Appendix M-6
Letters S --
Sarno through Smith

Part 7

From: Joseph Sarno
To: Bjorness, Joan E (DOT)
Cc: Frechette, Mark (DOT)
Subject: Re: I-81 project tunnel alternatives
Date: Thursday, October 14, 2021 4:48:09 PM
Attachments: Comments Letter - I-81 Project.pdf

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Ms. Bjorness,

Where do I go to send my comments? I am attaching them with this email.

Joseph W. Sarno
14 Erregger Terrace
Syracuse, NY 13224

Comments in Opposition to the Community Grid Plan

Introduction

In July 2021, the U.S. Federal Highway Administration and the N.Y. Department of Transportation released a draft report (the "Report") evaluating the social, economic, and environmental effects of the Interstate 81 Viaduct Project (the "Project") on the City of Syracuse, Onondaga County, and the surrounding communities. The purpose of the Project is to address the structural deficiencies and non-standard highway features of the current route along an aging viaduct running through the city of Syracuse.

The Project goals are: (1) improve safety and create an efficient regional and local transportation system within and through greater Syracuse; and (2) provide transportation solutions that enhance the livability, visual quality, sustainability, and economic vitality of greater Syracuse.

Several alternative solutions were proposed in order to meet the stated goals. Many alternative plans were summarily dismissed, after only limited analysis. Included in the plans dismissed were various tunnel options.

After the state dismissed the other alternatives, two options remained. The first option involves full reconstruction of the viaducts running through downtown Syracuse (the "Viaduct Project Plan"). The other option is the Community Grid Plan. Under that plan, the state would demolish most of the viaduct system and establish Business Loop 81 ("BL81"). Named the Community Grid Plan, it would reroute Interstate 81 ("I-81") through the suburbs along Interstate 481.

The drafters have made the determination that the Community Grid alternative is the preferred alternative without a reasonable justification. In response to the invitation for public review and comment, the following points are made in opposition to the Community Grid Plan and in support of a new shorter tunneling plan.

The Immoral History of Interstate 81

Interstate 81 has served the City of Syracuse and the surrounding communities since its completion in 1965, providing continuous high-speed multi-lane travel between Canada and the border of Pennsylvania and further points south. It is part of the federal Interstate Highway System which was launched in 1956 when then-President Eisenhower signed the Federal-Aid Highway Act. The purpose of the act was to enhance economic conditions surrounding the movement of people and goods and provide security and safety should there be a need to move people quickly through the area.

At the time of the Federal-Aid Highway Act was passed, racial segregation was pervasive in America. Jim Crow laws that mandated segregation in southern U.S. states were still on the books and would remain so until the passage of the Civil Rights Act of 1964. Even in northern states, where segregation was not expressly mandated, de facto segregation resulted in racial separation and oppression of blacks living in urban centers in the northern U.S. states. Theres is plenty of evidence of de facto segregation in the building of the country's interstate highways.

Local and regional developers of the highway system planned and built many highways directly, and sometimes intentionally, through African American neighborhoods, splitting the neighborhoods in half and destroying existing homes and businesses.

When I-81 was built back in the 1960s no group was more negatively affected than the mostly black Syracuse residents living in the 15th ward. Many advocacy groups, including the NAACP and the NYCLU, opposed the construction of the viaduct. Despite the opposition, the viaduct was built and ended up cutting through the neighborhoods of the 15th ward and "displacing more than 1,300 families, family businesses and destroying 75 percent of the homes of black Syracuse residents."[1]

Removal of the Current I-81 Expressway Will Create Traffic Nightmares

In 1970, according to the U.S. Census, the population of Onondaga County was 472,000. According to the 2020 census, the Onondaga County population stood at 476,000.[2] The U.S. Census Bureau's 2019 American Community Survey shows that 97% of workers in the Greater Syracuse area commuted to work by car.[3] According to the Report, about 80,000 to 90,000 people travel on I-81 through the city daily.

The removal of I-81 will likely have a more significant impact on traffic in the area than the Report suggests. NYDOT put out a video animation simulated traffic arriving from the South. The reasonable viewer should question the fantastic video. Where are the trucks? Where is the virtual overhead shot of traffic not stacking up at the roundabout? Why not show traffic in the neighborhoods absorbing the extra traffic. It is also significant that NYDOT did not include a simulation of traffic coming in from the north.

Community Grid Plan proponents cite various articles touting the success of cities that have removed freeways. Take these articles with a grain of salt. Cities such as San Francisco and Milwaukee successfully removed various freeway sections. But the freeway sections removed were relatively short spurs. Removing a 3-mile spur in Milwaukee (handling 30,000 cars) or a 1-mile spur in San Francisco may not have the same effect as eliminating a twelve-mile major express thoroughfare handling up to 90,000 cars in Syracuse.

One should also consider the availability and use of public transportation when extrapolating the success of other cities. After San Francisco removed the Embarcadero freeway, annual mass transit ridership experienced a reported 15% bump.[4] According to WalletHub, San Francisco is ranked third for the best public transportation system in the country. In contrast, Syracuse's public transportation system has no commuter rail options and a hub-and-spoke bus system. Only one percent (1%) of Greater Syracuse commuters use public transportation for their commute.[5]

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[1] https://nextcity.org/urbanist-news/entry/syracuses-proposed-community-grid-could-right-a-decades-old-wrong
[2] https://worldpopulationreview.com/us-counties/ny/onondaga-county-population
[3] 2019 American Community Survey, U.S. Census Bureau
[4] https://www.cnu.org/what-we-do/build-great-places/embarcadero-freeway#:~:text=The%20network%20of%20streets%20was%20able%20to%20absorb,saw%20the%20redevelopment%20potential%20and%20the%20cost%20comparisons
[5] 2019 American Community Survey, U.S. Census Bureau

Based upon a Google maps inquiry, it would take 3 hours and 41 minutes using public transportation to get from the southern I-81/I-481 interchange to the northern I-81/I-481interchange ***on any day and time*** of the week.[6] According to Google, that is only 14 minutes less than it would take to walk the route![7]

Syracuse is a 20-minute City because it is easy to get anywhere by car in the region in twenty minutes or less. Of course, this benefit only applies to those traveling by car. This benefit should not be at the expense of people using other forms of transportation. But as stated previously, 97% of Syracuse commuters are in cars. For those commuters, less time on the road means more time to spend with family and friends. According to Dr. John Sullivan, an expert in the field of human resources, "commute issues can have a major impact on hiring success and retention."[8] One study found that "adding 20 minutes to your commute makes you as miserable as getting a 19 percent pay cut."[9] Being a "20-minute city" is a benefit. One should not underestimate the value of this benefit.

The Community Grid Plan Would Hurt the Economy

Trucking

In its earliest days, Syracuse became a prominent transportation hub with the building of the Erie Canal. Trucks, trains, and cargo planes have replaced the canal barges of yesterday. These modern modes of transport rely on an efficient, well-connected transportation system. As stated in the Report, "an efficient and effective goods movement system is essential to the economic livelihood of the Syracuse metropolitan area."

Rerouting I-81 will increase transportation costs to truckers and the businesses that rely on the trucking industry. Westbound truckers coming from either direction on I-81 will have to either (a) travel on the longer express route or (b) travel on slower local roads not built for increased truck traffic. The results are increased fuel and toll costs, longer delivery times, and additional wear and tear on local roads. In either case, the increase costs will need to be absorbed by the trucking industry or passed on to consumers.

Retail/Restaurants

Syracuse is home to Destiny USA, the eighth largest mall in America and the largest mall in New York State.[10] Destiny USA is currently located on I-81 north of Syracuse. Per the Report, "Destiny USA generates an estimated $1.3 billion in annual retail sales, resulting in an estimated

---

[6] https://www.google.com/maps/dir/43.0013545,-76.1343454/43.1469993,-76.1097567/@43.0777262,-76.183867,12z/data=!3m1!4b1!4m6!4m5!2m3!6e0!7e2!8j1633980180!3e3?hl=en

[7] https://www.google.com/maps/dir/43.0013545,-76.1343454/43.1469993,-76.1097567/@43.0729768,-76.1838843,12z/data=!3m1!4b1!4m6!4m5!2m3!6e0!7e2!8j1633980180!3e2?hl=en

[8] https://www.tlnt.com/how-commute-issues-can-dramatically-impact-employee-retention/#:~:text=The%20impact%20varies%20with%20the%20job%20%E2%80%94%20The,are%20physically%20closer%20to%20where%20most%20workers%20live.

[9] https://www.inc.com/business-insider/study-reveals-commute-time-impacts-job-satisfaction.html

[10] https://usabynumbers.com/largest-shopping-malls-in-the-us/

$52.8 million in sales taxes to Onondaga County and $52.8 million to the State of New York." Many people are employed by Destiny USA's many retail and food service businesses.

The rerouting of I-81 under the Community Grid Plan means Destiny USA will no longer be on the express route through the city of Syracuse. As a result, the Report predicts that Destiny USA will lose some "pass-by" business. Per the Report, the total reduction in Destiny USA customers from the loss of this pass-by business equals 2.8%.[11] While it is not a large percentage, it equates to $2.9 million in lost sales tax revenue.

The Report dismisses the possibility that DestinyUSA will lose any business from local shoppers on the other side of the grid. According to the National Retail Federation, "nine out of ten consumers are more likely to choose a retailer based on convenience."[12] While stores like Banana Republic, Forever 21, and Nordstrom Rack are exclusive locally to DestinyUSA, these stores all have websites from which one can purchase their merchandise. Those online purchases still generate local sales tax revenues, but they don't help DestinyUSA employees.

Similar logic applies to other stores and restaurants. Instead of dealing with the increased grid traffic, people will forego trips to retail establishments, both downtown and across town. That weekly lunch trip to Heid's from DeWitt will become a less frequent event or else eliminated. With restaurants, some of that commerce might shift to closer substitutes, but diminished choices could translate into diminished revenues for all.

There is No Evidence the Community Grid Plan Will Benefit the Economy

Among its thousands of pages, the Report has only 16 pages of discussion and analysis of the economic impacts of The Community Grid Project. Of these 16 pages, only one page analyzes the permanent or operational effects expected to occur once the construction of the Project is complete. There is no discussion of any tangible benefits or how the economy will benefit. The economic benefit analysis is pure conjecture. Below are all the statements discussing the benefits (emphasis added).

> These pedestrian and traffic improvements would improve the flow of people and goods between these neighborhoods and ***could result in improved economic activity*** due to improved conditions for development currently supported by market conditions, namely mixed use residential and commercial.
>
> As further discussed below, the potential redevelopment of these parcels ***could add to local property tax revenues and may increase local sales taxes, should retail be redeveloped.***
>
> Increased visibility and pedestrian activity between these neighborhoods ***could have a beneficial effect on local economy.***

[11] Table 6-3-2-11

[12] https://nrf.com/research/consumer-view-winter-2020

As further discussed below under Indirect Effects, these improvements, along with ReZone Syracuse, ***could encourage new mixed-use commercial and residential development.***

New Urbanism Improvements Are Not Exclusive to the Community Grid Plan, and Should Not Be the Only Drivers of the Project Decision

Some people believe the selected Project should create neighborhood connectivity, accessible public spaces, and bicycle and pedestrian-friendly streets. These people are promoting the idea of new urbanism. New urbanism is the idea that the development of urban areas with a greater focus on interconnectivity among the people is beneficial to the community and ultimately favorable to growth. The goal is to provide "alternatives to the sprawling, single-use, low-density patterns typical of post-WWII development."[13]

For some people, these new urbanist developments are right for them. But not everyone wants the new urban lifestyle. The trend is the United States is still towards suburbanization. With each passing year in the United States, the country is becoming a more **suburbanized** society. Exceptions exist in certain large cities, like New York and Washington. In those cities, housing is in higher demand in the **city** center. But in **most** of the country, suburbanization is still occurring.

The truth is that the vast majority of Onondaga County residents do not live in the central city of Syracuse, where travel by bike or by foot is a reasonable option. In 2019, less than two percent of commuters walked to work, and only 0.14% rode a bicycle to work. Public transportation is limited to local and limited regional bus service provided by Centro. About one percent of Syracusans commute by bus.

And while new urbanism has its benefits, wider sidewalks and bicycle paths are not a solution to the crime that exists in the community. In 2019, Syracuse was 44th on the list of American cities with the highest rates of violent crime per capita, according to FBI statistics.[14] Such crime will need addressing, or the new urban development will not draw people to the area. On October 7, 2021, in the area described as the “gateway to the city” at the southern point of the “grid” section of the Community Grid Plan, two people ended up shot in the head.

Although Syracuse is no exception to the suburbanization trend, that doesn’t mean that new urban developments shouldn’t be built and promoted. Such efforts ***may*** increase the demand for housing in the city and encourage other business development. New urbanist development can and should be part of any plan. But the promotion of new urbanism should not be at the expense of the economy-at-large or other constituents’ needs. The shifting of I-81 would be bad for both Syracuse and central New York. Any transportation project must consider all users. It should balance the current and future needs of the entire community.

The Community Grid Plan Does Not Repair the Past Wrongs or Provide Real Benefits to the Community Divided by I-81.

[13] https://www.cnu.org/resources/what-new-urbanism

[14] https://www.cbsnews.com/pictures/the-most-dangerous-cities-in-america/

When I-81 was built back in the 1960s, no group was more affected than the black Syracuse residents living in the 15th ward. Many advocacy groups, including the NAACP and the NYCLU, opposed the construction of the viaduct. Despite the opposition, the state built the viaduct. Viaduct construction displaced thousands of families and destroyed a large percentage of homes in the area.

In terms of the destroyed homes, the Community Grid Plan can't undo that harm done in the 60s. In addition, as it stands, the Community Grid Plan does not reunite the divided neighborhoods south of Colvin Street. And it still puts a higher volume street right through Pioneer homes only now at street level, endangering kids in the area. The proposed roundabout will also bring significant amounts of traffic adjacent to Martin Luther King Jr. elementary school.

The Community Grid Plan will be noisier for people in the grid. Per the Report, noise barriers are not feasible along the local streets in much of the Central Study Area. On the south side, the Central Study Area starts on its southern end at Brighton. At the point tractor-trailers would be entering the BL-81 traffic calming zone, they will be at their noisiest as they downshift to slow down. Anyone that has lived on the main route on the edge of town knows how loud decelerating trucks can be.

It is correct to fix the wrongs of the past. But the Community Grid Plan does not do that. A better plan exists. We should not settle for anything less than a plan that does not fully address the past immoralities.

This is a Once In a Lifetime Opportunity to Create a Transportation System That Works For Everyone

The Project alternative decision is an important one. It will have an impact on the region for many years to come. We can create a system that is good for everyone. We need to create a system that provides the most benefits to the most people in the community. A proposal, such as the one diagrammed below, may provide that. The concept is similar to the T-2 alternative in the Report, only shorter. A well-thought-out design that considers all the people will make any additional money spent worth it.



Diagram of Abridged T-2 Hybrid Concept. Tunnel starts descending heading north just north of MLK East and rises back up and over E. Genessee Street north of Harrison. Almond becomes wide boulevard (north of Harrison) with bike paths and sidewalks and green space in the middle, perhaps pedestrian bridge to pavilion area where 550 Harrison was. Buildings needed include 550 Harrison, Madison Towers parking garage, 600 E. Genessee Street, and 601 E. Genessee Street. Includes architecturally unique pedestrian/bicycle bridge crossing the rising road at Cedar Street.

From:	Frechette, Mark (DOT)
To:	Bjorness, Joan E (DOT)
Subject:	FW: Route I-81 Project DEIS Comment Period - DeWitt Bypass
Date:	Thursday, October 14, 2021 3:08:49 PM
Attachments:	DEWITT BYPASS-REDUCED.pdf Transportation Project Report Cover.pdf NYSDOT Comment Letter - E Genesee St.pdf

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From: Greg Sgromo <gsgromo@dunnandsgromo.com>
Sent: Thursday, October 14, 2021 3:01 PM
To: dot.sm.mo.I81Opportunities <dot.sm.mo.I81Opportunities@dot.ny.gov>; Frechette, Mark (DOT) <Mark.Frechette@dot.ny.gov>
Cc: kmannion@usa.net; mbsizing@dunnandsgromo.com
Subject: Route I-81 Project DEIS Comment Period - DeWitt Bypass

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Hello Mark

Letter has been sent directly to you Via USPS with additional attachments.

Thank you

Greg

Greg Sgromo, P.E.
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October 14, 2021

Mark Frechette, P.E., Project Director
New York State Department of Transportation, Region 3
333 East Washington Street
Syracuse, NY 13202

Re: Route I-81 Project DEIS Comment Period
File No.: 119.002

Dear Mark:

I am writing this letter to make part of the record an alternative to the proposed modifications on E. Genesee Street into the Town DeWitt, between Lyndon Corners and the Route 481/81 off-ramp's. This is an alternative which was originally proposed by New York State DOT in 1988 and appears to have never been carried through due to funding reasons.

Over the years, development and growth on the east side of the City of Syracuse has made this project even more necessary. As part of my work as an adjunct professor at SUNY Polytechnic Institute, I teach the senior Capstone Design Courses. Our seniors in 2015 studied a potential bypass, the "Dewitt Bypass", as a possible way to mitigate the overburdened, and failing, intersections both along the Genesee Street corridor and the Route 290 corridor between 690 and Freemont Road.

As did the earlier New York State DOT proposal, the modified version studied by the design class found similar positive aspects to the proposed Dewitt Bypass. I have enclosed a copy of the overall plan proposed by the group and can make available their extensive design report to the department. Although this was done by seniors in the Civil Engineering Program, it does have some very valuable information within it that may assist in the departments for the study of this option.

The main attributes of the bypass can be summarized as follows:

1. The bypass would run from the existing off-ramps and on-ramps at the 481/690 interchange, eastward through undeveloped land to Burdick Street.
2. This roadway would intersect Butternut Creek Drive were traffic control would be facilitated by a modern roundabout.
3. Immediately adjacent to the roundabout, a bridge crossing Butternut Creek.
4. The bypass, from the roundabout to Burdick Street, would be a two-lane roadway with the design speed of approximately 40 mph.
5. There would be no intersections between the roundabout and the immediate vicinity of Burdick Street, enabling an uninterrupted and expeditious route eastward
6. From the Burdick Street intersection, travelers would have the option of going north towards Chittenango or south towards the Village of Fayetteville.

This option becomes very appealing to travelers between the Syracuse, Fayetteville, and Chittenango areas as it offers an alternative to the heavily traveled sections of Genesee Street and Route 290, which are all currently at or near capacity. This route becomes additionally appealing in that it avoids sections which are heavily encumbered by signalized intersections, which slow traffic down.

This option also offers an alternative to the Exits 3 modifications from Route 481 onto Genesee Street, which is a heavily congested on-ramp/off-ramp area which often backs up onto 481 and to the 690 interchange during any inclement weather or other disruption to free-flowing traffic on Genesee Street. Additionally this is a high accident area due to the high volume of merging which occurs at the on-ramp and off-ramp during evening peak hours.

Please feel free to contact me should you have any further questions, comments, or desire for additional information.

Sincerely,

Gregory Sgromo P.E.

GS/mbs
Attachments

TRANSPORTATION PROJECT REPORT

DESIGN REPORT/DRAFT ENVIRONMENTAL IMPACT STATEMENT AND SECTION 4(f) EVALUATION

VOLUME I

RELOCATED ROUTE 290
TOWNS OF DEWITT AND MANLIUS
ONONDAGA COUNTY

P.I.N. 3034.46

REPORT NUMBER FHWA-NY-EIS-8803D

UNITED STATES
DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
FRANKLIN E. WHITE, Commissioner

REG 97-1 (10/77)



1 SITE PLAN
SCALE1"=200'

GRAPHIC SCALE
200 0 100 200 400
(IN FEET)

DUNN AND SGROMO ENGINEERS
E. SYRACUSE, NEW YORK
5800 HERITAGE LANDING DRIVE (315)449-4940 (315)449-4941 FAX

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NO.	DATE	REVISION	BY

TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK.

DEWITT BYPASS PROJECT

SITE PLAN

SCALE:	AS NOTED
FILE NO.:	
DESIGNED BY:	
DATE:	06.27.2019
DRAWN BY:	
DRWG. NO.:	SP1
CHECKED BY:	

TRANSPORTATION PROJECT REPORT

DESIGN REPORT/DRAFT ENVIRONMENTAL IMPACT STATEMENT AND SECTION 4(f) EVALUATION

VOLUME I

RELOCATED ROUTE 290
TOWNS OF DEWITT AND MANLIUS
ONONDAGA COUNTY

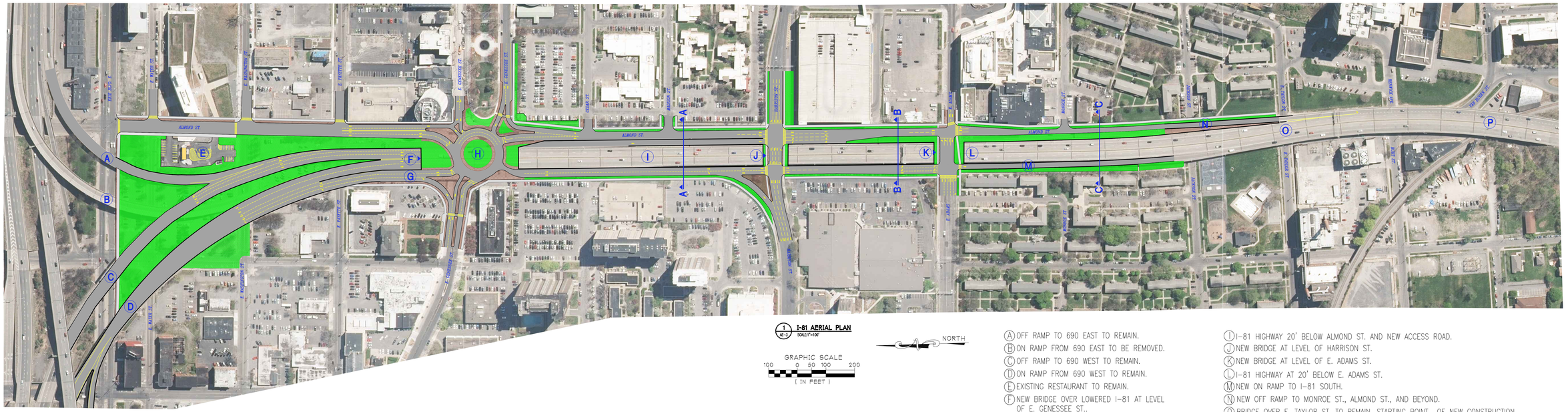
P.I.N. 3034.46

REPORT NUMBER FHWA-NY-EIS-8803D

UNITED STATES
DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
FRANKLIN E. WHITE, Commissioner

REG 97-1 (10/77)

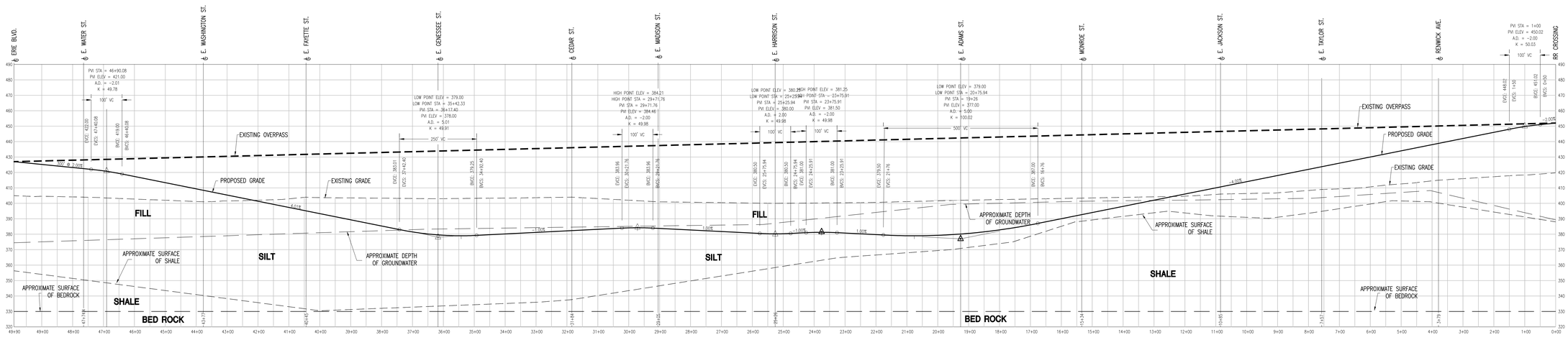


1 AE-3 **I-81 AERIAL PLAN**
SCALE:1"=100'

NORTH

GRAPHIC SCALE
100 0 50 100 200
(IN FEET)

(A) OFF RAMP TO 690 EAST TO REMAIN.
(B) ON RAMP FROM 690 EAST TO BE REMOVED.
(C) OFF RAMP TO 690 WEST TO REMAIN.
(D) ON RAMP FROM 690 WEST TO REMAIN.
(E) EXISTING RESTAURANT TO REMAIN.
(F) NEW BRIDGE OVER LOWERED I-81 AT LEVEL OF E. GENESSEE ST..
(G) SOUTH BOUND EXIT FROM I-81 TO PROPOSED TRAFFIC CIRCLE AND E. GENESSEE STREET.
(H) PROPOSED TRAFFIC CIRCLE AT EXISTING GRADE LEVEL OF E. GENESSEE ST.
(I) I-81 HIGHWAY 20' BELOW ALMOND ST. AND NEW ACCESS ROAD.
(J) NEW BRIDGE AT LEVEL OF HARRISON ST.
(K) NEW BRIDGE AT LEVEL OF E. ADAMS ST.
(L) I-81 HIGHWAY AT 20' BELOW E. ADAMS ST.
(M) NEW ON RAMP TO I-81 SOUTH.
(N) NEW OFF RAMP TO MONROE ST., ALMOND ST., AND BEYOND.
(O) BRIDGE OVER E. TAYLOR ST. TO REMAIN. STARTING POINT OF NEW CONSTRUCTION.
(P) BRIDGE OVER RAILROAD TO REMAIN.



2 AE-3 **I-81 PROFILE**
SCALE:1"=100' HORIZONTAL
1"= 20' VERTICAL

NOTES:
1. SUBSURFACE DATA SHOWN ON PROFILE IS FROM ENGINEERING REPORT BY _____DATED _____.
2. ELEVATIONS SHOWN ON THE PROFILE ARE FROM GOOGLE EARTH.

PROGRESS PRINT 04.04.17

DUNN & SGROMO ENGINEERS
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TOWN OF DEWITT
ONONDAGA CO., N.Y.

ROUTE I-81 ALTERNATIVES

PRELIMINARY AERIAL PLAN AND PROFILE

NO.	DATE	REVISION	BY

SCALE: AS NOTED
DESIGNED BY: GS
DRAWN BY: WRF
CHECKED BY: GS
FILE NO.: 1-19.002
DATE: MM.DD.YY
DWG. NO.: **AE-3**



1 SITE PLAN
SCALE1"=200'

GRAPHIC SCALE
200 0 100 200 400
(IN FEET)

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NO.	DATE	REVISION	BY

TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK.

DEWITT BYPASS PROJECT

SITE PLAN

SCALE:	AS NOTED
FILE NO.:	
DESIGNED BY:	
DATE:	06.27.2019
DRAWN BY:	
DRWG. NO.:	SP1
CHECKED BY:	

TRANSPORTATION PROJECT REPORT

DESIGN REPORT/DRAFT ENVIRONMENTAL IMPACT STATEMENT AND SECTION 4(f) EVALUATION

VOLUME I

RELOCATED ROUTE 290
TOWNS OF DEWITT AND MANLIUS
ONONDAGA COUNTY

P.I.N. 3034.46

REPORT NUMBER FHWA-NY-EIS-8803D

UNITED STATES
DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
FRANKLIN E. WHITE, Commissioner

REG 97-1 (10/77)

FHWA-NY-EIS-88-03-D
FEDERAL HIGHWAY ADMINISTRATION
REGION ONE

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND DRAFT SECTION 4(f) EVALUATION

PIN 3034.46, RELOCATED ROUTE 290
BUTTERNUT INTERCHANGE TO MANLIUS CENTER
TOWNS OF DEWITT AND MANLIUS
ONONDAGA COUNTY, NEW YORK

SUBMITTED PURSUANT TO 42 U.S.C. 4332(2)(c), 23 U.S.C. 138(a)
49 U.S.C. 303, 16 U.S.C. 460 L8f, and 16 U.S.C. 470(f)
BY
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION AND
NEW YORK STATE DEPARTMENT OF TRANSPORTATION

ABSTRACT:

This report describes the social, economic, and environmental effects of the proposed Relocated Route 290 in the Towns of DeWitt and Manlius, Onondaga County, New York. The alternatives proposed include the do-nothing or no-build and two basic alignments for the build alternatives. One alignment has three options for connecting to existing roadways in the vicinity of Manilus Center. The two alignments have been developed so that the westerly portion of one can be combined with the easterly portion of the other or vice versa. Wetlands, floodplains, parkland, and community noise levels are primary concerns for all build alternatives.

J. R. Lambert DATE 6/21/88
J. ROBERT LAMBERT
DIRECTOR
FACILITIES DESIGN DIVISION
NEW YORK STATE DEPARTMENT
OF TRANSPORTATION

for William A. Shea DATE JUN 22 1988
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COMMENTS DUE BY: August 31, 1988

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SUMMARY

A. Federal Highway Administration Action

Environmental Impact Statement

(x) Draft
( ) Final
(x) Section 4(f) Statement Attached

B. Brief Description of the Action

The project under consideration provides for "Relocated Route 290" in the Towns of DeWitt and Manlius and consists of a four lane arterial highway on new location with at grade signalized intersections. The proposed facility begins at the Butternut Interchange, proceeds in an easterly direction for approximately three (3) miles and terminates with a direct connection to Route 290 or 257 in the vicinity of Manlius Center. Bridges will be provided at the proposed crossings of Butternut Creek, Limestone Creek and the Old Erie Canal.

For all design alternatives, the project typical section provides for two 12 foot wide travel lanes in each direction separated by a 16 foot wide flush median. Left hand turn lanes will be provided within the proposed median at intersection locations. In addition, Fisher, Bowman, North Manlius Roads and Burdick Street will be widened to provide left hand turn lanes at their intersections with the proposed facility. At the Butternut Inter-change, on and off ramps will be provided to facilitate full access between the proposed facility and Interstate Routes 481 and 690.

Construction of the proposed facility is anticipated to occur in a west to east fashion according to a staged construction schedule which may involve three or more successive construction contracts. The initial contract would most likely involve construction of a four lane facility from the Butternut Interchange to a point east of Butternut Creek. All right of way for the proposed facility would be acquired in the initial stage. Subsequent stages would then involve construction of a two lane facility within a four lane right-of-way initially to Burdick Street and then to the eastern terminus. Final stages would ultimately provide for the construction of the remaining two lanes from a point east of Butternut Creek to the eastern terminus. The exact nature and extent of each construction stage will be determined after the Public Hearing and Design Approval and will be dependent upon a consideration of traffic needs and funding availability.

C. Summary of Alternatives Considered

The location band within which this project is located begins at Interstate Route 481, proceeds in an easterly direction and terminates in the vicinity of Manlius Center. The northern and southern limits of the location band are defined as existing Route 290 and the Old Erie Canal, respectively.

Two basic alignment locations have been selected for detailed consideration and preliminary plan development. These locations include a southerly (Alternative 1) and northerly (Alternative 2) routing within the northern portion of the location band. In all, a total of four design alternatives have been identified which follow the northern and/or southern alignment locations. These design alternatives are referred to as Alternatives 1, 2, 1-2 and 2-1.

Alternative 1 - Alternative 1 follows the southern alignment location throughout the study area. It begins at the Butternut Interchange and follows a common alignment, crosses Butternut Creek on a 350 to 400 foot long bridge and continues to a point approximately 1,250 feet west of Fisher Road. From this point, Alternative 1 curves to the northeast and crosses Fisher Road at a point approximately 3,500 feet south of existing Route 290. From Fisher Road, Alternative 1 continues in a northeasterly direction, crosses Bowman Road approximately 500 feet north of Taylor Road and then curves to the southeast and crosses Burdick Street 500 feet north of Taylor Road. East of Burdick Street, Alternative 1 continues in a southeasterly direction for approximately 4,500 feet and then crosses Limestone Creek and the Old Erie Canal on a 470± foot long bridge before terminating with a tee connection to Route 257. Total length of Alternative 1 is 2.4 miles.

Alternative 2 - Alternative 2 follows the northern alignment location throughout the study area. From its western terminus at the Butternut Interchange eastward to a point approximately 1,250 feet west of Fisher Road, it shares a common alignment with Alternative 1. From this point, Alternative 2 curves to the northeast and crosses Fisher Road approximately 3,000 feet south of existing Route 290 and aligns itself with the abandoned railroad before crossing Bowman Road. At a point approximately 1,100 feet east of Bowman Road, Alternative 2 curves to the southeast, crosses Burdick Street and passes immediately to the south of the DOW Lumber Yard. From Burdick Street, Alternative 2 proceeds in an east northeast direction for approximately 2,200 feet and then meets the abandoned railroad tracks. From this point eastward, there are three options available for Alternative 2. These options are referred to as Options A, B and C.

Option A - From a point approximately 1,250 feet west of Limestone Creek, Option A would proceed in a southeasterly direction along the abandoned railroad and cross Limestone Creek on a 430± foot long bridge. Continuing in a southeasterly direction, Option A would diverge from the abandoned railroad tracks and then cross the access road to the Meadowbrook Limestone Sewage Treatment Plant at a point approximately 700 feet west of existing Route 290. Option A would then continue in a southeasterly direction, cross the Old Erie Canal on a 140 foot long bridge and terminate with a direct connection to Route 257 at a point approximately 850 feet west of the existing Route 257/290 junction in Manlius Center. Total length of Alternative 2 with Option A is 2.7 miles.

Option B - From a point approximately 1,250 feet west of Limestone Creek, Option B would continue to follow the alignment of the abandoned railroad and would cross Limestone Creek on a

430± foot long bridge. After crossing Limestone Creek, Option B would proceed in an easterly direction, cross existing Route 290 approximately 650 feet southeast of Limestone Creek and pass to the north of Manlius Center before crossing the Old Erie Canal on a 200 foot long bridge. After crossing the canal, Option B would terminate with a direct connection to existing Route 290. Total length of Alternative 2 with Option B is 3.2 miles.

Option C - Option C would cross the abandoned railroad at a point approximately 1,250 feet west of Limestone Creek. It then curves to the southeast and crosses Limestone Creek on a 450± foot long bridge. It then aligns itself with existing Route 290 crosses the canal just to the west of the existing Route 290 bridge and terminates at the Route 257 intersection at Manlius Center. Total length of Alternative 2 with Option C is 2.8 miles.

Alternative 1-2 - Alternative 1-2 follows the same alignment as Alternative 1 from the Butternut Interchange eastward to a point approximately 1,200 feet west of Burdick Street and then crosses over to follow the alignment of Alternative 2 for the remainder of the project. Options A, B and C would also apply to this alternative. Alternative 1-2 is 2.7 miles in length with Option A, 3.2 miles long with Option B and 2.7 miles in length with Option C.

Alternative 2-1 - Alternative 2-1 follows the same alignment as Alternative 2 from the Butternut Interchange eastward to a point approximately 500 feet east of Bowman Road and then crosses over and becomes identical with Alternative 1 for the remainder of the project. Total length of Alternative 2-1 is 2.5 miles.

No-Build Alternative - The No-Build Alternative consists of retaining the existing state, county and local streets and highways within and adjacent to the project location band. Improvements associated with this alternative would consist only of normal maintenance, repair and rehabilitation activities. The existing Route 290 bridge over Butternut Creek has recently been reconstructed and the Fremont Road/Route 290 intersection was improved several years ago. The current DOT program includes improvements on existing Route 290 from Fremont Road west to the vicinity of the railroad station. No major improvements are planned or programmed for existing Route 290 between Fremont Road and Manlius Center.

The No-Build Alternative is a viable option which will receive equal consideration in the decision making process.

D. Areas of Controversy

Project scoping, interagency coordination and public involvement activities associated with the preparation of this Environmental Impact Statement have resulted in the identification of several areas of controversy.

The most prevalent concern of local residents is the perceived adverse impact of increased traffic volumes on Route 257 between Fayetteville and

Manlius Center and the "dumping" of traffic from the proposed facility onto a two-lane road (existing Route 257). Peak hour traffic volumes on Route 257 between Fayetteville and Manlius Center will decrease by 6 percent with Alternatives 2B and 1-2B, increase by 14 percent with Alternatives 2C and 1-2C, increase by 18 percent with Alternatives 2A and 1-2A and increase by 41 percent with Alternatives 1 and 2-1. Additional turning lanes, traffic signals and profile adjustments will be provided as necessary to accommodate the increased traffic volumes on Route 257 which may result from the project. No adverse impacts upon traffic safety, air quality or noise levels will result from the projected increased traffic volumes on Route 257.

Local business and property owners along Butternut Drive have expressed concern about the project's impact upon local flooding conditions along Butternut Creek. They have also expressed the need to maintain Butternut Drive as a through road between Cedar Bay Road and existing Route 290 and to provide direct access between Butternut Drive and the new facility. All highway development associated with this project will be limited to the floodway fringe and no significant encroachment upon the 100 year floodplains will occur as a result of this project. This project will not result in any significant increase in flooding conditions or 100 year flood elevations. Due to grade separations between Butternut Drive and the proposed facility, the proposed Butternut Creek crossing and roadway geometry considerations, it is not possible to provide a safe or cost effective connection between Relocated Route 290 and Butternut Drive. However, under all build alternatives, Butternut Drive will be maintained as a through road which passes beneath the proposed facility.

The U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, U.S. Department of Army Corps of Engineers and New York State Department of Environmental Conservation are concerned about the significant amount of floodplain and wetland areas which could be affected by the proposed facility. A particular concern of USF&W and NYSDEC was the potential adverse wetland impacts associated with the development of a relocated Butternut Drive connection to Fisher Road. In response to this concern, NYSDOT developed a second option for the relocation of Butternut Drive which avoids the wetland areas of concern. Selection of a design alternative for this project will be based upon a thorough consideration of wetland and floodplain involvements as well as other social, economic and environmental factors.

E. Summary of Environmental Impacts

This project will involve construction and the placement of fill within the 100 year floodplain of Butternut and Limestone Creeks. However, all proposed fill in these areas will be limited to the flood fringe and no significant encroachment upon the 100 year floodplain will occur.

This project will involve the placement of highway fill within regulated wetlands and will require a U.S. Department of Army Corps of Engineers Section 404 permit. A New York State Freshwater Wetlands Permit from the New York State Department of Environmental Conservation (DEC) will also be required in addition to a 401 Water Quality Certification. Mitigation measures for the disturbed wetlands will be in compliance with the permit conditions.

Temporary (construction related) and long term (traffic related) increases in noise levels are unavoidable impacts of this project. All traffic related noise impacts associated with the build alternatives are a result of predicted noise levels increasing six (6) to fourteen (14) dBA L_{10} over existing noise levels. In no instances do the build alternatives result in noise levels which exceed the federal noise abatement criteria level of 70 dBA L_{10} for residential properties.

A maximum of five (5) residential units will be displaced by this project. Replacement housing and relocation services provided by the Department of Transportation will insure that housing and relocation assistance are available to all relocatees without discrimination.

A maximum of 0.99 acres of Old Erie Canal State Park land will be required by this project. However, land is available to mitigate or replace that which is taken.

Impacts to water resources would be limited to a temporary increase in turbidity and sedimentation in the project study area streams during construction and a negligible decrease in water quality from highway runoff and deicing compounds. All project related work within the study area streams will be subject to the authorization of the U.S. Army Corps of Engineers under the provisions of the Section 404 Permit System which specifies specific mitigation practices that must be followed.

This project will affect fish and wildlife populations within the study area by disrupting or eliminating habitat in areas proposed for highway and bridge construction and by temporarily decreasing water quality. No known threatened or endangered fish and/or wildlife species or critical habitats/plant species will be affected.

Although the design alternatives satisfy the project objectives, differences exist between the alternatives regarding their respective social, economic and environmental consequences. These differences are summarized in the table at the end of this summary.

