**Information on BOCES purchase of property in Norwood and referendum**

1. The referendum will be held on February 8th, from noon until 8 PM, at all 3 CTE Centers and the ESC. More detailed information including the actual resolution will be shared soon by Moe.

2. The reason BOCES is purchasing the property stems from our desire to have a plan to transition to the Village of Norwood water, especially since the well failure at Seaway Tech in 2017 (the well failed on September 1, 2017, and the line and water pump were replaced on 9/9/17---students were unable to attend Seaway Tech to start the school year) This is the best possible outcome. With the renovation and new additions at Seaway it is a large facility to be on a well and it would seem prudent to be ready for another well failure or possible issues in the future.

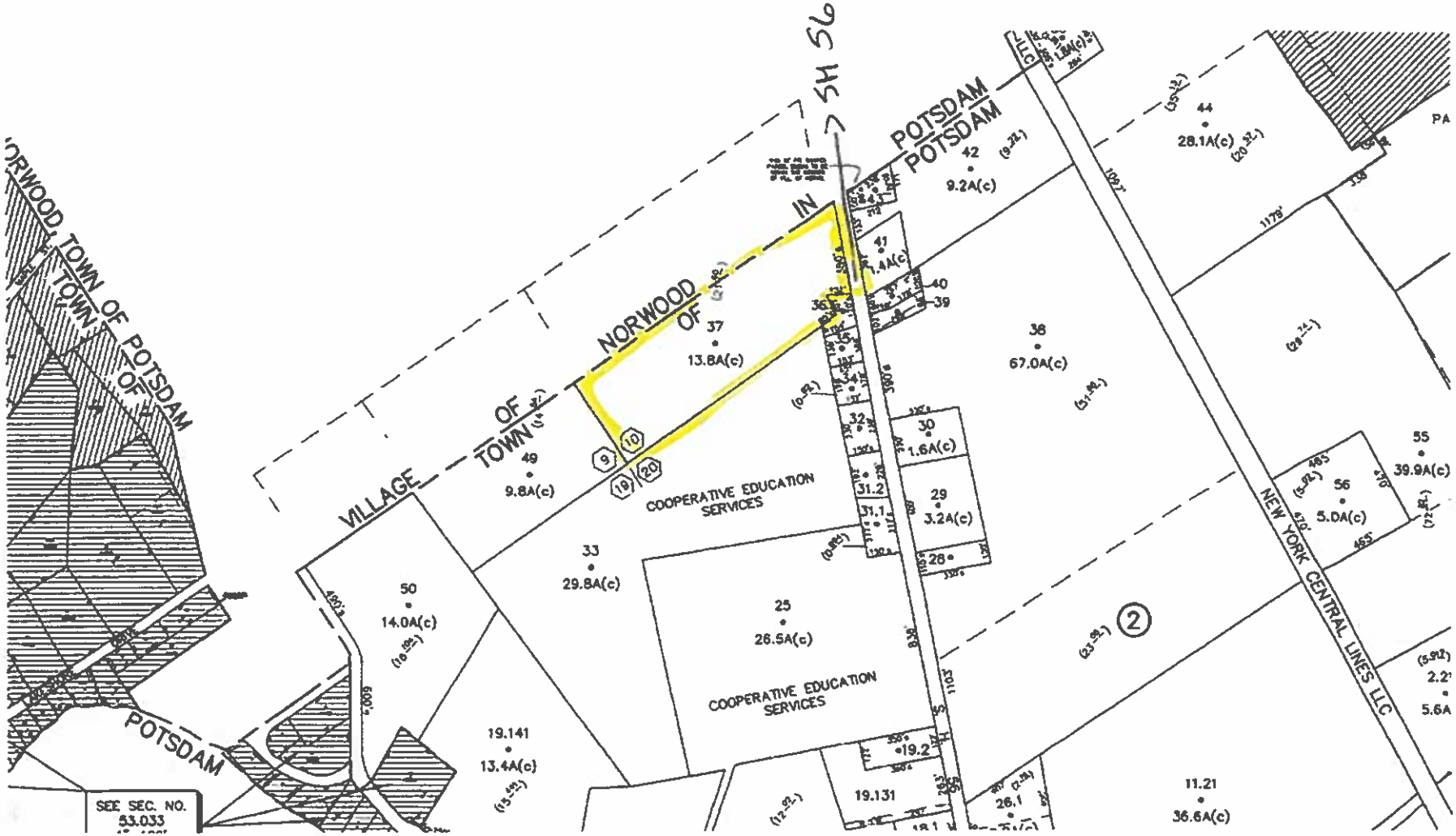
3. An engineering water study was conducted in 2019-20 to assess feasibility and cost, to insure that this is the best solution moving forward. (see attachment)

4. There will be minimal tax impact to Norwood-Norfolk CSD, who is also on Village Water ($14,600 annual assessment, which translates to approximately $373 in annual village taxes).

5. Water quality would improve and be more reliable on Norwood Village Water.

6. It is unlikely that school districts would be able to come up with a plan for their students if they were unable to attend Seaway Tech if our water system failed again.

7. The purchase price for the property is $30,000. See attached map of the parcel. Andy Silver represented BOCES as the buyer in this transaction. The purchase offer is contingent upon a positive vote in the referendum as this is required by the Education Law, Section 1950.


TOWN OF POTSDAM
TOWN OF POTSDAM
NORWOOD
VILLAGE OF NORWOOD
IN
SH 56
POTSDAM
POTSDAM
42
9.2A(c)
41
1.4A(c)
40
39
37
13.8A(c)
36
38
67.0A(c)
34
32
30
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COOPERATIVE EDUCATION SERVICES
33
29.8A(c)
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14.0A(c)
25
26.5A(c)
COOPERATIVE EDUCATION SERVICES
19.141
13.4A(c)
19.2
19.131
26.1
11.21
36.6A(c)
NEW YORK CENTRAL LINES LLC
44
28.1A(c)
55
39.9A(c)
56
5.0A(c)
2
SEE SEC. NO. 53.033

## $35,000

Broker Reciprocity

### Land: **13.8** acres

LOOKING TO BUILD? This 13.8 acre lot would be the perfect spot to do so. There is 380 ft of road frontage on State Highway 56. It is just outside the Village of Norwood and minutes to Potsdam for all your shopping needs. Also, just a few steps away from everyone's favorite North Country restaurant "The Lobster House". Don't miss out on this one!

| | | | |
|---|---|---|---|
| Lot Size: | 13.8 acres | Listing Date: | 06-30-2022 |
| Type: | Residential Lots & Land | Listing #: | 47128 |
| Sub Type: | Land | Street Address: | State Highway 56 |
| Listing Status: | For Sale | County/Area: | St Lawrence County |

Show more ...

## Listing By

| | |
|---|---|
| Agent: | Tammy Gary |
| Broker: | County Seat Realty |
| Source: | ST. Lawrence County Board of REALTORS® |
| Listing #: | 47128 |

*Preliminary Engineering Report*

# SLL BOCES Water Connection

Prepared for

## SLL BOCES – Seaway Career & Technical Education Center

7225 State Highway 56
Norwood, New York


February 2020

Barton&Loguidice

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**EXECUTIVE SUMMARY**

St. Lawrence-Lewis BOCES (SLL BOCES) and March Associates, Architects & Planners, P.C. retained the services of Barton & Loguidice, D.P.C to evaluate alternatives to connect the Seaway Technical Education Center (Seaway Tech) to a public water supply. The existing source of water supply to Seaway Tech is a single well, constructed in the late 1960s. A recent well pump failure at Seaway Tech delayed the start of school for multiple days in September 2017, impacting approximately 430 students. Therefore, connecting to a public water supply would help ensure reliability of water supply to the facility.

This report examines alternatives to address the recent water supply issues by connecting the SLL BOCES to the Village of Norwood public water supply. The alternatives include two (2) potential routes for the connection and three (3) different water line sizes for each route and are summarized below:

- Alternative No. 1a – NYS Route 56 Connection (12-inch)
- Alternative No. 1b – NYS Route 56 Connection (8-inch)
- Alternative No. 1c – NYS Route 56 Connection (4-inch)
- Alternative No. 2a – Cross Lots Connection (12-inch)
- Alternative No. 2b – Cross Lots Connection (8-inch)
- Alternative No. 2c – Cross Lots Connection (4-inch)

It is recommended that SLL BOCES proceed with the proposed 8-inch Connection along NYS Route 56 (Alternative No. 1b) for water supply at Seaway Tech. This alternative will connect Seaway Tech to the existing Village of Norwood water supply with 8-inch water mains. This alternative is the best alternative for SLL BOCES, as it provides BOCES with fire flow over 500 gpm unlike the 4-inch. The 12-inch water connection provides very little increase in fire flow for the additional cost and significantly increases residence time in the water main to the facility, which may become a water quality issue. The NYS Route 56 connection is easily accessible for any future maintenance and repair of the water main and would be more accessible for future user connections along NYS Route 56 if that is allowed at some time.

The estimated total project cost of Alternative No. 1b is $1,014,000, which will be the responsibility of SLL BOCES. Once implemented, this connection would alleviate the risk of pump failure and improve the reliability of water supply to the school.

**ABBREVIATIONS (cont'd)**

| | |
|---|---|
| NYSDOH | New York State Department of Health |
| NYSOPRHP | New York State Office of Parks, Recreation, and Historic Preservation |
| OCHD | Oneida County Health Department |
| OIN | Oneida Indian Nation |
| OMB | Office of Management and Budget |
| PAC | Powdered activated carbon |
| PACl | Polyaluminum chloride |
| PER | Preliminary Engineering Report |
| PHF | Peak Hourly Flow |
| ppm | parts per million |
| psig | Pounds per square inch (gauge) |
| Q | Volumetric flow rate (gpm, MGD) |
| scfm | Standard cubic feet per minute (68 degrees F and 1 atmosphere) |
| SEQR | State Environmental Quality Review |
| SPDES | State Pollutant Discharge Elimination System |
| SWPPP | Storm Water Pollution Prevention Plan |
| TDH | Total dynamic head |
| THM | Trihalomethane |
| TSS | Total suspended solids |
| USACE | United States Army Corps of Engineers |
| USFWS | United States Fish and Wildlife Service |

# 2.0 PROJECT BACKGROUND AND HISTORY

## 2.1. Site Information

### 2.1.1. Location

The St. Lawrence-Lewis (SLL) BOCES, Seaway Technical Education Center, is located adjacent to the Village of Norwood in the Town of Potsdam, in the northern part of St. Lawrence County, New York. Nearby communities consist of the Village of Norwood to the North, the Village of Canton to the Southwest, and Town of Stockholm to the East. The proposed water service area includes a water connection from the existing Village of Norwood water supply to the SLL BOCES and decommissioning of the existing well. The proposed project location is shown in Figures 1 and 2.

### 2.1.2. Geographic Conditions

The United States Department of Agriculture's Web Soil Survey was used to determine the various soils located in the water service area. The most common soil types along the proposed water main connection are Malone loams, Deford loamy fine sand and Hogansburg loams. Slopes for these material range from 0 to 2 percent slopes up to very stony 0 to 8 percent slopes. A soil map for the water connection and information on each material can be found in Appendix A.

### 2.1.3. Environmental Resources

The United States Fish & Wildlife Wetlands Mapper was used to create a Wetlands map to determine the characteristics of the proposed service area. The project area consists of freshwater forested/shrub wetlands. Preliminary screening through the New York State Department of Environmental Conservation Environmental Resource Mapper has identified that the project is located within the vicinity of rare plants or animals and state regulated freshwater wetlands. A copy of the United States Fish & Wildlife Wetlands Map and the Environmental Resource Map is included in Appendix B.

### 2.1.4. Floodplain Considerations

A flood map of the proposed project location was created to show 100 year floods, and evaluated to determine if the flood zones were in close proximity to the project. This project area is not located within a designated FEMA flood zone, but is in close proximity to a Zone A high risk area. SLL BOCES is located within a Zone C, 500-year flood zone. The flood map can be found in Appendix C.

## 3.0 EXISTING FACILITIES

### 3.1. Description and History

The SLL BOCES, Seaway Technical Education Center owns and operates an individual well, located on the property of the SLL BOCES, serving daily users. The SLL BOCES was built in the Town of Potsdam in the late 1960s, and constructed the single well in the late 1960s/early 1970s. The existing well is the only source of water for Seaway Tech. The location with relation to the proposed service area connection is shown in Figure 3.

### 3.2. Condition of Existing Facilities

The existing steel-cased well is located off the southeast section of the building, and is the permanent source of water for Seaway Tech. The 8-inch diameter well was drilled approximately 180 feet deep and was originally constructed for a well yield of 45 gpm. The existing well provides an adequate amount of water for Seaway Tech and would likely be sufficient for a reasonable amount of anticipated future growth.

The average daily water consumption for Seaway Tech is about 1,600 gpd during the school year season. In the summer months; however, the well is rarely used, as the amount of staff and students in the building is very minimal.

The existing well is currently in good condition and provides a sufficient amount of water to serve the present-day users. However, the recent well pump failure in the summer of 2017 delayed school opening for multiple days. The BOCES Superintendent stated in an article soon after, "if another system breakdown occurred, students would have no alternative plan." The well pump has since been replaced and has been functioning well since that time. New well pump information can be found in Table 3-1.

