FELLENZER ENGINEERING LLP

Consulting Engineers In: NY, NJ, PA, CT, VT, MA, RI

NASTRO GRAND LUXURY RETREAET
TOWN OF FORESTBURGH, NY

80 Tannery Road
Forestburgh, NY 12777
Section 24- Block 1- Lot 3

FE Project No. 25-084

Prepared For:
Richard Viola
P.O. Box 156
St. James, NY 11780

Attn: Mike Nastro COO

July 7th, 2025

Prepared By:
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EXECUTIVE SUMMARY

The existing site, located on 80 Tannery Road, Forestburgh NY 12777, consists of a vacant golf course and clubhouse. The proposed action would add 42 luxury cabins (focused near the middle of the site), 1 spa (containing exercise equipment, sauna, hot tub, etc. with views of the property surrounding it), interconnected gravel roads, parking, wells for public water supply, and septic systems. Along with renovation of an existing clubhouse into a lodge which would contain a bistro, bar, office, sundry shop, mechanical room, bathrooms, and a great hall.

As summarized in this report, the design of the site will include accommodations for the proposed use per the Town of Forestburgh requirements and other local regulatory agency requirements.

Through guidance with the Town Planning Board and the various interested and involved agencies, the applicant has engaged with regional professionals to evaluate the potential impacts to the surrounding environment and nearby residents.

The goal of these studies is to provide appropriate mitigation measures for any identified environmental impacts that can be implemented into the overall design of the site plan and also be in compliance with town zoning requirements. Through these efforts, it will be demonstrated to the Board and public that these improvements will not have a significant environmental impact within the community and will not warrant a Draft Environmental Impact Study (DEIS) or Positive Declaration of Environmental Significance per SEQRA.

INTRODUCTION

EXISTING AREA

The applicant, Richard Viola, is proposing a change of use on the existing site located at 80 Tannery Road in the Town of Forestburgh, NY. Lot 24-1-3 is approximately 200 acres, within the RR-1 District (Residential Recreational).

The property was originally used as a golf course and clubhouse. Existing site features include one clubhouse and approximately 200 acres of forest/meadow with occasional wetlands and ponds within. The property is currently permitted by the town code for the following uses:

- One-and Two- Family Residences (less than 15% slope)
- Agriculture
- Forest Management
- Public Utilities
- Non-Commercial Outdoor Recreation

Special Uses (Subject to site plan approval by the Planning Board):

- One-and Two-Family Residences (greater than 15% slope)
- Animal Husbandry
- Wildlife Management
- Places of Worship
- Schools and Collages
- Campgrounds
- Nurseries, Greenhouses and Fish Hatcheries
- Hunting and Fishing Cabins
- Boarding; Tourist Homes or Country Inns
- Clubhouses for social organizations with related recreational facilities
- Hotels and motels
- Nursing homes, medical and dental facilities

- Parks, libraries, museums and theaters
- Cemeteries and mortuaries
- Mineral Extraction

CAMPGROUND

Approval was given in 2017 from the Town of Forestburgh Planning Board to convert the property into a 100-tent site campground. However, this project was not finalized and the site remains a vacant golf course.

FLOODPLAIN

The provided FEMA FIRMette maps indicate that a portion of the project site is within the 100-year floodplain. There is no disturbance within the floodway currently proposed. A stormwater detention pond is being considered. See Appendix A.

SOILS

The provided USDA Web Soil Survey Map (Appendix B) shows that the underlying soils of the project area are:

- Arnot-Lordstown Complex (AIC)
- Arnot-Oquaga Complex (AoC/AoE)
- Arnot-Rock Outcrop Complex (ArF)
- Lackawanna Channery Loam (LaB)
- Lordstown Channery Silt Loam (LoB)
- Lordstown-Arnot Complex (LrC)
- Neversink and Alden Soils (Nf)
- Oquaga Very Channery Silt Loam (OeB)
- Scriba Loam (ScB)
- Scriba and Morris Loams (SeB)
- Swartswood gravelly Loam (SrB/SrC)
- Swartswood and Lackawanna Soils (SwE)
- Valois Gravelly Loam (VaB)
- Wellsboro Gravelly Loam (WeB)

- Wellsboro and Wurtsboro Soils (WIC)
- Wurtsboro Loam (WuB)

ENVIRONMENTAL RESOURCES

Federal wetlands exist on the site, and a portion of the project site is within the designated floodway and 100-year floodplain. Disturbance within the designated floodway will be avoided. The existing site has experienced disturbance over the years and is mostly covered with forest or cleared meadows. Any trees to be removed will be done within the NYSDEC parameters to avoid potential disturbance to the Indiana Bat. Based on this assessment, no significant impact to these resources is anticipated at this time. Refer to Appendix D for the long form EAF.

HISTORIC

The proposed site has been indicated as not being located in or adjacent to an archeologically sensitive area.

PROPOSED DESIGN

SITE

The proposed site will consist of:

RR-1 (Residential Recreational):

- 42 Luxury Cabins
- 1 Spa
- 1 Lodge with Bistro/Bar/Sundry Shop/Mechanical Room/Great Hall
- Interconnected Gravel Roadways
- Wells
- Septic Systems

PARKING

Parking has been calculated using the Town of Forestburgh municipal code:

- Hotel or Motel

  (1) Space per guest room x 42 cabins = 42 spaces
- Spa (Parking Count Estimated by Demand)

  1 space/~3 patrons x ~30 patrons = 10 spaces

- Eating and Drinking (Lodge)

  (1) Space/5 patrons x 97 patrons + (1) space/employee x ~11 employees= 31 spaces

- Office

  (1) Space/150 square feet of floor area x 215 square feet = 2 spaces

Total required:

85 Spaces

TRAFFIC

A traffic study was completed previously for the plan approved in 2017, which had a larger traffic volume. The analysis concluded that the project would not change the Level of Service, C. Attached in Appendix C.

WATER

The required values for flow are provided below by New York State Design Standards for Intermediate Sized Wastewater Treatment Systems, Table B-3 Typical Per-Unit Hydraulic Loading Rates:

Hotel (Cabins):

42 cabins x 110 GPD/unit x 1 unit/cabin = 4670 GPD

Lodge:

Bar: 33 seats x 20 GPD/seat = 660 GPD

Restaurant: 64 seats x 35 GPD/seat = 2240 GPD

Health Club (Spa):

20 GPD/patron x ~30 patrons = 600 GPD

Total Required Flow:

8170 GPD (5.7 GPM)

Peak Flow (2x Total):

16340 GPD (11.4 GPM)

It is proposed that two wells be used to supply water to the cabins, one well acts as backup. A Water Supply Concept Plan and Well Assessment Summary for the previous project in 2017 can be found in Appendix E. It was determined that these wells could sustain yields of 108000 GPD (75 GPM) each, which would satisfy the requirement stated above. Water quality tests showed compounds were found to be below NYSDOH Maximum Contaminant levels.

WASTEWATER TREATMENT

The previous project approval had four septic fields near the north-west corner and middle of the property, two fields in each area. The same approved locations will be used, the plan will be modified to accommodate the new required flow stated above. Wastewater from each cabin will be piped to a common point for consolidation, it will then be piped to the proposed septic fields. Previously the project was estimated to treat around 5000 GPD (3.5 GPM), now the project will treat an estimated 8170 GPD (5.7 GPM).

STORMWATER

Stormwater design shall follow the requirements of the New York State Stormwater Design Manual, latest revision. The design will account for the proposed impervious surfaces by adding a stormwater detention pond for water quality treatment, water quantity treatment and runoff reduction before discharging to grade. Storage to accommodate runoff generated from the 100-year storm is being provided. The proposed site disturbance is greater than one acre, a full Stormwater Pollution Prevention Plan (SWPPP) will be generated and submitted to the Town of Forestburgh for review and approval at a later date. A SWPPP will also be submitted to the NYSDEC for review and comment.

SITE LIGHTING

Proposed site lighting consists of illuminating the proposed parking lots, roads, lodge, and cabins. Lighting shall consist of down lighting and dark sky compliant LED fixtures so that no light source can spill over the property lines greater than allowed per Town Code. A site lighting plan with proposed photometrics will be included at a later date.

Type of Light Source	Maximum Illumination Permitted Throughout Area (footcandles)	Maximum Permitted Height of Light (feet)
All	1.5	Min(18, Building Height)

LANDSCAPING

All landscaping will adhere to the Town of Forestburgh code. Existing vegetation and open space will be preserved to the maximum extent possible. The view of the site from neighboring residencies and NY-42 will be screened using existing vegetation as a buffer.

CONCLUSION

The existing site, located on 80 Tannery Road, Forestburgh NY 12777, consists of a vacant golf course and clubhouse. The proposed action would add 42 luxury cabins (focused near the middle of the site), 1 spa (containing exercise equipment, sauna, hot tub, etc. with views of the property surrounding it), interconnected gravel roads, parking, wells for public water supply, and septic systems. Along with renovation of the clubhouse into a lodge which would contain a bistro, bar, office, sundry shop, mechanical room, bathrooms, and a great hall.

As summarized in this report, the design of the site will include accommodations for the proposed use per the Town of Forestburgh requirements and other local regulatory agency requirements. Through guidance with the Town Planning Board and the various interested and involved agencies, the applicant has engaged with regional professionals to evaluate the potential impacts to the surrounding environment and nearby residents. These studies have analyzed traffic flow and well water quality and quantity.

The goal of these studies is to provide appropriate mitigation measures for any identified environmental impacts that can be implemented into the overall design of the site plan and also be in compliance with town zoning requirements. Through these efforts, it will be demonstrated to the Board and public that these improvements will not have a significant environmental impact within the community and will not warrant a Draft Environmental Impact Study (DEIS) or Positive Declaration of Environmental Significance per SEQRA.

APPENDIX A

FEMA FIRMETTE FLOOD PLAIN MAP

National Flood Hazard Layer FIRMette

FEMA

74°45'7"W 41°34'23"N

74°44'29"W 41°33'56"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

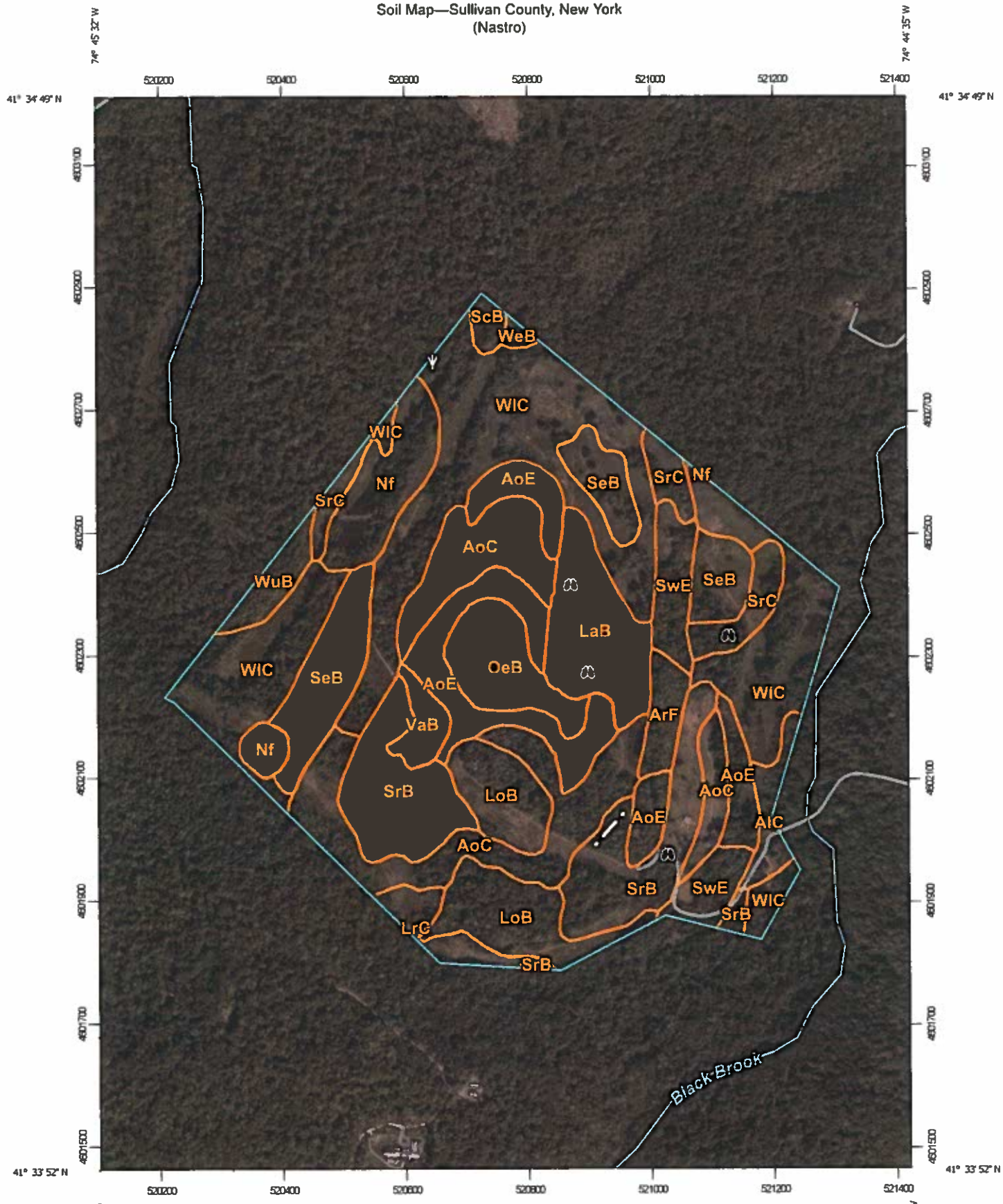
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/24/2025 at 8:10 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX B

USDA WEB SOIL SURVEY MAP



Map Scale: 1:8,520 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

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

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: Sullivan County, New York
Survey Area Data: Version 23, Aug 26, 2024

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

Date(s) aerial images were photographed: May 31, 2022—Oct 27, 2022

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AlC	Arnot-Lordstown complex, 0 to 15 percent slopes, very rocky	2.5	1.4%
AoC	Arnot-Oquaga complex, 0 to 15 percent slopes, very rocky	23.4	12.9%
AoE	Arnot-Oquaga complex, 15 to 35 percent slopes, very rocky	15.7	8.6%
ArF	Arnot-Rock outcrop complex, 35 to 70 percent slopes	2.7	1.5%
LaB	Lackawanna channery loam, 3 to 8 percent slopes	9.3	5.1%
LoB	Lordstown channery silt loam, 3 to 8 percent slopes, very stony	12.3	6.7%
LrC	Lordstown-Arnot complex, 8 to 15 percent slopes, extremely stony	2.9	1.6%
Nf	Neversink and Alden soils, very stony	8.3	4.6%
OeB	Oquaga very channery silt loam, 3 to 8 percent slopes	6.4	3.5%
ScB	Scriba loam, 3 to 8 percent slopes, stony	1.0	0.6%
SeB	Scriba and Morris loams, gently sloping, rubbly	12.8	7.1%
SrB	Swartswood gravelly loam, 3 to 8 percent slopes, stony	19.1	10.5%
SrC	Swartswood gravelly loam, 8 to 15 percent slopes, stony	5.9	3.2%
SwE	Swartswood and Lackawanna soils, steep, extremely stony	6.5	3.6%
VaB	Valois gravelly sandy loam, 3 to 8 percent slopes	2.1	1.2%
WeB	Wellsboro gravelly loam, 3 to 8 percent slopes	0.4	0.2%
WlC	Wellsboro and Wurtsboro soils, strongly sloping, extremely stony	48.0	26.4%
WuB	Wurtsboro loam, 3 to 8 pecent slopes, stony	2.6	1.4%
Totals for Area of Interest		182.0	100.0%

APPENDIX C

TRAFFIC ANALYSIS

June 12, 2017

Mr. Andrew Unterberg
182 Degraw Street #3
Brooklyn, NY 11321

Re: Traffic Assessment: Another Sky Campground, Sullivan County, NY
CHA File: 32849

Dear Mr. Unterberg:

The site of the proposed Another Sky Campground development is located at 80 Tannery Road, in Forestburgh, NY. It is the former site of the Forestburgh Country Club; an 18-hole golf club that also had a camping area adjacent to the golf course, which existed for approximately 9 years and closed in 2007. The proposed project consists of the construction of 100 tent only camp sites, with ancillary uses including a 6,000 s.f. general store, eating pavilion, pool or pond and play area, and bathroom and shower facilities. The site will have two designated areas consisting of a family camping area with 50 tents and an adult only camping area with 50 tents. Access to the site will be via the existing Tannery Road that provides access to NYS Route 42 (Forestburgh Road). The site is proposed to be operational in 2017 and will generally be open from April to October and closed during the winter months. The facility and its amenities will be for use by only the patrons renting the tents. Attachment A includes the proposed concept plan for the site.

This assessment includes documentation of existing traffic conditions, estimates of traffic generated by the proposed development, and a qualitative assessment in the roadway operating conditions resulting from the No-Build and Build conditions.

I. EXISTING CONDITIONS

The site is located off of Tannery Road, west of NYS Route 42. It is located approximately 15 minutes from Monticello and ninety minutes from Manhattan. The location of the project is shown in Exhibit 1 (Area Location Map).

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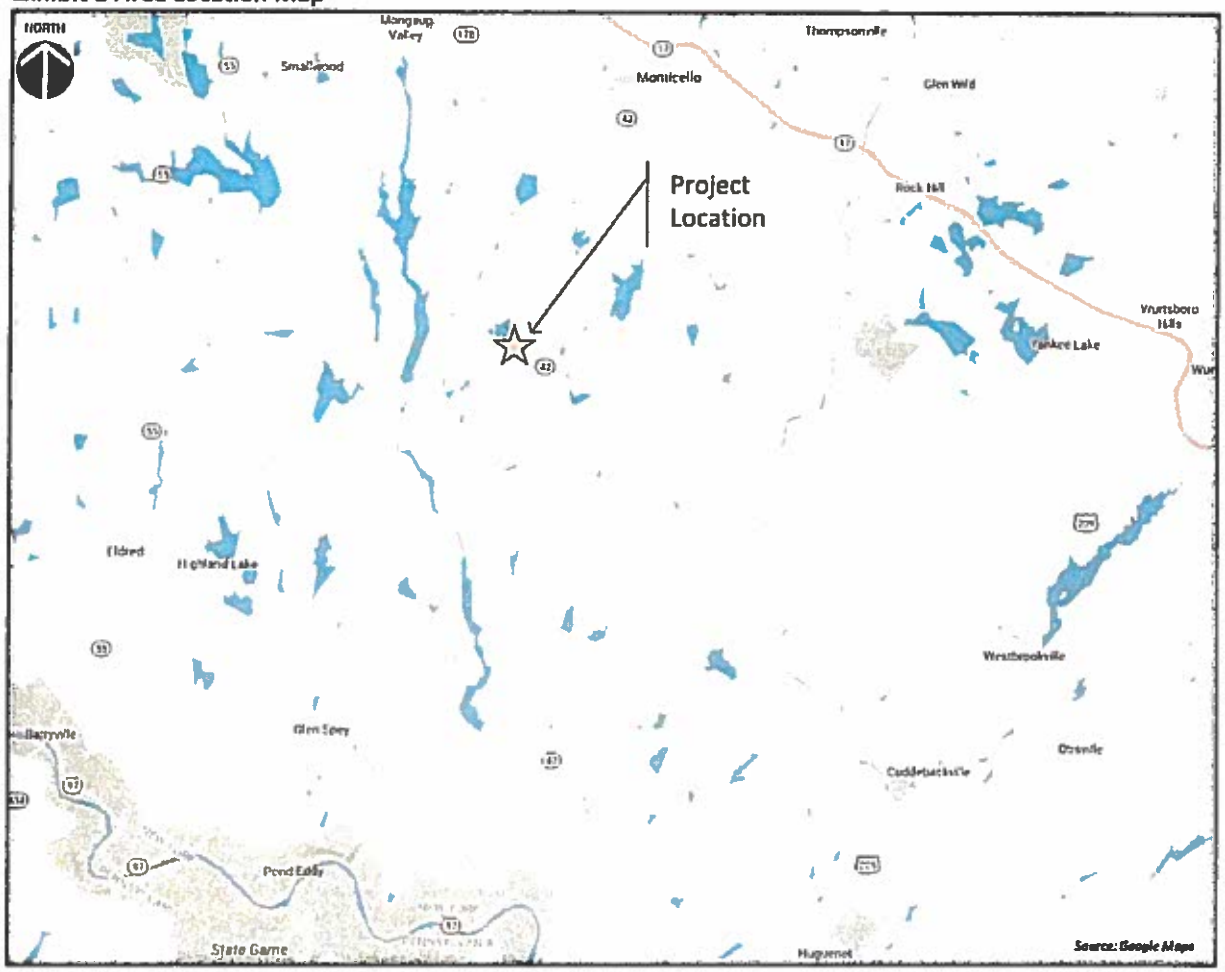
T 518.453.4500 • F 518.458.1735 • www.chacompanies.com

Exhibit 1 Area Location Map



A. STUDY AREA

NYS Route 42 is a two-lane north-south State roadway, classified as a rural minor arterial with a posted speed limit of 55 mph. Tannery Road intersects NYS Route 42 at an unsignalized "T" intersection and is the west leg of the intersection. The NYS Route 42 northbound approach to Tannery Road consists of a shared left-turn / through lane. The NYS Route 42 southbound approach to Tannery Road consists of a shared through / right-turn lane. The Tannery Road eastbound approach consists of a shared left / right-turn lane and is the stop controlled approach to the intersection.

B. TRAFFIC VOLUMES

Traffic volume data was compiled from the New York State Department of Transportation (NYSDOT) Traffic Data Viewer and is summarized in Exhibit 2. The latest actual annual average daily traffic (AADT) data provided by NYSDOT is 2010. The 2015 AADT is NYSDOT's estimated AADT.

Exhibit 2 Average Daily Traffic (ADT)

Route (Station)	Location (from/ to)	Estimated ADT (*in vehicles per day*) (year of counts)	ADT (*in vehicles per day*) (year of counts) [1]	Peak Hour Volume (*vehicles, 2010*)		Approximate Speed (2003)	
				AM (8-9 am)	PM (5-6 pm)	50th (mph)	85th (mph)
SR 42 (96_0241)	CR 48 Forestburgh to CR 108 to St. Josephs	2,064 (2015)	2,120 (2010)	155	204	NB: 63-65 SB: 56-59	NB: 70-72 SB:63-65
Directional Distribution		NA	49% NB 51% SB	68% NB 32% SB	33% NB 67% SB	NA	NA

[1] Automatic Traffic Recorder (ATR) located 1 mile north of Route 48; which is south of the project site.

Exhibit 2 shows that traffic volumes on NYS Route 42 have declined by approximately 2% over the last 5 years. The latest available speed data for this section of NYS Route 42 (Exhibit 2) showed that travel in the northbound direction was slightly higher than the southbound direction.

Tannery Road provides access only to the former 18-hole golf course which is closed. Therefore, there are no existing traffic volumes on Tannery Road.

II. FUTURE YEAR NO-BUILD CONDITIONS

In order to assess the traffic impacts associated with the project, it is first necessary to estimate the traffic volumes on the adjacent roadway for the future condition without the project (No-Build Condition) and then apply the traffic generated from the proposed project to obtain the future conditions with the project (Build Condition).

A. Background Growth

Historical traffic volume data on NYS Route 42 compiled from the NYSDOT is shown in Exhibit 3. The data indicates that there was a 38% increase in traffic volumes between 2000 and 2007 but a 12% decrease in the traffic volumes between 2007 and 2015. Although the last 8 years have shown a decline in traffic volumes, for the purposes of this study, a conservative annual growth rate of 0.5% per year was applied to the 2010 AM and PM peak hour volumes for 7 years to obtain the 2017 background conditions for this projects' planned year of opening (2017) for the weekday AM and PM peak hour. In addition, the 0.5% background growth rate was applied to the 2015 AADT for two years to obtain the 2017 estimated AADT of 2,085 vehicles per day.

Exhibit 3 NYSDOT Historical Traffic Volumes

Route (Station)	Year	ADT
SR 42 (96_0241)	2015	2,064
	2014	2,075
	2010	2,120
	2007	2,345
	2003	2,255
	2000	1,690

In addition to the general background growth rate, traffic from site specific projects in the area that could impact traffic volumes along NYS Route 42 were included.

B. Approved Developments

The Town of Forestburgh identified two approved developments whose traffic could impact NYS Route 42. The approved developments are:

1. Lost Lake Resort proposed on Cold Spring Route (CR 101)
2. EPT Concord Resort in Monticello, NY

In addition to Lost Lake Resort and the Concord Resort projects, a third project that could potentially add traffic volume along NYS Route 42 in the vicinity of Tannery Road is the Waterpark at Adelaar.

The site generated traffic from these three projects are included in the No-Build conditions for the proposed Another Sky Campground project as discussed below.

Lost Lake Resort

The Lost Lake Resort project consists of a residential resort area with numerous recreational facilities with site access from Cold Spring Road north of Rose Valley Road. The Lost Lake analysis evaluated a full build out scenario (year 2021) and an interim (year 2016) scenario (consisting of Phases I, II and III). The full build out scenario is based on the following proposed development:

- Condominiums/Townhouses – 40 units
- Hotel – 32 rooms
- Golf Course – 18 Holes
- Cabins – 30 units
- Recreational Homes – 2,557 units

Full build out includes the interim volumes. Attachment C includes the site generated traffic volume figures (Figures 3.8-13 through 3.8-16) for the Lost Lake Resort project that were included in the approved Environmental Impact Statement (EIS) documents for the project. Exhibit 4 summarizes the site generated traffic volumes from the Lost Lake Resort project traveling on NY Route 42 in the vicinity of Tannery Road. No AM site generated volumes were included in the Lost Lake Resort assessment. The volumes shown in Exhibit 4 were taken from the turn movements shown for the NYS Route 42 & St. Joseph's Road intersection on each of the figures since this intersection is north of the NYS Route 42 & Tannery Road intersection, which means traffic will be passing through the NYS Route 42 & Tannery Road intersection.

Exhibit 4 Lost Lake Resort Site Generated Traffic

Direction	Interim (2016)		Full Build out (2021)	
	Friday PM	Sunday PM	Friday PM	Sunday PM
Northbound	1	2	3	5
Southbound	2	2	5	5
Total 2-way	**3**	**4**	**8**	**10**

For the purposes of this study, the full build out volumes for Lost Lake Resort were included in the Another Sky Campground Project, as opposed to the interim volumes, which represents a conservative estimate of the volumes for this Another Sky Campground project.

CHA

EPT Concord Resort

Concord Resort proposes a planned residential development in the Town of Thompson that includes the following uses: Casino, Harness Horse Racetrack, Hospitality, Residential, Commercial, and Golf and Recreation. Concord Resort evaluated a full build out scenario (year 2022) and an interim (year 2014) Phase I scenario. Phase I, which was initially proposed for completion in 2014 has not yet been constructed. Full build out includes the volumes from Phase I.

Attachment C also includes the site generated traffic volume figures (Figures 11-7, 11-8, 11-18 and 11-19) for Concord Resort that were included in the approved Final EIS for the project. The study area for the Concord Resort included the Broadway & Liberty Street intersection but no intersections along NYS Route 42 (Forestburgh Road). Therefore, it was assumed that 50% of the eastbound and westbound volumes traveling through the Broadway & Liberty Street intersection could travel along NYS Route 42 past Tannery Road. As such, 50% of the eastbound traffic volume represents the NYS Route 42 northbound volume and 50% of the westbound volume represents the NYS Route 42 southbound volume. Exhibit 5 summarizes the Concord Resort volumes included in the Another Sky Campground project. No AM site generated volumes were included in the Concord Resort Assessment.

Exhibit 5 Concord Resort Site Generated Volumes (50%)

Direction	Phase I (2014)		Full Build out (2022)	
	Friday PM	Sunday PM	Friday PM	Sunday PM
Northbound	35	38	106	87
Southbound	28	31	95	80
Total 2-way	**63**	**69**	**201**	**167**

For the purposes of this study, 50% of the full build out volumes for Concord Resort were included in this Another Sky Campground Project, as opposed to the Phase I volumes, which represents a conservative estimate of the volumes for this project.

In addition to Lost Lake Resort and Concord Resort projects, a third project that could potentially add traffic volume along NYS Route 42 in the vicinity of Tannery Road is the Waterpark at Adelaar.