F. Permits and Certifications

The following permits or certifications are required before construction of the project:

Section 404 Permit, U.S. Army Corps of Engineers
Freshwater Wetlands Permit, NYS Department of Environmental Conservation
Water Quality Certification, NYS Department of Environmental Conservation

G. Agency Coordination

The Federal, State and Local Agencies or Organizations from whom comments are being requested on this DEIS are as follows:

FEDERAL

U.S. Department of Agriculture
U.S. Department of Commerce
National Marine Fisheries Service
U.S. Department of Health and Human Services
U.S. Department of Housing and Urban Development
U.S. Department of Interior, Environmental Project Review
U.S. Fish and Wildlife Service
Environmental Protection Agency
U.S. Department of Transportation, Office of the Secretary
Advisory Council on Historic Preservation
Federal Emergency Management Agency
Secretary of Defense
U.S. Department of the Army Corps of Engineers, Buffalo District
Federal Railroad Administration
Urban Mass Transportation Administration
Soil Conservation Service (USDA)
Federal Power Commission
Council on Environmental Quality

STATE

Department of Environmental Conservation
Department of Agriculture and Markets
State Education Department
Office of Parks, Recreation and Historic Preservation
- Division of Historic Preservation
- Management Systems
- Central New York Parks Region

State Police
Department of Health
Department of Commerce

LOCAL

Senator Nancy L. Hoffmann, NYS 48th District
Assemblyman Hyman M. Miller, NYS 121st District
William Sanford, Chairman, Onondaga County Legislature
Robert F. Tomeny, Onondaga County Legislature, 3rd District
Harold C. Brown, Jr., Onondaga County Legislature, 9th District
Terry R. Pickard, Onondaga County Legislature, 10th District
Nicholas Pirro, Onondaga County Executive
Onondaga County Department of Transportation
Onondaga County Environmental Management Council
Onondaga County Health Department
Onondaga County Drainage and Sanitation Department
Onondaga County Water Authority
Syracuse-Onondaga County Planning Agency

Onondaga County Soil and Water Conservation District
Town of DeWitt Supervisor
Town of DeWitt Clerk
Town of DeWitt Planning Board
Town of DeWitt Highway Superintendent
Town of Manlius Supervisor
Town of Manlius Highway Superintendent
Town of Manlius Clerk
Town of Manlius Planning Board
Superintendent, East Syracuse-Minoa Central Schools
Superintendent, Fayetteville-Manlius Schools
Superintendent, Jamesville DeWitt Central Schools
Mayor, City of Syracuse
Mayor, Village of Fayetteville
Mayor, Village of East Syracuse
Mayor, Village of Manlius
Mayor, Village of Minoa
Town of DeWitt Police Department
Town of Manlius Police Department
Onondaga County Fire Coordinator
Fire Chief, Minoa Fire Department
Fire Chief, Fayetteville Fire Department
Fire Chief, DeWitt Fire Department
Fire Chief, East Syracuse Fire Department
Niagara Mohawk Power Corporation
New York Telephone Company
Syracuse Newchannels Cable TV
Syracuse Metropolitan Transportation Council
Central New York Regional Transportation Authority
Metropolitan Water Authority
DeWitt Advisory Conservation Commission
CNY Regional Planning and Development Board
Soil Conservation Service (USDA) Onondaga County District
Onondaga Historical Association
DeWitt Community Library
Assoc. General Contractors of America
Metropolitan Development Assoc. of Syracuse and CNY
American Automobile Assoc.
Eagle Bulletin
Suburban Life
Syracuse Herald Journal
Syracuse Post Standard

COMPARISON OF ALTERNATIVES

CATEGORY	NO BLD.	ALT.1	ALT.2A	ALT.2B	ALT.2C	ALT.1-2A	ALT.1-2B	ALT.1-2C	ALT.2-1
SATISFY PROJECT OBJECTIVES									
1. Divert Ex. Rte. 290 Traffic to Increase Level of Service	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Reduce Peak Hour Congestion on Rte. 290 and Minimize Traffic Delays	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3. Promote Economic Growth	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4. Inc. Bus Service & Reduce Rush Hour Traffic on E/W Arterials	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
COST TO COMPLETE (MILLIONS OF DOLLARS - 1987)									
1) Construction	NA	18.0	21.5	23.5	19.0	21.5	23.0	19.0	18.0
2) Right-of-Way	NA	1.5	1.0	1.1	1.5	1.2	1.3	1.6	1.3
Total		19.5	22.5	24.6	20.5	22.7	24.3	20.6	19.3
RIGHT OF WAY ACRES REQUIRED*									
Total	NA	34.0	47.6	50.5	40.5	43.8	46.7	36.7	36.6
Farmland Soils (Prime and Statewide Impt.)	NA	37.6	50.8	49.4	44.8	53.5	52.1	47.5	42.7
Active Farmland	NA	1.0	2.45	2.45	0.6	2.45	2.45	0.6	1.0
Old Erie Canal Parkland	NA	0.64	0.37	0.99	0.40	0.37	0.99	0.40	0.64
DISPLACEMENTS									
1) Residences (Structures)	NA	3	1	1	2	2	2	3	2
2) Residences (Units)	NA	3	1	1	4	2	2	5	2
3) Commercial (Structures)	NA	0	0	0	0	0	0	0	0
ACRES OF NYSDEC WETLANDS REMOVED	NA	21.1	24.1	28.5	23.8	21.0	25.4	20.7	25.5
VEGETATION/WILDLIFE HABITAT REMOVED	NA	34.9	45.8	48.2	38.0	46.6	48.8	38.7	35.3
NOISE IMPACTS (NUMBER OF PROPERTIES)	NA	50	27	29	27	27	29	27	47
MITIGATION COSTS (THOUSANDS OF DOLLARS - 1987)									
1) Wetlands	NA	450	537.5	587.5	475	537.5	575	475	450
2) Noise	NA	651	180	180	180	0	0	0	651

*Does not include land already owned by NYSDOT

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I - INTRODUCTION

This document is the Design Report/Draft Environmental Impact Statement (DEIS) for the Relocated Route 290 Project located in the Towns of DeWitt and Manlius, Onondaga County, New York.

This report documents the design studies conducted for the project which proposes the construction of a new New York State Route 290 in the Towns of DeWitt and Manlius. This three mile long project was originally part of a larger study of the Route 5 Corridor in the Towns of DeWitt, Manlius and Sullivan. The location analysis phase of the project development process identified this project as one practical solution to traffic needs in this portion of the corridor and eliminated other location alternatives. Design studies were then progressed within this single location band with the development of feasible design alternatives.

This project will follow the combined hearing process. The combined hearing will focus on location considerations as well as design alternatives and their impacts. Specifically, this Design Report/DEIS will consider alternative highway design alignments within an east-west location band which begins in the vicinity of the I-690/481 interchange, proceeds in an easterly direction and terminates in the vicinity of Manlius Center near the intersection of existing Route 290 and Route 257.

This document has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, the State Environmental Quality Review (SEQR) Act of 1975 and the New York State Department of Transportation Environmental Action Plan and presents to the public and interested agencies a complete discussion of the scope of the project and potential socio-economic and environmental effects. The Environmental Action Plan describes the process to be used by the New York State Department of Transportation (NYSDOT) in developing federally-aided transportation projects to ensure full consideration of social, economic and environmental factors in making transportation decisions and to insure that such decisions are made in the best overall public interest.

This project requires the acquisition of a maximum of 0.7 acres of publicly owned land located within the Old Erie Canal State Park which is subject to protection under Section 4(f) of the Federal Aid Highway Act of 1968 and a Section 4(f) Involvement is required. The park is also subject to protection under Section 6(f) of the Land and Water Conservation Fund Act since Bureau of Outdoor Recreation funds (now Heritage Conservation and Recreation Service) were used for construction of various facilities and improvements in the park.

This document will be distributed to federal, state and local agencies as well as interested groups, organizations and individuals with special concerns or expertise for review and comment. It will be made available for public review at the Federal Highway Administration in Albany, the New York State Department of Transportation Region 3 Office in Syracuse and the Town Offices of DeWitt and Manlius. After this document has been distributed, a combined public hearing will be held and comments will be received and recorded.

After the public hearing transcript is analyzed, this document will be modified to address the comments of the reviewing agencies and general public. The modified report will be titled Project Report V - Design Recommendation/FEIS. The New York State Department of Transportation's recommendation will be included in Project Report V and the document will be submitted to the Federal Highway Administration for their approval.

Copies of this report and additional information can be obtained from:

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Acting Regional Director - Region 3
State of New York
Department of Transportation
333 East Washington Street
Syracuse, New York 13202

Mr. Phil Clark
Design Bureau
Room G-01, Building 4
State of New York
Department of Transportation
1220 Washington Avenue
Albany, New York 12232

Mr. Harold J. Brown
Division Administrator
Federal Highway Administration
Leo W. O'Brien Federal Building, 9th Floor
Clinton Avenue and North Pearl Street
Albany, New York 12207

II - PROJECT LOCATION, EVOLUTION, NEED AND OBJECTIVES

A. Project Location and Identification

This project is located in the Towns of DeWitt and Manlius, Onondaga County, New York and is shown on Figures 2-1 and 2-2. The official project designation is:

P.I.N. 3034.46
RELOCATED ROUTE 290
I-481 TO MANLIUS CENTER
ONONDAGA COUNTY

The termini for this project are defined in the west as Butternut Interchange (I-481/I-690) and in the east as Manlius Center in the vicinity of the intersection of existing Route 290 and Route 257. The location band for this project is shown in Figure 2-2. It begins at Interstate Route 481, proceeds in an easterly direction and terminates in the vicinity of Manlius Center. The northern and southern limits of the location band are defined as existing Route 290 and the Old Erie Canal, respectively.

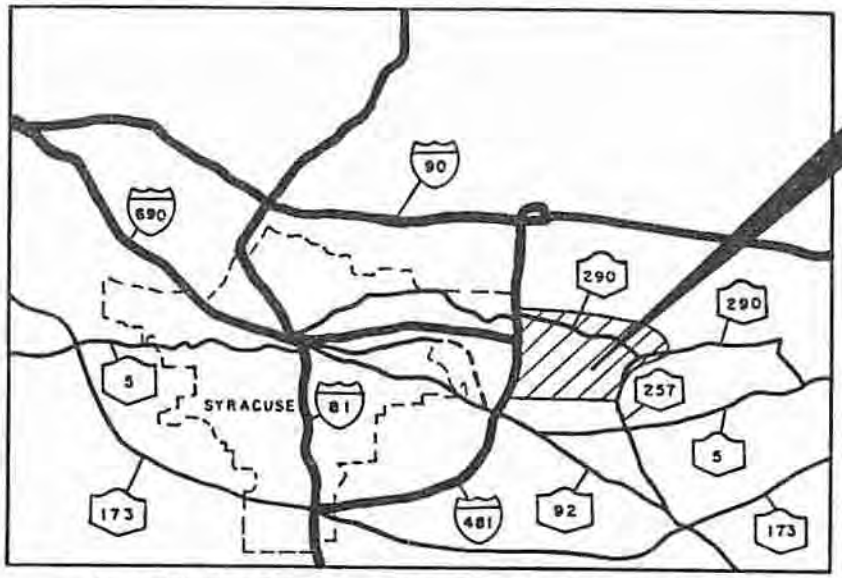
B. Project Evolution

In July 1971, the Policy Committee of the Syracuse Metropolitan Area Transportation Study (now the Syracuse Metropolitan Transportation Council) adopted a Transportation Plan developed by the Study's Planning Committee. Part of this plan called for a Relocated Route 5 East Corridor beginning in the vicinity of the I-481/I-690 Interchange (Butternut Interchange) and continuing east to the vicinity of Manlius Center.

Planning and engineering studies for a Relocated Route 5 were initially conducted by NYSDOT and documented in a September 1971 project information report. That report recommended that the eastern terminus of any relocated facility be at a point on Route 5 east of the Village of Chittenango in Madison County and that the project be constructed in stages. Also, that report anticipated the likelihood that only a two lane facility would be required to fulfill the transportation needs to the year 1995.

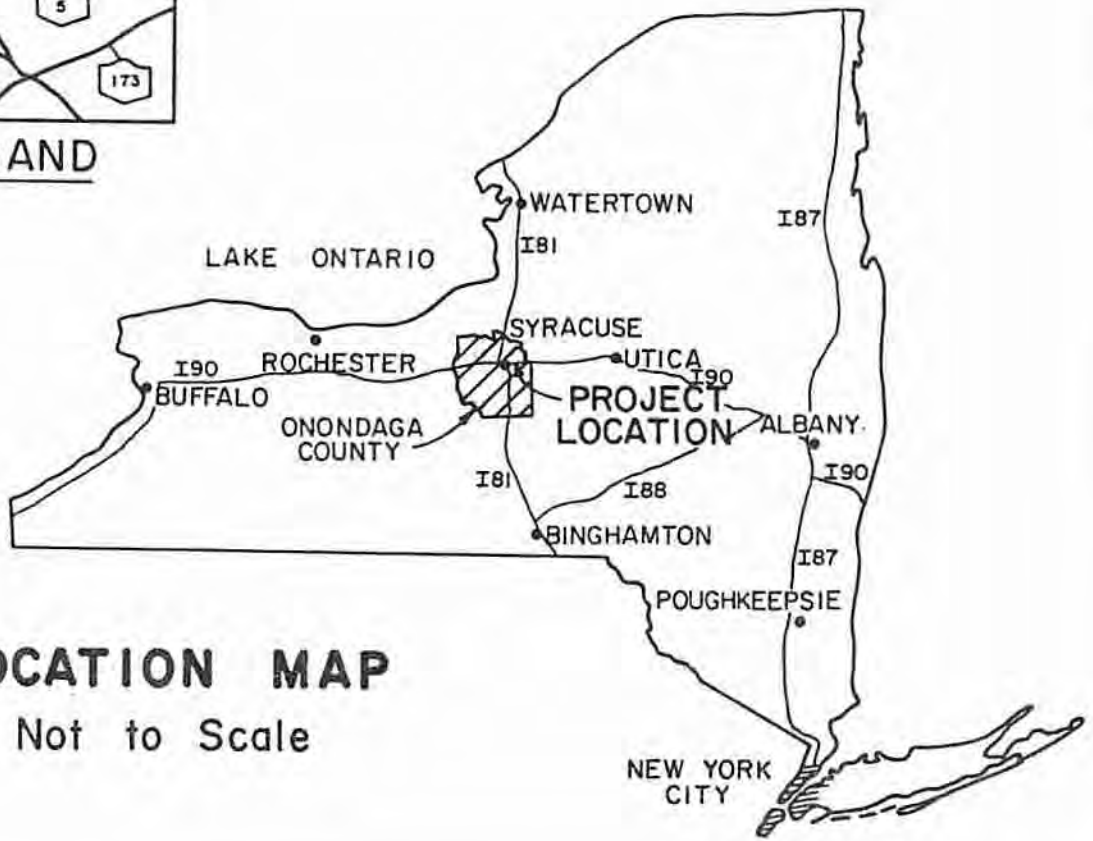
In 1978, NYSDOT commenced additional studies to further evaluate the proposed Route 5 corridor and to update the area's transportation needs. These studies culminated in the preparation of Project Report I and II (PR I and II) in January 1982 and Project Report III (PR III) in July 1982.

Project Report I and II identified and evaluated existing and future transportation needs in eastern Onondaga County and western Madison County. Within this region, Primary and Secondary Study Areas were delineated. These areas are shown on Figure 2-3. The Primary Study Area includes the area where specific transportation improvement alternatives would be located while the Secondary Study Area includes the larger impact area within which most of the effects of the various transportation improvements would occur.



PROJECT AREA

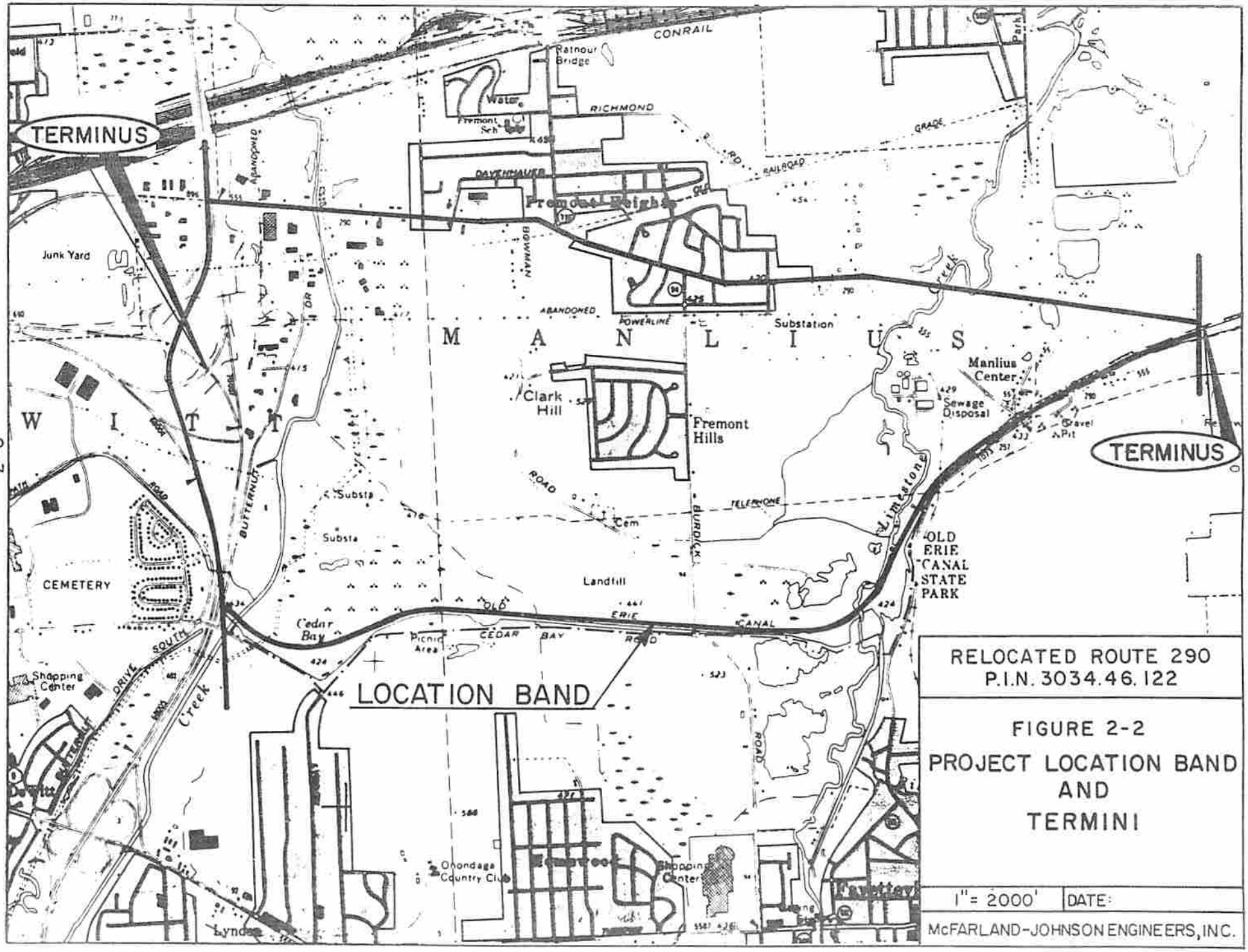
PROJECT LOCATION BAND



LOCATION MAP

Not to Scale

FIGURE 2-1



RELOCATED ROUTE 290
P.I.N. 3034.46.122

FIGURE 2-2
PROJECT LOCATION BAND AND TERMINI

1" = 2000' | DATE:

McFARLAND-JOHNSON ENGINEERS, INC.

As a result of this analysis, it was determined that additional east-west radial lines with access points to the freeway system are warranted within the study area.

Four principal corridors were then selected in the development and analysis of alternatives that address the identified needs. These four corridors extend in an easterly direction from I-481 and include the Route 290 Corridor, the I-690 Corridor, the Cedar Bay Corridor and the Route 5/92 Corridor (see Figure 2-3). In all, some twenty-five alternatives were then developed and evaluated. These alternatives included new roadways, new transit and improvements to the existing road system. Each preliminary alternative was evaluated on the basis of transportation effectiveness, environmental impact and consistency with the following community/project goals.

1. Provide Essential Transportation Service of High Quality.

2. Provide for Efficient Movement of People and Goods.

3. Maintain Well Being and Character of the Community.

4. Preserve and Enhance Natural Resources of the Study Area.

5. Promote Efficient Use of Energy Resources.

A brief discussion of the various alternatives considered for each of the four corridors is provided below:

Route 5 and 92 Corridor - Two alternative concepts were considered that would increase radial capacity along the Route 92 area by adding arterial lanes. One concept increased the capacity of Route 92 from the Village of Manlius through to I-481, and the other increased capacity from the Village of Manlius to the Jamesville Interchange of I-481 on a by-pass arterial at the southern extremities of the study area.

The new location alternative concept was eliminated due to adverse environmental impacts, high implementation costs and lack of traffic efficiency in the northern part of the study corridor.

The widening of existing Route 92 was eliminated because it did not address the traffic service needs of the study area and violated community character and energy resources.

Cedar Bay Corridor - The Cedar Bay Corridor included the widening and relocation of Kinne Road/Cedar Bay Road between Butternut Drive and North Burdick Street. The alternatives evaluated also included a new interchange with I-481 between the Butternut and Route 5 and 92 interchanges.

These alternatives were eliminated because they either violated the traffic service needs of the area, community character or energy resources. The proposed interchange would have also created undesirable operating conditions including a short weave section on the I-481 southbound lanes south of the Butternut Interchange, poor ramp geometrics and the inability to provide advance signing for all ramps in the interchange.

Route 290 Corridor - These alternatives included the widening of existing Route 290 from Galster Road to Burdick Street to three lanes in each direction, and from Burdick Street to Manlius Center to two lanes in each direction. Also, a widening of Burdick Street to two lanes in each direction, and an interchange between Routes 290 and I-481 in the northern quadrants were selectively evaluated.

These improvements were eliminated from consideration due to high construction costs, marginal effectiveness of adding an interchange with I-481, wetland impacts and a relatively large number of residential and business displacements.

Route 690 Corridor - Improvements in this corridor would provide for the eastward extension of I-690 as an arterial highway from the Butternut Interchange. This would simultaneously increase east-west corridor capacity and provide access to the metropolitan area freeway system via the Butternut Interchange. Several variations of this concept were developed of which one was selected as the recommended alternative, thus forming the basis for this project.

TSM Option - In addition to corridor alternatives, a Transportation Systems Management (TSM) option was developed in an attempt to find potential low cost, operations-oriented improvements that could accommodate expected future travel demand. The TSM package included: peak period express bus service from park and ride lots near the Villages of Manlius and Fayetteville, a staggered work hours program at large area employers, intersection improvements along Routes 5, 92 and 290 and Route 92 widening.

TSM received a mixed community response. There was much discussion of the appropriateness and/or the practicality of many of the elements of TSM. Many ridiculed the alternative as unworkable. However, TSM components could be effective if properly combined with one of the major reconstruction alternatives.

As a result of the above evaluation, PR I and II recommended a new four lane arterial highway be located within the I-690 corridor. The proposed facility would extend eastward from the Butternut Interchange to existing Route 290/257 in the vicinity of Manlius Center. In addition to the new four lane arterial highway, PR I and II considered the No-Build Option and a Transportation System Management (TSM) option as viable alternatives. The TSM option included items such as express bus service from park and ride lots, a staggered work hours program at large area employers; intersection improvements along Route 5, Route 92 and existing Route 290 including the widening of Route 92 to two thru lanes plus a turning lane from Lyndon Corners eastward to Woodchuck Hill Road.

Project Report I and II was completed and made available to the public on March 15, 1982 for review and comment. The majority of comments received as a result of the review of PR I and II favored either a new four lane arterial highway or TSM alternative. The most prevalent concern was the environmental impact of the project with respect to the Old Erie Canal Park, soils related problems, floodplains, wetlands, fish and wildlife, aquatic habitat, energy consumption, noise and air pollution and perceived adverse traffic effects upon the Village of Fayetteville.

In July 1982, PR III was completed and made available to the public. PR III developed specific conclusions and recommendations based upon the technical evaluations in PR I and II and the comments received from the review of PR I and II. The final project recommendation of PR III is to progress preliminary design of the four lane arterial highway alternative along with a recommendation to the Syracuse Metropolitan Transportation Council to further evaluate and/or implement elements of the TSM Alternative at such time as practical and warranted.

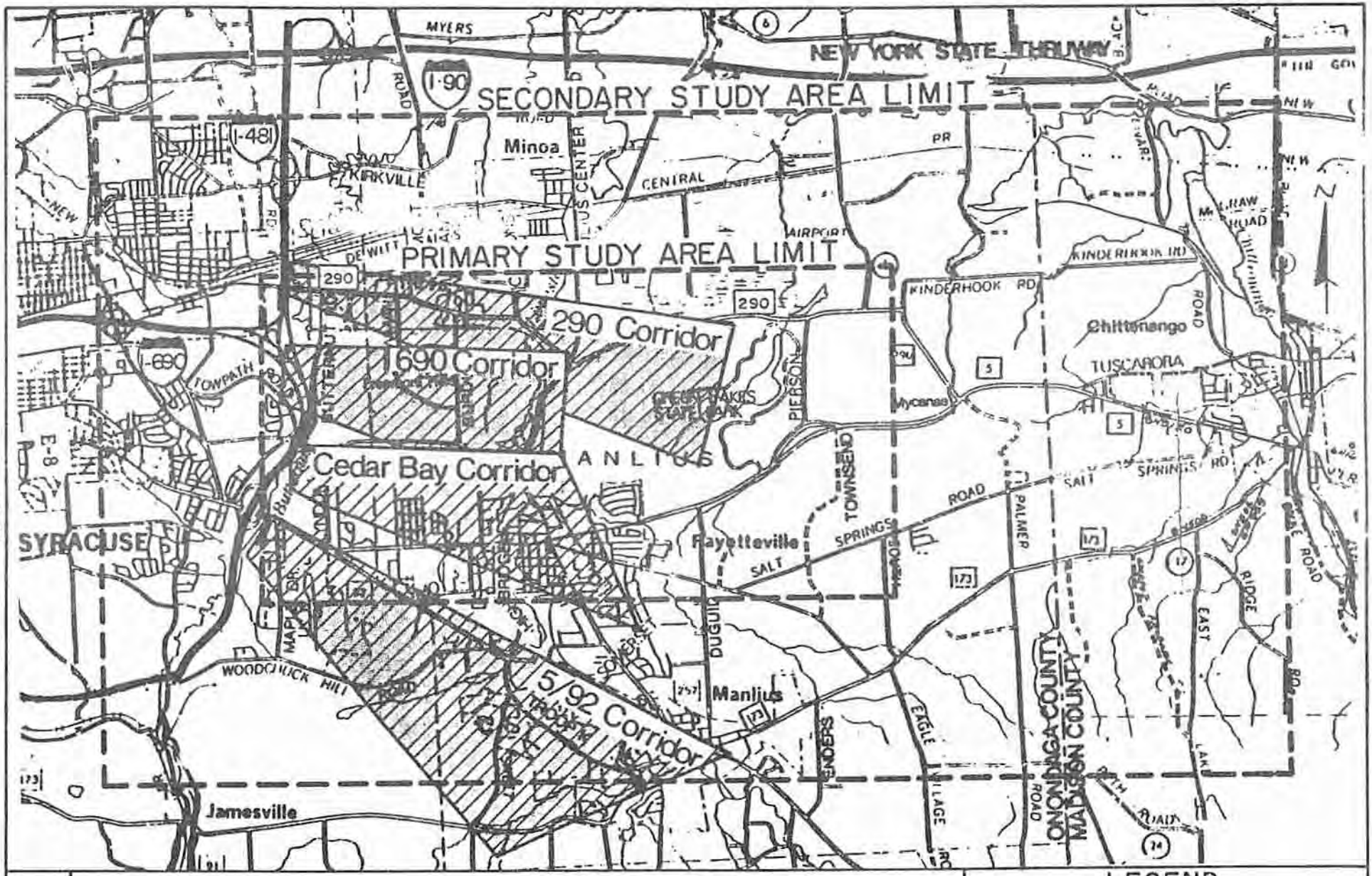


FIGURE 2-3

STUDY LIMITS & EAST/WEST CORRIDORS

LEGEND

- STUDY AREA LIMITS
- CORRIDOR

SCALE
1" = 1.2 MILES (APPROX.)

Ultimately, the four lane arterial alternative would provide for a four lane limited access arterial on new location. It would begin at the Butternut Interchange (I-690 at I-481) and would proceed in an easterly direction, north of Fremont Hills to Burdick Street. From this point, it would continue in an easterly direction on either new location or along a widened four lane Route 290 and terminate in the vicinity of Manlius Center. PR III also recommended a phased construction of the recommended alternative involving initial construction of a two-lane facility within a four lane right-of-way. Then, when warranted by traffic conditions, a subsequent stage would provide for the construction of the remaining two lanes.

The recommended four lane arterial within the I-690 corridor would provide the following benefits:

- Increased east-west corridor capacity and access to the metropolitan area freeway system via Butternut Interchange.
- Reduced traffic at key existing intersections.
- Minimal housing and business displacements.
- Substantial reduction in traffic congestion on existing Route 290.
- Improved access to the Interstate System for business in the Fisher Road and Burdick Street area.
- Utilization of right-of-way already acquired by the Department of Transportation, thus minimizing property acquisition and relocation requirements.

Currently, the recommendations of PR III have been carried each year in the annual Transportation Improvement Program of the Syracuse Metropolitan Transportation Council.

C. Project Need and Resulting Objectives

Project needs are determined from the identification of existing and projected transportation deficiencies which occur on the existing roadway network as a result of changes in transportation demands. These deficiencies are generally associated with roadway capacity problems, travel delays and undesirable Levels of Service (see Appendix C for definition of Levels of Service).

The present highway system is comprised of a low density road network. The major east-west roads (the dominant travel pattern) are the New York State Thruway (I-90), State Routes 5, 92 and 290 and Kirkville Road west of Manlius Center. The major north-south roads are I-481, Burdick Street/ Highbridge Street, North Manlius Road and State Route 257 from Manlius Center south to the Village of Manlius.

Within the limits of the project location band, the major east-west road is existing State Route 290. Important north-south roads passing

through the location band include I-481 at the western terminus, Route 257 near the eastern terminus and Burdick Street which passes through the center of the location band southward from Route 290 to Route 5 near the Village of Manlius. Local access roads within the location band include:

Butternut Drive - Located west of Butternut Creek, this road provides access to commercial and industrial operations in this area;

Fisher Road - Located east of Butternut Creek, this dead end road provides access from Route 290 to commercial/industrial operations and a municipal landfill at its southerly terminus;

Bowman Road - This road runs south and east from Route 290 to Burdick Street and provides access to local residential areas; and

Taylor Road - This road runs east to west between Burdick Street and Bowman Road and provides access to adjacent residential areas.

I-481 is a four lane controlled access facility with six lanes in the vicinity of the Butternut Interchange. All other roads in the location band are two lane facilities with widenings at appropriate intersection approaches.

PR I and II included an analysis of traffic conditions within the Towns of DeWitt, Manlius and Sullivan in Onondaga and Madison Counties. This analysis included a detailed evaluation of existing and future growth patterns and traffic volumes, accident rates, an origin-destination survey and an assessment of road and bridge conditions. As a result of this analysis, it was determined that existing traffic flow conditions in the study area are marginally constricted in peak periods and free flowing in non-peak periods. However, by the year 2011, several of the key intersections within the study area will be operating at or above capacity. The following table shows projected (1991 and 2011) levels of service for key intersections, assuming no improvements are made to the highway system.

TABLE 2-1

INTERSECTION LEVEL OF SERVICE IN PEAK PERIODS*

Location	ETC (1991)	Future (2011)
Existing Route 290 at		
Butternut Drive	C(D)	F(F)
Fisher Road	E(E)	F(F)
Bowman Road	F(E)	F(F)
Fremont Road	C(B)	F(C)
Burdick Street	F(E)	F(F)
Clemons Road	B(D)	D(F)

*F = AM, (F) = PM
Levels of service determined according to methodology of 1985 Highway Capacity Manual.

Future travel assignments for the committed null road network prepared by the New York State Department of Transportation indicate that existing Route 290 between the Butternut Interchange and Limestone Creek will be over capacity by the year 2005. Based upon a traffic analysis of this corridor, it was determined that two (2) additional traffic lanes of capacity in each direction would be necessary to accommodate future east-west traffic within the location band west of Manlius Center.

Compounding the problem on existing Route 290 is the narrow pavement and shoulder width, poor pavement structure, inadequate drainage and resultant flooding and large turning volumes into many businesses. To alleviate these inadequacies, the Department of Transportation has developed plans for the reconstruction of Route 290 between the Basil Rowe Road intersection in the Village of East Syracuse and the Bowman Road intersection in the Town of Manlius. The recommendation will include the addition of a continuous two-way left turn lane, improved drainage system and improved geometrics. However, these improvements will not alleviate the projected capacity deficiencies along Route 290.

Also contributing to the existing and future capacity problems discussed above is the low vehicle occupancy (1.2 people/vehicle) and underutilization of the transit system for work trip purposes.

Thus, based on technical evaluations of the existing roadway, travel patterns and the stated regional and community goals, the following is a summary of the transportation needs which establish the basis for this project.

1. Reduce expected traffic congestion on the street system by the equivalent of two lanes of east-west arterial traffic in each direction west of Manlius Center. Ultimate objectives are to reduce expected traffic flow and improve performance on existing Route 290.

2. Minimize the increase (over the null condition) of traffic volumes in the north-south corridors. Primary objective is to avoid attracting traffic from the south through Lyndon Corners, the Route 5/Highbridge Street/Burdick Street Intersection or Route 5/Route 257, all currently at or approaching capacity.

3. Upgrade line haul or express transit service from the study area and adjacent communities to downtown Syracuse and the University/Hospital complex due to the significant number of work trips destined to that area and the low (1.2) auto occupancy for these trips.

In the development of design alternatives which satisfy the established project needs, high priority has been given to those alternatives which would achieve the following project objectives:

1. Provide a facility that will divert a significant amount of through traffic from existing Route 290 so that it will operate at an acceptable level of service throughout the design period.

2. Provide a facility that will reduce peak hour congestion and minimize traffic delays and travel times within and through the study area.

3. Support economic growth and development in accordance with established state, county and local planning policy while minimizing impacts and infringement on residential and environmentally sensitive areas.

4. Encourage the use of express bus service as a means of further reducing rush hour congestion along existing east-west arterials in the vicinity of the study area.

III - ALTERNATIVES

A. Objectives and Design Criteria

The design alternatives presented in this document have been developed to satisfy the project needs and objectives as identified in Chapter II. As such, the design alternatives consider various alignment configurations for an at-grade arterial highway which will divert a significant amount of through traffic from existing Route 290 west of Manlius Center. The proposed facility would begin at the Butternut Interchange, proceed in an easterly direction for approximately three miles and terminate in the vicinity of Manlius Center with a direct connection to either Route 290 or Route 257. The project is being progressed to reduce peak hour congestion, travel times and delays within and through the study area and thus allow the highway network to operate at an acceptable level of service throughout the 20 year design period. Design alternatives for this project have been developed in a manner which supports the area's economic growth and development trends in accordance with established planning policy while minimizing impacts and infringement upon residential and environmentally sensitive areas. Although no specific provisions for express bus service are included in this project, none of the design alternatives would preclude the use of the proposed facility as an express bus route.

In order to accomplish the project objectives, certain engineering criteria were established for the project design studies. The design criteria for this project were established by the Department of Transportation based on the American Association of State Highway and Transportation Officials (1984 AASHTO) Design Standards. The criteria which served as a basis for development and evaluation of the design study alternatives are listed below:

	Mainline	Butternut Interchange Ramps
Design Speed:	60 mph	40 (30) mph
Maximum Grade:	4%	7%
Maximum Curve:	4°-15′	13° (25°)
Stopping Sight Distance (Minimum):	525′	275′ (200′)
Travel Lane Width:	12′	15′
Shoulders:	10′ Rt., 3′ Lt.	6.5′ Rt., 3.5′ Lt.
Clearance to Fixed Objects:*	30′	25′ (20′)
Superelevation:	E_{max} = 0.06′/ft.	E_{max} = 0.06′/ft.
Access Control:**	Partial	Full
Design Level of Service:	D (Minimum)	D (Minimum)

*The AASHTO "Guide for Selecting, Locating and Designing Traffic Barriers" will be used where an adequate clear distance cannot be obtained.

**For all segments entirely on new location, access will be allowed only at designated intersections.

B. Alternatives

Various physical, cultural and natural features within the location band posed constraints with respect to the positioning and alignment of the design alternatives. These constraints were carefully considered during the development and evaluation of preliminary alignment alternatives for this project. Provided below is a list of specific features within the study area which directly influenced the location of the various alignments.

1. Erie Village Subdivision - This 110+ acre subdivision which is presently under construction is located east of Burdick Street in the southeast portion of the study area. Ultimate plans call for the development of 500 residential townhouse units.

2. Fremont Hills - A residential area located in the central portion of the study area.

3. Fremont Heights - A residential area located in the north central portion of the study area.

4. Kodiak Subdivision - A proposed 21 unit residential subdivision located west of Fremont Heights in the north central portion of the location band.

5. Clark Hill Subdivision - A proposed 143 unit residential subdivision located west of Fremont Hills and east of Bowman Road in the central portion of the location band.

6. Fremont Meadows Subdivision - A proposed 158 unit residential subdivision located east of Burdick Street and north of Erie Village in the east central portion of the location band.

7. Medical Center East - A professional health care facility located on the east side of the Taylor Road/Burdick Street intersection.

8. Commercial/industrial development in the vicinity of the Butternut Interchange.

9. Electric substations.

10. Sanitary Landfills.

11. Extensive floodplain and wetland areas.

12. The Meadowbrook-Limestone Sewage Treatment Plant.

13. Abandoned railroad tracks traversing the northern and eastern portions of the study area.

14. Existing development in the vicinity of Manlius Center.

Because of the extensive amount of floodplain and wetland areas within the study area, an informational/scoping meeting was held at NYSDOT's

Region 3 office in Syracuse (see Appendix D). At this meeting, representatives from the New York State Department of Environmental Conservation (NYSDEC), the U.S. Department of Army Corps of Engineers (COE), the U.S. Fish and Wildlife Service (USFWS) and the Onondaga County Planning Agency were offered the opportunity to review and comment upon possible alignment locations within the location band. These preliminary alignments were also field reviewed by representatives from NYSDEC, USFWS and the Department of Transportation.

As a result of the above interagency coordination, preliminary impact assessment and subsequent evaluations by the Department of Transportation, the following design considerations and environmental constraints directly influenced the location of the design alternatives for this project.

1. At the eastern edge of the location band, the Old Erie Canal, residential properties and steep hillside posed spatial and geometric constraints upon the eastern terminus of each design alternative. As a result, the connection of the Design Alternatives with existing Route 290/257 is based upon traffic safety, access and sight distance considerations, avoidance of excessive hillside excavations and the minimization of residential displacements and property acquisition within the Old Erie Canal State Park.

2. The total utilization of the abandoned railroad as a possible alignment location in the vicinity of Fremont Heights was eliminated from consideration because of its close proximity to residential backyard areas.

3. In order to minimize involvement with designated wetland areas to the maximum practical extent, all design alternatives were located in a manner which favored higher upland areas and the use of the abandoned railroad wherever feasible. East of Burdick Street, a large wetland area was avoided as much as possible by locating the design alternatives along its northern and southern perimeters.

B-1 Alternatives Considered and Dismissed

Southerly Alignment Location - Attempts were made to position an alignment south of Fremont Hills within the study area. However, to facilitate a connection with Route 257 at its eastern terminus, a southerly alignment would involve an abandoned landfill, the Erie Village Subdivision (including Erie Lake) and the widewaters area of Old Erie Canal. This would result in approximately 22 additional residential displacements and significantly higher construction costs associated with highway development over an abandoned landfill with unsuitable load bearing characteristics, and additional costs to construct a 2,500' long bridge to span Erie Lake, Limestone Creek and the widewaters. This bridge is necessary to avoid filling within Erie Lake and the widewaters and thus minimize adverse adverse wetland and water quality impacts. A bridge over the widewaters would also increase Section 4(f) involvement within the Old Erie Canal State Park. These additional costs would increase project costs by at least 35 percent or $8,000,000.

Another southerly alignment that was considered was one that would terminate with a connection to North Burdick Street south of the Old Erie Canal. This would provide an alignment through the study area which avoids or minimizes involvement with the landfill, Erie Village and the Old Erie Canal widewaters area. However, such an alignment, by connecting with North Burdick Street instead of Route 257, would create more of a north/south traffic orientation and severely reduce the accessibility of the highway to east/west traffic along existing Route 290. As such, this alignment would not fulfill the project objective of diverting a significant amount of through traffic from existing Route 290 so that it could operate at an acceptable level of service through the design period.

Therefore, the northern portion of the location band was selected as the most feasible area for the development of design alternatives.

Widening of Existing Route 290 - In 1974, the Department proposed to reconstruct Route 290 to a four lane highway from the Amtrak passenger station to North Burdick Street. Although such a widening would increase levels of service along the roadway, this project was abandoned due to strong local opposition, mainly resulting from the major amounts of right of way acquisition and displacements that would be necessary.

Project Report I and II also evaluated the feasibility of widening existing Route 290 to increase its capacity and level of service. PR I and II concluded that excessive costs and the large amount of commercial and residential displacements severely limited the feasibility of a major widening of existing Route 290 to improve capacity. As a result, it was determined that the most practical and effective concept would be the limited widening of existing Route 290 from I-481 eastward to the North Burdick Street intersection.

Recently, the Department has prepared plans for the limited widening and reconstruction of existing Route 290 on a scale consistent with the findings and recommendations of PR I and II. The proposed reconstruction which has a total curbed width of 56 feet provides for two 12 foot travel lanes, a continuous 16 foot flush median/left turn lane, 8 foot shoulders with curbs, drainage improvements and improved intersection geometrics along Route 290 between the Basil Rowe Road intersection in East Syracuse eastward to the Bowman Road intersection. This 1.4 mile long project was let by the Department of Transportation on December 3,1987 and will be constructed in 1988 at a cost of approximately $3.3 million.