**Table 3-1: Well Pump Information**

| | |
|---|---|
| ***Model*** | Goulds 6M108, CentriPro Motor |
| ***Phase*** | 3 |
| ***Horsepower*** | 10 HP |
| ***Voltage*** | 200 Volt |
| ***Frequency*** | 60 Hz |
| ***Speed*** | 3,450 RPM |
| ***Current*** | 22 Amps |

A meeting with B&L, the Village, and BOCES took place on March 25, 2019 to discuss the proposed project and existing conditions of the facility. The following details were discussed:

- BOCES uses approximately 1,600 gpd;
- There are currently no sprinklers or fire hydrants at BOCES;
- Norwood currently has adequate capacity to serve BOCES;
- The Village of Norwood water system currently includes chlorination, fluoridation, and sequestering;

**Photo 3: Existing well located on the southeastern part of the building.**

**Table 4-1: NYS Route 56 Alternative – Comparison of Pros and Cons Summary**

| Pros | Cons |
|---|---|
| Easily Accessible | DOT Permit Costs |
| State Maintained ROW | DOT Permit Review Time |
| Capital Cost | |

4.1.1. Alternative No. 1a: NYS Route 56 Connection (12-inch)

Alternative No. 1a includes a 12-inch water main along NYS Route 56 from the Village connection point to SLL BOCES. Alternative No. 1a generally includes the route shown on Figure 4-1. The total estimated probable project cost (inflated to year 2021) is $1,301,000. The project cost breakdown can be found in Appendix D.

4.1.2. Alternative No. 1b: NYS Route 56 Connection (8-inch)

Alternative No. 1b includes an 8-inch water main along NYS Route 56 from the existing Village connection point to SLL BOCES. Alternative No. 1b generally includes the route shown on Figure 4-2. The total estimated probable project cost (inflated to year 2021) for Alternative 1b is $1,037,000. The project cost breakdown can be found in Appendix E.

4.1.3. Alternative No. 1c: NYS Route 56 Connection (4-inch)

Alternative No. 1c generally includes the route shown on Figure 4-3, including a 4-inch water main along the NYS Route 56 from the Village connection point to SLL BOCES. The total estimated probable project cost (inflated to year 2021) for Alternative No. 1c is $806,000. The project cost breakdown can be found in Appendix F.

## 4.2. Alternative No. 2: Cross Lots Connections

Alternatives No. 2a, 2b and 2c include the option of the water line location entering SLL BOCES through a cross lot connection. Alternative No. 2a and 2b would include connecting the new water main to the existing Village water mains on the corner of NYS Route 56 and Lake Shore Drive, continuing southwest on Lake Shore Drive and southeast through private lands to the back lot of Seaway Tech. However, Alternative No. 2c would connect to the existing 6-inch plastic pipe water main on Lake Shore Drive. It would then be installed down the west side of the building and then heading northeast up the southern side of the building to enter into the Mechanical Building. For a more detailed look at the connection points, please see figures included. The cross lot route is currently forested and would requiring clearing and grubbing to construct the water main. Effort will be required for ongoing vegetation maintenance along the route in the future. Permanent easements will be required on the private property to allow access for maintenance and repairs.

## 5.0 RECOMMENDED ALTERNATIVE

### 5.1. Basis of Selection

Each of the alternatives presented in the previous section are feasible and include connecting the existing SLL BOCES Seaway Tech Center to the Village of Norwood public water supply. All alternatives are different in regards to their route, water main size, fire flow and pressures. The table below shows a summary of each route and their water main size calculations.

**Table 5-1: Summary of Route Options**

| **Route Alternative No. 1 – NYS Route 56 Connection** | | | | | |
|---|---|---|---|---|---|
| Alternative | | Static Pressure (psi) | Dynamic Pressure* (psi) | Fire Flow** (gpm) | Total Cost Estimate |
| 1a | 12" | 50 | 50 | 632 | $1,271,000 |
| 1b | 8" | 50 | 50 | 565 | $1,014,000 |
| 1c | 4" | 50 | 49 | N/A | $788,000 |
| **Route Alternative No. 2 – Cross Lots Connection** | | | | | |
| Alternative | | Static Pressure (psi) | Dynamic Pressure* (psi) | Fire Flow** (gpm) | Total Cost Estimate |
| 2a | 12" | 50 | 50 | 618 | $1,430,000 |
| 2b | 8" | 50 | 50 | 552 | $1,145,000 |
| 2c | 4" | 50 | 49 | N/A | $733,000 |

*Using an estimated peak flow rate of 10 gpm.
**Using a minimum 20 psi for system pressure.

The recommended alternative for SLL BOCES is Alternative No. 1b, the NYS Route 56 route with 8-inch water main connection. The estimated project cost of the proposed alternative, Alternative No. 1b is $1,014,000. This alternative provides Seaway Tech with fire flow over 500 gpm, has minimal pressure loss under normal water use conditions, and keeps residence time in the water main to under five (5) days. The 4-inch water main is not capable of providing fire flow. The 12-inch water main offers little increase in fire flow for the additional cost and significantly increases residence time in the water main, which may create a water quality issue. The NYS Route 56 connection is easily accessible for any future maintenance and repair of the water main and would be more accessible for future user connections along NYS Route 56 if that is allowed at some time.

### 5.2. Hydraulic Modeling

A hydraulic model was developed for each of the alternatives, as shown in Table 5-1. The models and calculations show the comparison of pressures and fire flows between each alternative. It is proposed to use the NYS Route 56 8-inch connection. Using the 8-inch over the 4-inch connection will provide BOCES with a water pressure of 50 psi during domestic water use and an available fire flow of 565 gpm, while the 4-inch is not capable of providing fire flow. Likewise, the 12-inch does not gain much fire flow compared to the 8-inch, however increases

equipment costs, would be financed through the SLL BOCES fund. SLL BOCES will need to negotiate an agreement for the sale of water with the Village of Norwood. The Village of Norwood currently charges the Norwood-Norfolk School $5/kgal. Upon discussion with the Village, it is assumed the Village would charge SLL BOCES the same, resulting with an annual cost of water of $1,530/year. The estimated annual Water System O&M budget is $3,530 following start-up and activation of the proposed connection to the existing Village of Norwood system. See Table 5-3 below for the detailed O&M budget.

**Table 5-3: Annual O&M Budget**

| Description | Total Cost |
|---|---|
| Water testing and samples | $1,000 |
| Exercising hydrants and valves | $1,000 |
| Annual Cost of Water | $1,530 |
| ***Total O&M Cost*** | ***$3,530*** |

*Assuming 1,700 gpd for future expansion or increase in enrollment.

### 5.5. Project Schedule

Below is a timeframe for implementing the project following completion of this report:

| Project Schedule Milestone Item | Schedule Date |
|---|---|
| Submit Engineering Report | February 2020 |
| Environmental Review | + 1 month |
| Submit Project Plans and Specifications for Review and Approval | + 7 months |
| Project Letting/Bidding Phase | + 9 months |
| Construction Start | + 10 months |
| Construction Completion | + 13 months |

### 5.6. Next Steps

The following regulatory reviews and/or approvals of the rehabilitation project are anticipated and will be obtained during the project design phase:

- New York State Department of Environmental Conservation (NYSDEC) – Regulatory review and approval of the well decommissioning
- New York State Department of Health (NYSDOH) – Regulatory review and approval of the project
- New York State Education Department (NYSED) – Regulatory review and approval of the project

## 6.0 CONCLUSION

In September 2017, the existing well pump experienced operational issues resulting in the loss of water supply to Seaway Technical. This incident closed school for multiple days and impacted approximately 430 students. To help prevent future disruption to school operations, it is recommended that a connection be made from a public water supply to Seaway Tech. The estimated project cost of the proposed alternative, Alternative No. 1b is $1,014,000. This alternative is the most cost effective and provides BOCES with over 500 gpm of fire flow. Therefore, Alternative No. 1b is overall the best alternative for SLL BOCES.

**Figure 1**
**Aerial Map**

**Figure 2**
**NYS Project Location Map**

**Figure 3**
**Existing Infrastructure Map**

**Figure 4-1**
**Alternative No. 1a Schematic Design**

**Figure 4-2**
**Alternative No. 1b Schematic Design**

**Figure 4-3**
**Alternative No. 1c Schematic Design**

**Figure 4-4**
**Alternative No. 2a Schematic Design**

**Figure 4-5**
**Alternative No. 2b Schematic Design**

**Figure 4-6**
**Alternative No. 2c Schematic Design**

# Appendices

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 St. Lawrence County, New York


August 7, 2019

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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.

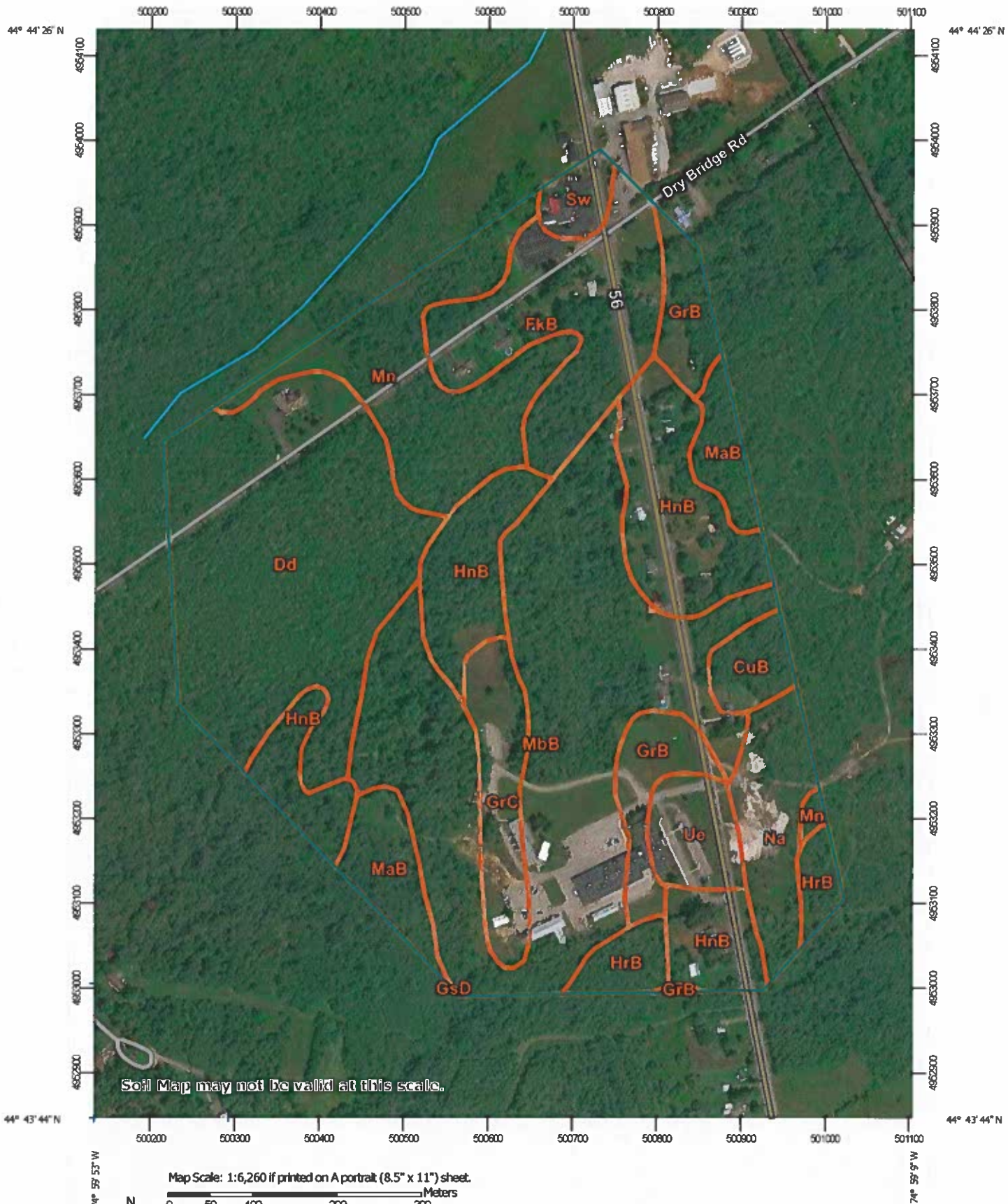
The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By 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

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

# Custom Soil Resource Report
## Soil Map




Map Scale: 1:6,260 if printed on A portrait (8.5" x 11") sheet.

Meters: 0 50 100 200 300

Feet: 0 300 600 1200 1800

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| CuB | Croghan sand, 0 to 8 percent slopes | 2.1 | 1.6% |
| Dd | Deford loamy fine sand | 26.2 | 19.2% |
| FkB | Flackville loamy fine sand, 3 to 8 percent slopes | 12.2 | 8.9% |
| GrB | Grenville loam, 3 to 8 percent slopes | 6.1 | 4.5% |
| GrC | Grenville loam, 8 to 15 percent slopes | 5.2 | 3.8% |
| GsD | Grenville loam, 15 to 25 percent slopes, very stony | 0.0 | 0.0% |
| HnB | Hogansburg loam, 3 to 8 percent slopes | 19.1 | 14.0% |
| HrB | Hogansburg and Grenville soils, 0 to 8 percent slopes, very stony | 3.1 | 2.3% |
| MaB | Malone loam, 3 to 8 percent slopes | 5.5 | 4.0% |
| MbB | Malone loam, 0 to 8 percent slopes, very stony | 33.9 | 24.8% |
| Mn | Munuscong mucky fine sandy loam | 12.6 | 9.2% |
| Na | Naumburg loamy fine sand | 5.5 | 4.0% |
| Sw | Swanton fine sandy loam | 1.6 | 1.2% |
| Ue | Udorthents, loamy | 3.3 | 2.4% |
| **Totals for Area of Interest** | | **136.5** | **100.0%** |

# Map Unit Descriptions

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

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.