Waterpark at Adelaar

The Waterpark at Adelaar consists of a year round indoor-outdoor waterpark with a 400 room hotel lodge proposed in the Town of Thompson. The traffic analysis for the waterpark project shows completion of the project in 2019.

Attachment C also includes the site generated traffic volume figures (Figures 8A and 9A) for the Waterpark that were included for the project. Like the Concord Resort project, the study area for the Waterpark included the Broadway & Liberty Street intersection but no intersections along NYS Route 42 (Forestburgh Road). Therefore, similar to Concord Resort, it was assumed that 50% of the eastbound and westbound volumes traveling through the Broadway & Liberty Street intersection could travel along NYS Route 42 past Tannery Road. As such, 50% of the eastbound traffic volume represents the NYS Route 42 northbound volume and 50% of the westbound volume represents the NYS Route 42 southbound volume, which is summarized in Exhibit 6. No AM site generated volumes were included in Waterpark Assessment.

Exhibit 6 Waterpark at Adelaar Site Generated Traffic (50%)

Direction	Project (2019)	
	Friday PM	Sunday PM
Northbound	4	5
Southbound	6	8
Total 2-way	10	13

For the purposes of this study, 50% of the site generated volumes for the Waterpark were included in this Another Sky Campground Project.

The arrival and departure pattern for the Another Sky Campground project coincides with only the Friday PM peak hour for these three developments. Therefore, Exhibit 7 summarizes the combined total site generated traffic volumes from these three approved projects for the Friday PM (weekday PM peak hour) that have been included in the No-Build (2017) condition. Exhibit 8 shows the volumes graphically.

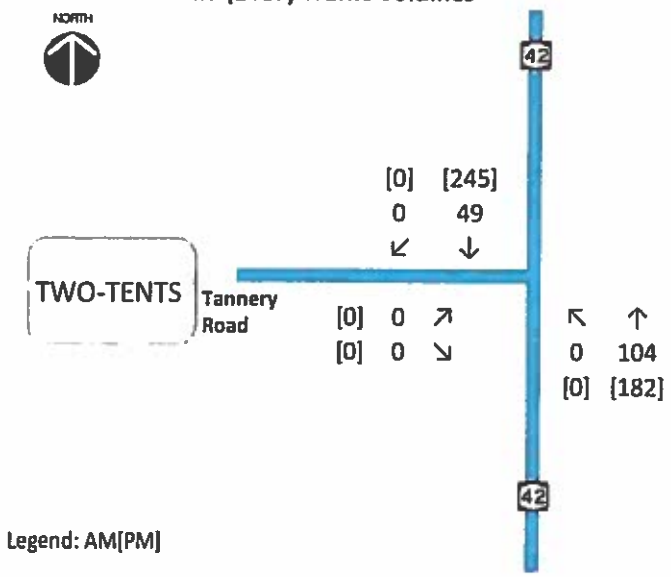
Exhibit 7 Approved Projects - Combined Site Generated Traffic Volumes

Approved Projects	Direction (Full Build Out)	
	Northbound	Southbound
Lost Lake Resort	3	5
Concord Resort	106	95
Waterpark	4	6
Total	**113**	**106**
Total (2-way)	**219**	

C. No-Build Conditions (2017)

The traffic generated by these three developments (Exhibit 7) were combined with the general background growth rate to represent the No-Build volumes, which will be the basis for evaluating the impact of this Another Sky Campground project. The resulting 2017 No-Build traffic volumes are shown in Exhibit 8.

Exhibit 8 No-Build (2017) Traffic Volumes



III. BUILD CONDITIONS

A. TRIP GENERATION

1. Proposed Use – 100 Tent Site

Trip generation of the proposed site development was estimated based on data published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th edition, which is the industry standard for determining trip generation for various land uses and is based on data collected at case study sites throughout the United States. The applicable ITE land use category corresponding to the Campground / Recreational Vehicle Park is ITE Land Use Code (LUC) 416. Trip generation was estimated for the weekday of the AM and PM peak hour of generator assuming 100% occupied camp sites. Exhibit 9 summarizes the daily and peak hour site generated traffic estimated for the weekday AM and PM peak hours of the project.

Exhibit 9 Site Generated Trips – Proposed 100 Tent Campground

Land Use – Campground (LUC 416)	AM Peak Hour			PM Peak Hour		
	Enter	Exit	Total	Enter	Exit	Total
100 Tents	9	16	25	25	16	41

2. Former Existing Use – 18 Hole Golf Course

For 9 years, the site was occupied as an 18-hole golf course and generated trips to and from the site. Using the ITE Trip Generation Manual, 9th edition, the number of weekday AM and PM trips associated with the golf course was estimated using the applicable ITE LUC 430, Golf Course. Trip generation was estimated for the weekday of the AM and PM peak hour of generator. Exhibit 10 summarizes the daily and peak hour site generated traffic estimated for the weekday AM and PM peak hours of the golf course.

Exhibit 10 Site Generated Trips – Former 18 Hole Golf Course

Land Use – Golf Course (LUC 430)	AM Peak Hour			PM Peak Hour		
	Enter	Exit	Total	Enter	Exit	Total
18 Holes	28	25	53	28	36	64

3. Comparison of Proposed Use vs. Former Use

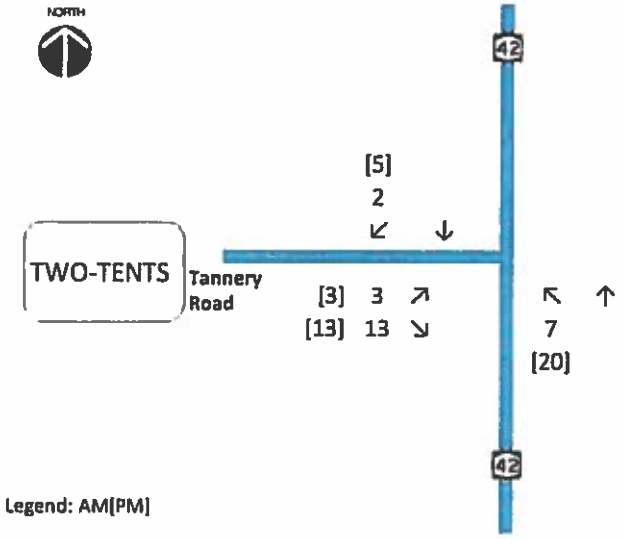
Comparing Exhibit 9 and Exhibit 10 shows that the proposed 100 tent facility is expected to generate less trips during both the weekday AM and PM peak hours than the former 18-hole golf course. The 100 tent facility is estimated to generate approximately ½ the number of AM trips and 2/3^{rds} the number of PM trips that the golf course generated.

B. TRIP ASSIGNMENT AND DISTRIBUTION

The traffic generated by the project (Exhibit 9) was distributed to the site access based on the existing roadway network and the proximity of the site in relation to proposed users. This distribution for the site generated trips was assumed to be 20% to/from the north and 80% to/from the south. Exhibit 11 shows the trip generation volumes graphically.

CHA

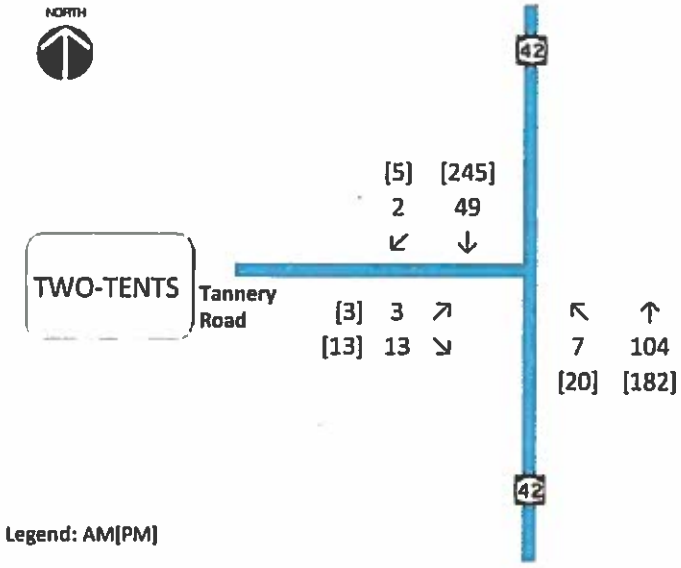
Exhibit 11 Another Sky Campground Site Generated Traffic



C. BUILD VOLUMES

The proposed development site-generated traffic shown in Exhibit 11 was added to the 2017 No-Build volumes (Exhibit 8) for the weekday AM and PM peak hours based upon the above noted trip distributions. See Exhibit 12 shows the 2017 Build traffic volumes graphically.

Exhibit 12 Build (2017) Traffic Volumes



IV. ASSESSMENT OF ROADWAY OPERATING CONDITIONS

Assessing the capacity of a roadway and/or intersection along a State Roadway can be performed using the graphs included in the Highway Capacity Manual (HCM), Appendix 5D. Figure 5D-1 is the appropriate graph for identifying the level of service (LOS) for NYS Route 42 and Figure 5D-9 is the appropriate graph for assessing the LOS of the unsignalized "T" intersection of NYS Route 42 with

Tannery Road. See Attachment B for these graphs, which shows that the LOS on NYS Route 42 and at the intersection (for both the NYS Route 42 major leg and Tannery Road minor leg), will operate at LOS C or better, both with and without the project.

Both Figures use the AADT of NYS Route 42 and either the 85th% speed of NYS Route 42 (Figure 5D-1) or the Tannery Road Design Hour Volume (DHV). The 2017 AADT of 2,085, which was developed by applying the 0.5% background growth rate for 2 years to the 2015 AADT (Exhibit 3) is shown on both Figures. This represents the AADT without the approved developments. The 85th% speed (Exhibit 2) and the DHV of 16 vehicles (Exhibit 8) were applied to the appropriate Figure. Figure 5D-1 shows that even if the AADT were to double along NYS Route 42 (an AADT of 4,170 vpd) with the same 85th% speed, the LOS would still be LOS C or better. Likewise, Figure 5D-9 shows that even multiplying the factor by 5 times (AADT = 10,425 vpd), the LOS for both NYS Route 42 and Tannery Road would be LOS C or better.

To estimate a potential AADT with the approved developments, it was assumed that the weekday PM peak hour volume (Exhibit 12) represents 10% of the AADT. Using this methodology, the AADT was estimated to be 4,520 vpd and was added to both Figures. The LOS on NYS Route 42 and at the intersection (for both the NYS Route 42 major leg and Tannery Road minor leg), will operate at LOS C or better, both with and without the project.

This analysis shows no change in the LOS between the No-Build and Build conditions and no future analyses are necessary. As noted in HCM Appendix 5D, Section 5D.2B, if the LOS is within the "C" or Better" zone for rural highways... the traffic impacts from the proposed T intersection are not expected to negatively impact operation of the State Highway.

V. RECOMMENDATIONS AND CONCLUSIONS

Another Sky Campground is proposing a 100 tent facility at 80 Tannery Road, in Forestburgh, NY. The project consists of the construction of 100 tent only camp sites, a 6,000 s.f. general store, eating pavilion, pool or pond and play area, and bathroom and shower facilities. The site will have two designated areas consisting of a family camping area with 50 tents and an adult only camping area with 50 tents. Access to the site will be via existing Tannery Road on NYS Route 42. The facility will generally be open from April to October with the facility and its amenities for use by only the patrons renting the tents.

A 0.5% annual background growth rate was applied to the 2015 traffic volumes to obtain the 2017 Background conditions. In addition, traffic from three approved projects (Lost Lake Resort, Concord Resort and Waterpark at Adelaar), totaling 219 trips (113 in the northbound and 106 in the southbound direction) was combined with the background growth to obtain the 2017 No-Build conditions for this Another Sky Campground project.

The Another Sky Campground project is proposed to be operational in 2017 and is estimated to generate 25 weekday AM peak hour trips and 41 weekday PM peak hour trips. Twenty percent (20%) of the traffic is assumed to travel to and from the north and 80% of the traffic is assumed to travel to and from the south. It is noted that the trips associated with the proposed facility is estimated to generate less trips than the former 18-hole golf course. The trips associated with the proposed facility is estimated at ½ the number of weekday AM peak hour trips and 2/3rds the number of weekday PM peak hour trips that the golf course generated.

The LOS assessment using the NYSDOT graphs for determining capacity along a two-lane roadway and at an unsignalized "T" intersection shows that the operations will be at LOS C or better for NYS Route 42 and at the intersection (for both the NYS Route 42 major leg and Tannery Road minor leg). Since the LOS is C or better, the traffic impacts from the "T" intersection are not expected to negatively impact operation of the State Highway and no improvements are necessary or required to accommodate traffic from this Another Sky Campground project.

Please feel free to contact me at (518) 453-8773 should you have any questions regarding the content or conclusions of this analysis.

Sincerely,

Christine J. Lilholt, P.E., PTOE
Senior Traffic Engineer

CJL/jv
Enclosure
v:\projects\any\k4\32849\reports\traffic\2017-05 ta-forestburg-another sky campground.doc

ATTACHMENT A

Concept Site Plan

ATTACHMENT B

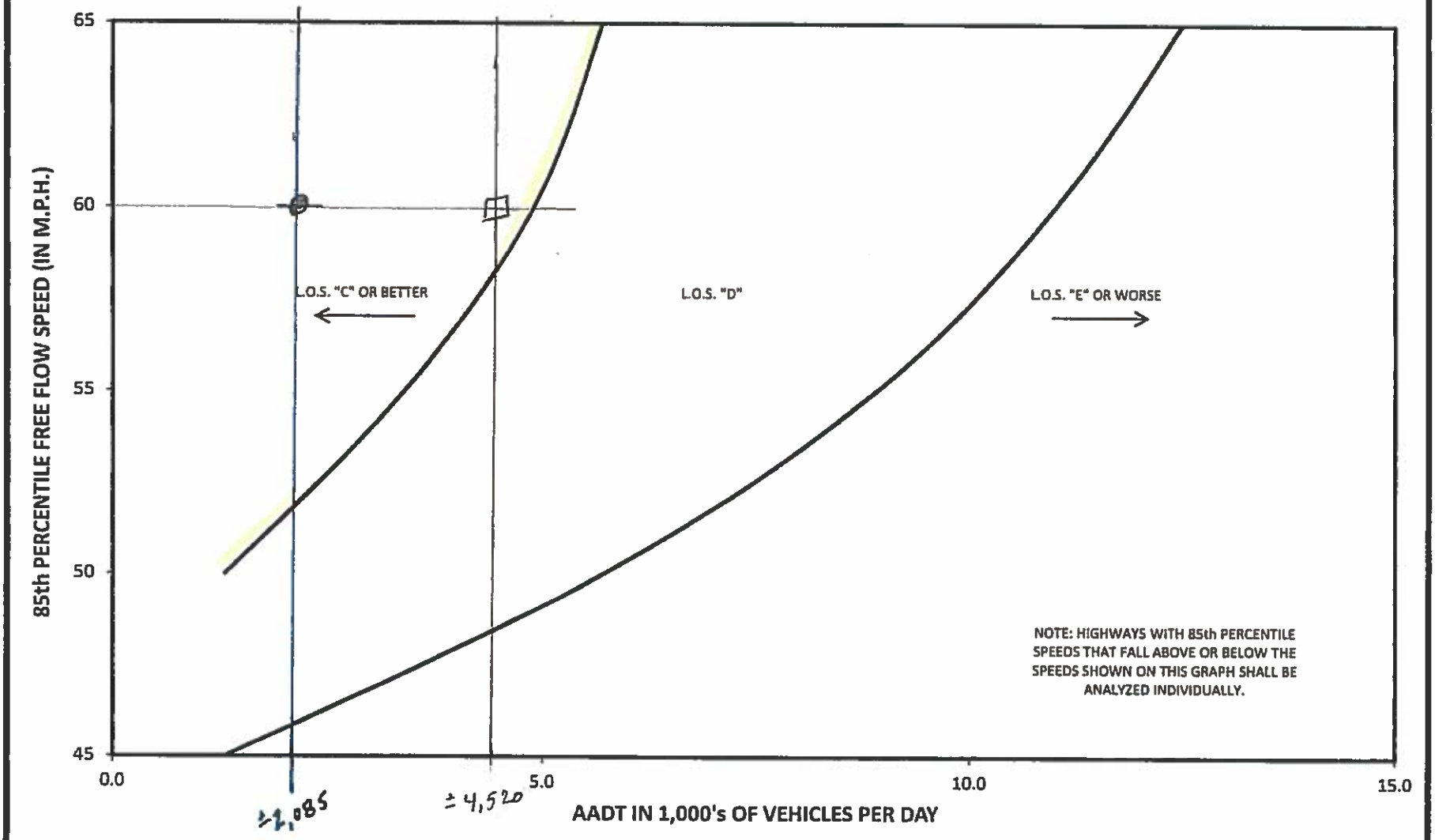
NYSDOT Capacity Analyses Graphs

Checked SEB

CHA 32BV
Two TEN[illegible]ESTBURGH

FIGURE 5D-1

FREE FLOW SEGMENT LEVEL OF SERVICE FOR UNDEVELOPED 2 LANE UNDIVIDED HIGHWAY

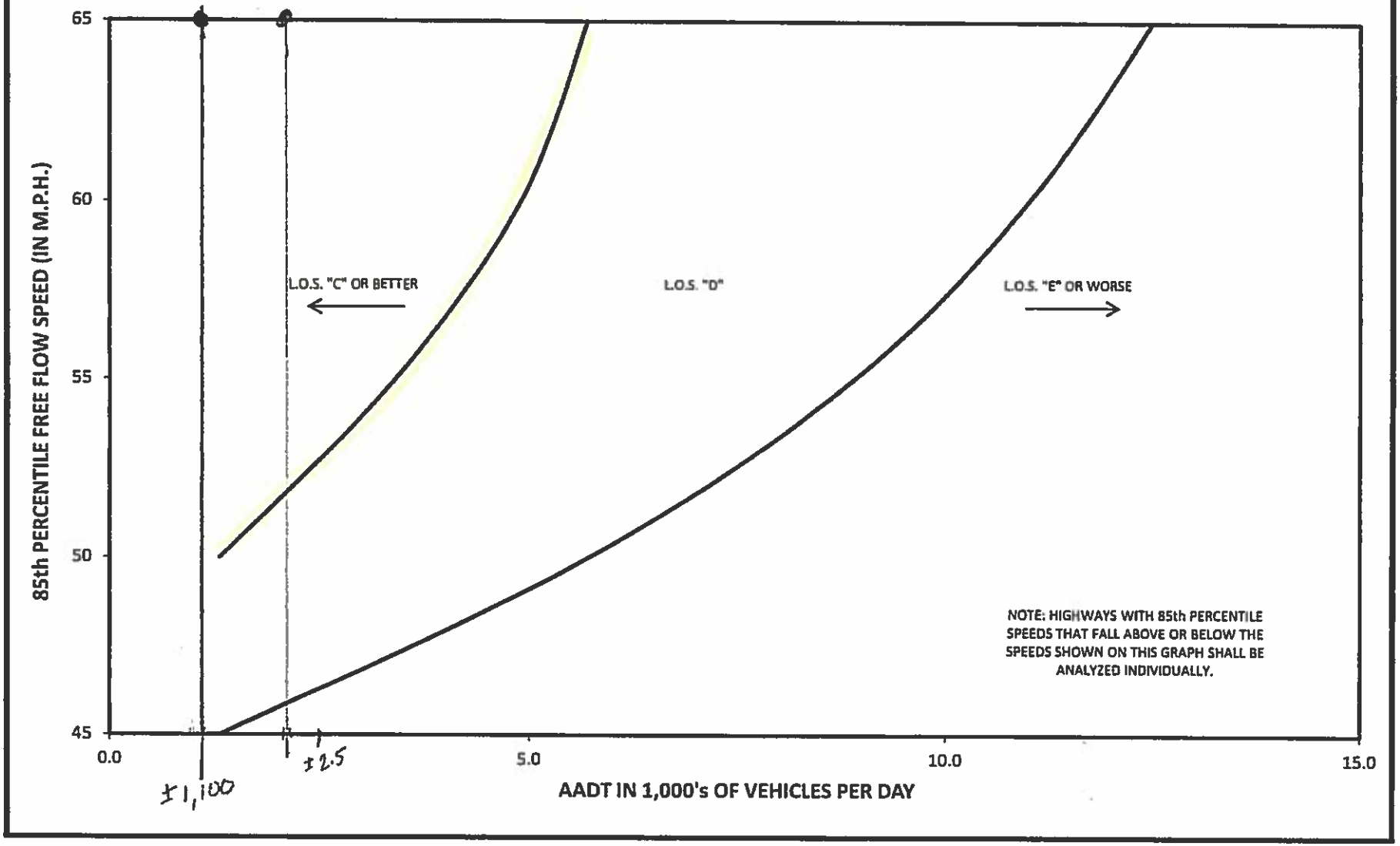


EVALUATE AS TWO-WAY

ASSUME 85th % SPEED = POSTED + 5 MPH
= 55 + 5 MPH
= 60 MPH

FIGURE 5D-1

FREE FLOW SEGMENT LEVEL OF SERVICE FOR UNDEVELOPED 2 LANE UNDIVIDED HIGHWAY



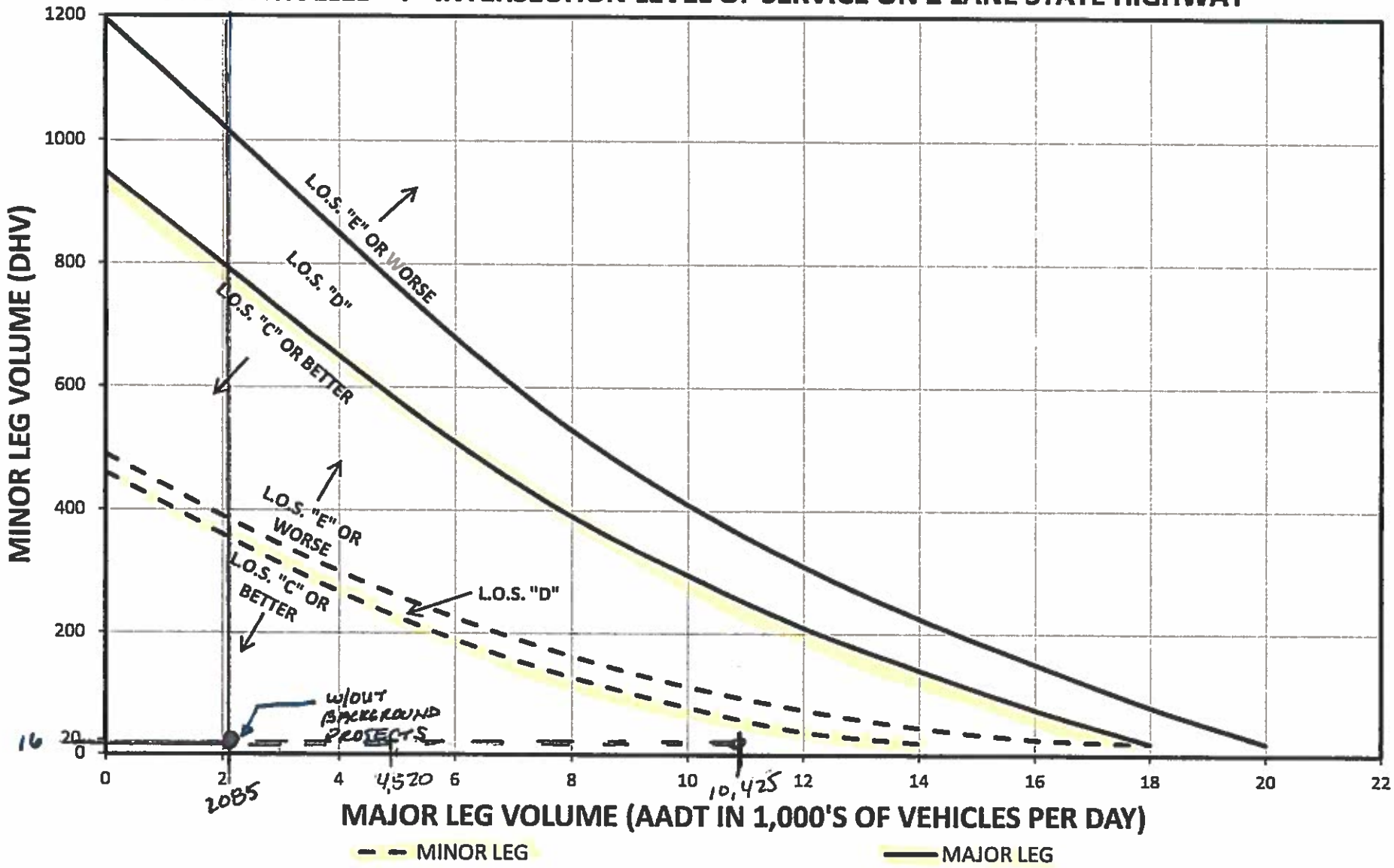
EVALUATE BY DIRECTION
USE 2003 SPEED DATA

Checked
SEB

CHA # 32844
TWO TOWNS PRESTBURGH

FIGURE 5D-9

UNCONTROLLED "T" INTERSECTION LEVEL OF SERVICE ON 2 LANE STATE HIGHWAY



If the Design Hour Volume (DHV) of the minor leg is 20 vehicles or less, no further analysis is required.

