=12,481.62 cfs
Flow (cfs)
Time (hours)

Summary for Reach 3R: 3R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 41.941 ac, 10.00% Impervious, Inflow Depth = 1.42" for 10-Year A event
Inflow = 19.91 cfs @ 13.60 hrs, Volume= 4.970 af
Outflow = 19.59 cfs @ 13.98 hrs, Volume= 4.970 af, Atten= 2%, Lag= 22.6 min
Routed to Reach 2R : 2R

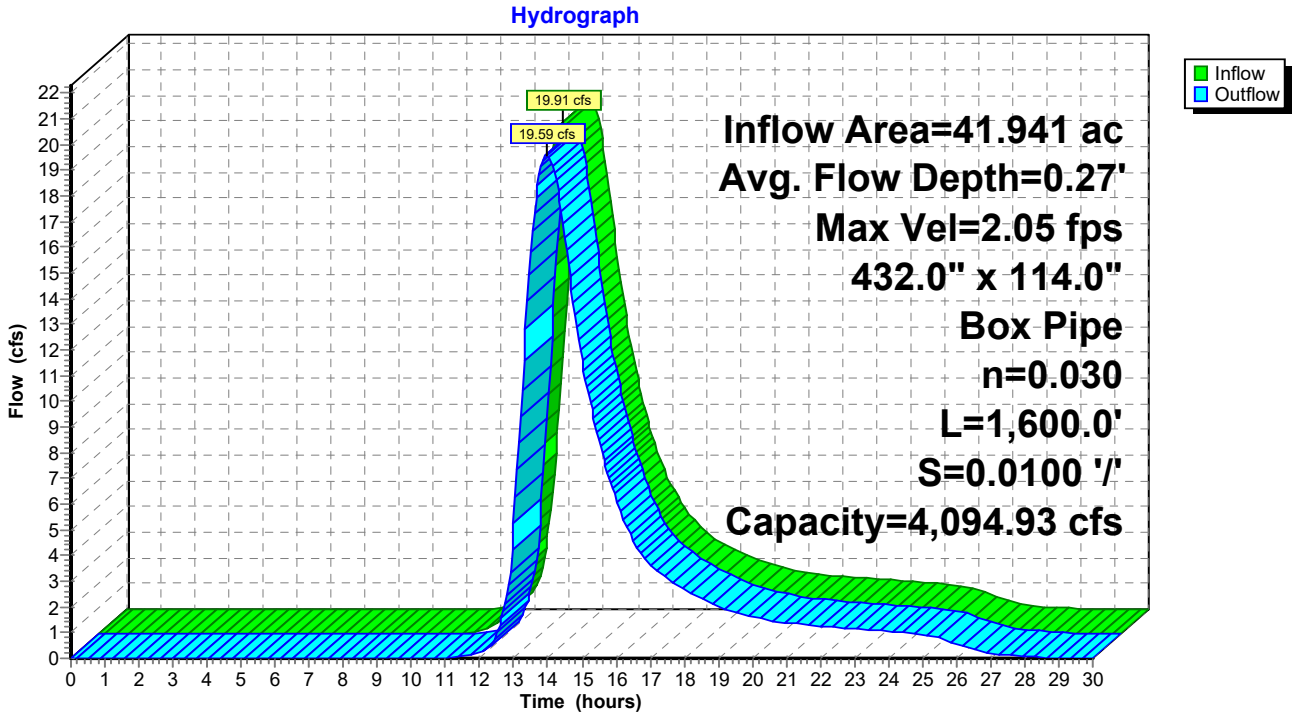
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.05 fps, Min. Travel Time= 13.0 min
Avg. Velocity = 1.14 fps, Avg. Travel Time= 23.3 min

Peak Storage= 15,299 cf @ 13.76 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 36.00'
Bank-Full Depth= 9.50' Flow Area= 342.0 sf, Capacity= 4,094.93 cfs

432.0" W x 114.0" H Box Pipe
n= 0.030 Stream, clean & straight
Length= 1,600.0' Slope= 0.0100 '/'
Inlet Invert= 609.40', Outlet Invert= 593.40'



Reach 3R: 3R


Hydrograph
Inflow
Outflow
19.91 cfs
19.59 cfs
Inflow Area=41.941 ac
Avg. Flow Depth=0.27'
Max Vel=2.05 fps
432.0" x 114.0"
Box Pipe
n=0.030
L=1,600.0'
S=0.0100 '/'
Capacity=4,094.93 cfs
Flow (cfs)
Time (hours)

Summary for Reach 5R: 5R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 102.803 ac, 14.80% Impervious, Inflow Depth = 1.45" for 10-Year A event
Inflow = 48.87 cfs @ 13.59 hrs, Volume= 12.462 af
Outflow = 48.85 cfs @ 13.59 hrs, Volume= 12.462 af, Atten= 0%, Lag= 0.2 min
Routed to Pond 1R : 1R

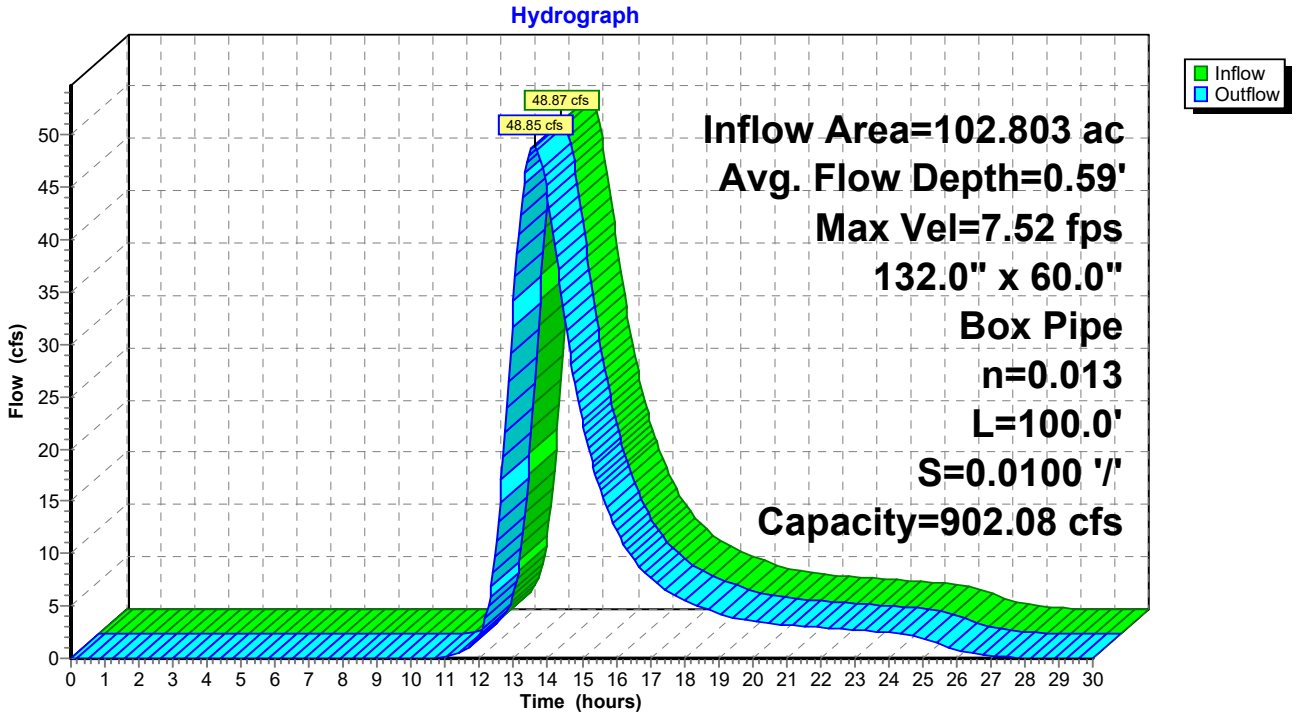
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.52 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.01 fps, Avg. Travel Time= 0.6 min

Peak Storage= 650 cf @ 13.59 hrs
Average Depth at Peak Storage= 0.59' , Surface Width= 11.00'
Bank-Full Depth= 5.00' Flow Area= 55.0 sf, Capacity= 902.08 cfs

132.0" W x 60.0" H Box Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 584.30', Outlet Invert= 583.30'



Reach 5R: 5R


Hydrograph
Inflow
Outflow
48.87 cfs
48.85 cfs
Inflow Area=102.803 ac
Avg. Flow Depth=0.59'
Max Vel=7.52 fps
132.0" x 60.0"
Box Pipe
n=0.013
L=100.0'
S=0.0100 '/'
Capacity=902.08 cfs
Flow (cfs)
0 5 10 15 20 25 30 35 40 45 50
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Reach 6R: 6R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 313.694 ac, 6.55% Impervious, Inflow Depth = 1.38" for 10-Year A event
Inflow = 137.60 cfs @ 13.58 hrs, Volume= 35.983 af
Outflow = 137.55 cfs @ 13.60 hrs, Volume= 35.983 af, Atten= 0%, Lag= 1.0 min
Routed to Reach 9R : 9R

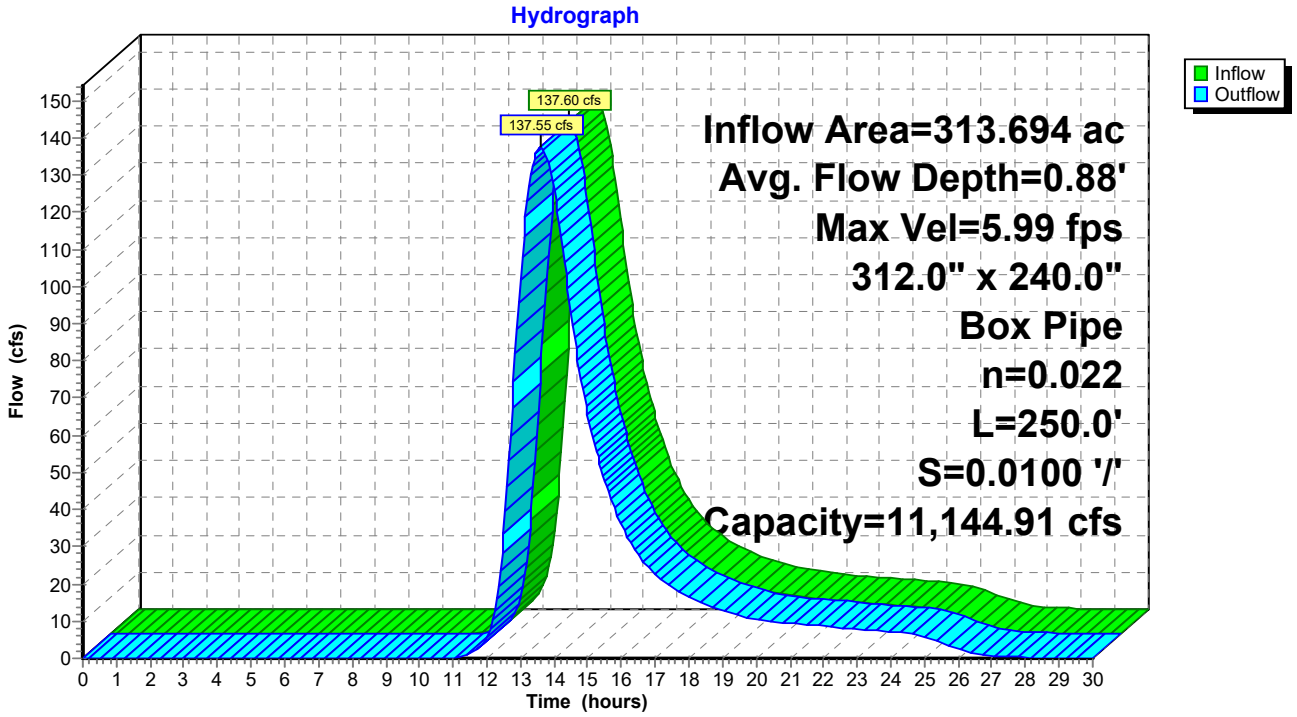
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.99 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 2.85 fps, Avg. Travel Time= 1.5 min

Peak Storage= 5,744 cf @ 13.59 hrs
Average Depth at Peak Storage= 0.88' , Surface Width= 26.00'
Bank-Full Depth= 20.00' Flow Area= 520.0 sf, Capacity= 11,144.91 cfs

312.0" W x 240.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 250.0' Slope= 0.0100 '/'
Inlet Invert= 588.60', Outlet Invert= 586.10'



Reach 6R: 6R


Hydrograph
Inflow
Outflow
137.60 cfs
137.55 cfs
Inflow Area=313.694 ac
Avg. Flow Depth=0.88'
Max Vel=5.99 fps
312.0" x 240.0"
Box Pipe
n=0.022
L=250.0'
S=0.0100 '/'
Capacity=11,144.91 cfs
Flow (cfs)
Time (hours)

Summary for Reach 7R: 7R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 246.936 ac, 6.98% Impervious, Inflow Depth = 1.38" for 10-Year A event
Inflow = 109.06 cfs @ 13.53 hrs, Volume= 28.440 af
Outflow = 109.05 cfs @ 13.54 hrs, Volume= 28.440 af, Atten= 0%, Lag= 0.2 min
Routed to Reach 6R : 6R

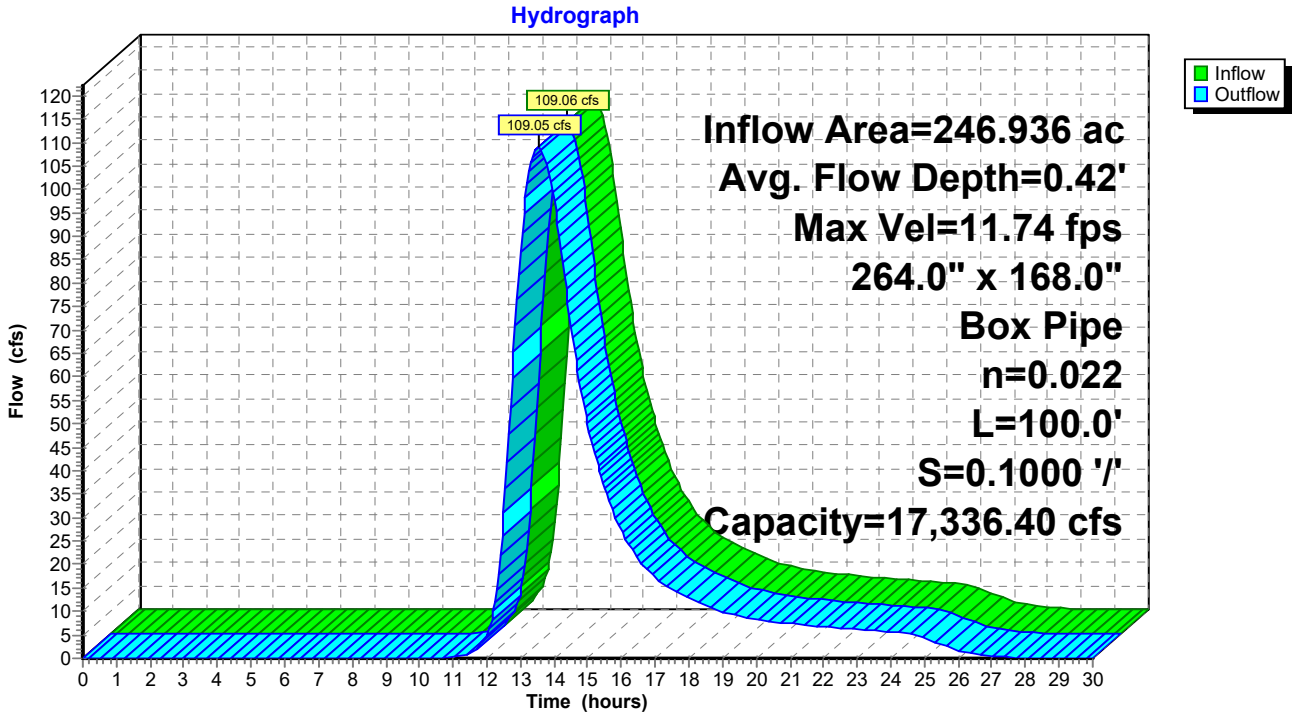
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.74 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.46 fps, Avg. Travel Time= 0.3 min

Peak Storage= 929 cf @ 13.54 hrs
Average Depth at Peak Storage= 0.42' , Surface Width= 22.00'
Bank-Full Depth= 14.00' Flow Area= 308.0 sf, Capacity= 17,336.40 cfs

264.0" W x 168.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 100.0' Slope= 0.1000 '/'
Inlet Invert= 661.30', Outlet Invert= 651.30'



Reach 7R: 7R


Hydrograph
Inflow
Outflow
109.06 cfs
109.05 cfs
Inflow Area=246.936 ac
Avg. Flow Depth=0.42'
Max Vel=11.74 fps
264.0" x 168.0"
Box Pipe
n=0.022
L=100.0'
S=0.1000 '/'
Capacity=17,336.40 cfs
Flow (cfs)
Time (hours)

Summary for Reach 9R: 9R

[52] Hint: Inlet/Outlet conditions not evaluated
[63] Warning: Exceeded Reach 6R INLET depth by 0.05' @ 13.00 hrs

Inflow Area = 334.148 ac, 7.38% Impervious, Inflow Depth = 1.38" for 10-Year A event
Inflow = 147.78 cfs @ 13.54 hrs, Volume= 38.523 af
Outflow = 147.76 cfs @ 13.55 hrs, Volume= 38.523 af, Atten= 0%, Lag= 0.4 min
Routed to Pond 1R : 1R

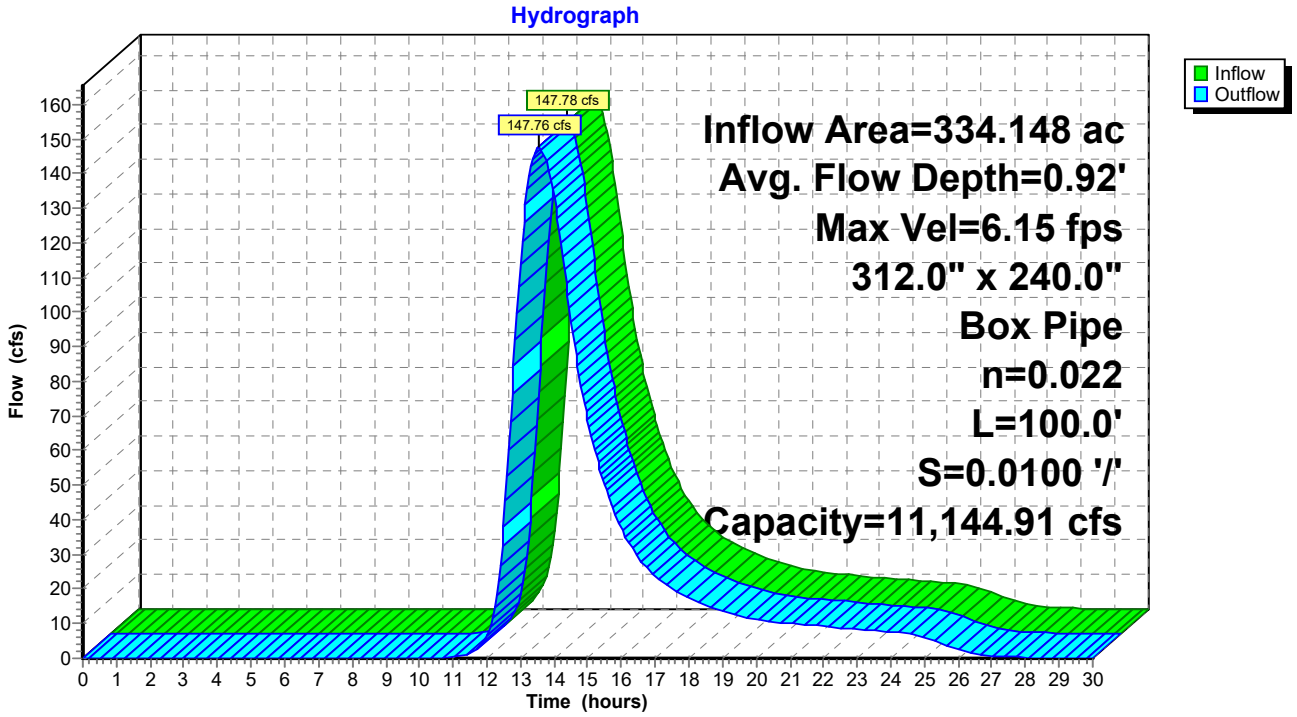
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.15 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.88 fps, Avg. Travel Time= 0.6 min

Peak Storage= 2,402 cf @ 13.54 hrs
Average Depth at Peak Storage= 0.92' , Surface Width= 26.00'
Bank-Full Depth= 20.00' Flow Area= 520.0 sf, Capacity= 11,144.91 cfs

312.0" W x 240.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 588.60', Outlet Invert= 587.60'



Reach 9R: 9R


Hydrograph
Inflow
Outflow
147.78 cfs
147.76 cfs
Inflow Area=334.148 ac
Avg. Flow Depth=0.92'
Max Vel=6.15 fps
312.0" x 240.0"
Box Pipe
n=0.022
L=100.0'
S=0.0100 '/'
Capacity=11,144.91 cfs
Flow (cfs)
Time (hours)

Summary for Reach 10R: 10R

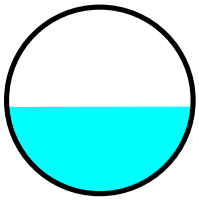
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 84.795 ac, 5.00% Impervious, Inflow Depth > 1.36" for 10-Year A event
Inflow = 33.03 cfs @ 14.04 hrs, Volume= 9.581 af
Outflow = 33.01 cfs @ 14.04 hrs, Volume= 9.581 af, Atten= 0%, Lag= 0.4 min
Routed to Link 39L : (new Link)

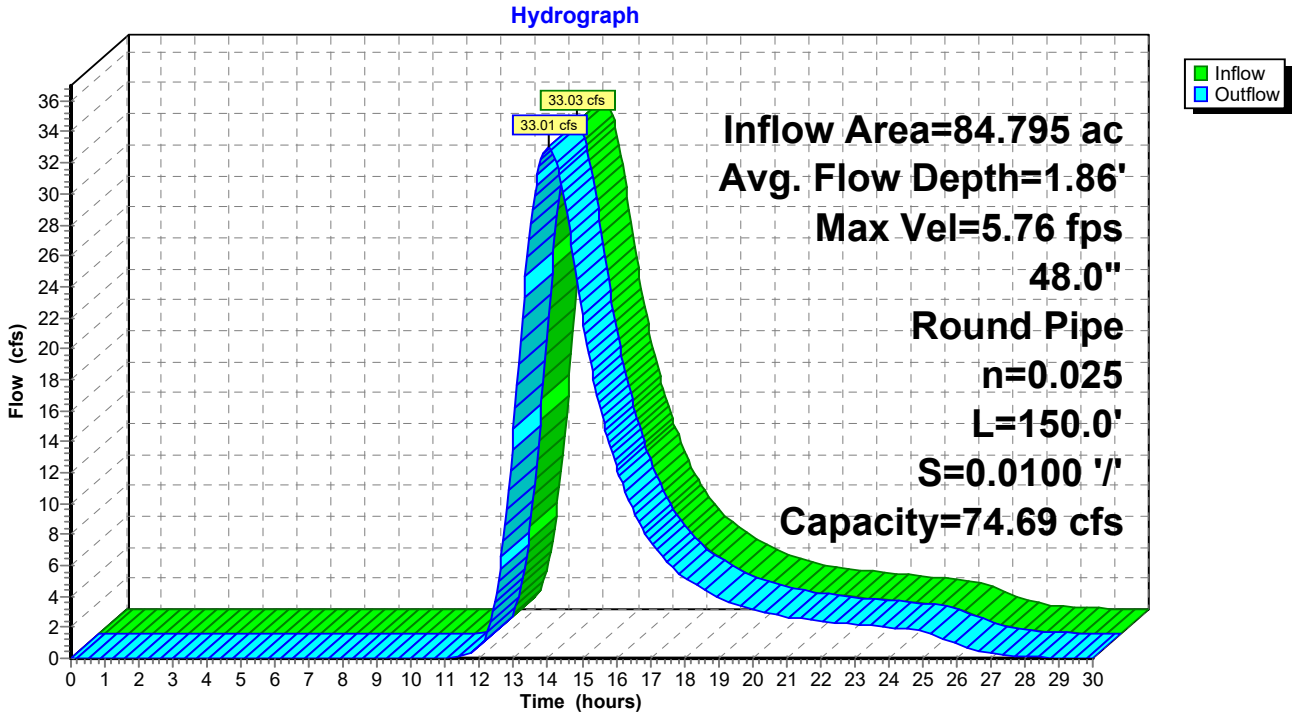
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.76 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.81 fps, Avg. Travel Time= 0.9 min

Peak Storage= 860 cf @ 14.04 hrs
Average Depth at Peak Storage= 1.86' , Surface Width= 3.99'
Bank-Full Depth= 4.00' Flow Area= 12.6 sf, Capacity= 74.69 cfs

48.0" Round Pipe
n= 0.025 Corrugated metal
Length= 150.0' Slope= 0.0100 '/'
Inlet Invert= 599.10', Outlet Invert= 597.60'



Reach 10R: 10R



Summary for Reach 11R: 11R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 65.122 ac, 5.00% Impervious, Inflow Depth > 1.36" for 10-Year A event
Inflow = 24.10 cfs @ 14.06 hrs, Volume= 7.358 af
Outflow = 24.08 cfs @ 14.08 hrs, Volume= 7.358 af, Atten= 0%, Lag= 0.9 min
Routed to Link 39L : (new Link)

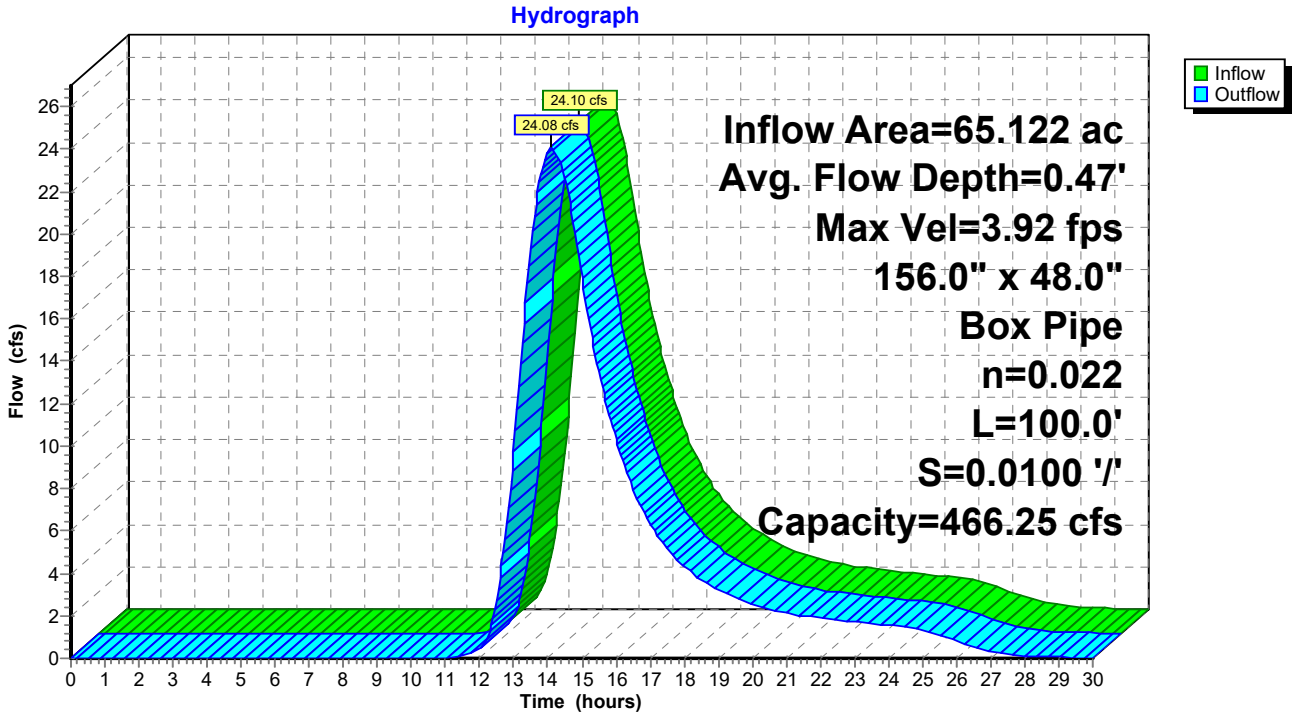
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.92 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.71 fps, Avg. Travel Time= 1.0 min

Peak Storage= 615 cf @ 14.07 hrs
Average Depth at Peak Storage= 0.47' , Surface Width= 13.00'
Bank-Full Depth= 4.00' Flow Area= 52.0 sf, Capacity= 466.25 cfs

156.0" W x 48.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 696.90', Outlet Invert= 695.90'



Reach 11R: 11R



Summary for Reach 12R: 12R

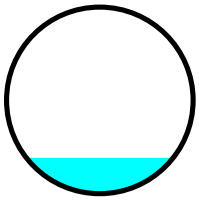
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 39.478 ac, 5.00% Impervious, Inflow Depth > 1.36" for 10-Year A event
Inflow = 15.98 cfs @ 13.94 hrs, Volume= 4.461 af
Outflow = 15.89 cfs @ 14.12 hrs, Volume= 4.460 af, Atten= 1%, Lag= 10.7 min
Routed to Reach 16R : 16R

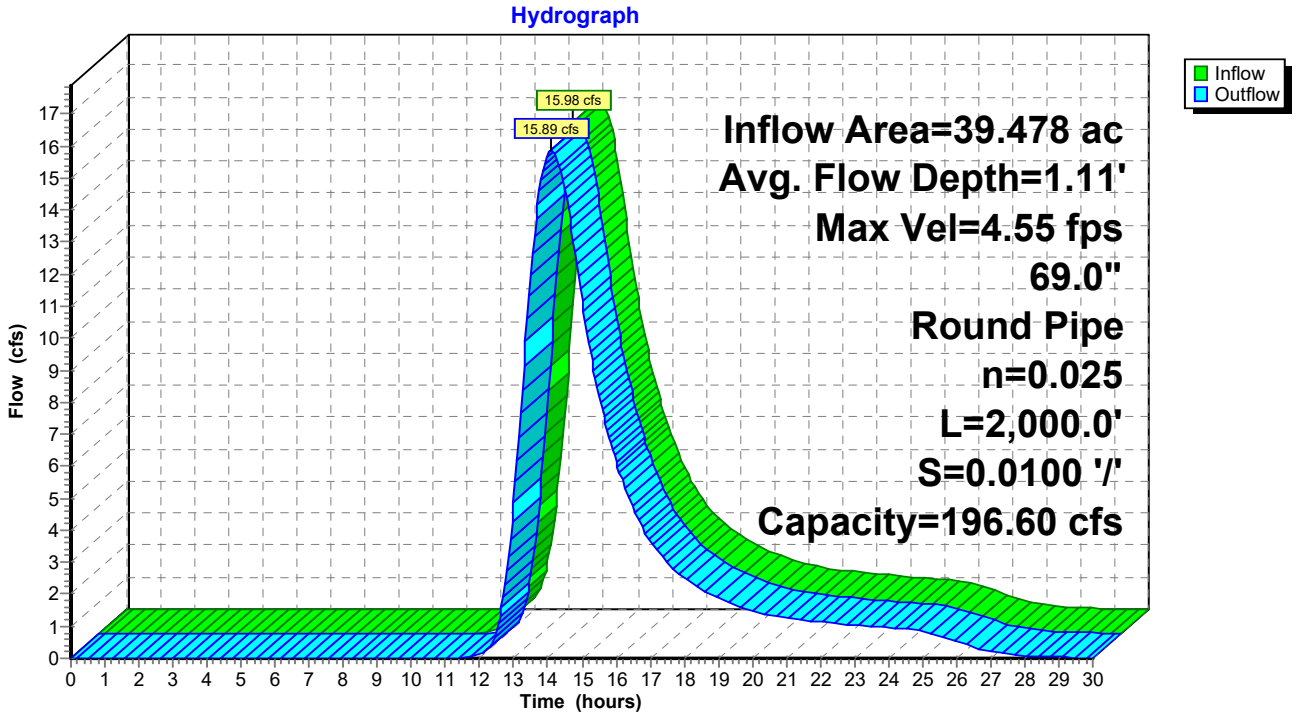
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.55 fps, Min. Travel Time= 7.3 min
Avg. Velocity = 2.16 fps, Avg. Travel Time= 15.4 min