**Adams**
*Percent of map unit:* 3 percent
*Hydric soil rating:* No

**Unnamed soils**
*Percent of map unit:* 3 percent

**Fahey**
*Percent of map unit:* 2 percent
*Hydric soil rating:* No

**Sunapee**
*Percent of map unit:* 2 percent
*Hydric soil rating:* No

**Crary**
*Percent of map unit:* 2 percent
*Hydric soil rating:* No

**Searsport**
*Percent of map unit:* 2 percent
*Landform:* Marshes, swamps
*Hydric soil rating:* Yes

**Naumburg**
*Percent of map unit:* 2 percent
*Landform:* Depressions
*Hydric soil rating:* Yes

**Kalurah**
*Percent of map unit:* 1 percent
*Hydric soil rating:* No

## Dd—Deford loamy fine sand

### Map Unit Setting
*National map unit symbol:* 9wwv
*Elevation:* 600 to 1,000 feet
*Mean annual precipitation:* 33 to 40 inches
*Mean annual air temperature:* 41 to 45 degrees F
*Frost-free period:* 100 to 145 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition
*Deford, loamy fine sand, and similar soils:* 80 percent
*Minor components:* 20 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Deford, Loamy Fine Sand

#### Setting
*Landform:* Depressions

*Landform:* Depressions
*Hydric soil rating:* Yes

## FkB—Flackville loamy fine sand, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 9wx7
*Elevation:* 300 to 700 feet
*Mean annual precipitation:* 33 to 40 inches
*Mean annual air temperature:* 41 to 45 degrees F
*Frost-free period:* 100 to 145 days
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Flackville, loamy fine sand, and similar soils:* 80 percent
*Minor components:* 20 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Flackville, Loamy Fine Sand

#### Setting

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

#### Typical profile

*H1 - 0 to 9 inches:* loamy fine sand
*H2 - 9 to 29 inches:* fine sand
*H3 - 29 to 72 inches:* stratified silty clay to silty clay loam

#### Properties and qualities

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* 20 to 40 inches to strongly contrasting textural stratification
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 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 in profile:* 5 percent
*Available water storage in profile:* Very low (about 2.0 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2w
*Hydrologic Soil Group:* C/D

## Description of Grenville

### Setting

*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Summit, shoulder
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Calcareous loamy lodgment till derived from limestone

### Typical profile

*Ap - 0 to 9 inches:* loam
*Bw1 - 9 to 12 inches:* loam
*Bw2 - 12 to 17 inches:* loam
*C - 17 to 35 inches:* gravelly fine sandy loam
*Cd - 35 to 79 inches:* gravelly fine sandy loam

### Properties and qualities

*Slope:* 3 to 8 percent
*Percent of area covered with surface fragments:* 0.0 percent
*Depth to restrictive feature:* 22 to 37 inches to densic material
*Natural drainage class:* Well drained
*Runoff class:* Low
*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:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 35 percent
*Available water storage in profile:* Low (about 4.3 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* B
*Hydric soil rating:* No

## Minor Components

### Hogansburg

*Percent of map unit:* 6 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Summit, shoulder
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

### Malone

*Percent of map unit:* 4 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Properties and qualities**

*Slope:* 8 to 15 percent
*Percent of area covered with surface fragments:* 0.0 percent
*Depth to restrictive feature:* 22 to 37 inches to densic material
*Natural drainage class:* Well drained
*Runoff class:* Low
*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:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 35 percent
*Available water storage in profile:* Low (about 4.3 inches)

**Interpretive groups**

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

**Minor Components**

**Hogansburg**

*Percent of map unit:* 7 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Shoulder, backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Malone**

*Percent of map unit:* 3 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Nehasne**

*Percent of map unit:* 3 percent
*Landform:* Hills
*Landform position (two-dimensional):* Summit, shoulder, backslope
*Landform position (three-dimensional):* Crest, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Waddington**

*Percent of map unit:* 2 percent
*Landform:* Terraces, deltas, outwash plains
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Convex
*Across-slope shape:* Convex

*Hydrologic Soil Group:* B
*Hydric soil rating:* No

**Minor Components**

**Hogansburg, very stony**
*Percent of map unit:* 8 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Backslope, shoulder
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Nehasne, very stony**
*Percent of map unit:* 3 percent
*Landform:* Hills
*Landform position (two-dimensional):* Shoulder, backslope, summit
*Landform position (three-dimensional):* Crest, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Waddington**
*Percent of map unit:* 2 percent
*Landform:* Deltas, outwash plains, terraces
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Malone, very stony**
*Percent of map unit:* 2 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

## HnB—Hogansburg loam, 3 to 8 percent slopes

**Map Unit Setting**
*National map unit symbol:* 2wrcg
*Elevation:* 90 to 1,580 feet
*Mean annual precipitation:* 31 to 59 inches
*Mean annual air temperature:* 39 to 48 degrees F
*Frost-free period:* 100 to 160 days
*Farmland classification:* All areas are prime farmland

*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Kalurah**

*Percent of map unit:* 3 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Summit, shoulder
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Nehasne**

*Percent of map unit:* 3 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Summit, shoulder
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* Unranked

## HrB—Hogansburg and Grenville soils, 0 to 8 percent slopes, very stony

**Map Unit Setting**

*National map unit symbol:* 2wrcj
*Elevation:* 100 to 1,800 feet
*Mean annual precipitation:* 31 to 59 inches
*Mean annual air temperature:* 39 to 48 degrees F
*Frost-free period:* 100 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Hogansburg, very stony, and similar soils:* 50 percent
*Grenville, very stony, and similar soils:* 30 percent
*Minor components:* 20 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Hogansburg, Very Stony**

**Setting**

*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Summit, shoulder
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Parent material:* Calcareous loamy lodgment till derived from limestone

*Available water storage in profile:* Low (about 4.3 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 6s
*Hydrologic Soil Group:* B
*Hydric soil rating:* No

**Minor Components**

**Malone, very stony**

*Percent of map unit:* 7 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Nehasne, very stony**

*Percent of map unit:* 5 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Summit, shoulder
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* Unranked

**Kalurah, very stony**

*Percent of map unit:* 5 percent
*Landform:* Ridges, low hills
*Landform position (two-dimensional):* Summit, shoulder
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Runeberg, very stony**

*Percent of map unit:* 3 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

## MaB—Malone loam, 3 to 8 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2wrcq

**Runeberg**

*Percent of map unit:* 3 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

**Ogdensburg**

*Percent of map unit:* 3 percent
*Landform:* Benches, till plains, ridges
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Coveytown**

*Percent of map unit:* 2 percent
*Landform:* Beach ridges
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Muskellunge**

*Percent of map unit:* 1 percent
*Landform:* Lake terraces, marine terraces
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

## MbB—Malone loam, 0 to 8 percent slopes, very stony

**Map Unit Setting**

*National map unit symbol:* 2wrcs
*Elevation:* 130 to 1,840 feet
*Mean annual precipitation:* 31 to 59 inches
*Mean annual air temperature:* 39 to 48 degrees F
*Frost-free period:* 100 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Malone, very stony, and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Ogdensburg, very stony**

*Percent of map unit:* 3 percent
*Landform:* Benches, till plains, ridges
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Coveytown**

*Percent of map unit:* 2 percent
*Landform:* Beach ridges
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Muskellunge**

*Percent of map unit:* 1 percent
*Landform:* Lake terraces, marine terraces
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

## Mn—Munuscong mucky fine sandy loam

**Map Unit Setting**

*National map unit symbol:* 9wyc
*Elevation:* 600 to 800 feet
*Mean annual precipitation:* 33 to 40 inches
*Mean annual air temperature:* 41 to 45 degrees F
*Frost-free period:* 100 to 145 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Munuscong, mucky fine sandy loam, and similar soils:* 80 percent
*Minor components:* 20 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Munuscong, Mucky Fine Sandy Loam**

**Setting**

*Landform:* Depressions
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave

**Naumburg**
*Percent of map unit:* 1 percent
*Landform:* Depressions
*Hydric soil rating:* Yes

**Swanton**
*Percent of map unit:* 1 percent
*Landform:* Depressions
*Hydric soil rating:* Yes

## Na—Naumburg loamy fine sand

**Map Unit Setting**
*National map unit symbol:* 9wyj
*Elevation:* 200 to 1,800 feet
*Mean annual precipitation:* 33 to 40 inches
*Mean annual air temperature:* 41 to 45 degrees F
*Frost-free period:* 100 to 145 days
*Farmland classification:* Farmland of statewide importance

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

**Description of Naumburg, Loamy Fine Sand**

**Setting**
*Landform:* Depressions
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Parent material:* Sandy glaciofluvial or deltaic deposits derived mainly from crystalline rock or sandstone

**Typical profile**
*Oe - 0 to 5 inches:* moderately decomposed plant material
*H2 - 5 to 19 inches:* loamy fine sand
*H3 - 19 to 41 inches:* sand
*H4 - 41 to 72 inches:* sand

**Properties and qualities**
*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.20 to 5.95 in/hr)
*Depth to water table:* About 6 to 18 inches
*Frequency of flooding:* None

## Sw—Swanton fine sandy loam

### Map Unit Setting

*National map unit symbol:* 9wzw
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 33 to 40 inches
*Mean annual air temperature:* 41 to 45 degrees F
*Frost-free period:* 100 to 145 days
*Farmland classification:* Prime farmland if drained

### Map Unit Composition

*Swanton, poorly drained, and similar soils:* 60 percent
*Swanton, somewhat poorly drained, and similar soils:* 20 percent
*Minor components:* 20 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Swanton, Poorly Drained

#### 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 or deltaic deposits overlying clayey glaciolacustrine or glaciomarine deposits

#### Typical profile

*H1 - 0 to 8 inches:* fine sandy loam
*H2 - 8 to 26 inches:* fine sandy loam
*H3 - 26 to 72 inches:* silty clay

#### Properties and qualities

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* 18 to 40 inches to strongly contrasting textural stratification
*Natural drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 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 in profile:* 3 percent
*Available water storage in profile:* Low (about 4.4 inches)

#### Interpretive groups

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

**Wegatchie**
*Percent of map unit:* 1 percent
*Landform:* Depressions
*Hydric soil rating:* Yes

**Kalurah**
*Percent of map unit:* 1 percent
*Hydric soil rating:* No

**Naumburg**
*Percent of map unit:* 1 percent
*Hydric soil rating:* No

**Deford**
*Percent of map unit:* 1 percent
*Landform:* Depressions
*Hydric soil rating:* Yes

**Hogansburg**
*Percent of map unit:* 1 percent
*Hydric soil rating:* No

**Malone**
*Percent of map unit:* 1 percent
*Hydric soil rating:* No

**Adjidaumo**
*Percent of map unit:* 1 percent
*Landform:* Depressions
*Hydric soil rating:* Yes

## Ue—Udorthents, loamy

**Map Unit Setting**
*National map unit symbol:* 9x03
*Mean annual precipitation:* 33 to 40 inches
*Mean annual air temperature:* 41 to 45 degrees F
*Frost-free period:* 100 to 145 days
*Farmland classification:* Not prime farmland

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

**Description of Udorthents, Loamy**

**Typical profile**
*H1 - 0 to 4 inches:* loam
*H2 - 4 to 72 inches:* channery loam

# 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.

### Depth to a Selected Soil Restrictive Layer: Lithic bedrock

A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to the user selected type of restrictive layer as described in for each map unit. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

## MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Rating Polygons
  - 0 - 25
  - 25 - 50
  - 50 - 100
  - 100 - 150
  - 150 - 200
  - > 200
  - Not rated or not available
- Soil Rating Lines
  - 0 - 25
  - 25 - 50
  - 50 - 100
  - 100 - 150
  - 150 - 200
  - > 200
  - Not rated or not available
- Soil Rating Points
  - 0 - 25
  - 25 - 50
  - 50 - 100
  - 100 - 150
  - 150 - 200
  - > 200
  - 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 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: St. Lawrence County, New York
Survey Area Data: Version 19, Mar 7, 2019