2017 AADT (ESTIMATED) NYSRT 42 = 2085 vpd

2017 DHV = 16 [AM + PM]

ATTACHMENT C

Background Developments

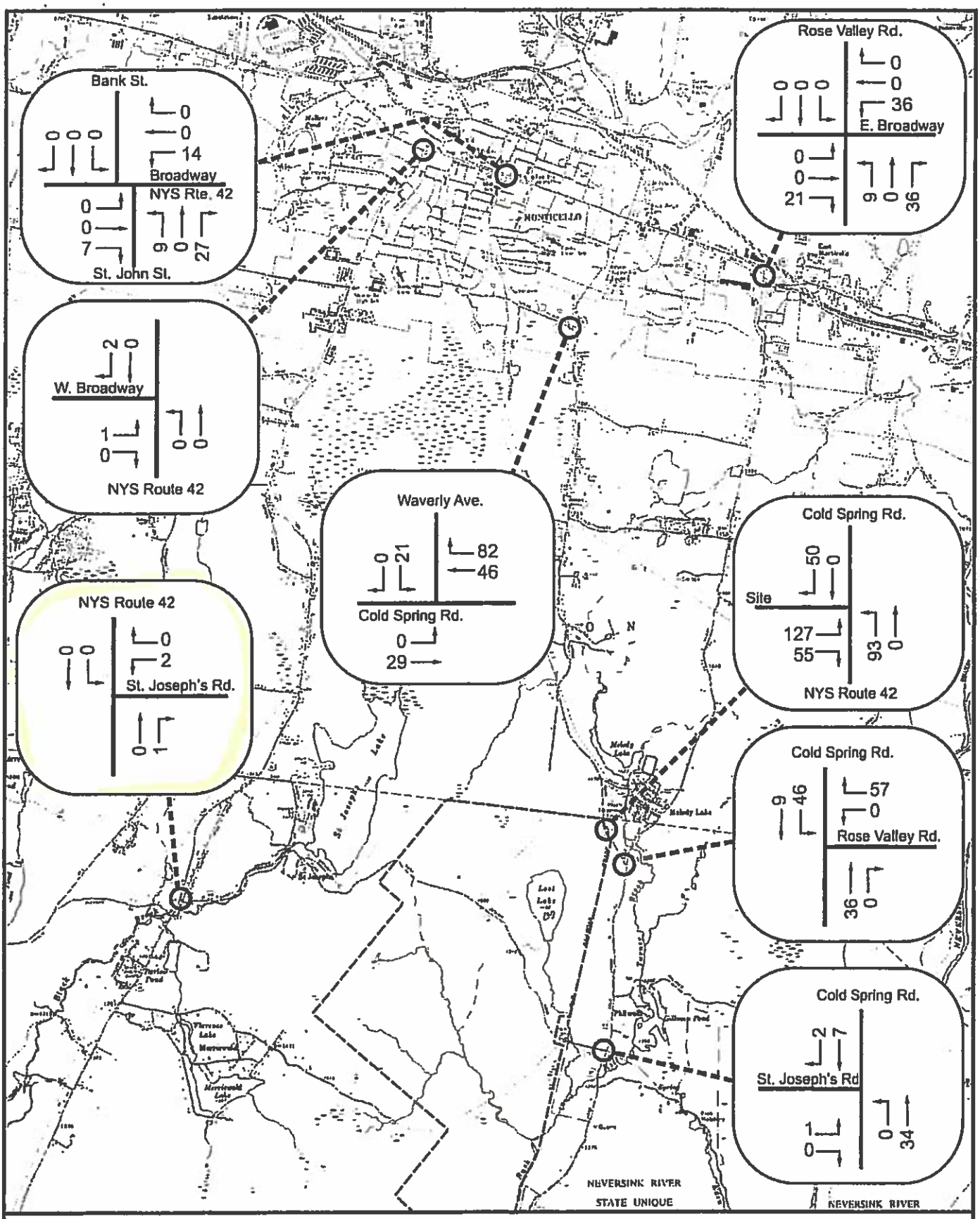


Fig 3.8-13: Interim Site Generated Friday Peak Hour Traffic
Lost Lake Resort
Town of Forestburgh, Sullivan County, New York
Base: US DOT Planimetric Map, Hartwood & Monticello Quads
Scale: 1" = 4,300

N
W E
S

LEGEND
- Intersections Studied
- Site Property Boundary

File 07093 9/29/09
JS:\07093

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

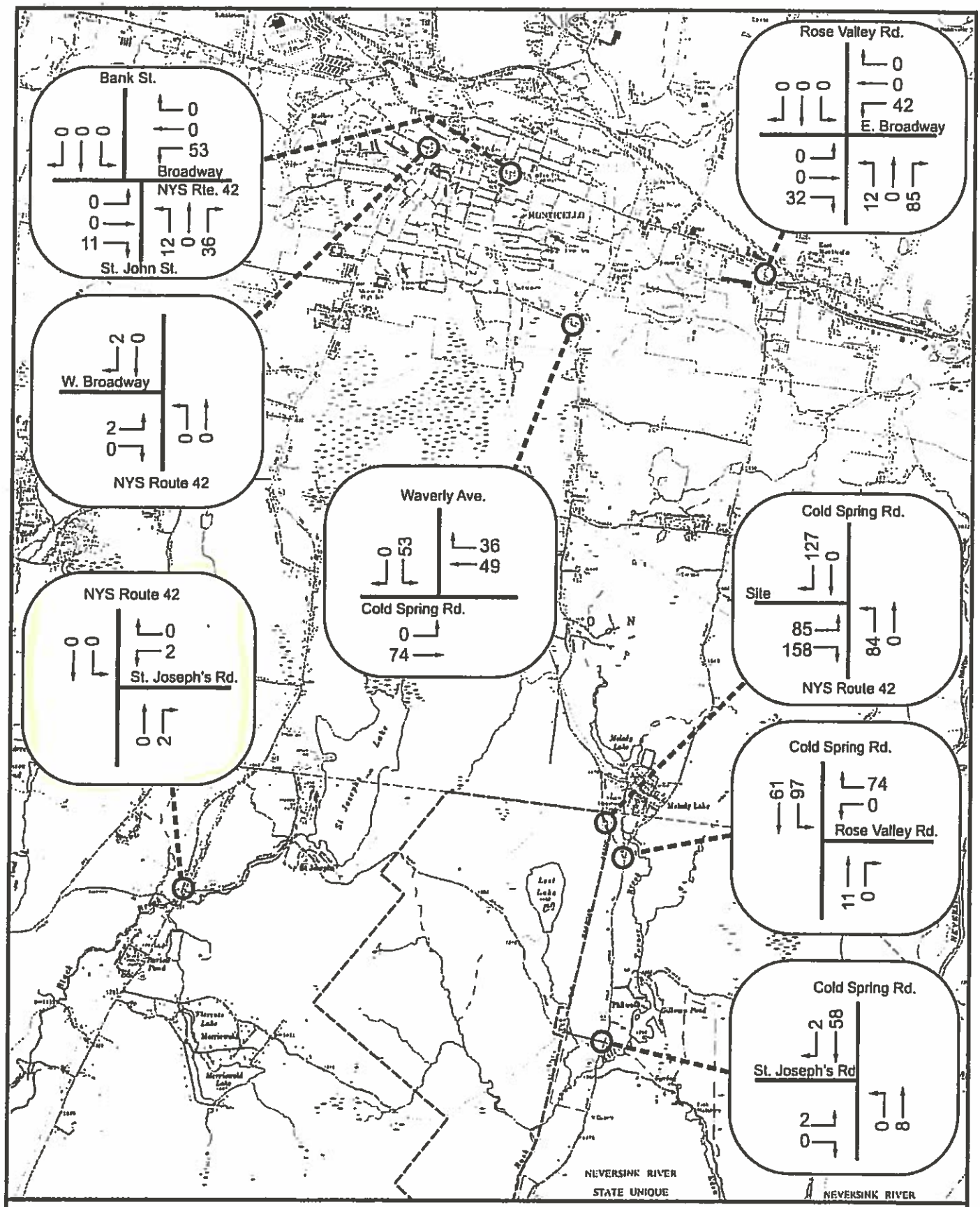


Fig 3.8-14: Interim Site Generated Sunday Peak Hour Traffic

Lost Lake Resort

Town of Forestburgh, Sullivan County, New York

Base: US DOT Planimetric Map, Hartwood & Monticello Quads

Scale: 1" = 4,300

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LEGEND

Intersections Studied

Site Property Boundary

File 07093 9/29/09
JS:107093

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

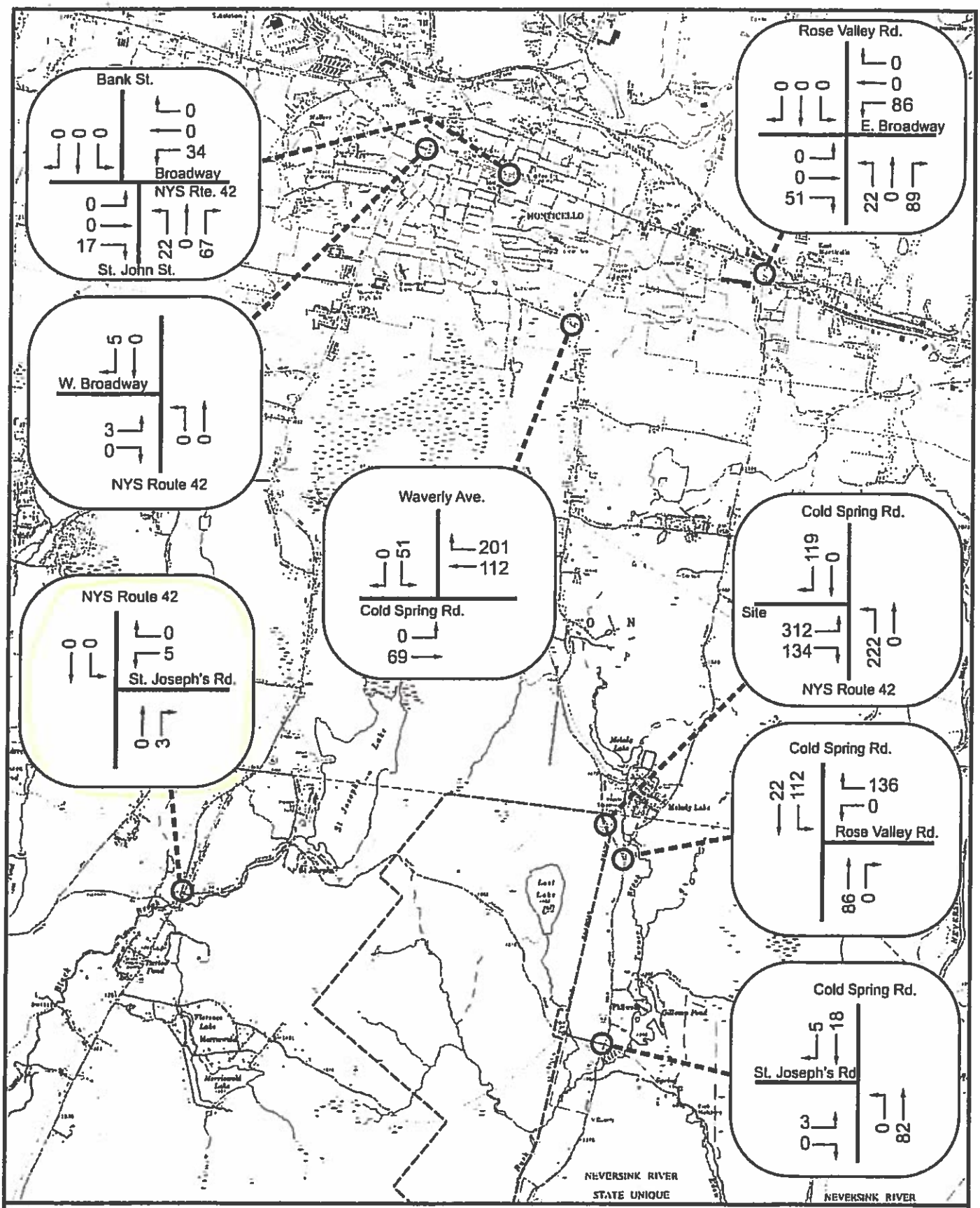

Fig 3.8-15: Site Generated Friday Peak Hour Traffic
Lost Lake Resort
Town of Forestburgh, Sullivan County, New York
Base: US DOT Planimetric Map, Hartwood & Monticello Quads
Scale: 1" = 4,300

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Intersections Studied
Site Property Boundary

File 07093 9/29/09
JS:\07093

Tim Miller Associates, Inc., 10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

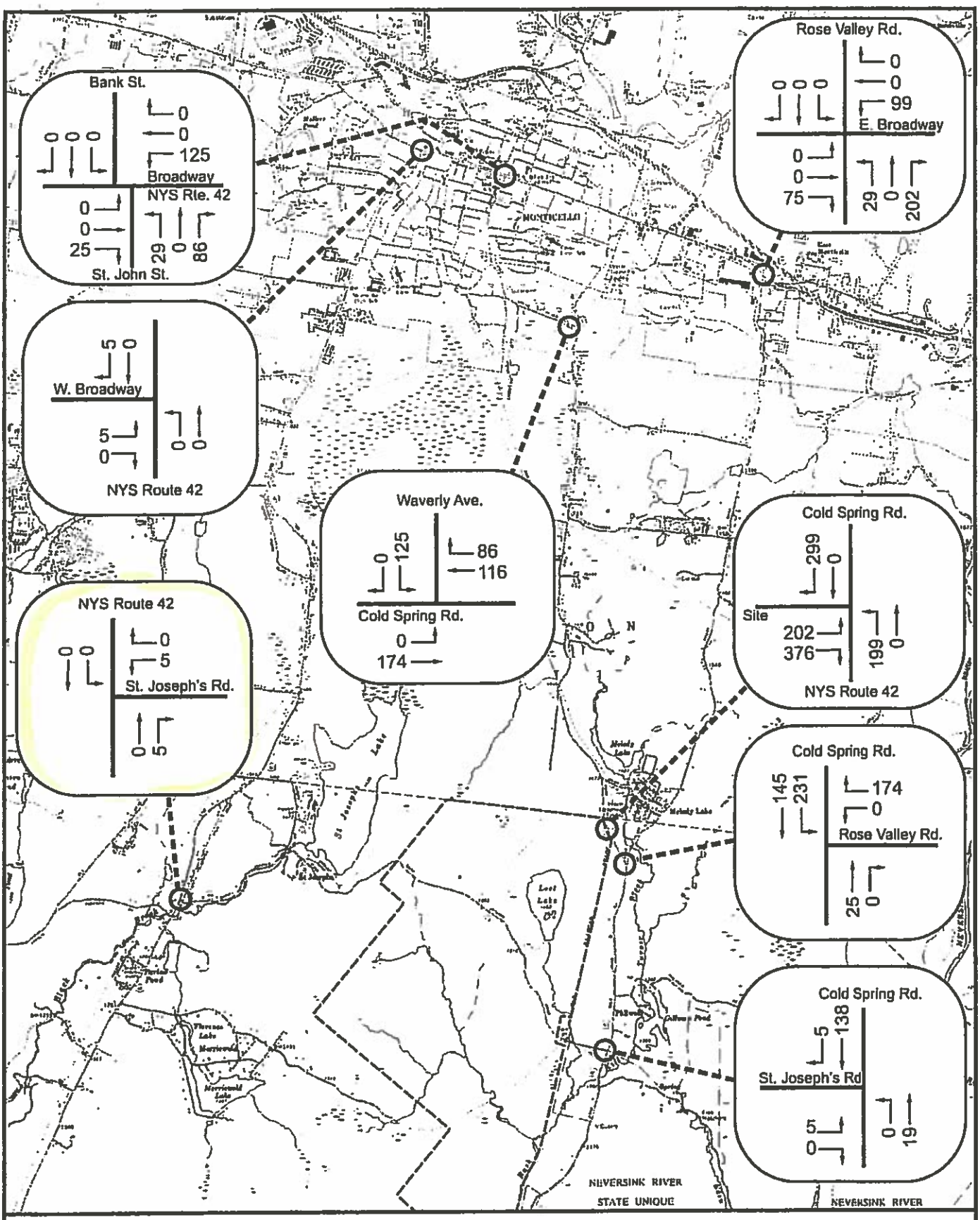

Fig 3.8-16: Site Generated Sunday Peak Hour Traffic
Lost Lake Resort
Town of Forestburgh, Sullivan County, New York
Base: US DOT Planimetric Map, Hartwood & Monticello Quads
Scale: 1" = 4,300

LEGEND
Intersections Studied
Site Property Boundary

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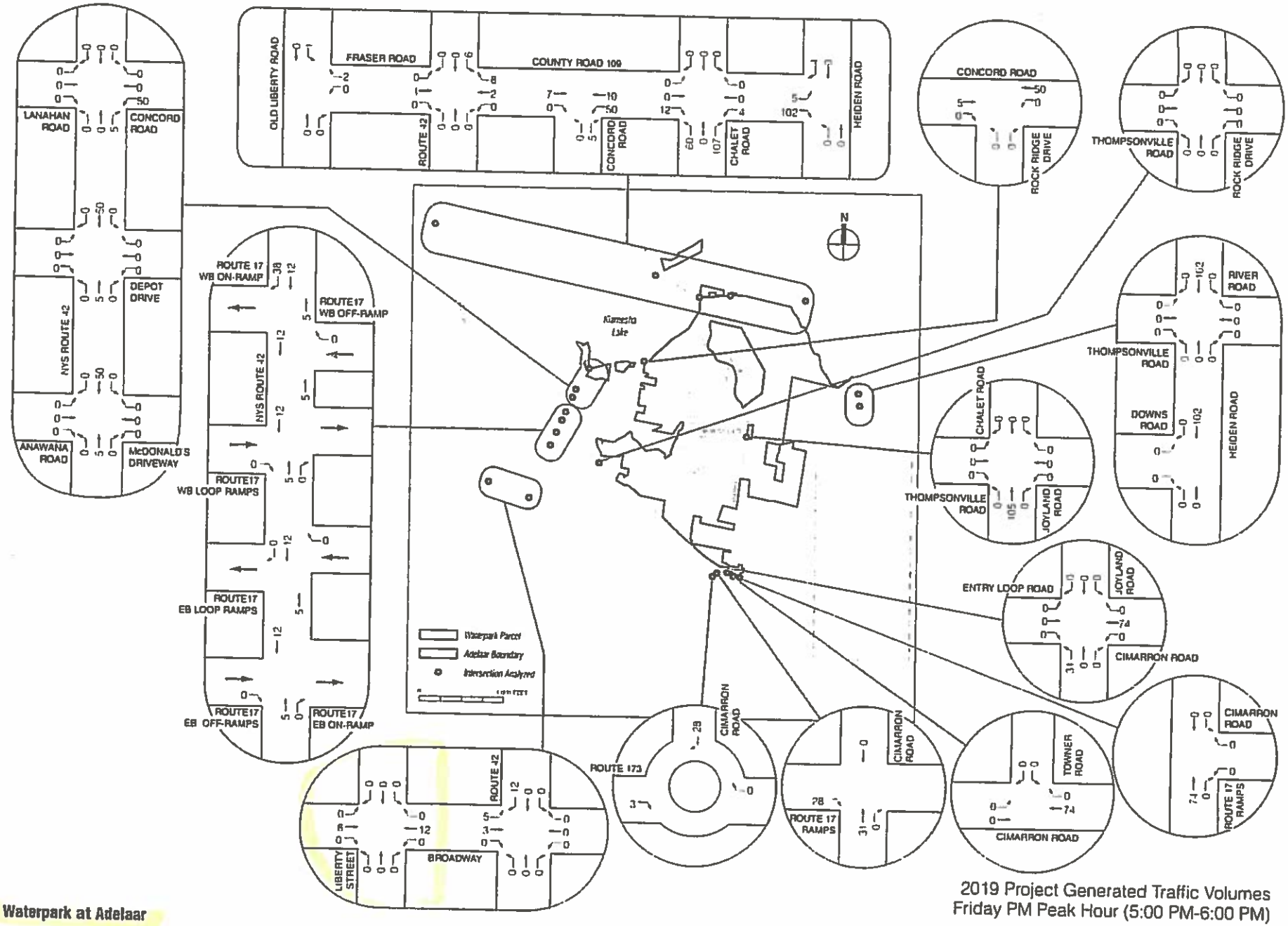
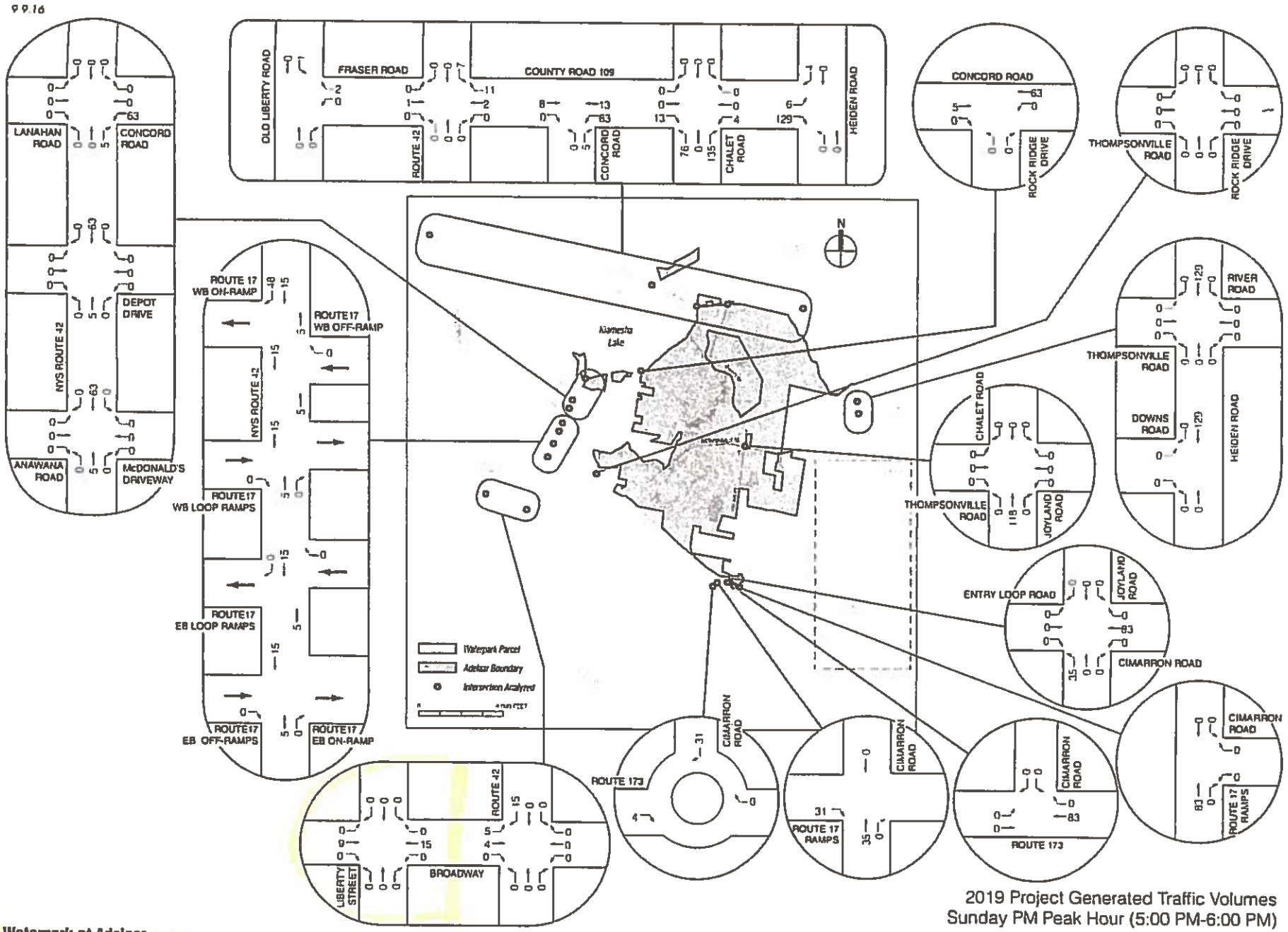
File 07093 9/29/09
JS:107093

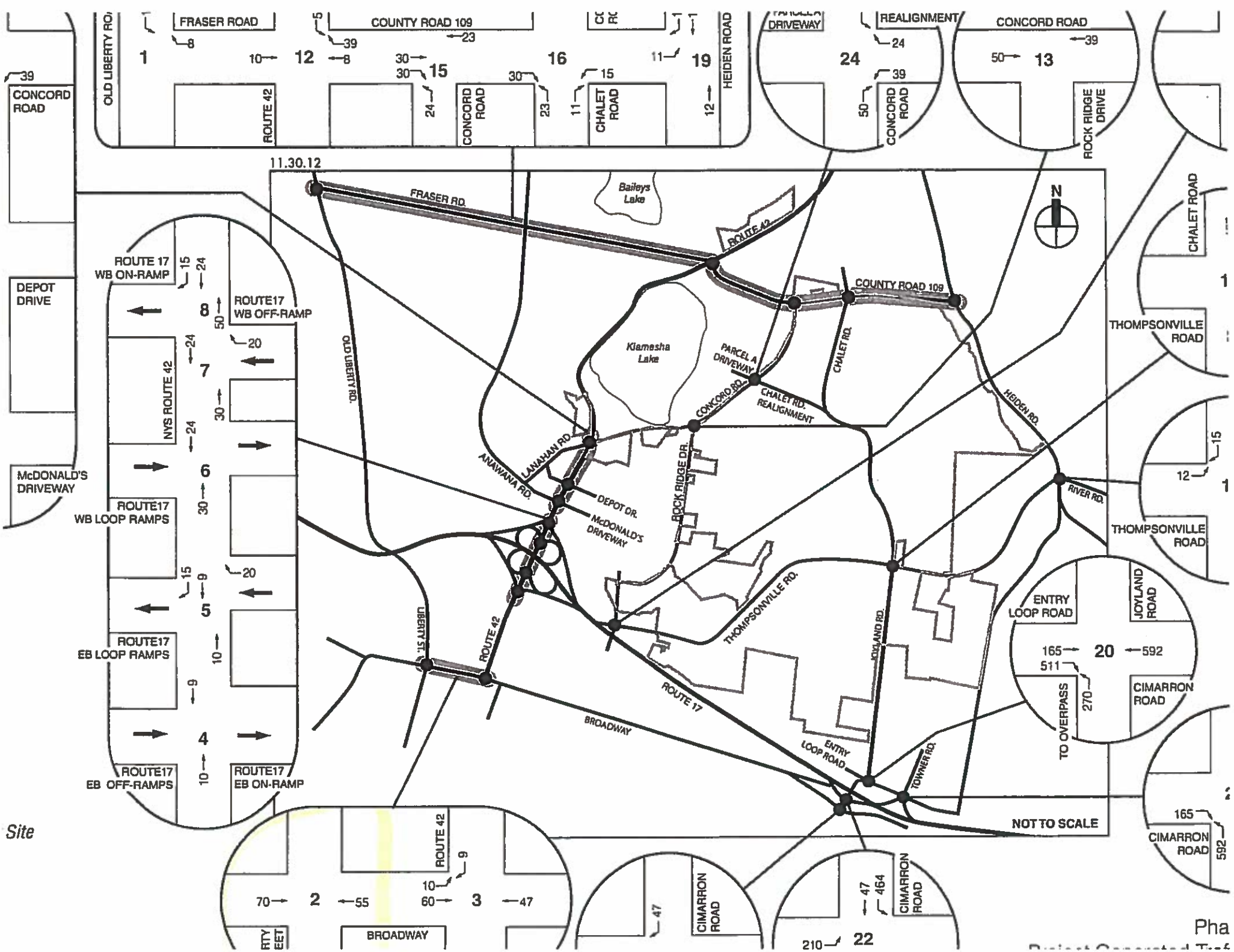
Tim Miller Associates, Inc., 10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