Preliminary project coordination with various federal, state and local agencies having regulatory jurisdiction over this project has revealed a major concern regarding the wetland involvement associated with a Relocated Route 290 facility regardless of its ultimate alignment location through the project study area. In an effort to avoid wetland involvement, consideration has been given to the extension of the existing Route 290 reconstruction project described above, from its present eastern terminus at Bowman Road eastward to the vicinity of Manlius Center in lieu of a Relocated Route 290 facility. Total estimated cost including right of way acquisition for this alternative is $8.0 million.

Based upon a consideration of construction costs, highway capacity analysis, property acquisition requirements and environmental impacts in conjunction with the established objectives, the eastward extension of the Route 290 reconstruction project has been dismissed as a feasible design alternative for the following reasons.

1. In comparison with a Relocated Route 290 facility, a limited widening of the existing facility would not satisfy the project objectives of providing an acceptable level of service, nor would it significantly reduce peak hour congestion, traffic delays and travel times along Route 290 as illustrated in the table below.

Design Year (2011) Levels of Service at Key Intersections*

Intersection**	No-Build	Limited Widening Route 290***	Relocated Route 290
290/Butternut	F(F)	F(F)	A(A)
290/Fisher	F(F)	F(F)	A(B)
290/Bowman	F(F)	F(F)	A(B)
290/Fremont	F(C)	F(D)	A(A)
290/Burdick	F(F)	D(F)	A(A)
290/Clemons	D(F)	B(B)	A(C)

*LOS assumes all intersections are signalized.
**All intersections are with existing Route 290.
***Two travel lanes with continuous 16 ft. left turn median.

2. A reconstructed Route 290 would not reduce property acquisition costs or residential displacements as compared to a Relocated 290 project as illustrated below:

	Reconstructed 290	Relocated Route 290 Minimum	Relocated Route 290 Maximum
ROW Cost	$1.5 Million	$1.0 Million	$1.6 Million
Relocations	5	1	5

3. Approximately two acres of NYSDEC designated wetlands would still be required to facilitate the reconstruction of Route 290.

Consideration has also been given to a major widening of existing Route 290 to provide an acceptable level of service through the design period. Under this concept, existing Route 290 would have a total curbed width of 66 feet and would include four 12 foot wide travel lanes with 1 foot curb offsets plus a continuous 16 foot wide flush median/left turn lane from the Amtrak station eastward to Manlius Center. Total estimated cost for this alternative including right of way acquisition is $17.5 million.

Key intersection levels of service on existing Route 290 are illustrated in the table below under three scenarios, i.e., major widening of existing Route 290, Relocated Route 290 and No-Build.

Design Year (2011) Levels of Service at Key Intersection*

Intersection	No-Build	Widen Existing 290 to 4 Travel Lanes Plus 16 Ft. Median	Relocated Route 290
290/Butternut	F(F)	B(C)	A(A)
290/Fisher	F(F)	A(B)	A(B)
290/Bowman	F(F)	A(B)	A(B)
290/Fremont	F(C)	C(A)	A(A)
290/Burdick	F(F)	B(A)	A(A)
290/Celmons	D(F)	A(A)	A(C)

*Level of Service assumes all intersections are signalized.

A major widening of existing Route 290 as described above compares favorably with a Relocated Route 290 regarding levels of service and thus would satisfy the project objectives of improving levels of service and reducing traffic congestion, delays and travel times. However, it does not meet the objective of minimizing impacts and infringement on residential areas. A major widening of Route 290 would involve property acquisition from approximately 40 commercial and 100 residential properties and would have a right of way acquisition cost of $4.5 million which is more than three times the cost for a Relocated Route 290 project. This right of way acquisition would require the relocation of approximately 15 residences and 2 gas stations as compared to no more than five residential relocations for a Relocated 290. In addition, this alternative would result in increased noise levels within an established residential area, and in comparison with No-Build conditions, would impact six additional residences.

A major widening of existing Route 290 would increase development pressures on adjacent wetlands but reduce wetland involvement to approximately three acres as compared to a maximum of 26 acres under a Relocated Route 290 project. However, the increased residential encroachment and property acquisition requirements reduces the community acceptance and feasibility of a major widening of existing Route 290.

Therefore, in light of the above considerations, a major widening of existing Route 290 has been dismissed as a design alternative for this project.

B-2 Design Study Alternatives

The project under consideration provides for a Relocated Route 290 in the Towns of DeWitt and Manlius and consists of a four lane arterial highway on new location with at grade signalized intersections. The proposed facility begins at the Butternut Interchange, proceeds in an easterly direction for approximately three (3) miles and terminates with a direct

connection to Route 290 or 257 in the vicinity of Manlius Center. Bridges would be provided at the proposed crossings of Butternut Creek, Limestone Creek and the Old Erie Canal.

As a result of the preliminary alignment evaluations and impact assessments, two basic alignment locations have been selected for detailed consideration and preliminary plan development. In all, a total of four design alternatives have been identified which follow the northern and/or southern alignment locations. These design alternatives which are referred to as Alternatives 1, 2, 1-2 and 2-1 are illustrated in Figure 3-1.

Alternatives 1 and 2 (Options A, B and C) follow the basic southern and northern alignment locations, respectively, through the study area. Alternatives 1-2 and 2-1 refer to "crossover" alternatives which utilize a portion of the southerly alignment and then crossover to the northerly alignment (or vice versa) in the vicinity of Burdick Street.

From the Butternut Interchange eastward to a point approximately 1,250 feet west of Fisher Road, all design alternatives share a common alignment. This section would require the relocation of Butternut Drive and the construction of a 350 to 400 foot long bridge to span Butternut Creek.

Two (2) options were initially investigated for the relocation of Butternut Drive. Option 1 would involve the "dead ending" of Butternut Drive north of the proposed facility and the construction of a $3,100\pm$ foot long connector road between Butternut Drive, south of the proposed facility and Fisher Road. This connector would cross Butternut Creek on a $360\pm$ foot long bridge and would then traverse a designated wetland area adversely affecting approximately three acres of wetland. Due to its wetland involvement, this option has been dropped from further consideration.

Under Option 2, Butternut Drive would be maintained as a through road which would pass beneath the proposed facility. This would require the relocation of a 1,850+/- foot section of Butternut Drive. At its maximum distance, relocated Butternut Drive would be located approximately 300 feet east of its existing location. Option 2 avoids wetland involvement and maintains the continuity of Butternut Drive. Therefore, Option 2 has been selected as the only feasible option available for the relocation of Butternut Drive and will be included as an integral element of each design alternative.

For all design alternatives, the project typical section provides for two 12 foot wide travel lanes in each direction separated by a 16 foot wide flush median. Left hand turn lanes will be provided within the proposed median at intersection locations. In addition, Fisher, Bowman, Burdick and North Manlius Roads will be widened to provide left hand turn lanes at their intersections with the proposed facility. At the Butternut Interchange, on and off ramps will be provided to facilitate full access between the proposed facility and Interstate Routes 481 and 690. Right of way along the proposed facility will be fully controlled without access except at intersections with existing crossroads.

Construction of the proposed facility will occur in a west to east fashion according to a staged construction schedule which may involve three or more successive construction contracts. The initial stage would most likely involve construction of a four lane facility from the Butternut Interchange to a point east of Butternut Creek. Subsequent stages would then involve construction of a two lane facility within a four lane right-of-way initially to Burdick Street and then to the eastern terminus. Final stages would ultimately provide for the construction of the remaining two lanes from a point east of Butternut Creek to the eastern terminus. The exact nature and extent of each construction stage will be determined at a later date and will be dependent upon a consideration of traffic needs and funding availability.

Alternative 1 - Alternative 1 follows the southern alignment location throughout the study area. It begins at the Butternut Interchange and follows the common alignment, crosses Butternut Creek on a 350 to 400 foot long bridge and continues to a point approximately 1,250 feet west of Fisher Road. From this point, Alternative 1 curves to the northeast and crosses Fisher Road at a point approximately 3,500 feet south of Route 290. From Fisher Road, Alternative 1 continues in a northeasterly direction, crosses Bowman Road approximately 500 feet north of Taylor Road and then curves to the southeast and crosses Burdick Street 500 feet north of Taylor Road. East of Burdick Street, Alternative 1 continues in a southeasterly direction for approximately 4,500 feet and then crosses Limestone Creek and the Old Erie Canal on a 470± foot long bridge before terminating with a T-intersection at Route 257. The existing railroad bridge and approach fill at Limestone Creek will be removed under this alternative. Total length of Alternative 1 is 2.4 miles.

Alternative 2 - Alternative 2 follows the northern alignment location throughout the study area. From its western terminus at the Butternut Interchange eastward to a point approximately 1,250 feet west of Fisher Road, it shares a common alignment with Alternative 1. From this point, Alternative 2 curves to the northeast and crosses Fisher Road approximately 3,000 feet south of existing Route 290 and aligns itself with the abandoned railroad before crossing Bowman Road. At a point approximately 1,100 feet east of Bowman Road, Alternative 2 curves to the southeast, crosses Burdick Street and passes immediately to the south of the DOW Lumber Yard. From Burdick Street, Alternative 2 proceeds in an east northeast direction for approximately 2,200 feet and then meets the abandoned railroad bed. From this point eastward, there are three options available for Alternative 2. These options are referred to as Options A, B and C.

Option A - From a point approximately 1,250 feet west of Limestone Creek, Option A would proceed in a southeasterly direction along the abandoned railroad and cross Limestone Creek on a 430± foot long bridge. Continuing in a southeasterly direction, Option A would diverge from the abandoned railroad tracks and then cross the access road to the Meadowbrook Limestone Sewage Treatment Plant at a point approximately 700 feet west of existing Route 290. Option A would then continue in a southeasterly direction, span the Old Erie Canal Park on a 140 foot long bridge and terminate with a connection to Route 257 at a point approximately 850 feet west of the existing Route 257/290

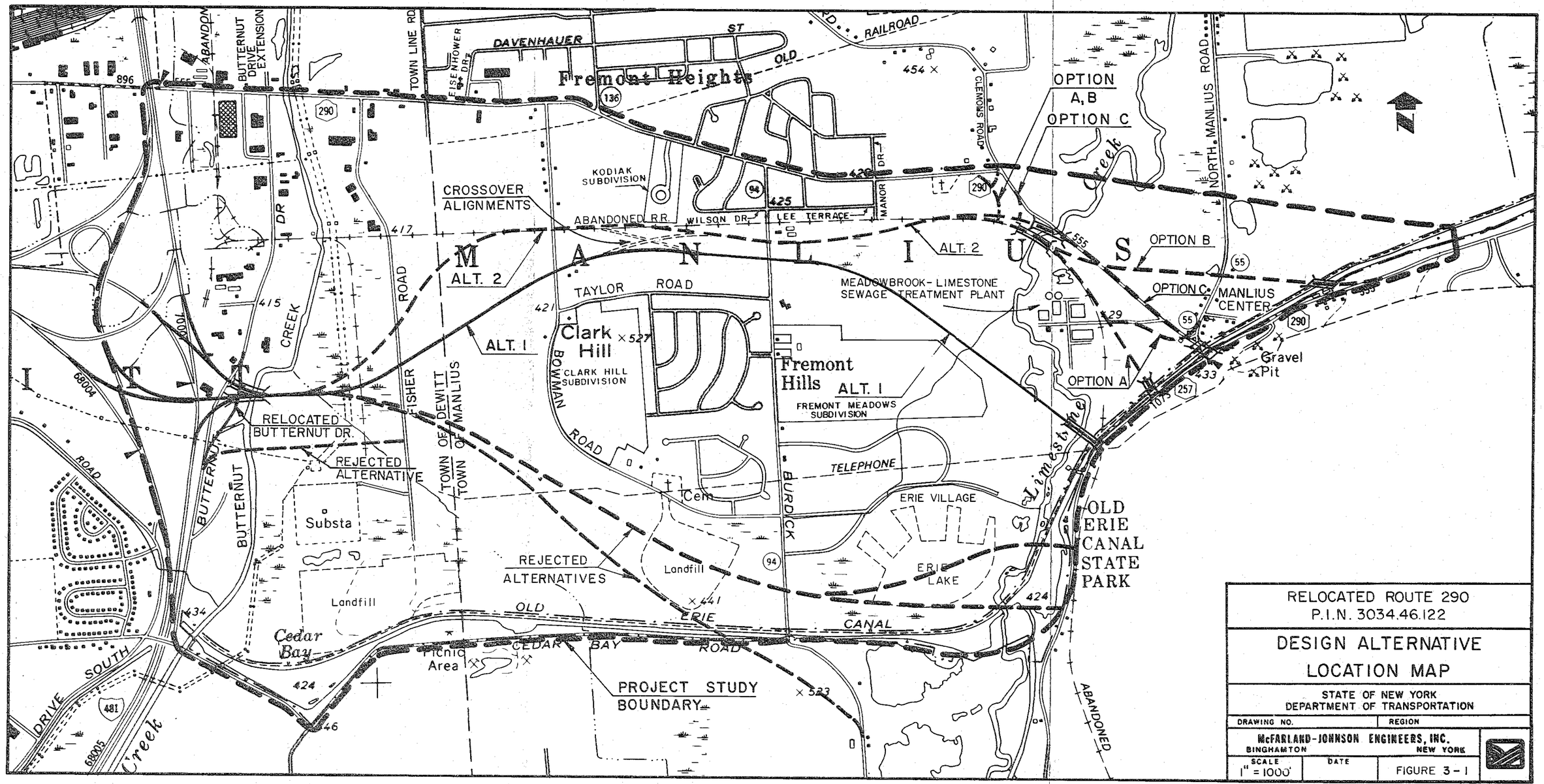
junction in Manlius Center. Total length of Alternative 2 with Option A is 2.7 miles.

Under this option, the existing bridge in Manlius Center will be replaced with a new pedestrian bridge to serve local residents and park users who wish to cross the Canal. Also included would be a new 1,300 foot long connector road which would provide direct access between existing Route 290 in Manlius Center and the proposed facility. This connection would run from the existing Route 290/North Manlius Road intersection westward to the new facility in the vicinity of the sewage treatment plant. Existing Route 290 would be connected to the new facility by a 900 foot long connector located just west of the existing Route 290/Clemons Road intersection. A 300 foot long section of Clemons Road would also have to be constructed to provide access to the new facility. The existing Route 290 bridge and approach highway section over Limestone Creek would be removed. Local access to Limestone Creek will be maintained along existing Route 290 through the construction of cul-de-sacs near the east and west banks of Limestone Creek.

Option B - From a point approximately 1,250 feet west of Limestone Creek, Option B would continue to follow the alignment of the abandoned railroad and would cross Limestone Creek on a 430+/- foot long bridge. After crossing Limestone Creek, Option B would proceed in an easterly direction, cross existing Route 290 approximately 650 feet southeast of Limestone Creek and pass to the north of Manlius Center before crossing the Old Erie Canal Park on a 200 foot long bridge. The existing bridge in Manlius Center will be replaced with a new pedestrian bridge to serve local residents and park users who wish to cross the Canal. After crossing the canal, Option B would terminate with a connection to existing Route 290. Total length of Alternative 2 with Option B is 3.2 miles.

As discussed under Option A, a 900 foot long connector road will be constructed between existing Route 290 and the new facility to the west of Clemons Road. Additionally, as was the case under Option A, Option B will require the relocation of 300+/- feet of Clemons Road and will remove the existing Route 290 bridge and highway approaches over Limestone Creek. Local access to Limestone Creek will be maintained along existing Route 290 from the west through the construction of a cul-de-sac near the west bank of Limestone Creek. Existing Route 290 will remain open to local traffic southeast of the new facility, however, the section between Limestone Creek and the Relocated 290/Existing 290 crossing will be abandoned.

Option C - Option C would cross the abandoned railroad at a point approximately 1,250 feet west of Limestone Creek. Like Options A and B, the existing railroad and Route 290 bridges will be removed over Limestone Creek. It then curves to the southeast and crosses Limestone Creek on a 430± foot long bridge. It then aligns itself with existing Route 290 and terminates 80 feet to



RELOCATED ROUTE 290
P.I.N. 3034.46.122

DESIGN ALTERNATIVE LOCATION MAP

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE 1" = 1000'	DATE
FIGURE 3-1	

the west of the existing Route 290/257 intersection at Manlius Center. Total length of Alternative 2 with Option C is 2.8 miles.

Included with this option will be a minor realignment of North Manlius Road and existing Route 290 to provide a safe and efficient intersection with the proposed facility. The existing bridge over the canal in Manlius Center would be replaced with a wider structure to carry the four travel lanes that are required to obtain an acceptable level of service at this location. The new structure will be located adjacent and immediately to the west of the existing structure to provide a smooth tangent alignment into the Relocated 290/Route 257 intersection. Option C would cross the Old Erie Canal pedestrian walkway at-grade.

Alternative 1-2 - Alternative 1-2 follows the same alignment as Alternative 1 from the Butternut Interchange eastward to a point approximately 1,200 feet west of Burdick Street and then crosses over to follow the alignment of Alternative 2 for the remainder of the project. Options A, B and C would also apply to this alternative. Alternative 1-2 is 2.7 miles in length with Option A, 3.2 miles long with Option B and 2.7 miles in length with Option C.

Alternative 2-1 - Alternative 2-1 follows the same alignment as Alternative 2 from the Butternut Interchange eastward to a point approximately 500 feet east of Bowman Road and then crosses over and becomes identical with Alternative 1 for the remainder of the project. Total length of Alternative 2-1 is 2.5 miles.

No-Build Alternative - The No-Build Alternative consists of retaining the existing state, county and local streets and highways within and adjacent to the project location band. Improvements associated with this alternative would consist only of normal maintenance, repair and rehabilitation activities. The existing Route 290 bridge over Butternut Creek has recently been reconstructed and the Fremont Road/Route 290 intersection was improved several years ago. The current DOT program includes improvements on Route 290 from Fremont Road west to the vicinity of the railroad station. No major improvements are planned or programmed for Route 290 between Fremont Road and Manlius Center.

B-3 Fulfillment of Objectives

All build design alternatives would achieve the project objectives of diverting through traffic from existing Route 290 so that it will operate at an acceptable level of service throughout the design period. They would also reduce peak hour congestion and minimize traffic delays and travel times within and through the study area. Design year traffic volumes on existing Route 290 and design year levels of service at key interchanges throughout the location band for each of the design alternatives are compared with the No-Build Alternative in Tables 3-1 and 3-2.

Although no new or reconstructed facilities would result from selection of the No-Build Alternative, it remains a viable option and will receive full consideration in the decision making process.

TABLE 3-1

DESIGN YEAR 2011 TRAFFIC VOLUMES ON EXISTING ROUTE 290

Annual Average Daily Traffic (Vehicles/Day)

Roadway Segment	No-Build	Design Alternative
I-481 to Butternut	20,400	12,200
Butternut to Fisher	20,650	11,300
Fisher to Townline	20,800	11,500
Townline to Eisenhower	20,050	10,850
Eisenhower to Bowman	19,350	10,350
Bowman to Fremont	18,700	10,100
Fremont to Burdick	17,300	8,100
Burdick to Clemons	14,050	7,200
Clemons to N. Manlius	13,900	5,720*
N. Manlius to Route 257	14,950	6,800**

*Clemons to Relocated Route 290
**Alternative 1 Only

All build alternatives would provide improved accessibility to industrial, commercial and residential areas within and adjacent to the location band. Although existing regional, county and local land use plans do not contain any specific provisions or recommendations concerning the project, the build alternatives are considered to be consistent with general planning policy since they have been developed to accommodate existing, planned and projected development trends of the area while minimizing impacts on residential and environmentally sensitive areas within the location band.

The design alternatives will not directly result in the increased use of express bus service. However, they will provide a modern highway facility which will support increased use of express bus service. Furthermore, the Department will consider the possibility of using excess real property adjacent to the new facility as possible sites for park and ride lots, if feasible. Possible sites for park and ride lots are located on NYSDOT owned property between Bowman Road and Burdick Street.

The No-Build Alternative consists of the existing state, county and local streets and highways within and adjacent to the location band. It does not include any major improvements which address the identified transportation needs and does not satisfy any of the project objectives. Traffic volumes on existing Route 290 would not be reduced nor would levels of service be improved. As a result, peak hour congestion and traffic delays on existing Route 290 would not be alleviated. Since the No-Build Alternative does not accommodate projected traffic volumes at an acceptable level of service, it does not support economic growth and development. Furthermore, the No-Build Alternative does not include any special provisions which would encourage the use of express bus service as a means of further reducing rush hour congestion.

Despite the failure of the No-Build Alternative to address transportation needs and satisfy project objectives, it is given equal consideration in the process leading to design approval (or rejection). The absence of direct environmental impacts, the absence of property acquisition and displacements and the lack of need for construction funding will all be weighed against the benefits and impacts of each alternative when a final project decision is made.

B-4 Engineering Considerations

All three design alternatives would meet or exceed the design criteria presented in Section A of this Chapter except throughout sections of the Butternut Interchange. However, other engineering considerations must also be addressed in order to determine specific details regarding the design, construction, operation and maintenance of this project. These considerations are discussed below.

B.4.1 Traffic Data

Traffic counts were taken on the existing road network and at key intersections throughout the study area to determine directional flows and turning movements. This traffic data was then projected for a 20 year design period utilizing a traffic simulation model. The model takes into account all anticipated improvements to the area's transportation system including the proposed project and generates future traffic volumes and turning movements.

The estimated time of completion (ETC) for this project is 1991 and the design year is 2011. This project will accommodate design year (2011) traffic volumes under the Level of Service conditions shown in Table 3-2. Design year traffic (2011) flow diagrams (Design Hourly Volumes) are provided in Appendix H.

B.4.2 Bridges and Hydraulic Considerations

All the build alternatives must span both Butternut and Limestone Creeks. Each build alternative will have three (3) bridges over Butternut Creek varying from 350 feet to 400 feet in length. All of the bridges will be designed to pass the 100 year flood underneath the low steel elevation of the structure. A hydraulic analysis utilizing the Corps of Engineers HEC-2 step backwater computer program was performed to insure that the bridges will conform to the requirements of FHPM 6-7-3-2, "Location and Hydraulic Design of Encroachments on Flood Plains" and 6 NYCRR 502 "Floodplain Management Criteria for State Projects".

A Corps of Engineers study for Butternut Creek was performed throughout the project area. The Corps study proposed that a series of flood control levees be utilized along Butternut Creek to help alleviate the frequent flooding of businesses and residences along the Creek. However, at this time, implementation of the proposed improvements has been suspended due to funding limitations and a poor benefit/cost ratio. If the study is reactivated and proceeds to the actual construction phase, the Relocated 290 project will be coordinated with the Corps' levee work and a complete hydraulic analysis considering the impacts of the Corps levee will be performed.

TABLE 3-2

DESIGN YEAR (2011) LEVELS OF SERVICE AT KEY INTERSECTIONS[1]

INTERSECTION	ALTERNATIVE 1	2-1	2-A	2-B	2-C	1-2A	1-2B	1-2C	No-Build
Fisher Rd.-Reloc. 290	B(A)	B(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	--
Bowman St.-Reloc. 290	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	--
Burdick St. - Reloc. 290	A(B)	A(B)	A(A)	A(B)	A(A)	A(A)	A(A)	A(A)	--
Reloc. 290/Existing 290 Connector	--	--	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	--
N. Manlius Rd.-Reloc. 290	--	--	A(A)	A(A)	A(B)	A(A)	A(A)	A(B)	E(F)
Rte. 257/Reloc. 290	B(C)	B(C)	B(D)	A(A)	B(D)	B(D)	A(A)	B(D)	F(F)
Butternut Dr.-Exist. 290	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	F(F)
Fisher Rd.-Existing 290	E(F)*	E(F)*	E(F)*	E(F)*	E(F)*	E(F)*	E(F)*	E(F)*	F(F)
Bowman Rd.-Exist. 290	E(E)*	E(E)*	E(E)*	E(E)*	E(E)*	E(E)*	E(E)*	E(E)*	F(F)
Fremont Rd.-Exist. 290	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	F(C)
Burdick St.-Exist. 290	E(D)**	E(D)**	E(D)**	E(D)**	E(D)**	E(D)**	E(D)**	E(D)**	F(F)
Clemons Rd.-Exist. 290	A(C)	A(C)	A(C)	A(C)	A(C)	A(C)	A(C)	A(C)	D(F)
Burdick St.-Bowman Rd.	C(D)	C(D)	C(D)	C(D)	C(D)	C(D)	C(D)	C(D)	C(C)
Cedar Bay Rd.-Burdick St.	C(F)	C(F)	C(F)	C(F)	C(F)	C(F)	C(F)	C(F)	A(F)

NOTE: A = AM, (A) = PM
*LOS will improve to A(B) with signalization, LOS shown are based on unsignalized intersections.
**LOS will improve to A(A) with signalization, LOS shown are based on unsignalized intersections.

[1]Design year levels of service determined according to methodology contained in 1985 Highway Capacity Manual and generally apply to all individual turning movements.

Each build alternative must also span Limestone Creek in the eastern potion of the study area. Alternative 1 spans both Limestone Creek and the Old Erie Canal with a 470 foot long multi-span continuous beam bridge. Due to vertical clearance requirements (10' minimum) over the Old Erie Canal Towpath, the proposed bridge will have a significant amount of freeboard above the existing 100 year flood elevation.

Design Options A, B and C span Limestone Creek near the abandoned railroad bridge south of existing Route 290 and are essentially similar in design, each utilizing a three (3) span structure with a total length of approximately 430+/- feet. Additionally, all three options will be designed to pass the 100 year flood. The proposed bridge lengths for Options A, B and C spanning Limestone Creek are based on the assumption that the existing railroad and Route 290 bridges and related approach sections would be removed with the construction of the Relocated 290 project. With Alternative 1, only the existing railroad bridge and approach fill will be removed.

B.4.3 Highway Drainage

Provisions for highway drainage are similar for all build alternatives and will be designed in accordance with federal and state regulations. Stormwater runoff along Relocated 290 will be collected by catch basins located in the median of the proposed highway section.

Modifications to natural drainage courses will be kept to a minimum and care will be taken to maintain existing flow characteristics to minimize erosion and sedimentation during construction. Equalizer pipes will be located underneath Burdick Street to insure that the 100 year flood plains of Butternut and Limestone Creeks will not be severed. Additionally, equalizer pipes will be located under Route 290 in designated wetland areas where the natural drainage courses may be disrupted by the new roadway section. Construction procedures that minimize erosion of roadway slopes and siltation of streams will be detailed in the final plans and specifications.

B.4.4 Highway Maintenance

Future maintenance costs should be reduced to some extent along the existing road system, particularly existing Route 290 since there will be a substantial diversion of traffic to the new facility. However, there will of course be additional maintenance associated with the new highway, interchange and ramp facilities. The New York State Department of Transportation will be responsible for all maintenance costs on the proposed highway and bridge facilities. The following table lists the highway facilities within the project study area and the agencies responsible for their maintenance.

Facility	Maintenance Jurisdiction
Butternut Drive	Town of DeWitt
Fisher Road	Town of DeWitt
Bowman Road	Town of Manlius
Burdick Street	Onondaga County
New York State Route 290	NYSDOT
Taylor Road	Town of Manlius
North Manlius Road	Onondaga County
New York State Route 257	NYSDOT
Cedar Bay Road	Town of DeWitt, Town of Manlius

B.4.5 Maintenance of Traffic During Construction

All build alternatives are on new location. As a result, the only areas requiring traffic maintenance are the intersected crossroads and crossroads that would require reconstruction. Slight delays will occur at these intersections and crossroads as a result of construction equipment activities, particularly with Alternatives 1, 2A and 1-2A along Route 257 where a considerable amount of earthwork and retaining wall work will be required.

An exception to the above statement will occur at Manlius Center under design Option C where the existing bridge at Manlius Center will be replaced by a new, wider bridge adjacent to the existing bridge. Although traffic will be maintained on the existing bridge during construction, some traffic disruption would occur due to the close proximity of the new structure and Relocated Route 290 alignment to the existing Route 257/290 intersection.

Traffic on Butternut Drive will be maintained by first constructing Relocated Butternut Drive and the bridges over Relocated Butternut Drive and Butternut Creek. Traffic then can be transferred to the new roadway when the Butternut Interchange ramp work is being constructed. The following is a list of those streets which would be crossed by the build alternatives.

Alternative	Intersection Streets
1, 2-1	Fisher Road Bowman Road Burdick Street New York State Route 257
1-2A, 2A	Fisher Road Bowman Road Burdick Street (Existing) New York State Route 290 North Manlius Road New York State Route 257

Alternative	Intersection Streets
1-2B, 2B	Fisher Road Bowman Road Burdick Street Existing Route 290 (2 times) North Manlius Road
1-2C, 2C	Fisher Road Bowman Road Burdick Street Existing Route 290 North Manlius Road Route 257-290 (Manlius Center)

B.4.6 Traffic Flow and Safety

The continued growth and expansion of the Town of Manlius and adjacent communities is expected to result in an increase in commuter traffic in the study area. The proposed facility will draw a substantial amount of traffic off existing Route 290 and other existing roads. Since the majority of intersections along existing New York State 290 are unsignalized (exception - Butternut and Fremont Roads), the reduction in traffic volumes should enhance traffic flow and safety features of existing Route 290 and adjacent roadways. Accident records from May 1981 to June 1985 indicate that 105 accidents have occurred from I-481 to Fremont Road along existing Route 290, a distance of approximately 1 mile. For the same period, only 50± accidents occurred from Fremont Road to the Route 290-257 intersection in Manlius Center, a distance of approximately 1.6 miles. Compared to the statewide average of 5.23 accidents per million vehicle miles for suburban type 2 lane roadways with free access, the western portion of existing Route 290 (to Fremont Road) is equal to statewide total accident average, whereas, the eastern portion (to Manlius Center) is below the statewide total accident average with 1.87 accidents per million vehicle miles. The proposed NYSDOT project along existing Route 290 west of Fremont Road should also help to alleviate future accident rates with the construction of a continuous left turn lane. A graphic plot of accident locations within the study area is depicted on Figure 3-2.

All intersections of the project with existing streets will be controlled by traffic signals. Safety widening with provision for a left turn lane will be proposed at these interconnecting streets: Fisher Road, Bowman Road, Burdick Street, North Manlius Road and Relocated Route 257.

Further details concerning the design parameters of the Butternut Interchange are provided in a separate technical document entitled the "Butternut Interchange". This study is available for review at the New York State Department of Transportation, Region 3 Office in Syracuse, New York.

The mainline of Relocated Route 290 will be designed for 60 MPH providing a minimum of 525′ of stopping sight distance (SSD) or headlight sight distance (HSD) throughout all crest and sag vertical curves.

The design speed for the Butternut Interchange which provides the east and westbound connections from Relocated 290 to I-690 is also 60 MPH. However, because of limitations imposed by matching the existing and proposed geometrics, the interchange will only accommodate 50 MPH operations.

B.4.7 Utilities

Utility work will be performed in accordance with the "Rules and Regulations Governing the Accommodation of Utilities Within the State Highway Right of Way". All utility work will be performed in a manner which keeps to a minimum the number and length of interruptions of service to the utility users. All proposed work will be coordinated with the affected utility owners during detailed design. The following activities are located within the project area.

Utility	Utility Organization
Telephone	AT&T, New York Telephone
Water	Onondaga County Water Authority
Gas	Syracuse Suburban Gas Co., Niagara Mohawk Power Corp.
Electric	Niagara-Mohawk Power Corp.
Sanitary	Department of Drainage and Sanitation County of Onondaga

B.4.8 Aesthetics

Due to the existing suburban/rural character of the project area, the aesthetic impact of Relocated Route 290 is considered of primary impor-tance. The objectives of landscape development throughout the project will be as follows:

1. Provide buffering between new or changed roadways and adjacent residential properties, particularly in the Fremont Hills and Fremont Heights area.

2. Preservation and/or enhancement of streetscape on existing roadways.

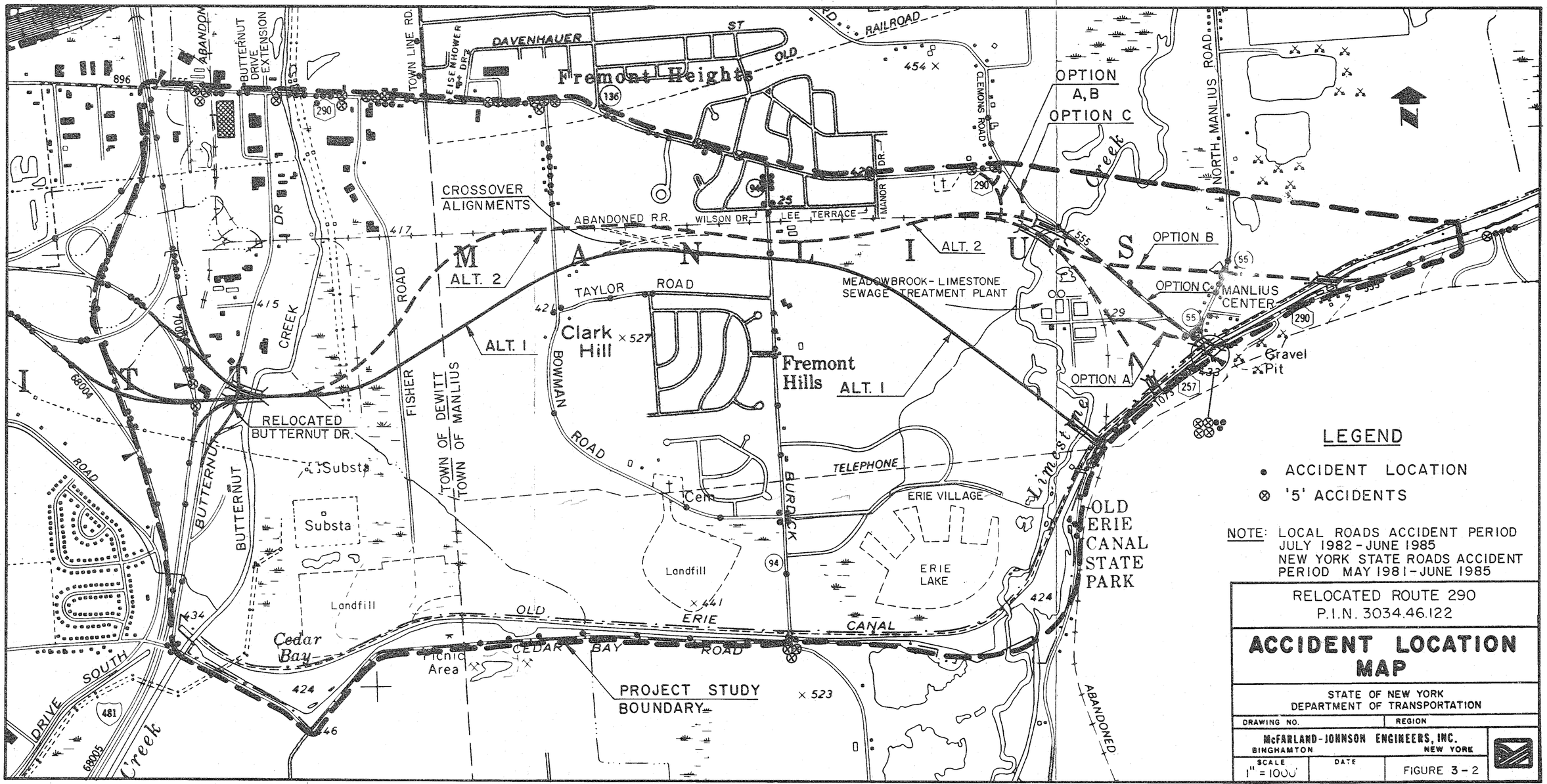
3. Establishment of streetscape on new location.

4. Provide unifying design elements within the project.

5. Restoration of surfaces disturbed by construction.

B.4.9 Soils

The project area is located within the Erie Ontario Plains at the extreme southern border of that physiographic province. There are


DAVENHAUER ST
OLD RAILROAD
Fremont Heights
TOWN LINE RD.
EISENHOWER DR.
ABANDONED
BUTTERNUT DRIVE EXTENSION
CLEMONS ROAD
NORTH MANLIUS ROAD
OPTION A, B
OPTION C
CROSSOVER ALIGNMENTS
ABANDONED R.R.
WILSON DR.
LEE TERRACE
MANOR DR.
ALT. 2
OPTION B
OPTION C
MANLIUS CENTER
MEADOWBROOK - LIMESTONE SEWAGE TREATMENT PLANT
TAYLOR ROAD
Clark Hill
Fremont Hills
ALT. 1
OPTION A
Gravel Pit
RELOCATED BUTTERNUT DR.
FISHER ROAD
BOWMAN ROAD
TOWN OF DEWITT
TOWN OF MANLIUS
BUTTERNUT CREEK
BUTTERNUT ROAD
Substa
Landfill
TELEPHONE
Cem
BURDICK
ERIE VILLAGE
ERIE LAKE
OLD ERIE CANAL STATE PARK
Limestone Creek
OLD ERIE CANAL
CEDAR BAY ROAD
Cedar Bay
Picnic Area
PROJECT STUDY BOUNDARY
SOUTH DRIVE
ABANDONED
Creek
896
454
417
415
424
434
441
523
527
555
LEGEND
ACCIDENT LOCATION
'5' ACCIDENTS
NOTE: LOCAL ROADS ACCIDENT PERIOD JULY 1982 - JUNE 1985
NEW YORK STATE ROADS ACCIDENT PERIOD MAY 1981 - JUNE 1985
RELOCATED ROUTE 290
P.I.N. 3034.46.122
ACCIDENT LOCATION MAP
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE
FIGURE 3 - 2

twelve (12) major soil associations within the project area (see Figure 4-1). These soils are generally of medium texture with medium to high lime content. Prolonged wetness, seasonally high water tables and susceptability to flooding and frost action limit the effectiveness of these soils as a suitable foundation material. As a result, it is anticipated that undercutting and the use of filter fabric will most likely be required in the wetland areas of the project. Soil borings will be taken along the path of the proposed facility prior to the final design stage.

B.4.10 Pedestrian and Bicycle Facilities

This project will be designed as a four lane arterial on new location with access control between intersections. Between intersections, no pedestrian or bicycle facilities are permitted. However, the Old Erie Canal State Park which is crossed by all alternatives has been identified by the U.S. Department of Interior National Park Service as a National Recreation Trail. Except for Alternatives 2C and 1-2C, bridges would be used to span the canal and its towpath with a minimum vertical clearance of approximately 10 feet which would provide for the unrestricted passage of bicycle and pedestrian traffic beneath the structures. At Manlius Center under Alternatives 2C and 1-2C, where Relocated Route 290 would cross the Old Erie Canal State Park towpath at grade, a marked crossing with pedestrian crossing warning signs will be constructed to provide additional safety for park users.

At crossroads, existing sidewalks will be replaced or if the need exists, new sidewalks will be constructed. Also, pedestrian crosswalks and pedestrian phased traffic signals will be provided, if warranted.

B.4.11 Construction Cost Comparisons

The estimated construction costs (1987 dollars) for the build alternatives are summarized in Table 3-3.

TABLE 3-3

CONSTRUCTION COST COMPARISON (1987 DOLLARS)*

ITEM	ALT. 1	ALT. 2-1	ALT. 2A	ALT. 2B	ALT. 2C	ALT. 1-2A	ALT. 1-2B	ALT. 1-2C
1. Roadway*	$ 5,615,000	$ 5,700,000	$ 6,360,000	$ 6,820,000	$ 6,085,000	$ 6,240,000	$ 6,700,000	$ 5,965,000
2. Structure	$ 7,170,000	$ 7,170,000	$ 9,050,000	$ 9,120,000	$ 7,560,000	$ 9,050,000	$ 9,120,000	$ 7,560,000
3. Earthwork	$ 4,735,000	$ 4,730,000	$ 5,325,000	$ 6,675,000	$ 4,680,000	$ 5,245,000	$ 6,595,000	$ 4,600,000
4. Signals	$ 260,000	$ 260,000	$ 390,000	$ 390,000	$ 390,000	$ 390,000	$ 390,000	$ 390,000
TOTAL COST	$17,780,000	$17,860,000	$21,125,000	$23,005,000	$18,715,000	$20,925,000	$22,805,000	$18,515,000

*Includes pavement, guiderail and drainage.

IV - SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS

A. Environmental Character (Affected Environment)

This section provides a description of the social, economic and environmental character of the study area. Located within the Towns of DeWitt and Manlius, the study area of this project encompasses approximately 2,170 acres and shares the same boundaries as the project location band (see Figure 2-1). This includes 682 acres of developed residential and commercial property and 1,184 acres of undeveloped land of which approximately 790 acres is wetland vegetation (of this total, 775 acres are NYSDEC protected wetlands).

This section also summarizes pertinent baseline data from the technical studies which provide a detailed assessment and evaluation of specific project related impacts. These technical studies are listed below and are available for review at the New York State Department of Transportation Region 3 Office in Syracuse, New York.