Peak Storage= 6,987 cf @ 13.99 hrs
Average Depth at Peak Storage= 1.11' , Surface Width= 4.53'
Bank-Full Depth= 5.75' Flow Area= 26.0 sf, Capacity= 196.60 cfs

69.0" Round Pipe
n= 0.025 Corrugated metal
Length= 2,000.0' Slope= 0.0100 '/'
Inlet Invert= 803.00', Outlet Invert= 783.00'



Reach 12R: 12R



Summary for Reach 13R: 13R

[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 14R OUTLET depth by 61.87' @ 13.10 hrs
[63] Warning: Exceeded Reach 24R1 INLET depth by 0.22' @ 13.45 hrs

Inflow Area = 105.757 ac, 5.00% Impervious, Inflow Depth > 1.35" for 10-Year A event
Inflow = 47.02 cfs @ 13.22 hrs, Volume= 11.936 af
Outflow = 46.78 cfs @ 13.35 hrs, Volume= 11.934 af, Atten= 0%, Lag= 7.6 min
Routed to Reach 16R : 16R

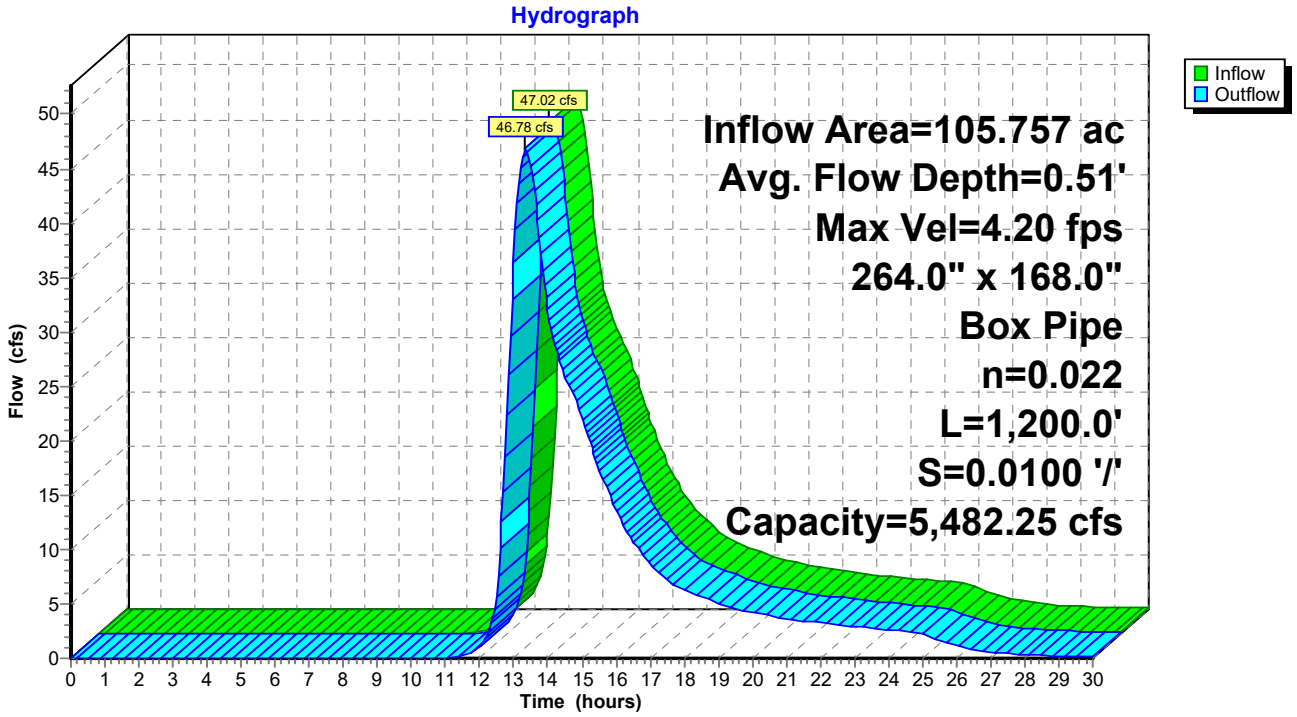
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.20 fps, Min. Travel Time= 4.8 min
Avg. Velocity = 2.13 fps, Avg. Travel Time= 9.4 min

Peak Storage= 13,370 cf @ 13.27 hrs
Average Depth at Peak Storage= 0.51' , Surface Width= 22.00'
Bank-Full Depth= 14.00' Flow Area= 308.0 sf, Capacity= 5,482.25 cfs

264.0" W x 168.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 1,200.0' Slope= 0.0100 '/'
Inlet Invert= 780.00', Outlet Invert= 768.00'



Reach 13R: 13R



Summary for Reach 14R: 14R

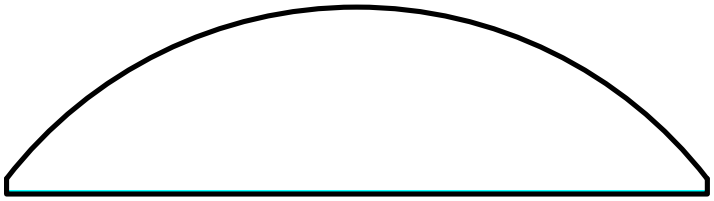
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 26.837 ac, 5.00% Impervious, Inflow Depth = 1.36" for 10-Year A event
Inflow = 15.79 cfs @ 13.10 hrs, Volume= 3.032 af
Outflow = 10.03 cfs @ 14.86 hrs, Volume= 3.018 af, Atten= 36%, Lag= 105.3 min
Routed to Reach 13R : 13R

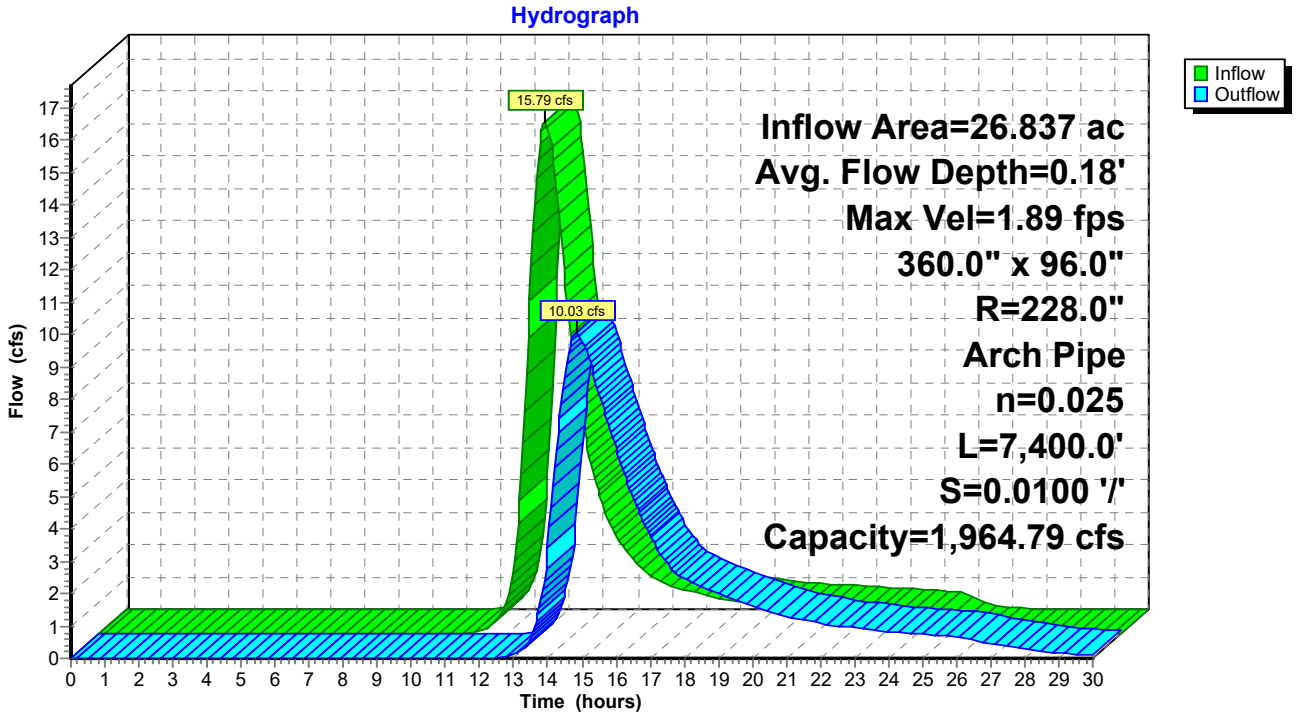
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.89 fps, Min. Travel Time= 65.2 min
Avg. Velocity = 1.19 fps, Avg. Travel Time= 103.8 min

Peak Storage= 39,264 cf @ 13.77 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 30.00'
Bank-Full Depth= 8.00' Flow Area= 173.4 sf, Capacity= 1,964.79 cfs

360.0" W x 96.0" H, R=228.0" Arch Pipe
n= 0.025 Corrugated metal
Length= 7,400.0' Slope= 0.0100 '/'
Inlet Invert= 792.50', Outlet Invert= 718.50'



Reach 14R: 14R



Summary for Reach 15R: 15R

[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 16R OUTLET depth by 18.40' @ 0.00 hrs

Inflow Area = 326.671 ac, 5.00% Impervious, Inflow Depth > 1.35" for 10-Year A event
Inflow = 59.04 cfs @ 14.16 hrs, Volume= 36.884 af
Outflow = 58.98 cfs @ 14.30 hrs, Volume= 36.874 af, Atten= 0%, Lag= 8.4 min
Routed to Pond 18R : 18R

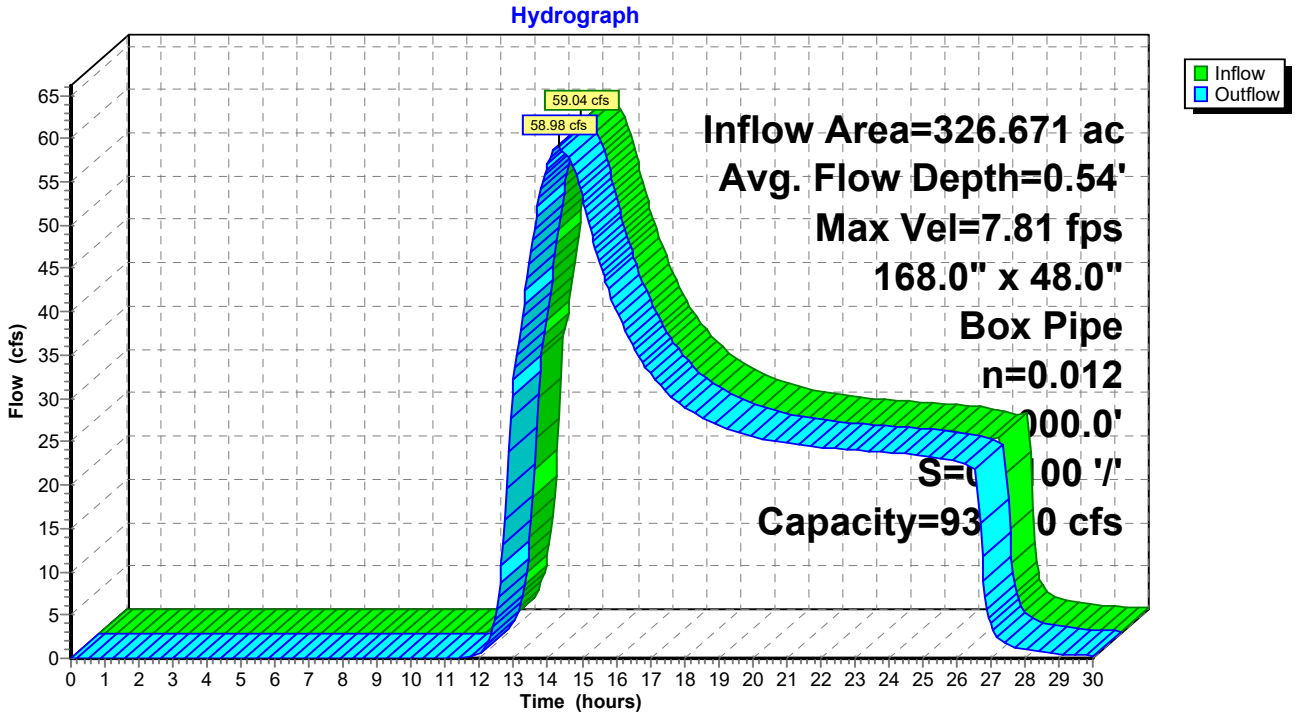
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.81 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 4.85 fps, Avg. Travel Time= 6.9 min

Peak Storage= 15,100 cf @ 14.22 hrs
Average Depth at Peak Storage= 0.54' , Surface Width= 14.00'
Bank-Full Depth= 4.00' Flow Area= 56.0 sf, Capacity= 931.00 cfs

168.0" W x 48.0" H Box Pipe
n= 0.012 Concrete pipe, finished
Length= 2,000.0' Slope= 0.0100 '/'
Inlet Invert= 765.50', Outlet Invert= 745.50'



Reach 15R: 15R



Summary for Reach 16R: 16R

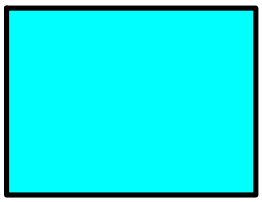
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 430% of Manning's capacity
[76] Warning: Detained 10.730 af (Pond w/culvert advised)
[63] Warning: Exceeded Reach 13R INLET depth by 1.58' @ 26.35 hrs

Inflow Area = 219.406 ac, 5.00% Impervious, Inflow Depth > 1.35" for 10-Year A event
Inflow = 90.72 cfs @ 13.51 hrs, Volume= 24.774 af
Outflow = 24.20 cfs @ 26.49 hrs, Volume= 24.766 af, Atten= 73%, Lag= 779.0 min
Routed to Reach 15R : 15R

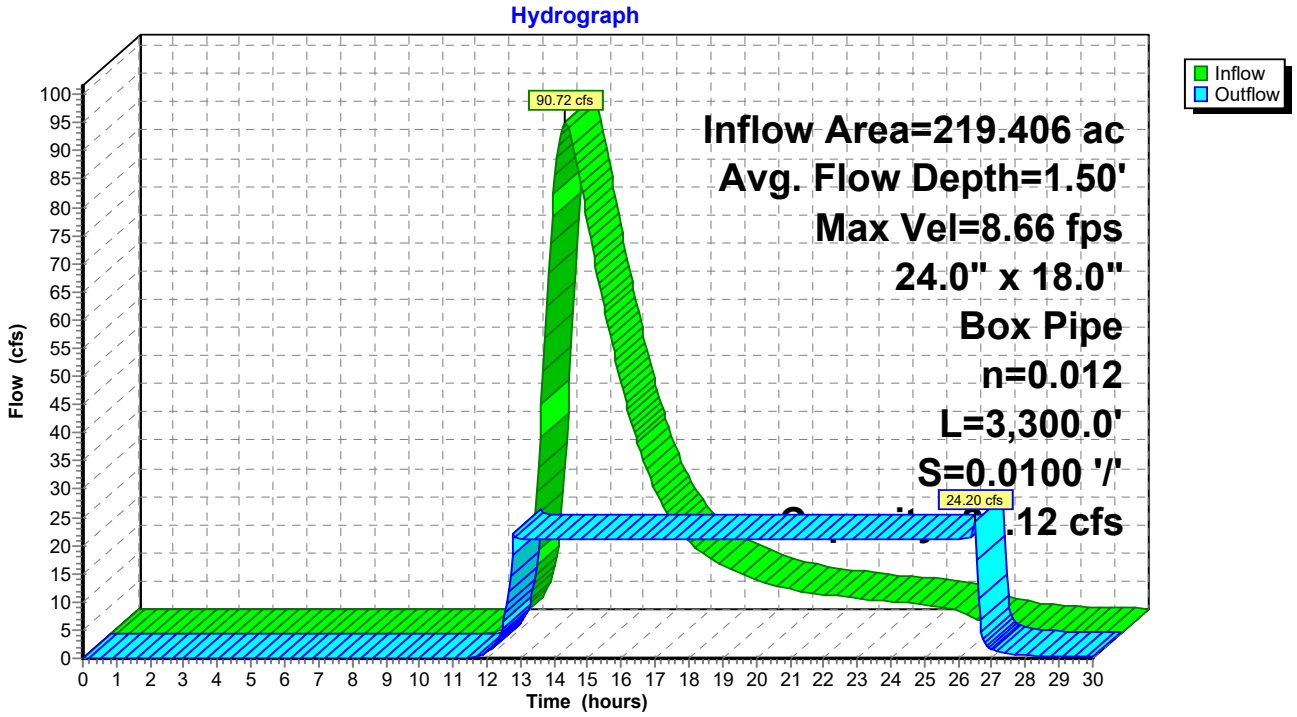
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.66 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 5.79 fps, Avg. Travel Time= 9.5 min

Peak Storage= 9,900 cf @ 12.75 hrs
Average Depth at Peak Storage= 1.50' , Surface Width= 2.00'
Bank-Full Depth= 1.50' Flow Area= 3.0 sf, Capacity= 21.12 cfs

24.0" W x 18.0" H Box Pipe
n= 0.012 Concrete pipe, finished
Length= 3,300.0' Slope= 0.0100 '/'
Inlet Invert= 780.10', Outlet Invert= 747.10'



Reach 16R: 16R



Summary for Reach 19R: 19R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 27.700 ac, 5.00% Impervious, Inflow Depth = 1.36" for 10-Year A event
Inflow = 15.08 cfs @ 13.28 hrs, Volume= 3.130 af
Outflow = 15.00 cfs @ 13.41 hrs, Volume= 3.130 af, Atten= 1%, Lag= 8.1 min
Routed to Link 39L : (new Link)

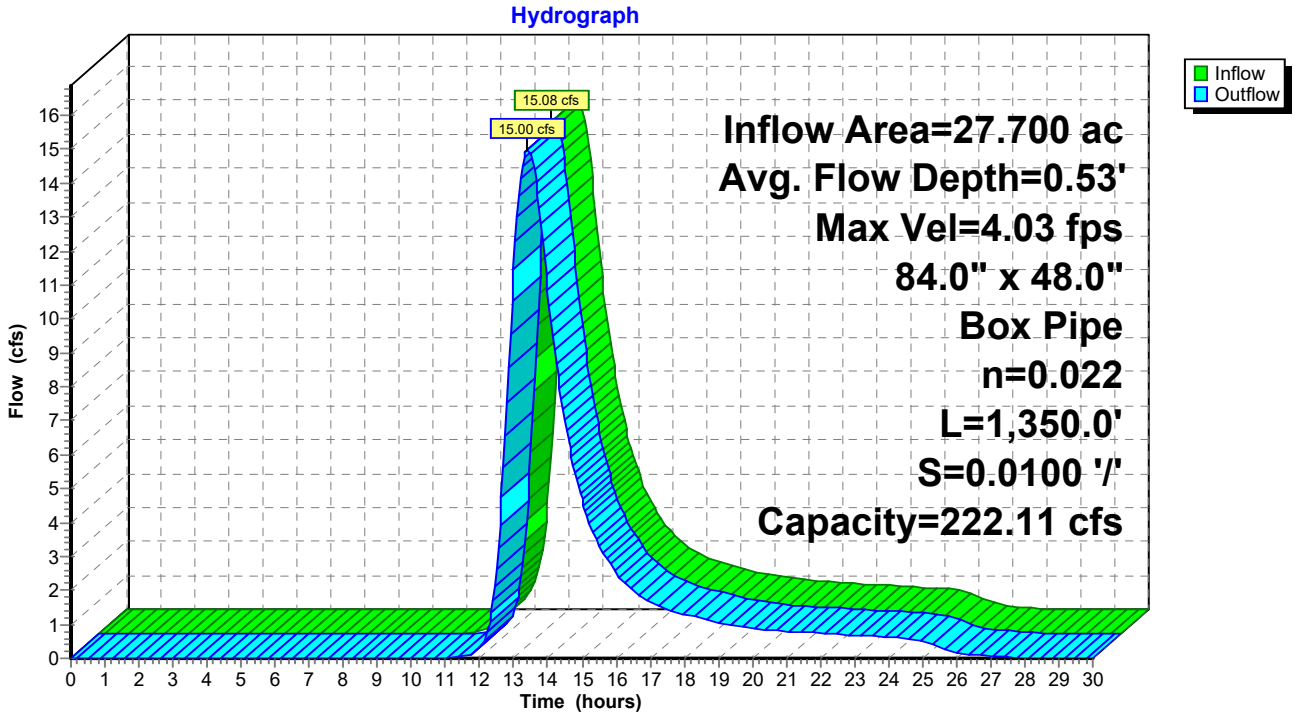
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.03 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 1.51 fps, Avg. Travel Time= 14.9 min

Peak Storage= 5,021 cf @ 13.32 hrs
Average Depth at Peak Storage= 0.53' , Surface Width= 7.00'
Bank-Full Depth= 4.00' Flow Area= 28.0 sf, Capacity= 222.11 cfs

84.0" W x 48.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 1,350.0' Slope= 0.0100 '/'
Inlet Invert= 654.50', Outlet Invert= 641.00'



Reach 19R: 19R



Summary for Reach 21R: 21R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 198.563 ac, 5.00% Impervious, Inflow Depth > 1.36" for 10-Year A event
Inflow = 62.85 cfs @ 13.99 hrs, Volume= 22.430 af
Outflow = 62.81 cfs @ 14.06 hrs, Volume= 22.427 af, Atten= 0%, Lag= 4.2 min
Routed to Pond 20R : 20R

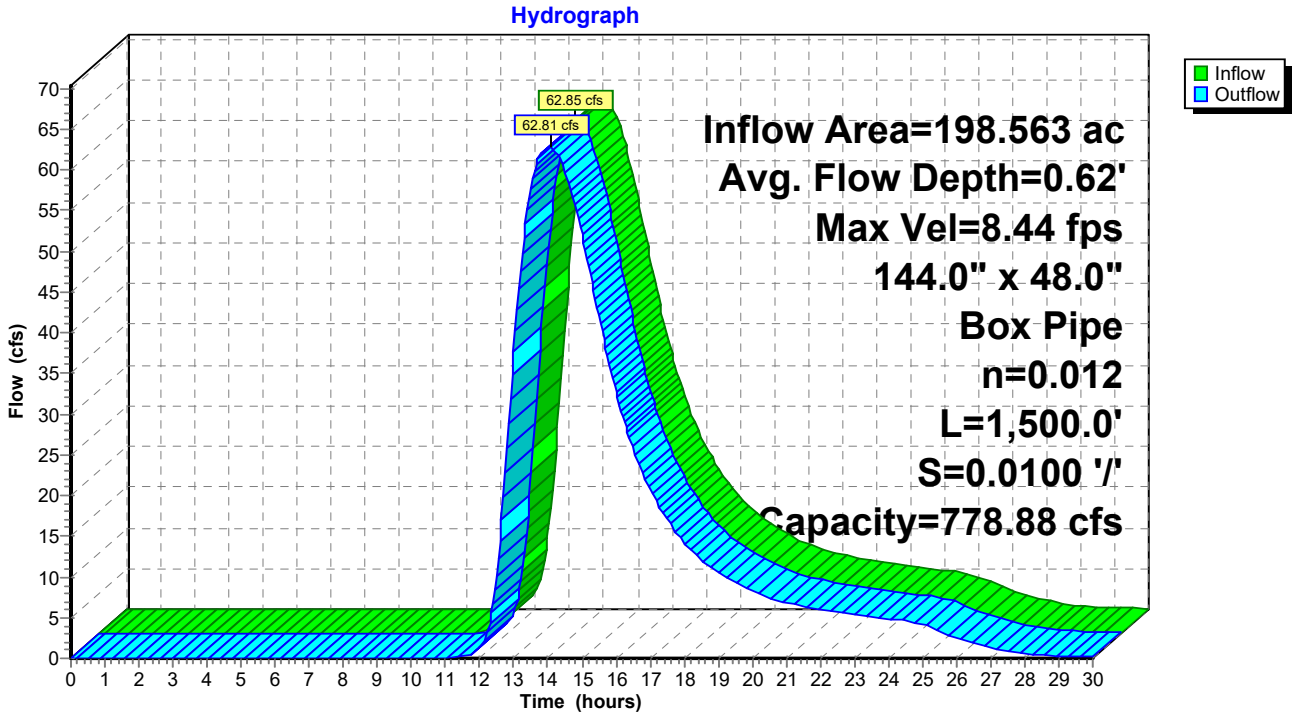
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.44 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 3.88 fps, Avg. Travel Time= 6.4 min

Peak Storage= 11,164 cf @ 14.02 hrs
Average Depth at Peak Storage= 0.62' , Surface Width= 12.00'
Bank-Full Depth= 4.00' Flow Area= 48.0 sf, Capacity= 778.88 cfs

144.0" W x 48.0" H Box Pipe
n= 0.012 Concrete pipe, finished
Length= 1,500.0' Slope= 0.0100 '/'
Inlet Invert= 651.30', Outlet Invert= 636.30'



Reach 21R: 21R



Summary for Reach 24R1: 24R1

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 45.180 ac, 5.00% Impervious, Inflow Depth = 1.36" for 10-Year A event
Inflow = 28.07 cfs @ 13.04 hrs, Volume= 5.105 af
Outflow = 27.79 cfs @ 13.22 hrs, Volume= 5.105 af, Atten= 1%, Lag= 10.7 min
Routed to Reach 13R : 13R

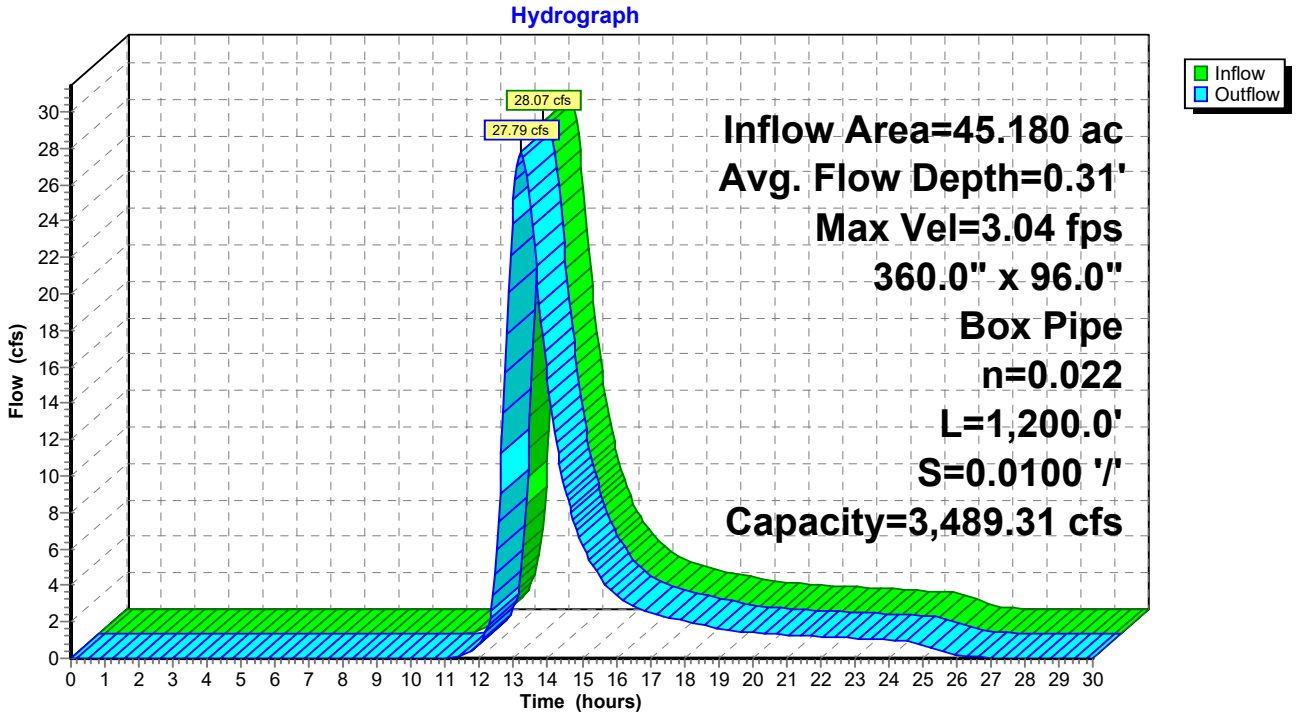
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.04 fps, Min. Travel Time= 6.6 min
Avg. Velocity = 1.43 fps, Avg. Travel Time= 14.0 min

Peak Storage= 10,987 cf @ 13.11 hrs
Average Depth at Peak Storage= 0.31' , Surface Width= 30.00'
Bank-Full Depth= 8.00' Flow Area= 240.0 sf, Capacity= 3,489.31 cfs

360.0" W x 96.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 1,200.0' Slope= 0.0100 '/'
Inlet Invert= 780.00', Outlet Invert= 768.00'



Reach 24R1: 24R1



Summary for Reach 24R2: 24R2

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 45.180 ac, 5.00% Impervious, Inflow Depth = 1.36" for 10-Year A event
Inflow = 29.36 cfs @ 12.95 hrs, Volume= 5.105 af
Outflow = 29.26 cfs @ 13.01 hrs, Volume= 5.105 af, Atten= 0%, Lag= 3.6 min
Routed to Pond 30R : 30R

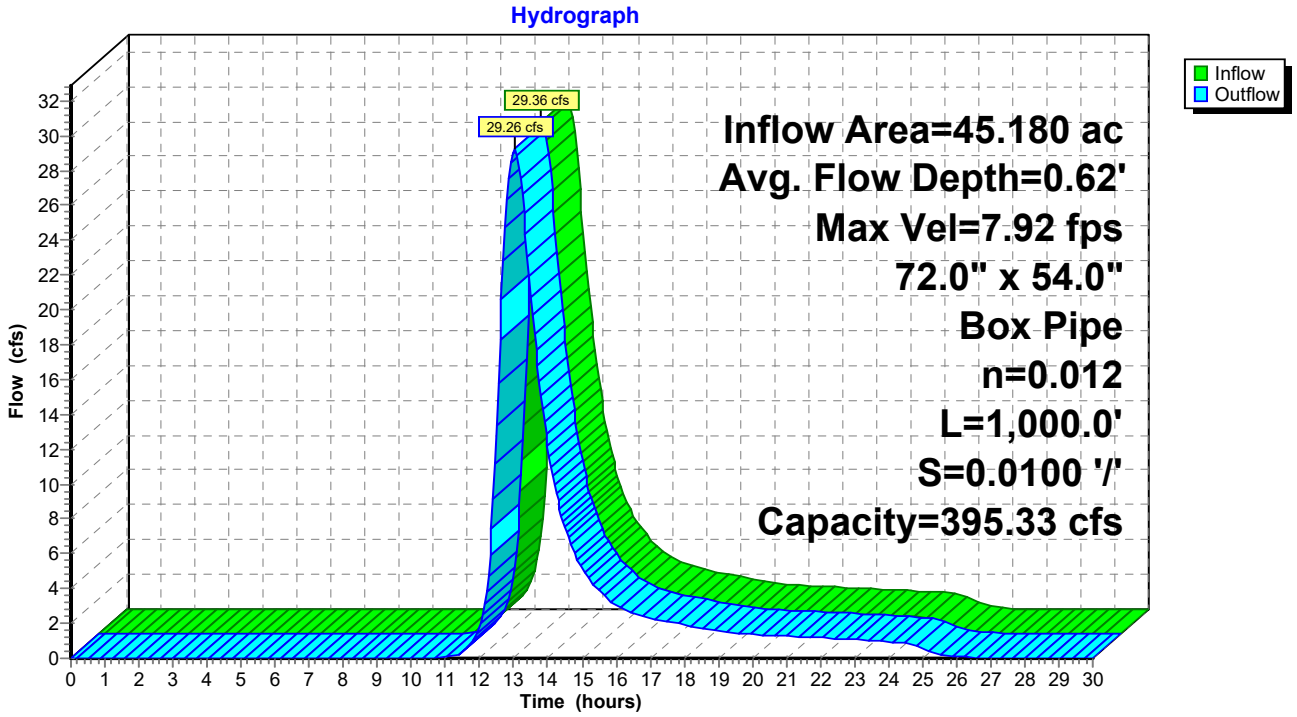
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.92 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 2.93 fps, Avg. Travel Time= 5.7 min