2019 Project Generated Traffic Volumes
Friday PM Peak Hour (5:00 PM-6:00 PM)
Figure 8A



2019 Project Generated Traffic Volumes
Sunday PM Peak Hour (5:00 PM-6:00 PM)
Figure 9A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OLD LIBERTY RD.
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CHALET ROAD
HEIDEN ROAD
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CONCORD ROAD
DEPOT DRIVE
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ROUTE 17 WB ON-RAMP
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ROUTE17 WB LOOP RAMPS
ROUTE17 EB LOOP RAMPS
ROUTE17 EB OFF-RAMPS
ROUTE17 EB ON-RAMP
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Baileys Lake
Kiamesha Lake
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RIVER RD.
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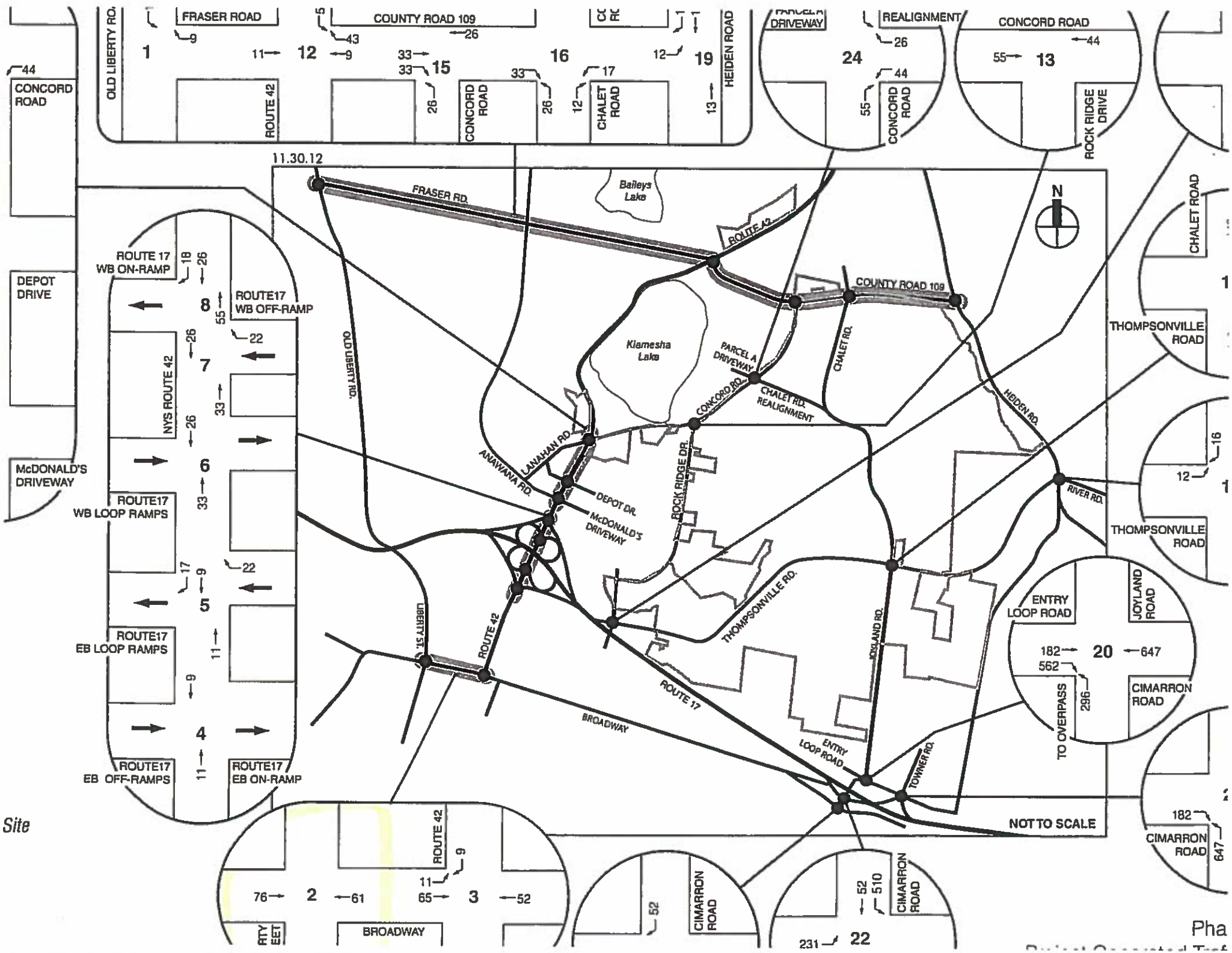
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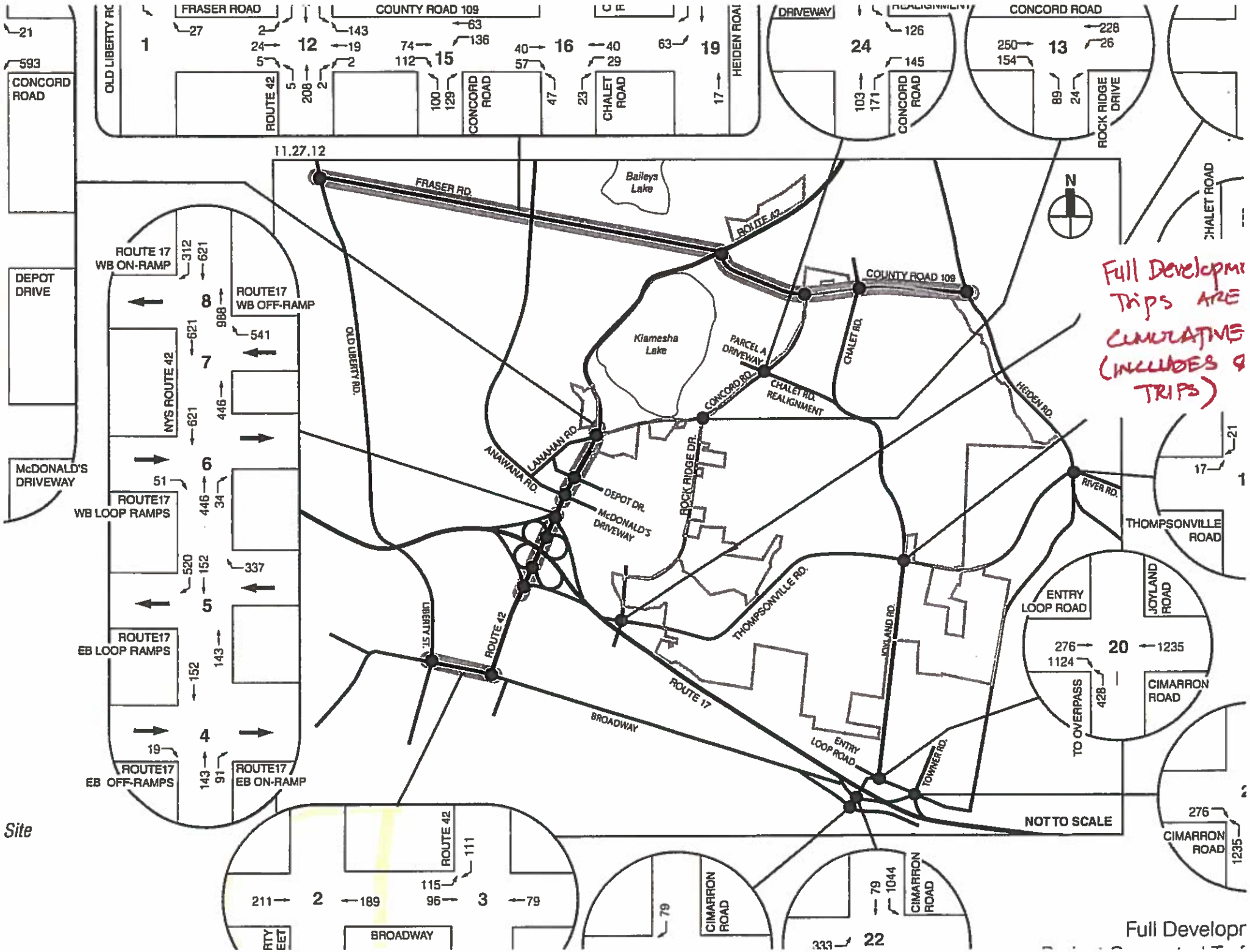
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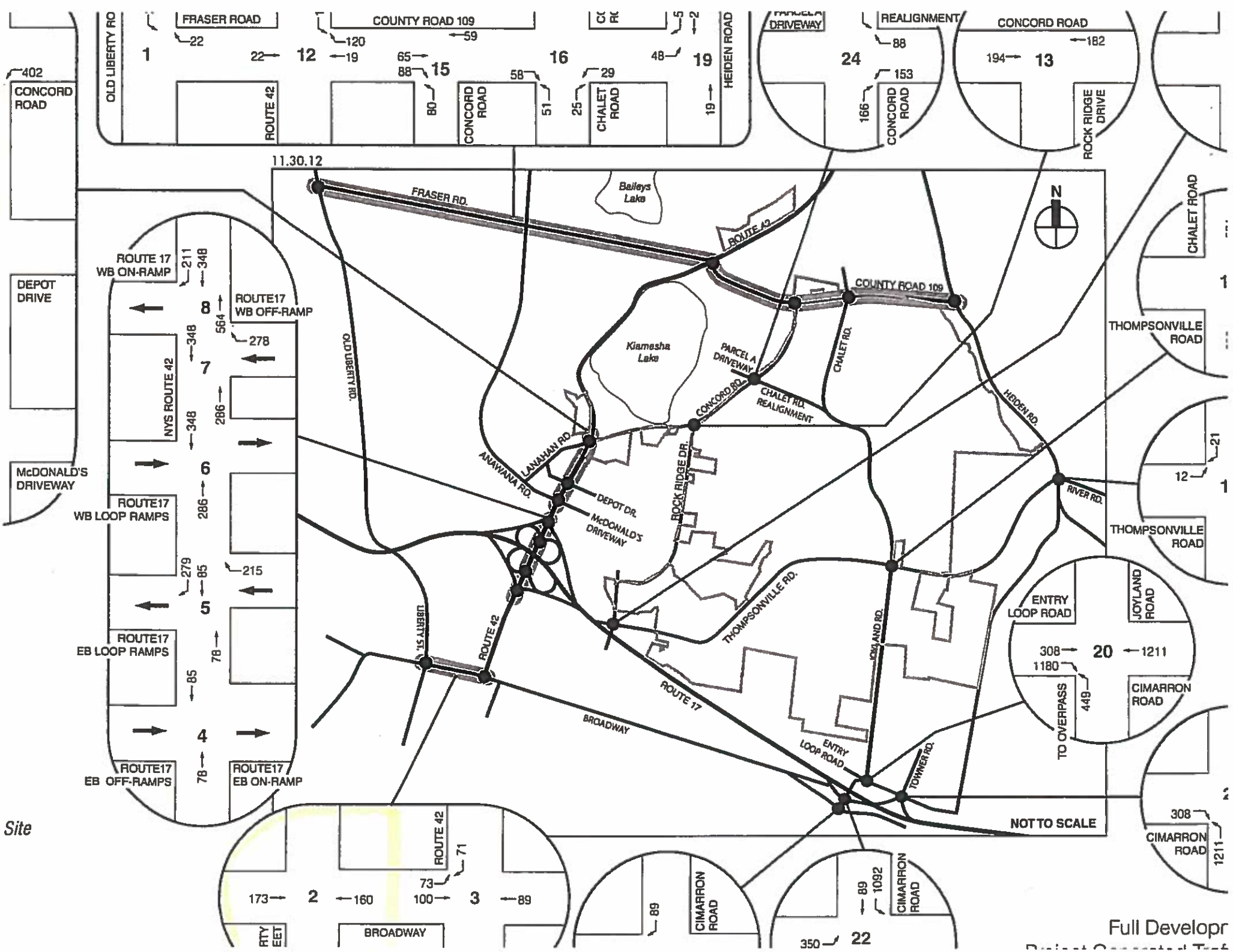
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Baileys Lake
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ANAWANA RD.
DEPOT DR.
McDONALD'S DRIVEWAY
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HEIDEN RD.
RIVER RD.
THOMPSONVILLE RD.
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BROADWAY
ROUTE 17
ENTRY LOOP ROAD
TOWNER RD.
TO OVERPASS
JOYLAND ROAD
CIMARRON ROAD
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APPENDIX D

LONG FORM EAF

Full Environmental Assessment Form
Part 1 - Project and Setting

Instructions for Completing Part 1

Part 1 is to be completed by the applicant or project sponsor. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification.

Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information; indicate whether missing information does not exist, or is not reasonably available to the sponsor; and, when possible, generally describe work or studies which would be necessary to update or fully develop that information.

Applicants/sponsors must complete all items in Sections A & B. In Sections C, D & E, most items contain an initial question that must be answered either "Yes" or "No". If the answer to the initial question is "Yes", complete the sub-questions that follow. If the answer to the initial question is "No", proceed to the next question. Section F allows the project sponsor to identify and attach any additional information. Section G requires the name and signature of the applicant or project sponsor to verify that the information contained in Part 1 is accurate and complete.

A. Project and Applicant/Sponsor Information.

Name of Action or Project: Nastro Grand Luxury Retreat		
Project Location (describe, and attach a general location map): 80 Tannery Road, Forestburgh, NY 12777		
Brief Description of Proposed Action (include purpose or need): Addition of 42 cabins, a parking lot, a spa, and a stormwater pond. Existing clubhouse/lodge will be renovated to have a car port, decking, lobby, great room, lounge, office, bathrooms, bistro, storage room, sundry shop, and mechanical room.		
Name of Applicant/Sponsor: Richard Viola	Telephone: (516) 319-6019 E-Mail: RViola@optonline.net	
Address: See below		
City/PO: P.O. Box 156, St. James	State: NY	Zip Code: 11780
Project Contact (if not same as sponsor; give name and title/role):	Telephone: E-Mail:	
Address:		
City/PO:	State:	Zip Code:
Property Owner (if not same as sponsor): Alana Unterberg	Telephone: E-Mail:	
Address: 7132 La Cosa Drive		
City/PO: Dallas	State: TX	Zip Code: 75248

B. Government Approvals

B. Government Approvals, Funding, or Sponsorship. ("Funding" includes grants, loans, tax relief, and any other forms of financial assistance.)		
Government Entity	**If Yes: Identify Agency and Approval(s) Required**	**Application Date (Actual or projected)**
a. City Counsel, Town Board, or Village Board of Trustees ☐Yes☑No		
b. City, Town or Village Planning Board or Commission ☑Yes☐No	Town of Forestburgh Planning Board	
c. City, Town or Village Zoning Board of Appeals ☐Yes☑No		
d. Other local agencies ☐Yes☑No		
e. County agencies ☐Yes☑No		
f. Regional agencies ☐Yes☑No		
g. State agencies ☐Yes☑No	NYSDOH, NYSDEC	
h. Federal agencies ☐Yes☑No		

i. Coastal Resources.
i. Is the project site within a Coastal Area, or the waterfront area of a Designated Inland Waterway? ☐Yes☑No

ii. Is the project site located in a community with an approved Local Waterfront Revitalization Program? ☐Yes☑No

iii. Is the project site within a Coastal Erosion Hazard Area? ☐Yes☑No

C. Planning and Zoning

C.1. Planning and zoning actions.

Will administrative or legislative adoption, or amendment of a plan, local law, ordinance, rule or regulation be the only approval(s) which must be granted to enable the proposed action to proceed? ☐Yes☑No

- **If Yes,** complete sections C, F and G.
- **If No,** proceed to question C.2 and complete all remaining sections and questions in Part I

C.2. Adopted land use plans.

a. Do any municipally- adopted (city, town, village or county) comprehensive land use plan(s) include the site where the proposed action would be located? ☑Yes☐No

If Yes, does the comprehensive plan include specific recommendations for the site where the proposed action would be located? ☑Yes☐No

b. Is the site of the proposed action within any local or regional special planning district (for example: Greenway; Brownfield Opportunity Area (BOA); designated State or Federal heritage area; watershed management plan; or other?) ☑Yes☐No

If Yes, identify the plan(s):
NYS Major Basins:Upper Delaware

c. Is the proposed action located wholly or partially within an area listed in an adopted municipal open space plan, or an adopted municipal farmland protection plan? ☑Yes☐No

If Yes, identify the plan(s):
Town of Forestburgh Sullivan County, New York Comprehensive Plan 2017/Conserving Open Space & Managing Growth: A Strategy for Sullivan County

C.3. Zoning

a. Is the site of the proposed action located in a municipality with an adopted zoning law or ordinance. ☑ Yes ☐ No
If Yes, what is the zoning classification(s) including any applicable overlay district?
RR-1 (Residential Recreational)

b. Is the use permitted or allowed by a special or conditional use permit? ☑ Yes ☐ No

c. Is a zoning change requested as part of the proposed action? ☐ Yes ☑ No
If Yes,
i. What is the proposed new zoning for the site?

C.4. Existing community services.

a. In what school district is the project site located? Monticello Central School District

b. What police or other public protection forces serve the project site?
Sullivan County Sheriff's Office/Village of Monticello Police Department

c. Which fire protection and emergency medical services serve the project site?
Forestburgh Fire District and Rock Hill Volunteer Ambulance

d. What parks serve the project site?
Lake Superior State Park/Minisink Battleground Park/Merriewold Park/Circle Park/Neversink George Trails

D. Project Details

D.1. Proposed and Potential Development

a. What is the general nature of the proposed action (e.g., residential, industrial, commercial, recreational; if mixed, include all components)? Commercial/Recreational

b. a. Total acreage of the site of the proposed action? 200.69 acres
b. Total acreage to be physically disturbed? ~40 acres
c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? 200.69 acres

c. Is the proposed action an expansion of an existing project or use? ☐ Yes ☑ No
i. If Yes, what is the approximate percentage of the proposed expansion and identify the units (e.g., acres, miles, housing units, square feet)? % _____ Units: _____

d. Is the proposed action a subdivision, or does it include a subdivision? ☐ Yes ☑ No
If Yes,
i. Purpose or type of subdivision? (e.g., residential, industrial, commercial; if mixed, specify types)
ii. Is a cluster/conservation layout proposed? ☐ Yes ☑ No
iii. Number of lots proposed? _____
iv. Minimum and maximum proposed lot sizes? Minimum _____ Maximum _____

e. Will the proposed action be constructed in multiple phases? ☐ Yes ☑ No
i. If No, anticipated period of construction: ~12 months
ii. If Yes:
- Total number of phases anticipated _____
- Anticipated commencement date of phase 1 (including demolition) _____ month _____ year
- Anticipated completion date of final phase _____ month _____ year
- Generally describe connections or relationships among phases, including any contingencies where progress of one phase may determine timing or duration of future phases:

f. Does the project include new residential uses? ☐Yes ☑No

If Yes, show numbers of units proposed.

	One Family	Two Family	Three Family	Multiple Family (four or more)
Initial Phase				
At completion of all phases				

g. Does the proposed action include new non-residential construction (including expansions)? ☑Yes ☐No

If Yes,

i. Total number of structures 42

ii. Dimensions (in feet) of largest proposed structure: TBD height; ~40' width; and ~40' length

iii. Approximate extent of building space to be heated or cooled: ~67200 square feet

h. Does the proposed action include construction or other activities that will result in the impoundment of any liquids, such as creation of a water supply, reservoir, pond, lake, waste lagoon or other storage? ☑Yes ☐No

If Yes,

i. Purpose of the impoundment: Stormwater Pond

ii. If a water impoundment, the principal source of the water: ☑ Ground water ☐ Surface water streams ☐Other specify:

iii. If other than water, identify the type of impounded/contained liquids and their source.

iv. Approximate size of the proposed impoundment. Volume: TBD million gallons; surface area: TBD acres

v. Dimensions of the proposed dam or impounding structure: TBD height; TBD length

vi. Construction method/materials for the proposed dam or impounding structure (e.g., earth fill, rock, wood, concrete):

Earth fill

D.2. Project Operations

a. Does the proposed action include any excavation, mining, or dredging, during construction, operations, or both? (Not including general site preparation, grading or installation of utilities or foundations where all excavated materials will remain onsite) ☑Yes ☐No

If Yes:

i. What is the purpose of the excavation or dredging? Construction of pond

ii. How much material (including rock, earth, sediments, etc.) is proposed to be removed from the site?

- Volume (specify tons or cubic yards): TBD
- Over what duration of time? TBD

iii. Describe nature and characteristics of materials to be excavated or dredged, and plans to use, manage or dispose of them.

TBD

iv. Will there be onsite dewatering or processing of excavated materials? ☑Yes ☐No

If yes, describe. TBD

v. What is the total area to be dredged or excavated? TBD acres

vi. What is the maximum area to be worked at any one time? 5 acres

vii. What would be the maximum depth of excavation or dredging? TBD feet

viii. Will the excavation require blasting? ☐Yes ☑No

ix. Summarize site reclamation goals and plan:

TBD

b. Would the proposed action cause or result in alteration of, increase or decrease in size of, or encroachment into any existing wetland, waterbody, shoreline, beach or adjacent area? ☐Yes ☑No

If Yes:

i. Identify the wetland or waterbody which would be affected (by name, water index number, wetland map number or geographic description):

ii. Describe how the proposed action would affect that waterbody or wetland, e.g. excavation, fill, placement of structures, or alteration of channels, banks and shorelines. Indicate extent of activities, alterations and additions in square feet or acres:

iii. Will the proposed action cause or result in disturbance to bottom sediments? ☐Yes ☑No
If Yes, describe:

iv. Will the proposed action cause or result in the destruction or removal of aquatic vegetation? ☐Yes ☑No
If Yes:

- acres of aquatic vegetation proposed to be removed:
- expected acreage of aquatic vegetation remaining after project completion:
- purpose of proposed removal (e.g. beach clearing, invasive species control, boat access):
- proposed method of plant removal:
- if chemical/herbicide treatment will be used, specify product(s):

v. Describe any proposed reclamation/mitigation following disturbance:
Standard ES control and restoration practices will be implemented

c. Will the proposed action use, or create a new demand for water? ☑Yes ☐No
If Yes:

i. Total anticipated water usage/demand per day: 8170 gallons/day

ii. Will the proposed action obtain water from an existing public water supply? ☐Yes ☑No
If Yes:

- Name of district or service area:
- Does the existing public water supply have capacity to serve the proposal? ☐Yes ☐No
- Is the project site in the existing district? ☐Yes ☐No
- Is expansion of the district needed? ☐Yes ☐No
- Do existing lines serve the project site? ☐Yes ☐No

iii. Will line extension within an existing district be necessary to supply the project? ☐Yes ☑No
If Yes:

- Describe extensions or capacity expansions proposed to serve this project:
- Source(s) of supply for the district:

iv. Is a new water supply district or service area proposed to be formed to serve the project site? ☐Yes ☑No
If, Yes:

- Applicant/sponsor for new district:
- Date application submitted or anticipated:
- Proposed source(s) of supply for new district:

v. If a public water supply will not be used, describe plans to provide water supply for the project:
Use of on-site existing wells

vi. If water supply will be from wells (public or private), what is the maximum pumping capacity: 75-150 gallons/minute.

d. Will the proposed action generate liquid wastes? ☑Yes ☐No
If Yes:

i. Total anticipated liquid waste generation per day: 8170 gallons/day

ii. Nature of liquid wastes to be generated (e.g., sanitary wastewater, industrial; if combination, describe all components and approximate volumes or proportions of each):
Sanitary wastewater

iii. Will the proposed action use any existing public wastewater treatment facilities? ☐Yes ☑No
If Yes:

- Name of wastewater treatment plant to be used:
- Name of district:
- Does the existing wastewater treatment plant have capacity to serve the project? ☐Yes ☐No
- Is the project site in the existing district? ☐Yes ☐No
- Is expansion of the district needed? ☐Yes ☐No

- Do existing sewer lines serve the project site? ☐Yes ☐No
- Will a line extension within an existing district be necessary to serve the project? ☐Yes ☐No

If Yes:

- Describe extensions or capacity expansions proposed to serve this project: _____

iv. Will a new wastewater (sewage) treatment district be formed to serve the project site? ☐Yes ☑No

If Yes:

- Applicant/sponsor for new district: _____
- Date application submitted or anticipated: _____
- What is the receiving water for the wastewater discharge? _____

v. If public facilities will not be used, describe plans to provide wastewater treatment for the project, including specifying proposed receiving water (name and classification if surface discharge or describe subsurface disposal plans):

On-site septic field and piping

vi. Describe any plans or designs to capture, recycle or reuse liquid waste:

Septic system

e. Will the proposed action disturb more than one acre and create stormwater runoff, either from new point sources (i.e. ditches, pipes, swales, curbs, gutters or other concentrated flows of stormwater) or non-point source (i.e. sheet flow) during construction or post construction? ☑Yes ☐No

If Yes:

i. How much impervious surface will the project create in relation to total size of project parcel?

TBD Square feet or TBD acres (impervious surface)

8.74M Square feet or 200.7 acres (parcel size)

ii. Describe types of new point sources. Stormwater catchbasin pipes

iii. Where will the stormwater runoff be directed (i.e. on-site stormwater management facility/structures, adjacent properties, groundwater, on-site surface water or off-site surface waters)?

On-site surface water(proposed stormwater pond) and groundwater

- If to surface waters, identify receiving water bodies or wetlands:

Proposed stormwater pond

- Will stormwater runoff flow to adjacent properties? ☐Yes ☑No

iv. Does the proposed plan minimize impervious surfaces, use pervious materials or collect and re-use stormwater? ☑Yes ☐No

f. Does the proposed action include, or will it use on-site, one or more sources of air emissions, including fuel combustion, waste incineration, or other processes or operations? ☐Yes ☑No

If Yes, identify:

i. Mobile sources during project operations (e.g., heavy equipment, fleet or delivery vehicles)

ii. Stationary sources during construction (e.g., power generation, structural heating, batch plant, crushers)

iii. Stationary sources during operations (e.g., process emissions, large boilers, electric generation)

g. Will any air emission sources named in D.2.f (above), require a NY State Air Registration, Air Facility Permit, or Federal Clean Air Act Title IV or Title V Permit? ☐Yes ☑No

If Yes:

i. Is the project site located in an Air quality non-attainment area? (Area routinely or periodically fails to meet ambient air quality standards for all or some parts of the year) ☐Yes ☐No

ii. In addition to emissions as calculated in the application, the project will generate:

- _____ Tons/year (short tons) of Carbon Dioxide (CO_2)
- _____ Tons/year (short tons) of Nitrous Oxide (N_2O)
- _____ Tons/year (short tons) of Perfluorocarbons (PFCs)
- _____ Tons/year (short tons) of Sulfur Hexafluoride (SF_6)
- _____ Tons/year (short tons) of Carbon Dioxide equivalent of Hydroflourocarbons (HFCs)
- _____ Tons/year (short tons) of Hazardous Air Pollutants (HAPs)

h. Will the proposed action generate or emit methane (including, but not limited to, sewage treatment plants, landfills, composting facilities)? ☐Yes ☑No

If Yes:

i. Estimate methane generation in tons/year (metric): _____

ii. Describe any methane capture, control or elimination measures included in project design (e.g., combustion to generate heat or electricity, flaring): _____

i. Will the proposed action result in the release of air pollutants from open-air operations or processes, such as quarry or landfill operations? ☐Yes ☑No

If Yes: Describe operations and nature of emissions (e.g., diesel exhaust, rock particulates/dust):

j. Will the proposed action result in a substantial increase in traffic above present levels or generate substantial new demand for transportation facilities or services? ☐Yes ☑No

If Yes:

i. When is the peak traffic expected (Check all that apply): ☐ Morning ☐ Evening ☐Weekend
☐ Randomly between hours of _____ to _____.

ii. For commercial activities only, projected number of truck trips/day and type (e.g., semi trailers and dump trucks): _____

iii. Parking spaces: Existing _____ Proposed _____ Net increase/decrease _____

iv. Does the proposed action include any shared use parking? ☐Yes ☐No

v. If the proposed action includes any modification of existing roads, creation of new roads or change in existing access, describe:

vi. Are public/private transportation service(s) or facilities available within ½ mile of the proposed site? ☐Yes ☐No

vii Will the proposed action include access to public transportation or accommodations for use of hybrid, electric or other alternative fueled vehicles? ☐Yes ☐No

viii. Will the proposed action include plans for pedestrian or bicycle accommodations for connections to existing pedestrian or bicycle routes? ☐Yes ☐No

k. Will the proposed action (for commercial or industrial projects only) generate new or additional demand for energy? ☑Yes ☐No

If Yes:

i. Estimate annual electricity demand during operation of the proposed action:
TBD

ii. Anticipated sources/suppliers of electricity for the project (e.g., on-site combustion, on-site renewable, via grid/local utility, or other):
Grid/local utility

iii. Will the proposed action require a new, or an upgrade, to an existing substation? ☐Yes ☑No

l. Hours of operation. Answer all items which apply.

i. During Construction:

- Monday - Friday: 7:00am-8:00pm
- Saturday: 9:00am-8:00pm
- Sunday: 9:00am-8:00pm
- Holidays: 9:00am-8:00pm

ii. During Operations:

- Monday - Friday: 12:00am-11:59pm
- Saturday: 12:00am-11:59pm
- Sunday: 12:00am-11:59pm
- Holidays: 12:00am-11:59pm

m. Will the proposed action produce noise that will exceed existing ambient noise levels during construction, operation, or both? ☐ Yes ☑ No

If yes:

i. Provide details including sources, time of day and duration:

ii. Will the proposed action remove existing natural barriers that could act as a noise barrier or screen? ☐ Yes ☐ No

Describe:

n. Will the proposed action have outdoor lighting? ☑ Yes ☐ No

If yes:

i. Describe source(s), location(s), height of fixture(s), direction/aim, and proximity to nearest occupied structures:

Location: Around proposed cabins,along proposed roads, and area of proposed parking

Source, height, direction, proximity:TBD

ii. Will proposed action remove existing natural barriers that could act as a light barrier or screen? ☐ Yes ☑ No

Describe:

o. Does the proposed action have the potential to produce odors for more than one hour per day? ☐ Yes ☑ No

If Yes, describe possible sources, potential frequency and duration of odor emissions, and proximity to nearest occupied structures:

p. Will the proposed action include any bulk storage of petroleum (combined capacity of over 1,100 gallons) or chemical products 185 gallons in above ground storage or any amount in underground storage? ☐ Yes ☑ No

If Yes:

i. Product(s) to be stored

ii. Volume(s) _____ per unit time _____ (e.g., month, year)

iii. Generally, describe the proposed storage facilities:

q. Will the proposed action (commercial, industrial and recreational projects only) use pesticides (i.e., herbicides, insecticides) during construction or operation? ☐ Yes ☑ No

If Yes:

i. Describe proposed treatment(s):

ii. Will the proposed action use Integrated Pest Management Practices? ☐ Yes ☐ No

r. Will the proposed action (commercial or industrial projects only) involve or require the management or disposal of solid waste (excluding hazardous materials)? ☐ Yes ☑ No

If Yes:

i. Describe any solid waste(s) to be generated during construction or operation of the facility:

- Construction: _____ tons per _____ (unit of time)
- Operation : _____ tons per _____ (unit of time)

ii. Describe any proposals for on-site minimization, recycling or reuse of materials to avoid disposal as solid waste:

- Construction:
- Operation:

iii. Proposed disposal methods/facilities for solid waste generated on-site:

- Construction:
- Operation:

s. Does the proposed action include construction or modification of a solid waste management facility? ☐ Yes ☑ No

If Yes:

i. Type of management or handling of waste proposed for the site (e.g., recycling or transfer station, composting, landfill, or other disposal activities): _____

ii. Anticipated rate of disposal/processing:

- _____ Tons/month, if transfer or other non-combustion/thermal treatment, or
- _____ Tons/hour, if combustion or thermal treatment

iii. If landfill, anticipated site life: _____ years

t. Will the proposed action at the site involve the commercial generation, treatment, storage, or disposal of hazardous waste? ☐ Yes ☑ No

If Yes:

i. Name(s) of all hazardous wastes or constituents to be generated, handled or managed at facility: _____

ii. Generally describe processes or activities involving hazardous wastes or constituents: _____

iii. Specify amount to be handled or generated _____ tons/month

iv. Describe any proposals for on-site minimization, recycling or reuse of hazardous constituents: _____

v. Will any hazardous wastes be disposed at an existing offsite hazardous waste facility? ☐ Yes ☐ No

If Yes: provide name and location of facility: _____

If No: describe proposed management of any hazardous wastes which will not be sent to a hazardous waste facility:

E. Site and Setting of Proposed Action

E.1. Land uses on and surrounding the project site

a. Existing land uses.

i. Check all uses that occur on, adjoining and near the project site.