1. Noise Study (included in Appendix A)
2. Terrestrial and Aquatic Ecology (included in Appendix B)
3. Air Quality Analysis
4. Cultural Resource Survey
5. Visual Resource Assessment

A-1 Topography, Geology and Soils

The project area is located within the Erie-Ontario Plains at the extreme southern border of that physiographic province. Topographic relief of the Erie-Ontario Plains is generally low. Typical landscapes of the province include low rolling hills and level lake plains.

The immediate project area is mainly level with a gentle regional slope towards Lake Ontario to the north. Elevations range from approximately 410 feet at the northern boundary (along Route 290) to approximately 420 feet at the base of the Old Erie Canal to the south. Two isolated hills - Clark Hill and the hill upon which Fremont Heights is located rise about 100 feet above the surrounding land. The project area is drained by Limestone and Butternut Creeks and their tributaries. Both are low gradient, meandering streams which flow northward, eventually discharging to Chittenango Creek. The Old Erie Canal is at the southern and eastern boundaries of the project area.

The southern project boundary is essentially the base of the escarpment which forms the northern border of the Appalachian Plateau physiographic province. Elevations rise rapidly to the south up the front of the escarpment. The erosion-resistant rock which forms the escarpment is the Onondaga Limestone.

Bedrock in the project area consists of Silurian and Devonian age sedimentary rocks which dip southward at about 50 feet per mile. Because of the southward dip, the rocks outcrop in bands generally oriented in an east-west direction with successively younger formations appearing to the

south. Most of the project area is underlain by the Syracuse Formation consisting of dolomite, shale, gypsum and salt. Other bedrock units in the project area include the Silurian age Vernon Formation (shale and dolomite), the Cobleskill Limestone and the Bertie and Camillus dolomite and shale.

Bedrock throughout the project area is mantled with a veneer of unconsolidated deposits of glacial origin. These deposits include glacial till, glacial outwash laid down by meltwater streams and lacustrine sediments deposited in glacial lakes. Depth to bedrock is generally 30 feet or less throughout the study area.

There are twelve major soil associations within the project area (see Figure 4-1). These soils which were formed primarily in glacial till and glacial water deposits are of medium texture with medium to high lime content. Permeabilities generally range from slow to moderately permeable. Prolonged wetness, seasonally high water tables and susceptability to flooding and frost action are the major constraints of these soils which limit their development potential.

A-2 Water Resources

The project study area is part of the Eastern Oswego River Basin. The western portion of the study area is drained by Butternut Creek while the eastern portion is drained by Limestone Creek. There are six (6) water courses located within the study area, encompassing approximately 53,500 lineal feet of stream channel ranging from the Old Erie Canal to large streams and intermittent tributaries. Stream depth ranges from inches to 10-15 feet.

Figure 4-2 identifies the location and name of each water course within the study area. Additional information on water resources can be found in Appendix B "Terrestrial and Aquatic Ecology".

Both Butternut and Limestone Creeks are slow moving, somewhat meandering streams with a relatively flat gradient (3 feet/mile). Wetland vegetation is present throughout the study area, encompassing some 790 acres or 38 percent of the study area.

The Old Erie Canal, Limestone Creek and Butternut Creek have a water classification of "Class C". The remaining tributary streams are "Class D". The New York State Department of Environmental Conservation defines a "C" classification as "Suitable for fishing and all other uses except as a source of water supply for drinking, culinary or food processing purposes and primary contact recreation". A "Class D" stream is defined as "Unsuitable for secondary contact recreation (activities where body contact with water is minimal and ingestion of water is not possible) but due to such natural conditions as intermittency of flow, water conditions not conducive to propagation of game fishery or stream bed conditions, the waters will not support the propagation of fish".

Groundwater in the study area can be obtained from both the bedrock and the overlying unconsolidated deposits. The median well yield, from the Middle Shale unit which is present in the study area, is 20

gallons per minute. Water quality may be poor, however, as iron, manganese, hardness or salt content may be excessive.

Higher well yields are possible from sand and gravel in the study area. The sand and gravel is generally buried beneath silt or other less permeable materials. The eastern portion of the study area is reported to be more productive - there is a record of a former well near Manlius Center which produced 600 gallons per minute. Water quality is likely to be better but even wells in the sand and gravel could be salty, reflecting the influence of the underlying bedrock.

There are no designated sole source aquifers within the study area.

Nearly the entire study area is served by a public water supply provided by the Onondaga County Water Authority (OCWA). A 48-inch diameter OCWA water supply main runs through the middle of the study area.

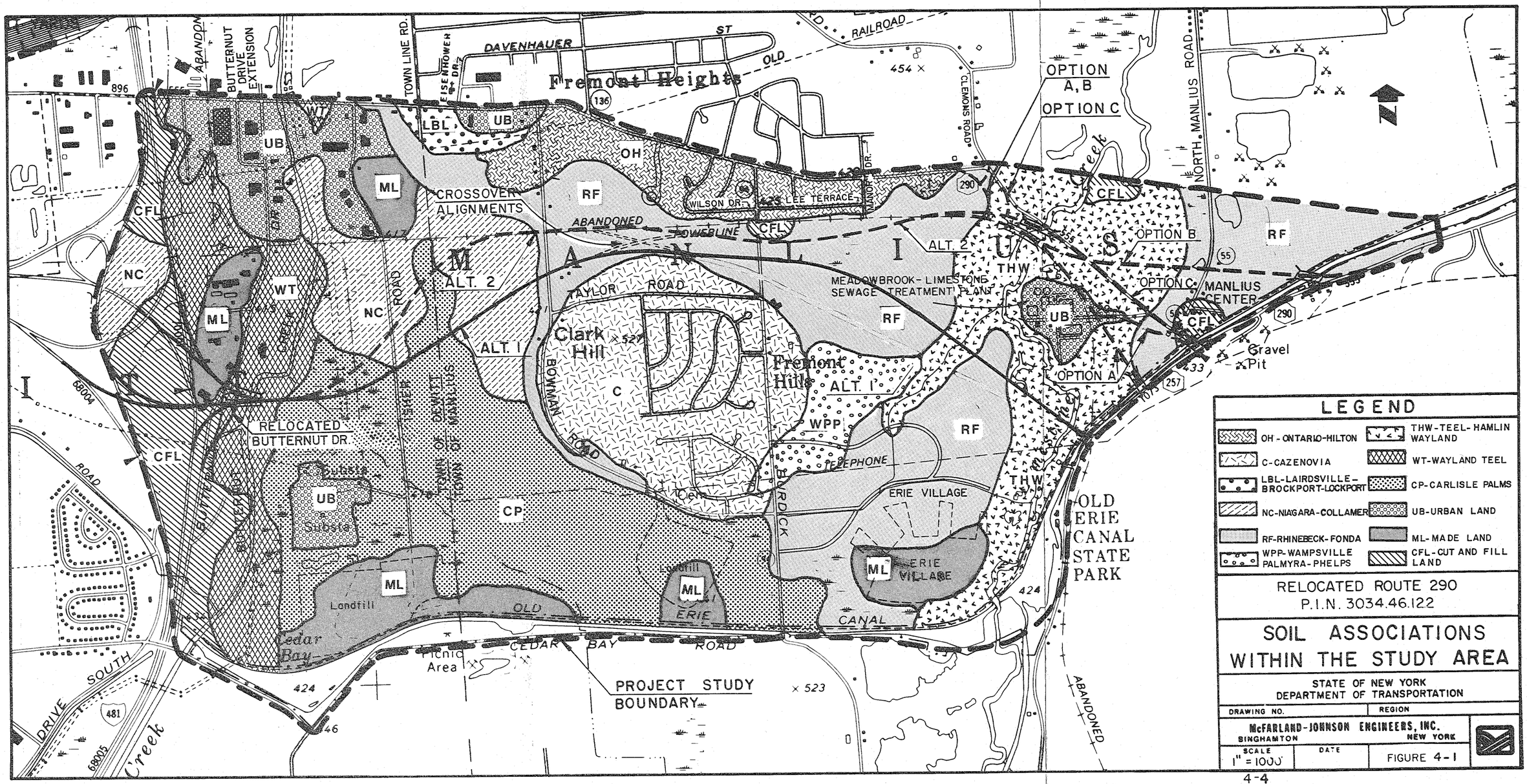
The public water supply source for the study area is Otisco Lake. There are no public water supply wells or reservoirs located within the study area.

There are only a few residences in the study area which are dependent on private wells for their water supply. These include a single residence on Bowman Road and approximately 5 residences located either on Route 257 or on existing Route 290 north of its intersection with Route 257.

A-3 Wetlands

Freshwater wetlands as defined by the New York State Department of Environmental Conservation (NYSDEC) are lands and submerged lands commonly called marshes, swamps, sloughs, bogs and flats supporting aquatic or semi-aquatic vegetation such as (1) wetland trees and shrubs, (2) emergent, rooted and free floating vegetation and (3) wet meadows, bog mat and submergent vegetation. This NYSDEC definition is consistent with definitions contained in federal regulations wherein wetlands are defined as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas (Federal Register/Vol. 51 No. 219/Thursday, November 13, 1986)."

In compliance with the New York State Freshwater Wetlands Act (September 1, 1974), the Department of Environmental Conservation has conducted studies to tentatively identify and map the individual freshwater wetlands in the State of New York which have an area of five (5) hectares or more, or if less than five (5) hectares, are of unusual local importance. Those areas identified within the study area are listed in Table 4-1 and their location is shown on Figure 4-2. They total approximately 775 acres and contain a variety of wetland vegetation types.


Fremont Heights
Clark Hill
Fremont Hills
OPTION A, B
OPTION C
OPTION A
OPTION B
OPTION C
ALT. 1
ALT. 2
CROSSOVER ALIGNMENTS
ABANDONED POWERLINE
RELOCATED BUTTERNUT DR.
MEADOWBROOK - LIMESTONE SEWAGE TREATMENT PLANT
MANLIUS CENTER
ERIE VILLAGE
OLD ERIE CANAL STATE PARK
PROJECT STUDY BOUNDARY
Gravel Pit
Picnic Area
Cedar Bay
Landfill
Substa
TAYLOR ROAD
BOWMAN ROAD
BURDICK
CEDAR BAY ROAD
SOUTH DRIVE
NORTH MANLIUS ROAD
CLEMONS ROAD
TOWN LINE RD.
BUTTERNUT DRIVE EXTENSION
ABANDONED
RAILROAD
TOWN OF DEWITT
TOWN OF MANLIUS
OLD ERIE CANAL
Creek
LEGEND
OH - ONTARIO-HILTON
THW-TEEL-HAMLIN WAYLAND
C-CAZENOVIA
WT-WAYLAND TEEL
LBL-LAIRDSVILLE-BROCKPORT-LOCKPORT
CP-CARLISLE PALMS
NC-NIAGARA-COLLAMER
UB-URBAN LAND
RF-RHINEBECK-FONDA
ML-MADE LAND
WPP-WAMPSVILLE PALMYRA-PHELPS
CFL-CUT AND FILL LAND
RELOCATED ROUTE 290
P.I.N. 3034.46.122
SOIL ASSOCIATIONS WITHIN THE STUDY AREA
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE
FIGURE 4-1

In addition to the mapping and studies prepared by NYSDEC, a more detailed study for the Towns of DeWitt and Manlius was conducted by the Onondaga County Environmental Management Council. This study resulted in publication of a wetland inventory with detailed mapping and verbal descriptions derived from NYSDEC definitions and regulatory mapping. Pertinent excerpts from this inventory are included in Appendix B - Terrestrial and Aquatic Ecology Analysis.

The USF&WS Biological Services Program's "Classification of Wetlands and Deepwater Habitats of the United States" (FWS/OBS-79/31, December 1979) classifies wetland areas by taking vegetation types, soil characteristics and water regime into account. Under this scheme, the wetland areas within the project study boundary are a combination of 1) Riverine Lower Perennial Emergent Wetland, 2) Palustrine Emergent Wetland, 3) Palustrine Aquatic Bed, 4) Palustrine Scrub-Shrub Wetland, 5) Palustrine Forested Wetland, 6) Riverine Lower Perennial Rock Bottom, 7) Riverine Lower Perennial Unconsolidated Bottom. The USF&WS has not published specific boundary descriptions or large scale mapping of wetland areas within the project study boundary.

NYSDEC wetland classification and mapping systems in addition to U.S. Fish and Wildlife Services "Classification of Wetlands and Deep Water Habitats" were used to identify wetlands within the study area. In comparing the two classification systems and the wetlands within the study area, all the NYSDEC wetlands shown in Table 4-1 are, according to USF&WS, Riverine and Palustrine Systems with a variety of classes. These classes would closely correlate with the land cover/vegetation mapping prepared for this project.

Major open water areas (Butternut Creek, Limestone Creek, Erie Lake and the Old Erie Canal) are not included in the NYSDEC definition although they are classified as wetlands under USF&WS criteria. This is the only significant difference between the two systems as applied to this project. Although the build alternatives for this project involve stream crossing bridges, they have no significant impact on open water areas. Thus, the discussion of wetland impacts in the report will utilize NYSDEC criteria so as to be consistent with previously published inventories and mapping.

Additional information regarding wetlands within the study area can be found in Appendix B "Terrestrial and Aquatic Ecology Analysis".

TABLE 4-1

NYSDEC DESIGNATED WETLANDS WITHIN THE STUDY AREA

Wetland	Date of Onondaga County EMC Inspection	Wetland Class	Size Total Acres	Total Acres in Study Area
SYE-17	9-76	Class III	91 Ac.	7 Ac.
SYE-21	9-76	Class II	166 Ac.	34 Ac.
SYE-22	9-76/4-78	Class II	893 Ac.	605 Ac.
MAN-7	8-76/3-78	Class I	1,699 Ac.	129 Ac.
			2,849 Ac.	775 Ac.

Source: NYSDEC and Onondaga County Environmental Management Council, Towns of DeWitt and Manlius Wetlands Inventory.

Each wetland has been assigned a classification or ranking according to its ability to perform wetland functions and provide wetland benefits (6 NYCRR Part 664). Class I wetlands have the highest rank and the ranking descends through Class II, III and IV. Class I wetlands (MAN-7) constitute 17 percent of the designated wetland acreage within the study area. Class II (SYE-21 and 22) and III (SYE-17) wetlands constitute 82 percent and 1 percent respectively of the remaining NYSDEC designated wetland acreage in the study area.

The benefits/functions of wetlands within the study area are primarily:

1. Flood and storm water control by hydrologic absorption and retention.

2. Wildlife habitat by providing breeding, nesting and feeding grounds and cover for many forms of wildlife, waterfowl and shorebirds.

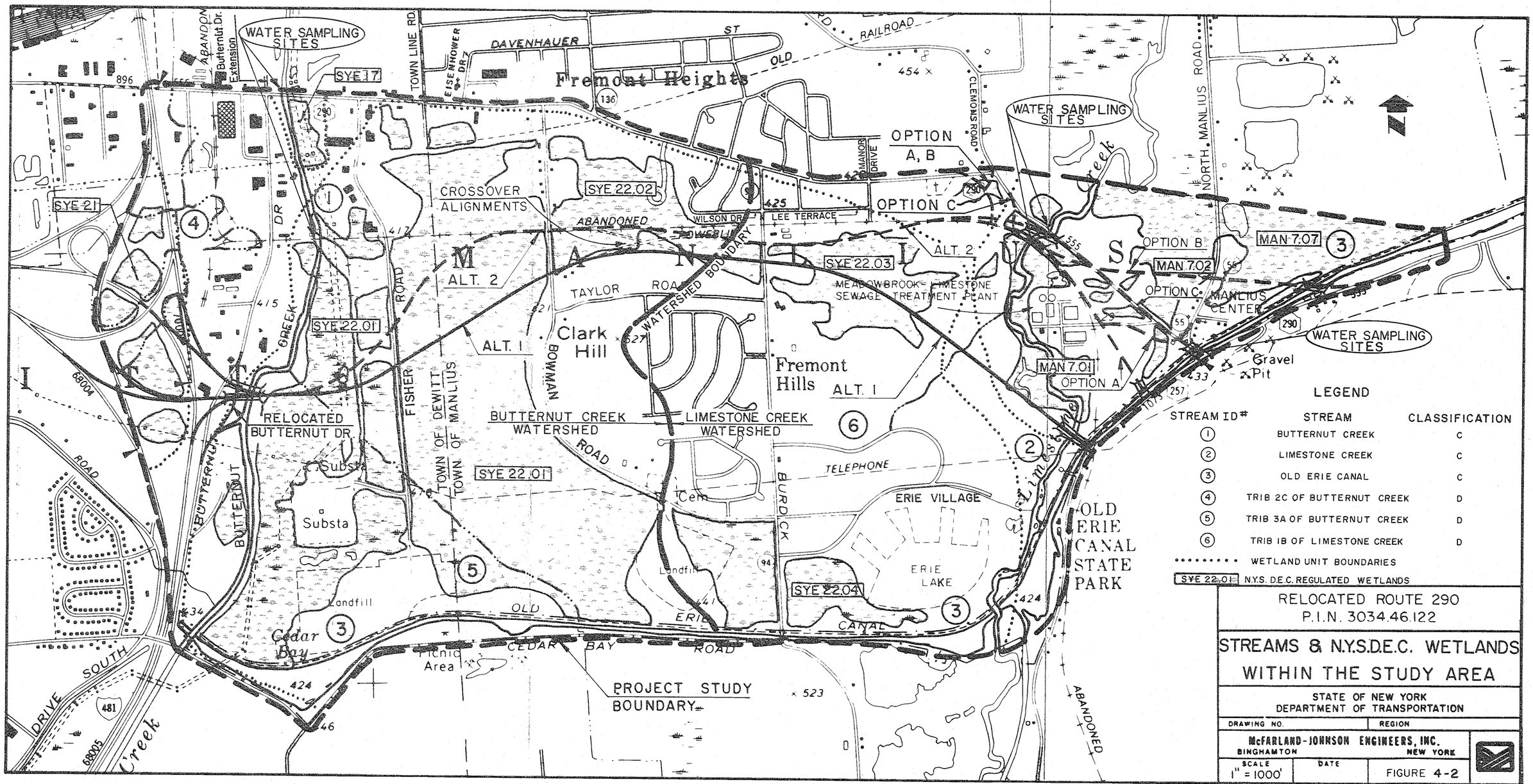
3. Protection of surface and subsurface water resources.

4. Education and limited recreation by providing areas for hunting, fishing, bird watching, camping and living classrooms.

5. Pollution treatment by serving as biological and chemical oxidation basins.

6. Turbidity control by serving as sedimentation areas and filtering areas absorbing silt and organic matter.

Most of the existing wetland acreage within the project study area, at one time, consisted of active farmlands. As can be seen in the 1938 aerial photo (Plate 4-1) on Page 4-8, cultivated land once occupied most of the study area except for the area south and east of Clark Hill.



RELOCATED ROUTE 290
P.I.N. 3034.46.122

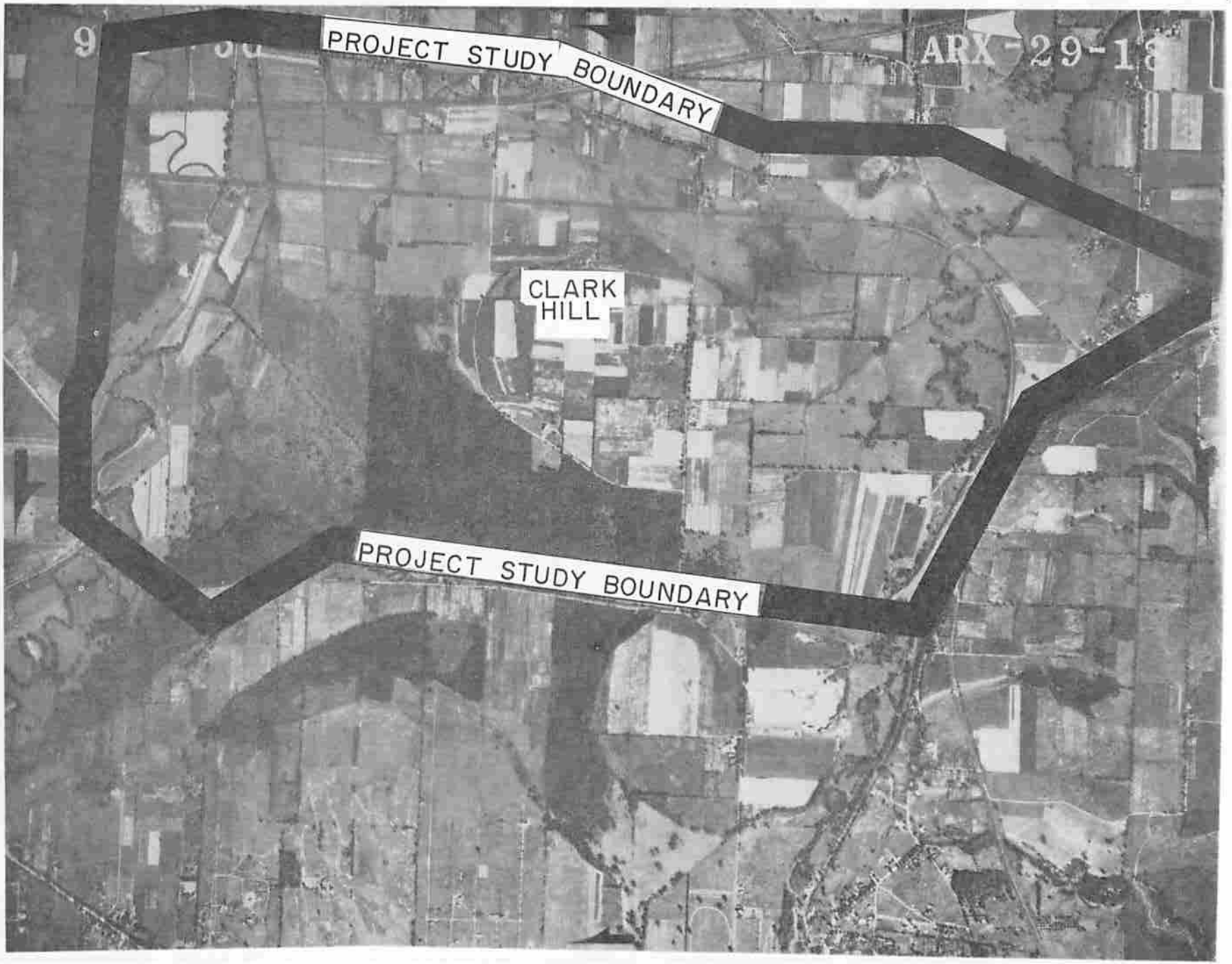
STREAMS & N.Y.S.D.E.C. WETLANDS WITHIN THE STUDY AREA

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO. | REGION

McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK

SCALE 1" = 1000' | DATE | FIGURE 4-2



1938 AERIAL PHOTOGRAPH
OF STUDY AREA

PLATE 4-1

A-4 Floodplains

Most of the project study area is located within the 100 year floodplains of Limestone and Butternut Creeks. The 100 year floodplain as defined by the Federal Emergency Management Agency (FEMA) includes those areas which are subject to flooding from a flood whose probability of occurrence on average is one percent in any one given year.

Figure 4-3 delineates the extent of the 100 year floodplain as determined from FEMA Flood Insurance Rate Maps for the Towns of DeWitt and Manlius. These floodplains are located adjacent to Limestone and Butternut Creeks which flow northward through the study area. According to the Flood Insurance Studies prepared for the Towns of DeWitt and Manlius, the large expanse of 100 year floodplain is primarily the result of the flat, low lying terrain adjacent to these two streams which carry runoff northward from the Appalachian Uplands south of the study area.

A-5 Vegetation

Approximately 1,213 acres of natural vegetation occurs within the study area. These areas consist of flooded trees and shrubs, upland trees and shrubs, wet meadow, emergent wetlands and successional fields. Within these areas, a wide variety of plant species occur as documented in Appendix B "Terrestrial and Aquatic Ecology". Figure 4-4 is a map of vegetation/land cover within the project area.

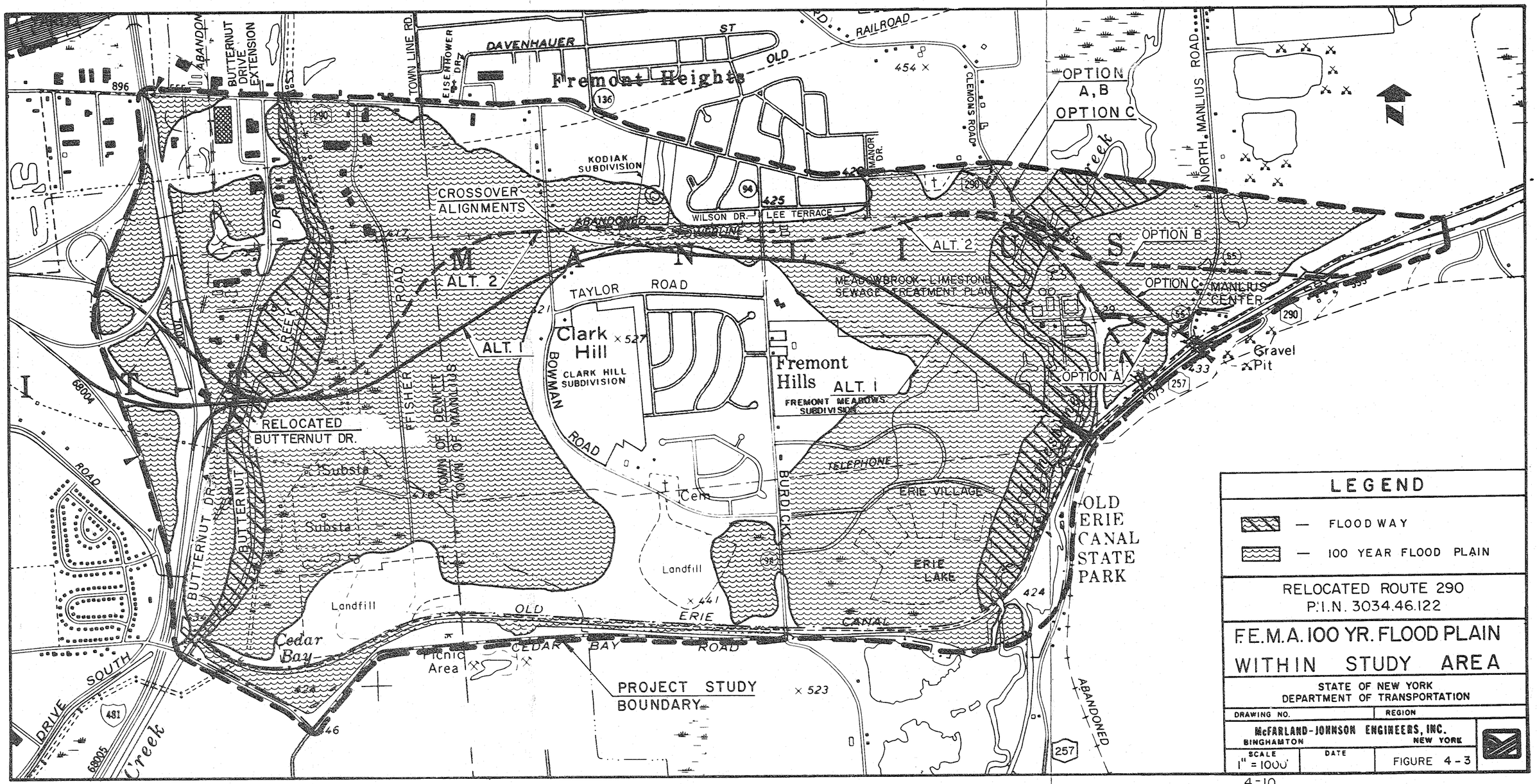
In addition to the natural vegetation, the study area contains approximately 36 acres of agricultural vegetation in the form of active agricultural cultivated crops (i.e., corn and cover crops).

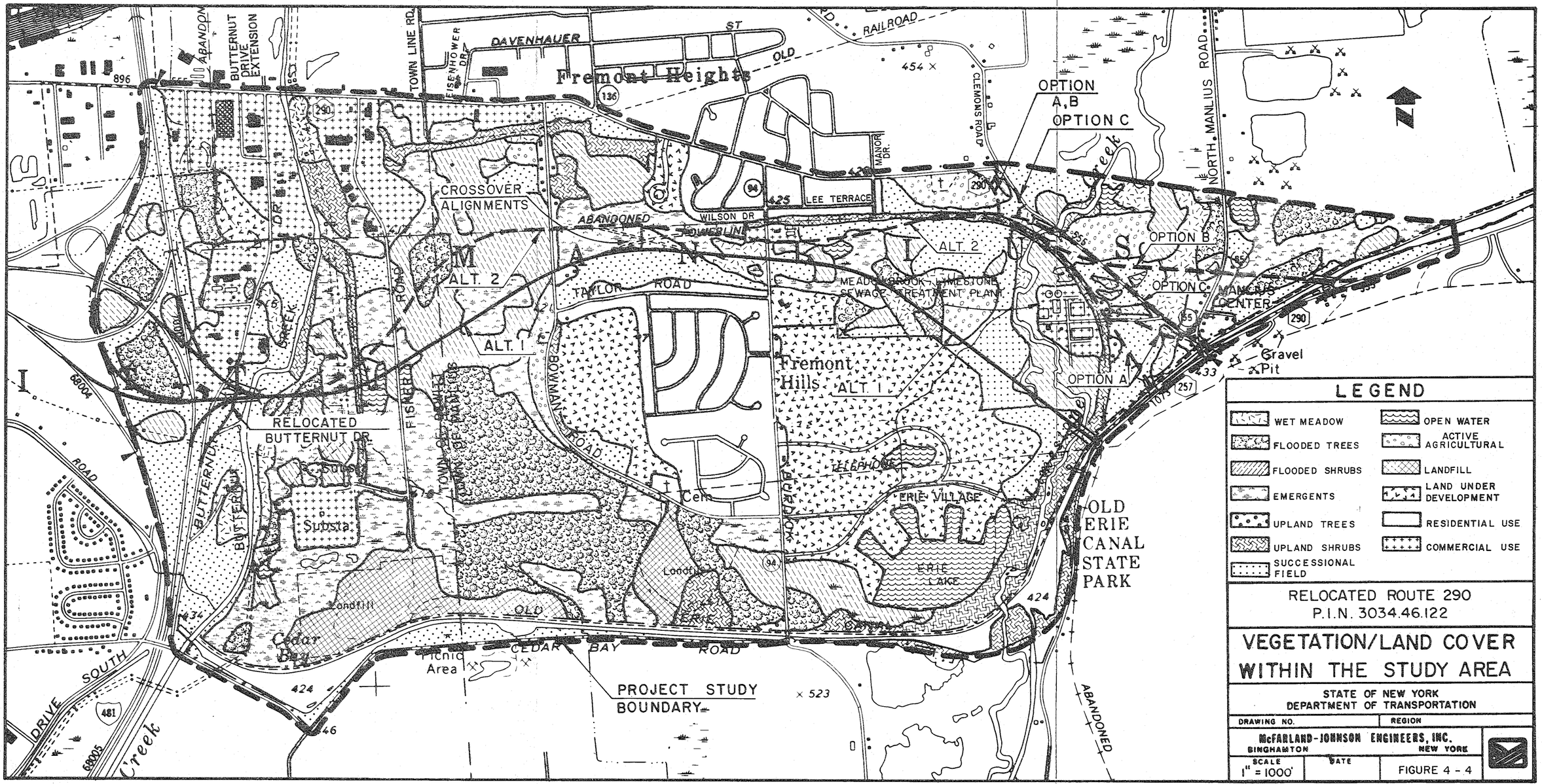
Project coordination with the New York State Department of Environmental Conservation's Regional Office at Cortland, New York has revealed that no critical habitats are present within the study area. However, threatened and/or endangered plant species have been identified by the New York Natural Heritage Program and the Syracuse Botanical Club (see Appendix D, letters dated 9/25/85, 11/18/86) as being located near Manlius and some have been located in field studies within the project area.

A-6 Fish and Wildlife

With the presence of numerous streams and wetland habitats in the area, a variety of amphibians, reptiles and fish life occurs. Field investigations of the study area and information provided by the U.S. Army Corps of Engineers/U.S. Fish and Wildlife Service have identified various species of fish, frogs, toads, turtles and non-poisonous snakes. A listing of those species and others is contained in Appendix B "Terrestrial and Aquatic Ecology".

Due to the large amount of undeveloped land in the study area, wildlife is diverse and somewhat abundant. Populations of most common wildlife such as deer, rabbits, squirrel, fox, duck and numerous song birds reside in the area.


Fremont Heights
DAVENHAUER ST
OLD RAILROAD
TOWN LINE RD.
EISENHOWER DR.
CLEMONS ROAD
NORTH MANLIUS ROAD
OPTION A, B
OPTION C
KODIAK SUBDIVISION
MANOR DR.
WILSON DR.
LEE TERRACE
CROSSOVER ALIGNMENTS
ABANDONED
ALT. 2
ALT. 1
OPTION B
OPTION C
MANLIUS CENTER
OPTION A
MEADOWBROOK-LIMESTONE SEWAGE TREATMENT PLANT
TAYLOR ROAD
Clark Hill
CLARK HILL SUBDIVISION
Fremont Hills
FREMONT MEADOWS SUBDIVISION
BOWMAN ROAD
BENNETT ROAD
FISHER ROAD
TOWN OF MANLIUS
TOWN OF DEWITT
RELOCATED BUTTERNUT DR.
BUTTERNUT DRIVE EXTENSION
BUTTERNUT DR.
Creek
Substa
Substa
Cem
Landfill
Landfill
Picnic Area
Cedar Bay
SOUTH DRIVE
OLD ERIE CANAL
CEDAR BAY ROAD
PROJECT STUDY BOUNDARY
TELEPHONE
ERIE VILLAGE
ERIE LAKE
OLD ERIE CANAL STATE PARK
Gravel Pit
ABANDONED
I 690
I 481
LEGEND
FLOOD WAY
100 YEAR FLOOD PLAIN
RELOCATED ROUTE 290
P.I.N. 3034.46.122
F.E.M.A. 100 YR. FLOOD PLAIN WITHIN STUDY AREA
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE
FIGURE 4-3



LEGEND

- WET MEADOW
- FLOODED TREES
- FLOODED SHRUBS
- EMERGENTS
- UPLAND TREES
- UPLAND SHRUBS
- SUCCESSIONAL FIELD
- OPEN WATER
- ACTIVE AGRICULTURAL
- LANDFILL
- LAND UNDER DEVELOPMENT
- RESIDENTIAL USE
- COMMERCIAL USE

RELOCATED ROUTE 290
P.I.N. 3034.46.122

VEGETATION/LAND COVER WITHIN THE STUDY AREA

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE 1" = 1000'	DATE
FIGURE 4 - 4	

According to NYS Department of Environmental Conservation Fish and Wildlife personnel in Cortland, New York, there are no critical fish or wildlife habitats present in the study area. Also, the U.S. Department of Interior Fish and Wildlife Service has indicated that there are no threatened or endangered fish or wildlife species residing within the study area although some transient species may be occasionally seen (see Appendix D, letter dated June 12, 1985).

A-7 Agriculture

Fifty years ago, approximately two-thirds of the project study area was devoted to agricultural operations (Ref. Plate 4-1). However, today agricultural productivity within the study area is relatively minor as only 36 acres or approximately 1.7 percent of the study area is actively farmed. Most farmed acreage is involved in either corn for grain and feed or cover crops.

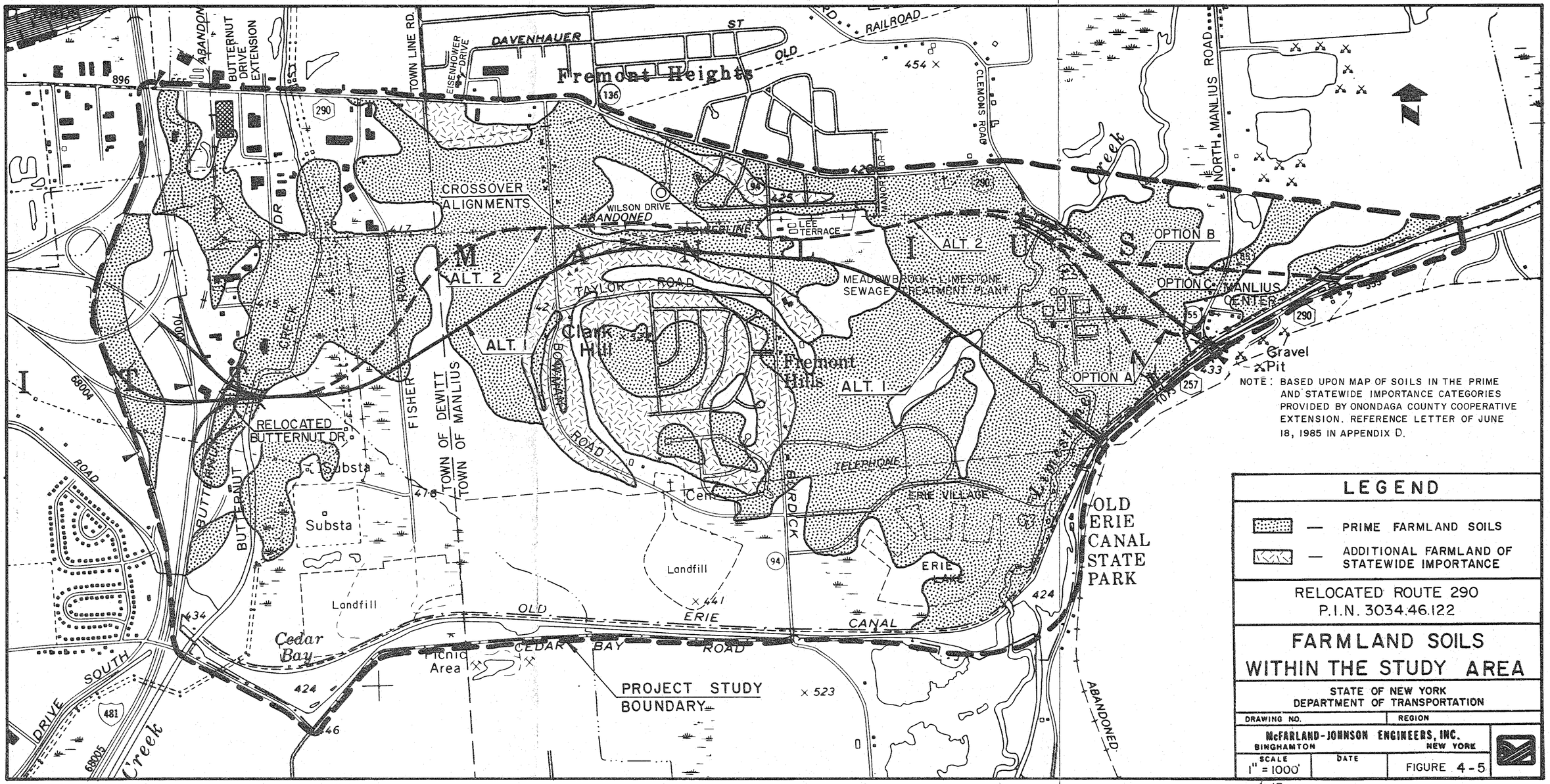
According to the U.S. Department of Agriculture Cooperative Extension Office in Syracuse, New York, there are no agriculture districts within the study area (see Appendix D, letter dated June 18, 1985). However, important farmland soils as defined by the USDA Soil Conservation Service are present throughout the area as shown in Figure 4-5.

Prime farmland soils occupy 44 percent (965 acres) of the study area with Additional Farmland Soils of Statewide Importance occupying 7.6 percent (165 acres). However, almost all of these soils are occupied by develop-ment or are located within wetland areas, thus unavailable for farming. Definitions of Prime Farmland and Additional Farmland of Statewide Importance are contained in Appendix C "Glossary".

A-8 Noise Levels

The noise analysis prepared for this project includes a noise survey of the project area (see Appendix A). The noise survey included existing noise measurements and identified land uses, activities and sensitive receptors (i.e., schools, residences, churches, etc.) in the project area which are subject to potential traffic noise impacts resulting from this project.

Measured existing noise levels ranged from a low of 49 dBA (L_{10}) in a backyard residential area off Taylor Road to a high of 70 dBA (L_{10}) in the vicinity of existing Route 290 and North Manlius Road. However, 61 percent of the measured noise levels were less than 65 dBA (L_{10}) (70 dBA is the federal noise abatement criteria level for residential properties). Areas of high noise levels were primarily limited to locations near existing transportation routes such as Route 290, Route 257, North Manlius Road, Burdick Street and Bowman Road. Areas of low noise levels were observed in undeveloped or quiet residential neighborhoods.