Peak Storage= 3,698 cf @ 12.98 hrs
Average Depth at Peak Storage= 0.62' , Surface Width= 6.00'
Bank-Full Depth= 4.50' Flow Area= 27.0 sf, Capacity= 395.33 cfs

72.0" W x 54.0" H Box Pipe
n= 0.012 Concrete pipe, finished
Length= 1,000.0' Slope= 0.0100 '/'
Inlet Invert= 780.30', Outlet Invert= 770.30'



Reach 24R2: 24R2



Summary for Reach 25R: 25R

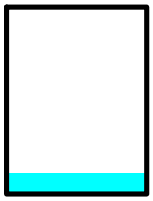
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 16.580 ac, 10.00% Impervious, Inflow Depth = 1.42" for 10-Year A event
Inflow = 7.74 cfs @ 13.64 hrs, Volume= 1.965 af
Outflow = 7.72 cfs @ 13.79 hrs, Volume= 1.965 af, Atten= 0%, Lag= 9.2 min
Routed to Link 39L : (new Link)

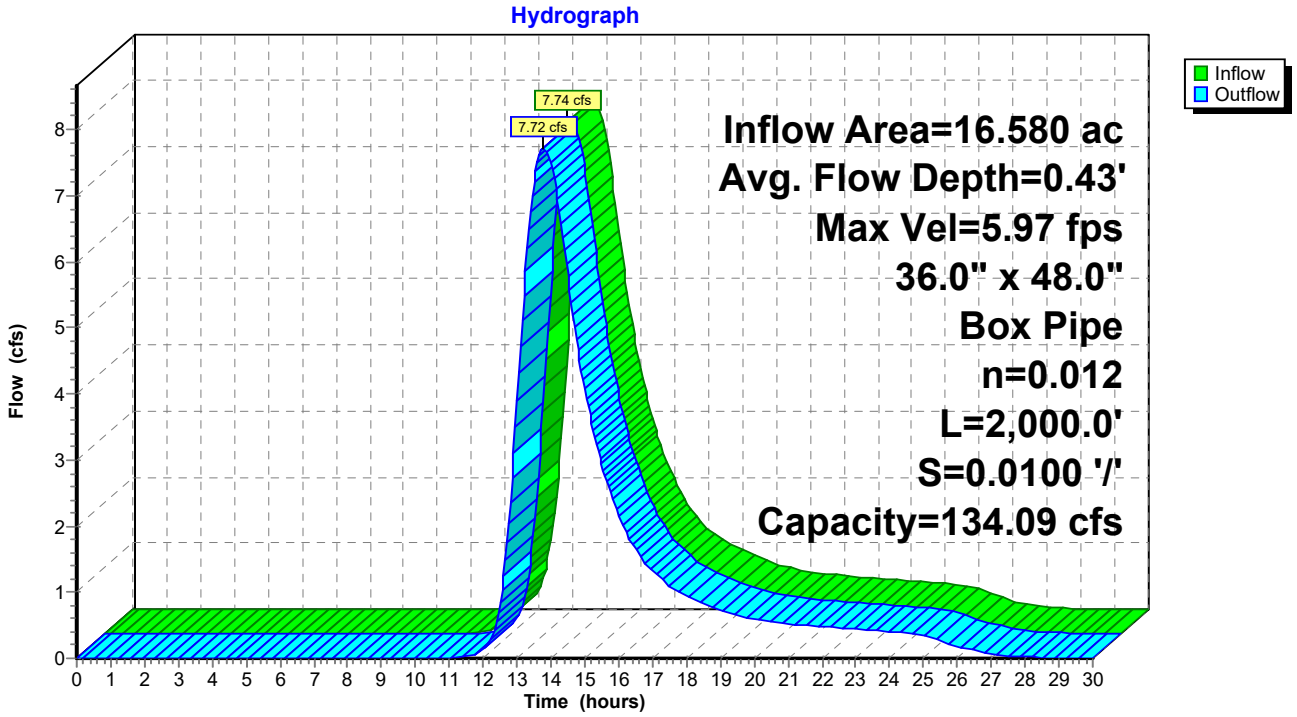
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.97 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 2.54 fps, Avg. Travel Time= 13.1 min

Peak Storage= 2,585 cf @ 13.70 hrs
Average Depth at Peak Storage= 0.43' , Surface Width= 3.00'
Bank-Full Depth= 4.00' Flow Area= 12.0 sf, Capacity= 134.09 cfs

36.0" W x 48.0" H Box Pipe
n= 0.012 Concrete pipe, finished
Length= 2,000.0' Slope= 0.0100 '/'
Inlet Invert= 661.10', Outlet Invert= 641.10'



Reach 25R: 25R



Summary for Reach 26R: 26R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 81.263 ac, 10.00% Impervious, Inflow Depth > 1.42" for 10-Year A event
Inflow = 34.86 cfs @ 13.83 hrs, Volume= 9.629 af
Outflow = 34.86 cfs @ 13.84 hrs, Volume= 9.629 af, Atten= 0%, Lag= 0.5 min
Routed to Link 39L : (new Link)

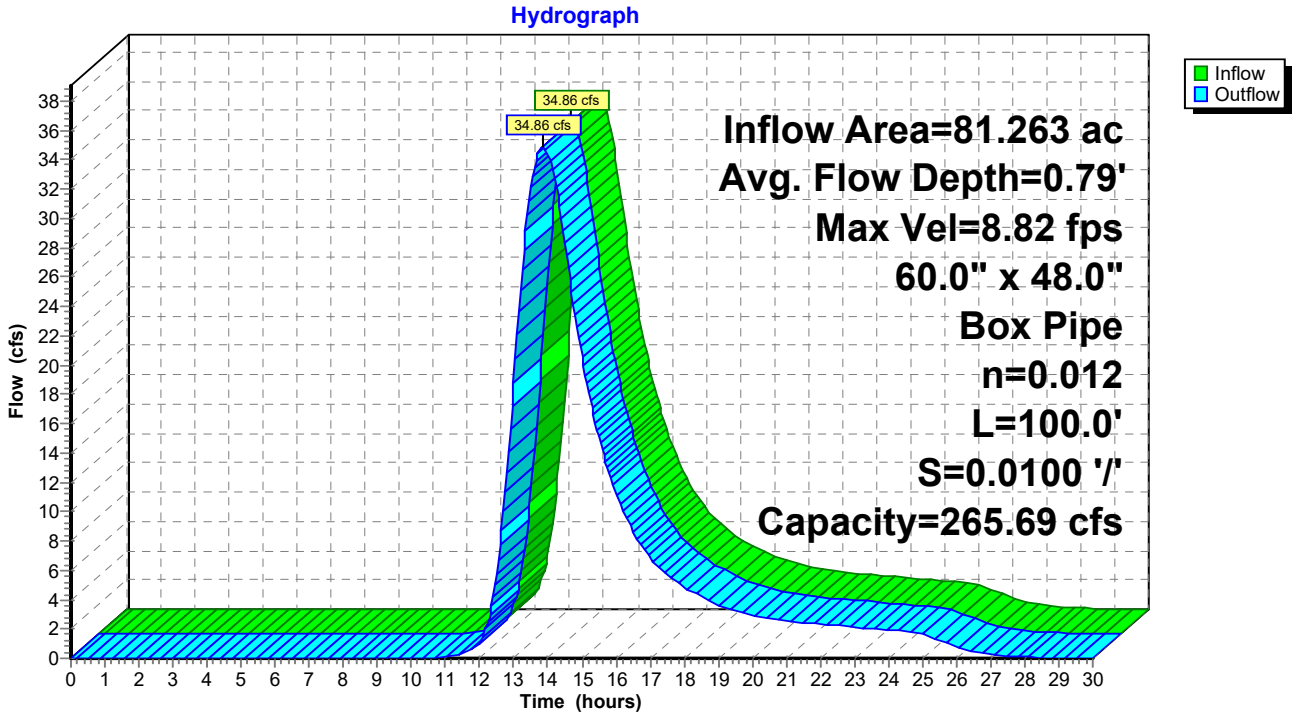
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.82 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.69 fps, Avg. Travel Time= 0.5 min

Peak Storage= 395 cf @ 13.84 hrs
Average Depth at Peak Storage= 0.79' , Surface Width= 5.00'
Bank-Full Depth= 4.00' Flow Area= 20.0 sf, Capacity= 265.69 cfs

60.0" W x 48.0" H Box Pipe
n= 0.012 Concrete pipe, finished
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 583.80', Outlet Invert= 582.80'



Reach 26R: 26R



Summary for Reach 28R: 28R

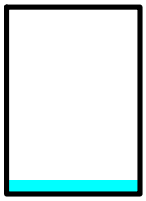
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 37.672 ac, 10.00% Impervious, Inflow Depth > 1.42" for 10-Year A event
Inflow = 16.51 cfs @ 13.81 hrs, Volume= 4.464 af
Outflow = 16.51 cfs @ 13.81 hrs, Volume= 4.464 af, Atten= 0%, Lag= 0.1 min
Routed to Reach 26R : 26R

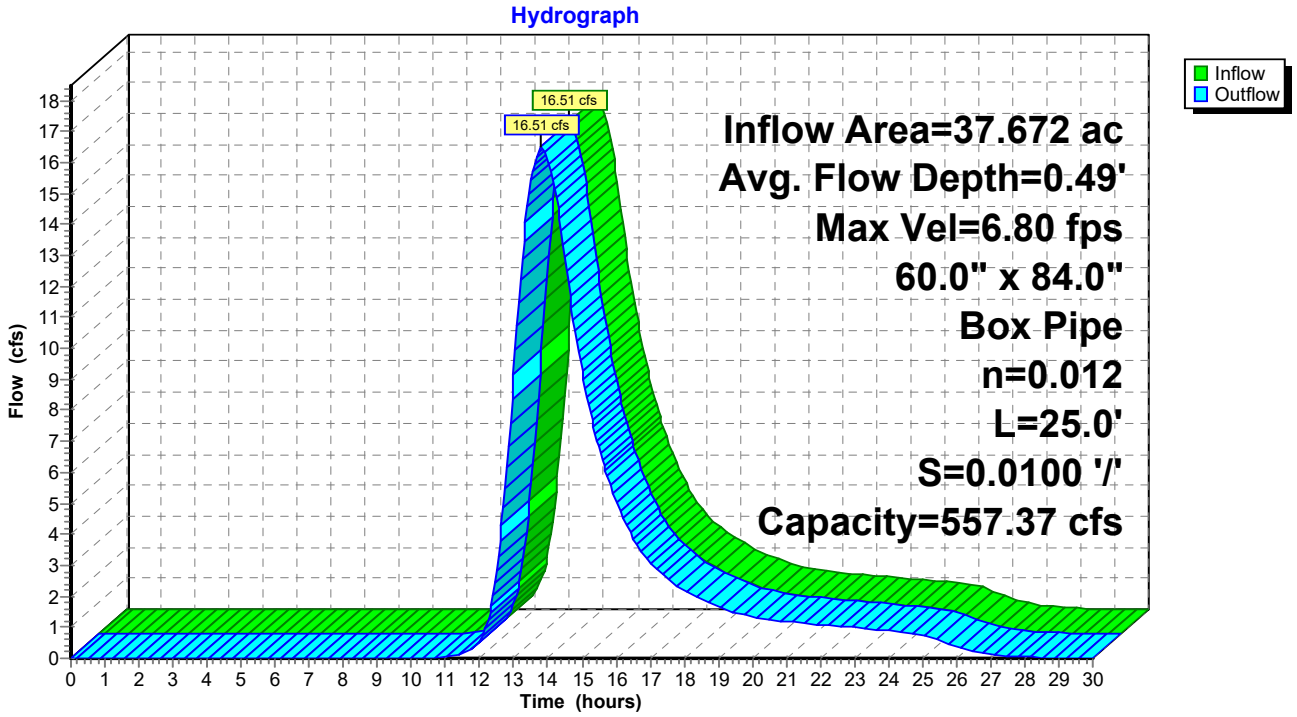
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.80 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.07 fps, Avg. Travel Time= 0.1 min

Peak Storage= 61 cf @ 13.81 hrs
Average Depth at Peak Storage= 0.49' , Surface Width= 5.00'
Bank-Full Depth= 7.00' Flow Area= 35.0 sf, Capacity= 557.37 cfs

60.0" W x 84.0" H Box Pipe
n= 0.012 Concrete pipe, finished
Length= 25.0' Slope= 0.0100 '/'
Inlet Invert= 635.60', Outlet Invert= 635.35'



Reach 28R: 28R



Summary for Reach 29R: 29R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 180.455 ac, 13.28% Impervious, Inflow Depth > 1.44" for 10-Year A event
Inflow = 76.07 cfs @ 13.78 hrs, Volume= 21.718 af
Outflow = 76.02 cfs @ 13.87 hrs, Volume= 21.717 af, Atten= 0%, Lag= 5.4 min
Routed to Link 39L : (new Link)

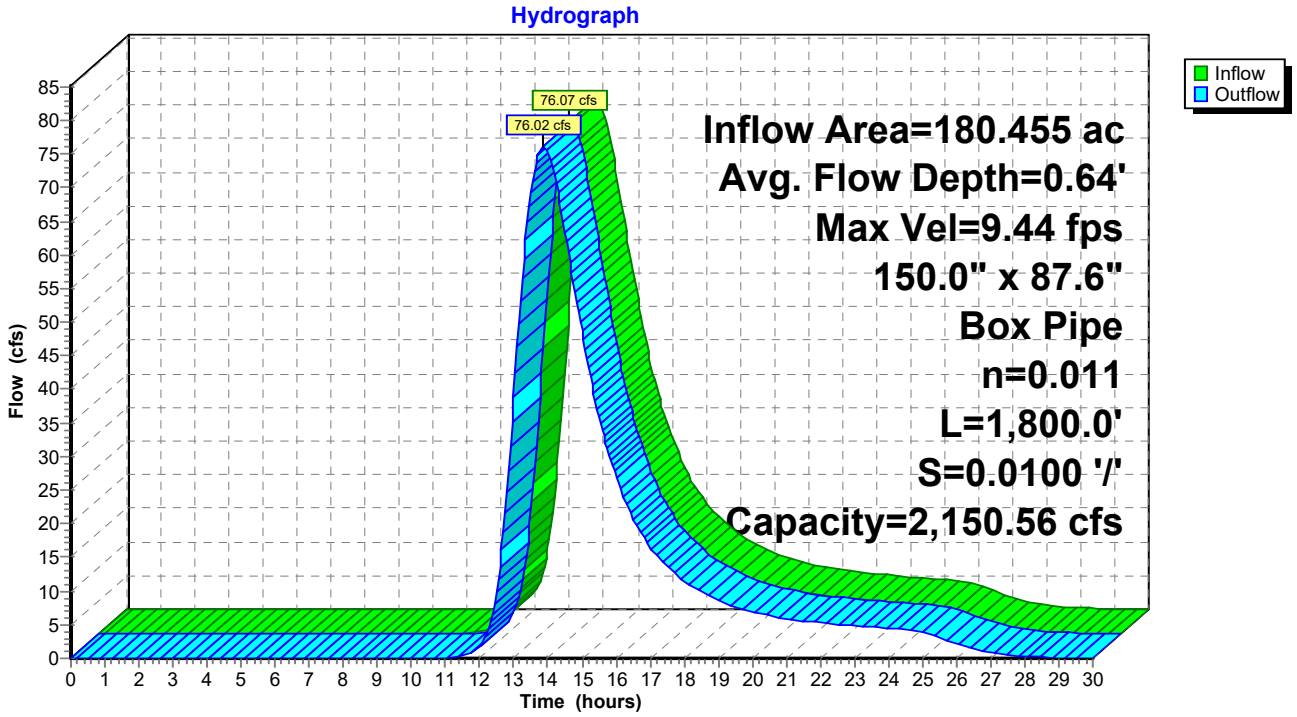
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.44 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 4.11 fps, Avg. Travel Time= 7.3 min

Peak Storage= 14,489 cf @ 13.82 hrs
Average Depth at Peak Storage= 0.64' , Surface Width= 12.50'
Bank-Full Depth= 7.30' Flow Area= 91.3 sf, Capacity= 2,150.56 cfs

150.0" W x 87.6" H Box Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 1,800.0' Slope= 0.0100 '/'
Inlet Invert= 581.20', Outlet Invert= 563.20'



Reach 29R: 29R



Summary for Reach 32R: 32R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 47.253 ac, 10.00% Impervious, Inflow Depth = 1.42" for 10-Year A event
Inflow = 23.77 cfs @ 13.51 hrs, Volume= 5.599 af
Outflow = 23.73 cfs @ 13.55 hrs, Volume= 5.599 af, Atten= 0%, Lag= 2.2 min
Routed to Pond 34R : 34R

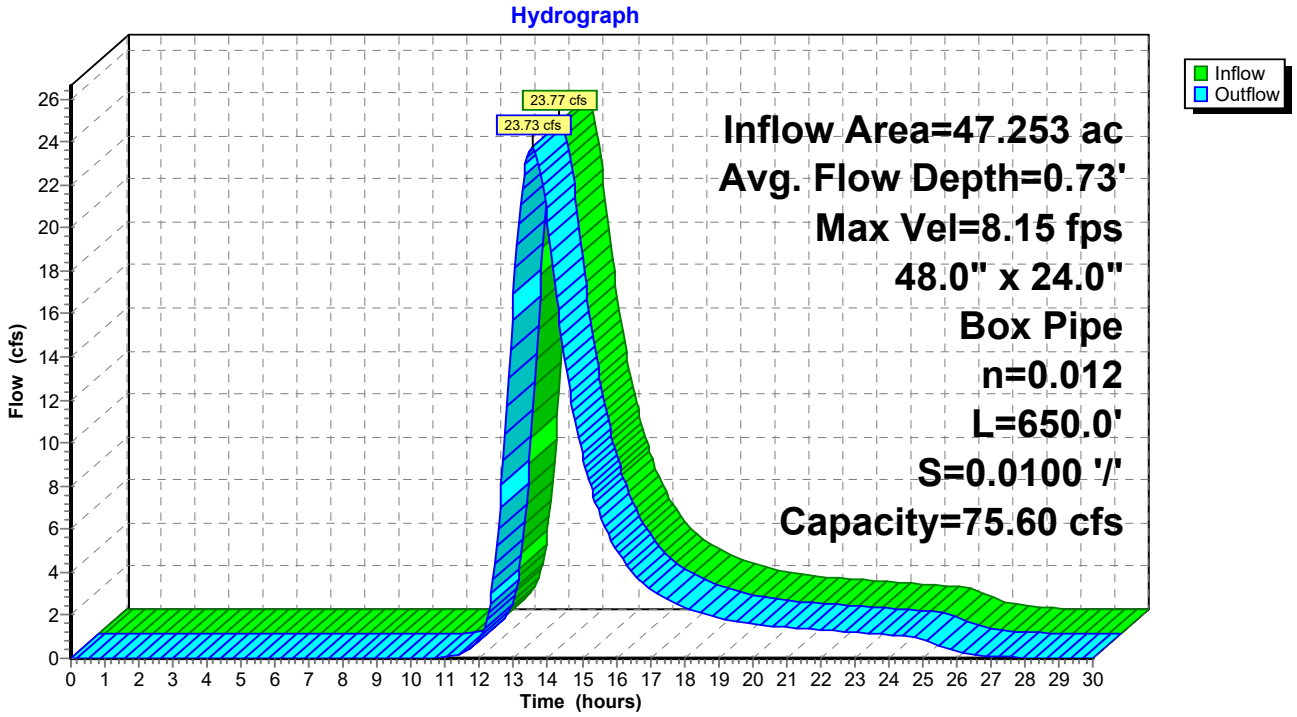
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.15 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 3.11 fps, Avg. Travel Time= 3.5 min

Peak Storage= 1,894 cf @ 13.53 hrs
Average Depth at Peak Storage= 0.73' , Surface Width= 4.00'
Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 75.60 cfs

48.0" W x 24.0" H Box Pipe
n= 0.012 Concrete pipe, finished
Length= 650.0' Slope= 0.0100 '/'
Inlet Invert= 732.50', Outlet Invert= 726.00'



Reach 32R: 32R



Summary for Reach 33R: 33R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 60.540 ac, 10.00% Impervious, Inflow Depth > 1.42" for 10-Year A event
Inflow = 23.11 cfs @ 14.14 hrs, Volume= 7.173 af
Outflow = 23.03 cfs @ 14.36 hrs, Volume= 7.170 af, Atten= 0%, Lag= 13.5 min
Routed to Reach 35R : 35R

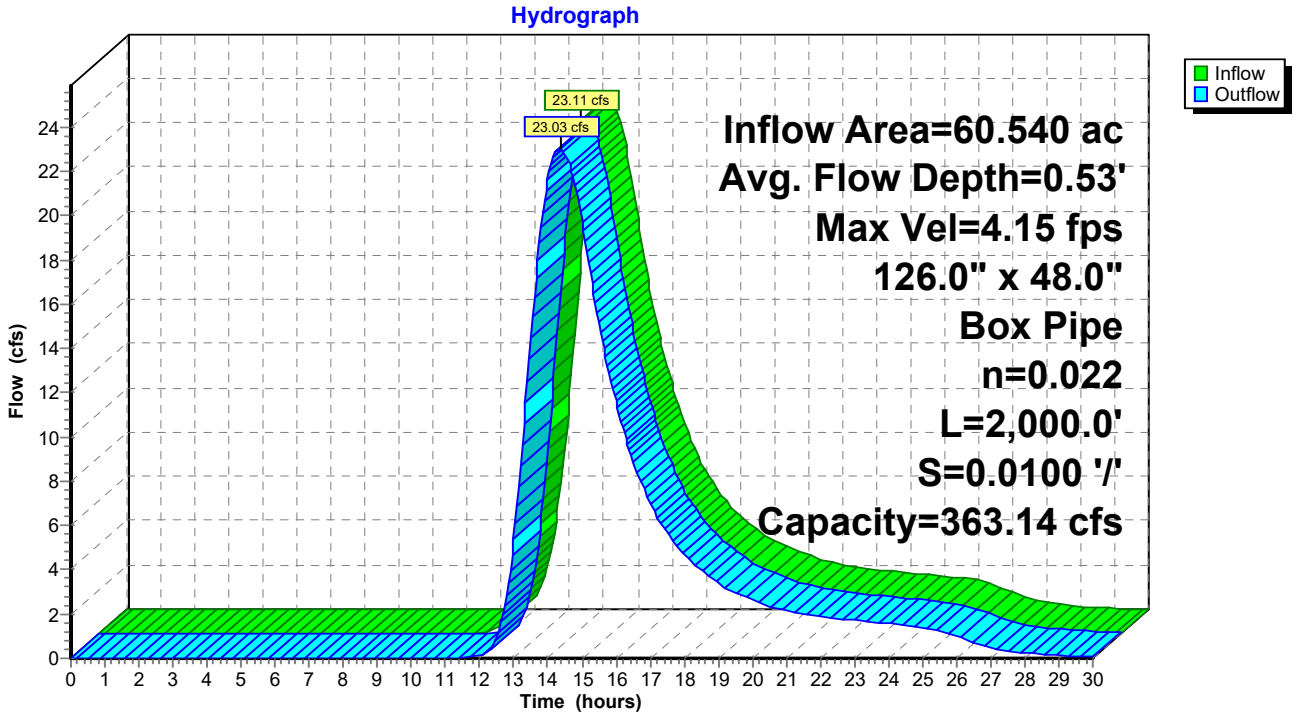
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.15 fps, Min. Travel Time= 8.0 min
Avg. Velocity = 1.81 fps, Avg. Travel Time= 18.4 min

Peak Storage= 11,110 cf @ 14.23 hrs
Average Depth at Peak Storage= 0.53' , Surface Width= 10.50'
Bank-Full Depth= 4.00' Flow Area= 42.0 sf, Capacity= 363.14 cfs

126.0" W x 48.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 2,000.0' Slope= 0.0100 '/'
Inlet Invert= 662.20', Outlet Invert= 642.20'



Reach 33R: 33R



Summary for Reach 35R: 35R

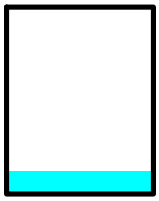
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 108.417 ac, 10.00% Impervious, Inflow Depth > 1.42" for 10-Year A event
Inflow = 42.35 cfs @ 14.04 hrs, Volume= 12.843 af
Outflow = 42.35 cfs @ 14.05 hrs, Volume= 12.843 af, Atten= 0%, Lag= 0.1 min
Routed to Link 39L : (new Link)

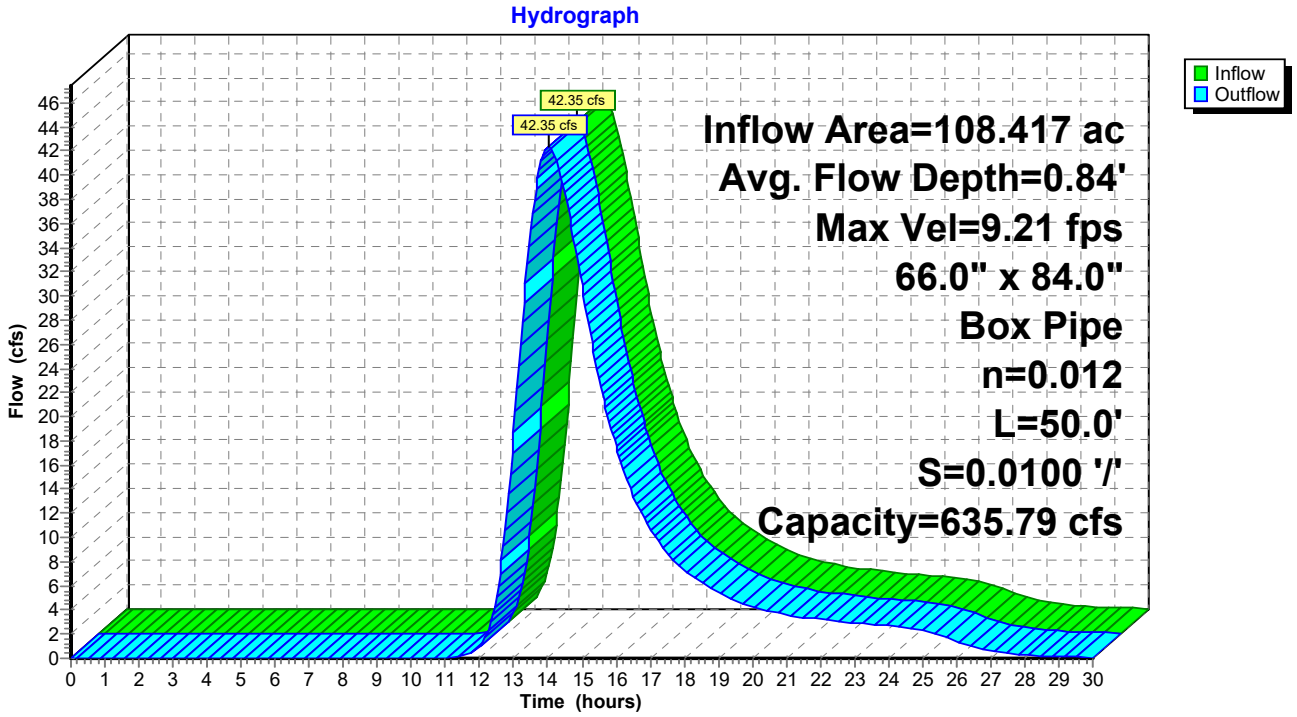
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.21 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.16 fps, Avg. Travel Time= 0.2 min

Peak Storage= 230 cf @ 14.04 hrs
Average Depth at Peak Storage= 0.84' , Surface Width= 5.50'
Bank-Full Depth= 7.00' Flow Area= 38.5 sf, Capacity= 635.79 cfs

66.0" W x 84.0" H Box Pipe
n= 0.012 Concrete pipe, finished
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 609.70', Outlet Invert= 609.20'



Reach 35R: 35R



Summary for Reach 36R: 36R

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 263.070 ac, 10.00% Impervious, Inflow Depth > 1.42" for 10-Year A event
Inflow = 107.25 cfs @ 13.92 hrs, Volume= 31.158 af
Outflow = 107.20 cfs @ 13.94 hrs, Volume= 31.157 af, Atten= 0%, Lag= 1.4 min
Routed to Link 39L : (new Link)

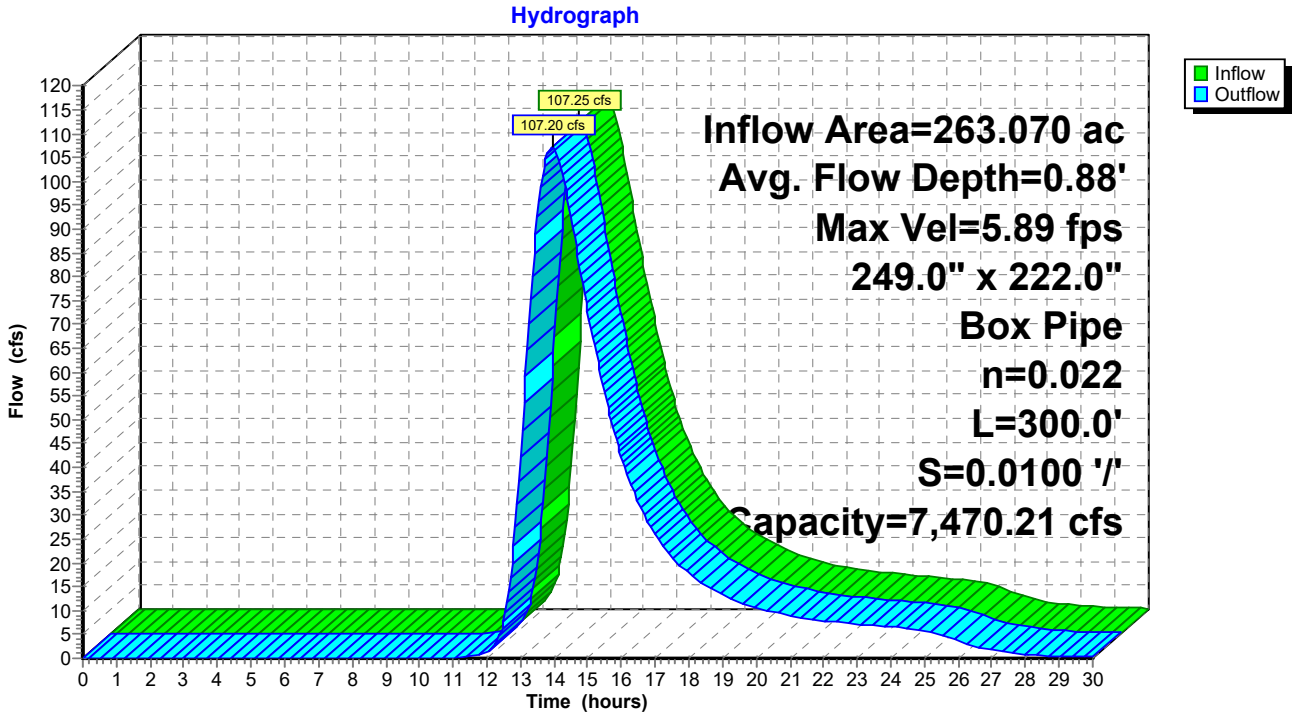
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.89 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 2.84 fps, Avg. Travel Time= 1.8 min

Peak Storage= 5,463 cf @ 13.93 hrs
Average Depth at Peak Storage= 0.88' , Surface Width= 20.75'
Bank-Full Depth= 18.50' Flow Area= 383.9 sf, Capacity= 7,470.21 cfs

249.0" W x 222.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 300.0' Slope= 0.0100 '/'
Inlet Invert= 588.00', Outlet Invert= 585.00'



Reach 36R: 36R



Summary for Reach 37R: 37R

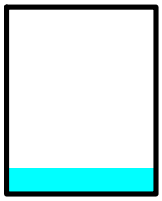
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 189.104 ac, 10.00% Impervious, Inflow Depth > 1.42" for 10-Year A event
Inflow = 76.95 cfs @ 13.71 hrs, Volume= 22.402 af
Outflow = 76.60 cfs @ 13.90 hrs, Volume= 22.394 af, Atten= 0%, Lag= 11.8 min
Routed to Reach 36R : 36R