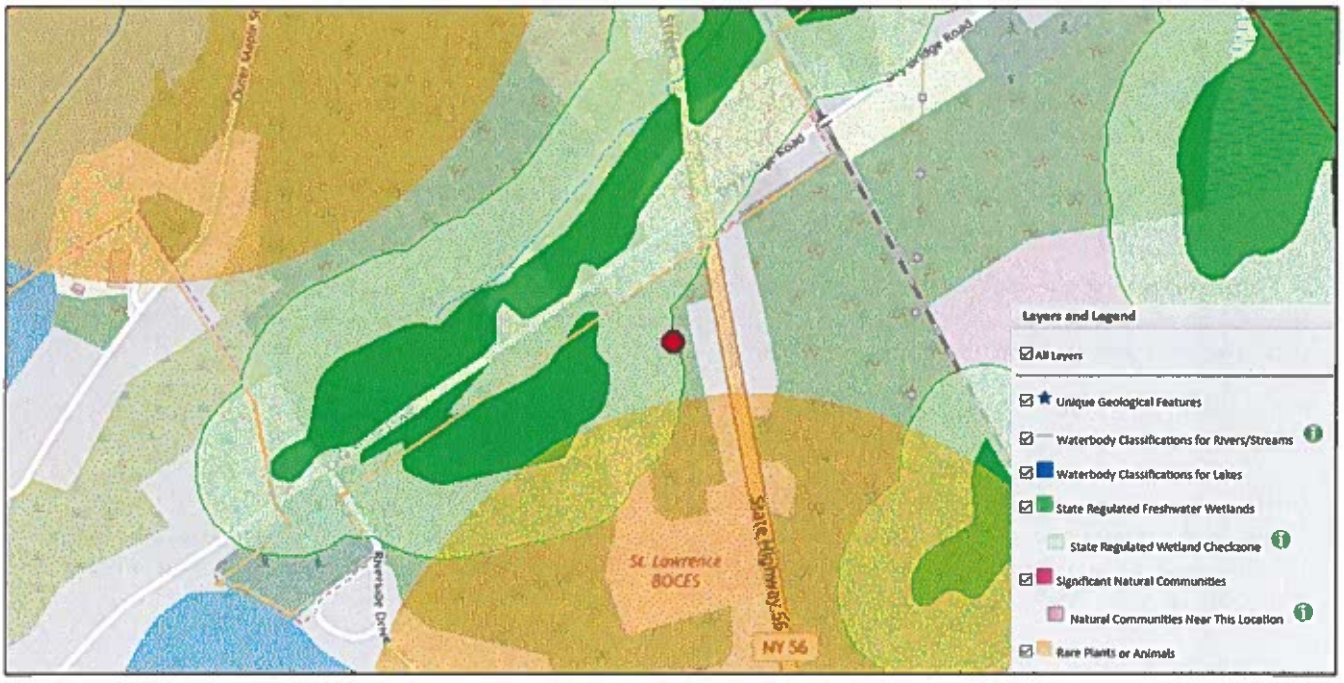
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 20, 2009—Oct 18, 2016

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.

# Appendix B
# USFWS NWI and Environmental Resource Map

# Environmental Resource Mapper




**The coordinates of the point you clicked on are:**

| | | | | |
|---|---|---|---|---|
| **UTM 18** | **Easting:** | 500681.080 | **Northing:** | 4953611.959 |
| **Longitude/Latitude** | **Longitude:** | -74.991 | **Latitude:** | 44.736 |

**The approximate address of the point you clicked on is:**
13668, Norwood, New York

**County:** St Lawrence
**Town:** Potsdam
**USGS Quad:** POTSDAM

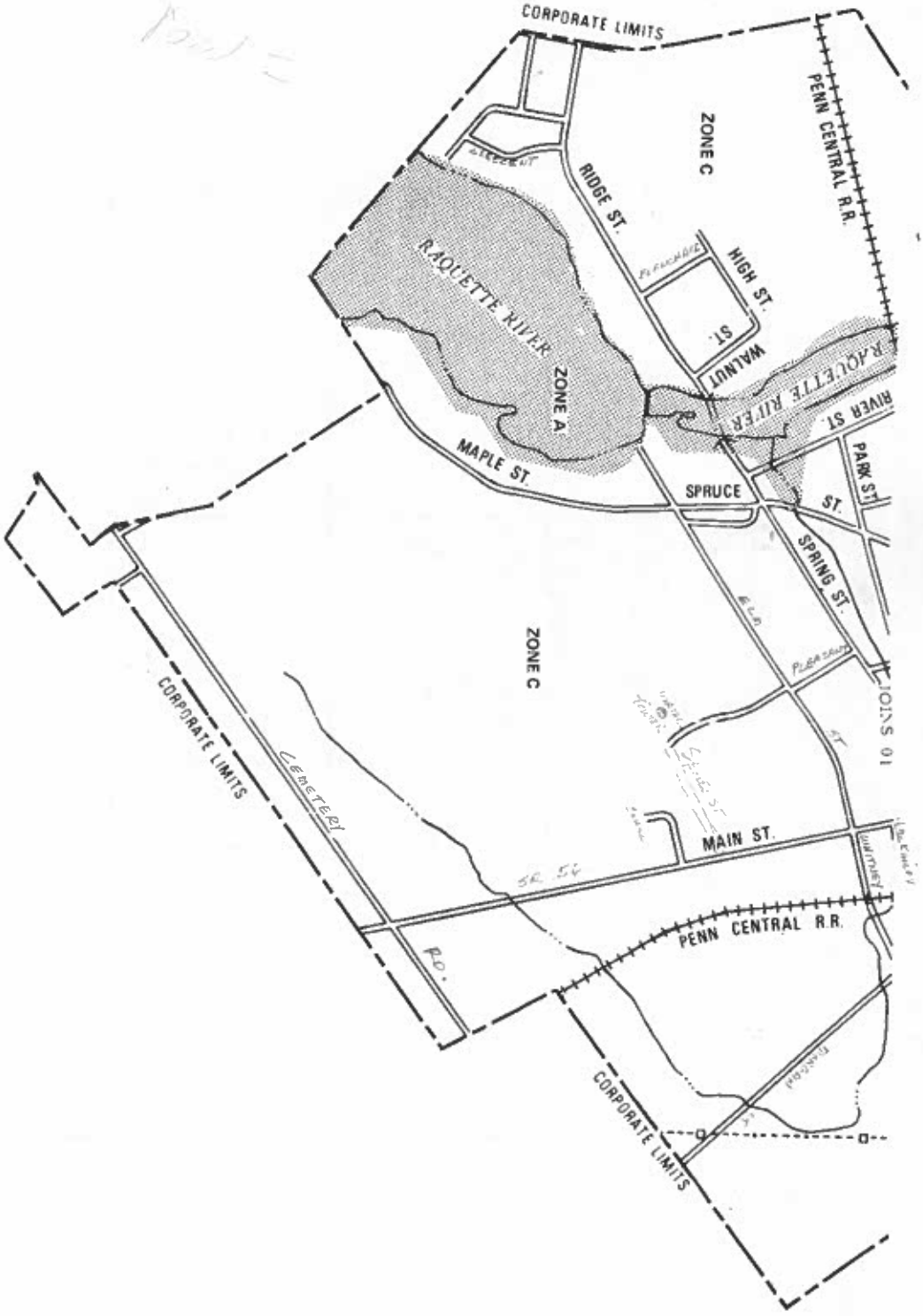
**DEC Region**

**Region 6**:
(Western Adirondacks/Eastern Lake Ontario) Herkimer, Jefferson, Lewis, Oneida and St. Lawrence counties. For more information visit **http://www.dec.ny.gov/about/613.html**.

**Old or Potential Records (Not displayed on the map)**

**Common Name:** Downy Phlox
**Scientific Name:** Phlox pilosa ssp. pilosa
**Date Last Documented:** 1910-09
**Location:** Norwood
**NYS Protected:** Endangered