Fremont Heights
DAVENHAUER ST
OLD RAILROAD
ABANDONED BUTTERNUT DRIVE EXTENSION
TOWN LINE RD.
EISENHOWER DRIVE
CLEMONS ROAD
NORTH MANLIUS ROAD
CROSSOVER ALIGNMENTS
WILSON DRIVE ABANDONED
POWERLINE
LEE TERRACE
MANOR DR
ALT. 2
ALT. 1
TAYLOR ROAD
MEADOWBROOK-LIMESTONE SEWAGE TREATMENT PLANT
OPTION B
OPTION C
MANLIUS CENTER
OPTION A
Gravel Pit
Clark Hill
Fremont Hills
RELOCATED BUTTERNUT DR.
BUTTERNUT CREEK
FISHER ROAD
TOWN OF DEWITT
TOWN OF MANLIUS
BOOKFIELD ROAD
TELEPHONE
ERIE VILLAGE
OLD ERIE CANAL STATE PARK
ERIE LAKE
Substa
Landfill
Cedar Bay
Picnic Area
CEDAR BAY ROAD
OLD ERIE CANAL
PROJECT STUDY BOUNDARY
ABANDONED
SOUTH DRIVE
Creek
NOTE: BASED UPON MAP OF SOILS IN THE PRIME AND STATEWIDE IMPORTANCE CATEGORIES PROVIDED BY ONONDAGA COUNTY COOPERATIVE EXTENSION. REFERENCE LETTER OF JUNE 18, 1985 IN APPENDIX D.
LEGEND
PRIME FARMLAND SOILS
ADDITIONAL FARMLAND OF STATEWIDE IMPORTANCE
RELOCATED ROUTE 290
P.I.N. 3034.46.122
FARMLAND SOILS WITHIN THE STUDY AREA
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE
FIGURE 4-5

A-9 Air Quality

In the New York State Air Quality Implementation Plan, Onondaga County is designated as the Syracuse Air Quality Maintenance Area since future growth might cause air quality standards to be violated. However, the project area is not located within any designated non-attainment areas regarding air quality standards for total suspended particulates, sulfur dioxide, carbon monoxide and ozone and therefore is in attainment for all criteria pollutants.

The latest emission inventory data collected by the New York State Department of Environmental Conservation (Station No. 3301-22, Post Office at 410 West Manlius Avenue, East Syracuse) indicated that 1984 levels for total suspended particulates in the vicinity of the study area are currently within the State and Federal Air Quality Standards. Currently, air quality monitoring at the above referenced station does not include carbon monoxide.

According to NYSDOT PEG No. 42, "Air Quality Analysis Procedures", an average carbon monoxide background concentration of 6.1 parts per million is representative of the project area based upon data obtained from past NYSDOT air quality monitoring sites.

A-10 Transportation

The present highway system is comprised of a low density road network. The major east-west roads (the dominant travel pattern) are the New York State Thruway (I-90), State Routes 5, 92 and 290 and Kirkville Road west of Manlius Center. The major north-south roads are I-481, Burdick Street/Highbridge Street, North Manlius Road and State Route 257 from Manlius Center south to the Village of Manlius.

Route 5 is a four lane facility with a continuous left turn lane from I-481 to Lyndon Road, a four lane facility with some left turn pockets from Lyndon Road to Limestone Plaza and a two lane facility from Limestone Plaza to the Village of Chittenango. I-481 is a four lane controlled access facility. All other roads in the study area are two lane facilities with widenings at appropriate intersection approaches.

West of the project area, CNY CENTRO, Inc. provides bus service between downtown Syracuse and East Syracuse, Penn Central Station, Shoppingtown and Wegmans and Cooks Shopping Center along various routes including James Street, Route 290, Erie Boulevard (Route 5), Butternut Drive, Jamesville Road, Woodchuck Hill Road and Maple Drive. Bus service is also provided between downtown Syracuse and the Villages of Fayetteville and Manlius along three designated routes utilizing portions of Routes 5, 92, 257 and 173 south of the project area (see Figure 4-6). A park and ride lot is located at the Wegmans & Cooks Shopping Center. North of the project area, CNY CENTRO operates a county shuttle between Syracuse, Minoa and Bridgeport. Buses operate from 5:00 A.M. to 11:30 P.M. on weekdays, 6:30 A.M. and 11:00 P.M. on Saturdays and 9:30 A.M. to 7:00 P.M. on Sundays. Bus service between Syracuse and Utica is provided by Central New York Coach Lines utilizing Route 5 with stops in the Village of Fayetteville, Mycenae and Chittenango. An average of seven runs are made daily between Syracuse and Utica.

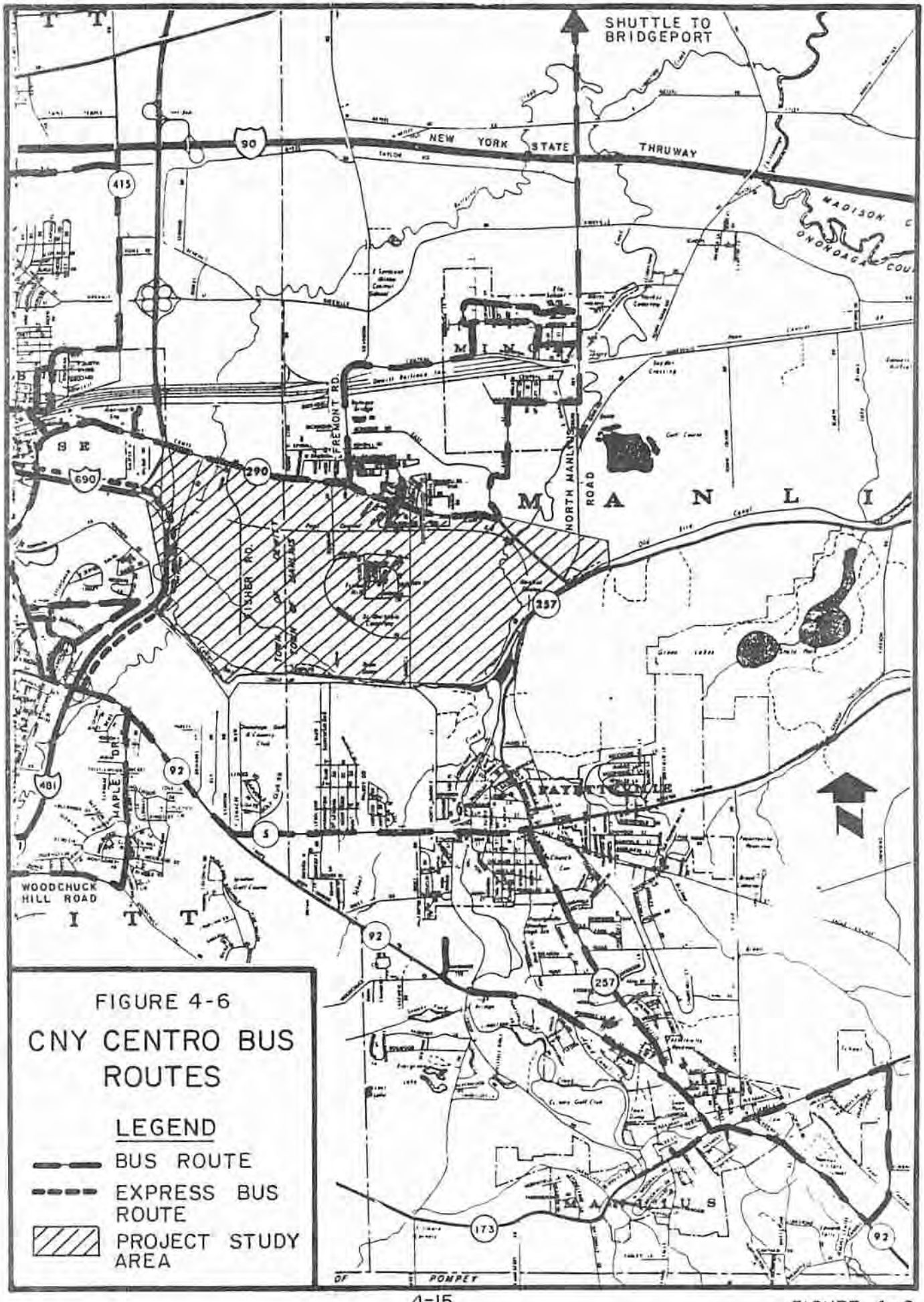

SHUTTLE TO BRIDGEPORT
NEW YORK STATE THRUWAY
90
415
MADISON
ONONDAGA
FREMONT RD.
NORTH MANLIUS ROAD
M A N L I
SE
690
290
FISHER RD.
257
481
92
5
MAPLE DR.
WOODCHUCK HILL ROAD
I T T
FAYETTEVILLE
173
POMPEY
FIGURE 4-6
CNY CENTRO BUS ROUTES
LEGEND
BUS ROUTE
EXPRESS BUS ROUTE
PROJECT STUDY AREA

FIGURE 4-6

According to a 1979 origin-destination survey conducted by the Department of Transportation, the average vehicle occupancy of work trips in the study area is 1.2 people/vehicle as compared to an average vehicle occupancy for all purposes of 1.4 people/vehicle. The low vehicle occupancy of work trips indicates a very limited use of car pooling throughout the study area.

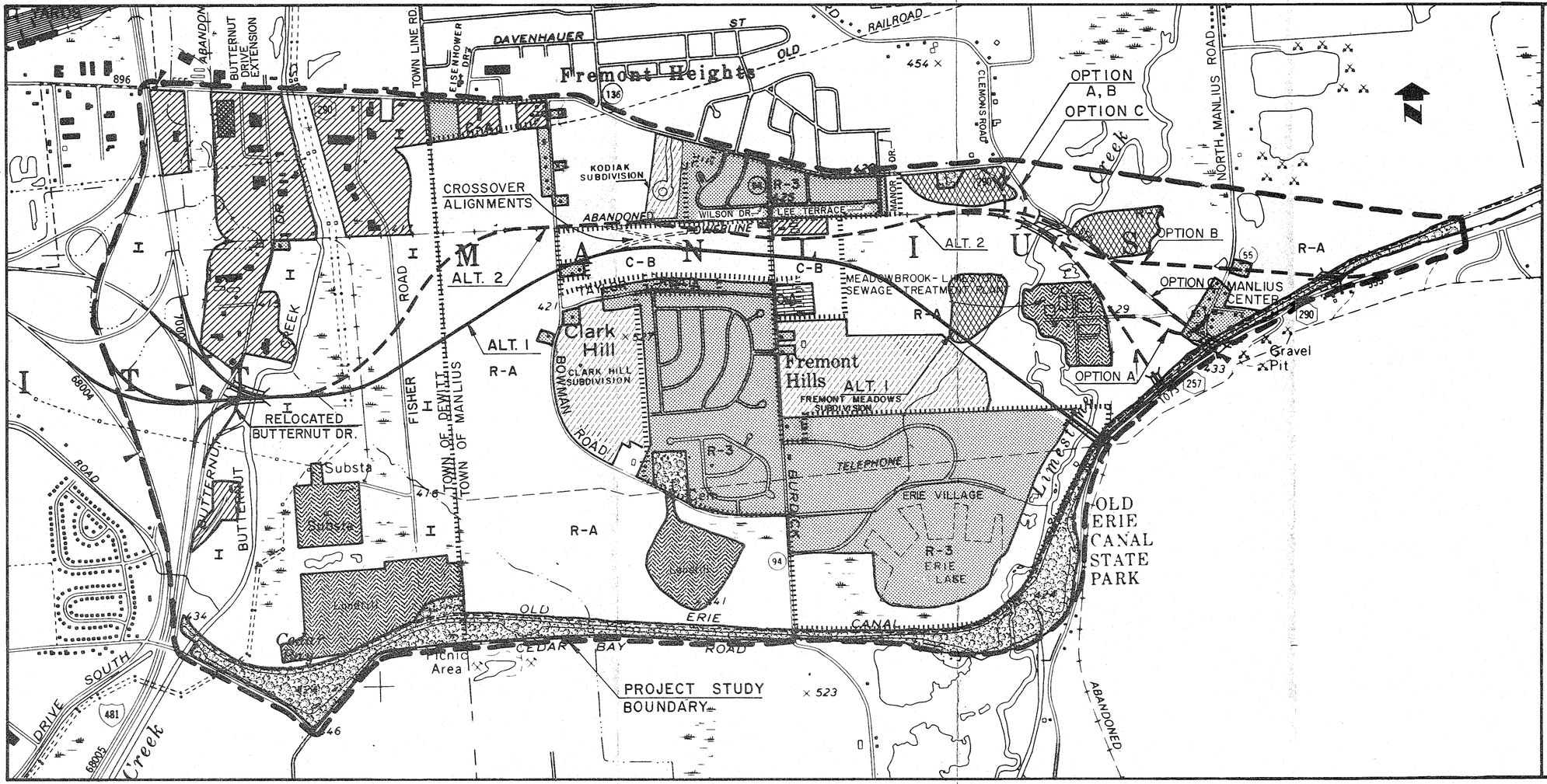
Freight transportation includes both truck and rail traffic and is primarily associated with industrial and commercial pickup and delivery operations. Within the study area, most of the vehicular freight traffic occurs along Route 290 and accounts for approximately 20 percent of the average daily traffic along this route. This heavy volume of truck traffic is primarily the result of the industrial and warehousing activities in the area, activity associated with the DeWitt freight yards and traffic associated with landfill sites south of Route 290. Rail service to the Syracuse area is provided by Consolidated Rail Corporation (Conrail) and the Delaware Otsego Railroad. The closest active rail facilities to the study area, the DeWitt Freight Yards, are located north of Fremont Heights and are owned and operated by Conrail.

Syracuse Hancock International Airport, located approximately 4.5 miles northwest of the study area, provides air freight and passenger service to the area. This airport has runways of 9,000 and 7,500 feet in length which can accommodate the largest aircraft. Presently, Hancock International Airport is served by many commercial passenger air carriers and six major air cargo companies.

A-11 Land Use and Zoning

Land use patterns within and adjacent to the project area are typical of a growing suburban area which is strongly influenced by the Syracuse metropolitan area and the proximity of the I-481/690 Butternut Interchange. In developed areas, the predominant land uses include residential, commercial and industrial activities. Undeveloped areas include wetlands and/or floodplains as well as cultivated land, abandoned gravel mines and landfill operations located along the southern portion of the study area. Other significant land uses within the project area include the Meadowbrook-Limestone Sewage Treatment Plant, the Old Erie Canal and electric substations. Figure 4-7 is a general land use map of the area.

Residential land occupies approximately 24 percent (528 acres) of the study area. Major subdivisions include Fremont Hills, Fremont Heights and Erie Village. Commercial/industrial activities occupy approximately 7 percent (154 acres) of the project area and are concentrated primarily in the immediate vicinity of the Butternut Interchange along Fisher Road, Route 290 and Butternut Drive. Table 4-2 is a tabulation of land uses in the project study area.



LEGEND

ZONING

DISTRICT BOUNDARY

TOWN OF DEWITT

I – INDUSTRIAL

TOWN OF MANLIUS

C–A COMMERCIAL A

C–B COMMERCIAL B

R–3 RESIDENTIAL

R–A RESTRICTED AGRICULTURAL

LAND USE

RESIDENTIAL

COMMERCIAL

COMMUNITY SERVICE

PUBLIC SERVICE

UNDEVELOPED / VACANT

OPEN SPACE ACTIVITIES, PARKS, CEMETERIES ETC.

ACTIVE AGRICULTURE

APPROVED SUBDIVISIONS

RELOCATED ROUTE 290
P.I.N. 3034.46.122

LAND USE AND ZONING

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE 1" = 1000'	DATE
FIGURE 4-7	

TABLE 4-2

EXISTING LAND USE TABULATION OF STUDY AREA

Land Use	Acres	Percent of Study Area
Residential	528	24.3
Commercial	154	7.1
Community Services	23	1.1
Public Service	100	4.6
Open Space Activities	31	1.4
Agriculture	36	1.7
Approved Subdivisions	114	5.2
Undeveloped/Vacant	1,184	54.6
Total	2,170	100.0

Zoning districts within the project area include industrial in the vicinity of the Butternut Interchange, restricted agriculture in undeveloped areas, commercial north of Fremont Hills and residential in the vicinities of Fremont Hills and Fremont Heights. These zoning districts are illustrated in Figure 4-7.

A-12 Population

The 1980 and estimated 1984 census populations of Onondaga County, the City of Syracuse and the Towns of DeWitt and Manlius are provided in the following table:

TABLE 4-3

POPULATION TRENDS, 1980 TO 1984

	1980	1984	Percent Change
Onondaga County	463,324	464,384	+0.2
Syracuse	170,105	164,219	-3.5
Town of DeWitt	26,868	25,891	-3.6
Town of Manlius	28,489	29,522	+3.6

As illustrated in the above table, the City of Syracuse and the Town of DeWitt both experienced a similar decline in their populations while a population increase of approximately 3.6 percent occurred in the Town of Manlius. These trends which reflect a general nationwide pattern of migration from central city locations to outlying suburban or bedroom communities are expected to continue into the future. Thus, although the total population of Onondaga County is expected to increase to 478,378 by the year 2005, declining populations have been projected for the City of Syracuse and the Town of DeWitt as shown in the following table.

TABLE 4-4

POPULATION PROJECTIONS, 1980 TO 2005*

	1984	2005	Percent Change
Onondaga County	464,384	478,378	+3.0
Syracuse	164,219	159,100	-3.1
Town of DeWitt	25,891	25,350	-2.1
Town of Manlius	29,522	33,700	+14.2

*New York State Department of Environmental Conservation and New York State Department of Commerce, "Projected Populations of Cities, Towns and Villages", September 30, 1985

A-13 Housing

The total number of housing units within Onondaga County increased by more than 5 percent between 1980 and 1985. The City of Syracuse as well as the Towns of DeWitt and Manlius also experienced increases in total housing units during this period. The total number of housing units for the years 1980 and 1985 are provided below.

TABLE 4-5

TOTAL HOUSING UNITS, 1980 AND 1985

	1980*	1985**	Percent Change
Onondaga County	176,895	186,510	+5.4
Syracuse	73,175	74,040	+1.2
Town of DeWitt	9,573	9,814	+2.5
Town of Manlius	9,866	10,912	+10.6

*U.S. Bureau of the Census, 1980 Census of Population and Housing
**Based upon building permits for new housing units between 1980 and 1985

A-14 Economic Setting

The local economy of the area is closely tied to its strategic location and proximity to major transportation corridors. The good regional transportation accessibility within the Town of DeWitt afforded by I-481 and its connections with I-81, I-690 and the New York State Thruway is a major factor influencing the existing and future economic development of the area. This accessibility has resulted in warehousing, distribution, freight related and commercial development in the western portion of the study area in the vicinity of the Butternut Interchange. Further to the east, residential areas such as Fremont Heights, Fremont Hills and Erie

Village represent bedroom communities which are closely tied to the major employment centers of the Syracuse metropolitan area west of I-481.

In describing the local tax base, total assessed valuation has increased approximately 7.3 percent in the Town of DeWitt and 42.5 percent within the Town of Manlius over the last five years. The current assessed valuations by property class for both towns is shown in Table 4-6.

TABLE 4-6

PERCENTAGE OF TOTAL ASSESSED VALUATION BY PROPERTY CLASS (1986)

	Town of DeWitt	Town of Manlius
Agricultural	.05	.70
Residential	34.41	67.07
Vacant Land	3.44	2.59
Commercial	35.20	14.18
Recreational	1.24	.53
Community Services	.15	6.22
Industrial	17.08	1.75
Public Service	8.42	6.65
Wild and Forest Land	.01	0.31
	100.00	100.00

A-15 Public Services, Community and Recreational Facilities

The Towns of DeWitt and Manlius are served by volunteer fire departments, private ambulance service and full time police departments. The project study area falls within the jurisdiction of the East Syracuse and Minoa Fire Protection Districts.

A New York State Department of Transportation highway maintenance facility is located east of Butternut Drive in the vicinity of the Butternut Interchange.

Medical Center East, a health care facility, is located along Burdick Street within the study area. Hospital facilities surround the study area with the nearest being St. Joseph's (Syracuse) located approximately 6 miles away. An average response time for ambulance service is 6-7 minutes.

No schools are located within the study area. The nearest schools are Fremont Elementary School, Pine Grove Middle School, Woodland Middle School and the East Syracuse-Minoa Central High School. School bus service is provided to students within the study area. Library facilities are located in both the Village of Fayetteville and Minoa.

Institutions of higher education in the area offer a wide variety of educational opportunities. Syracuse University in the City of Syracuse and LeMoyne College in the Town of DeWitt are located to the west of the project area.

There are two State Parks located within or adjacent to the study area: the Old Erie Canal State Park and Green Lakes State Park. The Old Erie Canal State Park, which parallels the southern and eastern boundaries of the study area, is a linear park which encompasses the Old Erie Canal and its associated towpath. In its entirety, the park stretches over thirty miles from the Town of DeWitt in Onondaga County eastward to the vicinity of Rome in Oneida County, New York. Throughout most of the study area, the park is approximately 150 feet wide and occupies approximately 283 acres. The principle recreational uses of the park are walking, jogging, biking and cross-country skiing along the towpath. Picnicing facilities are also located at various locations within the park. At its intersection with Burdick Street, the park receives approximately 132,000 users per year [see Chapter V, Section 4(f) involvement for a more detailed discussion of the Old Erie Canal State Park.]

Green Lakes State Park is a 1,100 acre facility owned and operated by the New York State Department of Parks and Recreation located just east of the study area. Facilities at the park include an 18-hole golf course, hiking trails, camping areas and a swimming area. In the winter, recreational activities include cross country skiing. Annually, Green Lakes State Park attracts approximately 1 million visitors. Access to the park is provided by way of Route 290 at a point approximately 2 miles east of the Route 290/257 junction in Manlius Center.

There are no Town or County parks within the study area.

Cultural facilities such as museums, theaters, civic centers, etc. used by the residents of the study area are primarily concentrated within the City of Syracuse.

A-16 Community Identity

The good regional accessibility provided by the various roads and highways which pass through the area (see Section A-10) has played an important role with respect to the type and character of development within the study area. The study area is best described as a growing suburban residential area. Route 290 provides a direct link to downtown Syracuse and connects with Burdick Street and Route 257 to provide good access to other regional shopping and employment centers from residential communities within the study area. These communities include Fremont Hills located west of Burdick Street, Fremont Heights which is located along Route 290 and Erie Village, a new 500 unit townhouse development (under construction) which is located east of Burdick Street. These subdivisions are typical middle income bedroom communities which are dependent upon the Syracuse Metropolitan area with respect to employment, commerce and industry.

Manlius Center is located at the junction of a former toll road (existing Route 290), the Erie Canal and the present North Manlius Road. As such, Manlius Center was a preferred location for a variety of roadside businesses and services during the last century. Development of this location dates back to the mid 1800's. Presently, Manlius Center includes several older residential structures, an old 2-story wood frame structure, an auto repair shop and a small community church.

A-17 Cultural Resources

A corridor-wide cultural resources reconnaissance survey was previously conducted (Versaggi, 1979) during an earlier phase of the transportation planning process for this project. The study area of the 1979 reconnaissance included the current study area and encompassed additional areas to the north, south and east. Cultural Resource Surveys have also been conducted for this Draft Environmental Impact Statement by the Public Archaeology Facility of the State University of New York at Binghamton (July 30, 1986 and December 1987). These cultural resource surveys consisted of supplemental background research on the history and prehistory of the project area, a walkover of the project area to locate testable locations at wetland margins and within wetlands, and subsurface investigations of these areas and of all testable portions of creek crossings, of the saddle area between Clark Hill and Fremont Heights, and of the Old Erie Canal at Manlius Center in the vicinity of the existing Route 290 crossing.

Based on the aforementioned studies, the cultural re-sources of the study area are summarized as follows:

Prehistoric Resources - There are no prehistoric sites within the project area listed with the New York State Office of Parks, Recreation and Historic Preservation. No prehistoric material was discovered and no soil anomalies indicative of prehistoric activity were encountered in shovel test pits during the 1986 Cultural Resources Survey.

Historic Resources - The New York State Office of Parks, Recreation and Historic Preservation lists no historic sites within the study area. During the 1986 survey, historic artifacts were recovered from two locations associated with structures visible on historic maps depicting the project area. These are School House No. 19 (dating to about 1854) and a structure identified as the "WSRR" Company which was erected between 1874 and 1889. Both were located on the present Route 290 and neither structure is presently standing.

The Old Erie Canal in the vicinity of this project is considered eligible for listing on the National Register of Historic Places. The canal is now functioning as a linear state park and is discussed in depth in Chapter V - Draft Section 4(f) Evaluation.

The Syracuse and Chenango Railroad was constructed through the project area between the years 1860 and 1874. The railroad crossed the Erie Canal via an elevated trestle east of Limestone Creek, subsequently turning west across the creek and travelling west to the north of Clark Hill. This rail line, now abandoned, does not appear to have any scientific or local historical significance.

There are no structures, within the study area, listed on the National Register of Historic Places. The State Historic Preservation Officer has determined that two buildings in the Hamlet of Manlius Center are potentially eligible for listing on the National Register. These structures are the Manlius Center Community Church on North Manlius Road and an abandoned warehouse adjacent to the Old Erie Canal at the existing Route 290 crossing.

A-18 Visual Quality

The project is located at the physiographic division known as the Onondaga Limestone escarpment, where the southern Allegheny Plateau ends and the northern Erie-Ontario Plain begins. This landform is the result of recent glaciation and consists of low lying wooded hills and drumlins surrounded by a nearly level and gently sloping lake plain to the north. Numerous water courses bisect and drain the project area also characterized by vegetated wetlands in the valley floor. All of these features are evident within the project study area, which when viewed from prominent points reflects the physiographic transition of the escarpment valued for its scenic and recreational resources.

The land use pattern consists primarily of single family residential development on the wooded slopes and northern boundary, commercial development to the northwest, site development/excavation and landfills on the floor and a recreational (water related) corridor along the southern boundary.

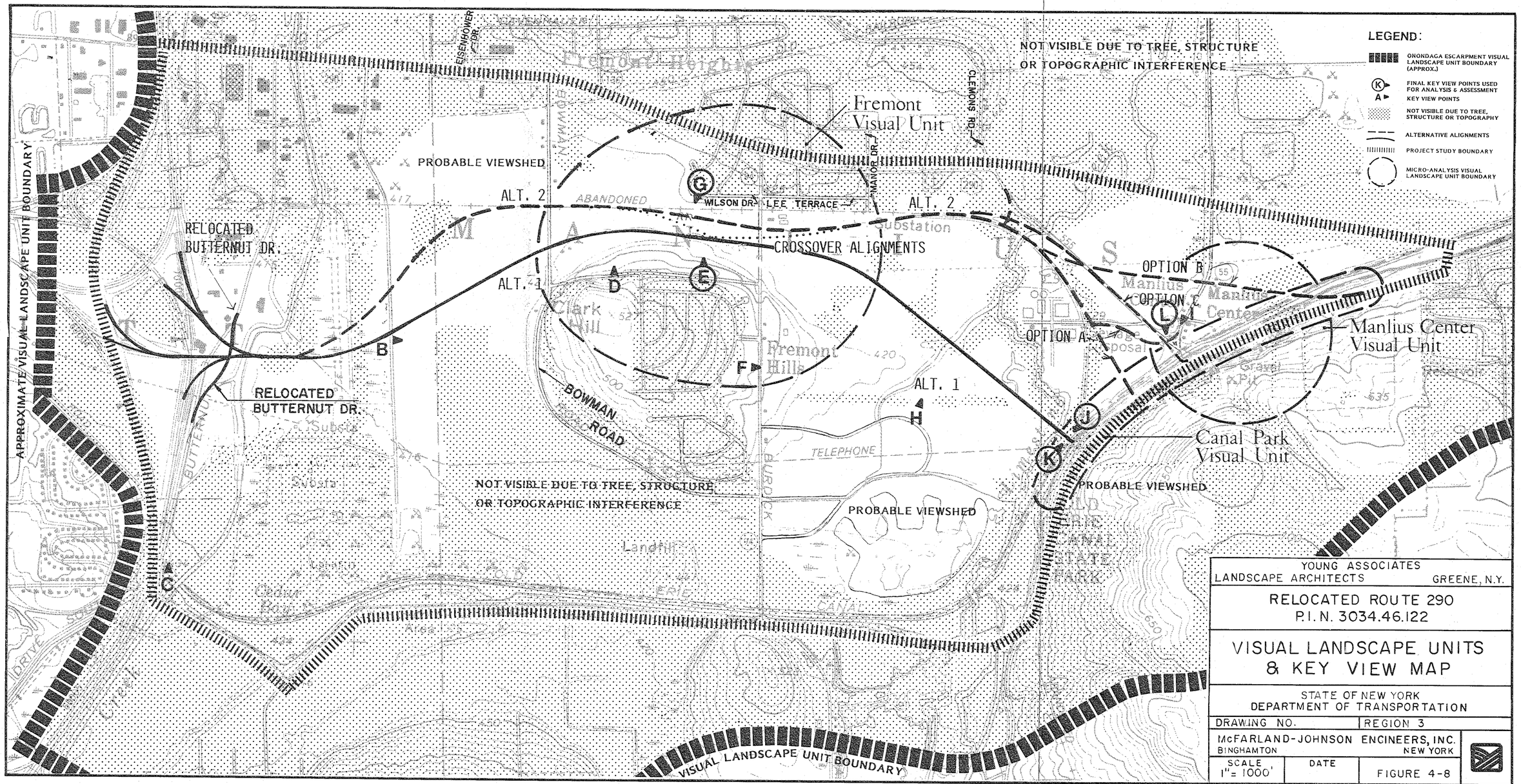
Figure 4-8 is a map of visual landscape units and key views within and adjacent to the project area. To provide a framework for analyzing the visual environment, one major visual landscape unit has been distinguished which encompasses the project area. This unit is referred to as the Onondaga Escarpment Unit. Due to the variety of character areas within the project study area and sensitivity of specific viewers, three additional landscape units were divided out of the one major unit for micro-analysis, they are:

1. Manlius Center Visual Landscape Unit
2. Canal Park Visual Landscape Unit
3. Fremont Visual Landscape Unit

Foreground views of the existing Route 290 and 257 intersection and tree-lined canal are typical of views in the Manlius Center Unit. Both the scale of the community and proximity to the canal are assumed resources valued by local people.

Views within the Fremont landscape units are often short foreground to middleground backyard views of the vegetated wetlands and/or wooded residential hillsides. Both the wetlands and hillsides are natural attractions and valued local resources. Views within the Canal Park landscape unit are generally limited foreground to middleground views that include the linear tree-lined trail and water course, also valued as a cultural, scenic and recreational resource.

There are three general viewer groups identified within the project visual zone. Commuters (drivers/riders), residents and recreation users. These viewer groups are identified based on land use, travel routes, activity and approximate numbers within the viewshed. Further characterization of viewer behavior and exposure, as they relate to key views, substantiates assumptions of viewer sensitivity to the project. In general, the most sensitive groups are the residents and recreation users. Commuters have a greater exposure to the alternatives but their duration and awareness of the view lowers their sensitivity.



YOUNG ASSOCIATES
LANDSCAPE ARCHITECTS GREENE, N.Y.

RELOCATED ROUTE 290
P.I.N. 3034.46.122

VISUAL LANDSCAPE UNITS & KEY VIEW MAP

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO. | REGION 3

McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK

SCALE 1"= 1000' | DATE | FIGURE 4-8

B. Social, Economic and Environmental Impacts of the Alternatives on the Affected Environment

This section discusses the social, economic and environmental impacts of the no-build and design alternatives upon the affected environment. Mitigative measures which reduce or compensate for the adverse impacts of the various alternatives upon the affected environment are also discussed. This section also documents significant issues, concerns and project requirements which were identified as a result of the consultation and coordination with federal, state and local agencies and individuals during the preparation of this DEIS (see Appendix D).

B-1 Topography, Geology and Soils

Due to the generally level physiographic features of the area, unfavorable construction activities such as large amounts of cut and fill and blasting will not be required. The topography and geology of the area will not be significantly altered or impacted as a result of this project. In most areas, the proposed facility will be constructed on a low highway embankment with an average fill depth of approximately 5 to 7 feet.

All design alternatives would involve construction in soils which are subject to flooding and/or are poorly drained. These soils also exhibit generally poor foundation and stability characteristics and may require special construction techniques or replacement with more suitable materials along the selected alignment to provide an appropriate base for the proposed facility.

Soil borings will be obtained and appropriate construction techniques in areas with poor soil characteristics will be determined during the detailed design phase of this project.

B-2 Water Resources

Minor impacts to water resources will be realized as a result of construction, maintenance and usage of the selected alternative.

Work in any streams and wetlands within the study area will require a U.S. Department of the Army Corps of Engineers' Section 404 permit. A New York State Department of Environmental Conservation Freshwater Wetlands Permit and a 401 Water Quality Certification are also required for disturbance of designated wetlands in the study area.

Construction of stream crossings and associated stream bank disturbances will create short term negative impacts on surface water quality in the form of increased turbidity and sedimentation. These impacts are similar for all Build Alternatives. All build alternatives will cross Butternut Creek, Limestone Creek and the Old Erie Canal. These major stream crossings will each span the water course and its regulated floodway. No piers or other obstructions will be placed in these streams and no channel relocations are proposed. Therefore, no stream bed disturbance will occur at any of the major stream crossings. Actual instream work, in addition to minor temporary construction crossings, will be the removal of the existing Route 290 bridges over Limestone Creek and

the Old Erie Canal (w/Alternatives 2A, B, C and 1-2A, B, C) and removal of the abandoned railroad bridges over Butternut and Limestone Creeks occurring with all alternatives.

Alternatives 1 and 2-1 would require two (2) minor stream crossings (i.e., culvert crossings of intermittent tributaries) while Alternatives 2 (A, B and C) and 1-2 (A, B and C) would each require one (1) minor stream crossing. Impacts associated with these minor crossings will be minimized with proper construction techniques as described in Sections 107 and 209 of the NYSDOT Standard Specifications and will cease following construction.

Construction of Alternatives 1, 1-2A, 1-2B or 1-2C will require the elimination of one (1) residential water supply well along the east side of Bowman Road approximately 400 feet north of Taylor Road. All other alternatives will be at least 600 feet north of it. On Route 257 in the vicinity of the project terminus, Alternative 1 will eliminate two (2) private well supplies while Alternatives 2A and 1-2A will eliminate one (1) private well supply as a result of right of way acquisition. Since the affected residents will be relocated, the elimination of these wells will not result in an adverse impact upon groundwater supplies. No other impacts upon groundwater supplies will occur as a result of this project.

Use of ice removal compounds (sodium and calcium chloride) during winter months will create minor impacts on surface water quality (see Appendix B "Terrestrial and Aquatic Ecology", Toler Chloride Analysis). The highest predicted chloride concentration resulting from this project under normal deicing application rates would occur with Alternative 2B as it contributes 0.43 mg/l to Limestone Creek and 0.53 mg/l to Butternut Creek. Shock level conditions (extreme ice or snow) would be 0.86 mg/l (Limestone Creek) and 1.06 mg/l (Butternut Creek) respectively. These predictions when added to monitored worst case background conditions of 61.5 mg/L for Butternut Creek and 45.0 mg/l for Limestone Creek are well below New York State Department of Environmental Conservation and USEPA drinking water standard of 250 mg/l.

Water quality impacts associated with highway usage can occur as runoff containing trace amounts of hydrocarbon waste, lubricants, lead and other substances associated with vehicle operation enter surface waters. These pollutants would enter the study area streams in relation to increased vehicle miles traveled (VMT) and the alternative's proximity to water courses. Intrusion of these pollutants would be similar for all alternatives as they have similar VMT's [99,667 (Alternative 1) to 103,352 (Alternative 2A)] and a similar amount of stream crossings, 4 (2A, B, C and 1-2A, B, C) to 5 (Alternatives 1 and 2-1). The significance of this impact will be minor as no alternatives parallel existing streams and only low levels of pollutants would intrude at stream crossings. Technical studies (i.e., FHWA/RD-84/062-066) by the Federal Highway Administration conclude that stormwater runoff from medium traffic volume (30,000 ADT) rural highways exerts minimal to no impact on the aquatic components of most receiving waters.

There will be no impacts on public water supply sources as a result of this project. Water quality in the few domestic wells in the

study area will not be impacted. Minor amounts of additional chlorides may get into the groundwater but will not result in any significant impacts. Several of the residences which utilize private wells may be removed with Build Alternatives 1, 1-2A and 2A.

All build alternatives will cross a 48" diameter Onondaga County Water Main. Generally, these crossings occur in a low highway fill condition that will not directly impact the water main location. If required, the water main will be encased in concrete for additional protection under the highway fill. An exception to this occurs with Alternatives 1, 1-2A, 1-2B and 1-2C where several hundred feet of water main will have to be relocated. Provisions will be made to maintain water service at all times during construction.

Construction of a new water line along Bowman Road to connect the end of the present southward extension from Route 290 to the line extending west from Burdick Street is currently being contemplated by the Onondaga County Water Authority. All of the construction alternatives would cross this proposed waterline construction area. This impact will be negligible as it is considered a routine type construction crossing.

B-3 Wetlands

In compliance with the provisions of Executive Order 11990, all build alternatives for this project have been developed to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands whenever there is a practicable alternative. Alternative alignments through comparable open or undeveloped space would result in equal or greater impacts to wetland areas. A major widening of existing Route 290 provides improved levels of traffic service and reduces congestion and delay as does each build alternative. However, it would not satisfy the project objective of minimizing impacts to the overall environment and avoiding infringement on residential areas. The major widening of existing Route 290 would involve property acquisition from forty commercial and one hundred residential properties including the displacement of fifteen residences and two businesses. In addition, there would be a resultant increase in noise levels within an established residential area. The major widening alternative would also increase the development pressure for new construction in areas no longer reserved for highway construction. Therefore, the major widening of existing Route 290 has been dismissed as a design alternative.

Disruption of wetlands due to highway construction is an unavoidable impact of this project. This disruption may result in a net loss of wetland acreage due to filling which is required to put in a roadbed. The impacts occurring as a result of this fill placement would be the loss or reduction of the wetland benefits/functions which are identified in Chapter IV, Section A-3 and further described in Appendix B.

The impacts of highway construction on wetlands can be grouped into two categories: direct physical impacts and indirect impacts (which may occur during construction or during long term highway use). The major direct impact would simply be the loss of wetland acreage due to

filling which is required to put in a roadbed. Turbidity increases in areas adjacent to construction could also be termed direct effects since they would directly inhibit growth of submerged plants (aquatic machrophytes) or bury benthic invertebrates.

In addition, the splitting of wetland areas is also considered a direct effect since it would physically divide the wetland into separate units. This is most noticeable in wetland unit SYE 22.01, between Bowman and Fisher Roads, as all alternatives would cross this wetland. In many cases, splitting of wetlands create hydrological impacts by restricting movement of both surface and ground water. However, at this location, water retained by this wetland is released westward and will not be significantly affected by the east/west crossing of any of the build alternatives. Culverts, equalizer pipes and/or french drains to maintain isolated surface flows and groundwater flows will be provided as necessary at this location and all wetland crossings during the detailed final design of this project.

The direct loss of wetland acreage is not simply a spatial consideration. The overall qualities and functions of these wetland areas include flood control, pollution control, open space aesthetics, recreation and wildlife habitat. Each of these has been examined in the context of total wetland area adjacent to the project and other aspects of the project which address identical issues. Floodplain analysis for the proposed facility indicated that elimination of existing floodway constrictions would permit construction of the project with no increase in flood elevation. Thus, there would be no significant effect on the flood control function of the wetland areas. Based on the location, overall size, adjacent land uses and character of the affected wetland areas, it can be surmized that they presently serve no major role within the project site in regards to pollution control, open space aesthetics or recreation on a per acre basis. The loss or removal of less than one percent of the four designated wetland units will not have a significant effect on pollution control, open space aesthetics or recreational functions. The most significant and measureable impact of wetland removal will be the direct loss of wildlife habitat.

In addition to the direct impact from loss of habitat, there will be indirect impacts on adjacent wetland areas due to the redistribution of wildlife from the lost wetland acreage, avoidance of affected areas by wildlife due to human activity and noise and effects of trace amounts of hydrocarbons, spilled materials, lead or deicing salts on wetland species. Table 4-7A identifies the wetlands affected by the project.

Table 4-7A

Designated Wetland Acreage Affected by Construction of Build Alternatives

Wetland	Total Acres	Acreage Within Study Area	Alternatives 1	2A	2B	2C	1-2A	1-2B	1-2C	2-1
SYE-17 & SYE-21	257	41	--	--	--	--	--	--	--	--
SYE-22	893	605	19.8	21.8	21.8	21.8	18.7	18.7	18.7	24.2
MAN-7	1,699	129	1.3	2.3	6.7	2.0	2.3	6.7	2.0	1.3
Total	2,849	775	21.1	24.1	28.5	23.8	21.0	25.4	20.7	25.5

As identified above in Table 4-7A, each design alternative disturbs varying amounts of wetland acreage.

Alternative 1 requires the actual disturbance of three (3) wetland areas within wetland unit SYE-22 totalling 19.8 acres or 2.6 percent of the NYSDEC designated wetland acreage within the project study area.

Beginning at the I-481/690 Butternut Interchange, Alternative 1 splits wetland SYE 22.01 in half disturbing 12.2 acres. This splitting of wetland 22.01 results in 139 acres of wetland 22.01 being isolated north of Alternative 1 and 335 acres isolated south of Alternative 1. It then proceeds north of Clark Hill disturbing the southern boundary of wetlands SYE 22.02 and SYE 22.03 removing 2.6 acres and 5.0 acres respectively. It also disturbs 1.3 acres of the southern boundary of wetland MAN 7.01 before connecting with Route 257. In many cases, splitting of wetlands create hydrological impacts by restricting movement of both surface and ground water. However, at wetlands SYE 22.01 and MAN 7.01, water retained by these wetlands is primarily released westward and will not be significantly affected by the east/west crossing of any of the build alternatives. Culverts, equalizer pipes and/or french drains to maintain isolated surface flows and groundwater flows will be provided as necessary at this location and all wetland crossings during the detailed final design of this project.