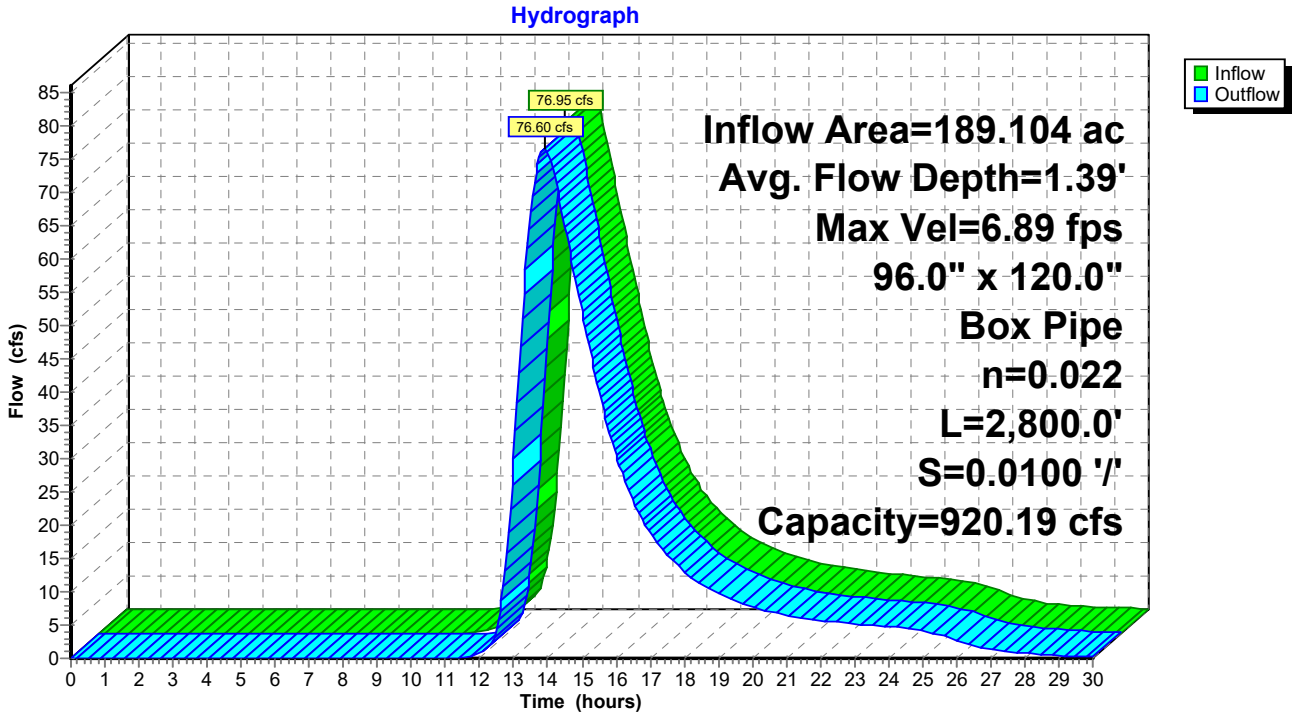
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.89 fps, Min. Travel Time= 6.8 min
Avg. Velocity = 3.06 fps, Avg. Travel Time= 15.2 min

Peak Storage= 31,117 cf @ 13.79 hrs
Average Depth at Peak Storage= 1.39' , Surface Width= 8.00'
Bank-Full Depth= 10.00' Flow Area= 80.0 sf, Capacity= 920.19 cfs

96.0" W x 120.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 2,800.0' Slope= 0.0100 '/'
Inlet Invert= 630.00', Outlet Invert= 602.00'



Reach 37R: 37R



Summary for Reach 38R: 38R

[52] Hint: Inlet/Outlet conditions not evaluated
[81] Warning: Exceeded Pond 31R by 8.61' @ 29.05 hrs
[81] Warning: Exceeded Pond 31R by 8.61' @ 29.05 hrs

Inflow Area = 118.634 ac, 10.00% Impervious, Inflow Depth > 1.42" for 10-Year A event
Inflow = 44.41 cfs @ 13.67 hrs, Volume= 14.056 af
Outflow = 44.16 cfs @ 13.93 hrs, Volume= 14.051 af, Atten= 1%, Lag= 15.4 min
Routed to Reach 37R : 37R

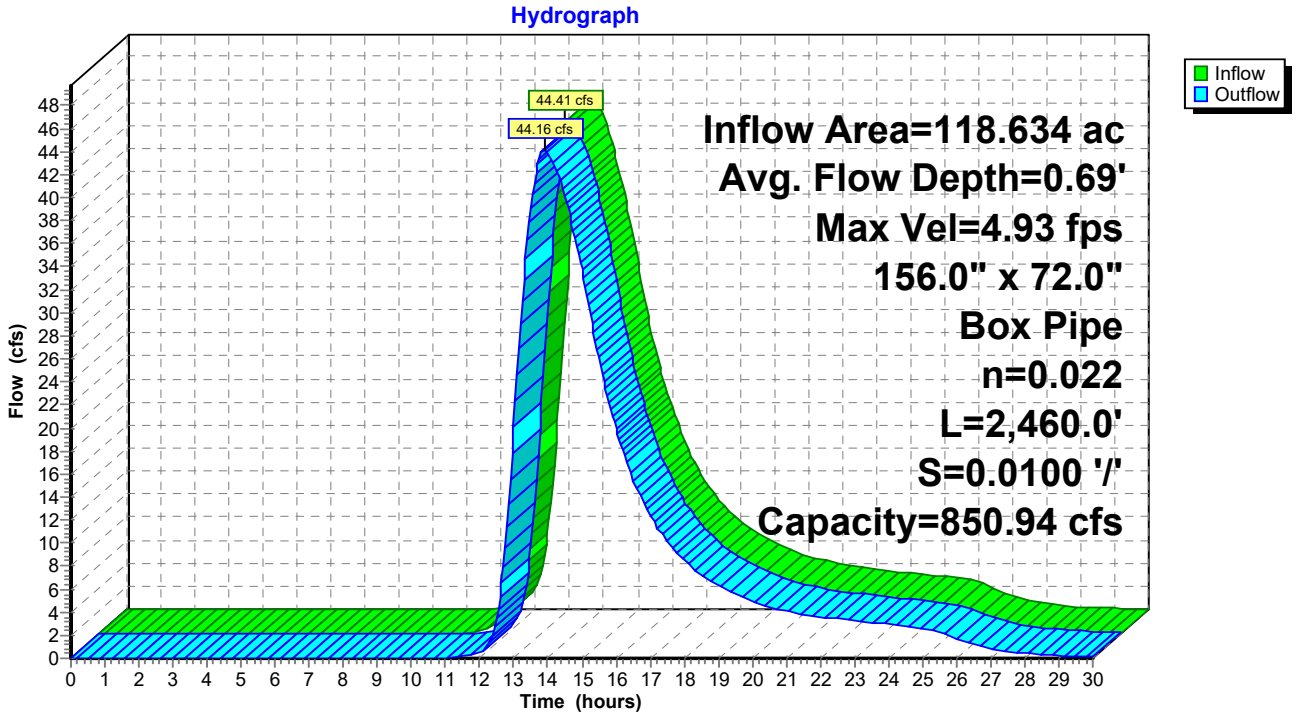
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.93 fps, Min. Travel Time= 8.3 min
Avg. Velocity = 2.19 fps, Avg. Travel Time= 18.8 min

Peak Storage= 22,033 cf @ 13.79 hrs
Average Depth at Peak Storage= 0.69' , Surface Width= 13.00'
Bank-Full Depth= 6.00' Flow Area= 78.0 sf, Capacity= 850.94 cfs

156.0" W x 72.0" H Box Pipe
n= 0.022 Earth, clean & straight
Length= 2,460.0' Slope= 0.0100 '/'
Inlet Invert= 747.50', Outlet Invert= 722.90'



Reach 38R: 38R



Summary for Pond 1R: 1R

[57] Hint: Peaked at 579.28' (Flood elevation advised)
[79] Warning: Submerged Pond 4R Primary device # 1 OUTLET by 6.38'

Inflow Area = 579.586 ac, 13.73% Impervious, Inflow Depth = 1.47" for 10-Year A event
Inflow = 275.38 cfs @ 13.46 hrs, Volume= 70.992 af
Outflow = 275.38 cfs @ 13.46 hrs, Volume= 70.992 af, Atten= 0%, Lag= 0.0 min
Primary = 32.25 cfs @ 13.46 hrs, Volume= 25.509 af
Routed to Link 39L : (new Link)
Secondary = 243.13 cfs @ 13.46 hrs, Volume= 45.483 af
Routed to Link 39L : (new Link)

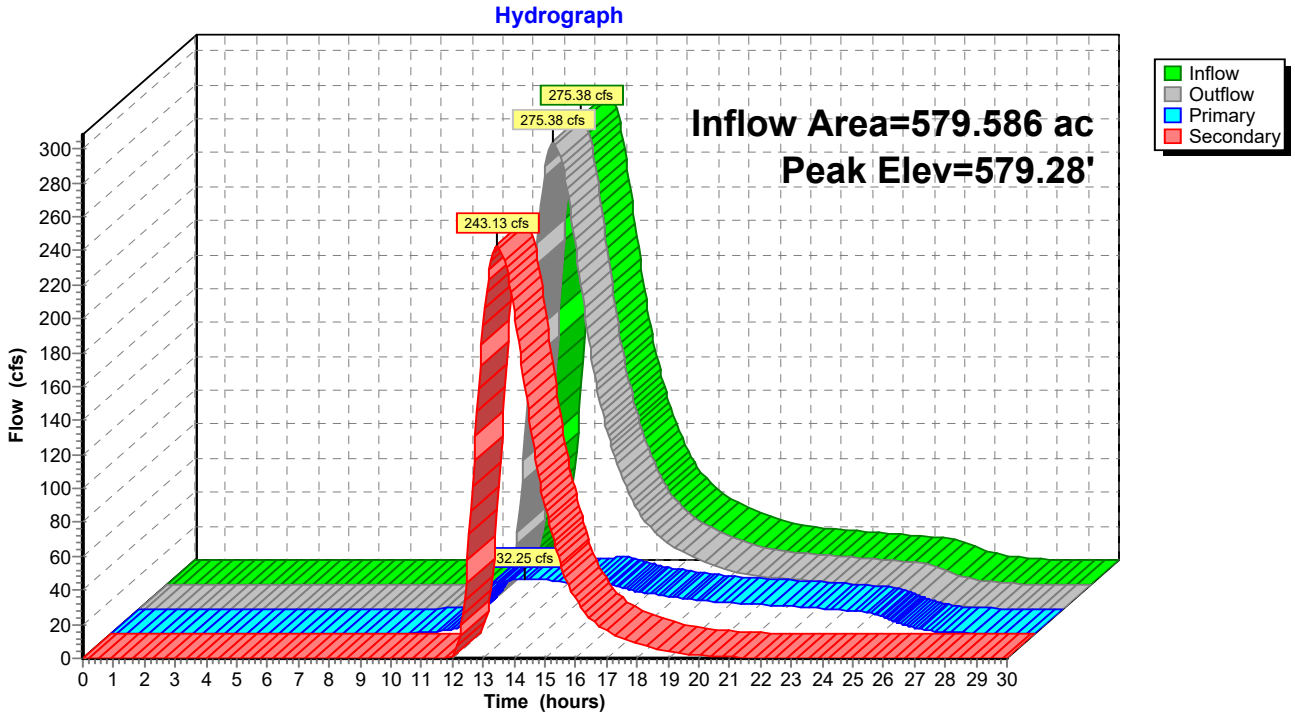
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 579.28' @ 13.46 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	573.30'	**33.6" Round Culvert** L= 1,000.0' Ke= 0.500 Inlet / Outlet Invert= 573.30' / 563.30' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 6.16 sf
#2	Secondary	575.30'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=32.25 cfs @ 13.46 hrs HW=579.28' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 32.25 cfs @ 5.24 fps)

Secondary OutFlow Max=243.08 cfs @ 13.46 hrs HW=579.28' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 243.08 cfs @ 6.11 fps)

Pond 1R: 1R


Hydrograph
Inflow Area=579.586 ac
Peak Elev=579.28'
275.38 cfs
275.38 cfs
243.13 cfs
32.25 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)

Summary for Pond 4R: 4R

[57] Hint: Peaked at 590.03' (Flood elevation advised)

Inflow Area = 85.111 ac, 19.59% Impervious, Inflow Depth > 1.56" for 10-Year A event
Inflow = 40.64 cfs @ 13.41 hrs, Volume= 11.083 af
Outflow = 40.64 cfs @ 13.41 hrs, Volume= 11.083 af, Atten= 0%, Lag= 0.0 min
Primary = 39.52 cfs @ 13.41 hrs, Volume= 11.026 af
Routed to Pond 1R : 1R
Secondary = 1.12 cfs @ 13.41 hrs, Volume= 0.057 af
Routed to Pond 1R : 1R

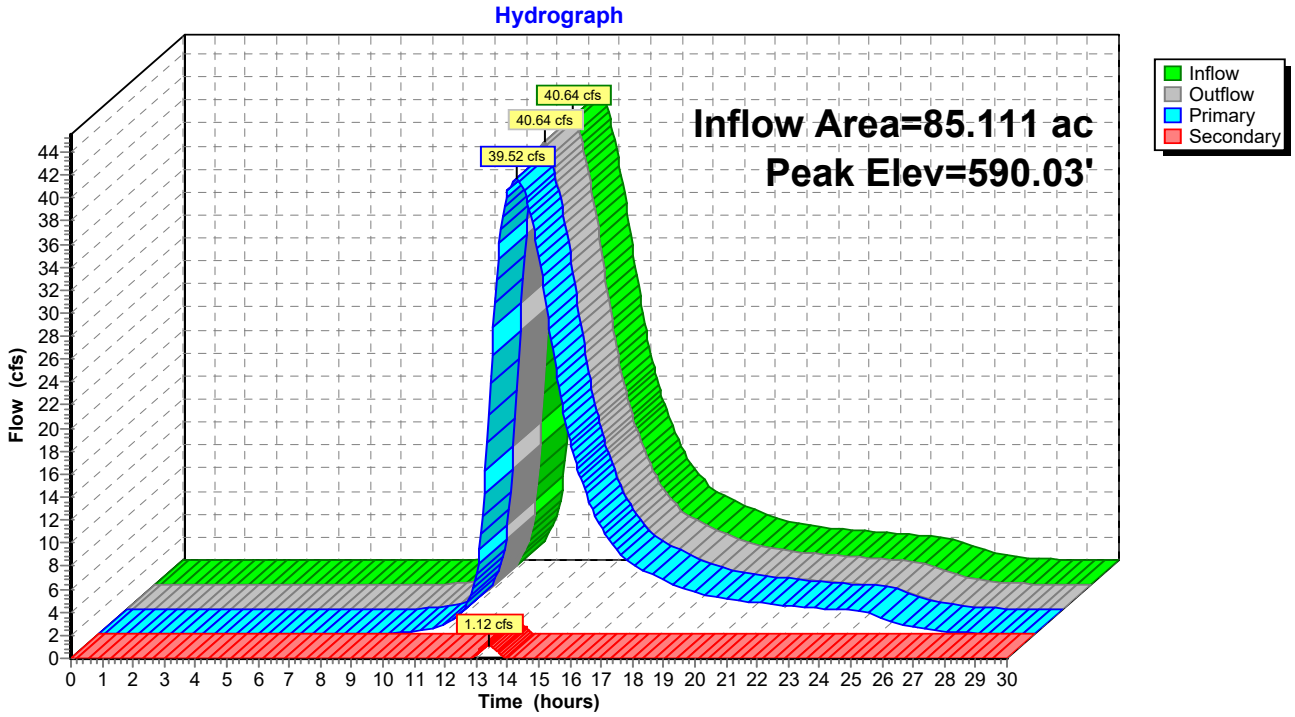
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 590.03' @ 13.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	587.90'	**60.0" Round Culvert** L= 1,500.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 587.90' / 572.90' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 19.63 sf
#2	Secondary	589.90'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=39.51 cfs @ 13.41 hrs HW=590.03' (Free Discharge)
1=Culvert (Inlet Controls 39.51 cfs @ 4.97 fps)

Secondary OutFlow Max=1.10 cfs @ 13.41 hrs HW=590.03' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 1.10 cfs @ 0.87 fps)

Pond 4R: 4R


Hydrograph
Inflow Area=85.111 ac
Peak Elev=590.03'
40.64 cfs
40.64 cfs
39.52 cfs
1.12 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)

Summary for Pond 8R: 8R

[57] Hint: Peaked at 645.25' (Flood elevation advised)

Inflow Area = 53.473 ac, 10.00% Impervious, Inflow Depth > 1.42" for 10-Year A event
Inflow = 23.41 cfs @ 13.79 hrs, Volume= 6.336 af
Outflow = 23.41 cfs @ 13.79 hrs, Volume= 6.336 af, Atten= 0%, Lag= 0.0 min
Primary = 23.41 cfs @ 13.79 hrs, Volume= 6.336 af
Routed to Reach 5R : 5R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 5R : 5R

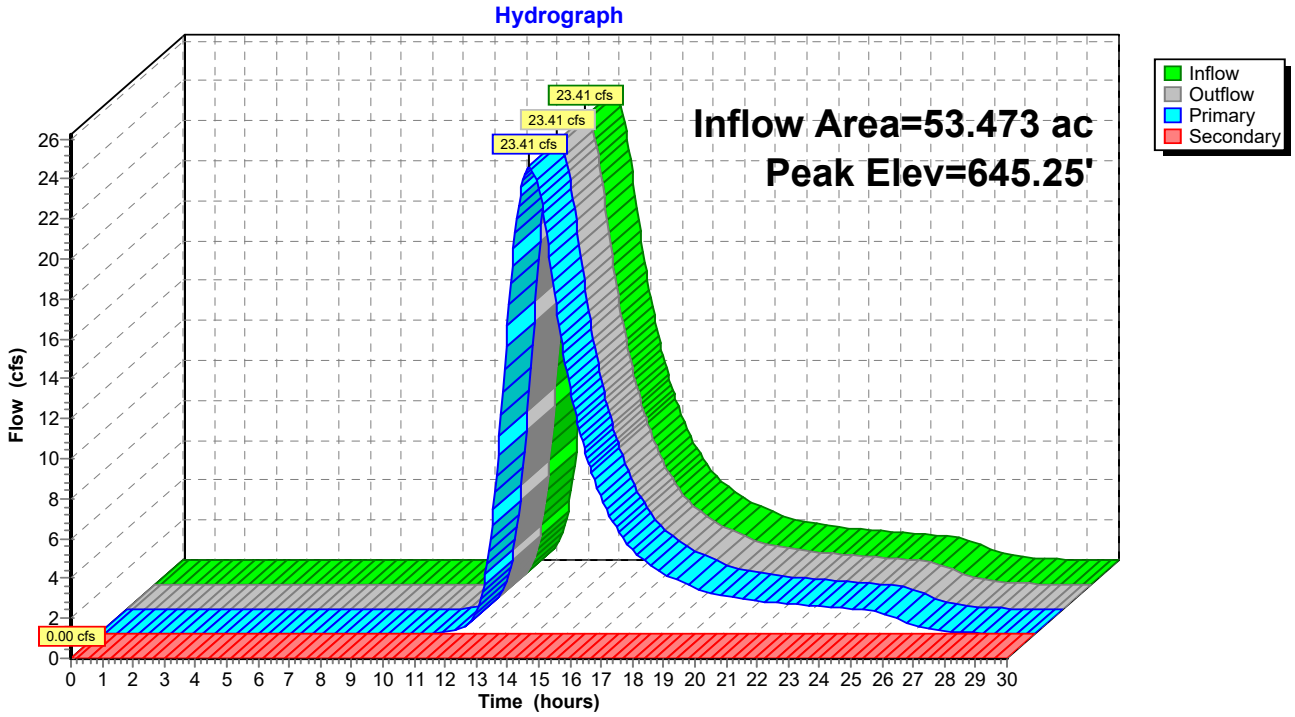
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 645.25' @ 13.79 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	643.70'	**66.0" Round Culvert** L= 250.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 643.70' / 641.20' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 23.76 sf
#2	Secondary	645.70'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=23.40 cfs @ 13.79 hrs HW=645.25' (Free Discharge)
1=Culvert (Inlet Controls 23.40 cfs @ 4.24 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=643.70' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 8R: 8R


Hydrograph
Inflow Area=53.473 ac
Peak Elev=645.25'
23.41 cfs
23.41 cfs
23.41 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)

Summary for Pond 17R: 17R

[57] Hint: Peaked at 783.61' (Flood elevation advised)
[81] Warning: Exceeded Pond 18R by 27.50' @ 10.25 hrs
[81] Warning: Exceeded Pond 18R by 27.50' @ 10.25 hrs

Inflow Area = 481.919 ac, 5.00% Impervious, Inflow Depth > 1.35" for 10-Year A event
Inflow = 124.20 cfs @ 13.50 hrs, Volume= 54.416 af
Outflow = 124.20 cfs @ 13.50 hrs, Volume= 54.416 af, Atten= 0%, Lag= 0.0 min
Primary = 74.63 cfs @ 13.50 hrs, Volume= 45.271 af
Routed to Link 39L : (new Link)
Secondary = 49.57 cfs @ 13.50 hrs, Volume= 9.145 af
Routed to Link 39L : (new Link)

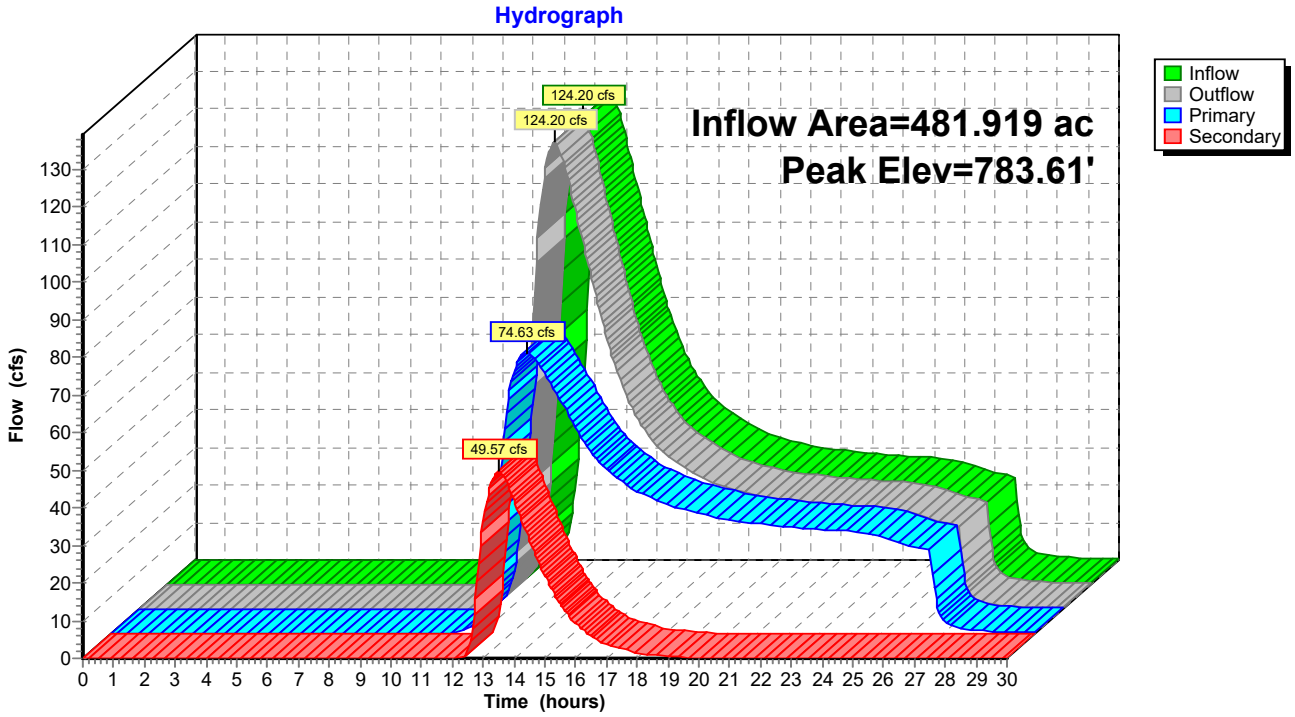
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 783.61' @ 13.50 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	780.10'	**48.0" Round Culvert** L= 3,680.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 780.10' / 743.30' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf
#2	Secondary	782.10'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=74.62 cfs @ 13.50 hrs HW=783.61' (Free Discharge)
1=Culvert (Inlet Controls 74.62 cfs @ 6.38 fps)

Secondary OutFlow Max=49.55 cfs @ 13.50 hrs HW=783.61' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 49.55 cfs @ 3.28 fps)

Pond 17R: 17R


Hydrograph
Inflow Area=481.919 ac
Peak Elev=783.61'
124.20 cfs
124.20 cfs
74.63 cfs
49.57 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 10 20 30 40 50 60 70 80 90 100 110 120 130
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Pond 18R: 18R

[57] Hint: Peaked at 756.33' (Flood elevation advised)
[62] Hint: Exceeded Reach 15R OUTLET depth by 10.33' @ 13.60 hrs

Inflow Area = 396.653 ac, 5.00% Impervious, Inflow Depth > 1.35" for 10-Year A event
Inflow = 83.60 cfs @ 13.68 hrs, Volume= 44.782 af
Outflow = 83.60 cfs @ 13.68 hrs, Volume= 44.782 af, Atten= 0%, Lag= 0.0 min
Primary = 23.42 cfs @ 15.37 hrs, Volume= 24.407 af
Routed to Pond 17R : 17R
Secondary = 60.82 cfs @ 13.68 hrs, Volume= 20.375 af
Routed to Pond 17R : 17R

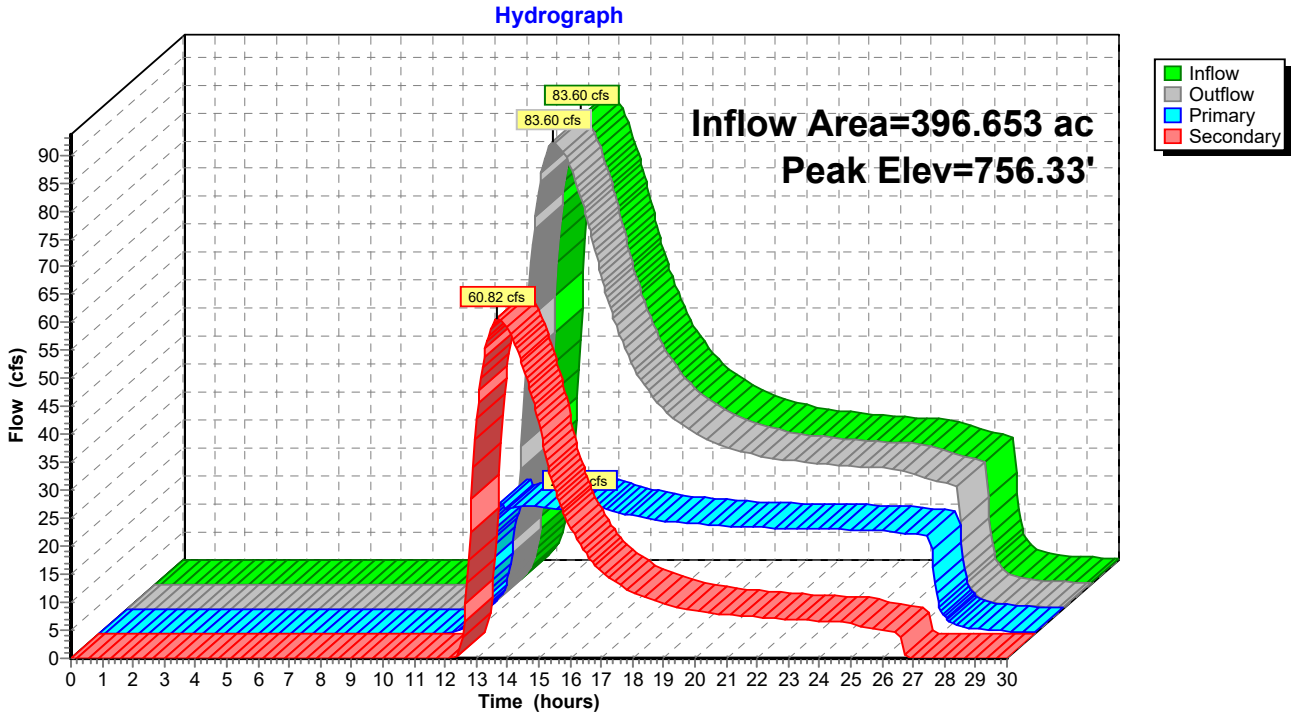
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 756.33' @ 13.68 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	752.60'	**30.0" Round Culvert** L= 500.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 752.60' / 747.60' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 4.91 sf
#2	Secondary	754.60'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=23.42 cfs @ 15.37 hrs HW=755.76' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 23.42 cfs @ 4.87 fps)

Secondary OutFlow Max=60.79 cfs @ 13.68 hrs HW=756.33' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 60.79 cfs @ 3.52 fps)

Pond 18R: 18R


Hydrograph
Inflow Area=396.653 ac
Peak Elev=756.33'
83.60 cfs
83.60 cfs
60.82 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Pond 20R: 20R

[57] Hint: Peaked at 580.34' (Flood elevation advised)

Inflow Area = 240.966 ac, 5.00% Impervious, Inflow Depth > 1.36" for 10-Year A event
Inflow = 77.88 cfs @ 13.60 hrs, Volume= 27.218 af
Outflow = 77.88 cfs @ 13.60 hrs, Volume= 27.218 af, Atten= 0%, Lag= 0.0 min
Primary = 67.17 cfs @ 13.60 hrs, Volume= 25.704 af
Routed to Link 39L : (new Link)
Secondary = 10.71 cfs @ 13.60 hrs, Volume= 1.514 af
Routed to Link 39L : (new Link)

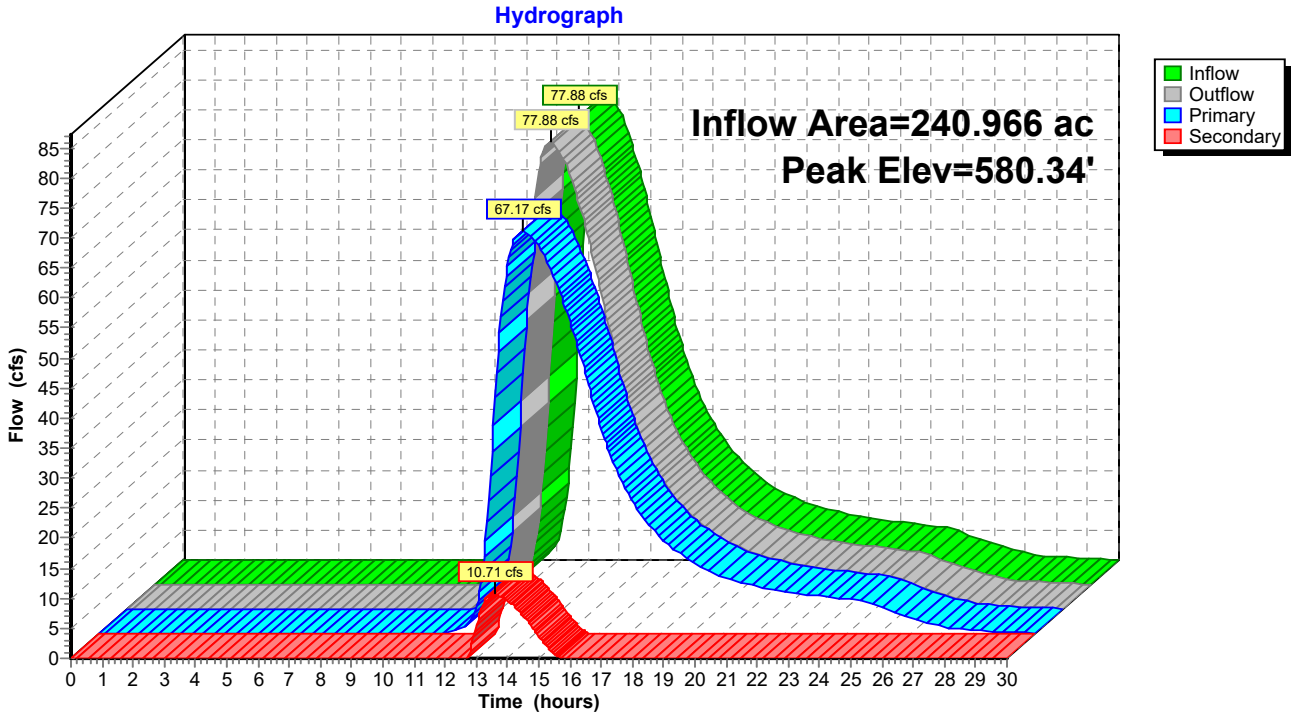
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 580.34' @ 13.60 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	577.80'	**120.0" Round Culvert** L= 930.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 577.80' / 568.50' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 78.54 sf
#2	Secondary	579.80'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=67.15 cfs @ 13.60 hrs HW=580.34' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 67.15 cfs @ 6.42 fps)