☐ Urban ☐ Industrial ☐ Commercial ☐ Residential (suburban) ☑ Rural (non-farm)
☑ Forest ☐ Agriculture ☐ Aquatic ☐ Other (specify): _____

ii. If mix of uses, generally describe:

b. Land uses and covertypes on the project site.

Land use or Covertype	Current Acreage	Acreage After Project Completion	Change (Acres +/-)
• Roads, buildings, and other paved or impervious surfaces	0.54	TBD	TBD
• Forested	TBD	TBD	TBD
• Meadows, grasslands or brushlands (non-agricultural, including abandoned agricultural)	TBD	TBD	TBD
• Agricultural (includes active orchards, field, greenhouse etc.)	0	0	0
• Surface water features (lakes, ponds, streams, rivers, etc.)	TBD	TBD	TBD
• Wetlands (freshwater or tidal)	11.1	11.1	0
• Non-vegetated (bare rock, earth or fill)	0	0	0
• Other Describe: _____			

c. Is the project site presently used by members of the community for public recreation? ☑ Yes ☐ No

i. If Yes: explain: Existing Golf Course and clubhouse

d. Are there any facilities serving children, the elderly, people with disabilities (e.g., schools, hospitals, licensed day care centers, or group homes) within 1500 feet of the project site? ☐ Yes ☑ No

If Yes,

i. Identify Facilities:

e. Does the project site contain an existing dam? ☐ Yes ☑ No

If Yes:

i. Dimensions of the dam and impoundment:

- Dam height: _____ feet
- Dam length: _____ feet
- Surface area: _____ acres
- Volume impounded: _____ gallons OR acre-feet

ii. Dam's existing hazard classification:

iii. Provide date and summarize results of last inspection:

f. Has the project site ever been used as a municipal, commercial or industrial solid waste management facility, or does the project site adjoin property which is now, or was at one time, used as a solid waste management facility? ☐ Yes ☑ No

If Yes:

i. Has the facility been formally closed? ☐ Yes ☐ No

- If yes, cite sources/documentation:

ii. Describe the location of the project site relative to the boundaries of the solid waste management facility:

iii. Describe any development constraints due to the prior solid waste activities:

g. Have hazardous wastes been generated, treated and/or disposed of at the site, or does the project site adjoin property which is now or was at one time used to commercially treat, store and/or dispose of hazardous waste? ☐ Yes ☑ No

If Yes:

i. Describe waste(s) handled and waste management activities, including approximate time when activities occurred:

h. Potential contamination history. Has there been a reported spill at the proposed project site, or have any remedial actions been conducted at or adjacent to the proposed site? ☐ Yes ☑ No

If Yes:

i. Is any portion of the site listed on the NYSDEC Spills Incidents database or Environmental Site Remediation database? Check all that apply: ☐ Yes ☐ No

☐ Yes – Spills Incidents database — Provide DEC ID number(s): _____

☐ Yes – Environmental Site Remediation database — Provide DEC ID number(s): _____

☐ Neither database

ii. If site has been subject of RCRA corrective activities, describe control measures:

iii. Is the project within 2000 feet of any site in the NYSDEC Environmental Site Remediation database? ☐ Yes ☑ No

If yes, provide DEC ID number(s):

iv. If yes to (i), (ii) or (iii) above, describe current status of site(s):

v. Is the project site subject to an institutional control limiting property uses? ☐ Yes ☑ No

- If yes, DEC site ID number:
- Describe the type of institutional control (e.g., deed restriction or easement):
- Describe any use limitations:
- Describe any engineering controls:
- Will the project affect the institutional or engineering controls in place? ☐ Yes ☐ No
- Explain:

E.2. Natural Resources On or Near Project Site

a. What is the average depth to bedrock on the project site? 1.4-2.5 and >6.56 feet

b. Are there bedrock outcroppings on the project site? ☐ Yes ☑ No
If Yes, what proportion of the site is comprised of bedrock outcroppings? ____ %

c. Predominant soil type(s) present on project site:

WIC	~26 %
AoC	~13 %
SrB	~10.5 %

d. What is the average depth to the water table on the project site? Average: ~5.1 feet

e. Drainage status of project site soils:

☑ Well Drained:	~59.5 % of site
☑ Moderately Well Drained:	~28 % of site
☑ Poorly Drained	~12.5 % of site

f. Approximate proportion of proposed action site with slopes:

☑ 0-10%:	~41 % of site
☑ 10-15%:	~45.5 % of site
☑ 15% or greater:	~13.5 % of site

g. Are there any unique geologic features on the project site? ☐ Yes ☑ No
If Yes, describe:

h. Surface water features.

i. Does any portion of the project site contain wetlands or other waterbodies (including streams, rivers, ponds or lakes)? ☑ Yes ☐ No

ii. Do any wetlands or other waterbodies adjoin the project site? ☑ Yes ☐ No

If Yes to either *i* or *ii*, continue. If No, skip to E.2.i.

iii. Are any of the wetlands or waterbodies within or adjoining the project site regulated by any federal, state or local agency? ☑ Yes ☐ No

iv. For each identified regulated wetland and waterbody on the project site, provide the following information:

- Streams: Name 815-163 and Black Brook and minor tribs segment 1401-0032 Classification B(T)
- Lakes or Ponds: Name ____ Classification TBD
- Wetlands: Name Federal Waters, Federal Waters, Federal Waters,... Approximate Size 11.1 Acres
- Wetland No. (if regulated by DEC) PFO4E/R4SBC/R3UBH

v. Are any of the above water bodies listed in the most recent compilation of NYS water quality-impaired waterbodies? ☐ Yes ☑ No

If yes, name of impaired water body/bodies and basis for listing as impaired:

i. Is the project site in a designated Floodway? ☐ Yes ☑ No

j. Is the project site in the 100-year Floodplain? ☑ Yes ☐ No

k. Is the project site in the 500-year Floodplain? ☐ Yes ☑ No

l. Is the project site located over, or immediately adjoining, a primary, principal or sole source aquifer? ☑ Yes ☐ No
If Yes:

i. Name of aquifer: Principal Aquifer

m. Identify the predominant wildlife species that occupy or use the project site:

Whitetail deer	Eastern cottontails	Eastern coyotes
Black bears	Eastern wild turkeys	Varying bird species
Red and grey squirrels	Red and grey foxes	Varying reptiles and amphibians

n. Does the project site contain a designated significant natural community? ☐Yes ☑No

If Yes:

i. Describe the habitat/community (composition, function, and basis for designation): _____

ii. Source(s) of description or evaluation: _____

iii. Extent of community/habitat:

- Currently: _____ acres
- Following completion of project as proposed: _____ acres
- Gain or loss (indicate + or -): _____ acres

o. Does project site contain any species of plant or animal that is listed by the federal government or NYS as endangered or threatened, or does it contain any areas identified as habitat for an endangered or threatened species? ☐ Yes ☑No

If Yes:

i. Species and listing (endangered or threatened): _____

p. Does the project site contain any species of plant or animal that is listed by NYS as rare, or as a species of special concern? ☐Yes ☑No

If Yes:

i. Species and listing: _____

q. Is the project site or adjoining area currently used for hunting, trapping, fishing or shell fishing? ☐Yes ☑No

If yes, give a brief description of how the proposed action may affect that use: _____

E.3. Designated Public Resources On or Near Project Site

a. Is the project site, or any portion of it, located in a designated agricultural district certified pursuant to Agriculture and Markets Law, Article 25-AA, Section 303 and 304? ☐Yes ☑No

If Yes, provide county plus district name/number: _____

b. Are agricultural lands consisting of highly productive soils present? ☐Yes ☑No

i. If Yes: acreage(s) on project site? _____

ii. Source(s) of soil rating(s): _____

c. Does the project site contain all or part of, or is it substantially contiguous to, a registered National Natural Landmark? ☐Yes ☑No

If Yes:

i. Nature of the natural landmark: ☐ Biological Community ☐ Geological Feature

ii. Provide brief description of landmark, including values behind designation and approximate size/extent: _____

d. Is the project site located in or does it adjoin a state listed Critical Environmental Area? ☐Yes ☑No

If Yes:

i. CEA name: _____

ii. Basis for designation: _____

iii. Designating agency and date: _____

e. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places? ☐ Yes ☑ No

If Yes:

i. Nature of historic/archaeological resource: ☐ Archaeological Site ☐ Historic Building or District

ii. Name: _____

iii. Brief description of attributes on which listing is based:

_____

f. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory? ☐ Yes ☑ No

g. Have additional archaeological or historic site(s) or resources been identified on the project site? ☐ Yes ☑ No

If Yes:

i. Describe possible resource(s): _____

ii. Basis for identification: _____

h. Is the project site within fives miles of any officially designated and publicly accessible federal, state, or local scenic or aesthetic resource? ☐ Yes ☑ No

If Yes:

i. Identify resource: _____

ii. Nature of, or basis for, designation (e.g., established highway overlook, state or local park, state historic trail or scenic byway, etc.): _____

iii. Distance between project and resource: _____ miles.

i. Is the project site located within a designated river corridor under the Wild, Scenic and Recreational Rivers Program 6 NYCRR 666? ☐ Yes ☑ No

If Yes:

i. Identify the name of the river and its designation: _____

ii. Is the activity consistent with development restrictions contained in 6NYCRR Part 666? ☐ Yes ☐ No

F. Additional Information

Attach any additional information which may be needed to clarify your project.

If you have identified any adverse impacts which could be associated with your proposal, please describe those impacts plus any measures which you propose to avoid or minimize them.

G. Verification

I certify that the information provided is true to the best of my knowledge.

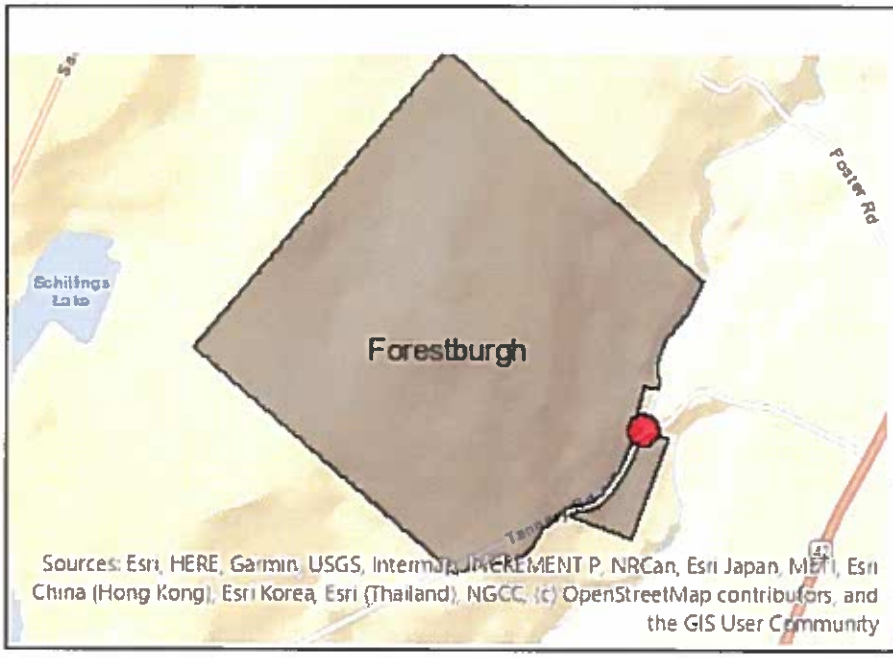
Applicant/Sponsor Name Richard Viola Date 07/23/25

Signature Richard Viola Title Principal / member

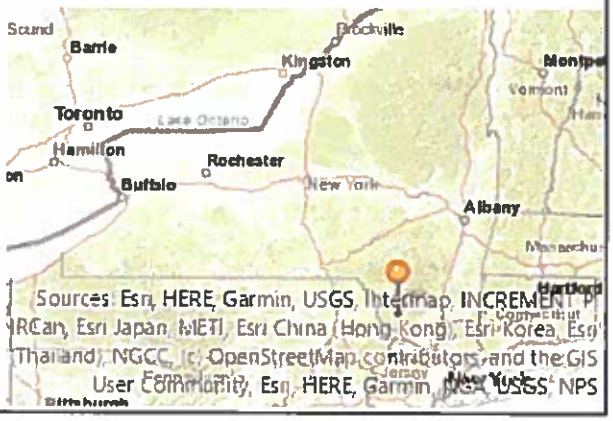
PRINT FORM

EAF Mapper Summary Report

Wednesday, June 18, 2025 3:47 PM



Disclaimer: The EAF Mapper is a screening tool intended to assist project sponsors and reviewing agencies in preparing an environmental assessment form (EAF). Not all questions asked in the EAF are answered by the EAF Mapper. Additional information on any EAF question can be obtained by consulting the EAF Workbooks. Although the EAF Mapper provides the most up-to-date digital data available to DEC, you may also need to contact local or other data sources to confirm data provided by the Mapper or to obtain data not provided by the Mapper.



B.i.i [Coastal or Waterfront Area]	No
B.i.ii [Local Waterfront Revitalization Area]	No
C.2.b. [Special Planning District]	Yes - Digital mapping data are not available for all Special Planning Districts. Refer to EAF Workbook.
C.2.b. [Special Planning District - Name]	NYS Major Basins:Upper Delaware
E.1.h [DEC Spills or Remediation Site - Potential Contamination History]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Listed]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Environmental Site Remediation Database]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.iii [Within 2,000' of DEC Remediation Site]	No
E.2.g [Unique Geologic Features]	No
E.2.h.i [Surface Water Features]	Yes - Digital mapping information on local, New York State, and federal wetlands and waterbodies is known to be incomplete. Refer to the EAF Workbook.
E.2.h.ii [Surface Water Features]	Yes - Digital mapping information on local, New York State, and federal wetlands and waterbodies is known to be incomplete. Refer to the EAF Workbook.
E.2.h.iii [Surface Water Features]	Yes - Digital mapping information on local, New York State, and federal wetlands and waterbodies is known to be incomplete. Refer to the EAF Workbook.
E.2.h.iv [Surface Water Features - Stream Name]	815-163
E.2.h.iv [Surface Water Features - Stream Classification]	B(T)
E.2.h.iv [Surface Water Features - Wetlands Name]	Federal Waters

E.2.h.v [Impaired Water Bodies]	No
E.2.i. [Floodway]	No
E.2.j. [100 Year Floodplain]	Yes
E.2.k. [500 Year Floodplain]	No
E.2.l. [Aquifers]	Yes
E.2.l. [Aquifer Names]	Principal Aquifer
E.2.n. [Natural Communities]	No
E.2.o. [Endangered or Threatened Species]	No
E.2.p. [Rare Plants or Animals]	No
E.3.a. [Agricultural District]	No
E.3.c. [National Natural Landmark]	No
E.3.d [Critical Environmental Area]	No
E.3.e. [National or State Register of Historic Places or State Eligible Sites]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.3.f. [Archeological Sites]	No
E.3.i. [Designated River Corridor]	No

APPENDIX E

WATER SUPPLY CONCEPT PLAN AND WELL ASSESSMENT SUMMARY

FORESTBURGH CONSERVATION LEAGUE, L.L.C.

The Falls at Black Creek

TOWN OF FORESTBURGH
SULLIVAN COUNTY, NEW YORK

WATER SUPPLY CONCEPT PLAN

Prepared for:

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MAY 2009

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RA File No. 07042

THE FALLS AT BLACK CREEK
WATER SUPPLY CONCEPT PLAN

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PROJECT INTRODUCTION AND SUMMARY

The Forestburg Conservation League, L.L.C. is proposing The Falls at Black Creek, a 282 unit residential development surrounded by a par 72 Championship Golf Course and club house, on 306.55 acres. The site is located in the Town of Forestburg, Sullivan County, New York. The project is located 7 miles north of the Orange County and Sullivan County Line, along the west side of State Route 42. See the Location Map included in the Attachments to this report. The golf clubhouse will have a restaurant, locker room facilities with showers for members, and a 250 seat banquet facility. A central water supply system is proposed for this project consisting of groundwater wells, a water storage tank and pressurized distribution system. A central sewage collection and treatment system with spray irrigation effluent disposal is also proposed for this project.

1.0 ESTIMATED WATER DEMANDS

The water demands for both the residential development and the golf course club house will be estimated to determine the required supply and storage requirements for the system. Both the Average Daily Demand (ADD) and the Maximum Day Demand will be estimated in the following sections.

1.1 Average Daily Demand

The 282 residential units for this project consist of a combination of three styles, single family homes, townhouses, and patio homes (one floor townhouse). Each of these styles have a proposed number of either 2, 3, or 4 bedroom units. The breakdown for the number of units for each number of bedrooms is listed below. The value for flow per unit is provided by Table 3 of the New York State Department of Environmental Conservation Design Standards for Wastewater Treatment Work, 1988. A 20% reduction was applied to these values based on water saving plumbing fixtures. Based on this information we can estimate the residential water demand as follows:

2-Bdrm Units = 104 units x 300 GPD/unit = 31,200 GPD x 0.80 = 24,960 GPD
3-Bdrm Units = 155 units x 400 GPD/unit = 62,000 GPD x 0.80 = 49,600 GPD
4-Bdrm Units = 23 units x 475 GPD/unit = 10,925 GPD x 0.80 = 8,740 GPD

Residential Water Demand Subtotal 83,300 GPD

To estimate the water demand of the golf course clubhouse a combination of water uses were estimated. The golf course clubhouse will include a restaurant, locker rooms with showers for members, and a 250 seat banquet facility. A peak day event would include a fully booked golf course of 150 people, assuming half are members and half are non-members. The design flows for this facility were taken from Table 3 of the New York State Department of Environmental Conservation Design Standards for Wastewater Treatment Work, 1988. A 20% reduction was applied to these values based on water saving plumbing fixtures. Assuming the golf operation totals 150 people, and a 250 seat banquet facility and applying these design flow values in the following manner provides the estimated water demands for the peak day operations at the clubhouse:

75 resident members x 75 GPD/member = 5,625 GPD x 0.80 = 4,500 GPD
5 non-resident members x 25 GPD/member = 1,875 GPD x 0.80 = 1,500 GPD
250 seats x 20 GPD/person = 5,000 GPD x 0.80 = 4,000 GPD

Clubhouse Water Demand Subtotal 10,000 GPD

Community Center Flows

The project proposes a community center associated with an outdoor swimming pool and two (2) tennis courts. To estimate the water demand for the community center we assumed a peak day event of 150 people utilizing the pool. The design flows for this facility were 10 GPD/swimmer taken from Table 3 of the New York State Department of Environmental Conservation Design Standards for Wastewater Treatment Work, 1988. A 20% reduction was applied to these values based on water saving plumbing fixtures. The estimated flow for the Community Center is as follows:

150 resident swimmers x 10 GPD/swimmer = 1,500 GPD x 0.8 = 1,200 GPD

Community Center Subtotal 1,200 GPD

This results in a total estimated water Average Daily Demand of 94,500 GPD (65 gallons per minute (GPM)), which is rounded to 95,000 GPD (66 GPM).

1.2 Maximum Daily Demand

Maximum Daily Demand (MDD) can vary depending on the type of use of the facility. Without existing water records, typically a multiplication factor is applied to the Average Daily Demand to determine MDD. A conservative factor typically used is two (2) times the Average Daily Demand. Based on this, the estimated MDD would be 190,000 GPD (95,000 GPD x 2) or 132 GPM. In accordance with the Ten States Standards (3.2.1.1), the recommended minimum available water supply is 132 GPM with the largest producing well out of service.

The following table is a summary of the estimated water demands for this project:

	GPD	GPM
Average Daily Demand	95,000	66
Max Daily Demand	190,000	132

1.3 Residential Fire Flow Demands

All fire flow requirements are derived from either the Ten States Standards or the Fire Code of New York State (FCNYS), August 2007, and the National Fire Protection Association (NFPA) 13, Standard for the Installation of Sprinkler Systems, 1999 Edition.

The Ten States Standards recommends use of the ISO Method for Fire flow demands. The Needed Fire Flow (NFF) was calculated using the ISO Guide for Determination of Needed Fire Flow, 2008 and copies of this guide and the calculations for the NFF are included in the Attachments.

For the single family residential units, the NFF was determined from the table in Chapter 7 of the ISO Guide. Based on the distance between buildings of between 31 to 100 feet, the NFF is 750 GPM in the single family residential section of the development. The ISO guidelines require a duration of two (2) hours for a NFF of less than 3,000 GPM.

For the Townhouse units, the NFF was calculated based on the formula for NFF in Chapter 1 of the ISO Guide and following information and assumptions:

- The Townhouse units would not be provided with fire suppression sprinklers.
- The buildings would be constructed by wood frame construction with divider walls between units constructed with a fire-resistance rating of not less than 1 hour.
- A four bedroom patio townhouse would be adjacent to a two bedroom patio townhouse. This provides a larger effective area than the two (2) story townhouses.

Based on this information, the NFF is 1,476 GPM, which would be rounded up to 1,500 GPM. Again, the ISO guidelines require a duration of two (2) hours for a NFF of less than 3,000 GPM.

The following is a summary of each of the NFF and fire storage requirements for each of the portions of the development.

Golf Course Clubhouse
& Community Center 1,500 gallons/minute x 90 minutes = 135,000 gallons
Single Family Homes 750 gallons/minute x 120 minutes = 90,000 gallons
Townhouse Units 1,500 gallons/minute x 120 minutes = 180,000 gallons

1.4 Club House and Community Center Fire Demands

It is anticipated that the golf course club house will require a sprinkler system for fire protection. From the FCNYS Section 903.3.1, all sprinkler systems shall be designed and installed in accordance with NFPA 13. NFPA 13, Section 7-2.2.1 states that Table 7-2.2.1 should be used in determining the minimum water supply requirements for light and ordinary hazard occupancies. The maximum fire flow required in Table 7-2.2.1 is 1,500 gpm for a 90 minute duration. This equates to the following fire flow storage requirement:

1,500 gallons/minute x 90 minutes = 135,000 gallons

It is assumed that the fire flow demands for the adjacent Community Center will be equal to these demands estimated for the Club House.

2.0 PROPOSED IMPROVEMENTS

2.1 Groundwater Source and Supply

This project proposes to utilize groundwater as the source of supply. The water demands for this project, estimated in the previous section are as follows:

	GPD	GPM
Average Daily Demand	95,000	66
Max Daily Demand	190,000	132

The Ten States Standards have the following requirements for groundwater sources:

> 3.2.1.1 The total developed capacity shall equal or exceed the design maximum day demand with the largest producing well out of service.
> 3.2.1.2 A minimum of two sources of groundwater shall be provided unless otherwise specified by the reviewing authority.
> 3.2.1.3 To ensure continuous service when the primary power has been interrupted, a standby power supply shall be provided through, 2. Dedicated portable or in-place auxiliary power of adequate supply and connectivity.

This project proposes to develop three (3) new wells to meet the water demands. The following is the size and proposed yield of the three (3) new wells:

Well No. 9	8" casing	150 gpm
Well No. 8	6" casing	75 gpm
Well No. 4	6" casing	75 gpm

Step drawdown testing was completed for these wells described above, and the results of this testing determined that the above wells could sustain the above yields. The details of this testing in included in the *Site Hydrogeology Aquifer Test and Well Assessment Summary*, prepared by Ground Water Investigations, Inc. included in an appendix to this report.

Either Well No. 9 or Wells 8 and 4 in combination can be used to meet the water demands of the project. These wells meet the Ten States Standards mentioned above based on the following:

- They provide a minimum of two sources of supply.

- They can meet the Maximum day demand with the largest well out of service.
- A portable or in place auxiliary power supply will be provided to Wells No. 8 and 9 to allow operation of the wells if primary power is out of service.

The location of the three (3) proposed production wells is shown on the Overall Water System Plan included in the Attachments to this report. The wells are located generally on the south west side of the project property. The proposed location for the water storage tank and booster pump station is also on the south west side of the project property so as to be near the wells and well houses. The water storage tank will be a ground storage tank that will not be capable of providing adequate pressures for the development, so a booster pump station will be provided to supply the pressures needed. As a result of these conditions, the wells will not be connected directly to the distribution system, but will be piped separately to the storage tank.

The new groundwater wells will be constructed in accordance with NYDOH section 5-B.3 Water Well Construction. Well yields will be determined in accordance with NYDOH Section 5-B.4 and well pumps will be provided in accordance with Section 5-B.5.

2.2 Groundwater Treatment Systems

Water quality testing on the new ground water sources was performed near the conclusion of the 72 hour pump test. The analytical results showed that all compounds analyzed for were found to be below the Maximum Contaminant levels for Public Water Systems in accordance with The State of New York, Title 10. Department of Health, Chapter I. State Sanitary Code, Part 5 Drinking Water Supplies, (NYDOH) Section 5-1.51. Additionally, MPA analysis and other testing indicate no potential for direct interaction between the surface water and the groundwater within the bedrock aquifer. This information is all documented in the *Site Hydrogeology Aquifer Test and Well Assessment Summary*, prepared by Ground Water Investigations, Inc. included in the Attachments to this report.

In accordance with The State of New York, Title 10. Department of Health, Chapter I. State Sanitary Code, Part 5 Drinking Water Supplies, Section 5-1.30, the minimum treatment for groundwater shall be disinfection by chlorination or other disinfection method acceptable to the department.

For this project, it is proposed that each well source will be provided with a disinfection treatment system consisting of liquid sodium hypochlorite. The chlorinators will be sized so that they can provided a chlorine residual of at least 2 mg/l after a contact time of 30 minutes at the maximum flows of each well. The

liquid sodium hypochlorite will be pumped and dosed by adjustable chemical feed pumps. Chemical feed rates can be adjusted on the pump by the operator based on the current flows. Two (2) chemical feed pumps will be provided for each pump to provide standby equipment in the event of equipment malfunction or maintenance. (Ten States Standards 4.3.1.2 and 4.3.1.3).

The disinfection treatment systems will be provided in a small utility buildings located near each well. Due to the close proximity of Wells No 8 and 9, the disinfection treatment may be combined into one building, and then a second building will be provided for Well 4. In addition to the disinfection treatment systems, each building and each well will include the following items for proper operation of the wells.

Flowmeter
Pressure Relief valve
Pressure gauges
Sample taps before and after the chlorine feed points

A Water System Schematic and Well House Plan Drawing are included in the Attachments section of this report.

The CT time for needed for each well and disinfection system will be determined based on the CT values for inactivation of Giardia lamblia cysts by free chlorine at various pH and temperature levels as listed in NYDOH Section 5-1.52 tables 14A through 14F. CT time will be provided in the storage tank after the point of chlorine injection. The Storage Tank volume will provide adequate CT time prior to reaching the public in the distribution system.

2.3 Finished Water Storage and Pumping Facilities

2.3a Water Storage Sizing

The Ten States Standards recommend that storage facilities meet the domestic demands and fire flow demands as follows:

- Provide sufficient volume to meet fire flow requirements (flow rate and duration)
- The minimum storage capacity for systems not providing fire flow should be equal to the average day demand.

The NYDOH Design of Small Water systems recommends that storage facilities meet the larger of the following conditions:

- One half of the average daily demand.
- The maximum daily demand plus fire flow demand minus the water supply available.

The maximum fire flow anticipated for the townhouse units is 1,500 GPM for 120 minutes. The following is a comparison of the maximum daily flow volume versus the peak hour flow plus fire flow volume:

Average Daily Demand = 95,000 Gallons

Maximum Daily Demand = 190,000 Gallons

Largest Fire Flow Demand = 1,500GPM x 120 min = 180,000 Gallons

Max Day Demand + Fire Flow – Well Supply =
190,000 GPD + 180,000 GPD – 216,000 GPD = 154,000 GPD

From the above water volumes, the Fire Flow Demand is the greater volume to be stored. This is a volume of 180,000 gallons. It is recommended that a storage tank with a volume of approximately 200,000 gallons be provided.

This project proposes a 200,000 gallon ground storage tank to meet the storage requirements for the project. The tank will be constructed at or slightly above grade. The tank will be a cylindrical shape constructed out of steel and will be coated inside and out to protect the steel. The following are the estimated dimensions for the tank:

Diameter	41 feet
Height to Overflow	20 feet
Volume to Overflow	200,000 Gallons
Overall Height	24 feet plus height of dome roof

The water storage tank will be designed in accordance with the requirements included in the Ten States Standards, Part 7 for Finished Water Storage facilities and American Water Works Association (AWWA) D100 latest edition. The following are some of the items to be provided with the tank:

- Tank Coatings will be provided in accordance with AWWA-D102-06 and NSF 61 requirements.
- The Tank will be provided with an overflow and exterior overflow pipe with a screen and flapper valve. The site will be graded to direct overflow water away from the tank, pump station and proposed residential development.
- The tank will be provided with a roof and vent on the roof to allow air in and out as it fills and drains. The vent shall also be provided with a screen.