Alternative 2A requires the disturbance of four (4) separate wetlands within wetland units SYE-22 and MAN-7, totalling 24.1 acres.

From its western terminus at the Butternut Interchange, Alternative 2A proceeds north and eastward intersecting the northern portions of wetlands SYE 22.01, 22.02 and 22.03 and removing 12.6 acres, 6.3 acres and 2.9 acres of wetland respectively. It results in the severing of wetlands 22.01 and 22.02, isolating 129 acres to the north of Alternative 2. However, much of this acreage is presently isolated by the abandoned railroad.

Approximately 1,250 feet west of Limestone Creek, Alternative 2A proceeds southeasterly along the abandoned railroad, intersecting wetland MAN 7.01, removing 2.3 acres and isolating 6 acres to the north. Again, this six acres is already isolated by the abandoned railroad. Alternative 2A then connects with Route 257.

Alternative 2B requires the most wetland disturbance of all the alternatives under consideration. It impacts six (6) wetlands within wetland units SYE-22 and MAN-7 and results in the taking of 28.5 acres or 3.7 percent of the designated wetland acreage within the study area.

Alternative 2B follows the same alignment as Alternative 2A and results in the same impacts on wetland SYE-22 (21.8 acres) and isolates the same 129 acres to the north. Then from a point 1,250 feet west of Limestone Creek, Alternative 2B would continue to follow the abandoned railroad and cross Limestone Creek, disturbing 1.7 ares of wetland MAN 7.01. It then proceeds east across existing Route 290 north of Manlius Center, crosses the Erie Canal and connects with existing Route 290 impacting 2.9 acres of wetland MAN 7.02 and 2.1 acres of wetland MAN 7.07. In addition, eleven (11) acres of wetland 7.02 and 7.07 will be isolated to the south of Alternative 2B. Hydrological impacts will be minimal as water retained by MAN-7 is primarily released westward and will not be significantly affected by this east/west crossing.

Alternative 2C results in the disturbance of five (5) wetlands within wetland units SYE-22 and MAN-7. Total wetland acreage disturbed is 23.8 acres or 3.1 percent of the study area wetlands.

Alternative 2C follows the same alignment as Alternatives 2A and 2B and results in the identical taking and isolation of 21.8 acres and 129 acres respectively of wetland unit SYE-22. Approximately 1,250 feet west of Limestone Creek, Alternative 2C crosses the abandoned railroad and Limestone Creek, impacting 1.3 acres of wetland MAN 7.01. It then curves southeasterly, aligns itself with existing Route 290 and terminates at the Route 290/257 intersection, impacting 0.7 acres of wetland MAN 7.02 along existing Route 290.

Alternative 1-2 follows the same alignment as Alternative 1 from the Butternut Interchange eastward to a point approximately 1,200 feet west of Burdick Street. This would result in the disturbance of 18.7 acres of wetlands SYE 22.01, 22.02 and 22.03 and result in the isolation of 139 acres to the north. The alignment then crosses over to follow the alignment of Alternative 2 for the remainder of the project. Options A, B and C are available and would create the following additional impacts:

Option	Wetland Disturbance (Acres)	Wetland Isolation (Acres)
A	2.3 (MAN 7.01)	6 (MAN 7.01)
B	1.7 (MAN 7.01) 2.9 (MAN 7.02) 2.1 (MAN 7.07)	6 (MAN 7.01) 7 (MAN 7.02) 4 (MAN 7.07)
C	1.3 (MAN 7.01) 0.7 (MAN 7.02)	6 (MAN 7.01)

Thus, the total wetland area disturbed (isolated) by Alternative 1-2 is 23.8 acres (6 acres) with Option A, 28.2 acres (17 acres) with Option B and 23.5 acres (6 acres) with Option C.

Alternative 2-1 requires the disturbance of four (4) wetlands within wetland units SYE-22 and MAN-7. Total wetland acreage disturbed is 24.2 acres or 3.1 percent of the study area wetlands. Alternative 2-1 follows the same alignment as Alternative 2 from the Butternut Interchange eastward to 500 feet east of Bowman Road. It then crosses over and becomes identical with Alternative 1 for the remainder of the project. Wetland isolated by Alternative 2-1 totals 129 acres within wetland SYE 22.

All wetland disturbance will require wetland permits from the New York State Department of Environmental Conservation (Article 24) and the U.S. Army Corps of Engineers (Section 404). Prior to preparation of permit applications, the proposed action will include all practicable measures to minimize harm to wetlands as a result of construction and to provide mitigation measures for the disturbed areas in compliance with the conditions of Article 24 and Section 404 as well as Section 209 of the New York State Standard Specifications for Construction and Materials and Part 502 of 6 NYCRR "Floodplain Management Criteria for New York State Projects".

General mitigation measures available to offset or compensate for wetland disturbance during project development include replacement of wetland acreage or intensive management of other properties to improve their wildlife value. Examples of replacement and management mitigative measures include:

1. In Kind Replacement - involves replacement of destroyed habitat with the same type habitat.

2. Out of Kind Replacement - involves replacement of one kind of habitat with a different kind.

3. Quality vs. Quantity - an example of this mitigative measure would be replacement of x amount of acres of emergent marshland with y amount of acres of newly constructed marshland (y greater than or equal to x).

4. On Site vs. Off Site - involves compensation occurring directly on the impacted sites or on adjacent sites.

The mitigation plan adopted by the Department as a result of selection of any build alternative will address the actual area disturbed and the specific ecological value of these wetland areas for the specific Alternative. As a minimum, it will confirm the Department decision to avoid additional disturbances by elimination of the Butternut Drive-Fisher Road Connector and it will emphasize the Department's commitment to minimize disturbance by utilization of appropriate construction details. Embankment side slopes will be steepened to reduce encroachments, french drains and/or equalizer pipes will be provided to maintain surface and groundwater hydrologic regimes, and a detailed plan for Soil Erosion and

Water Pollution Control will be included in the contract documents for construction of the selected alternative. In addition, the establishment of new right of way acquisition limits will include space for the enhancement of adjacent wetland areas and to provide landscaping consistent with the edge ecotone adjacent to the new facility. The mitigation plan will include replacement or enhancement of wetland areas by first utilizing property already owned or controlled by the State, i.e., Butternut Interchange infield areas, previous acquisitions for Relocated 290 (Circa 1968), and the abandoned railroad right-of-way. Wetland replacement is also anticipated to involve the utilization of isolated parcels of private land adjacent to the proposed facility and designated off site borrow areas. The Department's basic proposal for mitigation of wetland impacts, contingent on regulatory agency acceptance is outlined in Table 4-7B "Wetland Disturbance and Mitigation Proposal".

It should be noted that wetland mitigation measures can only be provided on property owned by the State or within the right-of-way acquired for highway purposes. A detailed discussion on wetland mitigation measures is contained in Appendix B, "Terrestrial and Aquatic Ecology".

The Department of Transportation will continue its coordination with the Department of Environmental Conservation, the U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers through final design to further define and develop specific mitigation plans.

B-4 Floodplains

Except for a small portion of Alternative 1 between Bowman Road and Burdick Street, the alignments of all design alternatives are located almost entirely within the 100 year floodplains of Butternut and Limestone Creeks. The Federal Emergency Management Agency (FEMA) has conducted a detailed Flood Insurance Study for Butternut and Limestone Creeks located respectively in the Towns of Dewitt and Manlius, New York. Both streams were studied by detailed hydraulic computer methods and the 100 year flood elevations and regulatory floodway limits were established.

All the build alternatives must cross the regulatory floodways of Butternut Creek. Generally, the proposed structures span the majority of the existing floodway limits for Butternut Creek. There will, however, be some instances where the highway embankment of Relocated Route 290 will encroach slightly into the FEMA floodway to reduce overall structure length and cost. To compensate for this, a new floodway limit was established contingent on reducing other flow constrictions within the study area, specifically the removal of an abandoned railroad bridge and approach section to the south of existing Route 290. All bridge lengths were designed predicated on this removal and a detailed hydraulic analysis utilizing the U.S. Army Corps of Engineers HEC-2 Water Surface Profile Program was performed. The results of this study showed that with the existing railroad bridge removed and proposed structures in place, the existing FEMA 100 year floodway water surface elevations will not increase.

Similarly, all build alternatives will span the majority of the regulatory floodway widths for Limestone Creek. Again, to reduce excessive bridge length and costs, the highway embankment of Relocated

TABLE 4-7B

WETLAND DISTURBANCE AND MITIGATION PROPOSAL TABLE

		Mitigative Engineering Practices			Proposed Mitigation (Acres)						
Alternate	Acres Disturbed	Butternut Drive Fisher Road Connector	Equalizer Pipes, French Drains	Steep Side Slopes	NYS Property	Proposed ROW	Butternut Interchange	Aband. RR	Fremont Meadows	Off Site Borrow Areas	Total
1	21.1	Deleted	Included	4 Acre Reduction	8	0	10	4	5	10	37
2A	24.1	Deleted	Included	4 Acre Reduction	7	6	10	4	0	10	37
2B	28.5	Deleted	Included	4 Acre Reduction	7	6	10	4	0	10	37
2C	23.8	Deleted	Included	4 Acre Reduction	7	5	10	4	0	10	36
2-1	25.5	Deleted	Included	4 Acre Reduction	6	0	10	4	5	10	35
1-2A	21.0	Deleted	Included	4 Acre Reduction	9	0	10	4	0	10	33
1-2B	25.4	Deleted	Included	4 Acre Reduction	9	0	10	4	0	10	33
1-2C	20.7	Deleted	Included	4 Acre Reduction	9	5	10	4	0	10	38

Route 290 for all the build alternatives crossing Limestone Creek will encroach slightly into regulatory floodways. To compensate for this, a new floodway was established contingent on making other hydraulic improvements within the project area. Specifically, the abandoned railroad bridge and approach section would be removed for each build alternative. Additionally, the existing Route 290 bridge and sections of the highway approach would be removed under all the build alternatives except for Alternatives 1 and 2-1 which are located significantly upstream of the other alternatives. All the proposed bridge lengths were designed predicated on these improvements and a detailed hydraulic study using the aforementioned HEC-2 computer program was performed. The results of this study showed that the existing FEMA 100 year and floodway water surface elevations did not increase with any of the build alternatives. Note that the floodway limits shown on the plans in Appendix G for both Butternut and Limestone Creeks have been adjusted to reflect the proposed conditions.

All bridges will be designed to provide a minimum freeboard of 2 feet for the 50 year storm with somewhat lesser freeboard for the 100 year storm. The actual minimum freeboard will be determined during final design. The hydraulic considerations and potential impacts on floodplains of Butternut and Limestone Creeks for each build alternative is summarized in Table 4-8.

In accordance with the provisions of Executive Order 11988, Flood Plain Management as implemented in FHPM 6-7-3-2, Location and Hydraulic Design of Encroachments on Flood Plains and 6NYCRR502, Flood Plain Management Criteria for State Projects, this section has considered and evaluated the practicability of alternatives to any significant encroachments or any support of incompatible floodplain development. As a result of this evaluation, it is concluded that (1) a significant encroachment does not exist, (2) there is no significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles, (3) there is no significant risk and (4) there are no significant impacts on natural and beneficial flood plain values.

B-5 Vegetation

The direct impact of highway construction with regard to flora and wildlife habitats is the loss of woodlands, wetlands, old fields and other natural vegetation acreage. Upland successional fields, emergent wetland, flooded deciduous shrubs and flooded deciduous trees comprise the majority of the natural vegetation in the study area totaling 47 percent (1,014 acres) of the 2,170± acres of all land. The magnitude of highway construction impact upon these natural areas can be expressed as the number of acres of natural vegetation found in the study area.

A detailed breakdown of natural vegetation and wildlife habitats required for each alternative is shown in Table 4-9 and further described in Appendix B.

TABLE 4-8

FLOODPLAIN IMPACT SUMMARY

BUTTERNUT CREEK

Alternative	# Bridge Crossings	Span Lengths	% of Flood Fringe Filled	Impact	Comments
All Build Alts.	3	380 - 450′	2%	Not Significant	Abandoned RR Bridge Removed

LIMESTONE CREEK

Alternative	# Bridge Crossings	Span Lengths	% of Flood Fringe Filled	Impact	Comments
1, 2-1	1	470′	1%	Not Significant	Abandoned RR Bridge Removed
1-2A, 1-2B, 1-2C 2A, 2B, 2C	1	430′	3%	Not Significant	Abandoned RR Bridge and Exist. 290 Bridge Removed

TABLE 4-9

WILDLIFE HABITATS IMPACTED BY BUILD ALTERNATIVES

Habitat Type	Acres in Study Area	Habitat Acres Impacted by Alternative 1	2A	2B	2C	1-2A	1-2B	1-2C	2-1
Flooded Trees	201	0.8	3.2	3.5	3.0	1.2	1.9	1.0	2.8
Upland Trees	8	1.6	2.2	0.3	-	2.2	0.3	-	1.6
Flooded Shrubs	220	7.3	8.8	8.6	8.1	8.0	7.4	7.3	8.1
Upland Shrubs	115	-	1.5	0.7	0.6	1.5	0.6	0.6	-
Wet Meadow	76	3.7	2.3	3.1	3.0	2.8	3.6	3.4	3.7
Emergents	293	8.2	9.1	12.6	9.1	7.7	11.2	7.7	10.4
Successional Field	300	12.1	15.5	16.2	12.9	19.4	20.0	16.8	8.1
Agriculture	36	-	2.5	2.5	0.6	2.5	2.5	0.6	-
Open Water	137	1.2	0.7	0.7	0.7	1.3	1.3	1.3	0.6
Total	1,386	34.9	45.8	48.2	38.0	46.6	48.8	38.7	35.3

As can be observed from Table 4-9, Alternatives 1-2B and 2B impact the most vegetation/habitat acreage of any of the alternatives under consideration. Alternative 1-2B removes approximately 48.8 acres or 3.5 percent of the 1,386 acres of available habitat within the study area. Alternative 2B impacts 48.2 acres or 3.5 percent of the habitat. Alternatives 1 and 2-1 impact the least amount (2.5%) of habitat acreage, 34.9 acres and 35.3 acres respectively.

Of the 1,386 acres of available wildlife habitat, 1,014 acres (flooded trees and shrubs, emergents and successional field) are considered important habitats in terms of size, value and use. Alternatives 2B and 1-2B again have the greatest impacts as they occupy 40.9 acres and 40.5 acres respectively. Alternatives 1 (28.4 acres) and 2-1 (29.4 acres) impact the least amount of important wildlife habitats.

B-6 Fish and Wildlife

Fish and wildlife exist as a direct result of their habitat. Construction of any one of the eight alternative routes would directly and adversely affect fish and wildlife populations within the study area through loss of habitat and indirectly due to increase in road kills.

Fisheries - Primary or direct impacts on surface water/aquatic biota as a result of this project can be divided into two groups, short and long term. Short term impacts are predominantly construction

related, whereas long term impacts are a result of operation and existence of the project.

A temporary decrease in the water quality of the study area's streams during construction of any alternative is considered a short term impact of this project. Erodible earth material will be exposed by clearing, grubbing, excavation and filling activities resulting in a temporary increase in turbidity and sedimentation in the streams. This increase in suspended solids and sediment loads will cause short term adverse impacts to both water quality and aquatic biota. The effect of a temporary increase in turbidity will cause interference with the photosynthetic production of oxygen, elevation of water temperatures and the introduction of additional nutrients into the water. Eventually, the turbidity will decrease as the suspended materials settle to the bottom of the stream. This increased sediment load could clog the interstitial spaces in the stream's gravel substrate with silt, reducing habitat for aquatic macroinvertebrates and deteriorating desirable spawning grounds required by many fish species.

Certain circumstances such as a heavy rain storm during grading operations or before adequate vegetative cover can be reestablished could cause severe temporary erosion or sediment problems, amplifying the above noted impacts. However, preventive and mitigative measures will reduce or prevent the occurrence of impacts of this nature.

Long term impacts associated with the removal of the abandoned railroad bridges over Butternut and Limestone Creeks (all Build Alternatives) and the removal of existing Route 290 bridges over Limestone Creek and the Old Erie Canal (Alternatives 2A, B, C and 1-2A, B, C) involve the physical alteration of aquatic habitats resulting in the burial or grading away of existing substrata. Bottom dwelling invertebrates and aquatic vegetation are particularly subject to destruction by this aspect of construction. Fish also can be affected through loss of habitat and/or spawning sites. These impacts will be isolated to the immediate vicinity of the bridge removals. All major stream crossings utilize long span bridges which cross the water course and its regulated floodway, thus eliminating the need for instream construction activities at these locations. Additional long term water quality impacts associated with highway usage and maintenance will occur as runoff which contains hydrocarbon waste, lubricants, lead, pesticides and other chemicals associated with vehicle operation and highway maintenance enter study area streams.

Measures to minimize the effects of erosion and sedimentation generated from upland construction activities will follow guidelines established by Section 209 of the New York State Standard Specifications for Construction and Materials in addition to any conditions outlined in the required Army Corps of Engineers Section 404 permit. Examples of mitigation measures to reduce impacts caused by instream construction are outlined below:

- During construction, temporary stream crossing structures will be provided and no fording of streams by construction equipment will be permitted.

- Care shall be exercised during the temporary installation and removal of all construction stream crossings.

- All dredged spoil material shall be placed at a predetermined location above and beyond the 100 year floodplain elevation of all study area streams and outside of designated wetland areas.

- All dewatering operations shall be routed to sediment or filtering basins prior to its discharge back to streams. Velocity of the disturbed water shall be reduced to prevent further erosion or sedimentation.

- Care shall be exercised during placement of concrete to prevent its spillage into the stream.

- With the removal of the existing bridge structures (i.e. existing Route 290 and abandoned railroad bridges), movement of machinery in the stream channel and banks shall be kept to a minimum. Where required, netting shall be used to prevent debris associated with bridge dismantlement from entering the stream.

Wildlife - Impacts of the proposed project on wildlife were determined by analyzing the project's impact on wildlife habitats. The effect of the project on each habitat type was determined by evaluating the extent of each plant community disturbed or destroyed by construction.

As with fisheries, short and long term impacts on wildlife will occur with the build alternatives. Short term construction impacts such as decreased surface water quality, a reduction in vegetative cover and increased human activity and noise will temporarily disrupt existing wildlife habitats and patterns. These short term impacts will be greater for Alternatives 2B and 1-2B as they require the most habitat/vegetation acreage disturbance of any of the alternatives under consideration.

Long term impacts associated with the presence and operation of the new facility will vary for each alternative. Permanent loss of natural vegetation (i.e., fish and wildlife habitats) is the most negative impact in this regard and will be limited primarily to those areas directly subject to highway construction. Loss of natural habitat to highway construction will result in a disruption of nesting, breeding and/or feeding sites. As shown in Table 4-9, "Wildlife Habitats Impacted by Build Alternatives" (Section B-5, Vegetation), Alternatives 2B and 1-2B require the most natural vegetation/habitat (48.2 and 48.8 acres respectfully) while Alternatives 1 and 2-1 require the least (34.9 and 35.3 acres respectfully).

Wildlife forced to leave an area will migrate to adjacent habitats. If these habitats are at maximum carrying capacity, then redistribution of wildlife would be a short term phenomena followed by some degree of actual loss. However, in contrast, populations of non-game small birds and mammals could be enhanced by habitats created by right-of-way vegetation and the highway ecotone.

Mitigation in the form of plantings of preferred wildlife plant species on or adjacent to disturbed areas can help compensate for habitats lost (see Appendix B, "Terrestrial and Aquatic Ecology").

Operation of the proposed facility could result in possible increases in wildlife road kills. These increases would be dependent upon the location of the newly constructed facility. A roadway crossing natural vegetation areas which serve as travelways and feed areas for wildlife would result in more road kills than a roadway traversing residential or urban developed areas. Alternatives 2B and 1-2B traverse the greatest amount of wildlife habitat as evidenced by their requirement of 48.2 and 48.8 acres of natural vegetation/habitat. However, exceptions to this may be noted. Whitetail deer appear to cross smaller open areas more frequently (i.e., county and town roads) as opposed to wider open areas (i.e., expressway right-of-way) and therefore, deer may tend to avoid the proposed highway. Smaller mammals such as cottontails, woodchucks and raccoon would comprise most of the road kills along the proposed highway. However, the actual amount of wildlife killed will be controlled somewhat by right-of-way fencing and road kills should not significantly reduce wildlife populations.

Coordination with the U.S. Fish and Wildlife Service indicates that except for an occasional transient species, no federally listed or proposed endangered or threatened species are known to exist within the study area (see Appendix D, letter dated June 12, 1985). Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act is required with the Fish and Wildlife Service.

In order to minimize impacts to the natural environment (i.e., fish and wildlife), the Department of Transportation will continue coordination with the Department of Environmental Conservation, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service and the Environmental Protection Agency.

B-7 Agriculture

This project would involve the acquisition of lands with prime and statewide important agricultural soils. Table 4-10 provides a tabulation of farmland soils which would be located within the right-of-way of each design alternative.

TABLE 4-10

ACQUISITION OF FARMLAND SOILS BY BUILD ALTERNATIVES

Alternative	Acreage Required for ROW		
	Prime Soils	Statewide Important Soils	Total
1	32.8	4.8	37.6
2A	50.8	0.0	50.8
2B	49.4	0.0	49.4
2C	44.8	0.0	44.8
1-2A	49.4	4.1	53.5
1-2B	48.0	4.1	52.1
1-2C	43.4	4.1	47.5
2-1	42.7	0.0	42.7

Alternatives 2 and 1-2 under Options A and B would require the acquisition of 2.45 acres of active farmland in the vicinity of the proposed connector with existing Route 290 west of Limestone Creek. In the same vicinity, Alternatives 2C and 1-2C would acquire a minimum of 0.6 acres of active farmland along the east side of the proposed facility. Alternatives 1 and 2-1 would require the acquisition of approximately 1 acre of active farmland from cultivated land just east of Limestone Creek.

The acquisition of farmland as described above will not significantly affect the agricultural production potential of the study area since most of the farmland soils are not actively farmed and are not suitable for cultivation because of their location within designated wetlands and/or their exposure to prolonged or seasonal wetness and periodic flooding. Furthermore, according to the U.S. Department of Agriculture Cooperative Extension, there is no agricultural production of any significance within the study area (see Appendix D, letter dated June 18, 1985).

In accordance with procedures established under the Farmland Protection Act of 1984 (7 CFR 658), a Farmland Conversion Impact Rating Form (Form AD 1006) has been completed for this project (see Appendix E). The purpose of the form is to measure the relative value of farmland affected by the project and to make a determination regarding its suitability for protection based upon a set of specific assessment criteria. Based upon these procedures, it has been determined that this project will not have a significant effect upon farmland and no farmland protection measures will be required.

Therefore, due to the limited utility of agricultural soils and limited agricultural production within the study area, no significant agricultural impacts will occur as a result of this project.

B-8 Noise

The potential impacts of the proposed project on the noise environment within the study area were determined using the New York State Department of Transportation noise prediction program entitled "HUSH003" and the FHWA noise prediction/noise barrier cost reduction program entitled "STAMINA 2.0/OPTIMA".

Impacts occurring as a result of each of the build alternatives are shown below in Table 4-11 and are depicted in Figures 6 thru 9 in Appendix A "Noise Study Report".

TABLE 4-11

NOISE IMPACTS ASSOCIATED WITH BUILD ALTERNATIVES

Alternative	Number of Impacted Properties	Location
1	50 Residential(1)	Seg. 3 (Taylor Rd.) - 15 Res. Seg. 4 (Fremont Meadows Sub.) - 35 Res.
2A	27 Residential(2)	Seg. 3 (Wilson Dr.) - 11 Res. Seg. 3 (Kodiak Sub.) - 2 Res. Seg. 4 (Lee Terrace) - 14 Res.
2B	29 Residential(2)	Seg. 3 (Wilson Dr.) - 11 Res. Seg. 3 (Kodiak Sub.) - 2 Res. Seg. 4 (Lee Terrace) - 14 Res. Seg. 6 (N. Manlius Rd.) - 2 Res.
2C	27 Residential	Seg. 3 (Wilson Dr.) - 11 Res. Seg. 3 (Kodiak Sub.) - 2 Res. Seg. 4 (Lee Terrace) - 14 Res.
1-2A	27 Residential	Seg. 3 (Taylor Rd.) - 13 Res. Seg. 4 (Lee Terrace) - 14 Res.
1-2B	29 Residential	Seg. 3 (Taylor Rd.) - 13 Res. Seg. 4 (Lee Terrace) - 14 Res. Seg. 6 (N. Manlius Rd.) - 2 Res.
1-2C	27 Residential	Seg. 3 (Taylor Rd.) - 13 Res. Seg. 4 (Lee Terrace) - 14 Res.
2-1	47 Residential(1)	Seg. 3 (Taylor Rd.) - 12 Res. Seg. 4 (Fremont Meadows Sub.) - 35 Res.

*Note:

(1) 35 of these residential impacts occur at the proposed Fremont Meadows Subdivision.

(2) 2 of these residential impacts occur at the proposed Kodiak Subdivision.

All of the above impacts associated with the build alternatives are a result of predicted noise levels increasing six (6) to fourteen (14) dBA L_{10} above existing noise levels. In no instances do the build alternatives result in noise levels which exceed the federal noise abatement criteria level of 70 dBA L_{10} for residential properties.

Also, in no instances do noise impacts occur along the existing roadway network within the study area as a direct result of this project. Most residential properties along existing Route 290 are currently experiencing noise impacts and many will continue to experience noise impacts with or without this project. In addition, some properties along existing roadways within the study area will experience reduced noise levels (see Table 4 of Noise Study Report in Appendix A) with any of the build alternatives as traffic will be rerouted from existing roadways to the build alternative.

Alternative 1 passing just north of Clark Hill impacts fifteen (15) residential properties along Taylor Road. Due to traffic generated noise levels along Burdick Street, these impacts begin approximately 250 feet west of Burdick Street and extend west to Bowman Road occurring primarily along backyard property lines adjacent to the proposed facility. Alternative 1 then crosses Burdick Street and continues southeast through the proposed Fremont Meadows Subdivision where existing subdivision plans indicate up to thirty-five (35) residential properties could be impacted.

Alternative 2A, by following the abandoned railroad, impacts eleven (11) residential properties off Wilson Drive and two (2) proposed lots at the Kodiak Subdivision. Due to traffic generated noise levels along Burdick Street, these impacts begin 300 feet west of Burdick Street and extend westward approximately 1,400 feet. Alternative 2A then crosses Burdick Street and impacts fourteen (14) residential properties along Lee Terrace. Again, due to traffic noise along Burdick Street and the DOW Lumber Yard acting as a natural noise barrier, these impacts begin 400 feet east of Burdick Street and extend eastward to Manor Drive. All these impacts occur along the backyard property lines.

Alternative 2B impacts the same properties along Wilson Drive (11), the Kodiak Subdivision (2) and Lee Terrace (14). In addition, Alternative 2B also impacts two (2) residential properties along the west side of North Manlius Road immediately south of the alternative. These impacts also occur along backyard property lines.

Alternative 2C, following the same basic alignment as Alternatives 2A and 2B to a point 1,250 feet west of Limestone Creek, impacts the same properties as Alternative 2A.

Alternatives 1-2A, 1-2B and 1-2C are crossover alignments from Alternative 1 to Alternative 2. By doing so, they impact thirteen (13) residential properties off Taylor Road and have the same impacts east of Burdick Street that occur with Alternatives 2A, 2B and 2C (i.e., Lee Terrace, North Manlius Road). The impacts along Taylor Road begin 400 feet west of Burdick Street due to traffic generated noise along Burdick Street and a more northerly alignment of Alternatives 1-2A, B and C than Alternative 1.

Alternative 2-1 follows the same alignment as Alternative 2 to a point 500 feet east of Bowman Road and then crosses over and becomes identical with Alternative 1. This alignment results in the same impacts as identified with Alternative 1 with the exception of three (3) less residential impacts off Taylor Road near Bowman Road due to a more northerly alignment than Alternative 1.

Identified in Table 4-12 are typical noise levels which will occur at the identified impact areas.

TABLE 4-12

TYPICAL DESIGN YEAR (2011) NOISE LEVELS (L_{10}) AT IMPACTED AREAS*

Site	Existing Noise Level **	Noise Level with Project	Noise Level Increase	Number of Properties Impacted
Wilson Drive w/Alts. 2A, B, C	56	64	8	11
Kodiak Subdivision w/Alts. 2A, B, C	56	62	6	2
Taylor Road w/Alt. 1	51	62	11	15
Taylor Road w/Alts. 1-2A, B, C	51	60	9	13
Taylor Road w/Alt. 2-1	51	59	8	12
Lee Terrace w/Alts. 2A, B, C and 1-2A, B, C	55	63	8	14
Fremont Meadows Sub. w/Alts. 1, 2-1	50	64	14	35
N. Manlius Rd. w/Alts. 2B, 1-2B	59	68	9	2

*L_{10} noise levels computed by adding 3 dBA to L_{eq} levels.

**Existing noise levels are based upon noise monitoring data for sites with similar characteristics and background conditions.

Short term noise impacts are expected to occur at most residential locations adjacent to proposed construction activities. However, these impacts are temporary in nature and will cease once construction is completed. Control of noise at the source can be accomplished by the following actions:

- Use of less noisy equipment in good working order.
- Restrictions on the hours of operation, work locations and the number of simultaneous operations allowed within a specific area.
- Locating stationary equipment as far as possible from sensitive receptors.
- Routing off site hauling away from densely populated areas and other noise sensitive sites.
- Early construction of noise barriers in areas where they have been recommended to help negate construction noise.

Tolerance of noise at the receptor is possible through a public relations and community awareness program featuring the following elements:

- Scheduled news releases, paid ads and/or specific brochures to make the public aware of upcoming construction activities and the anticipated severity and duration of the attendant noise.
- Coordination of construction activities with local officials.

Various noise mitigation measures were investigated for each impacted property. Noise insulation of individual dwellings is not legally possible under current legislation. Traffic management strategies (i.e., lane restriction, truck control) were found not to be feasible. Speed control is not applicable to this project since the proposed facility is a controlled access facility with a 55 MPH speed limit and signalized intersections. Changes in alignment are severely restricted due to various physical, cultural and natural features within the study area. Therefore, the use of noise barriers is the only feasible noise abatement measure available for this project.

All impacts occurring as a result of this project were investigated in regards to possible mitigation with noise barriers.

The installation of barriers along Alternatives 2A, B or C as they parallel the proposed Kodiak Subdivision are possible but due to the preliminary nature of the design of both this project and the subdivision, their effectiveness in terms of mitigation are general estimates at this time. However, it can be assumed that installation of a noise barrier along Wilson Drive with either Alternatives 2A, B or C will provide some noise attenuation to the adjacent Kodiak Subdivision and the barrier could be extended westward to provide maximum attenuation at that subdivision.

The installation of a noise barrier along Alternatives 2B or 1-2B as it crosses North Manlius Road is not feasible due to its poor cost effectiveness (i.e., high barrier cost vs. two (2) residences protected).

Therefore, the only areas where barriers can be closely investigated are Wilson Drive (Monitored Site 4), Taylor Road (Monitored Site 3), Lee Terrace (Monitored Site 6) and the Fremont Meadows Subdivision (similar to Monitored Site 3).

Wilson Drive - This site consists of a grouping of 11 residential properties which will be impacted by Alternatives 2A, 2B or 2C. These impacts are a result of noise increases over existing levels of 5.5 to 8 dBA L_{10}. Preliminary calculations indicate that a 1,200 foot long 10 foot high barrier would result in noise reductions of approximately 2 to 6 dBA L_{10} at the eleven impacted residences. This 6 dBA noise reduction would equate to present day or existing background noise levels and thus would provide an accoustically effective barrier. This barrier is as effective as can be expected considering the influence of existing Route 290 and the local street system. Approximate cost would be $180,000 or $16,364 per residence. The barrier is presently designed on the abandoned railroad bed and could be shifted slightly (as can Alternatives 2A, 2B and 2C) to help reduce impacts and barrier costs (see Figure 4-9).

Taylor Road - This site consists of a grouping of 15 residential properties which would be impacted with Alternative 1. Of these 15, only 12 residences would be impacted by Alternative 2-1 and 13 residences with Alternative 1-2. These impacts are a result of noise increases over existing levels of 5.5 to 11 dBA L_{10}. With Alternative 1, preliminary calculations indicate that a 2,270 foot long 10 foot high barrier will provide noise reductions of only 0-3 dBA L_{10} resulting in an acoustically ineffective noise barrier. Approximate costs would be $340,500 or $22,700 per residence. Increasing the barrier height to 12 feet will only increase noise reductions by approximately 1 dBA L_{10} and increase costs by $68,100 or approximately $4,540 per residence. This barrier is acoustically ineffective and is not recommended.

With Alternative 2-1, preliminary calculations indicate that a 1,120 foot long by 10 foot high barrier will result in noise reductions of 0 to 3 dBA L_{10} at the twelve impacted residences resulting in a total cost of approximately $225,000 or $18,750 per residence. This barrier is also considered acoustically ineffective and is not recommended. Increasing the barrier height to 12 feet would increase noise reductions by only 1 dBA L_{10} and increase costs by $45,000 or $3,750 per residence.

With Alternative 1-2, preliminary calculations indicate that a 2,000 foot long by 10 foot high barrier will result in noise reductions of 0-3 dBA L_{10} at the thirteen impacted residences. Total costs would be $300,000 or $23,077/residence. Increasing the barrier height to 12 feet would increase noise reductions by only 1 dBA L_{10} and increase costs by $60,000 or $4,615/residence. This barrier is also considered acoustically ineffective and therefore is not recommended.

Lee Terrace - This site consists of a grouping of 14 residential properties which would experience impacts as a result of noise increases of 5.5 to 8 dBA/L_{10} over existing conditions. These impacts would occur with any of the following alternatives: 2A, 2B, 2C, 1-2A, 1-2B and 1-2C. Preliminary calculations indicate that a 1,700 foot long, 10 foot high barrier will result in noise reductions of approximately 0 to 3

dBA L_{10}. Approximate costs for this barrier would be $255,000 or $18,214 per residence. Increasing the barrier height to 12 feet will increase noise reductions by 1 dBA L_{10} and increase costs by $51,000 or $3,643 per residence. A noise barrier at this site would be acoustically ineffective as only a 3 dBA noise reduction would occur with a 10 foot high barrier and is not recommended.

Fremont Meadows - This is a 158 unit subdivision presently under construction. Up to 35 proposed units within Fremont Meadows could be impacted with either Alternatives 1 or 2-1. These impacts would be a result of noise levels increasing by up to 14 dBA L_{10} over existing present day levels. With either Alternatives 1 or 2-1, preliminary calculations indicate that a 2,100 foot long 14 foot high barrier on top of a 10 foot high earth berm would result in noise reductions of 5 to 11 dBA L_{10} at nineteen of the impacted proposed units (see Figure 4-9). The other sixteen units would receive noise reductions of 2-4 dBA L_{10}. Total cost of the barrier would be approximately $651,000 or $34,263 per residence (above 5 dBA noise reduction).

A noise barrier at this location appears to be both acoustically effective and cost effective. However, due to the fact that:

a. The subdivision is not yet fully developed and changes in engineering plans could affect the noise analysis/barrier design;

and

b. The proposed Route 290 Relocation project is a staged construction project which could affect the noise analysis/barrier design at this site;

it is recommended that additional analysis be performed at this site once the subdivision is fully developed and prior to the start of highway construction. This will help to realistically re-establish background noise levels and reaffirm the required noise analysis and barrier recommendations.

Shown below is a brief summary of the noise barrier investigations:

Possible Barrier Location	With Alternative	No. of Residences Affected	Barrier Cost Per Residence*	Maximum Attenuation
Wilson Drive	2A, 2B, 2C	11	$16,364	6 dBA
Lee Terrace	2A, 2B, 2C, 1-2A, 1-2B, 1-2C	14	$18,214	3 dBA
Taylor Road	1	15	$22,700	3 dBA
	2-1	12	$18,750	3 dBA
	1-2	13	$23,077	3 dBA
Fremont Meadows	1, 2-1	35	$34,263	11 dBA

*Barrier cost based on $15/sq.ft.

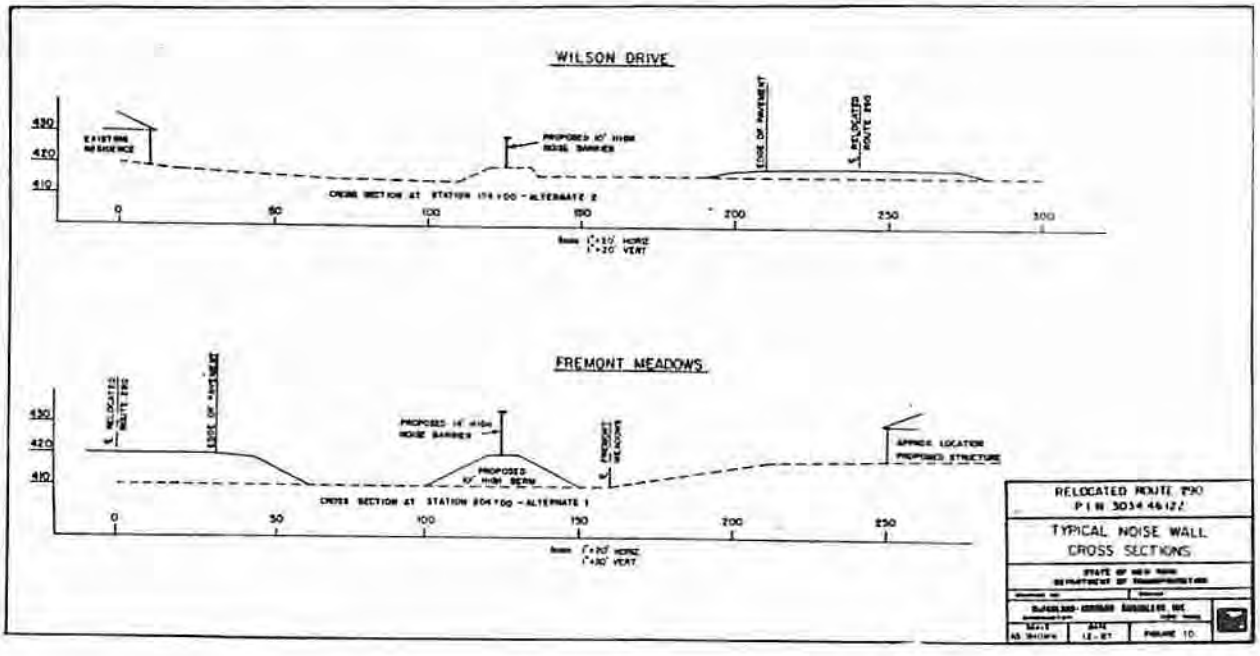


Figure 4-9

Preliminary investigations suggest that noise barriers along Taylor Road and Lee Terrace result in minor noise reductions, thus suggesting that noise barriers at these sites would be acoustically ineffective and not recommended. A noise barrier along Wilson Drive although not attaining the desired 10 dBA noise reduction per residence, does result in noise attentuation (i.e., 6 dBA) which compares to existing conditions. Also, a noise barrier at Fremont Meadows should be investigated further once the subdivision is completed or before highway construction begins.

The Department will continue to coordinate with local officials and the affected community regarding the desirability, effectiveness and need for appropriate noise mitigation through the final design stages of this project.

B-9 Air Quality

The air quality analysis for this project evaluates the impacts of each build alternative on existing air quality within the immediate project area (microscale analysis). In this analysis, screening procedures were used to assess the magnitude of the project's microscale impact.

Utilizing MOBILE 3 emission tables and appropriate traffic volumes, emission source strengths for the estimated time of completion (ETC), ETC+10 and the design year were calculated and the design year 2011 was identified as the critical analysis year. On the basis of traffic volumes and/or proximity of receptors, three sites were then selected for analysis. These sites include the project intersections with Fisher Road and Burdick Street and the free flow segment of Relocated Route 290 west of Fisher Road. The intersection sites were analyzed with the Hot Spot Verification Procedure and the free flow segment with the Caline 3 graphical procedure. Results are contained in the following table.

TABLE 4-13

AIR QUALITY ANALYSIS

Site	Procedure	Predicted 1-Hour CO Concentration	1-Hour Standard	8-Hour Cutoff	Further Analysis
Intersection of Relocated 290 and Burdick Street	Hot Spot	5.1 ppm	35 ppm	14 ppm	No
Intersection of Relocated 290 and Fisher Road	Hot Spot	10.2 ppm	35 ppm	14 ppm	No
Relocated 290 West of Fisher Road	Caline 3	5.7 ppm	35 ppm	9 ppm	No

One hour CO predictions at all 3 sites are less than the one hour standard of 35 ppm. In addition, all three one hour predictions are less than the 8 hour cutoff values requiring more detailed analysis.