Secondary OutFlow Max=10.66 cfs @ 13.60 hrs HW=580.34' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 10.66 cfs @ 1.96 fps)

Pond 20R: 20R


Hydrograph
Inflow Area=240.966 ac
Peak Elev=580.34'
77.88 cfs
77.88 cfs
67.17 cfs
10.71 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)

Summary for Pond 22R: 22R

[57] Hint: Peaked at 730.21' (Flood elevation advised)
[79] Warning: Submerged Pond 23R Primary device # 1 OUTLET by 5.21'

Inflow Area = 142.986 ac, 5.00% Impervious, Inflow Depth > 1.36" for 10-Year A event
Inflow = 46.79 cfs @ 14.41 hrs, Volume= 16.150 af
Outflow = 46.79 cfs @ 14.41 hrs, Volume= 16.150 af, Atten= 0%, Lag= 0.0 min
Primary = 12.07 cfs @ 16.60 hrs, Volume= 8.861 af
Routed to Reach 21R : 21R
Secondary = 35.19 cfs @ 14.41 hrs, Volume= 7.288 af
Routed to Reach 21R : 21R

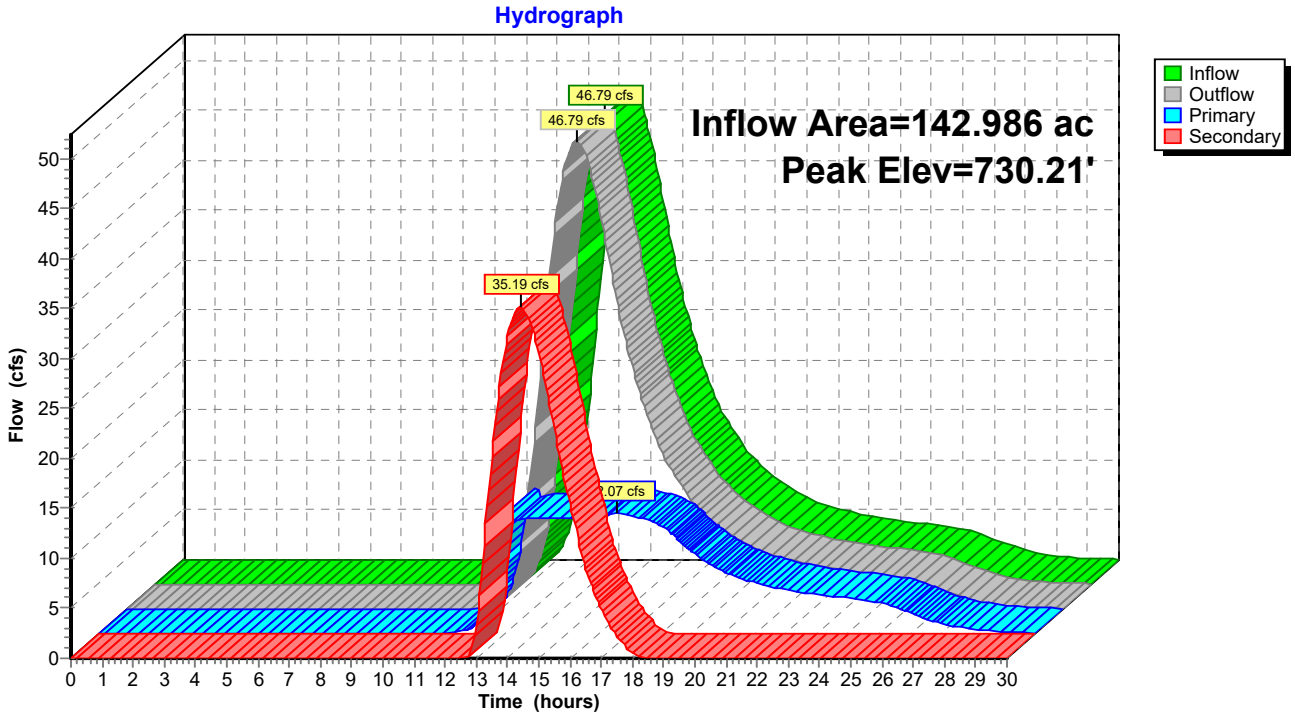
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 730.21' @ 14.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	727.00'	**23.5" Round Culvert** L= 1,000.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 727.00' / 717.00' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.01 sf
#2	Secondary	729.00'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=12.07 cfs @ 16.60 hrs HW=729.46' (Free Discharge)
1=Culvert (Barrel Controls 12.07 cfs @ 4.11 fps)

Secondary OutFlow Max=35.18 cfs @ 14.41 hrs HW=730.21' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 35.18 cfs @ 2.91 fps)

Pond 22R: 22R


Hydrograph
Inflow Area=142.986 ac
Peak Elev=730.21'
46.79 cfs
46.79 cfs
35.19 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)

Summary for Pond 23R: 23R

[57] Hint: Peaked at 769.51' (Flood elevation advised)

Inflow Area = 93.319 ac, 5.00% Impervious, Inflow Depth > 1.36" for 10-Year A event
Inflow = 29.83 cfs @ 14.63 hrs, Volume= 10.539 af
Outflow = 29.83 cfs @ 14.63 hrs, Volume= 10.539 af, Atten= 0%, Lag= 0.0 min
Primary = 29.83 cfs @ 14.63 hrs, Volume= 10.539 af
Routed to Pond 22R : 22R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 22R : 22R

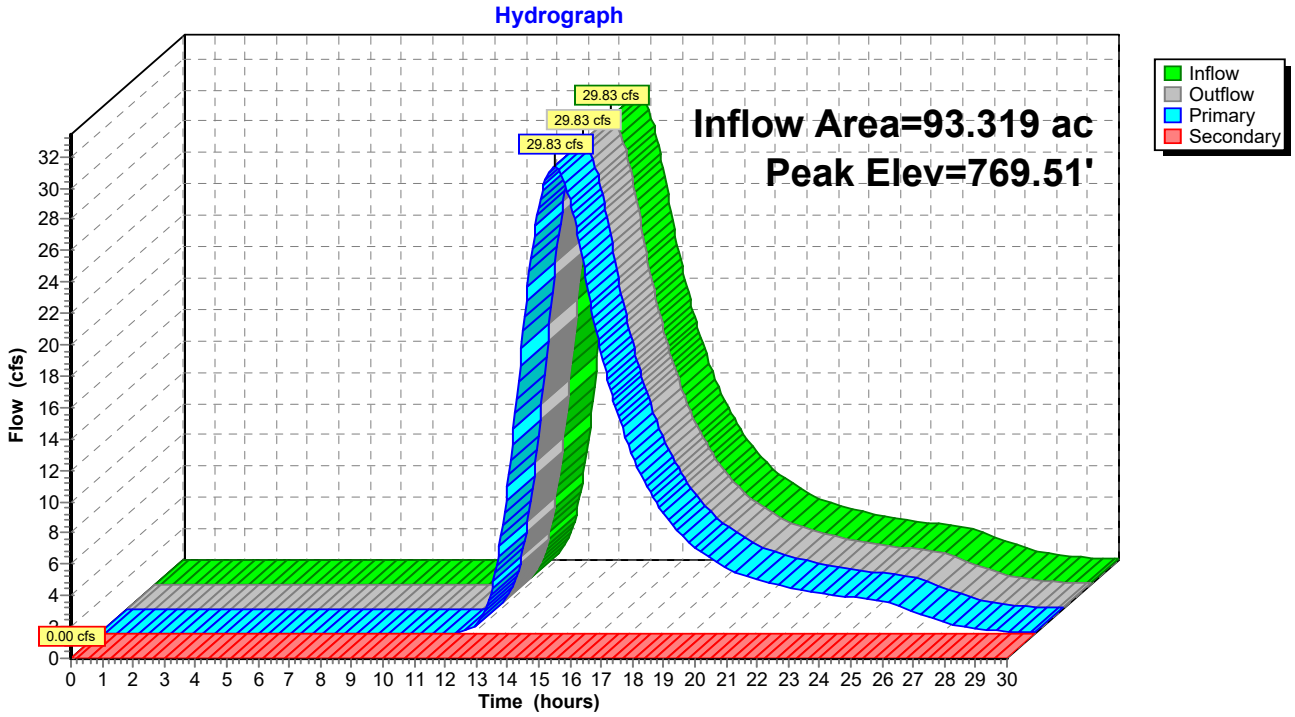
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 769.51' @ 14.63 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	768.00'	**60.0" W x 60.0" H Box Culvert** L= 4,300.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 768.00' / 725.00' S= 0.0100 '/' Cc= 0.900 n= 0.022 Earth, clean & straight, Flow Area= 25.00 sf
#2	Secondary	770.00'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=29.81 cfs @ 14.63 hrs HW=769.51' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 29.81 cfs @ 3.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=768.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 23R: 23R


Hydrograph
Inflow Area=93.319 ac
Peak Elev=769.51'
29.83 cfs
29.83 cfs
29.83 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

Summary for Pond 27R: 27R

[57] Hint: Peaked at 592.79' (Flood elevation advised)

Inflow Area = 13.127 ac, 10.00% Impervious, Inflow Depth = 1.42" for 10-Year A event
Inflow = 9.41 cfs @ 12.88 hrs, Volume= 1.556 af
Outflow = 9.41 cfs @ 12.88 hrs, Volume= 1.556 af, Atten= 0%, Lag= 0.0 min
Primary = 9.41 cfs @ 12.88 hrs, Volume= 1.556 af
Routed to Link 39L : (new Link)
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 39L : (new Link)

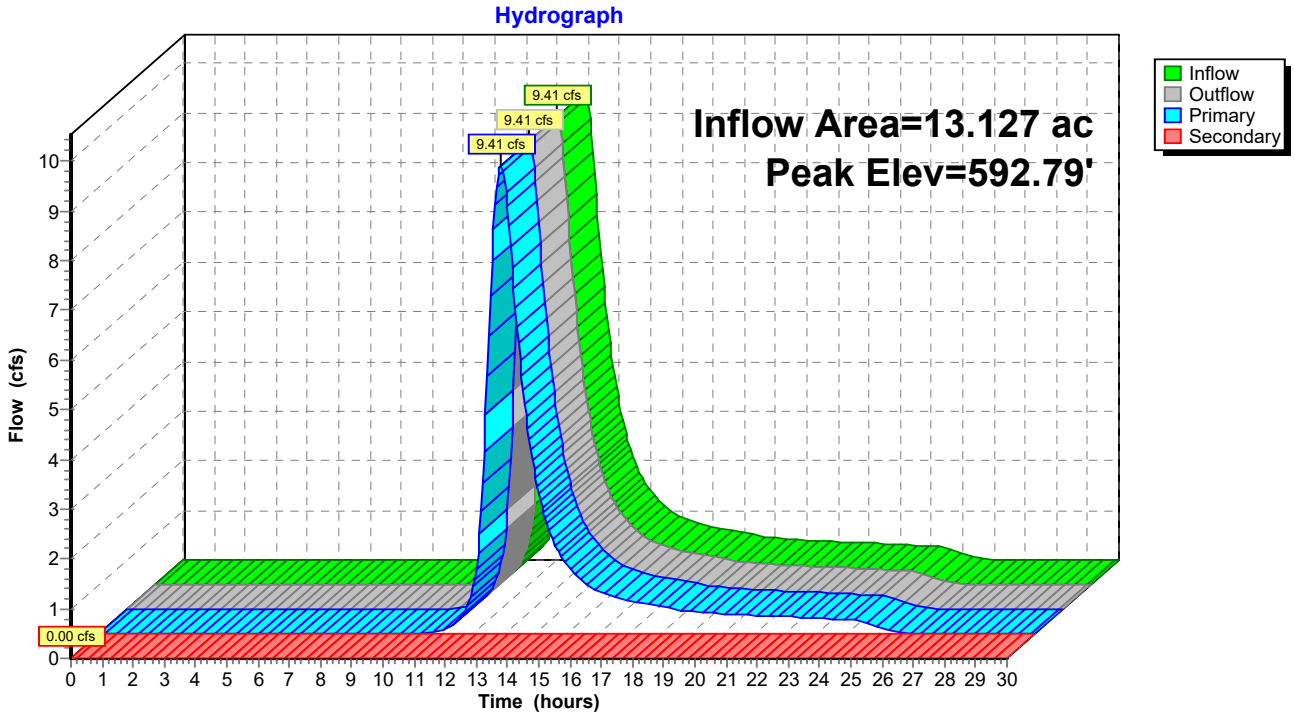
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 592.79' @ 12.88 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	591.50'	**24.0" W x 24.0" H Box Culvert** L= 1,500.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 591.50' / 576.50' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf
#2	Secondary	593.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=9.40 cfs @ 12.88 hrs HW=592.79' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 9.40 cfs @ 3.65 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=591.50' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 27R: 27R


Hydrograph
Inflow Area=13.127 ac
Peak Elev=592.79'
9.41 cfs
9.41 cfs
9.41 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Pond 30R: 30R

[57] Hint: Peaked at 699.08' (Flood elevation advised)

Inflow Area = 142.724 ac, 8.42% Impervious, Inflow Depth = 1.40" for 10-Year A event
Inflow = 64.31 cfs @ 13.37 hrs, Volume= 16.664 af
Outflow = 64.31 cfs @ 13.37 hrs, Volume= 16.664 af, Atten= 0%, Lag= 0.0 min
Primary = 42.16 cfs @ 13.37 hrs, Volume= 13.932 af
Routed to Reach 7R : 7R
Secondary = 22.14 cfs @ 13.37 hrs, Volume= 2.732 af
Routed to Reach 7R : 7R

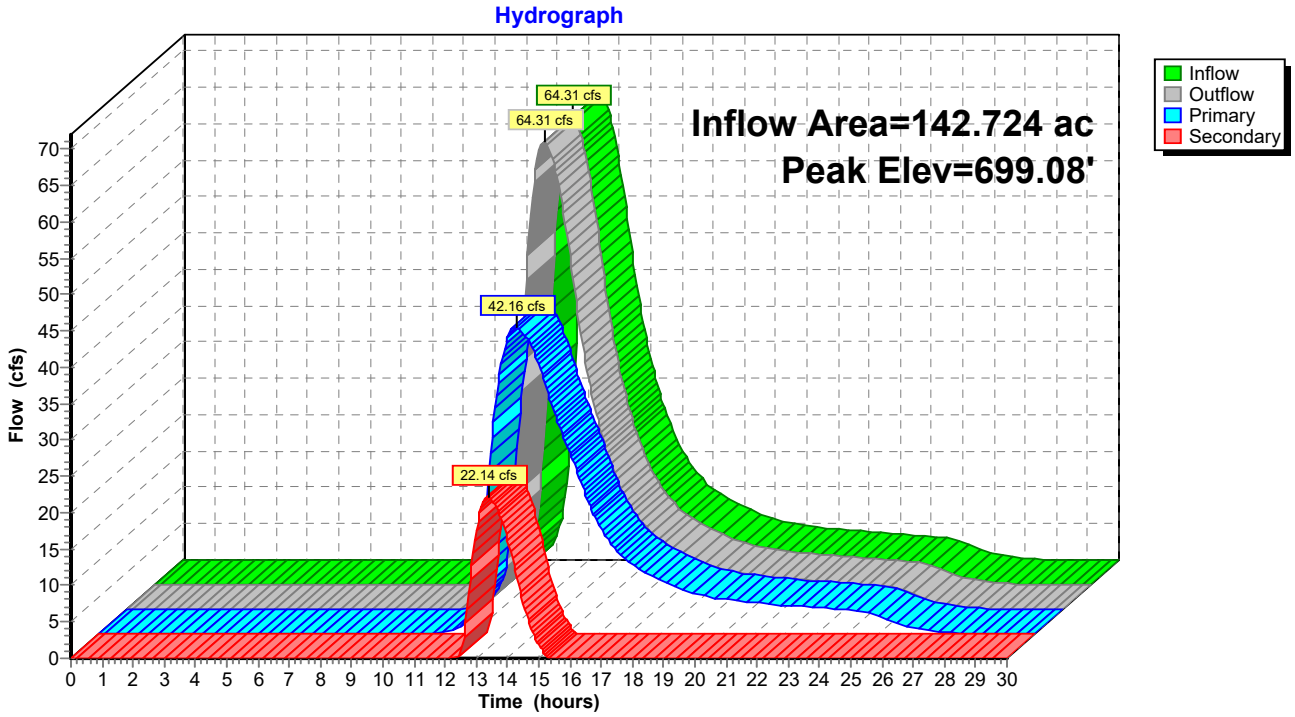
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 699.08' @ 13.37 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	696.20'	**48.0" Round Culvert** L= 900.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 696.20' / 687.20' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf
#2	Secondary	698.20'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=42.16 cfs @ 13.37 hrs HW=699.08' (Free Discharge)
1=Culvert (Barrel Controls 42.16 cfs @ 6.08 fps)

Secondary OutFlow Max=22.14 cfs @ 13.37 hrs HW=699.08' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 22.14 cfs @ 2.50 fps)

Pond 30R: 30R


Hydrograph
Inflow Area=142.724 ac
Peak Elev=699.08'
64.31 cfs
64.31 cfs
42.16 cfs
22.14 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Pond 31R: 31R

[57] Hint: Peaked at 740.90' (Flood elevation advised)

Inflow Area = 44.343 ac, 10.00% Impervious, Inflow Depth = 1.42" for 10-Year A event
Inflow = 24.12 cfs @ 13.32 hrs, Volume= 5.255 af
Outflow = 24.12 cfs @ 13.32 hrs, Volume= 5.255 af, Atten= 0%, Lag= 0.0 min
Primary = 24.12 cfs @ 13.32 hrs, Volume= 5.255 af
Routed to Reach 38R : 38R
Secondary = 0.00 cfs @ 13.31 hrs, Volume= 0.000 af
Routed to Reach 38R : 38R

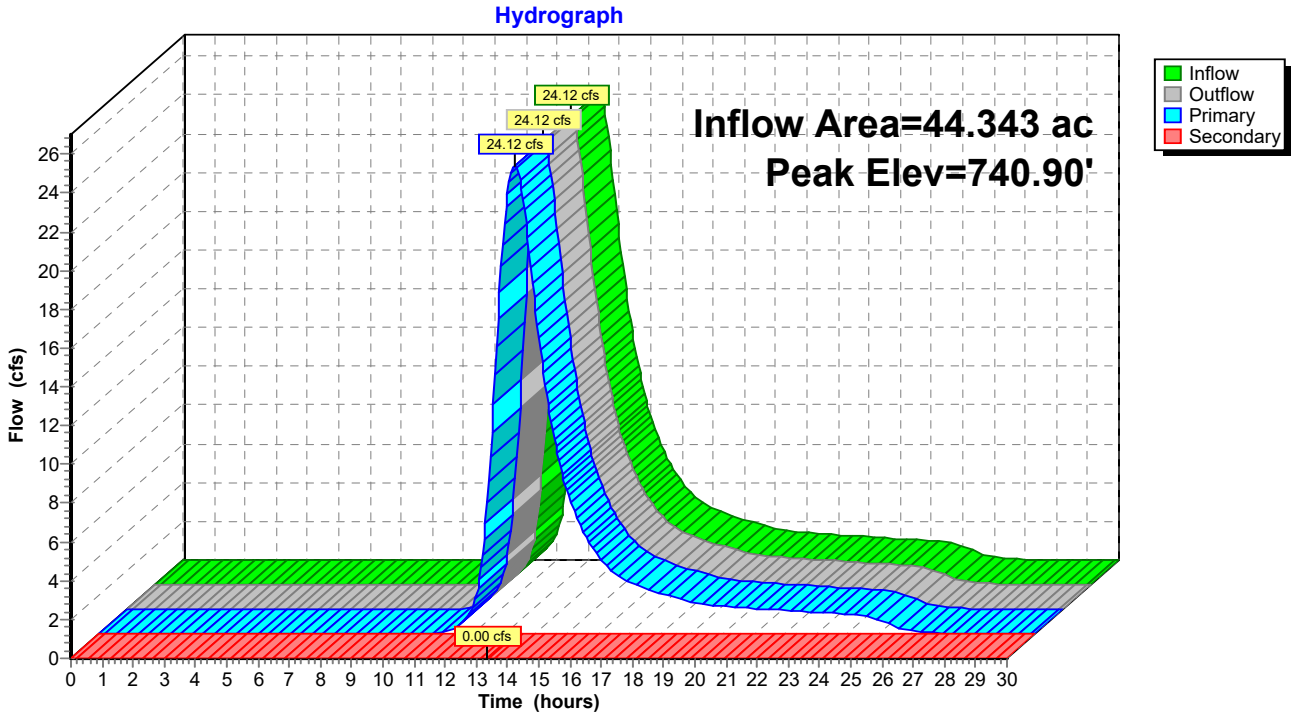
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 740.90' @ 13.32 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	738.90'	**36.0" Round Culvert** L= 500.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 738.90' / 733.90' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf
#2	Secondary	740.90'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=24.12 cfs @ 13.32 hrs HW=740.90' (Free Discharge)
↑**1=Culvert** (Inlet Controls 24.12 cfs @ 4.82 fps)

Secondary OutFlow Max=0.00 cfs @ 13.31 hrs HW=740.90' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.06 fps)

Pond 31R: 31R


Hydrograph
Inflow Area=44.343 ac
Peak Elev=740.90'
24.12 cfs
24.12 cfs
24.12 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Pond 34R: 34R

[57] Hint: Peaked at 590.40' (Flood elevation advised)

Inflow Area = 121.269 ac, 10.00% Impervious, Inflow Depth > 1.42" for 10-Year A event
Inflow = 48.22 cfs @ 13.84 hrs, Volume= 14.369 af
Outflow = 48.22 cfs @ 13.84 hrs, Volume= 14.369 af, Atten= 0%, Lag= 0.0 min
Primary = 13.33 cfs @ 13.84 hrs, Volume= 8.006 af
Routed to Reach 29R : 29R
Secondary = 34.89 cfs @ 13.84 hrs, Volume= 6.362 af
Routed to Reach 29R : 29R

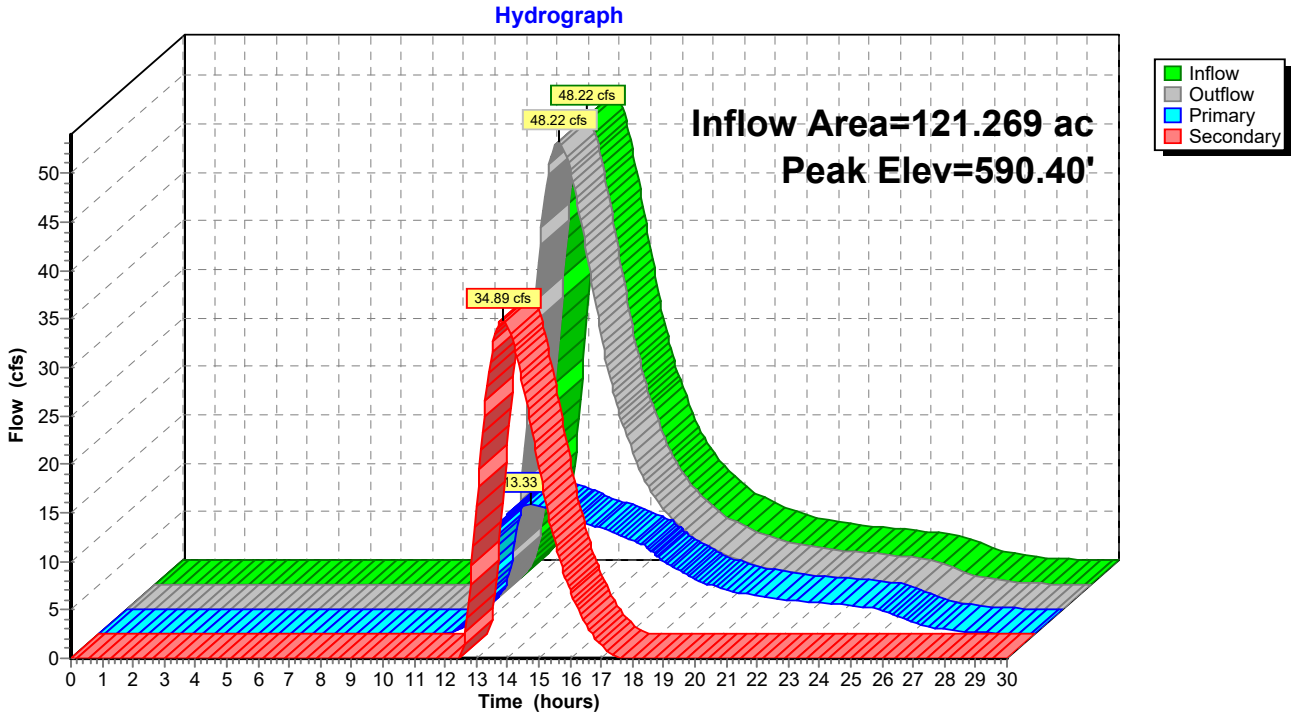
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 590.40' @ 13.84 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	587.20'	**18.0" Round Culvert** L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 587.20' / 586.95' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf
#2	Secondary	589.20'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=13.33 cfs @ 13.84 hrs HW=590.40' (Free Discharge)
1=Culvert (Inlet Controls 13.33 cfs @ 7.54 fps)

Secondary OutFlow Max=34.89 cfs @ 13.84 hrs HW=590.40' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 34.89 cfs @ 2.90 fps)

Pond 34R: 34R

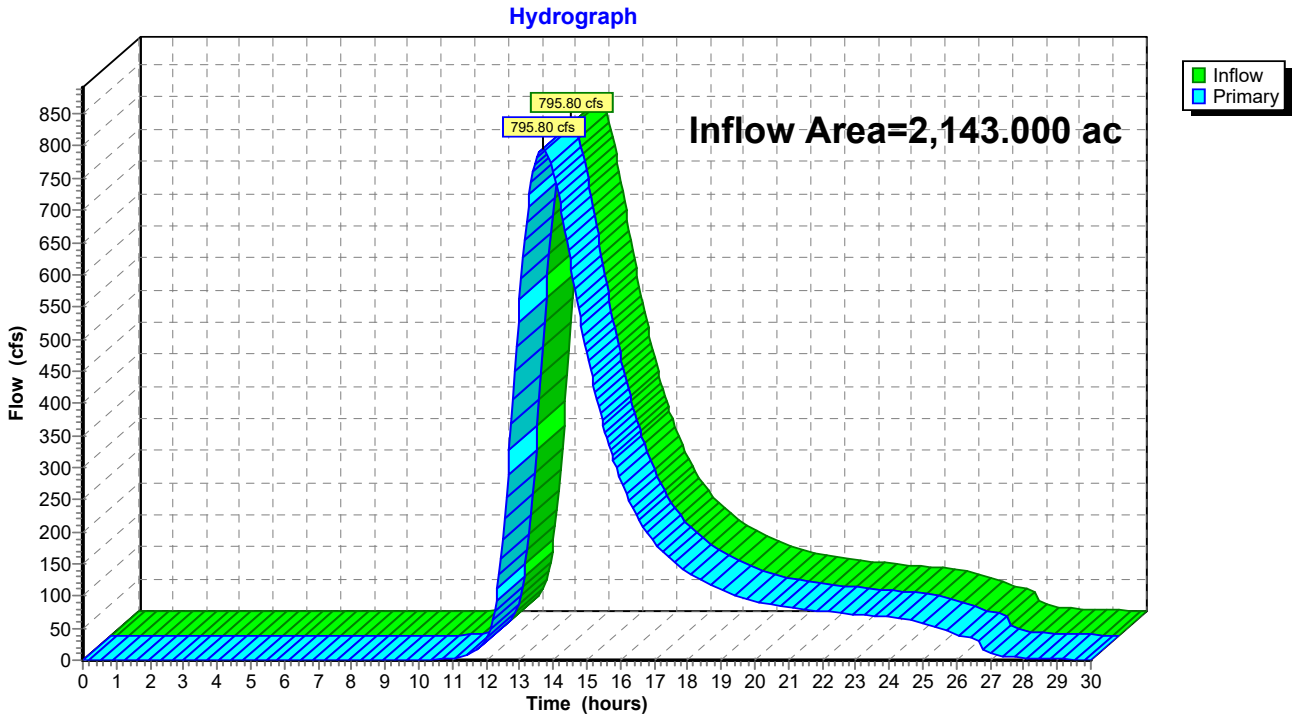

Hydrograph
Inflow Area=121.269 ac
Peak Elev=590.40'
48.22 cfs
48.22 cfs
34.89 cfs
13.33
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 5 10 15 20 25 30 35 40 45 50
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Link 39L: (new Link)

Inflow Area = 2,143.000 ac, 9.18% Impervious, Inflow Depth > 1.41" for 10-Year A event
Inflow = 795.80 cfs @ 13.68 hrs, Volume= 251.562 af
Primary = 795.80 cfs @ 13.68 hrs, Volume= 251.562 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link 39L: (new Link)



Appendix F

TOWN OF HAMBURG
DRAINAGE ESTIMATE
&
RECOMMENDATION

Watershed Area	Sub-Watershed Area	Drainage Feature Label	Item	Length (approx.)	Quantity	Unit Cost ($)	Figure #	Map	Ownership
Smokes Creek	1	CA1	Remove down stream beaver dam	-	Beaver dam removal	$7,800.00	1	17-2	State
Smokes Creek	1	CA2	Clean Inlet and Outlet. Dredge Outlet and Remove Beaver Dam.	100 ft	-	$2,850.00	2,353,354	17-2	Town
Smokes Creek	1	CA3	Re-create drainage path, clean culvert and remove beaver dam	75 ft	-	$3,900.00	351,352	17-2	Town
Smokes Creek	1	CA9	Remove down stream beaver dam	-	-	-	5,6	17-2	State
Beachwood Creek	4	CA10	Clean culvert from debris and remove beaver dam	75 ft	-	$5,400.00	30,31	17-1	State
Smokes Creek	3	CB9	Replace culvert with larger capacity culvert and Clean upstream/downstream drainage paths	50 ft	3'x8' conc. Box culvert	$56,700.00	49,50	17-3	Town
Beachwood Creek	3	CB10	Clean Culvert	30 ft	-	$3,240.00	52,53	17-3	Town
Beachwood Creek	3	CB11	Clean culvert	30 ft	-	$3,240.00	54,55	17-3	Town
Beachwood Creek	25	CB13	Clean upstream/downstream drainage paths and culvert	50 ft	-	$3,450.00	x	17-3	Town
Beachwood Creek	25	CB15	Clean downstream drainage path	50 ft	-	$2,700.00	59,60	17-3	Town
-	9	CC5	Dredge under bridge	-	Dredge	$2,400.00	67,68	17-3	State
Rush Creek	6	CC10	Clean downstream drainage path	50 ft	-	$2,700.00	92,93	17-4	State
Wanaka Creek	29	CC15	Clean culvert	25 ft	-	$3,000.00	x	17-5	State
Wanaka Creek	29	CC16	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	355	17-5	State
Rush Creek	7	CC23	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	132,133	17-5	County
Rush Creek	30	CC29	Clean out culvert	30 ft	-	$3,240.00	164,165	17-8	County
Rush Creek	30	CC36	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	192,193	17-8	Town
Rush Creek	7	CC38	Clean downstream drainage path	75 ft	-	$3,150.00	205,207	17-5	State
Rush Creek	7	CC41	Clean upstream/downstream drainage paths and culvert	200 ft	-	$6,150.00	212,213	17-5	Town
Rush Creek	7	CC42	Culvert Replacement and Clean upstream/downstream drainage paths	100 ft	x1 - 18" C.I.P.	$5,550.00	214,215	17-5	Town
Rush Creek	29	CC43	Culvert replacement and clean upstream/downstream drainage paths	100 ft	x1 - 24" C.I.P.	$5,600.00	219,220	17-8	Town
Rush Creek	29	CC44	Clean underground storm water system	-	Underground Cleaning	$6,600.00	x	17-8	
Rush Creek	29	CC45	Replace 18" culvert with 24" culvert and clean and clear	100 ft	x1 - 24" C.I.P.	$4,260.00	222,224	17-8	Town
Rush Creek	29	CC46	Clean upstream/downstream drainage paths and culvert	50 ft	-	$3,450.00	223,225	17-8	Town
Rush Creek	30	CC49	Clean out culvert	30 ft	-	$3,240.00	x	17-8	County
Rush Creek	30	CC54	Clean out culvert	30 ft	-	$3,240.00	243,244	17-8	Town