- The tank will be provided with two (2) bolted manways on the sides of the tank approximately 3 feet above the bottom of the tank to allow access when the tank is empty for maintenance or repairs.
- The tank will be provided with two (2) access hatches on the roof to allow access when the tank is full.
- The tank will be provided with ladders, handrails, and safety equipment to allow access to the roof for maintenance.
- The tank will be provided with separate inlet and outlet pipes and they will be located on opposite sides of the tank to promote circulation through the tank. A silt stop will be provided on the tank outlet pipe.
- The tank may be provided with freeze protection equipment as needed.
- Prior to putting into service, the tank will be disinfected in accordance with AWWA C652.

A Water Storage Tank Detail Drawing is included in the Attachments section of this report.

2.3.b Water Booster Pumping Station

This project proposes a Water Booster Pumping station to provide the required pressures for the distribution system for the development. The booster pump station will be located in a building adjacent to the water storage tank and will draw suction directly from the water storage tank. The entire tank and booster pump station site will be secured with a fence around the perimeter. The design flows for the development will be met with a series of pumps operating in parallel. The pumps, piping and building will be designed in accordance with the requirements included in the Ten States Standards, Part 6 for pumping facilities. The following is the estimated number and capacity of the proposed pumps to be included in the pump station:

Jockey pump	One (1)	25 GPM
Duty pump	Two (2) (1+1 standby)	130 GPM
Fire Flow Pump	One (1)	1500 GPM

The Jockey pump will operate during low flow periods to maintain pressure to the system. The duty pump will operate to meet the peak hour demand. The second duty pump will act as a back up to the first. The Fire Flow pump will be provided to meet the fire flow demand. The pumps will operate based on the pressure demands in the system. The following is a brief description of the intended operation of the pumps:

The jockey pump will be operating to maintain the distribution system pressure during low demands. As the demand through the day increases, the jockey pump will not be able to meet the demands and the system pressure will drop. When the system pressure drops below a pre-determined set point, the pump controller will energize the duty pump and de-energize the jockey pump. The duty pump will then operate to meet the higher demands. As the demands decrease with the duty pump operating, the pressure will begin to increase. Once the system pressures rise to a pre-determined set point, the pump controller will energize the jockey pump and de-energize the duty pump. This process will continue back and forth to maintain the desired pressures. If at some point, the demands decrease so much that even the jockey pump creates an undesired increase in system pressure, an internal recycle loop with pressure control valve will be provided to allow the jockey pump to recycle the water back through the water tank until the demands increase again.

The pump station, pumps and piping shall be provided with the following:

- A flow meter on the discharge indicating rate of flow and totalizer.
- A pressure relief valve
- Each pump will be provided with isolation valves and a check valve.
- A pressure gauge will be provided on the discharge line and a compound gauge on the suction line.
- The pump station will be provided with either two (2) sources of primary power or one (1) primary source and one (1) auxiliary source such as a onsite generator.
- Automatic Pump controls will be provided, and the controls will have the ability to determine certain alarm conditions such as pump failure or power outage. Alarm conditions will be sent to a communication device that will be able to alert operations staff of failure conditions.

A Water Booster Pump Station Drawing is included in the Attachments section of this report.

2.4 Water Distribution System

This portion of the report discussing the proposed Water Distribution System was provided by McGoey, Hauser and Edsall, Consulting Engineers, P.C.

Water Distribution Modeling and Analysis

Water for the proposed development will be supplied by the three onsite water supply wells that will pump water to the onsite water storage tank. Water will be supplied to the entire proposed development area by boosting the water pressure at the water booster pump station located in close proximity to the water supply wells and water storage tank. The computer software "WaterCAD" V 6.54 was utilized to model and analyze the proposed water distribution system. The "WaterCAD" program utilizes the Hardy Cross method of analysis. Model runs were performed to simulate the potable water supply and the fire flow conditions that the system is required to meet in accordance with the "Recommended Standards for Water Works" commonly known as the "Ten States Standards".

The model runs are summarized below:

1. Potable Supply Model:

   The "Ten States Standards" requires that the potable water supply be provided to the service area with a minimum pressure of 35 psi. The site was modeled by providing a potable water supply as follows: 12 gpm to all of the 4 unit multifamily buildings, 3 gpm to the single family homes and 15 gpm to both the Club House and the Community Building. The potable water supply was modeled to confirm that all locations in the development can serve the domestic water service with the minimum pressure of 35 psi. The system was modeled assuming that 90 psi of pressure was added to the distribution system by the water booster pumps in the water booster pump station. An equivalent reservoir elevation of 1440 ft was used in the potable supply computer modeling; this assumes the water booster pump building at an elevation of 1232 ft and the booster pumps being able to provide 90 psi (208 ft) of additional energy to the water system. As shown in the model run, the minimum pressure of 35 psi can be achieved in all parts of the service area during potable water supply conditions.

2. Fire Flow Model:

   The "Ten States Standards" requires that the required fire flow rate be provided to the service area at a minimum pressure of 20 psi. The site was modeled by providing the following fire flow rates: 1500 gpm to all of the 4 unit multifamily buildings, community building and club house, and 1000 gpm to the single family homes in addition to the normal domestic demand. The system was modeled assuming that 90 psi of pressure was added to the

distribution system by the water booster pumps in the water booster pump station. An equivalent reservoir elevation of 1440 ft was used in the potable supply computer modeling; this assumes the water booster pump building at an elevation of 1232 ft and the booster pumps being able to provide 90 psi (208 ft) of additional energy to the water system. As shown in the model run, the design conditions including the flow rate and minimum pressure of 20 psi have been met at all locations in the system.

Both the potable water modeling map with results and fire flow modeling map with results are presented in the Appendix.

Distribution System

The proposed water distribution system has been designed in accordance with AWWA and the Ten States Standards. The proposed distribution watermains will consist of C900 PVC pipe at a minimum buried cover depth of 4 feet below the surface. The sizes of the main are shown on the Water Distribution Modeling Map and the project plans. The minimum size main will be 8-inch diameter.

The water mains have been designed with a minimum horizontal separation distance of 10 feet from gravity sanitary sewers, sanitary sewer forcemains, sanitary sewer manholes, and storm sewers. Where the distribution system crosses sanitary and storm sewers, a minimum vertical separation of 18 inches has been included in the design. Valves will be cast iron. Gate valves will be provided in accordance with Ten States Standards with a maximum spacing of 800 feet. Additionally in accordance with the Ten States Standards, fire hydrants will be located on corners and the spacing along roadways will be from 350 feet to 600 feet.

Surface water crossings will also be performed in accordance the Ten States Standards which include the following:

- 5 feet of cover above the distribution piping beneath the stream bed.
- Distribution piping will be constructed with restrained joints at water crossings.
- Valves will be provided on both sides of the crossing and permanent sample taps will be provided where the surface water is more than 15 feet wide.

3.0 REQUIRED PERMITS AND EROSION & SEDIMENTAITON CONTROL MEASURES

Public Water Supply Permit

A Public Water Supply Permit application will be submitted to the NY State DEC and the NY State Department of Health, as necessary. The items to be submitted generally include the following:

- NY State DEC and US Army Corps of Engineers application forms
- Hydrogeologic Report including well pump test results
- Engineering Design Report for the water system
- Construction plans and specifications for the water system

Stream Crossing and Wetland Crossing Permits

It is anticipated that construction of the distribution system will require at least one stream crossing permit and possibly a wetlands crossing permit. It is anticipated that crossing under a stream or wetland for a utility will be performed by boring and casing or directional drilling methods to minimize disturbance to the stream or wetland. These permit applications will be submitted to the NY State DEC for approval.

Erosion and Sedimentation Control Plans and Narratives

Prior to construction, Erosion and Sedimentation Control Plans and Narratives will be submitted to the appropriate agencies for review and approval. These plans and narratives will provide engineered construction items and methods that will be provided and followed by the contractor to prevent sediment laden runoff from leaving the construction sites and entering local waterways.

4.0 OWNERSHIP, OPERATION, AND MAINTENANCE

Ownership

The water supply and distribution system for this project will be owned by a New York State Transportation Corporation-Water Works Corporation which will be formed to serve the water supply needs of this community. This Water Works Corporation will file a Certificate of Incorporation with the Secretary of State of NY. The New York State Public Service Commission (PSC) oversees the financial aspects of Water Works corporations by reviewing the engineering plans, operational plans and financial plans. The PSC oversees the rates charged by the Water Works corporations to its customer base.

Water System Operator

The water system will be under the responsible supervision of a licensed operator at all times. Most likely, the Water Works Corporation will hire a contract operator who will be responsible to operate and maintain the facilities. The operator shall be certified pursuant to Title 10 Department of Health, Chapter I. State Sanitary Code, Part 5. Drinking Water Supplies, Subpart 5-4. The operation and maintenance responsibilities will include but not be limited to the following:

Observation of the well houses, booster pump station and equipment daily
Record water supply amounts daily (daily totalizer)
Changing drums of liquid sodium hypochlorite and adjusting feed pumps as needed.
Coordination of sampling and testing of water quality samples for reporting.
Completion of monthly reports to be submitted to state agencies
Responding to emergency alarms provided by the facility.
Routine Maintenance of equipment such as changing belts, lubricants, and other wear or replaceable items
Repairs to equipment as capable
Routine flushing of water mains, particularly dead ends. Routine exercising of valves and fire hydrants.
Reading of individual customer water meters if necessary.

Water System Operating Manual

The water system operator will be provided with operating manual information to guide the operator. The operating manual should include the following:

Engineer's Design Report and Hydrogeologic Report
Basic Electrical Schematic of the well houses and booster pump station
Recommended Chemical feed rates and example calculations.
Piping Schematic plans for the well houses
Plans of all underground piping

Recommended operating ranges for equipment
Equipment maintenance check list
Procedure for residuals disposal
Equipment parts list
Copies of all warrantees and Guarantees
Trouble-shooting Guide
Permit requirements
Laboratory requirements and testing schedule
Operator requirements and hours
Emergency operation procedures
Utility Company contact information

5.0 REFERENCES

Title 10 Department of Health, Chapter I. State Sanitary Code, Part 5. Drinking Water Supplies, Subpart 5-1 Public Water Systems.

Recommended Standards for Water Works, 2007 Edition

The New York State Department of Health, The Design of Small Water Systems, 1958, reprinted 1999

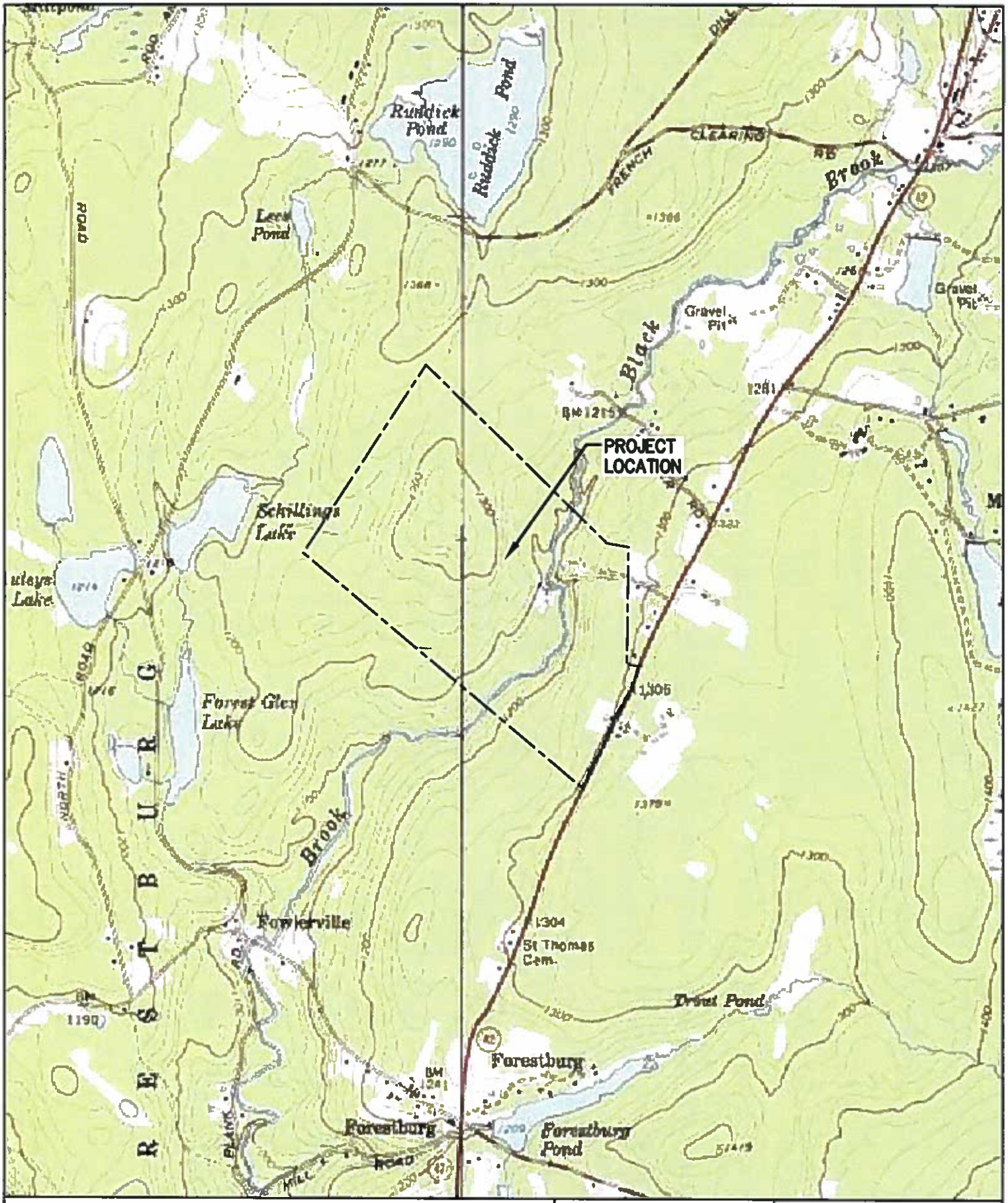
New York State Department of Environmental Conservation Design Standards for Wastewater Treatment Work, 1988

Fire Code of New York State (FCNYS), August 2007

National Fire Protection Association (NFPA) 13, Standard for the Installation of Sprinkler Systems, 1999 Edition

American Water Works Association

ISO Guide for Determination of Needed Fire Flow, 2008



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FORESTBURGH CONSERVATION LEAGUE, L.L.C.
TOWN OF FORESTBURGH
SULLIVAN COUNTY, NY

Date:	Project No.
5/11/09	07042
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NTS	1

Calculate Needed Fire Flow (NFF)

FIRE FLOW NEEDED – TOWNHOUSES

NFF = (Ci)(Oi) [1.0 + (X+P)i]

Find Ci Construction Factor

$Ci = 18F (Ai)^5$ F = 1.5 for Construction Class I

Calculate Ai (Worse Case Scenario : Patio Home → 2,400 SF)

Area of largest undivided area = 2,400 ft.²

50% of 2nd largest area = (0.5) (1,800) = 900 ft.²

Total max area (1 floor) = 3,300 ft.²

1 Story

Total Ai = 3,300 ft ² + (0.5)* 0 ft.²
= 3,300 ft.²

$C = 18 (1.5) (3{,}300 \text{ ft}^2)^5$

= 1,551

Find Oi (Occupancy Factor)

Occupancy Combustibility Class = C-2

Oi = 0.85

Find Xi + Pi

Find length: height ratio of facing wall of exposure building

Length = 40 ft.
# stories = 2
Ratio = 40 ft./2 stories = 20

Per chart 330.A, Xi = 0.12

Find Pi

Assume 0 passageways/fire doors
Therefore, Pi = 0

Calculate NFF for Townhouses

NFF = (Ci)(Oi) [1 +(X+P)i]

Assumptions → sprinklers not used

NFF = (1,551) (0.85) [1.12]
= 1,476 gpm

Round to nearest 250 gpm

NFF= 1,500 gpm

GUIDE FOR DETERMINATION OF NEEDED FIRE FLOW

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EDITION 05-2008

FOREWORD

ISO has prepared this guide as an aid in estimating the amount of water that should be available for municipal fire protection. ISO calls this the needed fire flow. This publication is only a guide and requires knowledge and experience in fire protection engineering for its effective application.

INDEX

PREFACE

ISO is the premier source of information, products, and services related to property and liability risk. For a broad spectrum of types of insurance, ISO provides statistical, actuarial, underwriting, and claims information and analyses; consulting and technical services; policy language; information about specific locations; fraud-identification tools; and data processing. In the United States and around the world, ISO serves insurers, reinsurers, agents, brokers, self-insureds, risk managers, insurance regulators, fire departments, and other governmental agencies.

One of ISO's important services is to evaluate the fire suppression delivery systems of jurisdictions around the country. The result of those reviews is a classification number that ISO distributes to insurers. Insurance companies use the Public Protection Classification (PPC™) information to help establish fair premiums for fire insurance – generally offering lower premiums in communities with better fire protection.

ISO uses the Fire Suppression Rating Schedule (FSRS) to define the criteria used in the evaluation of a community's fire defenses. Within the FSRS, a section titled "Needed Fire Flow" outlines the methodology for determining the amount of water necessary for providing fire protection at selected locations throughout the community. ISO uses the needed fire flows to:

1. Determine the community's "basic fire flow." The basic fire flow is the fifth highest needed fire flow in the community. ISO uses the basic fire flow to determine the number of apparatus, the size of apparatus fire pumps, and special fire-fighting equipment needed in the community.
2. Determine the adequacy of the water supply and delivery system. ISO calculates the needed fire flow for selected properties and then determines the water flow capabilities at these sites. ISO then calculates a ratio considering the need (needed fire flow) and the availability (water flow capability). ISO uses that ratio in calculating the credit points identified in the FSRS.

ISO developed the needed fire flow through a review of actual large-loss fires. ISO recorded the average fire flow and other important factors, including construction type, occupancy type, area of the building, and exposures. Those factors are the foundation of the needed fire flow formula.

The following pages include a number of excerpts from another ISO document, the Specific Commercial Property Evaluation Schedule (SCOPES). ISO uses the SCOPES manual to weigh features of individual properties for the purpose of defining the building's vulnerability to fire loss. Insurers also use this information in their underwriting and ratemaking decisions.

CHAPTER 1

Needed Fire Flow Formula

To estimate the amount of water needed to fight a fire in an individual, nonsprinklered building, ISO uses the formula:

$$NFF = (C_i)(O_i)[(1.0+(X+P)_i]$$

where

NFF_i	=	the needed fire flow in gallons per minute (gpm)
C_i	=	a factor related to the type of construction
O_i	=	a factor related to the type of occupancy
X	=	a factor related to the exposure buildings
P	=	a factor related to the communication between buildings

To calculate the needed fire flow of a building, you will need to determine the predominant type (class) of construction, size (effective area) of the building, predominant type (class) of occupancy, exposure from the property, and the factor for communication to another building.

Here is a summary of the step-by-step process:

Step 1. Determine the predominant construction type and the associated factor (F).
Step 2. Determine the effective area (A_i).
Step 3. Substitute the values for "F" and "A" into the formula $C_i=18F(A_i)^{0.5}$ and calculate the construction factor (C_i).
Step 4. Round off the construction factor (C_i) to the nearest 250 gpm.
Step 5. Determine the predominant occupancy type and the associated factor (O_i).
Step 6. Determine if there is an exposure charge by identifying the construction type and length-height value of the exposure building as well as the distance (in feet) to the exposure building. Also make note of any openings and protection of those openings in the wall facing the subject building (the building the needed fire flow is being calculated on). The factor related to the exposure building is (X).
Step 7. Determine if there is a communication charge by identifying the combustibility of the passageway, whether the passageway is open or closed, the length, and a description of any protection provided in the passageway openings. The factor related to the communications between buildings is (P).
Step 8. Substitute the values for the factors in the formula $NFF_i = (C_i)(O_i)[1.0+(X+P)_i]$ to determine the needed fire flow.

Further details of the step-by-step process are provided in the following pages.

Note: ISO does not determine a needed fire flow for buildings rated and coded by ISO as protected by an automatic sprinkler system meeting applicable National Fire Protection Association standards. See Chapter 6, "Determining Recognition of Automatic Sprinkler Systems," for more information.

CHAPTER 2

Type of Construction (C_i) and Effective Area (A_i)

To determine the portion of the needed fire flow attributed to the construction and area of the selected building, ISO uses the formula:

$$C_i = 18F\,(A_i)^{0.5}$$

Where:

F = coefficient related to the class of construction
- F = 1.5 for Construction Class 1 (wood frame construction)
- = 1.0 for Construction Class 2 (joisted masonry construction)
- = 0.8 for Construction Class 3 (noncombustible construction and Construction Class 4 (masonry noncombustible construction)
- = 0.6 for Construction Class 5 (modified fire-resistive construction) and Construction Class 6 (fire-resistive construction)

A_i = effective area

Appendix A provides C_i for a range of construction classes (F) and effective areas (A_i).

1. Construction Materials and Assemblies

ISO uses the following definitions to determine the construction class for a building:

a. Combustible: Wood or other materials that will ignite and burn when subjected to fire, including materials with a listed flame-spread rating greater than 25. Also included are assemblies or combinations of combustible materials with other materials, such as the following:

(1) Metal walls or floors sheathed on either interior or exterior surfaces (with or without air space) with wood or other combustible materials (flame-spread rating over 25).

(2) Metal floors or roofs with combustible insulation or other combustible ceiling material attached to the underside of the floor or interior surface of the roof deck, or within 18" of the horizontal supports.

(3) Combustible wall materials with an exterior surface of brick, stone, or other masonry materials (commonly known as "masonry veneer").

(4) Noncombustible wall or roof construction on a skeleton wood frame (commonly known as "wood-iron clad").

(5) Combustible wall or roof construction on a noncombustible or slow burning frame.

(6) Composite assemblies of noncombustible materials with combustible materials, such as a combustible core between two noncombustible panels, or a noncombustible panel with a combustible insulation material (flame-spread rating over 25).

(7) Composite assemblies of noncombustible or slow burning materials combined with foamed plastic materials (with any flame-spread rating), unless the foamed plastic materials qualify as slow burning. (Refer to Item f, below.)

(8) Combustible assemblies which are listed as having not less than a one-hour rating.

b. **Fire-resistive:** Noncombustible materials or assemblies which have a fire-resistance rating of not less than one hour.

c. **Masonry:** Adobe, brick, cement, concrete, gypsum blocks, hollow concrete blocks, stone, tile, and similar materials with a minimum thickness of 4".

d. **Noncombustible:** Materials, no part of which will ignite and burn when subjected to fire, such as aluminum, asbestos board, glass, gypsum board, plaster, slate, steel, and similar materials. Also included are:

(1) Fire-resistive and protected-metal assemblies with a fire-resistance rating of less than one hour

(2) Materials or composite materials with a listed surface-flame-spread rating of 0 and of such composition that surfaces that would be exposed by cutting through the material in any way would not have a listed flame-spread rating greater than 0

(3) Masonry walls less than 4" thick, which are not a part of combustible walls (masonry veneer)

Note: Combustible nailing (furring) strips fastened directly to noncombustible supports shall not affect the classification of noncombustible walls, floors, or roofs.

e. **Protected metal:** Metal which is protected by materials so that the resulting assembly has a fire-resistance rating of not less than one hour.

f. **Slow burning:** Materials with a listed flame-spread rating greater than 0 but not greater than 25; except, foamed plastic materials shall be rated as slow burning if such materials or coverings meet one of the conditions in (1) or (2) below.

An acceptable thermal barrier includes those which have been tested as part of a field-fabricated or factory-manufactured composite assembly which has passed one of the acceptable wall or ceiling panel tests, when applied over foamed plastic material of a thickness and listed flame-spread rating not greater than that used in the composite assembly tested. Where any material is of a type which falls or drips to the floor of the furnace during the flame-spread test, the flame-spread rating of the material, when not protected by a thermal barrier, shall be based on the flame-spread rating of the material on the floor of the furnace, where this flame-spread is higher than the flame-spread of the material on the furnace ceiling. In all other cases, the normal flame-spread rating of the material on the furnace ceiling shall be used.

(1) An acceptable thermal barrier consisting of 1/2" or greater noncombustible material, such as plaster, cement, or gypsum board, when used over foamed plastic material having a listed flame-spread rating not greater than 25

(2) An acceptable thermal barrier which is listed with not less than a 15-minute finish rating when used over foamed plastic material having a listed flame-spread rating not greater than 25

Note 1: Combustible nailing (furring) strips fastened directly to slow burning supports shall not affect the classification of slow burning walls, floors, or roofs.

Note 2: Lumber and lumber products shall be eligible for consideration as slow burning only when all the ceilings and the walls are treated with a listed flame-retardant impregnation which meets all of the following requirements:

(1) Impregnation-treated materials shall be properly identified as having a flame-spread rating of 25 or less.

(2) Such identification shall indicate that there is no evidence of significant progressive combustion when subjected to at least 30 minutes test duration.

(3) Such identification shall indicate that the material has a permanent treatment not subject to deterioration from the effects of weathering, exposure to moisture or humidity, etc. (This requirement only applies where the treated material is exposed to the weather or moisture.) However, combustible nailing (furring) strips, doors, trim, and the top surfaces of combustible floors shall not be required to be treated.

g. **Unprotected metal:** Metal with no fire-resistive protection, or with a fire-resistance rating of less than one hour.

2. Classification of Basic Construction Types

ISO classifies construction types into six different categories:

Construction Class 6 (fire-resistive construction)
Construction Class 5 (modified fire-resistive construction)
Construction Class 4 (masonry noncombustible construction)
Construction Class 3 (noncombustible construction)
Construction Class 2 (joisted masonry construction)
Construction Class 1 (wood frame construction)

Note: In applying the rules below, ISO disregards below-grade basement walls and the construction of the lowest floor (usually concrete).

a. **Fire-resistive (Construction Class 6):** Buildings constructed of any combination of the following materials:

Exterior walls or exterior structural frame:

- Solid masonry, including reinforced concrete, not less than 4 inches in thickness
- Hollow masonry not less than 12 inches in thickness
- Hollow masonry less than 12 inches, but not less than 8 inches in thickness, with a listed fire-resistance rating of not less than two hours
- Assemblies with a fire-resistance rating of not less than two hours

Note: Panel or curtain sections of masonry may be of any thickness.

Floors and roof:

- Monolithic floors and roof of reinforced concrete with slabs not less than 4 inches in thickness
- Construction known as "joist systems" (or pan-type construction) with slabs supported by concrete joists spaced not more than 36 inches on centers with a slab thickness not less than 2 ¾ inches
- Floor and roof assemblies with a fire-resistance rating of not less than two hours

Structural metal supports:

- Horizontal and vertical load bearing protected metal supports (including prestressed concrete units) with a fire-resistance rating of not less than two hours

Note: Wherever in the SCOPES reference is made to "pre-stressed," this term shall also include "post-tensioned."

b. **Modified fire-resistive (Construction Class 5):** Buildings with exterior walls, floors, and roof constructed of masonry materials described in a., above, deficient in thickness, but not less than 4 inches; or fire-resistive materials described in a., above, with a fire-resistance rating of less than two hours, but not less than one hour.

c. **Masonry noncombustible (Construction Class 4):** Buildings with exterior walls of fire-resistive construction (not less than one hour), or of masonry, not less than 4 inches in thickness and with noncombustible or slow burning floors and roof (including noncombustible or slow burning roof decks on noncombustible or slow burning supports, regardless of the type of insulation on the roof surface).

d. **Noncombustible (Construction Class 3):** Buildings with exterior walls, floors, and roof of noncombustible or slow burning materials supported by noncombustible or slow burning supports (including noncombustible or slow burning roof decks on noncombustible or slow burning supports, regardless of the type of insulation on the roof surface).

e. **Joisted masonry (Construction Class 2):** Buildings with exterior walls of fire-resistive construction (not less than one hour), or of masonry, and with combustible floors and roof.

f. **Frame (Construction Class 1):** Buildings with exterior walls, floors, and roof of combustible construction, or buildings with exterior walls of noncombustible or slow burning construction, with combustible floors and roof.