**Appendix C**
**FEMA-FIRMette Map**




PROOF

NOV 14 1985

02

federal emergency management agency

**VILLAGE OF NORWOOD, NY**

ST. LAWRENCE COUNTY

APPROXIMATE SCALE

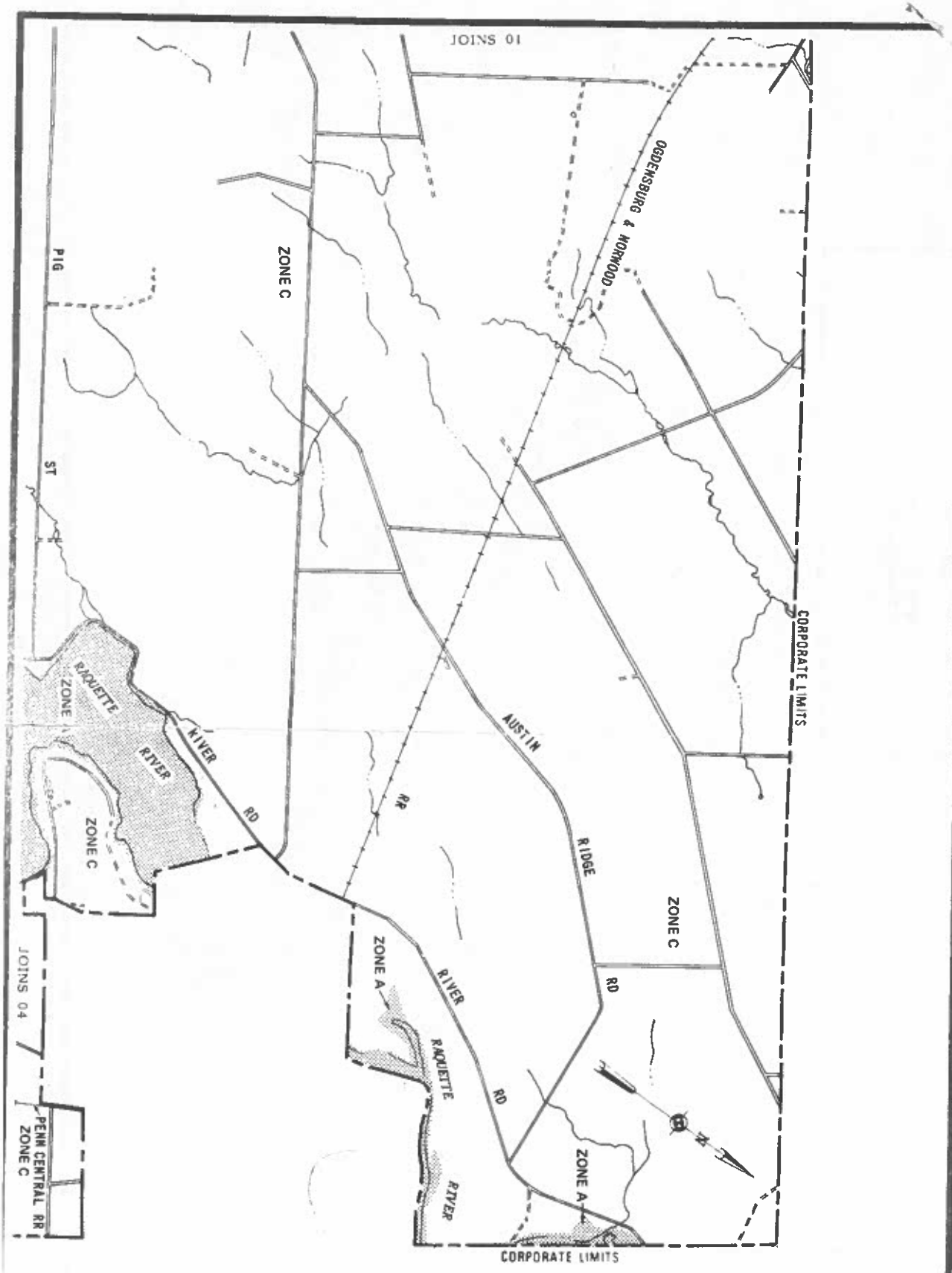
800 0 800 1600 2400 FEET

**FLOOD INSURANCE RATE MAP**

**COMMUNITY NUMBER 361345**

EFFECTIVE DATE

APRIL 30, 1986




02

federal emergency management agency

**TOWN OF POTSDAM, NY**

ST. LAWRENCE COUNTY

APPROXIMATE SCALE

2000 0 2000 4000 6000 FEET

**FLOOD INSURANCE RATE MAP**

**COMMUNITY NUMBER 361185**

EFFECTIVE DATE

MARCH 4, 1988

# Appendix D
# Alternative No. 1a Cost Estimate

# Appendix E
# Alternative No. 1b Cost Estimate

# Appendix F
# Alternative No. 1c Cost Estimate

# Appendix G
# Alternative No. 2a Cost Estimate

# Appendix H
# Alternative No. 2b Cost Estimate

# Appendix I
# Alternative No. 2c Cost Estimate

# Appendix J
# Hydraulic Models

## Scenario: Base

**Scenario: Base**
**Current Time Step: 0.000 h**
**FlexTable: Junction Table**

| Label | Elevation (ft) | Demand (gpm) | Hydraulic Grade (ft) | Pressure (psi) |
|---|---|---|---|---|
| J-1 | 330.00 | 2 | 499.78 | 73 |
| J-2 | 368.00 | 2 | 499.78 | 57 |
| J-3 | 332.00 | 2 | 499.78 | 73 |
| J-4 | 359.00 | 3 | 499.78 | 61 |
| J-5 | 340.00 | 1 | 499.78 | 69 |
| J-6 | 337.00 | 3 | 499.78 | 70 |
| J-7 | 335.00 | 2 | 499.78 | 71 |
| J-11 | 357.00 | 2 | 499.78 | 62 |
| J-12 | 350.00 | 2 | 499.78 | 65 |
| J-13 | 355.00 | 2 | 499.78 | 63 |
| J-14 | 347.00 | 2 | 499.79 | 66 |
| J-15 | 345.00 | 1 | 499.79 | 67 |
| J-16 | 330.00 | 2 | 499.79 | 73 |
| J-17 | 343.00 | 1 | 499.79 | 68 |
| J-20 | 321.00 | 1 | 499.82 | 77 |
| J-21 | 329.00 | 3 | 499.80 | 74 |
| J-22 | 328.00 | 1 | 499.80 | 74 |
| J-23 | 331.00 | 2 | 499.80 | 73 |
| J-24 | 324.00 | 2 | 499.88 | 76 |
| J-25 | 420.00 | 1 | 499.95 | 35 |
| J-26 | 365.00 | 3 | 499.92 | 58 |
| J-27 | 420.00 | 1 | 499.95 | 35 |
| J-28 | 393.00 | 1 | 499.92 | 46 |
| J-29 | 419.00 | 2 | 499.95 | 35 |
| J-30 | 424.00 | 1 | 499.97 | 33 |
| J-31 | 379.00 | 1 | 499.92 | 52 |
| J-32 | 381.00 | 1 | 499.92 | 51 |
| J-33 | 335.00 | 1 | 499.92 | 71 |
| J-34 | 351.00 | 1 | 499.92 | 64 |
| J-36 | 348.00 | 1 | 499.92 | 66 |
| J-37 | 328.00 | 1 | 499.81 | 74 |
| J-38 | 327.00 | 2 | 499.79 | 75 |
| J-39 | 328.00 | 1 | 499.80 | 74 |
| J-40 | 335.00 | 3 | 499.79 | 71 |
| J-41 | 337.00 | 3 | 499.79 | 70 |
| J-42 | 324.00 | 1 | 499.80 | 76 |
| J-46 | 326.00 | 1 | 499.80 | 75 |
| J-47 | 338.00 | 1 | 499.80 | 70 |
| J-49 | 372.00 | 2 | 499.80 | 55 |
| J-51 | 344.00 | 1 | 499.78 | 67 |
| J-52 | 351.00 | 1 | 499.78 | 64 |
| J-53 | 353.00 | 3 | 499.78 | 64 |
| J-54 | 330.00 | 2 | 499.78 | 73 |
| J-55 | 358.00 | 2 | 499.73 | 61 |
| J-57 | 381.00 | 3 | 499.78 | 51 |
| J-58 | 386.00 | 1 | 499.78 | 49 |
| J-59 | 357.00 | 1 | 499.78 | 62 |
| J-60 | 381.00 | 1 | 499.78 | 51 |
| J-61 | 374.00 | 1 | 499.78 | 54 |
| J-62 | 328.00 | 1 | 499.79 | 74 |
| J-63 | 324.00 | 2 | 499.78 | 76 |
| J-64 | 329.00 | 2 | 499.78 | 74 |
| J-65 | 322.00 | 3 | 499.78 | 77 |
| J-66 | 342.00 | 2 | 499.78 | 68 |
| J-68 | 332.00 | 2 | 499.78 | 73 |
| J-71 | 330.00 | 3 | 499.78 | 73 |
| J-72 | 340.00 | 1 | 499.78 | 69 |

**Scenario: Base**
**Current Time Step: 0.000 h**
**Fire Flow Node FlexTable: Fire Flow Report**

| Label | Fire Flow Iterations | Satisfies Fire Flow Constraints? | Fire Flow (Needed) (gpm) | Fire Flow (Available) (gpm) | Flow (Total Needed) (gpm) | Flow (Total Available) (gpm) | Pressure (Residual Lower Limit) (psi) | Pressure (Calculated Residual) (psi) | Pressure (Zone Lower Limit) (psi) | Pressure (Calculated Zone Lower Limit) (psi) | Junction w/ Minimum Pressure (Zone) | Pressure (System Lower Limit) (psi) | Pressure (Calculated System Lower Limit) (psi) | Junction w/ Minimum Pressure (System) | F B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J-97 | 3 | True | 500 | 632 | 510 | 642 | 20 | 20 | 0 | 23 | J-95 | 20 | 23 | J-95 | |
| J-95 | 5 | True | 500 | 633 | 504 | 637 | 20 | 23 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-4 | 4 | True | 500 | 1,646 | 502 | 1,648 | 20 | 20 | 0 | 30 | J-2 | 20 | 30 | J-2 | |
| J-6 | 6 | True | 500 | 1,799 | 502 | 1,802 | 20 | 33 | 0 | 20 | J-2 | 20 | 20 | J-2 | |
| J-21 | 6 | True | 500 | 2,139 | 502 | 2,142 | 20 | 25 | 0 | 20 | J-14 | 20 | 20 | J-14 | |
| J-26 | 5 | True | 500 | 1,387 | 502 | 1,389 | 20 | 34 | 0 | 20 | J-92 | 20 | 20 | J-92 | |
| J-40 | 8 | True | 500 | 1,989 | 502 | 1,991 | 20 | 42 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-41 | 8 | True | 500 | 2,006 | 502 | 2,009 | 20 | 41 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-53 | 6 | True | 500 | 1,963 | 502 | 1,965 | 20 | 33 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-57 | 6 | True | 500 | 1,604 | 502 | 1,606 | 20 | 22 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-65 | 3 | True | 500 | 1,232 | 502 | 1,235 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 | |
| J-71 | 24 | True | 500 | 2,059 | 502 | 2,061 | 20 | 42 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-73 | 4 | True | 500 | 1,853 | 502 | 1,856 | 20 | 20 | 0 | 24 | J-72 | 20 | 24 | J-72 | |
| J-1 | 8 | True | 500 | 2,096 | 502 | 2,098 | 20 | 38 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-2 | 3 | True | 500 | 1,096 | 502 | 1,098 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 | |
| J-3 | 6 | True | 500 | 1,941 | 502 | 1,943 | 20 | 35 | 0 | 20 | J-2 | 20 | 20 | J-2 | |
| J-7 | 22 | True | 500 | 1,913 | 502 | 1,915 | 20 | 20 | 0 | 20 | J-4 | 20 | 20 | J-4 | |
| J-11 | 4 | True | 500 | 1,776 | 502 | 1,778 | 20 | 20 | 0 | 24 | J-4 | 20 | 24 | J-4 | |
| J-13 | 3 | True | 500 | 1,043 | 502 | 1,045 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 | |
| J-16 | 3 | True | 500 | 1,377 | 502 | 1,379 | 20 | 20 | 0 | 31 | J-30 | 20 | 31 | J-30 | |
| J-23 | 6 | True | 500 | 2,300 | 502 | 2,302 | 20 | 28 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-38 | 8 | True | 500 | 2,103 | 502 | 2,105 | 20 | 45 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-63 | 9 | True | 500 | 2,096 | 502 | 2,098 | 20 | 45 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-64 | 3 | True | 500 | 1,126 | 502 | 1,128 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 | |
| J-66 | 4 | True | 500 | 1,975 | 502 | 1,977 | 20 | 20 | 0 | 22 | J-97 | 20 | 22 | J-97 | |
| J-74 | 3 | True | 500 | 1,338 | 502 | 1,340 | 20 | 20 | 0 | 31 | J-30 | 20 | 31 | J-30 | |
| J-76 | 6 | True | 500 | 2,092 | 502 | 2,094 | 20 | 34 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-82 | 6 | True | 500 | 1,974 | 502 | 1,976 | 20 | 21 | 0 | 20 | J-89 | 20 | 20 | J-89 | |
| J-86 | 4 | True | 500 | 1,517 | 502 | 1,519 | 20 | 20 | 0 | 23 | J-83 | 20 | 23 | J-83 | |
| J-12 | 3 | True | 500 | 1,353 | 501 | 1,355 | 20 | 20 | 0 | 31 | J-30 | 20 | 31 | J-30 | |
| J-14 | 4 | True | 500 | 1,939 | 501 | 1,940 | 20 | 20 | 0 | 26 | J-13 | 20 | 26 | J-13 | |
| J-24 | 4 | True | 500 | 3,028 | 501 | 3,030 | 20 | 47 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-29 | 6 | True | 500 | 3,440 | 501 | 3,441 | 20 | 20 | 0 | 20 | J-27 | 20 | 20 | J-27 | |
| J-49 | 3 | True | 500 | 643 | 501 | 644 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 | |
| J-54 | 8 | True | 500 | 2,085 | 501 | 2,087 | 20 | 43 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-55 | 5 | True | 500 | 645 | 501 | 646 | 20 | 32 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-68 | 6 | True | 500 | 2,018 | 501 | 2,020 | 20 | 41 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-92 | 3 | True | 500 | 575 | 501 | 576 | 20 | 20 | 0 | 23 | J-28 | 20 | 23 | J-28 | |
| J-5 | 6 | True | 500 | 1,858 | 501 | 1,859 | 20 | 27 | 0 | 20 | J-2 | 20 | 20 | J-2 | |
| J-20 | 8 | True | 500 | 2,338 | 501 | 2,339 | 20 | 48 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-28 | 19 | True | 500 | 589 | 501 | 590 | 20 | 21 | 0 | 20 | J-92 | 20 | 20 | J-92 | |
| J-31 | 5 | True | 500 | 598 | 501 | 599 | 20 | 27 | 0 | 20 | J-92 | 20 | 20 | J-92 | |
| J-32 | 5 | True | 500 | 617 | 501 | 618 | 20 | 27 | 0 | 20 | J-92 | 20 | 20 | J-92 | |
| J-37 | 8 | True | 500 | 2,282 | 501 | 2,283 | 20 | 45 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-59 | 6 | True | 500 | 1,854 | 501 | 1,855 | 20 | 32 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-77 | 4 | True | 500 | 1,943 | 501 | 1,944 | 20 | 20 | 0 | 23 | J-97 | 20 | 23 | J-97 | |
| J-78 | 6 | True | 500 | 2,091 | 501 | 2,092 | 20 | 27 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-15 | 3 | True | 500 | 1,244 | 500 | 1,245 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 | |
| J-17 | 4 | True | 500 | 1,564 | 500 | 1,564 | 20 | 20 | 0 | 22 | J-15 | 20 | 22 | J-15 | |
| J-22 | 6 | True | 500 | 2,081 | 500 | 2,081 | 20 | 26 | 0 | 20 | J-14 | 20 | 20 | J-14 | |
| J-25 | 4 | True | 500 | 2,868 | 500 | 2,868 | 20 | 20 | 0 | 20 | J-27 | 20 | 20 | J-27 | |
| J-27 | 4 | True | 500 | 2,155 | 500 | 2,156 | 20 | 20 | 0 | 26 | J-25 | 20 | 26 | J-25 | |
| J-30 | 2 | True | 500 | 3,500 | 500 | 3,501 | 20 | 25 | 0 | 27 | J-27 | 20 | 27 | J-27 | |
| J-33 | 5 | True | 500 | 598 | 500 | 598 | 20 | 39 | 0 | 20 | J-92 | 20 | 20 | J-92 | |
| J-34 | 5 | True | 500 | 598 | 500 | 598 | 20 | 33 | 0 | 20 | J-92 | 20 | 20 | J-92 | |
| J-36 | 5 | True | 500 | 598 | 500 | 598 | 20 | 32 | 0 | 20 | J-92 | 20 | 20 | J-92 | |
| J-39 | 5 | True | 500 | 830 | 500 | 830 | 20 | 39 | 0 | 20 | J-49 | 20 | 20 | J-49 | |
| J-42 | 5 | True | 500 | 1,187 | 500 | 1,187 | 20 | 38 | 0 | 20 | J-49 | 20 | 20 | J-49 | |
| J-46 | 5 | True | 500 | 963 | 500 | 964 | 20 | 35 | 0 | 20 | J-49 | 20 | 20 | J-49 | |
| J-47 | 5 | True | 500 | 717 | 500 | 717 | 20 | 35 | 0 | 20 | J-49 | 20 | 20 | J-49 | |
| J-51 | 6 | True | 500 | 1,875 | 500 | 1,876 | 20 | 37 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-52 | 4 | True | 500 | 1,483 | 500 | 1,484 | 20 | 20 | 0 | 30 | J-58 | 20 | 30 | J-58 | |
| J-58 | 4 | True | 500 | 1,642 | 500 | 1,642 | 20 | 20 | 0 | 26 | J-97 | 20 | 26 | J-97 | |
| J-60 | 4 | True | 500 | 1,462 | 500 | 1,462 | 20 | 20 | 0 | 29 | J-58 | 20 | 29 | J-58 | |
| J-61 | 6 | True | 500 | 1,815 | 500 | 1,815 | 20 | 24 | 0 | 20 | J-58 | 20 | 20 | J-58 | |
| J-62 | 3 | True | 500 | 1,232 | 500 | 1,233 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 | |
| J-72 | 4 | True | 500 | 1,906 | 500 | 1,907 | 20 | 20 | 0 | 22 | J-73 | 20 | 22 | J-73 | |
| J-75 | 4 | True | 500 | 1,609 | 500 | 1,609 | 20 | 20 | 0 | 31 | J-97 | 20 | 31 | J-97 | |
| J-83 | 4 | True | 500 | 1,514 | 500 | 1,514 | 20 | 20 | 0 | 21 | J-86 | 20 | 21 | J-86 | |
| J-84 | 3 | True | 500 | 1,403 | 500 | 1,403 | 20 | 20 | 0 | 28 | J-83 | 20 | 28 | J-83 | |
| J-85 | 6 | True | 500 | 2,091 | 500 | 2,092 | 20 | 23 | 0 | 20 | J-97 | 20 | 20 | J-97 | |
| J-89 | 3 | True | 500 | 1,016 | 500 | 1,017 | 20 | 20 | 0 | 21 | J-90 | 20 | 21 | J-90 | |
| J-90 | 3 | True | 500 | 648 | 500 | 648 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 | |
| J-91 | 6 | True | 500 | 1,993 | 500 | 1,993 | 20 | 35 | 0 | 20 | J-2 | 20 | 20 | J-2 | |