Rush Creek	29	CC56	Clean downstream drainage path	50 ft	-	$2,700.00	251,256	17-5	State
Rush Creek	29	CC57	Clean upstream/downstream drainage paths	100 ft	-	$3,600.00	253,255	17-5	State
Foster Brook	2	CD13	Re-create drainage path and clean culvert	100 ft	-	$4,350.00	283,286	17-4	Railway
Foster Brook	-	CD17	Clean upstream/downstream drainage paths	100 ft	-	$3,600.00	266	177	County
Foster Brook	29	CD22	Clean upstream drainage path	50 ft	-	$2,700.00	292,293	17-6	County
Foster Brook	29	CD23	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	294	17-6	County
Eighteenmile Creek	6	CD25	Clean underground storm water system			$6,600.00	x	17-6	County
Foster Brook	34	CD27	Clean out culvert	40 ft	-	$3,720.00	345	17-6	State
Foster Brook	34	CD28	Clean culvert	40 ft	-	$3,720.00	366,367	17-9	State
Foster Brook	-	CD3	Dredge under bridge	-	Dredge	$2,400.00	x	17-7	County
Foster Brook	-	CD4	Dredge under bridge	-	Dredge	$2,400.00	267,268	17-7	Town
Foster Brook	32	CD30	Clean downstream drainage path	50 ft	-	$2,700.00	300,301	17-9	County
Berricks Creek	31	CD31	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	302,303	17-20	State
Lake Erie	-	CE9	Clean underground storm water system	-	Underground Cleaning	$6,600.00	x	17-10	State
Lake Erie	-	CG10	Clean underground storm water system	-	Underground Cleaning	$6,600.00	241,403	17-12	State
Berricks Creek	9	CG21	Clean upstream/downstream drainage paths and culvert	75 ft	-	$3,150.00	337	17-9	Town
Berricks Creek	9	CG24	Clean upstream/downstream drainage paths and culvert	100 ft	-	$3,600.00	332	17-9	Town
Berricks Creek	9	CG27	Clean upstream/downstream drainage paths and replace culvert	100 ft	Twin 42" R.C.P.	$56,700.00	333	17-9	Town
Berricks Creek	9	CG28	Clean upstream/downstream drainage paths	50 ft	-	$2,700.00	334	17-9	Town
Berricks Creek	36	CG30	Replace 24" C.M.P.	-	x1 - 24" C.I.P.	$4,260.00	196	17-10	County
Lake Erie	-	CG9	Clean underground storm water system	-	Underground Cleaning	$6,600.00	242,395	17-12	State
Wanaka Creek	26	CH1	Clean underground storm water system	-	Underground Cleaning	$6,600.00	x	17-13	
Lake Erie	-	CH10	Clean underground storm water system	-	Underground Cleaning	$6,600.00	187	17-12	State
Wanaka Heights Creek	-	CH14	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	148	17-13	State
Lake Erie	27	CH16	Clean upstream/downstream drainage paths and replace culvert	150 ft	x1 - 24" C.I.P.	$6,960.00	191	17-12	Railway
Lake Erie	-	CH18	Clean upstream/downstream drainage paths and culvert	150 ft	-	$4,500.00	x	17-12	Railway
Wanaka Creek	26	CH2	Culvert Replacement	-	9'x6' conc. Arch	$118,800.00	x	17-13	Railway

Wanaka Creek	26	CH3	Culvert Replacement	-	5'x4.75' conc. Arch	$66,600.00	98	17-13	Railway
Wanaka Creek	26	CH4	Clean upstream/downstream drainage paths	100 ft	-	$3,600.00	99	17-13	Railway
Wanaka Creek	26	CH5	Clean upstream/downstream drainage paths	100 ft	-	$3,600.00	100	17-13	Railway
Wanaka Creek	26	CH6	Culvert Replacement and Clean upstream drainage paths	100 ft	Twin 48" R.C.P.	$56,700.00	102	17-13	Railway
Wanaka Creek	28	CH8	Culvert Replacement	-	x1 - 30" C.I.P.	$4,350.00	322	17-19	State
Wanaka Creek	26	CI5	Culvert Replacement	-	x1 - 18" C.I.P.	$4,200.00	343	17-19	State
Lake Erie	-	CJ13	Clean culverts	50 ft	-	$4,200.00	109	17-17	County
Lake Erie	-	CJ14	Clean underground storm water system	-	Underground Cleaning	$4,350.00	108	17-17	County
Beachwood Creek	20	CJ19	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	155	17-17	State
Beachwood Creek	20	CJ24	Clean underground storm water system	-	Underground Cleaning	$4,350.00	160	17-17	State
Lake Erie	20	CJ27	Replace 18" C.I.P. and clean road side ditches	100 ft	x1 - 18" C.I.P.	$5,550.00	161	17-17	State
Lake Erie	20	CJ28	Replace 18" C.I.P.	-	x1 - 18" C.I.P.	$4,200.00	163	17-17	State
Beachwood Creek	22	CJ33	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	316	17-14	State
Beachwood Creek	22	CJ34	Culvert Replacement	-	x1 - 18" C.I.P.	$4,200.00	317	17-14	State
Beachwood Creek	22	CJ35	Culvert Replacement	-	x1 - 18" C.I.P.	$4,200.00	318	17-14	State
Beachwood Creek	21	CJ36	Re-create drainage path	100 ft	-	$3,600.00	319	17-14	State
Wanaka Heights Creek	26	CJ37	Re-create drainage path and clean culvert	100 ft	-	$4,350.00	313	17-13	County
Lake Erie	-	CK1	Clean upstream drainage path and culvert	100 ft	-	$4,350.00	7	17-16	County
Eighteenmile Creek	-	CK4	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	11	17-16	Town
Eighteenmile Creek	-	CK5	Culvert Replacement	-	x1 - 18" C.I.P.	$4,200.00	12	17-16	County
Eighteenmile Creek	-	CK6	Clean underground storm water system	-	Underground Cleaning	$6,600.00	13	17-16	Town
Eighteenmile Creek	-	CK7	Replace 12" C.I.P.	-	x1 - 12" C.I.P.	$4,050.00	14	17-16	Town
Eighteenmile Creek	10	CK10	Clean underground storm water system	-	Underground Cleaning	$6,600.00	24	17-15	State
Eighteenmile Creek	10	CK11	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	25	17-15	State
Eighteenmile Creek	11	CK16	Clean upstream/downstream drainage paths	100 ft	-	$4,350.00	311	17-15	County
Eighteenmile Creek	14	CK17	Re-create drainage path and clean culvert	100 ft	-	$4,350.00	312	17-14	State
Eighteenmile Creek	11	CK24	Cuvlert Replacement	-	x1 - 36" C.I.P.	$4,530.00	310	17-15	County
Eighteenmile Creek	17	CK33	Clear culvert of debris	30 ft	-	$3,240.00	x	17-14	State
Eighteenmile Creek	10	CK36	Culvert Replacement	-	x1 - 24"x36" box culvert	$22,800.00	26	17-16	County

Eighteenmile Creek	18	CK40	Culvert Replacement	-	x1 - 30" C.M.P.	$4,350.00	349	17-14	Town
Eighteenmile Creek	18	CK41	Clean road side ditch and replace culvert	100 ft	x1 - 24" x 24" conc. Box Culvert	$15,150.00	350	17-14	Town
Eighteenmile Creek	23	CK43	Clean road side ditch and culvert	75 ft	-	$3,900.00	347	17-18	Town
Eighteenmile Creek	15	CK45	Clean out culvert	50 ft	-	$4,200.00	409	17-18	Town
Eighteenmile Creek	23	CK48	Replace 18" C.I.P.	-	x1 - 18" C.I.P.	$4,200.00	348	17-18	County
Eighteenmile Creek	-	CK50	Clean upstream Drainage path	50 ft	-	$2,700.00	x	17-16	County
Eighteenmile Creek	10	CK54	Clean downstream drainage path	50 ft	-	$2,700.00	79	17-16	Town
Eighteenmile Creek	10	CK55	Clean underground storm water system	-	Underground Cleaning	$6,600.00	81	17-16	Town
Eighteenmile Creek	23	CL1	Clean upstream/downstream drainage paths	50 ft	-	$2,700.00	3	17-23	County
Eighteenmile Creek	23	CL2	Clean upstream/downstream drainage paths	50 ft	-	$2,700.00	4	17-23	County
Rush Creek	-	CN20	Clean out culvert	30 ft	-	$3,240.00	90	17-4	State
Rush Creek	-	CN21	Clean out culvert	30 ft	-	$3,240.00	91	17-4	State
Rush Creek	6	CN29	Re-create drainage path	100 ft	-	$3,600.00	101	17-6	State
Foster Brook	32	CN31	Clean out culvert	30 ft	-	$3,240.00	104	17-8	State
Foster Brook	7	CN46	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	127	17-5	County
Rush Creek	7	CN51	Clean out culvert	30 ft	-	$3,240.00	131	17-5	County
Rush Creek	30	CN67	Clean out culvert	50 ft	-	$4,200.00	172	17-8	County
Rush Creek	24	CN73	Clean underground storm water system	-	Underground Cleaning	$6,600.00	179	17-21	County
Rush Creek	24	CN74	Clean underground storm water system	-	Underground Cleaning	$6,600.00	180	17-21	County
Foster Brook	7	CN77	Clean out culvert	30 ft	-	$3,240.00	190	17-8	Town
Berricks Creek	36	CN81	Clean out culvert	30 ft	-	$3,240.00	195	17-11	County
Rush Creek	6	CN91	Clean out culvert and re-define drainage paths	100 ft	-	$4,350.00	203	17-6	Town
Rush Creek	7	CN94	Clean upstream/downstream drainage paths	100 ft	-	$3,900.00	210	17-5	Town
Rush Creek	7	CN95	Clean upstream/downstream drainage paths	100 ft	-	$3,600.00	211	17-5	Town
Rush Creek	30	CN101	Clean upstream/downstream drainage paths	50 ft	-	$2,700.00	231	17-8	County
Rush Creek	30	CN102	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	232	17-8	Town
Rush Creek	30	CN103	Clean upstream/downstream drainage paths and culvert	100 ft	-	$4,350.00	233	17-8	Town
Rush Creek	30	CN104	Clean underground storm water system	-	Underground Cleaning	$6,600.00	234	17-8	Town
Rush Creek	6	CN126	Clean underground storm water system	-	Underground Cleaning	$6,600.00	298	17-6	County
Berricks Creek	33	CN129	Clean Downstream Drainage pat	50 ft	-	$2,700.00	339	17-9	Town
Rush Creek	7	CN133	Re-define drainage path	100 ft	-	$3,600.00	359	17-5	State

Waterfalls Village Creek	33	CN154	Culvert Replacement	-	x1 - 24" C.I.P.	$4,260.00	380	17-9	State
Beachwood Creek	21	CZ1	Clean downstream drainage path	50 ft	-	$2,700.00	125	17-17	County
Beachwood Creek	21	CZ2	Clean upstream drainage path	50 ft	-	$2,700.00	126	17-17	County
Smokes Creek	3	DITCH	Clean road side ditches	200 ft	-	$5,400.00	x	-	
Berricks Creek	17	POOR	Replace 18" C.M.P and clean upstream/downstream drainage paths	100 ft	x1 - 18" C.M.P.	$5,550.00	x	-	
Eighteenmile Creek	10	-	Modifying Pine Lakes Communitee Lake Outlet	-	Outlet Remediation	$20,000.00	421 - 425	-	Town
					TOTAL:	$877,990.00			

*Cost estimate assumes work will be completed by third party contractors.

Appendix G

TOWN OF HAMBURG GOLF COURSE

FLOOD MITIGATION
AND
PRELIMINARY DESIGNS OF DRAINAGE IMPROVEMENTS

Town of Hamburg

Erie County, New York



TOWN OF HAMBURG GOLF COURSE

FLOOD MITIGATON STUDY
AND
PRELIMINARY DESIGNS OF DRAINAGE IMPROVEMENTS

DRAFT - JULY 2010

WENDEL DUCHSCHERER
ARCHITECTS & ENGINEERS

140 John James Audubon Parkway
Suite 201
Amherst NY 14228

WDP No. 3008-10HGC

I. Introduction

The Town of Hamburg Golf Course has significant problems with flooding. The golf course, located along Boston State Road, becomes flooded under extreme flooding events. This flooding can close the course, produce erosion, and accumulate debris/sediment along the greens and fairways. In August of 2009, a very large rain event occurred within Southern Erie County. This extreme event caused more flooding and damage than any event experienced in the previous 32 years at the Hamburg Golf Course. Approximately two-thirds of the golf course was flooded and trees and debris were washed onto the Town property. In addition, significant erosion of the banks of Eighteen Mile Creek was seen and sediment (up to 6 inches in depth) was deposited onto the greens and fairways of the golf course. This flooding event closed the golf course for a week and disrupted play for the rest of the season. Revenue from play at the course was reduced and significant costs for cleanup (over $100,000) were incurred.

Located along Boston State Road east of the Village of Hamburg, the golf course is crossed by two creeks, Eighteen Mile Creek and Neuman Creek (Figure 1.1). Both waterways are quite large; Eighteen Mile Creek drains over 26,000 acres (40.7 square miles) upstream of the golf course and Neuman Creek drains 4,200 acres (6.6 square miles) before it terminates at Eighteen Mile Creek. These creeks drain parts of the Towns of Hamburg, Boston, Orchard Park, Colden and Concord upstream of the golf course.

Mitigating this flooding is an area of focus for the Town of Hamburg. Wendel Duchscherer (Wendel) was contracted by the Town to assist in the development of a plan to reduce flooding along the golf course. The development of this flood mitigation plan began with the construction of a model of Eighteen Mile Creek and Neuman Creek upstream, downstream, and within the golf course property. Following construction of the model, a mitigation plan was prepared. Model construction and development of the flood mitigation plan were completed using the following set of tasks:

- Data Collection
- Model Development
- Model Confirmation
- Model Existing Conditions
- Develop Proposed Mitigation Measures
- Preliminary Cost Estimates
- Conclusions & Recommendations

Sections of the report that follow this introduction will describe each of these tasks in detail.

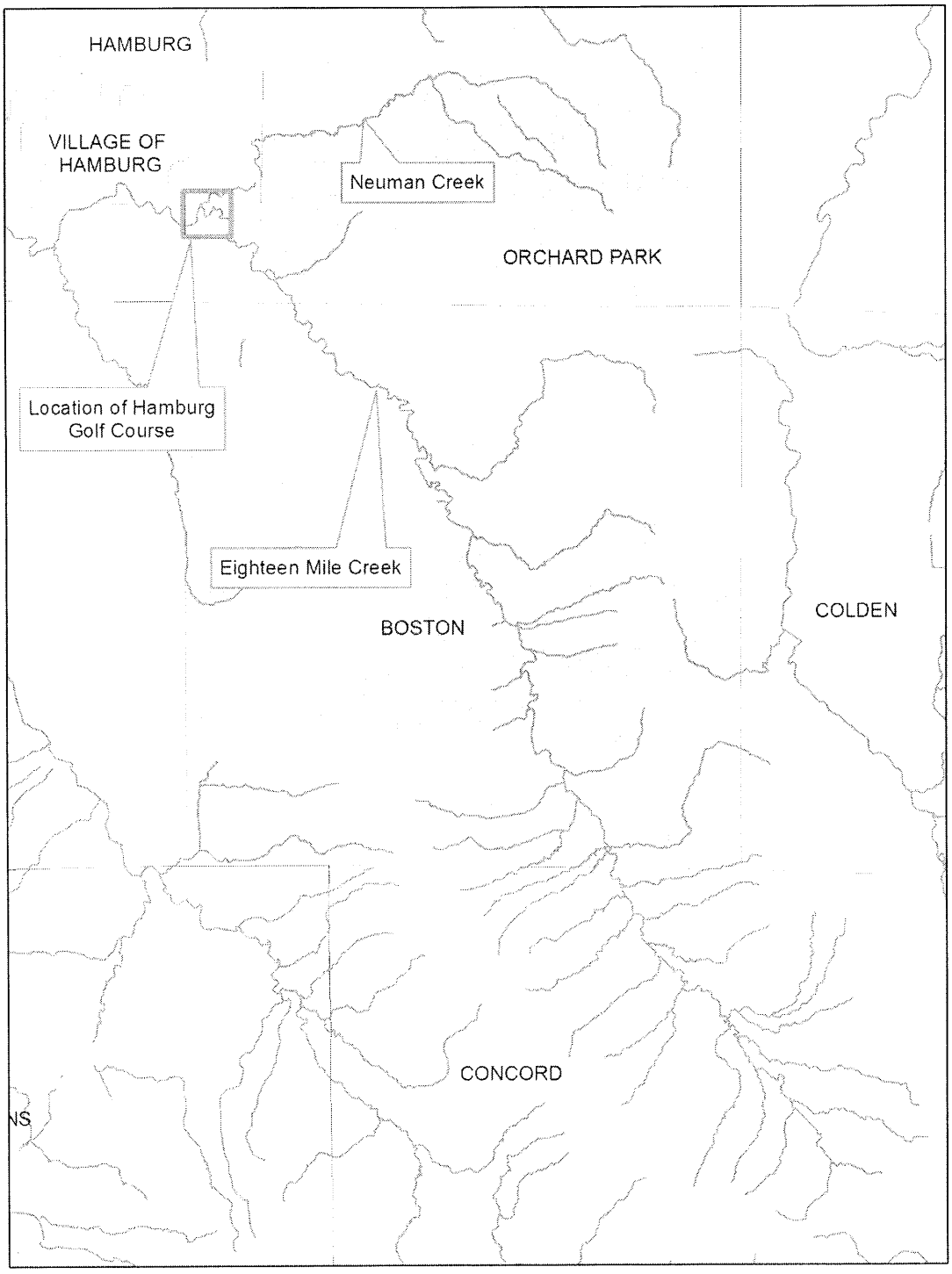


Figure 1.1: Location of the Town of Hamburg Golf Course and Associated Creeks

II. Data Collection

To adequately assess flooding in the Town of Hamburg Golf Course, a series of models were developed. These models require a large amount of data to provide accurate results. As part of this project, Wendel collected data from a variety of sources. To save both time and money, existing data was used whenever possible. These data sources included plans of the site, engineering reports, and geographic information systems (GIS) data. To confirm and augment this existing data, additional data was collected in site visits and field surveys during this project.

A. Existing Data

Construction plans of the golf course, engineering reports, and a large amount of GIS data were collected as part of this project. Each of these data sources is detailed below.

1. Construction Plans

The Town of Hamburg Engineering Department provided copies of the plans for the golf course. The first set of plans is from May of 1995 when nine holes were added to the golf course. The second set of plans is from 2003 when the golf course was renovated. These plans show the locations and elevations of the greens, fairways, and tee boxes on the course. The locations, slopes, and invert elevations of drainage structures on the golf course were also provided. This information provided data needed when applying the model to confirm that proposed improvements would be adequate to mitigate flooding.

2. Engineering Reports

Two engineering reports provided critical information for this project. In 2003, Erie County replaced the Eckhardt Road Bridge upstream of the golf course along Eighteen Mile Creek. As part of the design, C&S Engineers produced an engineering report that included flows for Eighteen Mile Creek at this bridge under various design conditions (Erie County, 2003). These flows were used as upstream boundary conditions for our model of Eighteen Mile Creek. The Federal Emergency Management Agency (FEMA), produced a Flood Insurance Study for Erie County that included some portions of Eighteen Mile Creek (FEMA, 2009). This study provided water surface elevations along Eighteen Mile Creek for various design storms. These water surface elevations were used in this project to confirm the model of Eighteen Mile Creek developed for this project.

3. GIS Data

Data that showed the ground surface elevations within the golf course was important for this project. As part of the Flood Insurance Study, FEMA collected elevation data of all of Erie County using LiDAR (FEMA, 2009). This information allowed Wendel to characterize the low spots in the golf course and also provided information used to develop stream cross sections in the model. An example of this data source is shown in Figure 2.1. Other GIS data sources were used to assist in constructing the model including:

- Aerial Photography – aerial maps of the Town of Hamburg were used to determine the imperviousness of an area. With these maps, the buildings and paved areas of the Town were estimated. This data was used to estimate flows in Neuman Creek.
- Soils Data – along with the aerial photos, this data was used to determine how much flow would be generated in Neuman Creek.
- Parcel Definitions – knowing the locations of parcel boundaries was important when determining potential areas for flood mitigation measures.
- Wetland Delineations – when choosing potential solutions to the flooding problems, it was important to know the locations of wetlands. Due to permitting issues, wetlands were avoided whenever possible.

Road and stream location data was also provided in a GIS format. This data was used when producing maps of the Town of Hamburg Golf Course.



Figure 2.1: LiDAR data at the Intersection of Neuman and Eighteen Mile Creeks
(blue areas represent low areas, dark green represents higher areas)

B. Collected Data

Relying only on existing data for the model of the Town of Hamburg Golf Course would limit the effectiveness of the model. Therefore, additional data needed to be collected. This data, collected by site visits and field surveys, was used to supplement the data that already existed. Also, the data collected served as a check that the existing data sources accurately represented the real-world conditions in 2010. The data collected as part of this project is described below.

1. Site Visits

Many of the data sources used in the project were over 10 years old. Therefore, site visits were needed to check the locations and condition of the culverts, bridges, pipes, and ponds within the golf course. Wendel documented the conditions at the golf course during a site visit with Garry Nelson. Photos of existing conditions were taken to confirm the elevations and details of drainage devices. Figure 2.2 shows one of the bridges over Neuman Creek.

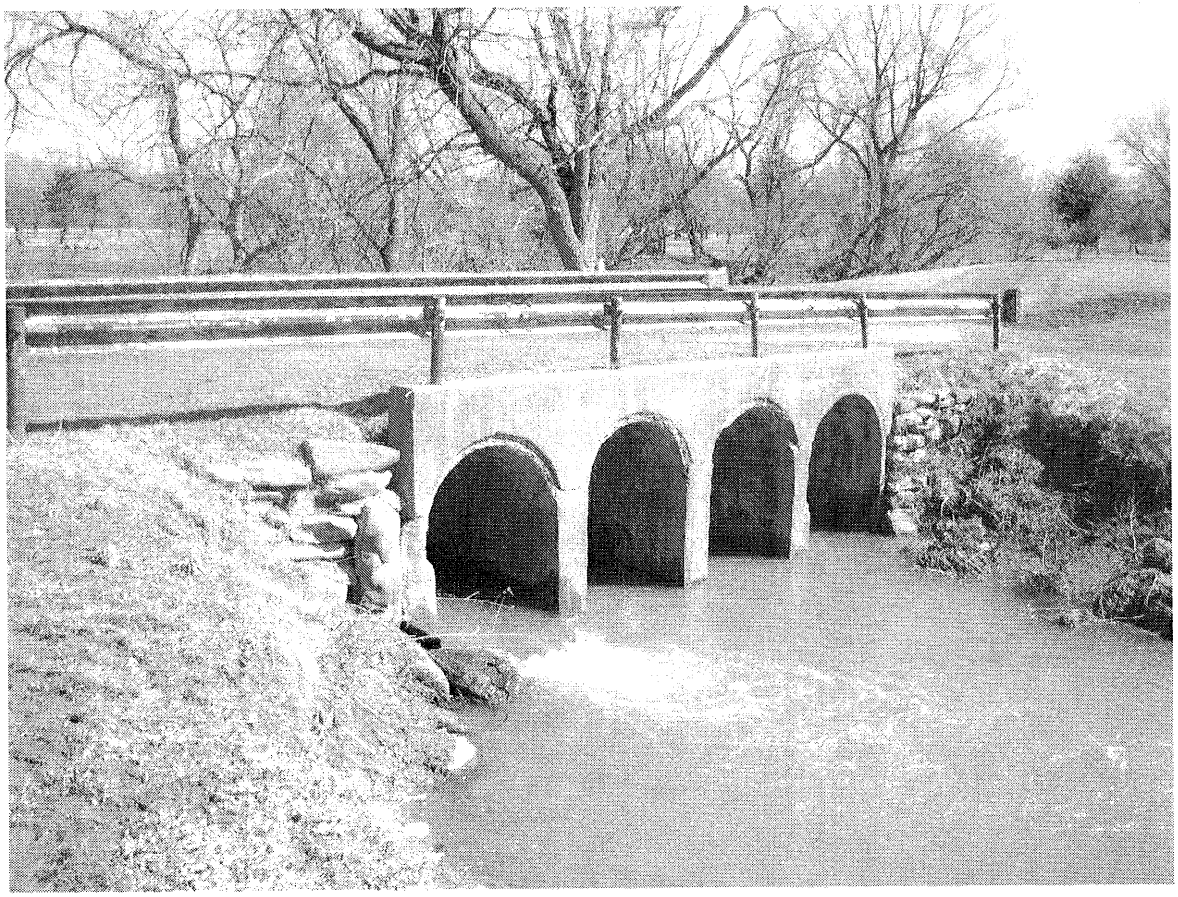


Figure 2.2: Bridge Over Neuman Creek

2. Field Survey

Survey data of both Eighteen Mile Creek and Neuman Creek was collected to augment the ground surface elevation information provided from the LiDAR data. The 2009 LiDAR data was collected from the air. Therefore, any elevations of the creeks measured by LiDAR were the water surface elevations, not the elevation of the bottom of the creek. Traditional survey techniques were used by Wendel to collect this information. Wendel also surveyed each culvert and bridge along the main channel of Eighteen Mile Creek and Neuman Creek within the golf course. These culverts are an essential

component of the drainage model, so confirming the data provided in the construction plans was important to the project.

III. Model Development

Using the data collected, two models were constructed to accurately simulate conditions upstream, downstream, and within the Town of Hamburg Golf Course. A model of Neuman Creek was developed in HydroCAD to determine the runoff and flow in this creek upstream of the golf course. A HEC-RAS model of both Eighteen Mile and Neuman Creek was developed to estimate water surface elevations in these waterways. In this section of the report, the process of constructing these models will be described.

A. Model Background Information

HydroCAD is one of the most widely used stormwater models in the United States. It models the hydrology of stormwater runoff from watershed areas using hydrologic techniques developed by the Natural Resources Conservation Service as part of the model TR-55 (HydroCAD, 2004). Rainfall is transformed to runoff, which is then routed to streams to create a hydrograph of a watershed being studied. HydroCAD was used to model the area of Neuman Creek upstream of the golf course.

HEC-RAS was developed by the United States Army Corps of Engineers (USACOE) to perform one-dimensional steady and unsteady flow calculations within a stream channel (Brunner, 2002). The model calculates water surface elevations for a full network of channels and has the ability to model the impact of various obstructions (bridges and culverts) in the channels. HEC-RAS was designed for flood plain management applications and flood insurance studies. Version 4.1 of HEC-RAS was used to model Neuman Creek and Eighteen Mile Creek in this project.

Wendel also used HEC-GeoRAS for this project. Developed by the USACOE, HEC-GeoRAS is a pre- and post-processor for HEC-RAS. This allows the user to use GIS to create input data for the HEC-RAS model. The use of HEC-GeoRAS in this project saved time and effort as it improved the process for creating input data for the model.

B. Constructing the HydroCAD Model

To construct the HydroCAD model of Neuman Creek, the watershed area upstream of the golf course needed to be defined. This area was determined using GIS data and the watershed delineation is shown in Figure 3.1. For this watershed area, slopes were determined along with estimates of the impervious area and soil types. This information was determined using GIS data as well. As a final step, this data was entered into HydroCAD along with rainfall data to construct a finished model. The model was then run to produced flow in Neuman Creek just upstream of the golf course.

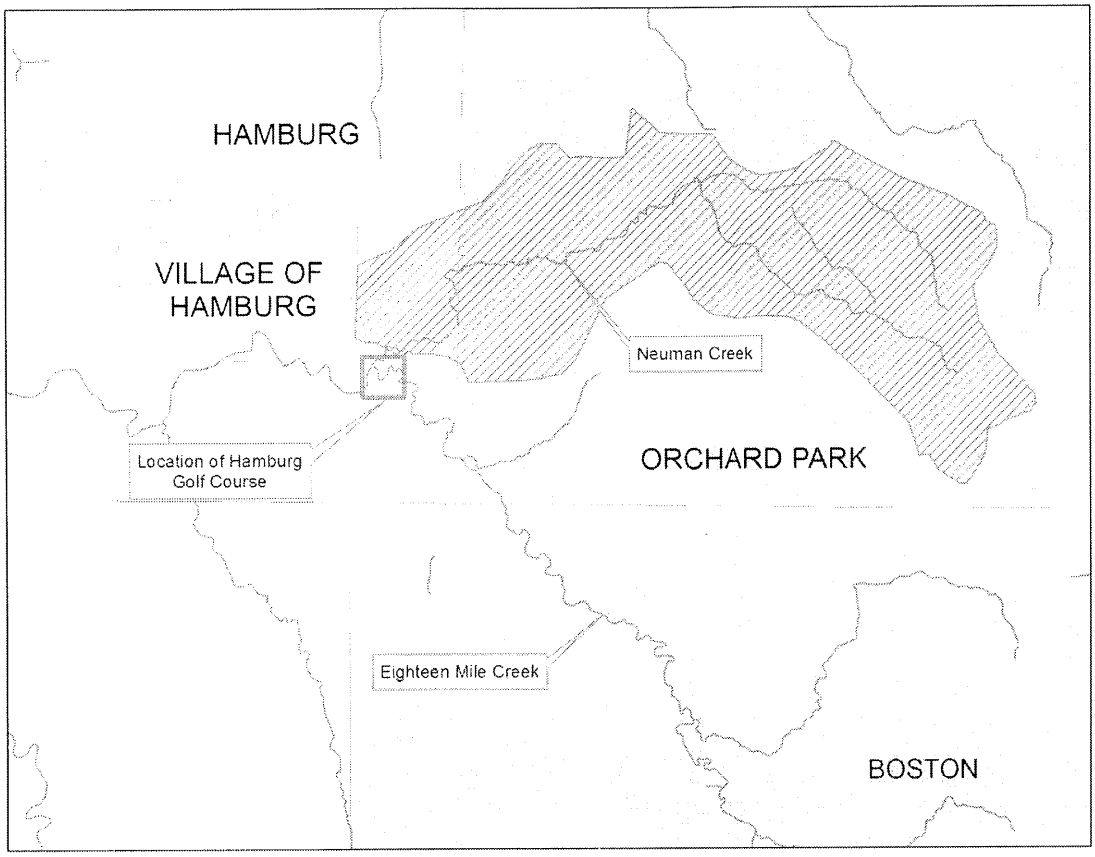


Figure 3.1: Watershed Delineation for Neuman Creek (shaded)

C. Constructing the HEC-RAS Model

With the use of HEC-GeoRAS, the process of constructing models of Eighteen Mile Creek and Neuman Creek in HEC-RAS was streamlined. Using HEC-GeoRAS and ArcGIS, LiDAR data was combined with information defining the channel (channel centerline, left/right bank locations, cross-section locations, and effective flow areas) to generate the base input of the HEC-RAS model. Figure 3.2 shows an example of a small section of Eighteen Mile Creek as defined in HEC-GeoRAS.