Notes applicable to construction-type definitions above:

Note 1: Masonry or fire-resistive walls with panels composed of glass, noncombustible, slow burning, combustible, or open sections shall retain their classification as masonry or fire-resistive, provided that such panels are in or supported by a structural frame of masonry or protected metal (two hours fire resistance if in walls classed as Construction Class 6, one hour in classes 2, 4, or 5). Similarly, masonry or fire-resistive floors with wood or other combustible surfacing in buildings otherwise subject to Construction Classes 5 or 6 shall retain their classification as Classes 5 or 6.

Note 2: Noncombustible or slow burning roof deck with an exterior surface of combustible materials, such as combustible insulation, felt, asphalt, or tar, shall retain its classification as noncombustible or slow burning.

3. Crosswalk to Other Construction Types

The International Code Council (ICC) and the National Fire Protection Association (NFPA) have their own classification of construction types. These classifications are used in the codes and standards that they promulgate and are unique to their organization's publications. Below is a table that generally compares ISO's construction types to those of these other organizations.

Construction Types

ISO SCOPES Definition	ISO Construction Class	International Code (ICC)	NFPA 220	NFPA 5000	Standard Code 1997 (SBCCI)	National 1999 (BOCA)	Uniform Code 1997 (ICBO)
Wood frame	1	V, B	V	V	VI	5B	V
Ordinary (joisted masonry)	2	III, A	III	III	V	3	IIIV
Non-combustible (all metal)	3	II, B	II	II	IV	2C	11-N
Non-combustible (masonry)	4	II, A	II	III	IV	2B	II- 1 hr.
Modified – fire resistive	5	II, A	II	II	II	1B	II fire resistive
Fire resistive	6	I, A	I	I	I	1A	I
Heavy timber	2	IV	IV	IV	III	4	IV

4. Classification of Mixed Construction

In buildings constructed as defined in two or more classes above, ISO determines the appropriate construction class as follows:

Note: In applying these rules, ISO disregards basement walls and the lowest floor level.

a. **Fire-resistive:** Any building with 66 2/3 % or over of the total wall area and 66 2/3 % or over of the total floor and roof area constructed as defined in Construction Class 6.

b. **Modified fire-resistive:** Any building with 66 2/3 % or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in Construction Class 5; or

Any building with 66 2/3% or over of the total wall area, and 66 2/3% or over of the total floor and roof area constructed as defined in Construction Classes 5 and 6, but with neither type in itself equaling 66 2/3% or over of the total area.

c. **Masonry noncombustible:** Any building with 66 2/3% or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in Construction Class 4; or

Any building not qualifying under a. or b., above, with 66 2/3% or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in two or more of Construction Classes 4, 5, and 6, but with no single type in itself equaling 66 2/3% or over of the total area.

d. **Noncombustible:** Any building with 66 2/3% or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in Construction Class 3; or

Any building not qualifying under a. through c., above, with 66 2/3% or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in two or more of Construction Classes 3, 4, 5, and 6, but with no single type in itself equaling 66 2/3% or over of the total area.

e. **Joisted masonry:** Any building not qualifying under a. through d., above, with 66 2/3% or over of the total wall area constructed as described in Construction Class 2; or

Any building not qualifying under a. through d., above, with 66 2/3% or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in two or more of Construction Classes 2, 3, 4, 5, and 6, but with no single type in itself equaling 66 2/3% or over of the total area.

f. **Frame:** Any building not qualifying under a. through e., above, or any building with over 33 1/3 % of the total wall area of combustible construction, regardless of the type of construction of the balance of the building.

5. Determining Effective Area (A_i)

In the portion of the needed fire flow formula attributed to the construction and area of the subject building,

$$C_i = 18F\,(A_i)^{0.5}$$

The factor "A_i" is the "effective area" of the subject building.

a. Exempt areas:
Disregard the following in the determination of the effective area:

- In nonsprinklered buildings, or buildings which do not qualify for sprinkler credit (see Chapter 6, "Determining Recognition of Automatic Sprinkler Systems"), disregard floor areas (including basement and subbasement) where the entire floor is protected by an acceptable system of automatic sprinklers or other acceptable automatic fire protection systems, provided that there are no Combustibility Class C-5 occupancies on the floor (see "Occupancy Factor," i.e., "Rapid burning or flash burning").

- Basement and subbasement areas which are vacant, or are used for building maintenance, or which are occupied by occupancies having C-1 or C-2 contents combustibility (see "Occupancy Factor") regardless of the combustibility class applicable to the building. A basement is a story of a building which is 50% or more below grade, unless such story is accessible at grade level on one or more sides. A story which is less than 50% below grade shall also be considered a basement if such story is wholly enclosed by blank masonry foundation walls.

- In breweries, malt mills, and other similar occupancies, disregard perforated (slatted) operating decks which contain no storage.

- Roof structures, sheds, or similar attachments.

- Courts without roofs.

- Areas of mezzanines less than 25% times the square foot area of the floor immediately below.

b. Modification for division walls:
An acceptable division wall shall be constructed entirely of noncombustible materials with a fire-resistance rating of not less than one hour, or of masonry materials, and shall:

(1) Extend from one exterior wall to another (or form an enclosed area within the building).

(2) Extend from one masonry or fire-resistive floor to another masonry or fire-resistive floor, or from a masonry or fire-resistive floor to a roof of any construction.

(3) Have all openings through the wall protected by an automatic or self-closing labeled Class B (not less than one-hour) fire door.

Where division walls meet the above requirements, the maximum area on any floor used to determine the effective area shall be the largest undivided area plus 50% times the second largest undivided area on that floor.

c. Effective area calculation:

After modification for division walls as provided above, the effective area shall be the total square foot area of the largest floor in the building, plus the following percentage of the total area of the other floors:

(1) Buildings classified as Construction Classes 1 - 4: 50% of all other floors.

(2) Buildings classified as Construction Classes 5 or 6:

(a) If all vertical openings in the building are protected (see 4d., "Protection requirements," below), 25% times the remaining area not exceeding the two other largest floors.

(b) If one or more vertical openings in the building are unprotected (see 4d., "Protection requirements," below), 50% times the remaining area not exceeding 8 other floors with unprotected openings.

Note: The effective area determined under item 4c.(2)(b), above, shall not be less than the effective area that would be determined under item 4c.(2)(a), above, if all openings were protected.

d. Protection requirements:

The protection requirements for vertical openings are only applicable in buildings of Construction Class 5 or 6. The type of protection for vertical openings shall be based on the construction of the enclosure walls and the type of door or other device used for the protection of openings in the enclosure.

The following materials are acceptable for one-hour construction in enclosure walls: 4-inch brick, 4-inch reinforced concrete, 6-inch hollow block, 6-inch tile, or masonry or noncombustible materials listed with a fire-resistance rating of not less than one hour.

Protected openings:

Enclosures shall have walls of masonry or fire-resistive construction with a fire-resistance rating of not less than one hour.

Doors shall be automatic or self-closing and be labeled for Class B opening protection (not less than one-hour rating).

Elevator doors shall be of metal or metal-covered construction, so arranged that the doors must normally be closed for operation of the elevator.

Unprotected openings:

Unprotected floor openings. Also includes doors or enclosures not meeting the minimum requirements for protected openings, above.

5. Maximum and Minimum Value of C_i:

The value of C_i shall not exceed

8,000 gpm for Construction Class 1 and 2
6,000 gpm for Construction Class 3, 4, 5, and 6
6,000 gpm for a 1-story building of any class of construction

The value of C_i shall not be less than 500 gpm.

ISO rounds the calculated value of C_i to the nearest 250 gpm.

CHAPTER 3

Occupancy Factor (O_i)

The factors below reflect the influence of the occupancy in the subject building on the needed fire flow:

Occupancy Combustibility Class	Occupancy Factor (O_i)
C-1 (Noncombustible)	0.75
C-2 (Limited-combustible)	0.85
C-3 (Combustible)	1.00
C-4 (Free-burning)	1.15
C-5 (Rapid burning)	1.25

1. Determining Occupancy Type

Occupancy combustibility classifications reflect the effect of the combustibility of contents on the building structure. ISO uses the following definitions to determine the combustibility classification of an occupancy:

a. **Noncombustible (C-1)** - Merchandise or materials, including furniture, stock, or equipment, which in permissible quantities does not in themselves constitute an active fuel for the spread of fire.

No occupancy shall be eligible for this classification which contains a sufficient concentration of combustible material to cause structural damage OR which contains a sufficient continuity of combustible materials so that a fire could spread beyond the vicinity of origin.

The maximum amount of combustible materials in any 10,000 square-foot section of an occupancy otherwise containing noncombustible materials shall not exceed 1000 board feet of lumber, or over 2 barrels (110 gallons) of combustible liquids or greases or equivalent amounts of other combustible materials. Further, the maximum total area containing combustible material in an occupancy otherwise containing noncombustible materials shall not exceed 5% of the total square foot area of that occupancy.

Note: In determining the applicability of C-1, combustible interior walls or partitions (including combustible finish), mezzanines, racks, shelves, bins, and similar combustible construction shall be considered combustible material.

Examples of occupancies which may (subject to survey) be eligible for C-1 classification include those storing asbestos, clay, glass, marble, stone, or metal products and some metalworking occupancies.

b. **Limited-combustible (C-2)** - Merchandise or materials, including furniture, stock, or equipment, of low combustibility, with limited concentrations of combustible materials.

Examples of occupancies classified as C-2 include banks, barber shops, beauty shops, clubs, habitational occupancies, hospitals, and offices.

Occupancies classified as C-2 in the occupancy classification list may be eligible for C-1 classification provided that such occupancy meets all of the requirements for C-1 classification.

Note: For manufacturing occupancies where over 20% of the total square foot area of the occupancy contains storage of combustible material or materials crated or wrapped in combustible containers, the combustibility class applicable to the occupancy shall not be less than C-3.

c. **Combustible (C-3)** - Merchandise or materials, including furniture, stock, or equipment, of moderate combustibility.

Examples of occupancies classified as C-3 include food markets, most wholesale and retail occupancies, etc.

Occupancies classified as C-3 in the occupancy classification list may be eligible for C-2 classification, provided that the total square foot area containing combustible material does not exceed 10% of the total square foot area of the occupancy.

Note: For the purpose of the above rule, combustible interior walls or partitions (including combustible finish), racks, shelves, bins, and similar combustible construction shall be considered combustible material.

d. **Free-burning (C-4)** - Merchandise or materials, including furniture, stock, or equipment, which burn freely, constituting an active fuel.

Examples of occupancies classified as C-4 include cotton bales, furniture stock, and wood products.

e. **Rapid burning or flash burning (C-5)** - Merchandise or materials, including furniture, stock, or equipment, which either

(1) burn with a great intensity

(2) spontaneously ignite and are difficult to extinguish

(3) give off flammable or explosive vapors at ordinary temperatures

(4) as a result of an industrial processing, produce large quantities of dust or other finely divided debris subject to flash fire or explosion

Examples of occupancies classified as C-5 include ammunition, excelsior, explosives, mattress manufacturing, matches, and upholsterers.

2. Determining Occupancy Combustibility Classification in Multiple Occupancy Buildings

In sole occupancy buildings or in multiple-occupancy buildings with occupancies subject to a single-occupancy classification, the occupancy classification applicable to the occupant(s) shall also apply to the building.

In multiple-occupancy buildings with occupancies having different occupancy classifications, the occupancy classification applicable to the building shall be determined according to the total floor area (including basements and subbasements) occupied by each occupancy, as follows:

Note: Basement and subbasement areas which are either vacant or used for building services or building maintenance shall be considered C-2 combustibility. Where such areas are used for other purposes, the combustibility class for those areas shall be determined according to the combustibility class of their occupancies.

- **C-1** combustibility shall apply ONLY where 95% or more of the total floor area of the building is occupied by C-1 occupants, and there are no C-5 occupancies.

- **C-2** combustibility shall apply to buildings which
  a. do not qualify as C-1 above, but where 90% or more of the total floor area of the building is occupied by C-1 and C-2 occupancies; OR
  b. are classified as CSP Construction Class 5 or 6, AND where 80% or more of the total floor area of the building is occupied by C-1 and C-2 occupancies, AND NOT MORE THAN 5% of the total floor area is occupied by C-5 occupancies.

- **C-4** combustibility shall apply to any building containing C-4 occupants, where the combined total area occupied by C-4 and C-5 (if any) occupants is 25% OR MORE OF THE TOTAL FLOOR AREA of the building, provided the C-5 occupancies occupy, in total, less than 15% of the total floor area.

- **C-5** combustibility shall apply to any building where 15% OR MORE OF THE TOTAL FLOOR AREA is occupied by C-5 occupancies.

- **C-3** combustibility shall apply to any building not provided for above.

Occupancy Type Examples

Noncombustible (C-1) - Merchandise or materials, including furniture, stock, or equipment, which in permissible quantities do not in themselves constitute an active fuel for the spread of fire.

C-1 occupancy type examples:

- Asbestos storage
- Clay storage
- Marble storage
- Metal products storage
- Stone storage

Limited-combustible (C-2) - Merchandise or materials, including furniture, stock, or equipment, of low combustibility, with limited concentrations of combustible materials.

C-2 occupancy type examples:

- Airport, bus, railroad terminal
- Apartment
- Artist's studio
- Auto repair shop
- Auto showroom
- Aviary
- Barber shop
- Church
- Cold storage warehouse
- Day care center
- Educational institution
- Gasoline service station
- Greenhouse
- Health club
- Jail
- Library
- Medical laboratory
- Motel
- Museum
- Nursing home
- Office
- Pet grooming shop
- Photographer's studio
- Radio station
- Recreation center
- Rooming house
- Undertaking establishment

Combustible (C-3) - Merchandise or materials, including furniture, stock, or equipment, of moderate combustibility.

C-3 occupancy type examples:

- Auto parts store
- Auto repair training school
- Bakery
- Boat sales (where storage≥15%)
- Book store
- Bowling establishment
- Casino
- Commercial laundry
- Contractor equipment storage
- Department store (where storage≥15%)
- Dry cleaner (no flammable fluids)
- Gift shop (where storage≥15%)
- Hardware store (where storage ≥15%)
- Leather processing
- Municipal storage building
- Nursery sales outlet store
- Pavilion or dance hall
- Pet shop
- Photographic supplies
- Printer
- Restaurant
- Sandwich shop
- Shoe repair
- Sporting goods (where storage ≥15%)
- Supermarket
- Theater
- Vacant building
- Wearing apparel factory (except furs)

Free-burning (C-4) - Merchandise or materials, including furniture, stock, or equipment, which burn freely, constituting an active fuel.

C-4 occupancy type examples:

- Aircraft hangers
- Cabinet making
- Combustible metals (e.g., magnesium)
- Dry cleaner (using flammable fluids)
- Feed store (with > 1/3 ton of hay)
- Fur apparel manufacturing
- Furniture manufacturing
- Kennels
- Lumber
- Packaging and crating
- Paper products manufacturing
- Petroleum bulk distribution center
- Stables
- Tire manufacturing
- Tire recapping or retreading
- Wax products (candles, etc.)
- Woodworking shop

Rapid burning or flash burning (C-5) - Merchandise or materials, including furniture, stock, or equipment, which either

(1) burn with a great intensity

(2) spontaneously ignite and are difficult to extinguish

(3) give off flammable or explosive vapors at ordinary temperatures

(4) as a result of an industrial processing, produce large quantities of dust or other finely divided debris subject to flash fire or explosion

C-5 occupancy type examples:

- Ammunition
- Feed mill (with > 7 tons of hay & straw)
- Fireworks
- Flammable compressed gases
- Flammable liquids
- Flour mill
- Highly flammable solids
- Matches
- Mattress factory
- Nitrocellulose-based plastics
- Painting with flammables or combustibles
- Rag storage
- Upholstering shop
- Waste paper storage

CHAPTER 4

Exposure and Communication Factor ($X_i + P_i$)

The factors developed in this item reflect the influence of adjoining and connected buildings on the needed fire flow. An exposure building has a wall 100 feet or less from a wall of the subject building. A communicating building has a passageway to the subject building. ISO develops a value for the exposure to another building for the side with the highest charge. Likewise, ISO develops a value for a communication to another building for the side with the highest charge. The formula is:

$(X_i + P_i)$, with a maximum value of 0.60

1. Exposures (Table 330.A)

The factor for X depends upon the construction and length-height value (length of wall in feet, times height in stories) of the exposure building and the distance between facing walls of the subject building and the exposure building. Table 330.A of the FSRS gives the factors. When there is no exposure on a side, $X_i = 0$.

a. Construction of facing wall of exposure – ISO considers the wall construction of the exposure. The exposure factor used considers only the side of the subject building with the highest factor.
b. Length-height value of the facing wall of the exposure – ISO determines the length-height value of the facing wall of the exposure by multiplying the length of the facing wall of the exposure in feet by the height of the exposure in stories. ISO considers buildings five stories or more in height as five stories. Each 15 feet or fraction thereof equals one story.
c. Exposure distance – The distance in feet from the subject building to the exposure building, measured to the nearest foot, between the nearest points of the buildings. Where either the subject building or the exposure is at a diagonal to the other building, ISO increases the exposure distance by 10 feet.
d. Construction of facing wall of subject building – The wall construction of the subject building.

2. Exposure exceptions

The following conditions rule out exposure charges from adjacent buildings:

- Buildings rated sprinklered (See Chapter 6, "Determining Recognition of Automatic Sprinkler Systems.")
- Buildings rated as habitational, including their appurtenant outbuildings
- Buildings of Construction Class 5 or 6
- Buildings of Construction Class 3 or 4 with C-1 or C-2 contents combustibility class applicable to the building

TABLE 330.A FACTOR FOR EXPOSURE (X_i)

Construction of Facing Wall of Subject Building	Distance in Feet to the Exposure Building	Length-Height of Facing Wall of Exposure Building	Construction of Facing Wall of Exposure Building Classes			
			1,3	2, 4, 5, & 6		
				Unprotected Openings	Semiprotected Openings (wired glass or outside open sprinklers)	Blank Wall
Frame, Metal or Masonry with Openings	0 – 10	1-100	0.22	0.21	0.16	0
		101-200	0.23	0.22	0.17	0
		201-300	0.24	0.23	0.18	0
		301-400	0.25	0.24	0.19	0
		Over 400	0.25	0.25	0.20	0
	11 - 30	1-100	0.17	0.15	0.11	0
		101-200	0.18	0.16	0.12	0
		201-300	0.19	0.18	0.14	0
		301-400	0.20	0.19	0.15	0
		Over 400	0.20	0.19	0.15	0
	31 - 60	1-100	0.12	0.10	0.07	0
		101-200	0.13	0.11	0.08	0
		201-300	0.14	0.13	0.10	0
		301-400	0.15	0.14	0.11	0
		Over 400	0.15	0.15	0.12	0
	61 - 100	1-100	0.08	0.06	0.04	0
		101-200	0.08	0.07	0.05	0
		201-300	0.09	0.08	0.06	0
		301-400	0.10	0.09	0.07	0
		Over 400	0.10	0.10	0.08	0
Blank Masonry Wall	Facing wall of the exposure building is higher than the subject building. Use the above table EXCEPT use only the length-height of the facing wall of the exposure building ABOVE the height of the facing wall of the subject building. Buildings five stories or over in height, consider as five stories.					
	When the height of the facing wall of the exposure building is the same or lower than the height of the facing wall of the subject building, $X_i = 0$.					

3. Communications (Table 330.B)

The factor for P depends upon the protection for communicating party-wall openings and the length and construction of communications between fire divisions. Table 330.B of the FSRS gives the factors. When more than one communication type exists in any one side wall, apply only the largest factor P for that side. When there is no communication on a side, $P_i = 0$.

a. Communications with combustible construction - An open passageway must be open on top or at least one side.
b. Fire-resistive, noncombustible, or slow burning communications – ISO considers the type of construction found within the passageway.
c. Description of protection of passageway openings – The protection for the openings to the passageway by Class A or B, single or double fire door.

4. Communications Exceptions

The following conditions rule out charges for communication with other separately rated buildings:

- Buildings rated sprinklered (See Chapter 6, "Determining Recognition of Automatic Sprinkler Systems.")
- Buildings rated as habitational, including their appurtenant outbuildings
- Buildings of Construction Class 5 or 6
- Buildings of Construction Class 3 or 4 with C-1 or C-2 contents combustibility class applicable to the building

TABLE 330.B FACTOR FOR COMMUNICATIONS (P_i)

Description of Protection of Passageway Openings	Fire-resistive, Noncombustible, or Slow burning Communications				Communications with Combustible Construction					
	Open	Enclosed			Open			Enclosed		
	Any Length	10 Ft. or Less	11 Ft. to 20 Ft.	21 Ft. to 50 Ft. +	10 Ft. or Less	11 Ft. to 20 Ft.	21 Ft. to 50 Ft. +	10 Ft. or Less	11 Ft. to 20 Ft.	21 Ft. to 50 Ft. +
Unprotected	0	++	0.30	0.20	0.30	0.20	0.10	++	++	0.30
Single Class A Fire Door at One End of Passageway	0	0.20	0.10	0	0.20	0.15	0	0.30	0.20	0.10
Single Class B Fire Door at One End of Passageway	0	0.30	0.20	0.10	0.25	0.20	0.10	0.35	0.25	0.15
Single Class A Fire Door at Each End or Double Class A Fire Doors at One End of Passageway	0	0	0	0	0	0	0	0	0	0
Single Class B Fire Door at Each End or Double Class B Fire Doors at One End of Passageway	0	0.10	0.05	0	0	0	0	0.15	0.10	0

\+ For over 50 feet, $P_i = 0$.

++ For unprotected passageways of this length, consider the 2 buildings as a single fire division

Note: When a party wall has communicating openings protected by a single automatic or self-closing Class B fire door, it qualifies as a division wall for reduction of area. Where communications are protected by a recognized water curtain, the value of P_i is 0.

CHAPTER 5

Separate Classifications of Buildings

ISO classifies the following as separate buildings:

a. Buildings separated by two independent walls, with no common or continuous combustible roof, that meet all of the requirements under either (1), (2), or (3) below.

(1) Where there is no communication between the two buildings

(2) Where the independent walls have communicating passageways constructed and protected as follows:

(a) A passageway open on the top or at least one side

(b) An enclosed passageway of glass, noncombustible, slow burning, or fire-resistive construction more than 10 feet in length (or, if combustible, more than 20 feet in length)

(c) An enclosed passageway of glass, noncombustible, slow burning or fire-resistive construction 10 feet or less in length (or, if combustible, 20 feet or less in length), provided that any such passageway is protected on at least one end by an automatic or self-closing labeled Class A fire door installed in a masonry wall section in accordance with standards

Where one or both of the communicating buildings qualify for sprinkler credit under ISO's Specific Commercial Property Evaluation Schedule (see Chapter 6, "Determining Recognition for Automatic Sprinkler Systems"), the above rules (including the Class A door requirement) apply. However, where acceptable sprinklers are installed over the communication in a masonry wall in the sprinklered building, such sprinklers are acceptable in lieu of the Class A door.

NOTE: A passageway is a structure providing communication between two otherwise separate buildings. Passageways must not contain contents. Enclosed passageways must not be more than 15 feet in width (least dimension). Passageways open on the top or at least one side shall not be more than 25 feet in width (least dimension). Any communicating structure that contains contents, or is more than 15 feet in width if enclosed, or is more than 25 feet in width if open, is a structure subject to all of the requirements regarding separate classification under this item.

(3) Where the independent walls have no communications, or where the two buildings have passageways constructed and protected as provided above, ISO classifies each building separately, with appropriate charges for exposure and communication (if any) under Chapter 4, "Exposure and Communication Factor."

b. Buildings separated by one continuous masonry party wall conforming to all of the following requirements:

(1) The party wall is constructed of brick or reinforced concrete not less than 6 inches in thickness; OR reinforced concrete building units (or filled blocks) with a fire-resistance rating of not less than two hours and not less than 6 inches in thickness; OR other masonry materials not less than 8 inches in thickness.

(2) The party wall rises to the underside of AND is in direct contact with a fire-resistive, masonry, or noncombustible roof; OR pierces a slow burning or combustible roof. In addition, no combustible material extends across any parapet that pierces a slow burning or combustible roof.

(3) The party wall extends to the interior surface of AND is in direct contact with a fire-resistive, masonry, or noncombustible wall OR pierces a slow burning or combustible wall. In addition, combustible cornices, canopies, or other combustible material do not extend across the party wall.

(4) All load bearing structural metal members in the party wall are protected metal (not less than one hour).

(5) At least a single automatic or self-closing labeled Class A fire door protects all access communications through the party wall. Where one or both of the communicating buildings qualify for sprinkler credit under ISO's Specific Commercial Property Evaluation Schedule (see Chapter 6, "Determining Recognition for Automatic Sprinkler Systems"), acceptable sprinklers installed over the communications are acceptable in lieu of the Class A door.

A single, labeled 1½ hour damper protects all communications caused by air conditioning and/or heating ducts piercing a party wall.

Note 1: Where unprotected metal, noncombustible, or combustible wall, floor, or roof supports are continuous through a masonry wall, such a wall is not be acceptable for separate classification.

Note 2: ISO ignores the usual openings provided for common utilities when their size is limited to that necessary to provide for normal clearances and vibration; such openings are the rule rather than the exception, and their effect is included in the overall analysis. ISO also ignores openings protected by one-hour listed firestop systems. ISO may also ignore abnormally large openings when mortar or other masonry material fills the excessive clearances.

ISO classifies all buildings not eligible for separate classification under a. or b. as a single building.

CHAPTER 6

Determining Recognition of Automatic Sprinkler Systems

ISO uses the Specific Commercial Property Evaluation Schedule (SCOPES) to evaluate sprinkler protection of a property. The criteria within the SCOPES manual permit determination of the percentage of credit for the sprinkler protection. For ISO to rate and code the property as a sprinklered property, it must score at least 10 points (out of the initial 100 points available) in ISO's automatic sprinkler grading.

A grading of 100 points represents the value of a two-source (water supply) wet-pipe or dry-pipe installation, standard in all respects, where no unusual conditions of construction or occupancy exist. In addition, the system must be installed and maintained as outlined in the National Fire Protection Association (NFPA) Standard 13 *Standard for the Installation of Sprinkler Systems*, NFPA 25 *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, and other NFPA standards as appropriate.

ISO classifies a property as a sprinklered property if it meets the following minimum conditions:

- The sprinklered building has assured maintenance. Shut down, idle, or vacant structures have acceptable watchman or waterflow and control-valve supervision (remote or central station) or a caretaker. A caretaker is a responsible person who visits the premises not less than weekly.
- The usable unsprinklered area does not exceed:
  a) 25% of the total area in buildings with an Occupancy Combustibility Class of C-1
  b) 20% of the total area in buildings with an Occupancy Combustibility Class of C-2 or C-3
  c) 10,000 square feet or 15% of the total area in buildings with an Occupancy Combustibility Class of C-4
  d) 5,000 square feet or 10% of the total square foot area in buildings with an Occupancy Combustibility Class of C-5

  See Chapter 3, "Occupancy Factor" for definitions of the occupancy combustibility classes.

  Note: the area limitations above do not include unused, unsprinklered areas such as underfloor areas, attic areas, etc. However, ISO classifies usable vacant areas as used areas. ISO considers areas with obstructed sprinkler protection as unsprinklered.
- Installation has evidence of flushing and hydrostatic tests of both the underground and overhead piping in accordance with NFPA Standard 13.
- A full flow main drain test has been witnessed within the last 48 months.
- Dry-pipe installations have evidence of a satisfactory or partly satisfactory dry-pipe trip test conducted within the last 48 months.
- Fire-pump installations have evidence and results of a fire-pump test conducted within the last 48 months.

Where all 1- and 2-family dwellings in an entire subdivision or other definable area are protected with a residential sprinkler system meeting the requirements of NFPA 13D, *Standard for Sprinkler Systems in One- and Two- Family Dwellings and Mobile Homes*, a reduction in the needed fire flow may be appropriate. Where evidence is available to document the installation of these systems, the needed fire flow for such installations may be reduced to 500 gpm at 20 psi. No allowance will be made for

individual 1- and 2-family dwellings provided with residential sprinkler systems when interspersed with similar non-sprinklered 1- and 2-family dwellings.