# Scenario: Base

| | | | | |
|---|---|---|---|---|
| J-73 | 338.00 | 3 | 499.78 | 70 |
| J-74 | 335.00 | 2 | 499.78 | 71 |
| J-75 | 342.00 | 1 | 499.78 | 68 |
| J-76 | 328.00 | 2 | 499.78 | 74 |
| J-77 | 341.00 | 1 | 499.78 | 69 |
| J-78 | 336.00 | 1 | 499.78 | 71 |
| J-82 | 338.00 | 2 | 499.78 | 70 |
| J-83 | 346.00 | 1 | 499.78 | 67 |
| J-84 | 337.00 | 1 | 499.78 | 70 |
| J-85 | 333.00 | 1 | 499.78 | 72 |
| J-86 | 350.00 | 2 | 499.78 | 65 |
| J-89 | 350.00 | 1 | 499.78 | 65 |
| J-90 | 348.00 | 1 | 499.78 | 66 |
| J-91 | 332.00 | 1 | 499.78 | 73 |
| J-92 | 397.00 | 2 | 499.92 | 45 |
| J-95 | 378.00 | 4 | 499.72 | 53 |
| J-97 | 385.00 | 10 | 499.72 | 50 |

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# Alternative No. 1c

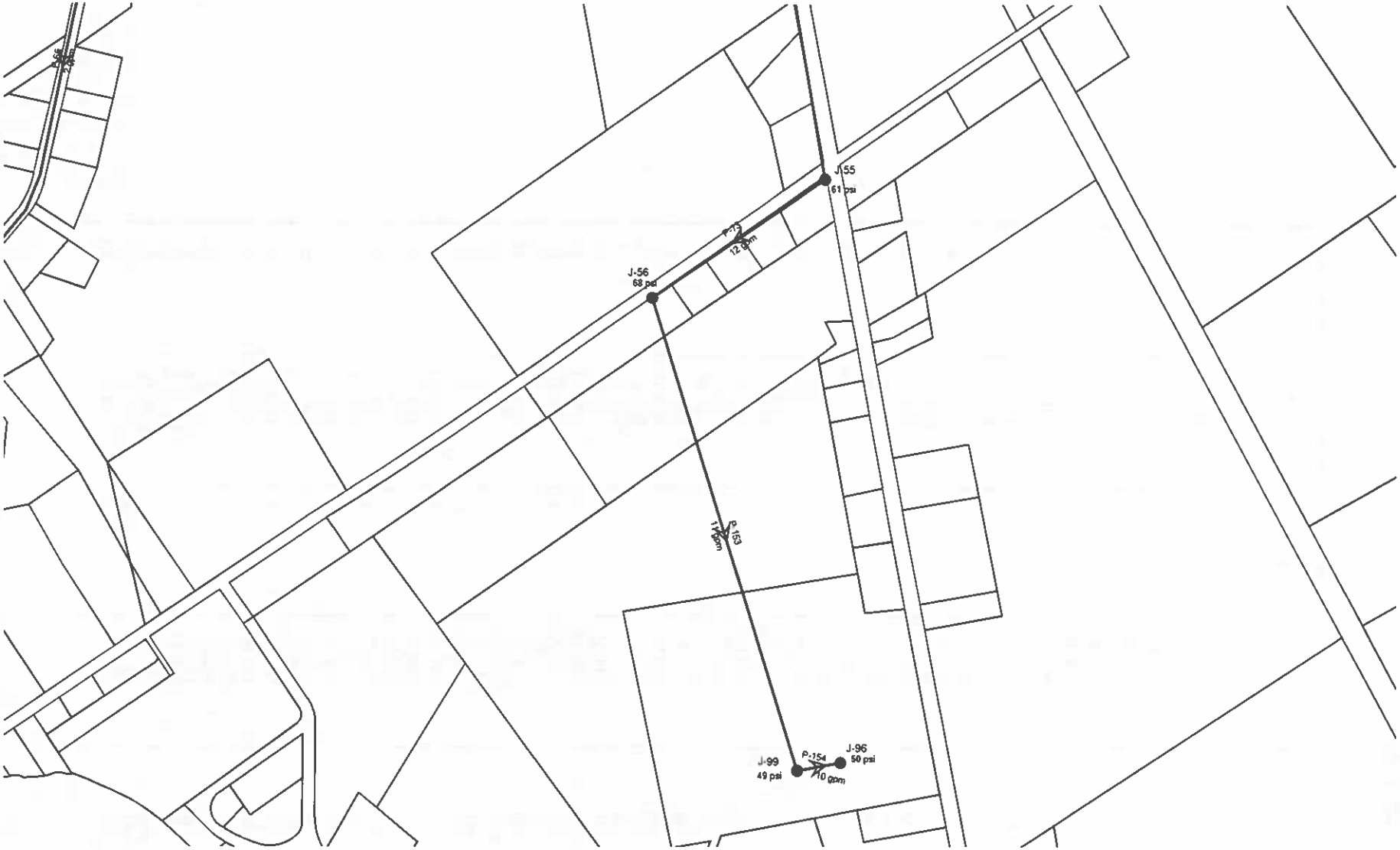
**Scenario: Base**
**Current Time Step: 0.000 h**
**FlexTable: Junction Table**

| Label | Elevation (ft) | Demand (gpm) | Hydraulic Grade (ft) | Pressure (psi) |
|---|---|---|---|---|
| J-1 | 330.00 | 2 | 499.78 | 73 |
| J-2 | 368.00 | 2 | 499.78 | 57 |
| J-3 | 332.00 | 2 | 499.78 | 73 |
| J-4 | 359.00 | 3 | 499.78 | 61 |
| J-5 | 340.00 | 1 | 499.78 | 69 |
| J-6 | 337.00 | 3 | 499.78 | 70 |
| J-7 | 335.00 | 2 | 499.78 | 71 |
| J-11 | 357.00 | 2 | 499.78 | 62 |
| J-12 | 350.00 | 2 | 499.78 | 65 |
| J-13 | 355.00 | 2 | 499.78 | 63 |
| J-14 | 347.00 | 2 | 499.79 | 66 |
| J-15 | 345.00 | 1 | 499.79 | 67 |
| J-16 | 330.00 | 2 | 499.79 | 73 |
| J-17 | 343.00 | 1 | 499.79 | 68 |
| J-20 | 321.00 | 1 | 499.82 | 77 |
| J-21 | 329.00 | 3 | 499.80 | 74 |
| J-22 | 328.00 | 1 | 499.80 | 74 |
| J-23 | 331.00 | 2 | 499.80 | 73 |
| J-24 | 324.00 | 2 | 499.88 | 76 |
| J-25 | 420.00 | 1 | 499.95 | 35 |
| J-26 | 365.00 | 3 | 499.92 | 58 |
| J-27 | 420.00 | 1 | 499.95 | 35 |
| J-28 | 393.00 | 1 | 499.92 | 46 |
| J-29 | 419.00 | 2 | 499.95 | 35 |
| J-30 | 424.00 | 1 | 499.97 | 33 |
| J-31 | 379.00 | 1 | 499.92 | 52 |
| J-32 | 381.00 | 1 | 499.92 | 51 |
| J-33 | 335.00 | 1 | 499.92 | 71 |
| J-34 | 351.00 | 1 | 499.92 | 64 |
| J-36 | 348.00 | 1 | 499.92 | 66 |
| J-37 | 328.00 | 1 | 499.81 | 74 |
| J-38 | 327.00 | 2 | 499.79 | 75 |
| J-39 | 328.00 | 1 | 499.80 | 74 |
| J-40 | 335.00 | 3 | 499.79 | 71 |
| J-41 | 337.00 | 3 | 499.79 | 70 |
| J-42 | 324.00 | 1 | 499.80 | 76 |
| J-46 | 326.00 | 1 | 499.80 | 75 |
| J-47 | 338.00 | 1 | 499.80 | 70 |
| J-49 | 372.00 | 2 | 499.80 | 55 |
| J-51 | 344.00 | 1 | 499.78 | 67 |
| J-52 | 351.00 | 1 | 499.78 | 64 |
| J-53 | 353.00 | 3 | 499.78 | 64 |
| J-54 | 330.00 | 2 | 499.78 | 73 |
| J-55 | 358.00 | 2 | 499.73 | 61 |
| J-57 | 381.00 | 3 | 499.78 | 51 |
| J-58 | 386.00 | 1 | 499.78 | 49 |
| J-59 | 357.00 | 1 | 499.78 | 62 |
| J-60 | 381.00 | 1 | 499.78 | 51 |
| J-61 | 374.00 | 1 | 499.78 | 54 |
| J-62 | 328.00 | 1 | 499.79 | 74 |
| J-63 | 324.00 | 2 | 499.78 | 76 |
| J-64 | 329.00 | 2 | 499.78 | 74 |
| J-65 | 322.00 | 3 | 499.78 | 77 |
| J-66 | 342.00 | 2 | 499.78 | 68 |
| J-68 | 332.00 | 2 | 499.78 | 73 |
| J-71 | 330.00 | 3 | 499.78 | 73 |
| J-72 | 340.00 | 1 | 499.78 | 69 |