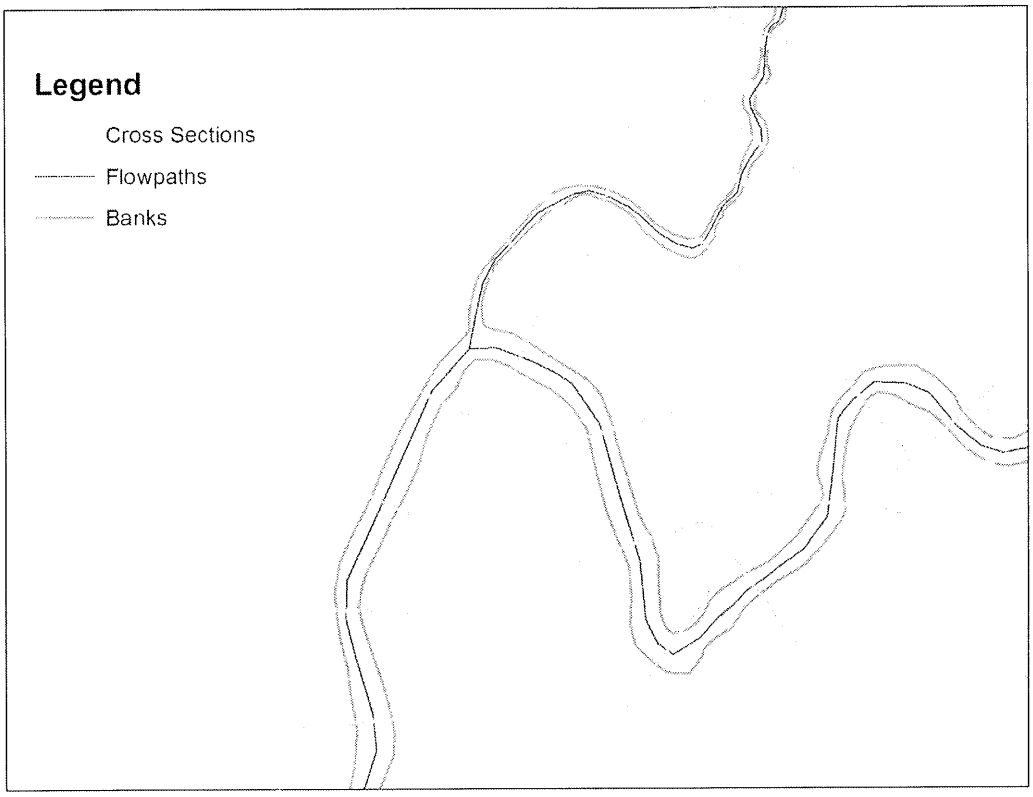


Figure 3.2: HEC-GeoRAS definition of the Intersection of Eighteen Mile and Neuman Creeks

This base input was then modified by incorporating data collected as part of the field survey. Starting with the data provided by the HEC-GeoRAS program, the following modifications to the model were made:

1) At each cross-section defined in HEC-RAS, the bottom elevation of the channel was modified. The LiDAR data used to create the cross-sections within HEC-GeoRAS defined the water surface elevation in the channel. Using the field survey data, the channel bottom could be defined as needed in the HEC-RAS model.
2) Culvert and bridges were added to the HEC-RAS models of Eighteen Mile Creek and Neuman Creek. These culverts and bridges can obstruct flow so they were a necessary addition to the model. In most cases, additional cross-sections were added to the models to incorporate these changes.
3) The input data provided by HEC-GeoRAS did not include all of the parameters needed by HEC-RAS. Manning's roughness coefficients were added to construct the models.

D. Defining the Upstream Boundary Conditions

Two different upstream boundary conditions were used for the HEC-RAS models of Eighteen Mile Creek and Neuman Creek (Figure 3.3). For Neuman Creek, the Bridge under Boston State Road was used as the

upstream boundary condition. This location was chosen based on the fact that we only needed water surface elevations along Neuman Creek within the golf course. For Eighteen Mile Creek, the upstream boundary was located at the Eckhardt Road Bridge. This was chosen based upon the availability of existing data (specifically water surface elevations and flow) at this bridge.

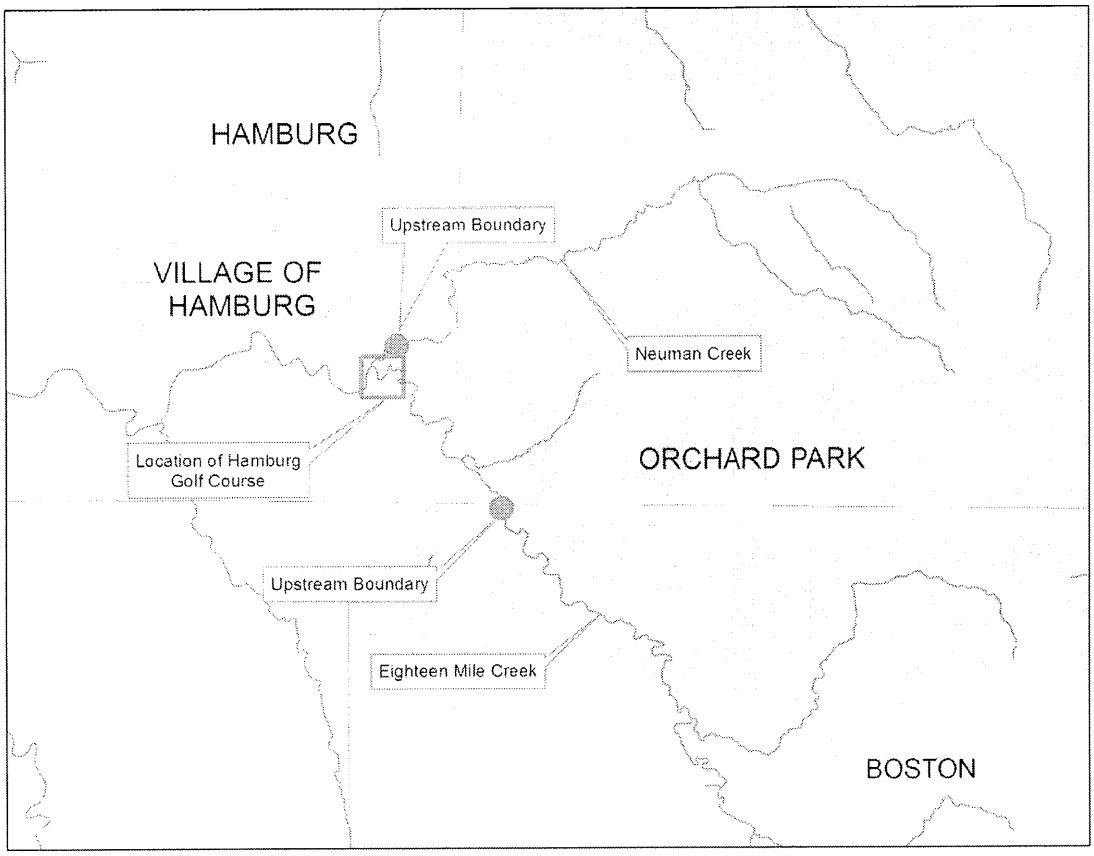


Figure 3.3: Location of Upstream Boundaries for use in the HEC-RAS Model

IV. Model Confirmation

After constructing the models of Eighteen Mile Creek and Neuman Creek, Wendel went through a process to confirm that the model accurately represented the real world conditions of this area. This was completed by comparing the model results with data collected in the field and data found in existing engineering reports. Two different methods were used for this confirmation process. In Eighteen Mile Creek, water surface elevations at locations along the creek have been published by FEMA in the Flood Insurance Study for various design storms. In other areas, no direct measurements of water surface elevations have been collected. For these areas, confirmation was completed by comparing the results of the model to local knowledge of what typically happens in these areas during a flood.

A. Developing Design Storms

To confirm the model, we first need to develop design storms for this area. This will allow for confirmation when comparing our new model with the data published by FEMA. A design storm is an artificially constructed rainfall pattern that attempts to represent what would be expected to occur during a specified statistical period. For example, a five year design storm includes a rainfall pattern that would be expected to occur, on average, once every five years. In probabilistic terms, there is a 20% chance in a given year that this type of storm would occur. To construct design storms for the Town of Hamburg Golf Course, Wendel determined the rainfall amounts for each of the design storms. These values were established using the values given in the New York State Stormwater Management Design Manual (Center for Watershed Protection, 2003) and are given in Table 4.1.

Table 4.1: Rainfall amounts for each 24 Hour Design Storm

Design Storm	Chance of Design Storm Occurring In a Given Year	Rainfall Amount (in.)
2 year	50 %	2.5
5 year	20 %	3.1
10 year	10 %	3.6
25 year	5 %	4.0
50 year	2 %	4.5
100 year	1%	4.9

Using the values in Table 4.1 along with the intensity-duration-frequency curves for Erie County (Erie & Niagara County, 1972), the design storms for the Town were created using the alternating block method (Chow, 1988). The 10yr design storm, as shown in Figure 4.1, represents the typical shape and rainfall distribution of these design storms.

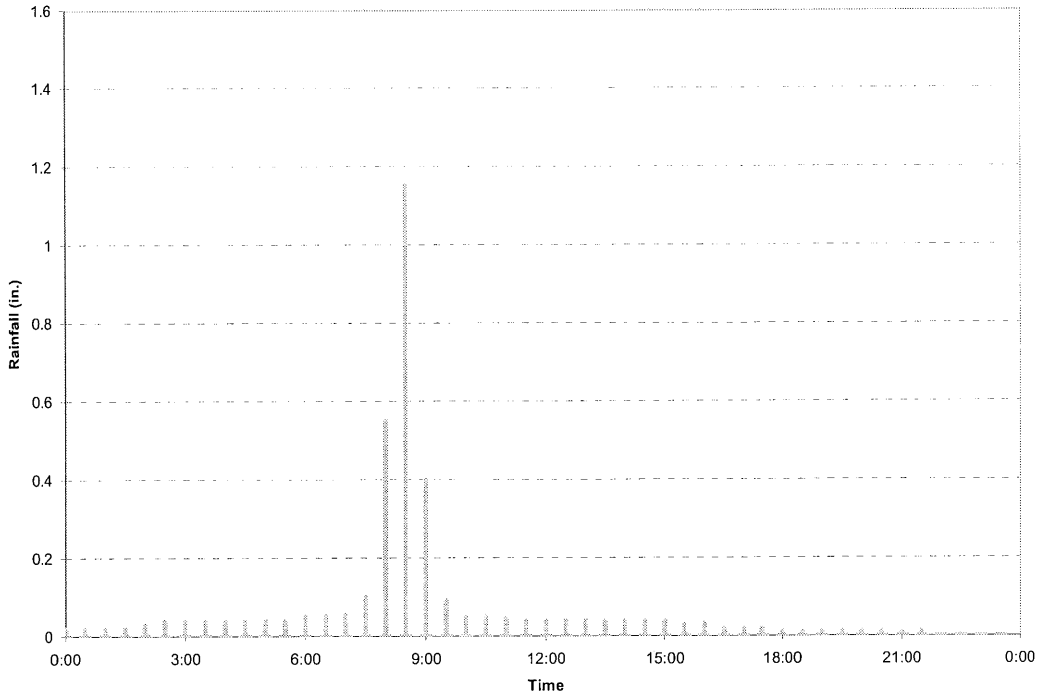


Figure 4.1: 10 year, 24-hour design storm for the Town of Hamburg Golf Course

B. Confirmation of the Model Using FEMA Water Surface Elevations

The HydroCAD model of the Neuman Creek watershed was run using the design storms presented in the earlier section. Flow at the downstream end of this HydroCAD model for each design storm is given in Table 4.2.

Table 4.2: Flow in Neuman Creek at Boston State Road

Design Storm	Flow in Neuman Creek (cfs)
2 year	478
5 year	812
10 year	1125
25 year	1393
50 year	1744
100 year	2035

The data in Table 4.2 is used as the upstream flow for the Neuman Creek HEC-RAS model. The upstream flow in the Eighteen Mile Creek HEC-RAS model was taken from the engineering report on the Eckhardt Road Bridge that was discussed earlier. These flows are given in Table 4.3 and the flows match values used by FEMA in their model of Eighteen Mile Creek.

Table 4.3: Flow in Eighteen Mile Creek at the Eckhardt Road Bridge

Design Storm	Flow in Eighteen Mile Creek (cfs)
2 year	2812
5 year	3728
10 year	4643
25 year	5150
50 year	5883
100 year	6384

With this flow information, the HEC-RAS model of Eighteen Mile Creek and Neuman Creek can be run for the six design storms presented. The results of the HEC-RAS model were then compared with the data provided by FEMA. As shown in Table 4.4, the data match quite well.

Table 4.4: A Comparison of Water Surface Elevations along Eighteen Mile Creek

Design Storm	Town Border with Boston, NY		200 ft upstream of confluence with Neuman Creek	
	HEC-RAS Model	FEMA Data	HEC-RAS Model	FEMA Data
10 year	800.00	800.0	789.08	789.0
50 year	801.04	801.0	790.28	790.5
100 year	801.44	801.2	790.75	790.8

C. Confirmation of the Model Using Field Observations

Using existing studies, we could only confirm the model at two locations due to the limited data provided in the FEMA report on Eighteen Mile Creek. To provide additional confirmation of the model, model results were compared to what is commonly seen on the golf course during flood events.

During our field visit, the golf superintendent was able to share the following information regarding flooding at the golf course:

- On the west side of the course, flooding is often seen on the 12th, 13th, 14th, 15th, and 16th holes
- Flooding is often seen on the 9th, 17th, and 18th holes near Neuman Creek.
- On the east side of the course, flooding is often seen on the 3rd, 4th, 6th, 7th, and 8th holes
- During extreme events flooding can reach the 17th tee box and Boston State Road

Checking these statements against the results of the HEC-RAS model, each of these flooding elements can be seen. Based on this information along with the data comparison of water surface elevations shown in Table 4.4, we can assume that the model is confirmed to represent existing conditions adequately.

V. Existing Conditions Model

The confirmed models of Eighteen Mile Creek and Neuman Creek were then used to analyze a series of model scenarios for existing conditions. These scenarios answered the following question:

- Under existing conditions, where does flooding occur and what magnitude of storm causes that flooding?

To answer this question, the confirmed models of Eighteen Mile Creek and Neuman Creek were run using the six design storms (2, 5, 10, 25, 50 & 100 year) created during the model confirmation process.

The HEC-RAS model of Eighteen Mile Creek is 20,800 feet long running from the Eckhardt Road Bridge downstream to the South Buffalo Street Bridge. The HEC-RAS model of Neuman Creek is 1100 feet long, running from Boston State Road to the confluence with Eighteen Mile Creek. A map of all of the cross sections in the model is provided as Figure 5.1 below.

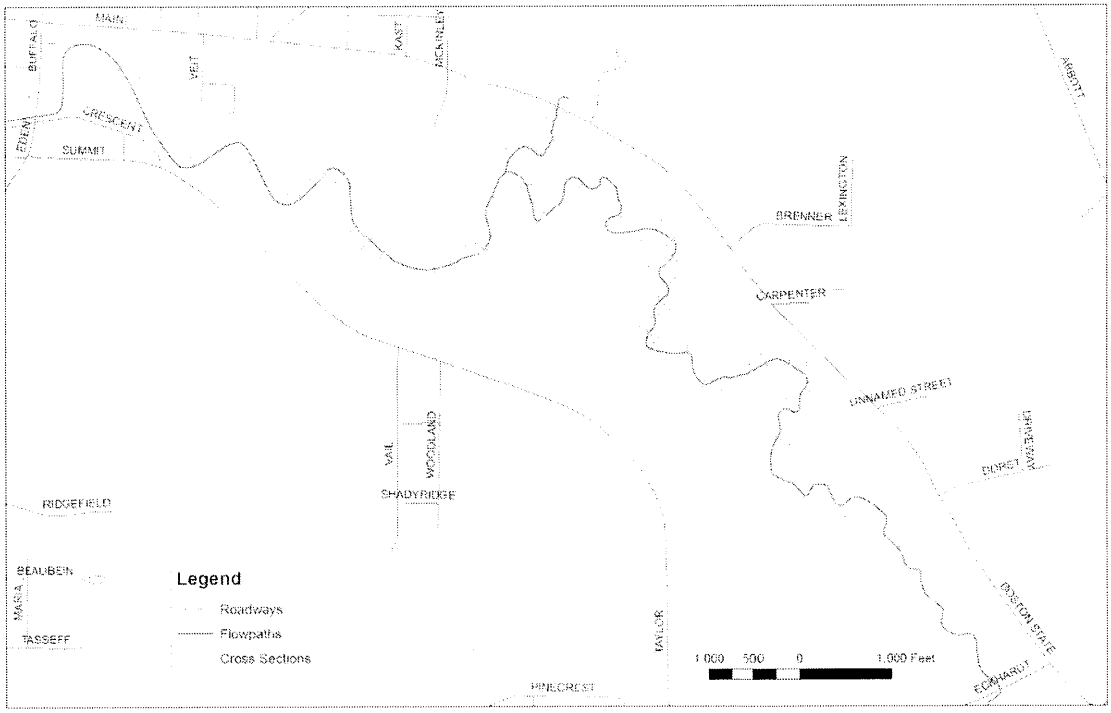


Figure 5.1: Stationing for the HEC-RAS Model of Eighteen Mile Creek and Neuman Creek

Of particular interest for this project are the cross sections closest to the Town of Hamburg Golf Course. Two figures, Figure 5.2 and Figure 5.3, show detailed maps of the cross sections nearest the golf course. Yellow labels showing the numbers of critical golf holes are also presented in these maps.

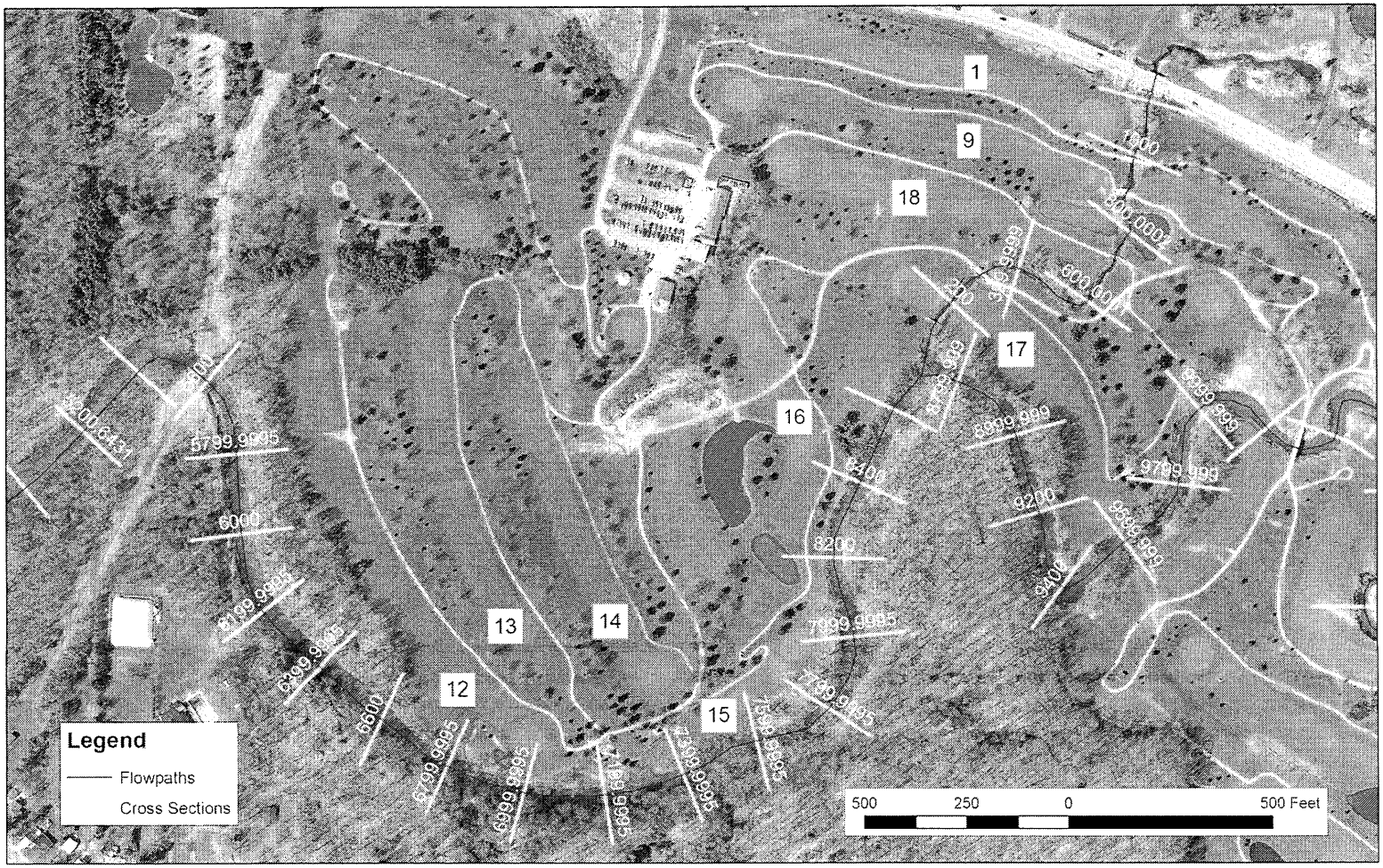


Figure 5.2: HEC-RAS Cross Sections along the Western Side of the Golf Course

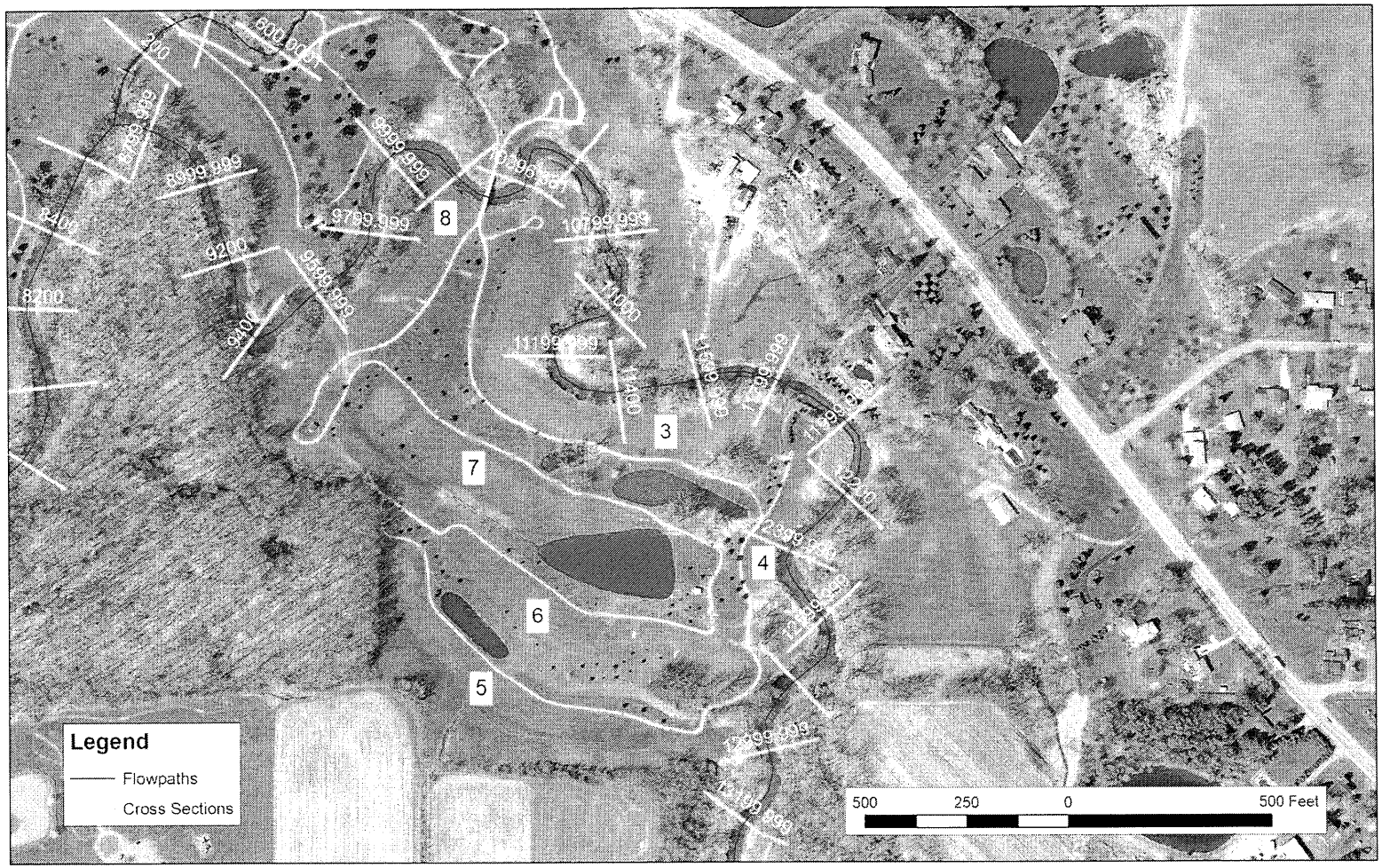


Figure 5.3: HEC-RAS Cross Sections along the Eastern Side of the Golf Course

Water Surface Elevations at each cross section were calculated for each of the six design storms under existing conditions. In Table 5.1, the water surface elevations for Neuman Creek are given. In Table 5.2, the water surface elevations for Eighteen Mile Creek are given for sections near the golf course.

Table 5.1: Water Surface Elevations along Neuman Creek under Existing Conditions

Cross Section	Design Storm (yr)					
	2	5	10	25	50	100
1142.809	787.43	788.42	789.27	789.75	790.39	790.83
1000	787.39	788.39	789.25	789.74	790.38	790.83
943	787.38	788.37	789.24	789.72	790.37	790.82
871	787.31	788.34	789.22	789.71	790.35	790.8
800.0001	787.34	788.37	789.23	789.72	790.36	790.82
763	787.34	788.37	789.23	789.72	790.37	790.82
630	787.34	788.36	789.23	789.72	790.36	790.82
600.0001	787.33	788.36	789.23	789.72	790.36	790.82
399.9999	787.33	788.36	789.23	789.72	790.36	790.81
345	787.33	788.36	789.23	789.72	790.36	790.81
199.9999	787.31	788.34	789.21	789.71	790.35	790.81
75	787.3	788.33	789.21	789.7	790.35	790.8

Table 5.2: Water Surface Elevations along Eighteen Mile Creek under Existing Conditions

Cross Section	Design Storm (yr)					
	2	5	10	25	50	100
12799.99	789.87	790.72	791.29	791.58	791.97	792.27
12599.99	789.69	790.48	791.05	791.36	791.81	792.13
12399.99	789.78	790.71	791.38	791.72	792.17	792.49
12200	789.55	790.59	791.3	791.65	792.12	792.45
11999.99	789.15	790.46	791.24	791.6	792.07	792.4
11799.99	788.86	789.71	790.24	790.49	790.82	791.13
11599.99	788.47	789.73	790.48	790.83	791.3	791.67
11400	788.61	789.74	790.45	790.79	791.25	791.63
11199.99	788.47	789.58	790.24	790.59	791.02	791.45
11000	788.33	789.3	789.95	790.34	790.86	791.27
10799.99	788.4	789.39	790.05	790.42	790.91	791.31
10600.42	787.88	788.93	789.75	790.18	790.72	791.11
10396.38	788.09	789.11	789.84	790.24	790.77	791.17
10199.99	787.76	788.82	789.61	790.01	790.6	791.01
9999.999	787.61	788.72	789.62	790.05	790.64	791.05
9799.999	787.57	788.65	789.57	790.02	790.61	791.04
9599.999	787.21	788.23	789.22	789.76	790.42	790.87
9400	787.41	788.43	789.3	789.77	790.39	790.83
9200	787.22	788.16	789	789.5	790.16	790.64
8999.999	787.13	788.16	789.08	789.61	790.28	790.75
8799.999	787.14	788.2	789.11	789.63	790.3	790.76
8599.999	786.77	788.01	788.99	789.51	790.17	790.64
8400	786.93	788.08	789.02	789.53	790.19	790.65
8200	786.91	788.07	789.01	789.52	790.18	790.64
7999.999	786.87	788.02	788.97	789.48	790.14	790.61
7799.999	786.41	787.68	788.79	789.34	790.03	790.51
7599.999	786.36	787.64	788.75	789.3	790	790.48
7399.999	786.2	787.58	788.7	789.26	789.95	790.44
7199.999	786.03	787.41	788.64	789.21	789.92	790.41
6999.999	786	787.45	788.64	789.2	789.91	790.4
6799.999	785.95	787.44	788.63	789.2	789.9	790.39
6600	785.7	787.28	788.52	789.11	789.83	790.32
6399.999	785.37	786.85	788.08	788.81	789.61	790.14
6199.999	785.03	786.39	787.68	788.43	789.45	790.03
6000	784.63	786.14	787.5	788.38	789.4	789.98
5799.999	784.35	785.91	787.31	788.24	789.24	789.83

Using the information in Tables 5.1 & 5.2, along with elevation data for the golf course, we have calculated that the following flooding occurs under existing conditions:

- For a 2 year design storm:
  - Water will flow into the low areas along the 4th fairway
  - Water will flow into the low areas along the 15th fairway
  - Water will flow into the low areas along the 17th fairway
- For a 5 year design storm (everything above, plus)
  - Water will flow into the low areas along the 3rd fairway
  - Water will flow into the low areas along the 8th fairway
  - Water will flow into the low areas along the 12th fairway
  - Water will flow into the low areas along the 13th fairway
  - Water will flow into the low areas along the 14th fairway
  - Water will flow into the low areas along the 16th fairway
  - The ground near the pump station will be flooded
  - Parts of the 15th green will be flooded
- For a 10 year design storm (everything above, plus)
  - Water will flow into the low areas along the 6th fairway
  - Parts of the 12th green will be flooded
  - Parts of the 14th green will be flooded
- For a 25 year design storm (everything above, plus)
  - The pump station will flood
- For a 50 year design storm (everything above, plus)
  - Parts of the 17th green will be flooded
  - Parts of the 4th green will be flooded
  - Parts of the 1st green will be flooded
- For a 100 year design storm (everything above, plus)
  - Parts of the 8th green will be flooded
  - Boston State Road will begin to be flooded

In the next section, potential mitigation measures to alleviate these flooding problems will be presented.

VI. Proposed Mitigation Measures

Many mitigation measures were investigated as part of this project. It was the goal of Wendel and the Town of Hamburg to propose projects that were:

- Valuable – the project had to reduce flooding in the golf course
- Cost Effective – the Town cannot afford large capital expenses
- Environmentally Sensitive – the Town wants to avoid additional environmental problems with the proposed solutions
- Golf Friendly – mitigation measures that have a negative impact on play at the course cannot be included

In this section, we detail numerous mitigation measures and describe how they would help decrease flooding at the Town of Hamburg Golf Course. In some cases, proposed mitigation measures would not meet the needs of this project. These mitigation measures are described and the reasons why they are not appropriate are given.

A. Bypass Channels

To mitigate flooding, bypass channels can be constructed. Bypass channels provide additional locations for flow during large storm events. This in turn, lowers the water surface elevations along a waterway. In the Town of Hamburg Golf Course, two grass-lined bypass channels could be constructed near Eighteen Mile Creek to mitigate flooding. The location of these channels, as shown in Figure 6.1, was chosen to minimize disruption to the golf course and limit problems with playability. In both bypass channels, no water will flow in the channels except in extreme storm events. Under normal conditions, the channels will remain dry. These channels would be constructed with very shallow slopes, which allow golf carts to travel through these bypass channels without restriction.

The eastern bypass channel would start at the bend in the 3rd fairway. It would cross the 3rd fairway and the 8th fairway before connecting back with Eighteen Mile Creek. This path is shown in more detail in Figure 6.2. Preliminary design of this 650 ft bypass has shown no major problems with this location. Some drainage pipe and irrigation line may need to be redirected; these issues would be addressed during final design.

The western bypass channel would start near the intersection of Neuman Creek and Eighteen Mile Creek. From this starting point, it would cross the 16th fairway before connecting with the pond located between the 15th and 16th fairways. The bypass would continue to head west crossing the 15th, 14th, 13th, and 12th fairways before connecting back with Eighteen Mile Creek. This path is shown in more detail in Figure 6.3. Preliminary design of this 1600 ft bypass has shown no major problems with this location. Some drainage pipe and irrigation line may need to be redirected and a permit from the USACOE may be needed to discharge back into Eighteen Mile Creek as a wetland is located along the bank. We are assuming that a permit from the USACOE can be obtained; these issues would be addressed during final design.