Therefore, this project will not result in violations of the one or eight hour CO standards and no further analysis is required.

Methodology is not available to predict lead concentrations along highways with reasonable accuracy. Monitoring studies have shown that lead concentrations along high volume highways do not violate the NAAQS for lead for the year 1982. By 1990, there is predicted to be a further significant reduction (from 1982 levels) in lead emissions from motor vehicles. Based on these predictions, microscale lead analysis for highway projects is not needed or warranted.

This project is in an area where the State Implementation Plan does not contain any transportation control measures. Therefore, the conformity procedures of 23 CFR 770 do not apply to this project.

Temporary degradation of air quality will occur during construction, largely as a result of particulates generated during excavation and earth moving activities. These impacts can be mitigated by the use of water and/or other dust control measures and will be lessened with proper construction techniques as described in Sections 107 and 209 of the NYSDOT Standard Specifications.

B-10 Transportation and Energy Consumption

As discussed in Chapter III, Section B-3, all build alternatives would equally provide for a modern four lane arterial highway which would accomplish the following project objectives:

1. Provide a facility that will divert a significant amount of through traffic from existing Route 290 so that it will operate at an acceptable level of service throughout the design period.

2. Provide a facility that will reduce peak hour congestion and minimize traffic delays and travel times within and through the study area.

3. Support economic growth and development in accordance with established state, county and local planing policy while minimizing impacts and infringement on residential and environmentally sensitive areas.

4. Encourage the use of express bus service as a means of further reducing rush hour congestion along existing east-west arterials in the vicinity of the study area.

The design alternatives will not directly result in the increased use of express bus service. However, they will provide a modern highway facility which will support increased use of express bus service. Furthermore, the Department will consider the possibility of using excess real property adjacent to the new facility as possible sites for park and ride lots, if feasible.

Table 4-14 below compares design year traffic volumes on the north south crossroads within the study area for the build and no-build alternatives.

TABLE 4-14

DESIGN YEAR TRAFFIC VOLUMES ON NORTH-SOUTH CROSSROADS

Annual Average Daily Traffic (Vehicles/Day)

Roadway Segment	No-Build	Alt.1	Alts. 2A,1-2A	Alts. 2B,1-2B	Alts. 2C,1-2C
Bowman Road					
Route 290 to Alt.	3,450	5,400	5,400	5,400	5,400
Alt. to Burdick	3,450	3,350	3,350	3,350	3,350
Burdick Street					
Route 290 to Alt.	8,400	5,200	5,200	5,200	5,200
Alt. to Bowman	8,200	8,300	8,500	9,300	8,700
Bowman to Cedar Bay	7,400	7,500	7,700	8,500	7,900
Cedar Bay to Fayetteville Village Line	9,400	9,500	9,700	10,500	9,900
Cedar Bay Road					
Burdick-Lyndon Road	3,300	3,300	3,500	3,100	3,700
Fisher Road					
Route 290 to Alt.	3,150	7,150	7,150	7,150	7,150
Alt. to End	3,150	1,100	1,100	1,100	1,100
Route 257					
Alt. South to Study Area Boundary	6,600	9,300	7,800	6,200	7,500
Study Area Boundary to Fayetteville Village Line	9,000	10,700	9,900	9,100	9,600
Butternut Drive					
Route 290 to Cedar Bay	6,550	4,850	4,850	4,850	4,850

All build alternatives would result in increased design year traffic volumes on portions of Bowman Road, Fisher Road and Route 257 within the study area. These projected increases will be accommodated by the provision of additional turning lanes, traffic signals and profile adjustments as necessary in order to maintain an acceptable level of service. Based on traffic warrants, all intersections of the proposed facility with existing streets and roads will be controlled by traffic signals. In addition, left hand turn lanes will be provided at all crossroad intersections with the proposed facility. These improvements will assure that existing

north-south crossroads within the study area will have sufficient capacity to accommodate design year traffic volumes associated with the build alternative.

The energy analysis prepared for this project included a comparative analysis of the build and no-build alternatives with respect to: 1) the direct energy used by vehicles operating on the roadway network and 2) indirect energy used in construction and/or maintenance of the network. For the purposes of this analysis, the roadway network was defined as all public roads and highways located within the study area.

Direct energy consumed by vehicles operating on the roadway network is related to the total vehicles miles traveled on the network within a given period of time. Vehicle miles traveled is calculated by multiplying the total number of miles in the roadway network by its corresponding 2-way average annual daily traffic (AADT). The total vehicles miles traveled within the study area for the build and no-build alternatives is provided in the following table.

TABLE 4-15

VEHICLE MILES TRAVELED, YEAR 2011

Alternative	Vehicle Miles/Day
No-Build	103,200
1	98,700
2-1	98,700
2A, 1-2A	102,700
2B, 1-2B	101,200
2C, 1-2C	103,000

The results of the vehicle miles traveled analysis indicate that direct energy comsumption would be reduced with each of the build alternatives and no adverse energy impacts will result from the operation of the proposed facility.

Indirect energy requirements associated with the construction and maintenance of the proposed facility are dependent upon such factors as roadway length, pavement type, number of bridges and terrain. With the exception of roadway length, these factors are essentially the same for all build alternatives. Thus, for this project, the comparison of indirect energy requirements for the build alternatives can be based upon a consideration of their respective roadway lengths. Roadway lengths for each of the build alternatives are provided below.

TABLE 4-16

ROADWAY LENGTHS OF BUILD ALTERNATIVES

Alternative	Length in Miles
1	2.4
2A	2.7
2B	3.2
2C	2.8
1-2A	2.7
1-2B	3.2
1-2C	2.7
2-1	2.5

Based upon the above table, it can be concluded that the energy required for roadway construction and maintenance will be lowest for Alternative 1 and highest for Alternatives 2B and 1-2B. Neither of these is considered to represent a significant impact.

B-11 Land Use and Zoning

Various land uses will be subject to acquisition for this project as a result of their location within the proposed right-of-ways of the design alternatives. Table 4-17 provides a breakdown of land uses within the right-of-ways of the build alternatives.

TABLE 4-17

LAND USE WITHIN PROPOSED RIGHT OF WAY (ACRES)

	Alternatives							
Land Use	1	2A	2B	2C	1-2A	1-2B	1-2C	2-1
Residential	2.6	1.7	1.3	3.2	1.6	1.2	3.1	1.6
Commercial	0.1	0.6	0.6	0.6	0.3	0.3	0.3	0.1
Community Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parks/Recreation	0.3	0.3	0.4	0.6	0.3	0.4	0.6	0.3
Agriculture	1.0	2.5	2.5	0.6	2.5	2.5	0.6	1.0
Undeveloped/Vacant	57.4	67.5	70.7	60.4	66.1	69.3	59.0	60.2
TOTAL ROW ACRES	61.4	72.6	75.5	65.4	70.8	73.7	63.6	63.2

Existing regional, county and local land use plans do not contain any specific provisions or recommendations concerning this project. However, all design alternatives are consistent with general planning policy since they have been developed to accommodate existing, planned and projected development trends of the study area in a manner which minimizes

disturbance to existing residential and environmentally sensitive areas. All design alternatives avoid the residential areas of Erie Village, Fremont Hills and Fremont Heights. Depending upon the design alternative, residential displacements would range from one (1) unit with Alternatives 2A and 2B to a maximum of five (5) units with Alternative 1-2C (see Section B-13, Housing and Relocation Impacts).

Land use changes in the vicinity of project intersections with existing roads are a common result of most highway development projects. These changes occur as roadside and service related business attempt to locate on properties adjacent to these intersections in order to benefit from the increased traffic and accessibility. Except for the intersection of 2B and 1-2B with North Manlius Road, all design alterna-tives for this project intersect existing crossroads at locations within or adjacent to industrial or commercially zoned districts. Thus any project induced development at these locations would generally be consistent with existing zoning. Alternatives 2B and 1-2B intersect North Manlius Road in an area zoned Restricted Agricultural. Enforcement of the Town's zoning ordinances will insure a compatible relationship between existing and project induced development.

As suggested above, commercially and industrially zoned districts on crossroads to the project are areas which are most likely to experience project induced development. As shown on Figure 4-7, Land Use and Zoning, there are two such districts adjacent to project crossroads which would be traversed by the various alternatives.

In the Town of DeWitt, the design alternatives cross Fisher Road within an industrially zoned district. In the Town of Manlius, all design alternatives cross Bowman Road and Burdick Street within or adjacent to a commercially zoned district. However, the potential for development adjacent to these intersections is significantly reduced due to the presence of designated wetlands at these locations (see Figure 4-2, Streams and Wetlands).

As evidenced by the current construction of the Erie Village Subdivision, the study area is an attractive area for residential development. Proximity to major transportation corridors and interchange facilities which provide good access to the region's employment, shopping, cultural and educational facilities in conjunction with the availability of public water and sewer facilities is an important factor responsible for the residential desirability of the area. As such, this project will be designed to accommodate, under an acceptable level of service, the additional traffic volumes resulting from the continued residential growth of the area, and will provide improved accessibility to existing and future residential areas within the study area. However, because of the area's inherent attractiveness, the incremental accessibility resulting from this project is not considered to be of sufficient magnitude to significantly affect future trends in residential development.

B-12 Population

Population impacts will be limited primarily to a few residential relocations in the vicinity of Manlius Center (see Section B-13,

Housing and Relocation Impacts). No new areas will be "opened-up" to residential development under any of the design alternatives and it is unlikely that any project induced development would significantly affect existing population char-acteristics and trends.

All build alternatives avoid existing residential areas to the extent possible and no significant impacts upon population concentrations or distributions within the study area are anticipated as a direct result of this project.

As discussed in Section B-11, Land Use and Zoning, a limited amount of project induced development may occur in the vicinity of project intersections. This induced development will most likely take the form of roadside related businesses and services such as gas stations, fast food restaurants, convenience stores, etc. which attract patronage from the traveling public and nearby neighborhoods. This type of development will have a negligible impact upon the area's population characteristics.

B-13 Housing and Relocation Impacts

A detailed field inspection was performed to determine the number of displacements that will result from each of the build alternatives. Below is a discussion of the housing and relocation requirements for the various build alternatives.

Alternative 1 will require the acquisition of one single family residence on Bowman Road and two single family residences located on Route 257 at the eastern terminus of the proposed facility.

Alternative 2A will require the acquisition of one single family residence in the vicinity of its intersection with Route 257.

Alternative 2B will require the acquisition of one single family residence on North Manlius Road.

Alternative 1-2A will displace one single family residence on Bowman Road and one single family residence on Route 257.

Alternative 1-2B will acquire one single family residence on Bowman Road and one single family residence on North Manlius Road.

Alternative 2-1 will displace two single family residences on Route 257.

Alternative 2C will require the acquisition of one single family residence and one three family residence in the vicinity of its eastern terminus in Manlius Center.

Alternatives 1-2C will also require the acquisition of the same residences in Manlius Center as Alternative 2C as well as one residence on Bowman Road.

The Department of Transportation provides advance notification of impending right-of-way acquisition and all properties are appraised

on the basis of comparable sales and land values in the area. Owners of property to be acquired will be offered and paid fair market value for their property.

As part of the Department of Transportation's Conceptual Relocation Plan (ref. Appendix F), the availability of replacement properties in the project's general vicinity was reviewed and it was established that there are an adequate number of units available to replace those that would be required by this project. As a result of the Conceptual Relocation Plan, it has been determined that all residential displacees can be successfully relocated.

B-14 Economic Setting

Industrial and commercial zoned property along Fisher Road, Bowman Road and Burdick Street in the vicinity of their intersections with the proposed facility as well as property adjacent to relocated Butternut Drive would be subject to project induced development. This development would most likely include a variety of roadside and service related businesses (gas stations, convenience stores, fast food restaurants, etc.). This is considered a beneficial economic impact which will further strengthen and diversify the local tax base and result in a minor increase in employment opportunities within the study area. The potential for and magnitude of project induced development would be similar for all build alternatives.

The improved accessibility within and through eastern Onondaga County which is provided by this project may lead to a variety of secondary regional economic benefits. These benefits include reduced travel times and traffic delays which translate into a reduction in energy consumption, reduced travel and transportation costs, and increased market areas for local business and industry.

Another economic benefit common to all build alternatives will be a short term increase in employment associated with project construction. This benefit will extend over two or more construction seasons and will have a secondary effect of stimulating service related businesses such as gas stations, restaurants and small grocery stores in the vicinity of the project.

Acquisition of property for right-of-way will result in a minor decrease in property tax revenues. Table 4-18 compares the effect of right-of-way acquisition upon property tax revenues for each of the build alternatives.

TABLE 4-18

PROPERTY TAX REVENUES LOST AS A RESULT
OF RIGHT-OF-WAY ACQUISITION

Alternative	Right of Way (Acres)	Occupied Structures Removed	Total Revenues Lost*
1	61.4	3	$3,500.00
2A	72.6	1	7,800.00
2B	75.5	1	8,700.00
2C	65.4	2	5,600.00
1-2A	70.8	2	5,300.00
1-2B	73.7	2	6,200.00
1-2C	63.6	3	3,200.00
2-1	63.2	2	4,600.00

*Rounded to nearest $100.00

B-15 Public Services, Community and Recreational Facilities

No public service or community facilities such as schools, churches, hospitals and fire and police stations will be affected by any of the design alternatives. The Build Alternatives will not adversely affect the accessibility of any public and community services or facilities. During construction of the proposed facility, no major detours will be required and all developed areas will remain readily accessible to emergency fire, police and ambulance services. Primary access to the commercial areas along Butternut Drive, north of the proposed facility, would continue to be provided by way of existing Route 290.

A NYSDOT Region 3 highway maintenance facility is located within the project work limits east of Butternut Drive and will be relocated as necessary at the Department's expense.

All build alternatives will provide for a modern at grade arterial highway which will reduce rush hour traffic congestion on existing Route 290 and reduce travel times throughout the study area. As a result, this project will aid in the protection of the general health and welfare of the people in the project vicinity by reducing response time for emergency fire and police services, safety equipment, safety personnel and ambulance service as well as reducing travel times to medical facilities in the City of Syracuse by providing greater access to the I-481/690 Interchange.

B-16 Community Identity

The character, stability and composition of Fremont Heights, Fremont Hills, Erie Village and Manlius Center will not be adversely affected as a result of this project. All eight build alternatives avoid concentrated residential developments and no existing communities will be severed, separated or isolated as a result of this project.

However, the proximity of the build alternatives to residential areas may be viewed by local residents as an undesirable intrusion because of perceived impacts upon noise, air and visual quality (see Sections B-8, B-9 and B-18). These perceptions will be most prevalent in the vicinities of Fremont Hills and Fremont Heights where the proposed facility will pass within several hundred feet of residential backyard areas. Table 4-19 compares each of the build alternatives with respect to their distance from these residential areas.

TABLE 4-19

AVERAGE DISTANCE BETWEEN PROJECT AND RESIDENCES IN FREMONT HILLS AND FREMONT HEIGHTS

Alternative	Distance in Feet from Project Centerline*	
	Fremont Heights	Fremont Hills
1	480	445
2	310	705
1-2	390	525
2-1	645	545

*Average distance based on all residential properties in Fremont Heights and Fremont Hills which would front on Relocated Route 290.

The above table shows that Alternative 2 which is located closest to Fremont Heights is the least balanced of the alternatives with respect to its proximity to the two communities. Alternative 1 follows an intermediate position and would therefore tend to balance any perceived impacts between the two communities.

Some project induced development in the form of roadside and service related businesses (fast food restaurants, gas stations, convenience stores, etc.) can be expected to occur in the vicinity of project intersections with existing north-south crossroads. These locations are presently zoned for commercial or industrial development. Enforcement of the Town's zoning ordinances will insure that any project induced development in these areas will be consistent with local planning policy and compatible with nearby residential communities.

Presently, the intersection of existing Route 290 and Burdick Street which is located within the Fremont Heights residential area is operating under Level of Service C. However, by the year 2005, under No-Build conditions, traffic volumes are expected to exceed the capacity of this intersection. As a result, traffic congestion will occur at this intersection during rush hour periods causing increased levels of annoyance for nearby residents.

With each of the build alternatives, a significant amount of the east-west through traffic would be diverted to the new facility, thus enabling the intersections along existing Route 290 to operate at an acceptable level of service. This is considered a beneficial impact which will serve to maintain community character and stability by reducing the

potential for traffic congestion and related community annoyance within established residential neighborhoods.

B-17 Cultural Resources

No prehistoric materials were discovered during the Cultural Resources Survey for this project and there were no previously known prehistoric sites in the study area. Therefore, none of the build alternatives will have an impact on prehistoric cultural resources.

Historic artifacts were recovered from two locations associated with structures visible on historic maps depicting the project area. These are School House No. 19 (dating at least to 1854) and a structure identified as the "WSRR" Company which was erected between 1874 and 1889. Both are located on the present Route 290, and neither structure is presently standing. The School House No. 19 deposits are located in the area to be impacted by Alternative 2, Option C and the "WSRR" Co. deposits are located in a corn field intersected by the proposed route of a connector between existing Route 290 and Alternatives 2 and 1-2 Options A, B and C. The State Historic Preservation Officer's opinion is that the project will have no effect on archaeological resources eligible for or included in the National Register of Historic Places.

All build alternatives at the eastern project terminus must, by necessity, cross over the Old Erie Canal. The State Historic Preservation Officer (SHPO) has reviewed this project and found the Erie Canal in the vicinity of the proposed alternatives to be eligible for the National Register of Historic Places. The Erie Canal is significant for its varied role in the making of New York history in the categories of engineering, transportation, local/regional development and economic growth. The contributing elements of the canal include all built engineering features such as the canal and retaining walls, towpaths, berm banks, bridges, locks, aqueducts, turning basins, culverts, waste weirs, feeders and dams. There are no locks, aqueducts, turning basins, culverts, waste weirs, feeders or dams in the vicinity of any proposed alternative. The bridge in Manlius Center which carries existing Route 290 over the canal was constructed in 1927 and is not a significant contributing element. Thus, only the canal, retaining walls, towpaths and berm banks require analysis of effect. In general, the placement of bridge abutments or support piers would constitute the primary effect of any of the proposed canal crossings.

Alternative 1 and Alternative 2-Option A provide new bridges which clear span the canal and towpath with no intermediate support piers, only minor embankment construction and with abutments placed away from the contributing elements of the canal. Alternative 2-Option B also provides for a new bridge which would clear span the towpath. However, the length of the structure under this alternative is such that either an intermediate support pier must be placed in the waterway or an unusually deep girder be constructed. The physical construction of a pier in the waterway or the visual intrusion of a deep girder structure would have an effect on the setting of this Register eligible resource. Alternative 2-Option C provides for a crossing of the canal at approximately the same grade as existing and slightly to the west of the present roadway. No intermediate support piers are required and abutments can be placed away from the

towpath and berm areas. The present recreation trail will be routed off the towpath to improve pedestrian safety at this crossing. Minor filling along the towpath will be necessary to provide a smooth transition to the relocated roadway and recreation trail. Details of any such fill will be coordinated with SHPO to insure that any concern they might have is adequately addressed.

For all alternatives, the placement of support piers and abutments within the limits of the towpath and canal berm is a concern of SHPO. The SHPO recommends the placement of abutments as far away from canal features as possible. SHPO has specifically advised that the placement of an abutment on the canal berm or placement of a support pier within the canal waterway would constitute an adverse effect. SHPO requires specific details of pier and abutment construction so as to be able to formally comment on effect. These details will be provided at a later stage of project design and prior to selection of a preferred alternative.

Based on preliminary coordination with the SHPO and the plans and profiles for the design alternatives the Department and FHWA anticipate that Alternative 1 would have no effect on the Register eligible resource; Alternative 2-Option A would have no adverse effect; Alternative 2-Option B would have an adverse effect; and Alternative 2-Option C would have no adverse effect. The Department will continue to coordinate with SHPO to obtain formal opinions of effect for all alternatives. Actions which result in an official finding of adverse effect require consultation and agreement on mitigation measures with SHPO and the National Advisory Council on Historic Preservation.

A more detailed assessment of project invovlvement with The Old Erie Canal State Park is contained in Chapter V, Draft 4(f) Evaluation.

B-18 Visual Quality

The visual resource analysis for this project evaluated the visual impacts of the design alternatives on the existing visual resources. Both views 'from' and 'of' the proposed alternatives were considered.

The four design alternatives are set primarily within the flat wetlands between the Route 481/Butternut Interchange and the small village of Manlius Center. The project viewshed is divided into one major landscape visual unit and three micro or subunits for analysis. There are three general viewer groups identified: commuters (drivers/riders), residents and recreation users. About one third of the project falls within the residential section of the corridor known as Fremont where a number of key views are concentrated. Because of structures, vegetation and rolling topography, there is only one superior viewer position within this viewshed. The remainder of the project setting is along undeveloped vegetated wetlands with potential connections to existing roadways at Manlius Center, the Old Erie Canal and the Butternut Interchange.

Because of the topography and undeveloped vegetated slopes and wetlands within the viewshed, most viewpoints are limited to normal foreground and midground views in all three micro-analysis landscape units. The exception being two superior viewpoints in the Fremont Visual Unit. The

Onondaga Escarpment Unit is readily identified by local people as a visual resource in and of itself. As a unique physiographic region, this resource is identified by its numerous drumlins, wetlands and small lakes.

Adverse visual impacts are anticipated in all four alternatives for the views 'of' the road. Conversely, in the views 'from' the road, some viewpoints will offer characteristic views of the natural wetlands and surrounding hills providing orientation and scenic experiences for the highway user. It is possible that commercial development will occur at intersections, potentially increasing adverse visual impacts 'from' and 'of' the road. In addition, there is public awareness of the potential for leaving an earth moving scar because of the image of adjacent open mining and landfill operations and current subdivision construction throughout the area.

Alternative 1 will have a more significant impact severity than Alternative 2 in the Bowman Road area as a result of greater exposure to viewers in the Clark Hill area and the removal of existing structures, although its construction limits are slightly less. The introduction of a permanent noise barrier to mitigate noise impacts of Alternative 1 will not adversely impact visual resources due to existing vegetation and distance from Fremont Heights residents. Additionally, Alternative 2 follows the corridor created by the abandoned railroad and existing utility lines. In the Fremont visual unit, Alternative 2 is predicted to have a greater adverse impact than 1 as a result of increased exposure to additional residential viewers of high sensitivity. The scale of this impact could be substantially reduced or mitigated with the implementation of proposed noise barriers along the abandoned railroad. Alternative 1, east of the Burdick Street intersection, will have a more significant impact severity because of its potential increase in exposure to future Erie Village and Fremont Meadows residents. This alternative visually cuts across the grain of the existing landscape whereas Alternative 2 follows the lines of the abandoned railroad already present. Additionally, the increased scale and dominance of the bridge and retaining wall structures at the canal add to the overall impact at Alternative 1. Likewise, Alternative 2-1 will have a slightly greater impact severity than 1-2. Although, Alternative 1-2 impacts Fremont Heights residents as noted earlier, its potential impact may be mitigated through careful plantings and limited right of way clearing.

Where Alternative 2 splits into three options north of Manlius Center, Option B will have the least impact due to its minimal disruption of the existing visual resources. The visual effects of Options A and C will adversely impact the existing visual resource as a result of greater physical change and exposure. Relocated Butternut Drive, will have a negligible impact since it has the least amount of physical change and a limited exposure to viewers of low sensitivity and view duration. Although views 'from' the road are not the primary issue in this particular action, there will be sequential views and orientational features provided for the highway users primarily at the intersections on the east and west extremes of the project. Alternative 2, Option B provides the best views from the road due to its orientation and elevated bridge crossing.

C. Consequence of Impacts

This section will discuss the environmental consequences of the impacts identified in Section B in light of the mitigation measures which are under consideration. This discussion will focus only on those areas where impacts are anticipated and will concentrate on those environmental consequences which result from project implementation and impact mitigation.

C-1 Water Resources

Impacts to water resources associated with this project include a temporary increase in turbidity and sedimentation during construction (which will be mitigated by erosion control provisions) and a negligible decrease in water quality associated with highway runoff and deicing compounds. No public supplies or actively used residential wells will be affected (other than those acquired). The quality and quantity of existing surface and groundwater will not be affected by this project. Therefore, no significant long term consequences should result from this project.

C-2 Wetlands

Disruption of wetlands due to highway construction will result in a net reduction in wetland acreage and an associated decrease in the wetland benefits/functions within the study area. Those benefits primarily affected would be water retention, pollution/soil filtration and flood control and wildlife habitat.

Indirect impacts on wetlands include redistribution and avoidance of wetlands by wildlife due to increased human activity and effects of trace amounts of hydrocarbons, lead and/or deicing salts on wetland species.

The removal of up to 28.5 acres (3.7%) of the total NYSDEC designated wetland acreage will occur within the study area. With implementation of mitigation measures and staged construction, the consequences of wetland reductions within the study area can be reduced.

C-3 Vegetation

The removal of approximately 3 percent of the natural vegetation within the study area will result in a minor reduction of natural habitat within the study area. Mitigation in the form of revegetation of disturbed areas can reduce the environmental consequence of this impact. No threatened or endangered plant species or critical habitat areas are encountered.

C-4 Fish and Wildlife

The project will affect some fish and wildlife populations within the study area by disrupting habitat areas during construction, eliminating habitat by permanent right-of-way requirements and increasing road kills. However, no known threatened or endangered fish and wildlife

species will be affected. The consequence of this impact can be reduced by mitigation measures such as preferred wildlife plantings.

The permanent loss of natural vegetation as a result of right-of-way requirements will reduce the overall natural habitat of the area. Fish and wildlife within the disturbed areas will be forced to migrate to adjacent areas which could lead to overcrowding, strife and increased death rates. As a result, any reduction in natural habitat acreage could result in environmental consequences in the form of a decrease in indigenous fish and wildlife populations if adjacent areas are not capable of supporting increased population densities.

The incidence of road kills resulting from this project should have an insignificant effect upon indigenous wildlife populations within the study area. The installation of right-of-way fencing along the expressway can help reduce the significance of this impact.

C-5 Noise

Temporary (construction related) and long term (traffic related) increases in noise levels are unavoidable impacts of this project.

Increased traffic noise levels of more than 5 dBA could impact up to 50 properties. In no instances do the build alternatives result in noise levels which exceed the federal noise abatement criteria levels. The increased traffic noise levels associated with this project may result in an annoyance to the affected residences, particularly in areas where the existing noise levels are relatively low. Noise barriers were investigated for these areas (Wilson Drive, Lee Terrace, Taylor Road, Fremont Meadows Subdivision) and are recommended at Wilson Drive with Alternatives 2A, B or C and at Fremont Meadows with Alternatives 1 and 2-1.

All of the build alternatives would result in significant short term construction noise impacts. However, the effects of these impacts can be minimized by various mitigation measures such as control of noise at the source and tolerance of noise at the receptors through a public relations and community awareness program. No long term consequences will result from construction noise associated with this project.

C-6 Transportation

This project will provide a new four lane limited access arterial highway which will divert a significant amount of east-west through traffic from existing Route 290 within the study area. As such, this project will allow the existing highway network within the study area to operate at an improved level of service throughout the design period. This will reduce peak hour congestion, traffic delays and travel times within and through the study area. These improvements would also have a secondary benefit of slightly reducing the associated energy consumption requirements for operation and maintenance of the highway network.

C-7 Land Use and Zoning

Increased accessibility provided by this project may result in induced development in the vicinity of crossroad intersections. Each of the build alternatives would have similar effects upon the development potential of these areas. Project induced development would generally consist of roadside and service related businesses. This type of development is consistent with existing zoning since the project intersections with existing crossroads are located in or adjacent to commercial and/or industrial zoned districts. No adverse consequences upon land use or zoning are anticipated as a result of this project.

C-8 Housing

This project will result in the relocation of up to five residential units. Replacement housing relocation services provided by the Department of Transportation will insure that housing resources and relocation assistance are available to all relocatees without discrimination.

C-9 Economic Setting

Right of way requirements for this project will result in a negligible reduction to the total assessed valuation for the Towns of DeWitt and Manlius. This reduction should be offset by increased property values within residentially, commercially and industrially zoned districts along crossroads as a result of improved accessibility. Project induced development in these areas could result in a long term increase in employment and commercial and industrial activity which could further strengthen the area's economic base. In addition, construction of this project will result in a short term increase in employment (construction work force) which could stimulate local service related business operations such as gas stations, restaurants and convenience stores in the vicinity of the project. For the above stated reasons, these consequences are not considered significant.

C-10 Cultural Resources

Historic artifacts at two locations associated with former structures and railroad trestle abutments at Limestone Creek could be impacted by this project, depending on the alternative selected. These features are not considered eligible for the National Register of Historic Places.

The "setting" of the Old Erie Canal State Park could be adversely affected by bridge construction under Alternative 2, Option B. The length of this structure requires either a very deep beam with adverse visual impacts or an intermediate pier in the waterway with a potential adverse historic resource impact. Should this be considered for selection as the preferred alternative, additional coordination with the State Historic Preservation Officer will be necessary.

D. Comparison of Alternatives

This section serves as a comparison between the design alternatives including the No-Build Alternative. It is based upon a comparison of those issues which have been identified as being significant in Sections B and C.

Although all the design build alternatives satisfy the project objectives, differences exist between the alternatives regarding their respective social, economic and environmental consequences. These differences are summarized in Table 4-20.

TABLE 4-20

COMPARISON OF ALTERNATIVES

CATEGORY	NO BLD.	ALT.1	ALT.2A	ALT.2B	ALT.2C	ALT.1-2A	ALT.1-2B	ALT.1-2C	ALT.2-1
SATISFY PROJECT OBJECTIVES									
1. Divert Ex. Rte. 290 Traffic to Increase Level of Service	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Reduce Peak Hour Congestion on Rte. 290 and Minimize Traffic Delays	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3. Promote Economic Growth	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4. Inc. Bus Service & Reduce Rush Hour Traffic on E/W Arterials	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
COST TO COMPLETE (MILLIONS OF DOLLARS - 1987)									
1) Construction	NA	18.0	21.5	23.5	19.0	21.5	23.0	19.0	18.0
2) Right-of-Way	NA	1.5	1.0	1.1	1.5	1.2	1.3	1.6	1.3
Total		19.5	22.5	24.6	20.5	22.7	24.3	20.6	19.3
RIGHT OF WAY ACRES REQUIRED*									
Total	NA	34.0	47.6	50.5	40.5	43.8	46.7	36.7	36.6
Farmland Soils (Prime and Statevide Impt.)	NA	37.6	50.8	49.4	44.8	53.5	52.1	47.5	42.7
Active Farmland	NA	1.0	2.45	2.45	0.6	2.45	2.45	0.6	1.0
Old Erie Canal Parkland	NA	0.64	0.37	0.99	0.40	0.37	0.99	0.40	0.64
DISPLACEMENTS									
1) Residences (Structures)	NA	3	1	1	2	2	2	3	2
2) Residences (Units)	NA	3	1	1	4	2	2	5	2
3) Commercial (Structures)	NA	0	0	0	0	0	0	0	0
ACRES OF NYSDEC WETLANDS REMOVED	NA	21.1	24.1	28.5	23.8	21.0	25.4	20.7	25.5
VEGETATION/WILDLIFE HABITAT REMOVED	NA	34.9	45.8	48.2	38.0	46.6	48.8	38.7	35.3
NOISE IMPACTS (NUMBER OF PROPERTIES)	NA	50	27	29	27	27	29	27	47
MITIGATION COSTS (THOUSANDS OF DOLLARS - 1987)									
1) Wetlands	NA	450	537.5	587.5	475	537.5	575	475	450
2) Noise	NA	651	180	180	180	0	0	0	651

*Does not include land already owned by NYSDOT

V - DRAFT 4(F) EVALUATION

There are two State Parks located near or adjacent to the study area: the Old Erie Canal State Park and Green Lakes State Park. The Old Erie Canal State Park is a linear park which encompasses the Old Erie Canal and its associated towpath. In its entirety, the park stretches from DeWitt to near Rome, New York (approximately 35 miles). The Old Erie Canal State Park forms the southern and eastern boundaries of this project study area. All of the alternatives, including the No Build Alternative for this project, would have some involvement with this 4(f) property since a crossing over the canal is necessary.

Green Lakes State Park is an 1,100 acre facility owned and operated by the New York State Department of Parks and Recreation located just east of the study area. The access road to Green Lakes intersects with existing Route 290 approximately two (2) miles east of Manlius Center. There will be no direct or indirect negative impacts on Green Lakes State Park as a result of this project.

There are no other Section 4(f) properties within or adjacent to the study area.

Description of Facilities

The length of the Old Erie Canal State Park within the study area is approximately 3.7 miles. The park is a narrow, linear park that essentially consists of the Canal itself and its associated towpath. Throughout the study area the park property ranges from 150 to 600 feet in width.

The park is both historic and recreational in nature. The early growth and development of the City of Syracuse was tied in large part to the construction of the canal in the early 1800's. That portion of the Erie Canal in the project area was abandoned in the early 1900's when its successor, the Barge Canal, was built.

The principal recreational uses of the park are for walking, biking and cross-country skiing along the towpath. A stone dust pavement has been placed on the towpath which is approximately 10 feet wide. Wildlife habitat primarily outside of but immediately adjacent to the park includes emergent wetlands, flooded timber and shrubland which offer opportunities for nature observation. The water quality classification of the Canal itself is C which is defined as suitable for fishing and all other uses except as a source of water supply for drinking, culinary or food processing purposes and primary contact recreation. A warm water fishery (bass, pike, bullheads) is present in the Canal.

Existing facilities in the Park are shown on Figure 5-1. Two foot bridges and Stearns Bridge allow passage across the Canal within the study area.

According to information provided by the New York State Office of Parks, Recreation and Historic Preservation, access to the park in the form of parking areas is provided at 3 locations within the study area: 1) at

Butternut Drive (35 spaces), 2) at the Cedar Bay Picnic Area near the DeWitt-Manlius town border (100 spaces) and 3) at Burdick Street (20 spaces). No parking is provided in any of the areas where the four alternatives cross the Canal. Park users often park and enter in Manlius Center at an abandoned structure located adjacent to the existing Route 290 bridge crossing. However, that parcel remains private property and it is not a designated parking area.

Much of the park use is from local residents. Attendance figures for 1982 and 1983 are 237,000 and 261,000 respectively. Use of the park has been increasing each year and the section from DeWitt to Green Lakes State Park (where another foot bridge allows passage over the Canal) is the most heavily used section of the entire trail. This trend can be expected to continue as a result of the subdivision activity (e.g., Erie Village, Fremont Meadows, etc.) in the study area. At its intersection with Burdick Street, the park receives approximately 132,000 visitors per year.

The Erie Canal State Park is identified by the U.S. Department of Interior National Park Service as a National Recreation Trail.

Ownership - The Old Erie Canal State Park is owned and operated by the New York State Office of Parks, Recreation and Historic Preservation. The New York State Department of Transportation retains flowage rights to the Canal (e.g., water flow within the Canal cannot be impeded) as it remains a feeder of the Barge Canal system.

Federal Land and Water Conservation Act funds were used in the development of the Old Erie Canal State Park facilities. According to Section 6(f) of the Land and Water Conservation Fund Act of 1965, property acquired or developed with those funds cannot be converted to non-recreational uses without the substitution of other recreational properties of at least equal fair market value and of reasonable usefulness and location.

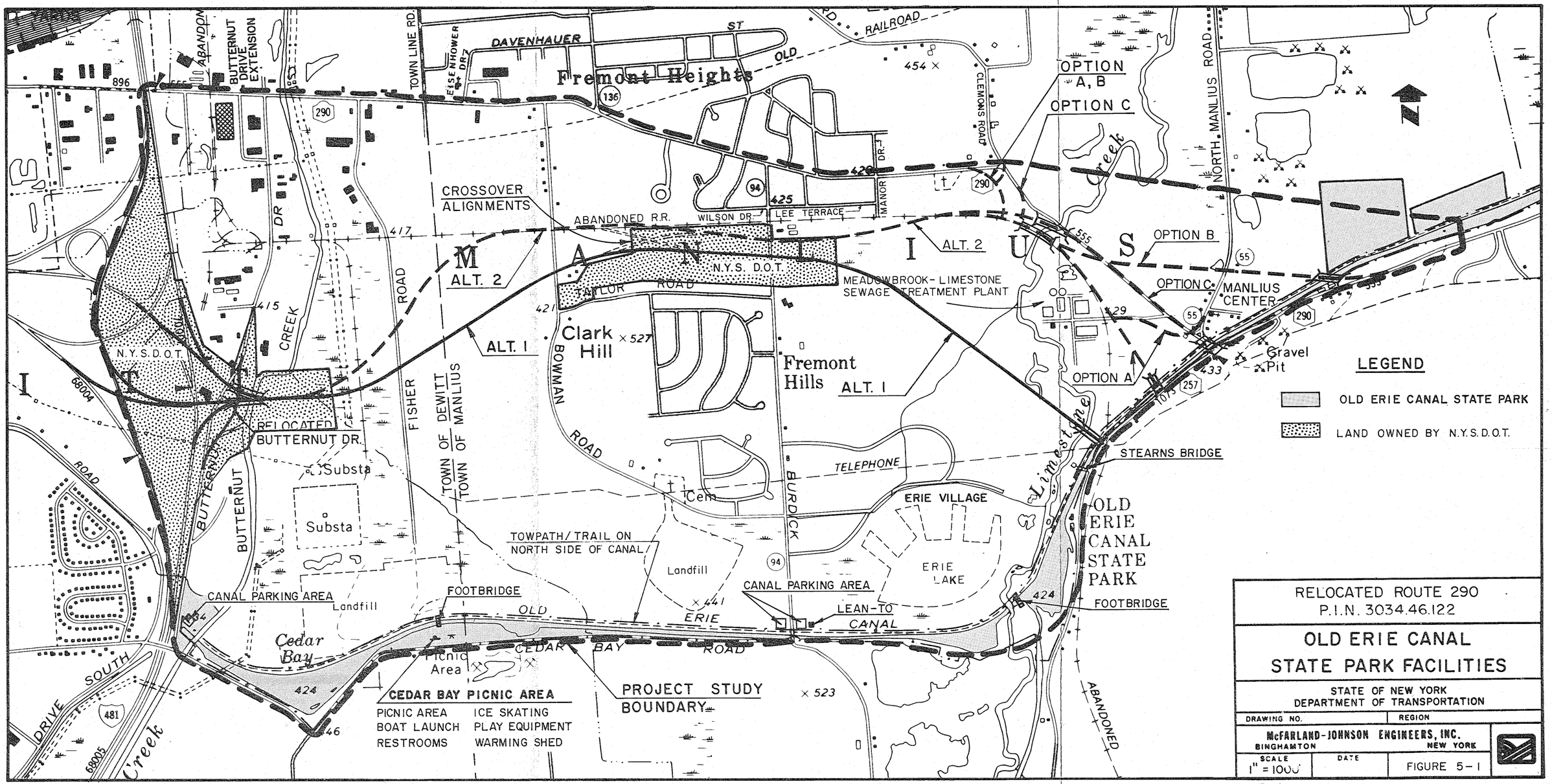
The New York State Office of Parks, Recreation and Historic Preservation has indicated their concerns regarding construction details, pedestrian/vehicular conflicts, park access and the mitigation measures which could be used to reduce or compensate for the project's involvement within the park (see Appendix D). The remainder of this report describes each alternative's impact upon the park and identifies the various mitigation measures which are available.

Project Impacts

There are four alternatives at the eastern project terminus: Alternative 1 and the Options A, B and C under Alternatives 2 and 1-2 (see Figures 5-2 thru 5-5). Since the Canal forms the southern and eastern project boundaries and existing Routes 290 and 257 are on the east side of the canal at the eastern project terminus, a bridge crossing, and therefore some involvement with the park, is necessary. Option C consists of replacement of the existing Route 290 bridge over the Erie Canal. Alternative 1 and Options 2A and 2B all involve new bridge structures on new alignments. The profiles of the four bridge crossing alternatives are shown on Figures 5-6 and 5-7. All bridge crossings will be designed to

provide a minimum of 10 feet of vertical clearance over the canal's towpath.

Although Alternative 1, Option 2A and Option 2B would all involve acquisition of right-of-way through Park property, actual impacts to the Park at each location would be minimal. All three of these new bridge structures would span the canal and towpath. With Option 2B, the new structure would either be quite deep (girder 9± feet high) or require an intermediate support pier in the waterway. Thus, upon completion, none of these alternatives would hinder use of the Park since passage below the bridge structures would be unimpeded. The minimum vertical clearance over the towpath of approximately 10 feet for each of these alternatives would also allow passage of maintenance vehicles.