**Scenario: Base**
**Current Time Step: 0.000 h**
**Fire Flow Node FlexTable: Fire Flow Report**

| Label | Fire Flow Iterations | Satisfies Fire Flow Constraints? | Fire Flow (Needed) (gpm) | Fire Flow (Available) (gpm) | Flow (Total Needed) (gpm) | Flow (Total Available) (gpm) | Pressure (Residual Lower Limit) (psi) | Pressure (Calculated Residual) (psi) | Pressure (Zone Lower Limit) (psi) | Pressure (Calculated Zone Lower Limit) (psi) | Junction w/ Minimum Pressure (Zone) | Pressure (System Lower Limit) (psi) | Pressure (Calculated System Lower Limit) (psi) | Junction w/ Minimum Pressure (System) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J-97 | 3 | False | 500 | 190 | 510 | 200 | 20 | 20 | 0 | 26 | J-95 | 20 | 26 | J-95 |
| J-95 | 5 | False | 500 | 202 | 504 | 206 | 20 | 23 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-4 | 4 | True | 500 | 1,646 | 502 | 1,648 | 20 | 20 | 0 | 30 | J-2 | 20 | 30 | J-2 |
| J-6 | 6 | True | 500 | 1,799 | 502 | 1,802 | 20 | 33 | 0 | 20 | J-2 | 20 | 20 | J-2 |
| J-21 | 6 | True | 500 | 2,139 | 502 | 2,142 | 20 | 25 | 0 | 20 | J-14 | 20 | 20 | J-14 |
| J-26 | 5 | True | 500 | 1,387 | 502 | 1,389 | 20 | 34 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-40 | 8 | True | 500 | 1,989 | 502 | 1,991 | 20 | 42 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-41 | 8 | True | 500 | 2,006 | 502 | 2,009 | 20 | 41 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-53 | 6 | True | 500 | 1,957 | 502 | 1,959 | 20 | 33 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-57 | 6 | True | 500 | 1,599 | 502 | 1,601 | 20 | 22 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-65 | 3 | True | 500 | 1,232 | 502 | 1,235 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-71 | 24 | True | 500 | 2,052 | 502 | 2,055 | 20 | 42 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-73 | 4 | True | 500 | 1,853 | 502 | 1,856 | 20 | 20 | 0 | 24 | J-72 | 20 | 24 | J-72 |
| J-1 | 8 | True | 500 | 2,090 | 502 | 2,092 | 20 | 38 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-2 | 3 | True | 500 | 1,096 | 502 | 1,098 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-3 | 6 | True | 500 | 1,941 | 502 | 1,943 | 20 | 35 | 0 | 20 | J-2 | 20 | 20 | J-2 |
| J-7 | 22 | True | 500 | 1,913 | 502 | 1,915 | 20 | 20 | 0 | 20 | J-4 | 20 | 20 | J-4 |
| J-11 | 4 | True | 500 | 1,776 | 502 | 1,778 | 20 | 20 | 0 | 24 | J-4 | 20 | 24 | J-4 |
| J-13 | 3 | True | 500 | 1,043 | 502 | 1,045 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-16 | 3 | True | 500 | 1,377 | 502 | 1,379 | 20 | 20 | 0 | 31 | J-30 | 20 | 31 | J-30 |
| J-23 | 6 | True | 500 | 2,300 | 502 | 2,302 | 20 | 28 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-38 | 8 | True | 500 | 2,103 | 502 | 2,105 | 20 | 45 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-63 | 8 | True | 500 | 2,090 | 502 | 2,092 | 20 | 46 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-64 | 3 | True | 500 | 1,126 | 502 | 1,128 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-66 | 4 | True | 500 | 1,975 | 502 | 1,977 | 20 | 20 | 0 | 21 | J-97 | 20 | 21 | J-97 |
| J-74 | 3 | True | 500 | 1,338 | 502 | 1,340 | 20 | 20 | 0 | 31 | J-30 | 20 | 31 | J-30 |
| J-76 | 6 | True | 500 | 2,085 | 502 | 2,087 | 20 | 34 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-82 | 6 | True | 500 | 1,974 | 502 | 1,976 | 20 | 21 | 0 | 20 | J-89 | 20 | 20 | J-89 |
| J-86 | 4 | True | 500 | 1,517 | 502 | 1,519 | 20 | 20 | 0 | 23 | J-83 | 20 | 23 | J-83 |
| J-12 | 3 | True | 500 | 1,353 | 501 | 1,355 | 20 | 20 | 0 | 31 | J-30 | 20 | 31 | J-30 |
| J-14 | 4 | True | 500 | 1,939 | 501 | 1,940 | 20 | 20 | 0 | 26 | J-13 | 20 | 26 | J-13 |
| J-24 | 4 | True | 500 | 3,028 | 501 | 3,030 | 20 | 47 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-29 | 6 | True | 500 | 3,440 | 501 | 3,441 | 20 | 20 | 0 | 20 | J-27 | 20 | 20 | J-27 |
| J-49 | 3 | True | 500 | 643 | 501 | 644 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-54 | 8 | True | 500 | 2,079 | 501 | 2,080 | 20 | 43 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-55 | 5 | True | 500 | 643 | 501 | 644 | 20 | 32 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-68 | 6 | True | 500 | 2,012 | 501 | 2,014 | 20 | 41 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-92 | 3 | True | 500 | 575 | 501 | 576 | 20 | 20 | 0 | 23 | J-28 | 20 | 23 | J-28 |
| J-5 | 6 | True | 500 | 1,858 | 501 | 1,859 | 20 | 27 | 0 | 20 | J-2 | 20 | 20 | J-2 |
| J-20 | 8 | True | 500 | 2,338 | 501 | 2,339 | 20 | 48 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-28 | 19 | True | 500 | 589 | 501 | 590 | 20 | 21 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-31 | 5 | True | 500 | 598 | 501 | 599 | 20 | 27 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-32 | 5 | True | 500 | 617 | 501 | 618 | 20 | 27 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-37 | 8 | True | 500 | 2,282 | 501 | 2,283 | 20 | 45 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-59 | 6 | True | 500 | 1,854 | 501 | 1,855 | 20 | 32 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-77 | 4 | True | 500 | 1,943 | 501 | 1,944 | 20 | 20 | 0 | 23 | J-97 | 20 | 23 | J-97 |
| J-78 | 6 | True | 500 | 2,085 | 501 | 2,086 | 20 | 27 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-15 | 3 | True | 500 | 1,244 | 500 | 1,245 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-17 | 4 | True | 500 | 1,564 | 500 | 1,564 | 20 | 20 | 0 | 22 | J-15 | 20 | 22 | J-15 |
| J-22 | 6 | True | 500 | 2,081 | 500 | 2,081 | 20 | 26 | 0 | 20 | J-14 | 20 | 20 | J-14 |
| J-25 | 4 | True | 500 | 2,868 | 500 | 2,868 | 20 | 20 | 0 | 20 | J-27 | 20 | 20 | J-27 |
| J-27 | 4 | True | 500 | 2,155 | 500 | 2,156 | 20 | 20 | 0 | 26 | J-25 | 20 | 26 | J-25 |
| J-30 | 2 | True | 500 | 3,500 | 500 | 3,501 | 20 | 25 | 0 | 27 | J-27 | 20 | 27 | J-27 |
| J-33 | 5 | True | 500 | 598 | 500 | 598 | 20 | 39 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-34 | 5 | True | 500 | 598 | 500 | 598 | 20 | 33 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-36 | 5 | True | 500 | 598 | 500 | 598 | 20 | 32 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-39 | 5 | True | 500 | 830 | 500 | 830 | 20 | 39 | 0 | 20 | J-49 | 20 | 20 | J-49 |
| J-42 | 5 | True | 500 | 1,187 | 500 | 1,187 | 20 | 38 | 0 | 20 | J-49 | 20 | 20 | J-49 |
| J-46 | 5 | True | 500 | 963 | 500 | 964 | 20 | 35 | 0 | 20 | J-49 | 20 | 20 | J-49 |
| J-47 | 5 | True | 500 | 717 | 500 | 717 | 20 | 35 | 0 | 20 | J-49 | 20 | 20 | J-49 |
| J-51 | 6 | True | 500 | 1,875 | 500 | 1,876 | 20 | 37 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-52 | 4 | True | 500 | 1,483 | 500 | 1,484 | 20 | 20 | 0 | 30 | J-58 | 20 | 30 | J-58 |
| J-58 | 4 | True | 500 | 1,642 | 500 | 1,642 | 20 | 20 | 0 | 26 | J-97 | 20 | 26 | J-97 |
| J-60 | 4 | True | 500 | 1,462 | 500 | 1,462 | 20 | 20 | 0 | 29 | J-58 | 20 | 29 | J-58 |
| J-61 | 6 | True | 500 | 1,815 | 500 | 1,815 | 20 | 24 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-62 | 3 | True | 500 | 1,232 | 500 | 1,233 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-72 | 4 | True | 500 | 1,906 | 500 | 1,907 | 20 | 20 | 0 | 22 | J-73 | 20 | 22 | J-73 |
| J-75 | 4 | True | 500 | 1,609 | 500 | 1,609 | 20 | 20 | 0 | 30 | J-97 | 20 | 30 | J-97 |
| J-83 | 4 | True | 500 | 1,514 | 500 | 1,514 | 20 | 20 | 0 | 21 | J-86 | 20 | 21 | J-86 |
| J-84 | 3 | True | 500 | 1,403 | 500 | 1,403 | 20 | 20 | 0 | 28 | J-83 | 20 | 28 | J-83 |
| J-85 | 6 | True | 500 | 2,085 | 500 | 2,085 | 20 | 24 | 0 | 20 | J-97 | 20 | 20 | J-97 |
| J-89 | 3 | True | 500 | 1,016 | 500 | 1,017 | 20 | 20 | 0 | 21 | J-90 | 20 | 21 | J-90 |
| J-90 | 3 | True | 500 | 648 | 500 | 648 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-91 | 6 | True | 500 | 1,993 | 500 | 1,993 | 20 | 35 | 0 | 20 | J-2 | 20 | 20 | J-2 |

# Scenario: Base



| | | | | |
|---|---|---|---|---|
| J-72 | 340.00 | 1 | 499.78 | 69 |
| J-73 | 338.00 | 3 | 499.78 | 70 |
| J-74 | 335.00 | 2 | 499.78 | 71 |
| J-75 | 342.00 | 1 | 499.78 | 68 |
| J-76 | 328.00 | 2 | 499.78 | 74 |
| J-77 | 341.00 | 1 | 499.78 | 69 |
| J-78 | 336.00 | 1 | 499.78 | 71 |
| J-82 | 338.00 | 2 | 499.78 | 70 |
| J-83 | 346.00 | 1 | 499.78 | 67 |
| J-84 | 337.00 | 1 | 499.78 | 70 |
| J-85 | 333.00 | 1 | 499.78 | 72 |
| J-86 | 350.00 | 2 | 499.78 | 65 |
| J-89 | 350.00 | 1 | 499.78 | 65 |
| J-90 | 348.00 | 1 | 499.78 | 66 |
| J-91 | 332.00 | 1 | 499.78 | 73 |
| J-92 | 397.00 | 2 | 499.92 | 45 |
| J-96 | 385.00 | 10 | 499.74 | 50 |
| J-99 | 386.00 | 1 | 499.74 | 49 |

# Alternative No. 2b

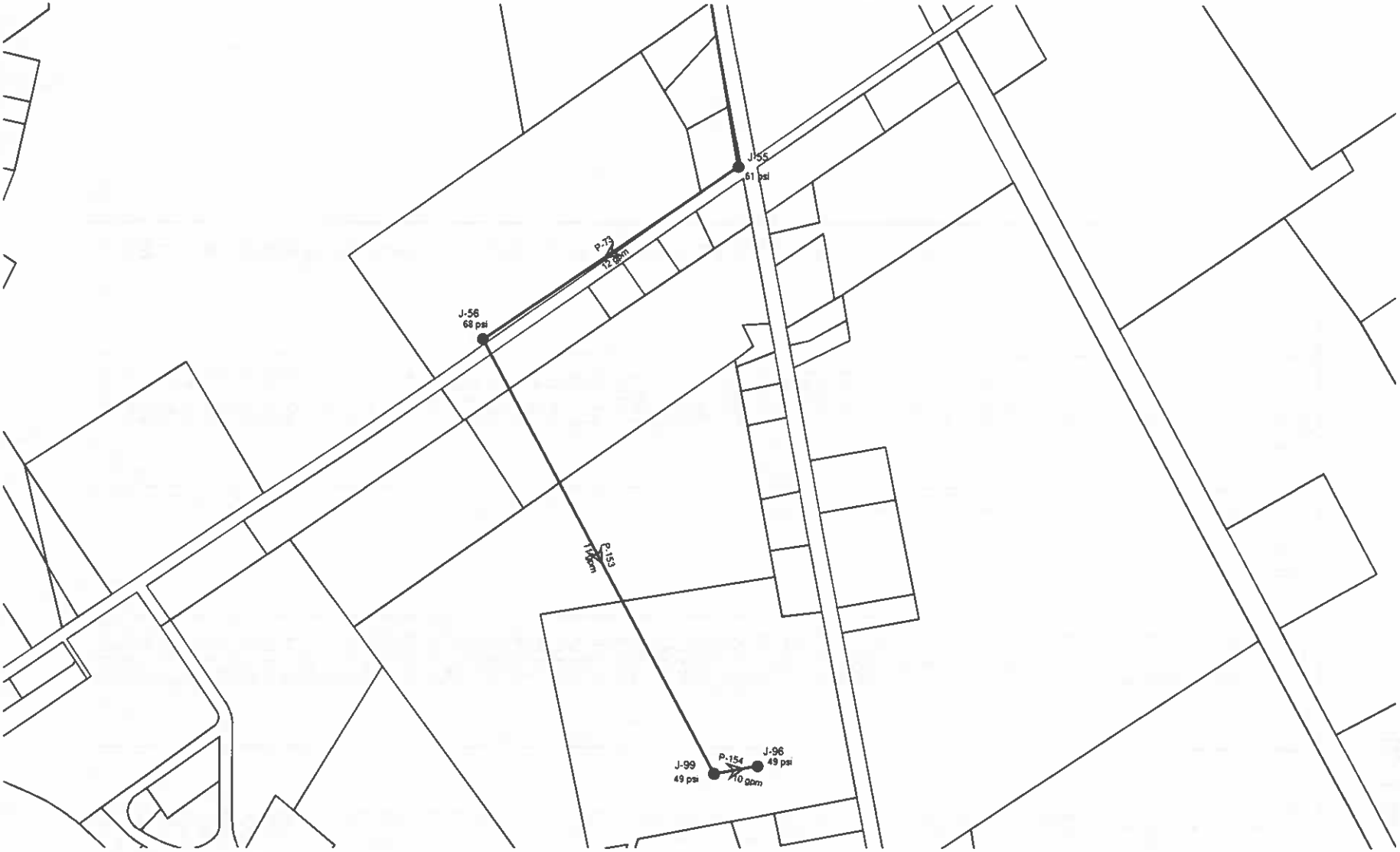
**Scenario: Base**
**Current Time Step: 0.000 h**
**FlexTable: Junction Table**

| Label | Elevation (ft) | Demand (gpm) | Hydraulic Grade (ft) | Pressure (psi) |
|---|---|---|---|---|
| J-1 | 330.00 | 2 | 499.78 | 73 |
| J-2 | 368.00 | 2 | 499.78 | 57 |
| J-3 | 332.00 | 2 | 499.78 | 73 |
| J-4 | 359.00 | 3 | 499.78 | 61 |
| J-5 | 340.00 | 1 | 499.78 | 69 |
| J-6 | 337.00 | 3 | 499.78 | 70 |
| J-7 | 335.00 | 2 | 499.78 | 71 |
| J-11 | 357.00 | 2 | 499.78 | 62 |
| J-12 | 350.00 | 2 | 499.78 | 65 |
| J-13 | 355.00 | 2 | 499.79 | 63 |
| J-14 | 347.00 | 2 | 499.80 | 66 |
| J-15 | 345.00 | 1 | 499.79 | 67 |
| J-16 | 330.00 | 2 | 499.79 | 73 |
| J-17 | 343.00 | 1 | 499.80 | 68 |
| J-20 | 321.00 | 1 | 499.82 | 77 |
| J-21 | 329.00 | 3 | 499.80 | 74 |
| J-22 | 328.00 | 1 | 499.80 | 74 |
| J-23 | 331.00 | 2 | 499.81 | 73 |
| J-24 | 324.00 | 2 | 499.88 | 76 |
| J-25 | 420.00 | 1 | 499.95 | 35 |
| J-26 | 365.00 | 3 | 499.93 | 58 |
| J-27 | 420.00 | 1 | 499.95 | 35 |
| J-28 | 393.00 | 1 | 499.92 | 46 |
| J-29 | 419.00 | 2 | 499.95 | 35 |
| J-30 | 424.00 | 1 | 499.97 | 33 |
| J-31 | 379.00 | 1 | 499.92 | 52 |
| J-32 | 381.00 | 1 | 499.92 | 51 |
| J-33 | 335.00 | 1 | 499.92 | 71 |
| J-34 | 351.00 | 1 | 499.92 | 64 |
| J-36 | 348.00 | 1 | 499.92 | 66 |
| J-37 | 328.00 | 1 | 499.82 | 74 |
| J-38 | 327.00 | 2 | 499.80 | 75 |
| J-39 | 328.00 | 1 | 499.80 | 74 |
| J-40 | 335.00 | 3 | 499.79 | 71 |
| J-41 | 337.00 | 3 | 499.79 | 70 |
| J-42 | 324.00 | 1 | 499.81 | 76 |
| J-46 | 326.00 | 1 | 499.80 | 75 |
| J-47 | 338.00 | 1 | 499.80 | 70 |
| J-49 | 372.00 | 2 | 499.80 | 55 |
| J-51 | 344.00 | 1 | 499.79 | 67 |
| J-52 | 351.00 | 1 | 499.79 | 64 |
| J-53 | 353.00 | 3 | 499.79 | 64 |
| J-54 | 330.00 | 2 | 499.79 | 73 |
| J-55 | 358.00 | 2 | 499.74 | 61 |
| J-56 | 343.00 | 1 | 499.74 | 68 |
| J-57 | 381.00 | 3 | 499.78 | 51 |
| J-58 | 386.00 | 1 | 499.79 | 49 |
| J-59 | 357.00 | 1 | 499.79 | 62 |
| J-60 | 381.00 | 1 | 499.79 | 51 |
| J-61 | 374.00 | 1 | 499.79 | 54 |
| J-62 | 328.00 | 1 | 499.79 | 74 |
| J-63 | 324.00 | 2 | 499.79 | 76 |
| J-64 | 329.00 | 2 | 499.79 | 74 |
| J-65 | 322.00 | 3 | 499.79 | 77 |
| J-66 | 342.00 | 2 | 499.78 | 68 |
| J-68 | 332.00 | 2 | 499.79 | 73 |
| J-71 | 330.00 | 3 | 499.79 | 73 |