Figure 6.1: Location of the Proposed Bypass Channels (in red)

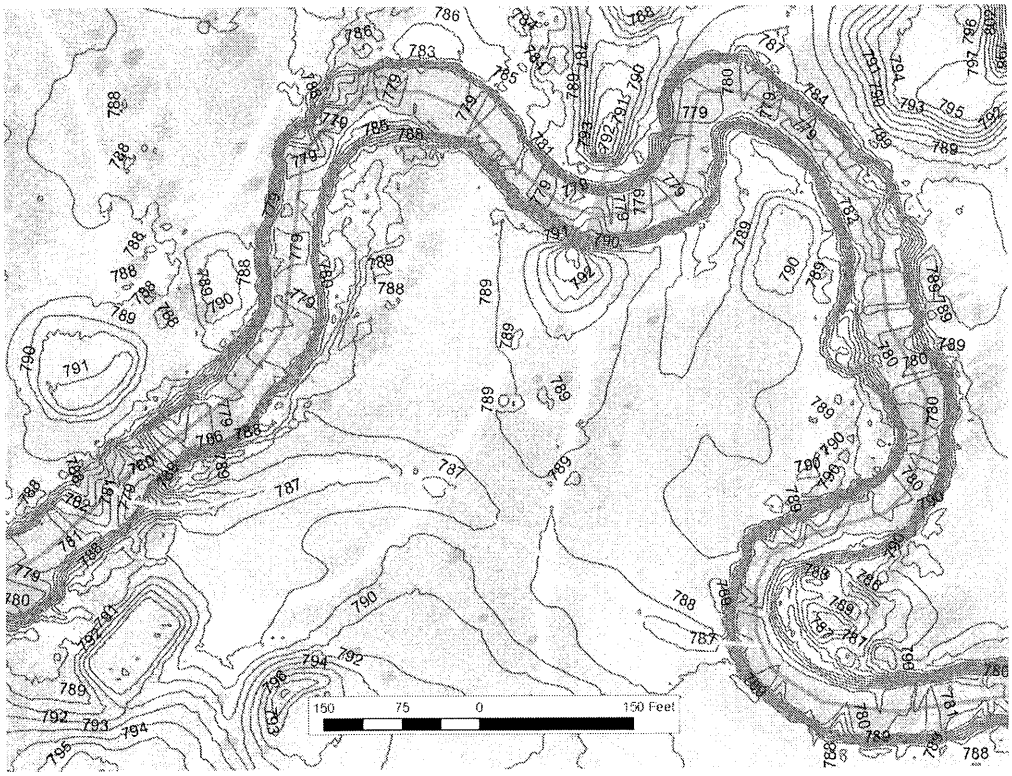


Figure 6.2: Location and Contours of the Proposed Eastern Bypass Channel



Figure 6.3: Location and Contours of the Proposed Western Bypass Channel

The bypass channel designs were added to the HEC-RAS models of Eighteen Mile Creek and Neuman Creek. The model was then rerun for the six design storms to examine the impact of this mitigation measure. The results from this HEC-RAS model are given in Table 6.1 and Table 6.2.

Table 6.1: Water Surface Elevations along Neuman Creek with the Addition of Bypass Channels

Cross Section	Design Storm (yr)					
	2	5	10	25	50	100
1142.809	787.17	788.09	788.88	789.43	790.17	790.65
1000	787.12	788.04	788.85	789.41	790.16	790.64
943	787.11	788.01	788.83	789.39	790.14	790.63
871	786.99	787.96	788.8	789.36	790.12	790.61
800.0001	787.02	788	788.82	789.39	790.14	790.63
763	787.02	788	788.82	789.39	790.14	790.63
630	787.02	787.99	788.82	789.38	790.14	790.63
600.0001	787.02	787.99	788.82	789.38	790.14	790.63
399.9999	787.01	787.99	788.81	789.38	790.13	790.62
345	787.01	787.99	788.81	789.38	790.13	790.62
199.9999	786.98	787.96	788.79	789.36	790.12	790.62
75	786.97	787.94	788.78	789.35	790.12	790.61

Table 6.2: Water Surface Elevations along Eighteen Mile Creek with the Addition of Bypass Channels

Cross Section	Design Storm (yr)					
	2	5	10	25	50	100
12799.99	789.76	790.55	791.11	791.4	791.82	792.1
12599.99	789.57	790.28	790.79	791.11	791.58	791.92
12399.99	789.65	790.51	791.15	791.51	792	792.33
12200	789.38	790.33	791.04	791.43	791.94	792.28
11999.99	788.81	790.08	790.96	791.36	791.88	792.23
11799.99	788.59	789.24	789.65	789.9	790.26	790.55
11599.99	788.03	788.96	789.88	790.37	790.94	791.32
11400	788.23	789.08	789.86	790.31	790.88	791.26
11199.99	788.1	788.99	789.68	790.09	790.69	791.1
11000	788.03	788.9	789.59	790.02	790.64	791.06
10799.99	788.06	788.91	789.6	790.02	790.62	791.04
10600.42	787.63	788.76	789.55	789.99	790.6	791.02
10396.38	787.79	788.81	789.55	789.98	790.59	791.01
10199.99	787.45	788.49	789.3	789.77	790.43	790.88
9999.999	787.3	788.38	789.26	789.77	790.44	790.9
9799.999	787.26	788.31	789.19	789.73	790.42	790.87
9599.999	787.02	787.96	788.89	789.5	790.25	790.73
9400	787.13	788.08	788.91	789.46	790.18	790.65
9200	786.92	787.78	788.54	789.11	789.91	790.42
8999.999	786.75	787.74	788.58	789.21	790.03	790.55
8799.999	786.76	787.77	788.64	789.25	790.06	790.56
8599.999	786	787.34	788.43	789.09	789.91	790.42
8400	786.33	787.51	788.49	789.13	789.93	790.44
8200	786.3	787.49	788.48	789.12	789.93	790.43
7999.999	786.25	787.41	788.42	789.07	789.88	790.39
7799.999	785.88	787.17	788.3	788.98	789.82	790.34
7599.999	785.83	787.13	788.26	788.95	789.8	790.32
7399.999	785.68	787.04	788.2	788.9	789.75	790.28
7199.999	785.56	786.93	788.14	788.86	789.72	790.25
6999.999	785.51	786.95	788.15	788.86	789.72	790.25
6799.999	785.45	786.92	788.13	788.84	789.71	790.23
6600	785.33	786.85	788.07	788.8	789.67	790.2
6399.999	785.22	786.69	787.94	788.69	789.59	790.13
6199.999	785.09	786.59	787.87	788.64	789.56	790.1
6000	784.92	786.51	787.83	788.61	789.53	790.08
5799.999	784.8	786.43	787.76	788.55	789.46	790.01

These results can be compared with the results of the existing conditions model (Table 5.1 and Table 5.2) to determine the benefit of the proposed bypass channels. The changes in elevation between the existing conditions model and the proposed bypass channel model are given in Table 6.3 and Table 6.4. As shown in these tables, the proposed bypass channels lower the water surface elevations in Neuman Creek and Eighteeen Mile Creek by as much as 0.77'. This may not seem to be a large number, but it has a large impact on flooding in the Town of Hamburg Golf Course including:

1) Flooding on the 15th green will not occur until a 10 year storm; under existing conditions it floods during a 5 year storm.
2) Flooding on the 12th and 14th greens will not occur until a 25 year storm; under existing conditions both greens flood during a 10 year storm.
3) The pump station will not flood until a 50 year storm; under existing conditions it would flood under a 25 year storm.
4) Flooding on the 17th, 4th, and 1st greens will not occur until a 100 year storm; under existing conditions, these green flood during a 50 year storm.
5) The 8th green floods during the 100 year storm under existing conditions; it will not flood under a 100 year storm after construction of the bypass channels.

In addition, the use of bypass channels will assist in controlling the flooding across the fairways, funneling storm event flows to these channels and then Eighteen Mile Creek. This will reduce the detention time of water on site which will help to limit sedimentation on the Town of Hamburg Golf Course.

Table 6.3: Comparison of Proposed and Existing Conditions along Neuman Creek

Cross Section	Design Storm (yr)					
	2	5	10	25	50	100
1142.809	-0.26	-0.33	-0.39	-0.32	-0.22	-0.18
1000	-0.27	-0.35	-0.4	-0.33	-0.22	-0.19
943	-0.27	-0.36	-0.41	-0.33	-0.23	-0.19
871	-0.32	-0.38	-0.42	-0.35	-0.23	-0.19
800.0001	-0.32	-0.37	-0.41	-0.33	-0.22	-0.19
763	-0.32	-0.37	-0.41	-0.33	-0.23	-0.19
630	-0.32	-0.37	-0.41	-0.34	-0.22	-0.19
600.0001	-0.31	-0.37	-0.41	-0.34	-0.22	-0.19
399.9999	-0.32	-0.37	-0.42	-0.34	-0.23	-0.19
345	-0.32	-0.37	-0.42	-0.34	-0.23	-0.19
199.9999	-0.33	-0.38	-0.42	-0.35	-0.23	-0.19
75	-0.33	-0.39	-0.43	-0.35	-0.23	-0.19

(note: decreases in elevation between proposed and existing are shown In red)

Table 6.4: Comparison of Proposed and Existing Conditions along Eighteen Mile Creek

Cross Section	Design Storm (yr)					
	2	5	10	25	50	100
12799.99	-0.11	-0.17	-0.18	-0.18	-0.15	-0.17
12599.99	-0.12	-0.2	-0.26	-0.25	-0.23	-0.21
12399.99	-0.13	-0.2	-0.23	-0.21	-0.17	-0.16
12200	-0.17	-0.26	-0.26	-0.22	-0.18	-0.17
11999.99	-0.34	-0.38	-0.28	-0.24	-0.19	-0.17
11799.99	-0.27	-0.47	-0.59	-0.59	-0.56	-0.58
11599.99	-0.44	-0.77	-0.6	-0.46	-0.36	-0.35
11400	-0.38	-0.66	-0.59	-0.48	-0.37	-0.37
11199.99	-0.37	-0.59	-0.56	-0.5	-0.33	-0.35
11000	-0.3	-0.4	-0.36	-0.32	-0.22	-0.21
10799.99	-0.34	-0.48	-0.45	-0.4	-0.29	-0.27
10600.42	-0.25	-0.17	-0.2	-0.19	-0.12	-0.09
10396.38	-0.3	-0.3	-0.29	-0.26	-0.18	-0.16
10199.99	-0.31	-0.33	-0.31	-0.24	-0.17	-0.13
9999.999	-0.31	-0.34	-0.36	-0.28	-0.2	-0.15
9799.999	-0.31	-0.34	-0.38	-0.29	-0.19	-0.17
9599.999	-0.19	-0.27	-0.33	-0.26	-0.17	-0.14
9400	-0.28	-0.35	-0.39	-0.31	-0.21	-0.18
9200	-0.3	-0.38	-0.46	-0.39	-0.25	-0.22
8999.999	-0.38	-0.42	-0.5	-0.4	-0.25	-0.2
8799.999	-0.38	-0.43	-0.47	-0.38	-0.24	-0.2
8599.999	-0.77	-0.67	-0.56	-0.42	-0.26	-0.22
8400	-0.6	-0.57	-0.53	-0.4	-0.26	-0.21
8200	-0.61	-0.58	-0.53	-0.4	-0.25	-0.21
7999.999	-0.62	-0.61	-0.55	-0.41	-0.26	-0.22
7799.999	-0.53	-0.51	-0.49	-0.36	-0.21	-0.17
7599.999	-0.53	-0.51	-0.49	-0.35	-0.2	-0.16
7399.999	-0.52	-0.54	-0.5	-0.36	-0.2	-0.16
7199.999	-0.47	-0.48	-0.5	-0.35	-0.2	-0.16
6999.999	-0.49	-0.5	-0.49	-0.34	-0.19	-0.15
6799.999	-0.5	-0.52	-0.5	-0.36	-0.19	-0.16
6600	-0.37	-0.43	-0.45	-0.31	-0.16	-0.12
6399.999	-0.15	-0.16	-0.14	-0.12	-0.02	-0.01
6199.999	0.06	0.2	0.19	0.21	0.11	0.07
6000	0.29	0.37	0.33	0.23	0.13	0.1
5799.999	0.45	0.52	0.45	0.31	0.22	0.18

(note: decreases in elevation between proposed and existing are shown In red)

B. Selective Berming

Placement of berms to protect the golf course from flooding is limited in this project. Only near the 15th green is placement of a berm practical. At this location, a berm can be placed around the green at an elevation of 789' as shown in Figure 6.4. On the north side of the 15th hole, the berm can be placed in a manner that replaces the existing cart path. On the south, the berm will be placed near the edge of Eighteen Mile Creek. With the construction of the proposed bypass channels, the 15th green is protected for a 10 year storm. Adding this berm along with the proposed bypass channels mitigates flooding of the 15th green through a 25 year storm. With the use of these two mitigation measures (bypass channels and berming), all of the greens at the Town of Hamburg Golf Course would be protected through a 25 year storm.

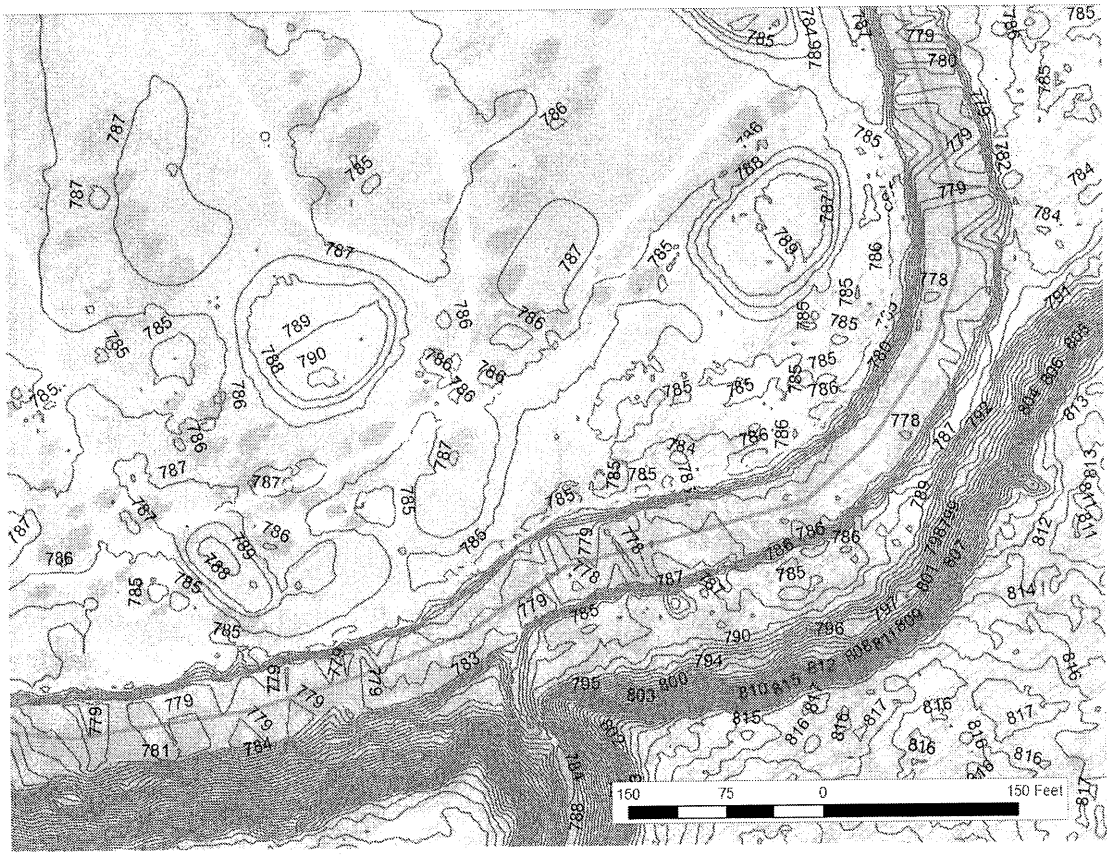


Figure 6.4: Proposed Location of the Berm at the 15th Hole (berm is shown in orange)

C. Pump Station Improvements

Since 2005, the pump station has flooded three times. Two of these occurrences (2005 & 2009) were due to large storm events. The third was due to debris, which then caused flooding during the October 2006 surprise storm. Three different approaches were investigated to mitigate flooding at the pump station:

- Elevate the Building and Pump – if the pump is elevated by 1.5 ft, it will be above the 100 year design event. To elevate the pump and the associated controls by this amount, the building will also need to be elevated.
- Install a Submersible Pump – The golf course already has a wet well that could be used for a submersible pump. A submersible pump will not have problems with flooding, but will be costly.
- Do nothing – the pump station will only flood under a 50 year design event if the bypass channels are constructed. Therefore, the cost of repairing the pump if flooding occurs may be more appropriate than the other options.

The positive and negatives associated with each of these options will be discussed in further detail during the cost section of the report.

D. Elevating Greens

Constructing the bypass channels and the berm at the 15th Hole will mitigate flooding of all of the greens for a 25 year storm. To mitigate flooding of the 12th, 14th, and 15th greens for up to a 100 year storm, the greens will need to be elevated. Each of these three greens would need to be elevated by up to 2 feet in locations. This can be done, but it would be costly and require significant design changes on the golf course.

E. Erosion Control

The Town of Hamburg Golf Course has significant problems with erosion along Eighteen Mile Creek near the 3rd and 8th Holes. If this erosion is not controlled, playability of the 3rd and 8th holes will be reduced, and over time, the foundations of the large bridge over Eighteen Mile Creek may be compromised. Due to these conditions, we recommend the following erosion control techniques:

- Information from Contech will be added here.

F. Adoption of Sustainable/Green Infrastructure

Early in the project, Wendel was asked to look at how sustainable and green infrastructure might be used to mitigate flooding at the Town of Hamburg Golf Course. Sustainable and green infrastructure includes things like rain gardens, vegetated swales, pervious pavement, and rain barrels. These elements can control stormwater by storing water or by allowing it to infiltrate into the soil. An example of a rain garden in front of the Town of Tonawanda Driving Range is shown in Figure 6.5. While we encourage the Town to look at these elements to reduce flooding and other stormwater issues in Hamburg, they are not practical for this mitigation project for the following reasons:

1) The flows in Eighteen Mile Creek and Neuman Creek are massive, even under small design storms. The amount of flow that would need to be stored or infiltrated by these green design elements is too large to be controlled.
2) The Town of Hamburg Golf Course is upstream of most of the Town of Hamburg. To have an impact on the golf course, these green infrastructure projects would need to be constructed upstream in the Towns of Boston, Orchard Park, Colden and Concord.



Figure 6.5: Rain Garden at Town of Tonawanda Driving Range

G. Bridge and Culvert Improvements

Each of the bridges and culverts along Eighteen Mile Creek and Neuman Creek were analyzed as part of this flood mitigation study. Our survey team collected data (size and shape of openings) that allowed for modeling of each bridge and culvert within HEC-RAS. These model results showed the following:

- The large bridge on Eighteen Mile Creek near the 3rd and 8th Holes is sufficient and allows the 100 year design storm flows to continue through the bridge with no appreciable impact on the water surface elevations.
- Each of the bridges and culverts along Neuman Creek are undersized, but due to their small size and low height above the elevation of the golf course, they do not cause large increases in the water surface elevations along Neuman Creek.

For these two reasons, we are not recommending replacement of any of the bridges or culverts along the golf course as part of this mitigation plan. If the bridges or culverts are replaced in the future, they should be designed to make sure that they will not cause an increase in the water surface elevations along Eighteen Mile Creek and Neuman Creek.

H. Stream Cleaning and Other Stream Modifications

The Town of Hamburg should continue to maintain Eighteen Mile Creek and Neuman Creek, removing debris and performing other maintenance activities along these creeks. Often, widening streams or making streams deeper has been recommended when looking to mitigate flooding in the past. This is not recommended for the following reasons:

1) Stream widening will not be permitted by the USACOE. Stream widening will have a negative impact on stream habitat during normal or dry weather flows. Wider streams are warmer streams which may be detrimental to fish. We know of no stream widening that has been approved by the USACOE recently.
2) Increasing the depth of streams will not be permitted by USACOE for similar reasons. Also, increasing the depth of streams will only reduce flooding if it is done for the entire length of the stream until it discharges to Lake Erie. This would be cost prohibitive.

VII. Preliminary Cost & Benefit Estimates

The Town of Hamburg hopes to mitigate flooding at the golf course, but it needs to be done in a cost effective manner. In this section, the costs of the proposed mitigation measured are defined, along with the costs associated with not mitigating these flooding issues. A comparison of these two costs can be used as a starting point to analyze the benefits of flood mitigation at the Town of Hamburg Golf Course.

A. Preliminary Costs of the Proposed Mitigation Measures

To determine the costs associated with these projects, Wendel used information gathered from contractors in the community and records of recent bid prices. It is important to note that these cost estimates are based on preliminary design of the proposed solutions and these designs may change based on field conditions and other unknown variables. Therefore, the costs may change based upon the final design. All preliminary costs given here do include engineering, legal, and administrative costs, along with a contingency amount. The preliminary costs do not include permitting and wetland mitigation costs, nor do they allow for major utility work. Cost Estimates are based on 2010 dollars and could increase due to inflation.

1. Bypass Channels and Berm Construction

The proposed construction of the bypass channels and the berm along the 15th Hole are earth moving projects. The costs presented here for the bypass channels and the berm are contractor costs for topsoil removal and replacement, digging and shaping, erosion control, grading, and moving & stockpiling materials on the golf course. The cost for replacing the cart path when adding the berm has also been included. These costs do not include seeding or the transport of excavated materials. Seeding will be done by the Town of Hamburg Golf Course employees to ensure consistency with the rest of the course and the cost for transport was excluded based on discussions with the Town Engineer. It is anticipated that the Town will use these excavated materials at other Town sites and can provide people and equipment to move the stockpiles. The costs for each of these proposed mitigation measures are given in Table 7.1.

Table 7.1: Preliminary Cost Estimates for the Bypass Channels and Berm

Proposed Mitigation Measure	Preliminary Cost Estimate
#1 – Eastern Bypass Channel	$87,000
#2 – Western Bypass Channel	$334,000
#3 – Berm along 15th Hole	$72,000

It is important to note that these costs are based on contractors completing these earth moving projects. In the past, the Operating Engineers have helped the Town of Hamburg with projects at the golf course. If their assistance can be obtained, the costs associated with these mitigation measured can be reduced substantially.

2. Pump Station Improvements

In the previous section, two methods for mitigating flooding at the pump station were investigated. The first involved raising the elevation of the pump and the pump station building by 1.5 feet. Assuming the building is structurally sound and withstands the stress of being elevated, the cost of raising the building plus the cost of a new pump and associated controls would be $42,000. A new pump would be needed to maintain the desired flow of irrigation water with a greater suction life. The second option is the purchase of a submersible pump. In discussions with Pump Irrigation Technologies, it was determined that this cost would be approximately $50,000.

A third cost was estimated at the pump station. If the pump station is flooded, it costs approximately $4,000 to $5,000 to rewind the pump motors and repair/replace the pump controller. This is not a mitigation measure, but it provides information needed for a cost and benefit analysis.

3. Elevating Greens

In discussions with the Town of Hamburg greenskeeper, Garry Nelson, he stated that elevating the greens would cost approximately $50,000 per green.

4. Erosion Control

To be completed when information is provided by Contech.

B. Costs of Flooding at the Town of Hamburg Golf Course

The information given above represents the costs of improvements for mitigating flooding at the Town of Hamburg Golf Course. The information presented in this subsection describes the costs incurred when extreme flooding events occur in the Town of Hamburg. There are two major costs associated with an extreme flooding event:

- cleanup and repair costs, and
- lost revenue.

The cost of cleanup and repair can be estimated using the August 2009 storm event as a guide. In this extreme event (greater than a 100yr design storm), the Town of Hamburg spent $105,000 on cleanup and repairs of the Golf Course. This includes things like green repairs, pump rehabilitation, and sediment removal. Therefore, we can estimate that extreme storm events in the future will incur similar costs.

The cost of lost revenue was harder to estimate. Again, information from the August 2009 storm was used as a surrogate. The Town of Hamburg was able to provide Wendel data on revenue at the golf course from 2005 through 2009. This information is provided in Table 7.2. To determine the lost revenue, we compared revenue from 2009 to the typical year. A typical year was defined as an average of revenue from 2005, 2007, and 2008. 2006 was not included in the typical year calculation due to the October storm in 2006. Through July, the revenue from 2009 versus that of a typical year is very similar. It is only after the storm in August that revenues drop. A comparison of the typical year versus 2009 is

shown in Figure 7.1. The difference between the typical year and 2009 was $72,000. The Town of Hamburg also estimated that $46,000 of revenue was lost in 2010 due to the extreme flooding event. Adding these two numbers together equals $118,000. This was used as the estimate of lost revenue from the extreme flooding event.

Table 7.2: Revenue at the Town of Hamburg Golf Course 2005-2009

Year	Through July	August	September	October	November	Season Total
2005	$383,850	$82,530	$29,506	$8,408	$2,459	$506,754
2006	$358,969	$64,476	$38,041	$7,226	$2,696	$471,408
2007	$383,388	$75,392	$49,162	$22,121	$3,462	$533,525
2008	$401,068	$81,619	$43,351	$22,487	$4,763	$553,288
2009	$390,660	$38,805	$22,797	$5,139	$2,088	$459,489

Notes: 2006 revenues were low due to the October Storm, 2009 revenues were low due to the August flooding event

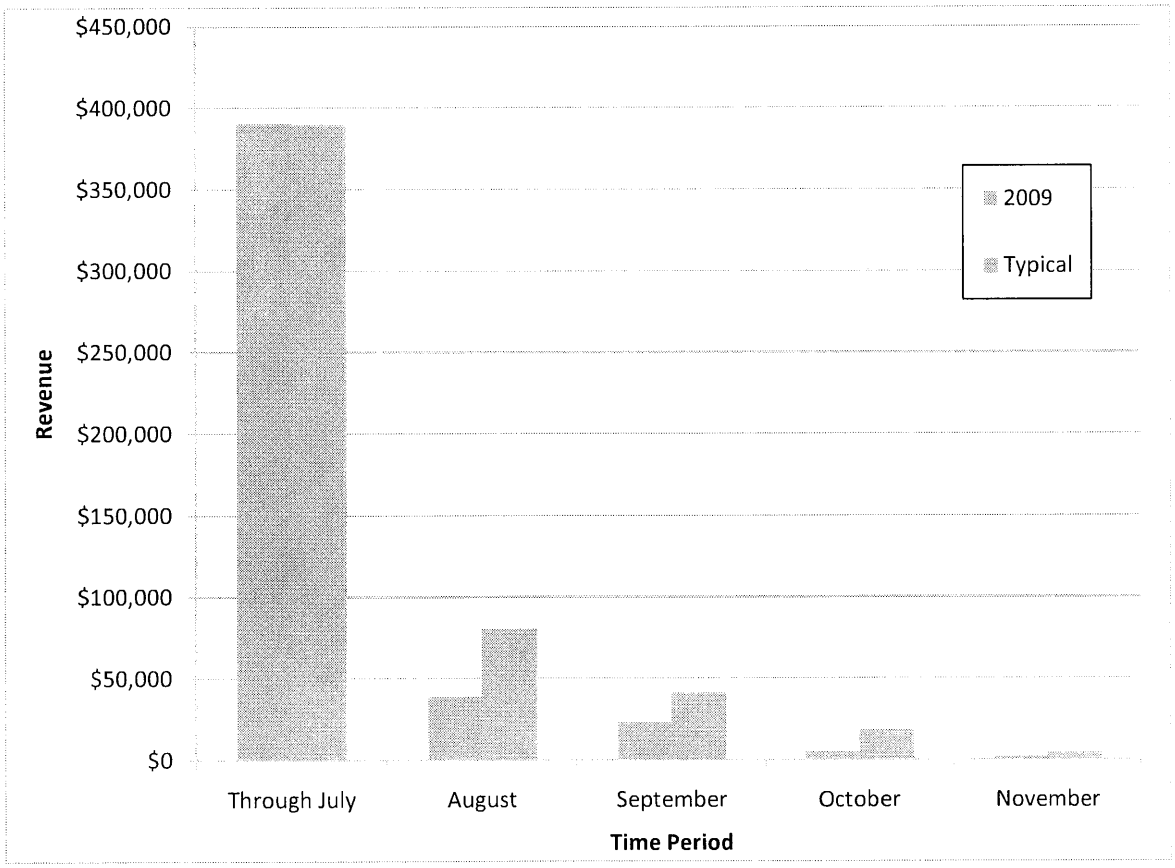


Figure 7.1: Revenue Comparison, 2009 versus a Typical Year

C. Preliminary Benefit Analysis

Preliminary analysis has shown that it will cost $493,000 to construct the bypass channels and berm along the 15th hole. Comparing this cost with the losses from a flood (approx $223,000), this construction work would pay for itself if the course floods more than two times in the future. Also, these construction costs could be much lower if the Operating Engineers can complete this work at a reduced cost. In addition, these projects will help to dry the course quicker under less extreme events, improving the golf experience for all who play at the Town of Hamburg Golf Course.

The erosion control project costs were not included in the cost benefit analysis as this work has to be done. Without erosion control, two fairways (3rd and 8th holes) will be unplayable in the future and the major redesigns of these holes may be needed to rectify this situation.

The projects to elevate the greens and improve the pump station are less beneficial from a cost benefit analysis. It only costs approximately $5,000 to repair the pump if it is flooded. Compared to the cost to elevate the pump station ($42,000), it would take more than eight floods greater than a 50 year design storm (assuming the bypass channels are constructed) before elevating the pump makes sense from a cost-benefit analysis. Similarly, the cost of elevating the greens ($50,000) versus the benefit is not enough to recommend this mitigation measure.

VIII. Conclusions and Recommendations

This report provides a roadmap to flood mitigation at the Town of Hamburg Golf Course. Due to various constraints, namely cost and construction phasing, it is expected that not all of the mitigation projects will be constructed at one time. Therefore, Wendel recommends the following prioritization.

A. First Priority

Construction of erosion control measures is critical for the Town of Hamburg Golf Course. If the erosion is allowed to continue, large portions of the 3rd Hole and 8th Hole fairways will fall into Eighteen Mile Creek. In addition, this erosion could start to impact the large bridge over Eighteen Mile Creek, eroding the foundation which could lead to failure of the bridge. Erosion control is a very high priority and should be one of the first projects completed at the golf course.

The construction of the bypass channels provides flood mitigation for at least the 10 year storm event in all areas. Therefore, it is also a high priority project. It is recommended that the eastern bypass channel be constructed first. This is important from a construction staging and timing standpoint. To install the erosion control measures, the front nine of the golf course may need to be closed. While the front nine is closed for erosion control, it is anticipated that the eastern bypass channel could be constructed at the same time. This would limit the impact on play at the golf course as we would expect the following construction schedule:

- Mid to Late September – Close the front nine of the golf course; start construction of the erosion control projects and eastern bypass channel
- Late October – Finish erosion control projects and eastern bypass channel; reseed bypass channel
- Early Spring – Complete restoration of the bypass channel; reopen front nine

B. Second Priority

In the second construction season, the western bypass channel should be constructed. Construction of this bypass channel will complete the 10 year flood mitigation for all greens at the golf course. To construct this bypass channel, the back nine of the golf course will need to be closed. The same schedule for construction is recommended as before, with construction starting in September to limit the amount of time when the back nine cannot be played. If possible, the berm around the 15th Hole should also be constructed at this time, providing 25 year flood mitigation for all greens. Material dug from the western bypass channel could be used for this berm, lowering costs for the project. This will also limit downtime for the golf course. If this berming was done at another time, a temporary hole may need to be designed to allow for 18 holes of play during construction.

C. Third Priority

At this point, all of the greens will be protected for a 25 year storm event. To provide additional protection, the greens will need to be elevated. This can be done, but it is costly and will have impacts

on play of the golf course. We would only recommend this step if the greens continue to be damaged by floods in the future. Similarly, pump station improvements could be constructed if the pump station continues to need repair on a regular basis. Unless the repairs are needed very frequently, it is our opinion that it is better to just set aside reserves to handle these pump station repairs.

D. Conclusion

Through the use of this information, the Town of Hamburg can develop a plan to mitigate flooding at the golf course. The recommendations given here will provide the best solution at the lowest cost, lowest impact to play at the golf course, and lowest environmental impact.

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