Where residential occupancies up to and including four stories in height are protected with an automatic fire sprinkler system installed in accordance with NFPA 13R, *Standard for the Installation of Sprinkler Systems in residential Occupancies up to and including Four Stories in Height*, a reduction of the needed fire flow may be appropriate. Where evidence is available from local fire or building officials to document the installation, approval, testing and maintenance of these systems as defined in Chapter 6 of the Standard, the needed fire flow shall be the greater of the base of riser demand or 1,000 gpm at 20 psi, whichever, is greater, except when the calculated nonsprinklered needed fire flow is less than 1,000 gpm, the lesser demand should be used. Residential occupancies are as specified in NFPA 101 *Life Safety Code*® include (1) Apartment buildings, (2) Lodging and rooming houses, (3) Board and care facilities, and (4) Hotels, motels, and dormitories.

CHAPTER 7

Other Considerations for Determining Needed Fire Flow (NFF_I)

- When the subject building or exposure buildings have a wood-shingle roof covering and ISO determines that the roof can contribute to spreading fires, ISO adds 500 gpm to the needed fire flow.
- The maximum needed fire flow is 12,000 gpm. The minimum is 500 gpm.
- ISO rounds the final calculation of needed fire flow to the nearest 250 gpm if less than 2,500 gpm and to the nearest 500 gpm if greater than 2,500 gpm.
- For 1- and 2-family dwellings not exceeding 2 stories in height, ISO uses the following needed fire flows:

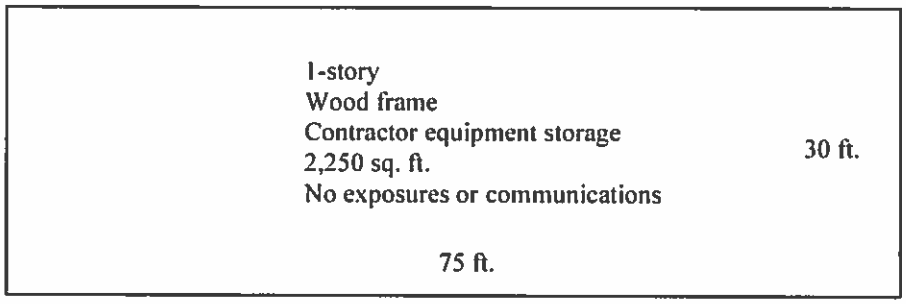
DISTANCE BETWEEN BUILDINGS	NEEDED FIRE FLOW
More than 100'	500 gpm
31-100'	750 gpm
11-30'	1,000 gpm
10' or less	1,500 gpm

- For other types of habitational buildings, the maximum needed fire flow is 3,500 gpm.

CHAPTER 8

Examples

Example 1.



CONSTRUCTION TYPE

Construction Class 1 (wood frame construction)
Construction type coefficient (F) = 1.5
Effective area (A_i) = 2,250

$C_i = 18F\,(A_i)^{0.5}$
$C_i = 18(1.5)\,(2,250)^{0.5}$
$C_i = 27\,(47.43)$
$C_i = 1,280.72$
C_i = 1,250 (rounded to the nearest 250 gpm)

OCCUPANCY TYPE

Contractor equipment storage
Occupancy combustibility class C-3 (Combustible)
Occupancy factor (O_i) = 1.00

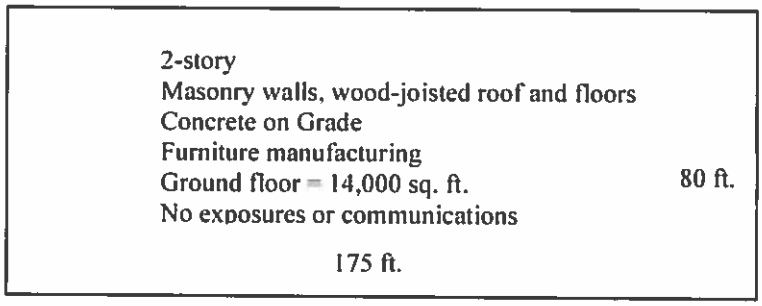
EXPOSURES AND COMMUNICATIONS

None
Exposure and communication factor $(X + P)_i = 0.00$

CALCULATION

$NFF_i = (C_i)(O_i)[1.0+(X+P)_i]$
$NFF_i = (1,250)(1.00)[1.0+(0.00)]$
$NFF_i = (1,250)(1.00)(1.00)$
NFF_i = 1,250 gpm

Example 2



CONSTRUCTION TYPE

Construction Class 2 (joisted masonry construction)
Construction type coefficient (F) = 1.0
Effective area (A_i) = 21,000 (ground floor + ½ of second floor area)

$C_i = 18F\ (A_i)^{0.5}$
$C_i = 18(1.0)\ (21{,}000)^{0.5}$
$C_i = 18\ (144.91)$
$C_i = 2{,}608.45$
C_i = 2,500 (rounded to the nearest 250 gpm)

OCCUPANCY TYPE

Furniture manufacturing
Occupancy combustibility class C-4 (free-burning)
Occupancy factor (O_i) = 1.15

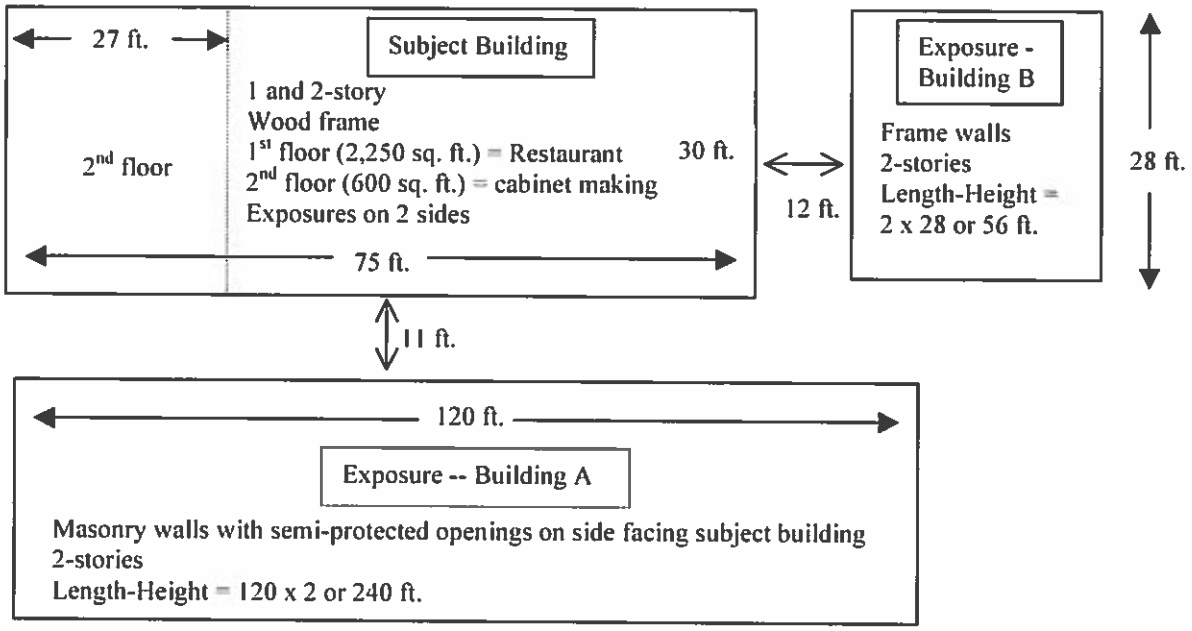
EXPOSURES AND COMMUNICATIONS

None
Exposure and communication factor $(X + P)_i = 0.00$

CALCULATION

$NFF_i = (C_i)(O_i)[1.0+(X+P)]$
$NFF_i = (2{,}500)(1.15)[1+(0.00)]$
$NFF_i = (2{,}500)(1.15)(1.00)$
$NFF_i = 2{,}875$
NFF_i = 3,000 gpm (because it is greater than 2,500 ISO rounds the NFF to the nearest 500 gpm)

Example 3



CONSTRUCTION TYPE

Construction Class 1 (wood-frame construction)
Construction type coefficient (F) = 1.5
Effective area (A_i) = 2,655 (ground floor + ½ of second floor area)

$C_i = 18F\,(A_i)^{0.5}$
$C_i = 18(1.5)\,(2{,}655)^{0.5}$
$C_i = 27(51.53)$
$C_i = 1{,}391.31$
C_i = 1,500 (rounded to the nearest 250 gpm)

OCCUPANCY TYPE

Cabinet making (occupies over 25% of the total floor of the building)
Occupancy combustibility class C-4 (free-burning)
Occupancy factor (O_i) = 1.15

EXPOSURES AND COMMUNICATIONS

Exposure charge for Building A = 0.14
Exposure charge for Building B = 0.17
The building with the highest charge is Building B.
Exposure factor (X_i) = 0.17
Communication (P_i) charge = none
Exposure and communication factor $(X + P)_i$ = 0.17

CALCULATION

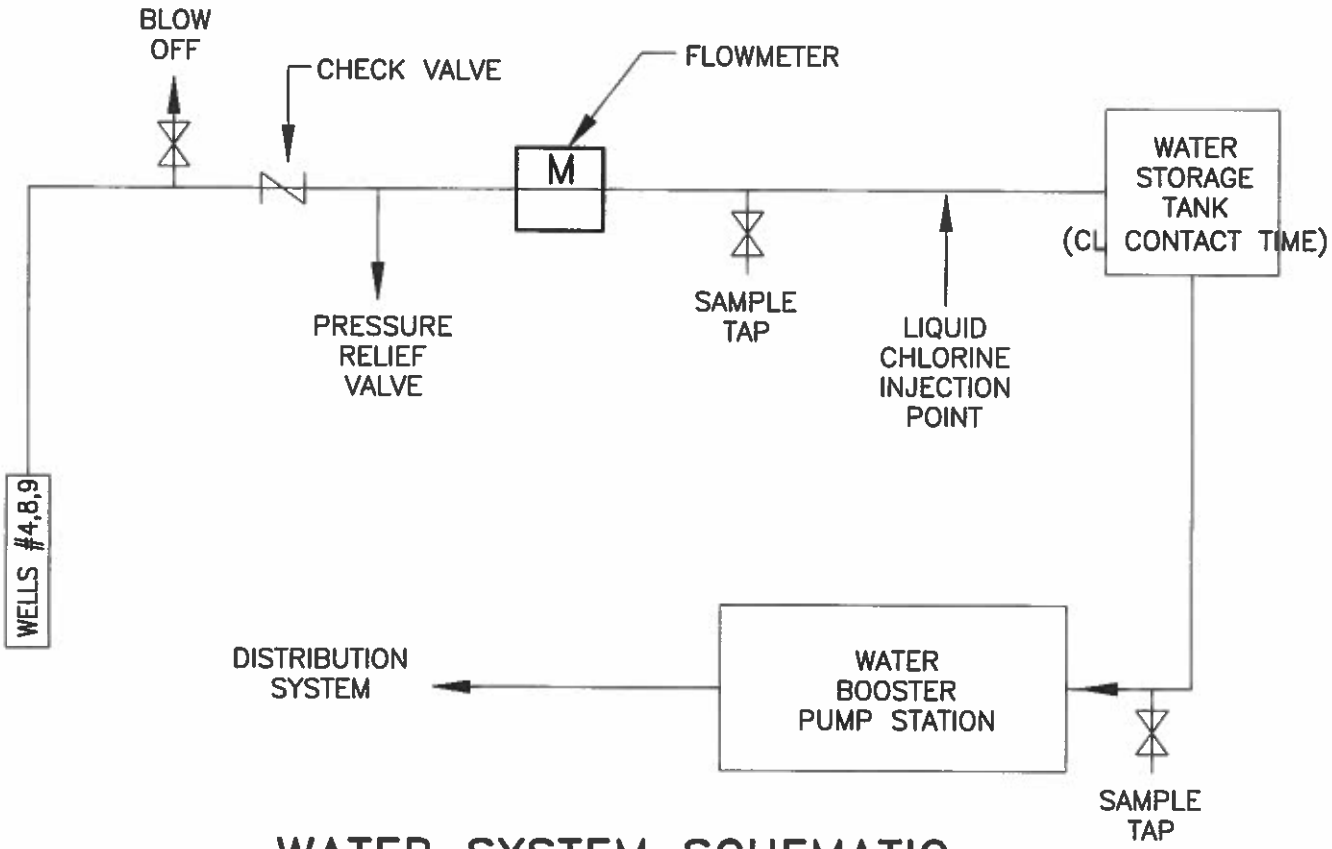
$NFF_i = (C)(O)[1.0+(X+P)]$
$NFF_i = (1{,}500)(1.15)[1+(0.17)]$
$NFF_i = (1{,}500)(1.15)(1.17)$
$NFF_i = 2{,}018$
NFF_i = 2,000 gpm

APPENDIX A

Needed Fire Flow/Effective Area Table

TYPE OF CONSTRUCTION FACTOR AS DETERMINED BY RANGE IN EFFECTIVE AREA

Class	1		2		3,4		5,6	
Factor (F)	1.5		1.0		0.8		0.6	
	Effective Area (A_I)		Effective Area (A_I)		Effective Area (A_I)		Effective Area (A_I)	
(C_I)	At Least	Not Over	At Least	Not Over	At Least	Not Over	At Least	Not Over
500	0	535	0	1,205	0	1,883	0	3,348
750	536	1,050	1,206	2,363	1,884	3,692	3,349	6,564
1,000	1,051	1,736	2,364	3,906	3,693	6,103	6,565	10,850
1,250	1,737	2,593	3,907	5,835	6,104	9,117	10,851	16,209
1,500	2,594	3,622	5,836	8,150	9,118	12,734	16,210	22,639
1,750	3,623	4,822	8,151	10,852	12,735	16,954	22,640	30,140
2,000	4,823	6,194	10,853	13,937	16,955	21,776	30,141	38,714
2,250	6,195	7,737	13,938	17,409	21,777	27,202	38,715	48,359
2,500	7,738	9,452	17,410	21,267	27,203	33,230	48,360	59,076
2,750	9,453	11,338	21,268	25,511	33,231	39,861	59,077	70,864
3,000	11,339	13,395	25,512	30,140	39,862	47,095	70,865	83,724
3,250	13,396	15,624	30,141	35,156	47,096	54,931	83,725	97,656
3,500	15,625	18,025	35,157	40,557	54,932	63,374	97,657	112,659
3,750	18,026	20,597	40,558	46,344	63,375	72,413	112,660	128,734
4,000	20,598	23,341	46,345	52,517	72,414	82,058	128,735	145,881
4,250	23,342	26,256	52,518	59,076	82,059	92,306	145,882	164,100
4,500	26,257	29,342	59,077	66,020	92,307	103,156	164,101	183,390
4,750	29,343	32,600	66,021	73,350	103,157	114,610	183,391	203,751
5,000	32,601	36,029	73,351	81,066	114,611	126,666	203,752	225,185
5,250	36,030	39,630	81,067	89,168	126,667	139,325	225,186	247,690
5,500	39,631	43,402	89,169	97,656	139,326	152,587	247,691	271,267
5,750	43,403	47,346	97,657	106,529	152,588	166,452	271,268	295,915
6,000	47,347	51,461	106,530	115,788	166,453		295,916	
6,250	51,462	55,748	115,789	125,434				
6,500	55,749	60,206	125,435	135,464				
6,750	60,207	64,836	135,465	145,881				
7,000	64,837	69,637	145,882	156,684				
7,250	69,638	74,609	156,685	167,872				
7,500	74,610	79,753	167,873	179,446				
7,750	79,754	85,069	179,447	191,406				
8,000	85,070		191,407					



WATER SYSTEM SCHEMATIC

NTS

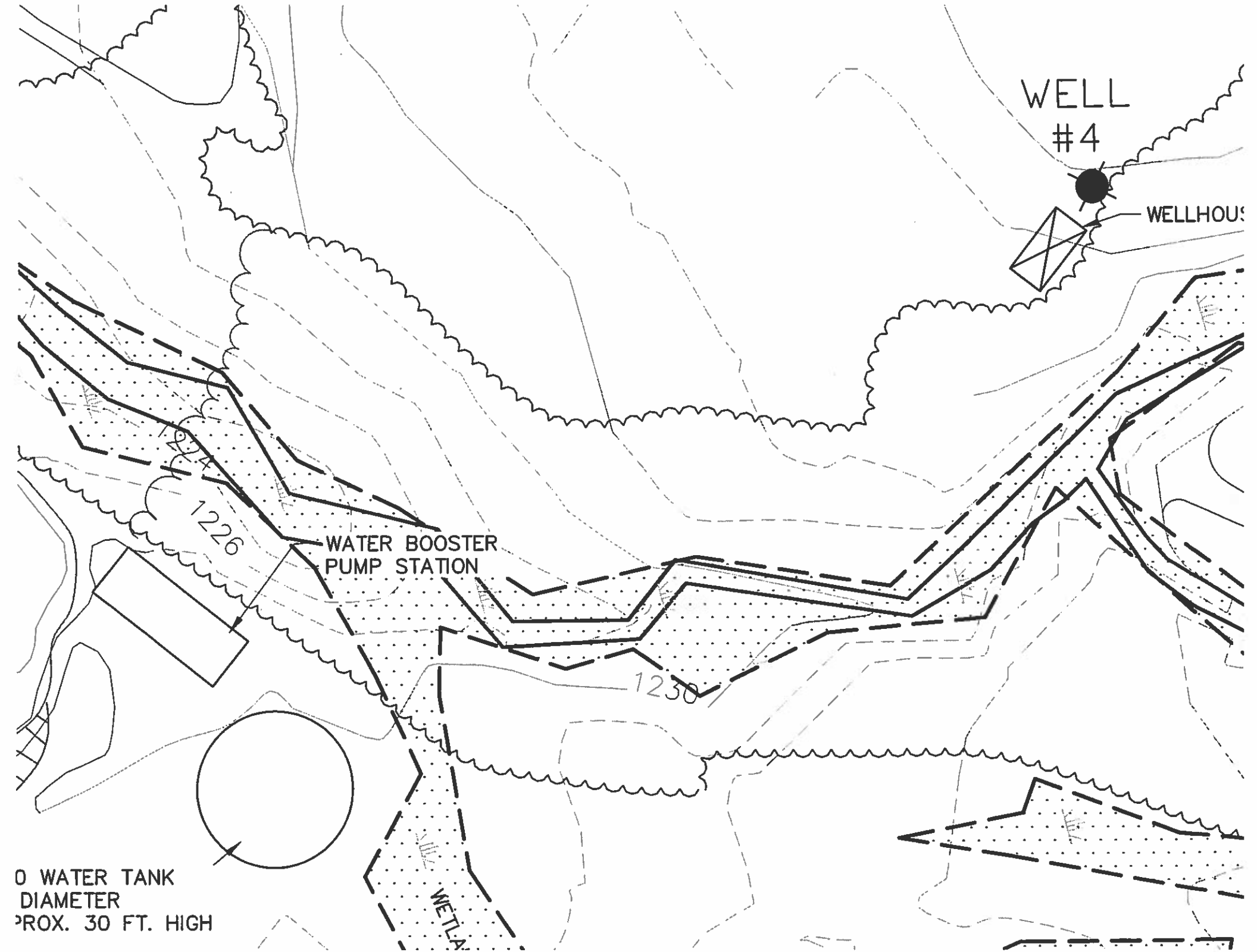
WATER SYSTEM SCHEMATIC

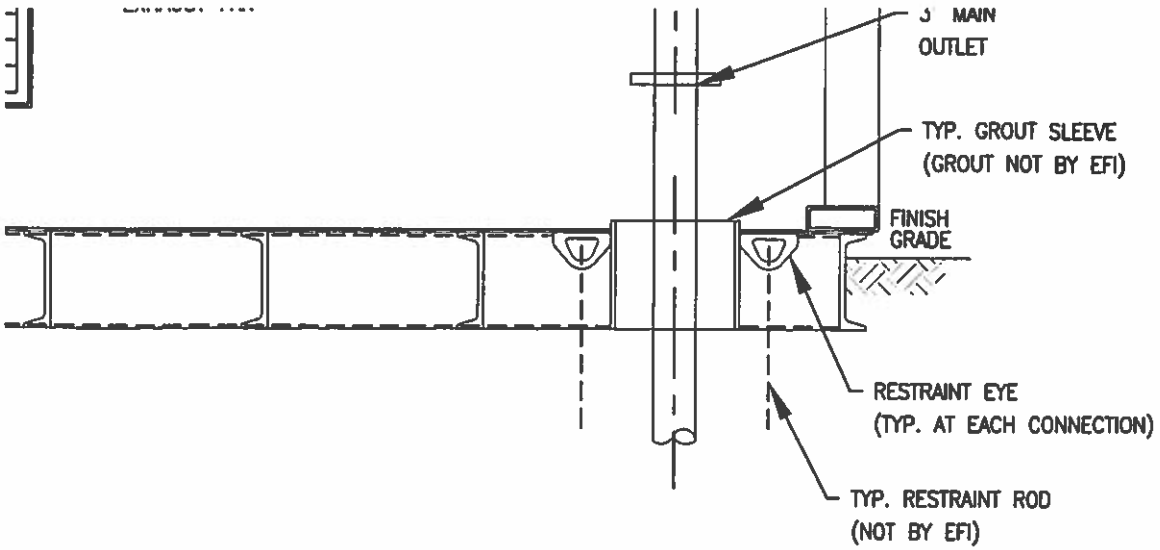
Reilly ASSOCIATES SINCE 1930
ENGINEERING/ENVIRONMENTAL/SURVEYING

49 South Main Street, Suite 200
Pittston, PA 18640

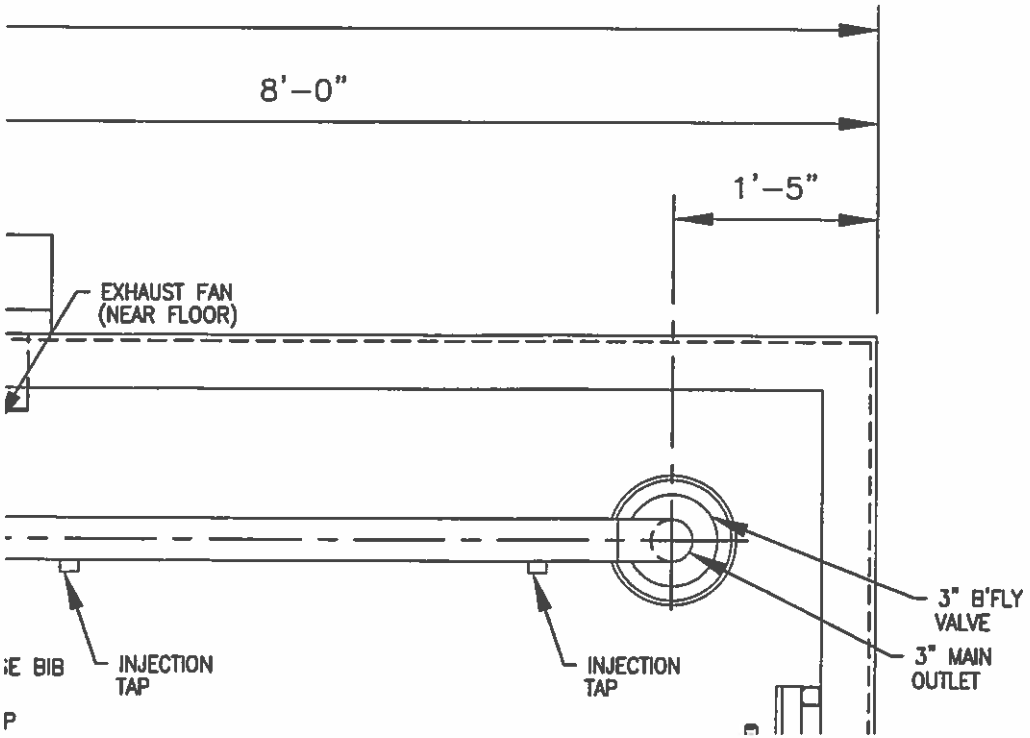
tel: 570.654.2473
fax: 570.654.6880
e-mail: www.reillyengineering.com

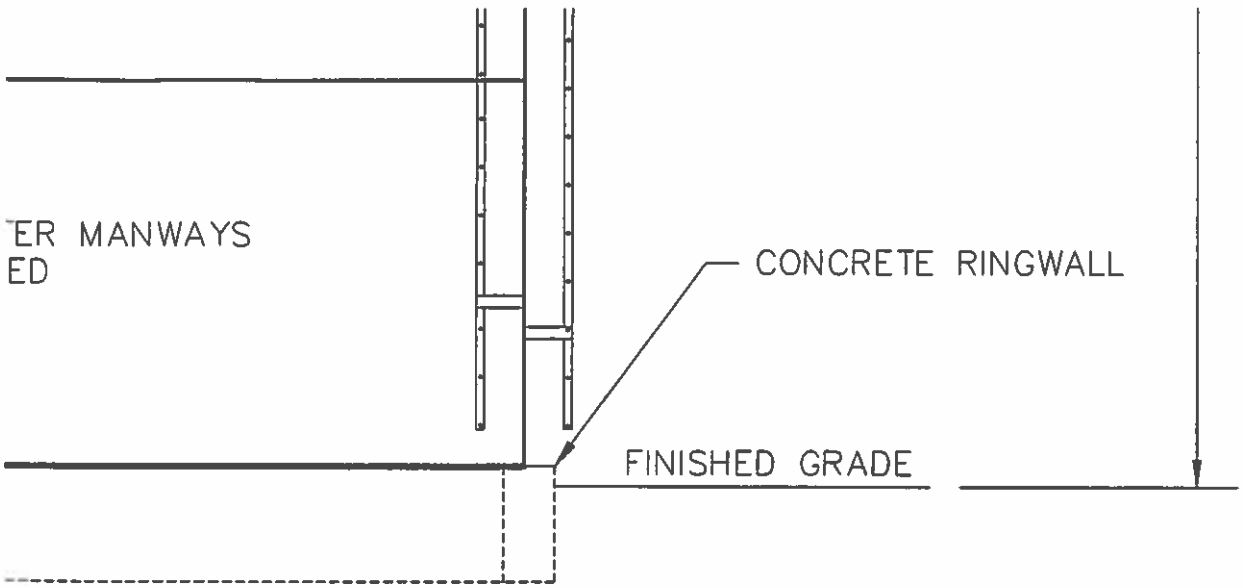
Date:	Project No.
5-7-09	07042
Scale:	Sheet No.
NTS	1 OF 1


WELL
#4
WELLHOUS
1226
WATER BOOSTER
PUMP STATION
1230
0 WATER TANK
DIAMETER
PROX. 30 FT. HIGH
WETLA


3" MAIN
OUTLET
TYP. GROUT SLEEVE
(GROUT NOT BY EFI)
FINISH
GRADE
RESTRAINT EYE
(TYP. AT EACH CONNECTION)
TYP. RESTRAINT ROD
(NOT BY EFI)

-TYPICAL


8'-0"
1'-5"
EXHAUST FAN
(NEAR FLOOR)
3" B'FLY
VALVE
3" MAIN
OUTLET
INJECTION
TAP
INJECTION
TAP



TANK NOTES

1) TANK MATERIALS AND CONSTRUCTION TO BE IN ACCORDANCE WITH NFPA 22, 2008 EDITION, AND AWV
2) ALL PLATES TO BE COLD ROLLED TO PROPER RADIUS.
3) ALL INTERIOR SURFACES SHALL BE BLAST CLEANED PER AWWA D102 SSPC SP10. ALL EXTERIOR SURF CLEANED PER SSPC SP6. THE INTERIOR AND EXTERIOR PAINT SYSTEMS SHALL BE IN ACCORDANCE WITH
4) LOCATION OF ALL ACCESSORIES SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
5) ALL PLATE MATERIAL SHALL CONFORM TO ASTM-A36. ALL STRUCTURAL STEEL SHALL CONFORM TO A SHALL CONFORM TO ASTM-A53.GR.B
6) TANK SHALL BE HYDROSTATICALLY TESTED. FLOOR SHALL BE VACUUM TESTED.
7) SHELL PLATE WELDS SHALL BE TESTED BY RADIOGRAPHIC EXAMINATION.
8) PROVIDE PIPE COUPLINGS ON ALL LINES TO/FROM TANK @ 6'-0" PAST FOUNDATION.
9) PROVIDE HEATERS AS PER NFPA 22.
10) TEST AND TREAT SAND WITH HYDRATED LIME FOR CORROSION RESISTANCE AS PER SECT. 12.6 AWWA
11) SLOPE SAND AS PER TANK MANUFACTURERS REQUIREMENT.

200,000 GAL. WATER STORAGE TAN

1/4"=1'-0"

FOUNDATION NOTES

DRAIN

12" MAIN SUCTION

TYP. GRANULAR FILL (NOT BY EFI)

VATION–TYPICAL