**Scenario: Base**
**Current Time Step: 0.000 h**
**Fire Flow Node FlexTable: Fire Flow Report**

| Label | Fire Flow Iterations | Satisfies Fire Flow Constraints? | Fire Flow (Needed) (gpm) | Fire Flow (Available) (gpm) | Flow (Total Needed) (gpm) | Flow (Total Available) (gpm) | Pressure (Residual Lower Limit) (psi) | Pressure (Calculated Residual) (psi) | Pressure (Zone Lower Limit) (psi) | Pressure (Calculated Zone Lower Limit) (psi) | Junction w/ Minimum Pressure (Zone) | Pressure (System Lower Limit) (psi) | Pressure (Calculated System Lower Limit) (psi) | Junction w/ Minimum Pressure (System) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J-96 | 19 | True | 500 | 552 | 510 | 562 | 20 | 20 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-4 | 4 | True | 500 | 1,646 | 502 | 1,649 | 20 | 20 | 0 | 30 | J-2 | 20 | 30 | J-2 |
| J-6 | 6 | True | 500 | 1,800 | 502 | 1,803 | 20 | 33 | 0 | 20 | J-2 | 20 | 20 | J-2 |
| J-21 | 6 | True | 500 | 2,140 | 502 | 2,143 | 20 | 25 | 0 | 20 | J-14 | 20 | 20 | J-14 |
| J-26 | 5 | True | 500 | 1,387 | 502 | 1,389 | 20 | 34 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-40 | 8 | True | 500 | 1,990 | 502 | 1,993 | 20 | 42 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-41 | 8 | True | 500 | 2,008 | 502 | 2,010 | 20 | 41 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-53 | 6 | True | 500 | 1,948 | 502 | 1,951 | 20 | 33 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-57 | 6 | True | 500 | 1,592 | 502 | 1,595 | 20 | 22 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-65 | 3 | True | 500 | 1,232 | 502 | 1,235 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-71 | 8 | True | 500 | 2,043 | 502 | 2,046 | 20 | 42 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-73 | 4 | True | 500 | 1,854 | 502 | 1,857 | 20 | 20 | 0 | 24 | J-72 | 20 | 24 | J-72 |
| J-1 | 8 | True | 500 | 2,080 | 502 | 2,082 | 20 | 38 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-2 | 3 | True | 500 | 1,097 | 502 | 1,099 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-3 | 6 | True | 500 | 1,942 | 502 | 1,944 | 20 | 35 | 0 | 20 | J-2 | 20 | 20 | J-2 |
| J-7 | 22 | True | 500 | 1,914 | 502 | 1,916 | 20 | 20 | 0 | 20 | J-4 | 20 | 20 | J-4 |
| J-11 | 4 | True | 500 | 1,777 | 502 | 1,779 | 20 | 20 | 0 | 24 | J-4 | 20 | 24 | J-4 |
| J-13 | 3 | True | 500 | 1,044 | 502 | 1,046 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-16 | 3 | True | 500 | 1,378 | 502 | 1,380 | 20 | 20 | 0 | 31 | J-30 | 20 | 31 | J-30 |
| J-23 | 6 | True | 500 | 2,297 | 502 | 2,299 | 20 | 29 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-38 | 8 | True | 500 | 2,104 | 502 | 2,106 | 20 | 46 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-63 | 8 | True | 500 | 2,081 | 502 | 2,083 | 20 | 46 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-64 | 3 | True | 500 | 1,126 | 502 | 1,128 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-66 | 4 | True | 500 | 1,976 | 502 | 1,978 | 20 | 20 | 0 | 21 | J-99 | 20 | 21 | J-99 |
| J-74 | 3 | True | 500 | 1,338 | 502 | 1,340 | 20 | 20 | 0 | 31 | J-30 | 20 | 31 | J-30 |
| J-76 | 6 | True | 500 | 2,076 | 502 | 2,078 | 20 | 34 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-82 | 6 | True | 500 | 1,974 | 502 | 1,976 | 20 | 21 | 0 | 20 | J-89 | 20 | 20 | J-89 |
| J-86 | 4 | True | 500 | 1,517 | 502 | 1,519 | 20 | 20 | 0 | 23 | J-83 | 20 | 23 | J-83 |
| J-12 | 3 | True | 500 | 1,354 | 501 | 1,355 | 20 | 20 | 0 | 31 | J-30 | 20 | 31 | J-30 |
| J-14 | 4 | True | 500 | 1,940 | 501 | 1,941 | 20 | 20 | 0 | 26 | J-13 | 20 | 26 | J-13 |
| J-24 | 4 | True | 500 | 3,028 | 501 | 3,030 | 20 | 47 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-29 | 6 | True | 500 | 3,441 | 501 | 3,443 | 20 | 20 | 0 | 20 | J-27 | 20 | 20 | J-27 |
| J-49 | 3 | True | 500 | 643 | 501 | 644 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-54 | 8 | True | 500 | 2,070 | 501 | 2,071 | 20 | 43 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-55 | 5 | True | 500 | 631 | 501 | 633 | 20 | 32 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-68 | 6 | True | 500 | 2,003 | 501 | 2,005 | 20 | 41 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-92 | 3 | True | 500 | 575 | 501 | 576 | 20 | 20 | 0 | 23 | J-28 | 20 | 23 | J-28 |
| J-5 | 6 | True | 500 | 1,859 | 501 | 1,860 | 20 | 27 | 0 | 20 | J-2 | 20 | 20 | J-2 |
| J-20 | 8 | True | 500 | 2,338 | 501 | 2,339 | 20 | 48 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-28 | 19 | True | 500 | 589 | 501 | 590 | 20 | 21 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-31 | 5 | True | 500 | 598 | 501 | 599 | 20 | 27 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-32 | 5 | True | 500 | 617 | 501 | 618 | 20 | 27 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-37 | 8 | True | 500 | 2,282 | 501 | 2,283 | 20 | 45 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-56 | 5 | True | 500 | 605 | 501 | 606 | 20 | 39 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-59 | 6 | True | 500 | 1,856 | 501 | 1,857 | 20 | 32 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-77 | 4 | True | 500 | 1,943 | 501 | 1,944 | 20 | 20 | 0 | 23 | J-99 | 20 | 23 | J-99 |
| J-78 | 6 | True | 500 | 2,076 | 501 | 2,077 | 20 | 27 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-99 | 3 | True | 500 | 553 | 501 | 554 | 20 | 20 | 0 | 20 | J-96 | 20 | 20 | J-96 |
| J-15 | 3 | True | 500 | 1,244 | 500 | 1,245 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-17 | 4 | True | 500 | 1,564 | 500 | 1,565 | 20 | 20 | 0 | 22 | J-15 | 20 | 22 | J-15 |
| J-22 | 6 | True | 500 | 2,081 | 500 | 2,082 | 20 | 26 | 0 | 20 | J-14 | 20 | 20 | J-14 |
| J-25 | 4 | True | 500 | 2,869 | 500 | 2,869 | 20 | 20 | 0 | 20 | J-27 | 20 | 20 | J-27 |
| J-27 | 4 | True | 500 | 2,156 | 500 | 2,157 | 20 | 20 | 0 | 26 | J-25 | 20 | 26 | J-25 |
| J-30 | 2 | True | 500 | 3,500 | 500 | 3,501 | 20 | 25 | 0 | 27 | J-27 | 20 | 27 | J-27 |
| J-33 | 5 | True | 500 | 598 | 500 | 598 | 20 | 39 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-34 | 5 | True | 500 | 598 | 500 | 598 | 20 | 33 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-36 | 5 | True | 500 | 598 | 500 | 598 | 20 | 32 | 0 | 20 | J-92 | 20 | 20 | J-92 |
| J-39 | 5 | True | 500 | 830 | 500 | 831 | 20 | 39 | 0 | 20 | J-49 | 20 | 20 | J-49 |
| J-42 | 5 | True | 500 | 1,187 | 500 | 1,188 | 20 | 38 | 0 | 20 | J-49 | 20 | 20 | J-49 |
| J-46 | 5 | True | 500 | 964 | 500 | 964 | 20 | 35 | 0 | 20 | J-49 | 20 | 20 | J-49 |
| J-47 | 5 | True | 500 | 717 | 500 | 718 | 20 | 35 | 0 | 20 | J-49 | 20 | 20 | J-49 |
| J-51 | 6 | True | 500 | 1,877 | 500 | 1,877 | 20 | 37 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-52 | 4 | True | 500 | 1,484 | 500 | 1,484 | 20 | 20 | 0 | 30 | J-58 | 20 | 30 | J-58 |
| J-58 | 4 | True | 500 | 1,643 | 500 | 1,644 | 20 | 20 | 0 | 25 | J-99 | 20 | 25 | J-99 |
| J-60 | 4 | True | 500 | 1,462 | 500 | 1,463 | 20 | 20 | 0 | 29 | J-58 | 20 | 29 | J-58 |
| J-61 | 6 | True | 500 | 1,816 | 500 | 1,817 | 20 | 24 | 0 | 20 | J-58 | 20 | 20 | J-58 |
| J-62 | 3 | True | 500 | 1,233 | 500 | 1,233 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-72 | 4 | True | 500 | 1,907 | 500 | 1,907 | 20 | 20 | 0 | 22 | J-73 | 20 | 22 | J-73 |
| J-75 | 4 | True | 500 | 1,609 | 500 | 1,610 | 20 | 20 | 0 | 30 | J-99 | 20 | 30 | J-99 |
| J-83 | 4 | True | 500 | 1,514 | 500 | 1,515 | 20 | 20 | 0 | 21 | J-86 | 20 | 21 | J-86 |
| J-84 | 3 | True | 500 | 1,403 | 500 | 1,404 | 20 | 20 | 0 | 28 | J-83 | 20 | 28 | J-83 |
| J-85 | 6 | True | 500 | 2,076 | 500 | 2,076 | 20 | 24 | 0 | 20 | J-99 | 20 | 20 | J-99 |
| J-89 | 3 | True | 500 | 1,016 | 500 | 1,017 | 20 | 20 | 0 | 21 | J-90 | 20 | 21 | J-90 |
| J-90 | 3 | True | 500 | 648 | 500 | 648 | 20 | 20 | 0 | 32 | J-30 | 20 | 32 | J-30 |
| J-91 | 6 | True | 500 | 1,994 | 500 | 1,994 | 20 | 35 | 0 | 20 | J-2 | 20 | 20 | J-2 |

# Scenario: Base



| | | | | |
|---|---|---|---|---|
| J-72 | 340.00 | 1 | 499.78 | 69 |
| J-73 | 338.00 | 3 | 499.78 | 70 |
| J-74 | 335.00 | 2 | 499.78 | 71 |
| J-75 | 342.00 | 1 | 499.78 | 68 |
| J-76 | 328.00 | 2 | 499.78 | 74 |
| J-77 | 341.00 | 1 | 499.78 | 69 |
| J-78 | 336.00 | 1 | 499.78 | 71 |
| J-82 | 338.00 | 2 | 499.78 | 70 |
| J-83 | 346.00 | 1 | 499.78 | 67 |
| J-84 | 337.00 | 1 | 499.78 | 70 |
| J-85 | 333.00 | 1 | 499.78 | 72 |
| J-86 | 350.00 | 2 | 499.78 | 65 |
| J-89 | 350.00 | 1 | 499.78 | 65 |
| J-90 | 348.00 | 1 | 499.78 | 66 |
| J-91 | 332.00 | 1 | 499.78 | 73 |
| J-92 | 397.00 | 2 | 499.92 | 45 |
| J-96 | 385.00 | 10 | 499.38 | 49 |
| J-99 | 386.00 | 1 | 499.40 | 49 |

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