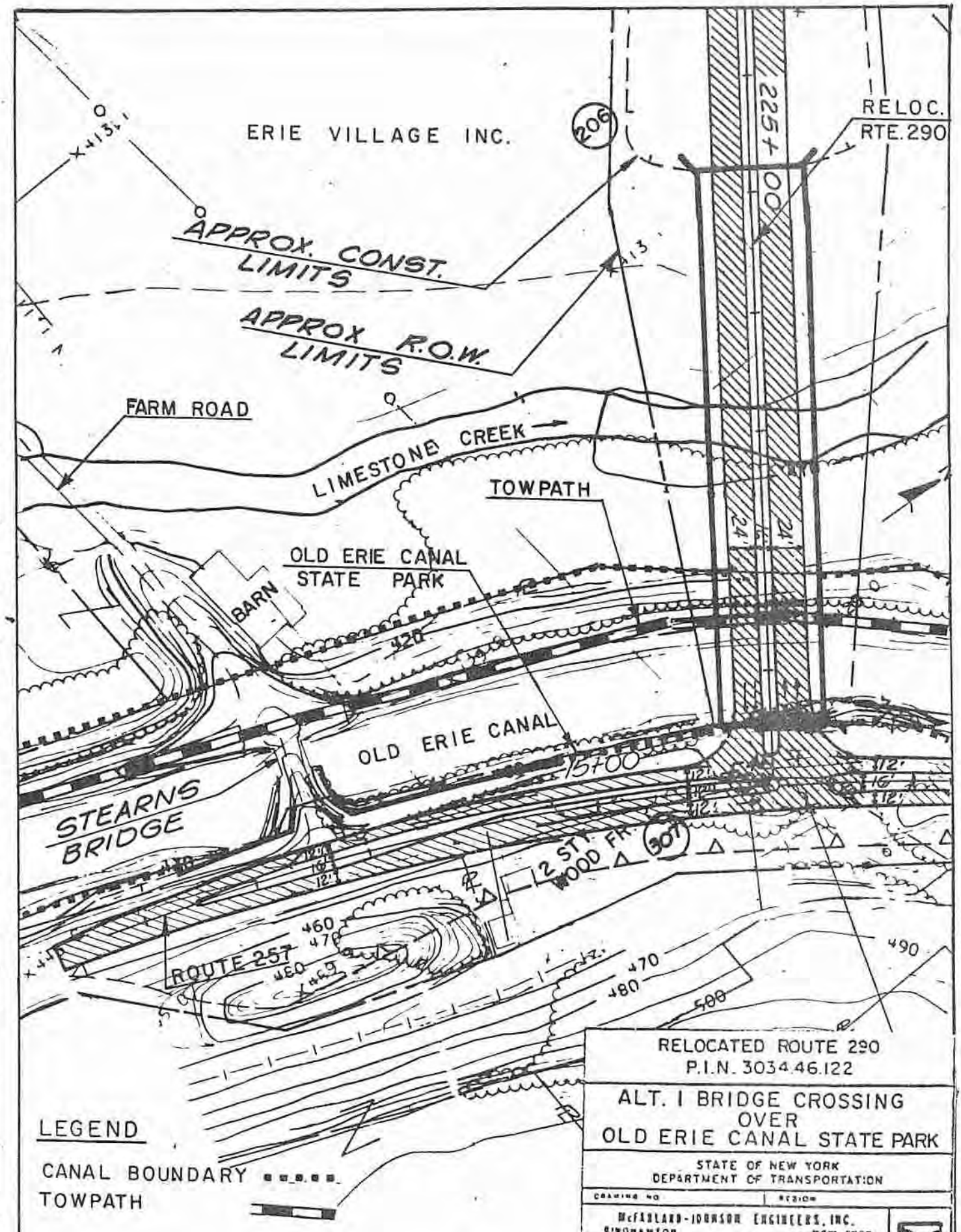


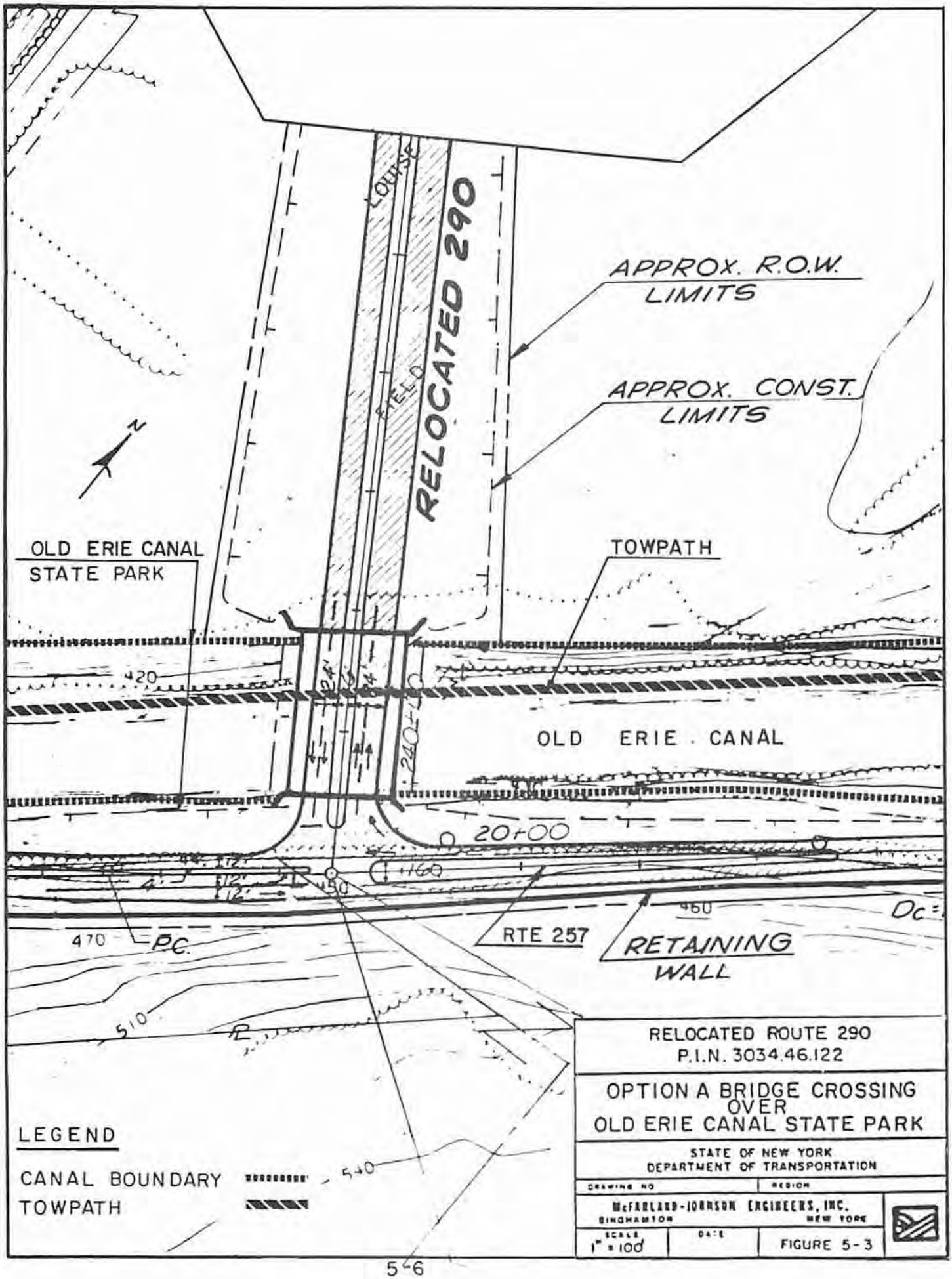
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P.I.N. 3034.46.122

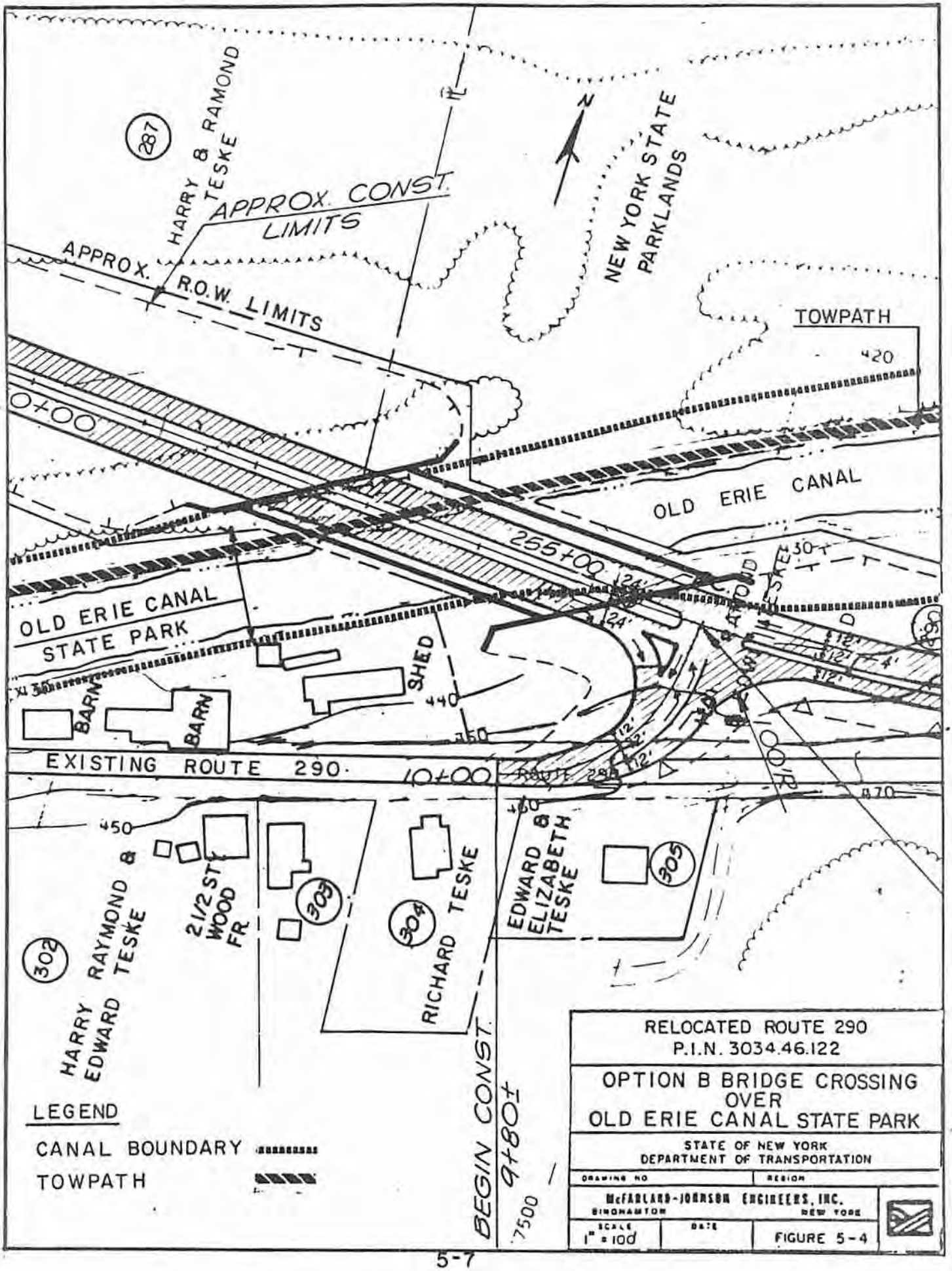
OLD ERIE CANAL STATE PARK FACILITIES

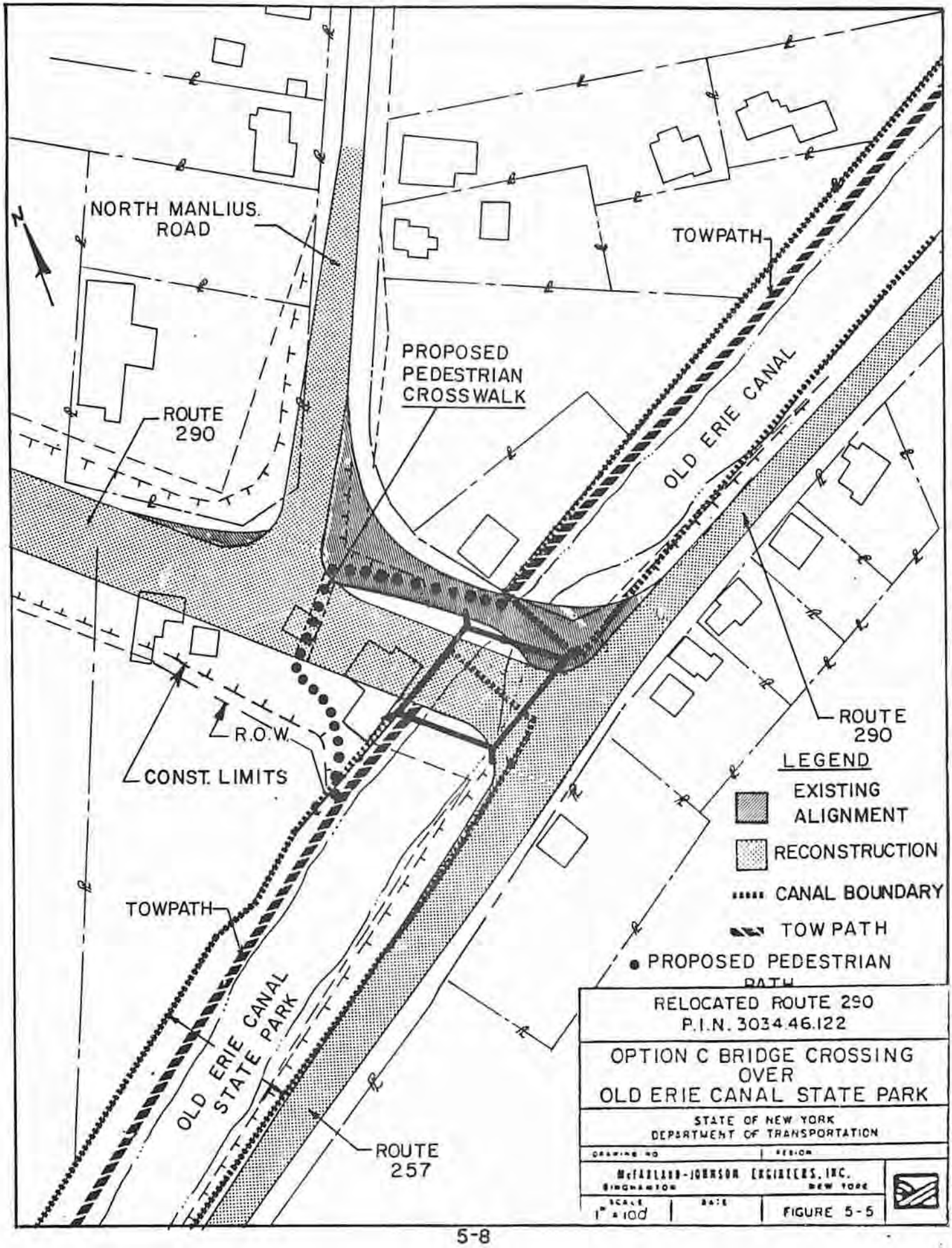
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

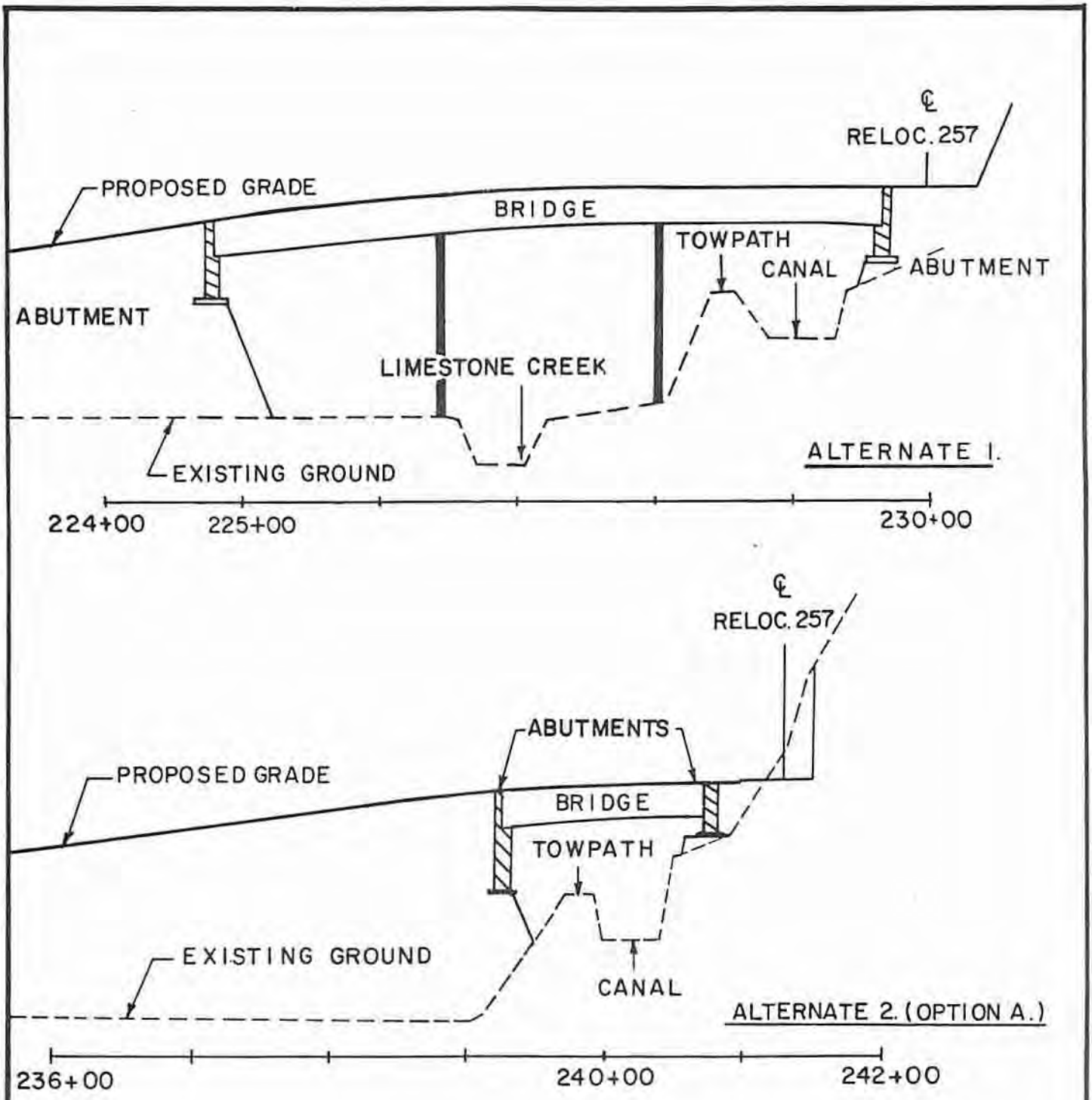
DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE 1" = 1000'	DATE
FIGURE 5-1	


ERIE VILLAGE INC.
206
225+00
RELOC.
RTE. 290
APPROX. CONST. LIMITS
APPROX R.O.W. LIMITS
FARM ROAD
LIMESTONE CREEK
TOWPATH
OLD ERIE CANAL STATE PARK
BARN
OLD ERIE CANAL
15+00
STEARNS BRIDGE
2 STY. WOOD FR.
307
ROUTE 257
24'
12'
16'
LEGEND
CANAL BOUNDARY
TOWPATH
RELOCATED ROUTE 290
P.I.N. 3034.46.122
ALT. I BRIDGE CROSSING OVER OLD ERIE CANAL STATE PARK
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 100'
FIGURE 5-2


RELOCATED 290
LOUISE
FIELD
APPROX. R.O.W. LIMITS
APPROX. CONST. LIMITS
N
OLD ERIE CANAL STATE PARK
TOWPATH
OLD ERIE CANAL
420
20+00
460
470
PC.
RTE 257
RETAINING WALL
510
540
LEGEND
CANAL BOUNDARY
TOWPATH
RELOCATED ROUTE 290
P.I.N. 3034.46.122
OPTION A BRIDGE CROSSING OVER OLD ERIE CANAL STATE PARK
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON
NEW YORK
SCALE 1" = 100'
DATE
FIGURE 5-3


HARRY & RAMOND TESKE
287
APPROX. CONST. LIMITS
APPROX. R.O.W. LIMITS
NEW YORK STATE PARKLANDS
TOWPATH
420
0+00
OLD ERIE CANAL
255+00
OLD ERIE CANAL STATE PARK
SHED
BARN
BARN
EXISTING ROUTE 290
10+00
450
440
430
RAYMOND & TESKE
HARRY EDWARD
21/2 ST WOOD FR
303
304
RICHARD TESKE
EDWARD & ELIZABETH TESKE
305
302
BEGIN CONST.
9+80±
LEGEND
CANAL BOUNDARY
TOWPATH
RELOCATED ROUTE 290
P.I.N. 3034.46.122
OPTION B BRIDGE CROSSING OVER OLD ERIE CANAL STATE PARK
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 100'
DATE
FIGURE 5-4


NORTH MANLIUS ROAD
TOWPATH
PROPOSED PEDESTRIAN CROSSWALK
ROUTE 290
OLD ERIE CANAL
R.O.W.
CONST. LIMITS
ROUTE 290
LEGEND
EXISTING ALIGNMENT
RECONSTRUCTION
CANAL BOUNDARY
TOW PATH
PROPOSED PEDESTRIAN PATH
TOWPATH
OLD ERIE CANAL STATE PARK
ROUTE 257
RELOCATED ROUTE 290
P.I.N. 3034.46.122
OPTION C BRIDGE CROSSING OVER OLD ERIE CANAL STATE PARK
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
1" = 100'
FIGURE 5-5



HORIZ. SCALE 1"=100'
VERT. SCALE 1"=20'

RELOCATED ROUTE 290
P.I.N. 3034.46.122

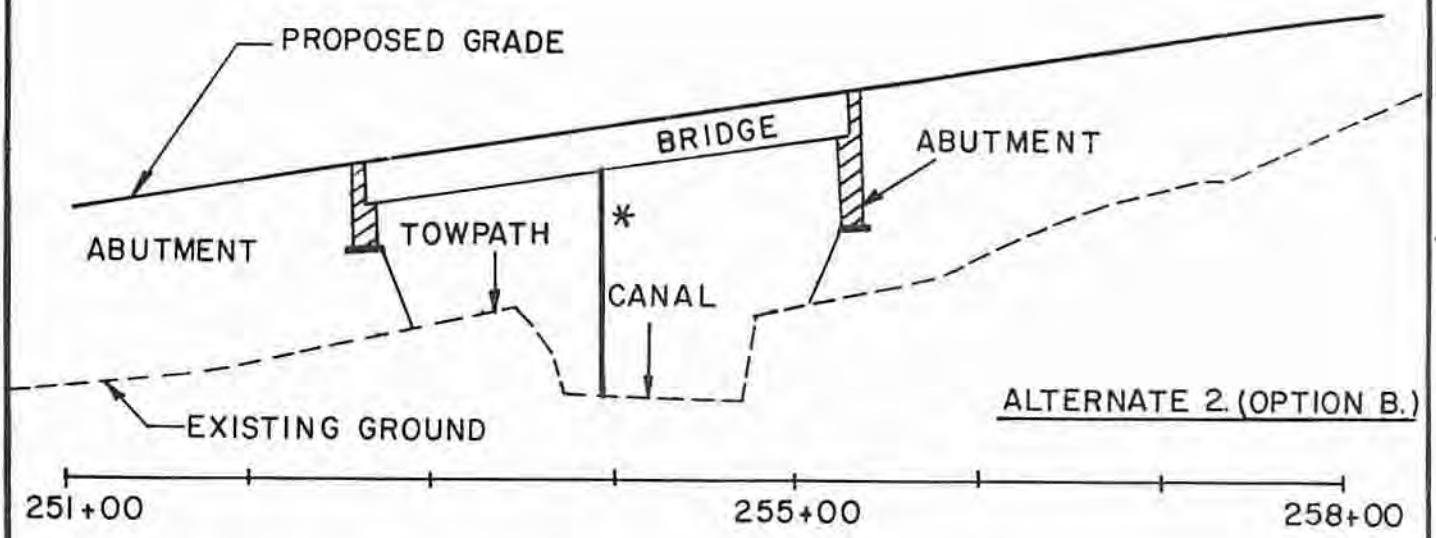
PROFILES OF BRIDGE CROSSINGS OVER OLD ERIE CANAL STATE PARK

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO. | REGION

McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK

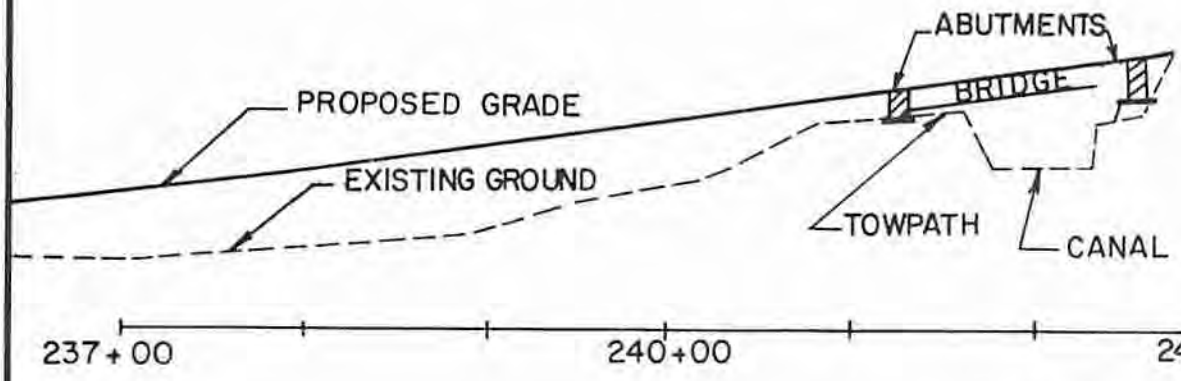
SCALE | DATE | FIGURE 5-6



ALTERNATE 2. (OPTION B.)

* IN LIEU OF SUPPORT PIER A DEEPER GIRDER MAY BE REQUIRED.

INTERSECTION RTE. 290/257



ALTERNATE 2. (OPTION C.)

HORIZ. SCALE 1"= 100'
VERT. SCALE 1"= 20'

RELOCATED ROUTE 290
P.I.N. 3034.46.122

PROFILES OF BRIDGE CROSSINGS OVER OLD ERIE CANAL STATE PARK

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO. | REGION

McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK

SCALE | DATE | FIGURE 5-7

Under Options A and B, the existing Route 290 bridge crossing would be removed. Thus, under these Options, free pedestrian access along the towpath could be provided at a location where none now exists.

Option C involves replacement of the existing Route 290 roadway over the Erie Canal. The existing structure is approximately 40 feet wide and is at-grade with the towpath. Thus, at this location, park users currently have to cross existing Route 290 to continue along the towpath. This situation, in addition to the parking practices previously mentioned, is considered a safety hazard by the New York State Office of Parks, Central Region.

Under Option C a new, wider roadway would be constructed on a slightly modified horizontal alignment. The centerline of the new roadway would be approximately 70 feet south of the existing roadway centerline. The new structure would also be essentially at grade with the towpath. Because of geometric constraints, spanning the towpath is not proposed for Option C. Furthermore, it is not possible to provide pedestrian passage beneath the bridge because of the limited (approximately 4-5 feet) vertical clearance between the bridge and the Canal itself.

Under the No-Build Alternative, Alternative 1 and Option C, the existing Route 290 crossing over the Canal would be maintained as is or improved. The year 2011 two way design hour volumes for those alternatives are as follows: 1) No-Build Alternative - 1,330 vehicles, 2) Alternative 1 - 680 vehicles and 3) Option C - 1,410 vehicles. Since the projected volumes for Alternative 1 are significantly less than the No-Build Alternative, pedestrian crossings at the bridge should be made easier. Projected traffic for Option C is essentially the same as the No-Build Alternative. However, the new bridge structure and roadway under Option C would be approximately twice as wide as now exists. This would probably make it somewhat more difficult for park users to cross at this location, even though traffic volumes will not increase.

There are currently no special provisions for park users who cross existing Route 290 (i.e., crosswalk or roadway signs). Under Alternative 2C, the trail would be relocated and a crosswalk would be provided in the vicinity of North Manlius Road at a location with improved sight distance and with signs and pavement markings conforming to the New York State Manual for Uniform Traffic Control Devices.

In accordance with regulations promulgated under 36CFR800, the State Historic Preservation Officer (SHPO) has reviewed this project and found the Erie Canal in the vicinity of the proposed alternatives to be eligible for the National Register of Historic Places. The Erie Canal is significant for its varied role in the making of New York history in the categories of engineering, transportation, local/regional development and economic growth. The contributing elements of the canal include all built engineering features such as the canal and retaining walls, towpaths, berm banks, bridges, locks, aqueducts, turning basins, culverts, waste weirs, feeders and dams. There are no locks, aqueducts, turning basins, culverts, waste weirs, feeders or dams in the vicinity of any proposed alternative. The bridge in Manlius Center which carries existing Route 290 over the canal was constructed in 1927 and is not a significant contributing element

of the canal. Thus only the canal, retaining walls, towpaths and berm banks require analysis of effect.

In general, the placement of abutments or support piers would constitute the primary effect of any of the proposed canal crossings. Alternative 1 and Alternative 2, Option A provide new bridges which clear span the canal and towpath with no intermediate support piers, only minor embankment construction and with abutments placed away from the contributing elements of the canal. Alternative 1 would have no effect on the Register eligible resource and Alternative 2, Option A would have no adverse effect. Alternative 2, Option B also provides for a new bridge which would clear span the towpath. However, the length of the structure under this alternative is such that either an intermediate support pier must be placed in the waterway or an unusually deep girder be constructed. The physical construction of a pier in the waterway or the visual intrusion of a deep girder structure would have an adverse effect on the setting of this Register eligible resource. Actions which result in an official finding of adverse effect require consultation and agreement on mitigation measures with the SHPO and the National Advisory Council on Historic Preservation. Alternative 2, Option C provides for a crossing of the canal at approximately the same grade as existing and slightly to the west of the present roadway. No intermediate piers are required and abutments can be placed away from the towpath and berm areas. Bridge railings and approach guide railing as well as an adjacent intersection dictate that the trailway be routed north of the towpath to improve pedestrian safety at this crossing. Minor filling along the towpath will be necessary to provide a smooth transition to the relocated trailway. This alternative will have no adverse effect on the Register eligible resource. Prior to selection of a preferred alternative, additional coordination with SHPO will be necessary concerning specific design details.

Table 5-1 presents the park area through which right-of-way will have to be acquired and also lists the amount of land that will be directly impacted by each of the alternatives (by construction of bridge abutments and roadways).

TABLE 5-1

IMPACTS ON OLD ERIE CANAL PARK LAND

Alternative	Acreage Required for Right of Way	Approximate Acreage Directly Disturbed
1	0.64 Ac	0.16 Ac
2A, 1-2A	0.37 Ac	0.06 Ac
2B, 1-2B	0.99 Ac	0.45 Ac
2C, 1-2C	0.40 Ac	0.34 Ac

Alternatives 2B and 1-2B would have the largest requirements for right of way acquisition, largely because they pass through a parcel of parklands adjacent to but beyond the Canal boundaries proper (see Figures 5-1 and

5-4). It is not feasible for Option B to avoid that parcel of parklands lying north of the canal because to shift the alignment to the east would increase park involvement further and a shift to the west would impact residential properties. The Office of Parks has stated that they have no development plans for that parcel of Parklands in question.

None of the alternatives will cause significant impacts to terrestrial wildlife habitat because of the minimal disturbance within park boundaries. Because the eastern abutments of the new bridges for all build alternatives would be in close proximity to the Canal, there is some potential for discharge of construction generated sediment to the Canal, which if occurred would result in a temporary increase in turbidity. The probable extent of this construction impact would be low because of the limited area of disturbance and correspondingly low earthwork requirements. In order to ensure that this impact will be minimized, erosion and sedimentation control measures will be implemented during construction. There will be no long term water quality impacts to the Canal as a result of this project.

The air quality analysis conducted for this project has found that 1 and 8 hour carbon monoxide standards will not be violated.

A detailed noise study has been conducted for this project and is summarized in Appendix A of this report. The Activity Category for the Old Erie Canal State Park is B, for which the Federal Noise Abatement Criteria is 70 dBA. The approximate current noise level experienced by park users along the towpath where it is closest to existing Route 257 (about 125 feet) is 64 dBA as determined through computer simulation. Three of the build alternatives would result in higher traffic volumes along Route 257 (volumes would decrease under Option B). The greatest traffic increase would be for Alternative 1. The worst case noise level along the towpath due to increased traffic on Route 257 would be 68 dBA (4 dBA increase) for the design year. This is within the Federal Noise Abatement Criteria of 70 dBA and also within the relative abatement criteria (acceptable noise increase above existing conditions) of 5 dBA.

As stated previously, there will be no direct impact on Green Lakes State Park which is located approximately 2 miles east of the study area. There will be no indirect (i.e., traffic-related) impacts on that park because projected traffic volumes for all build alternatives for that segment of Route 290 east of its intersection with Route 257 are the same as under no-build conditions. Thus, implementation of this project will not affect traffic operations at the Green Lakes State Park access road.

Alternatives

All build alternatives must have some involvement with the Old Erie Canal State Park in the form of a bridge crossing since the canal forms the southern/eastern boundary of the entire study area.

Not even the No-Build Alternative would avoid involvement with Park property since an at-grade crossing of the towpath already exists.

Mitigation Measures

If a build alternative is selected, impacts to the Park will consist of right-of-way acquisition and direct disturbance of Park property as outlined in Table 5-1 and impacts to park pedestrian traffic at the location of the existing Route 290 bridge (Option C only because of the wider roadway). No other park facilities such as parking areas, etc. would be affected.

Although the area of property that would be required under any of the alternatives is small, replacement of that land is required under Section 6(f) of the Land and Water Conservation Fund Act of 1965. Figure 5-1 shows property within the study area owned by the Department of Transportation. Since none of that land is contiguous to the Park, it appears that other properties would have to be used as replacement. On existing Route 290, approximately one mile east of Manlius Center, the Department of Transportation does own a 7.6 acre roadside parking area adjacent to the canal which could be used in the mitigation plan.

Ultimately, mitigation will be accomplished through discussions between the New York State Department of Transportation and the New York State Office of Parks, Recreation and Historic Preservation. However, this section will point out the inherent differences between the alternatives in how they lend themselves to 1) property replacement and 2) mitigation of Park concerns about the pedestrian safety/parking situation at the existing Route 290 bridge crossing. The Office of Parks has stated that their preferred alternative would be a new structure to carry Route 290 over the canal and trail (elimination of the at-grade crossing). They have also stated that they would like to establish a 30+ car parking lot in the Manlius Center area. (See letter from New York State Office of Parks dated July 29, 1986 in Appendix D.)

If either Alternative 2 Options A or B are implemented, the existing Route 290 bridge over the Canal would be removed. From the perspective of Park use selection of either of these alternatives would be the most favorable. By removing the bridge, pedestrian passing would be improved along the towpath at a location where park users are now required to cross existing Route 290, thereby eliminating safety concerns.

With removal of the existing Route 290 bridge under Options A and B, pedestrian passage across the Canal will be maintained by constructing a new pedestrian bridge at that location. This will serve both residents of Manlius Center and park users who wish to cross the Canal.

After removal of the existing bridge, some land should be available near the location of the current bridge abutments which will no longer be required for highway right of way. Title of this excess right-of-way could be conveyed to the Park, compensating for the additional lands taken. As previously stated, the new bridge structures under Options A and B would span the Canal and towpath and would not interfere with pedestrian traffic along the towpath. These alternatives could thus address all of the Park's concerns.

If Option C is selected, the existing bridge will be replaced by a new, wider bridge about 70 feet to the south and at grade with the towpath. Therefore, park users will still have to cross Route 290. In addition to being wider, the new bridge under Option C would also be a longer structure and guardrails will be installed extending westward from the bridge. Because of this, it will be impossible for Park users to cross Route 290 at the exact location where the towpath intersects the roadway. Therefore, Park users will be directed by means of a new path to a designated crosswalk at the intersection of Relocated Route 290 and North Manlius Road. Establishment of this designated crosswalk will increase pedestrian safety compared to the current conditions.

Under Option C, parkland replacement could be accomplished if those properties which are subject to residential displacements are acquired in full. Under this Option, two dwellings on the west side of the Canal must be acquired. If those property parcels are acquired in full, approximately 2 acres of land beyond Department of Transportation right-of-way requirements would be available that could be transferred to the Park. This would be sufficient area for the Park to establish a parking lot. Several of the Park's concerns could then be addressed under this Option.

Alternative 1 includes a new bridge that would span the towpath plus continued use of the existing Route 290 bridge. Thus, this alternative also requires Park pedestrians to cross the roadway at Manlius Center.

Under this alternative, projected traffic volumes on existing Route 290 are lower than under No-Build conditions. This in itself can be considered a mitigating measure with respect to the pedestrian crossing since the reduced traffic volumes should result in increased safety. In addition, a designated crosswalk will be established at the location where pedestrians currently cross and advance pedestrian warning signs will also be installed.

Parkland replacement under this alternative might be accomplished in conjunction with right-of-way acquisition for the new bridge structure but land at that location may not be of the same utility to the Park as that which might be available under the other alternatives (i.e., in Manlius Center).

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VII - LIST OF PREPARERS

This Draft Environmental Impact Statement was prepared by the staff of McFarland-Johnson Engineers, Inc., Binghamton, New York under the direction and with the active involvement of the New York State Department of Transportation and the United States Department of Transportation Federal Highway Administration.

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APPENDIX 'A'

NOISE STUDY REPORT

New York State Department of Transportation
P.I.N. 3034.46

Relocated Route 290
Butternut Interchange to Manlius Center
Towns of DeWitt/Manlius
Onondaga County

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Conclusions

The assessment of the potential noise impacts of the proposed project on the environment has resulted in the following conclusions:

1. Most residential properties along existing Route 290 are currently experiencing noise impacts and many will continue to experience noise impacts with or without this project.

2. The federal noise abatement criteria for residential properties (70 dBA-L_{10}) will not be exceeded with any of the build alternatives.

3. Under the build alternatives, noise impacts (predicted noise level increase of six (6) to fourteen (14) dBA above existing levels) will occur as shown below:

   Alternative 1 - 50 residential properties

   Alternative 2A - 27 residential properties

   Alternative 2B - 29 residential properties

   Alternative 2C - 27 residential properties

   Alternative 1-2A - 27 residential properties

   Alternative 1-2B - 29 residential properties

   Alternative 1-2C - 27 residential properties

   Alternative 2-1 - 47 residential properties

4. Construction activities associated with each build alternative are expected to result in short term noise impacts at several receptor locations during the time of construction. However, these impacts are temporary in nature and will cease once construction is completed.

5. Noise abatement in terms of continuous noise barriers may be feasible along Segment 3 of Alternatives 2A, 2B and 2C to negate impacts along Wilson Drive. Also, a noise barrier appears to be feasible along Alternatives 1 and 2-1 as they pass by Fremont Meadows Subdivision. Barriers are not cost effective along Lee Terrace, Taylor Road or other portions of the project.

I - Introduction

The purpose of this report is to assess the impacts of both traffic generated noise and noise generated during the construction of the proposed project. The noise analysis and impact assessment for the proposed project was performed in accordance with the requirements of the Federal Aid Highway Program Manual, Volume 7, Chapter 7, Section 3 (FHPM 7-7-3) and the New York State Department of Transportation Interim Project Development Guidelines No. 5-4-1, "Noise Analysis Considerations", Transmittal #17.

Procedures established by these guidelines require the identification of existing land use activities, measurement of existing noise levels and prediction of future noise levels should the project be constructed. Existing noise levels were monitored at nine (9) locations to provide a general picture of the existing noise levels over the entire project study area. Prediction of future noise levels were determined using the HUSH 003 and Stamina 2.0/Optima computer programs for noise analysis.

Future noise levels were compared to existing noise levels for both the "Build" and "No Build" alternatives. Also predicted future noise levels were compared to federal noise abatement criteria. These comparisons were the basis for the determination of the anticipated impact upon land uses and activities and the evaluation of noise abatement measures for reducing or eliminating noise impacts for developed lands.

II - Project Location and Description

The location of the proposed project is shown in Figure A-1. The project is listed under New York State Department of Transportation Project Identification Number (PIN) 3034.46 - Relocated Route 290, I-481 to Manlius Center, Onondaga County. The project study corridor will begin at Interstate Route 481, proceed in an easterly direction and terminate in the vicinity of Manlius Center. The northern and southern limits of the location band are defined as existing Route 290 and the Old Erie Canal, respectively.

As a result of the preliminary alignment evaluations and impact assessments, two basic alignment locations have been selected for detailed consideration and preliminary plan development. These locations include a southerly (Alternative 1) and northerly (Alternative 2) routing within the northern portion of the study area. In all, a total of four design alternatives have been identified which follow the northern and/or southern alignment locations. These design alternatives which are referred to as Alternatives 1, 2, 1-2 and 2-1 are illustrated in Figure A-2.

Alternatives 1 and 2 follow the basic southern and northern alignment locations respectively through the study area. Alternatives 1-2 and 2-1 refer to "crossover" alternatives which utilize a portion of the southerly alignment and then crossover to the northerly alignment (or vice versa) in the vicinity of Burdick Street.

From the Butternut Interchange eastward to a point approximately 1,250 feet west of Fisher Road, all design alternatives share a common alignment.

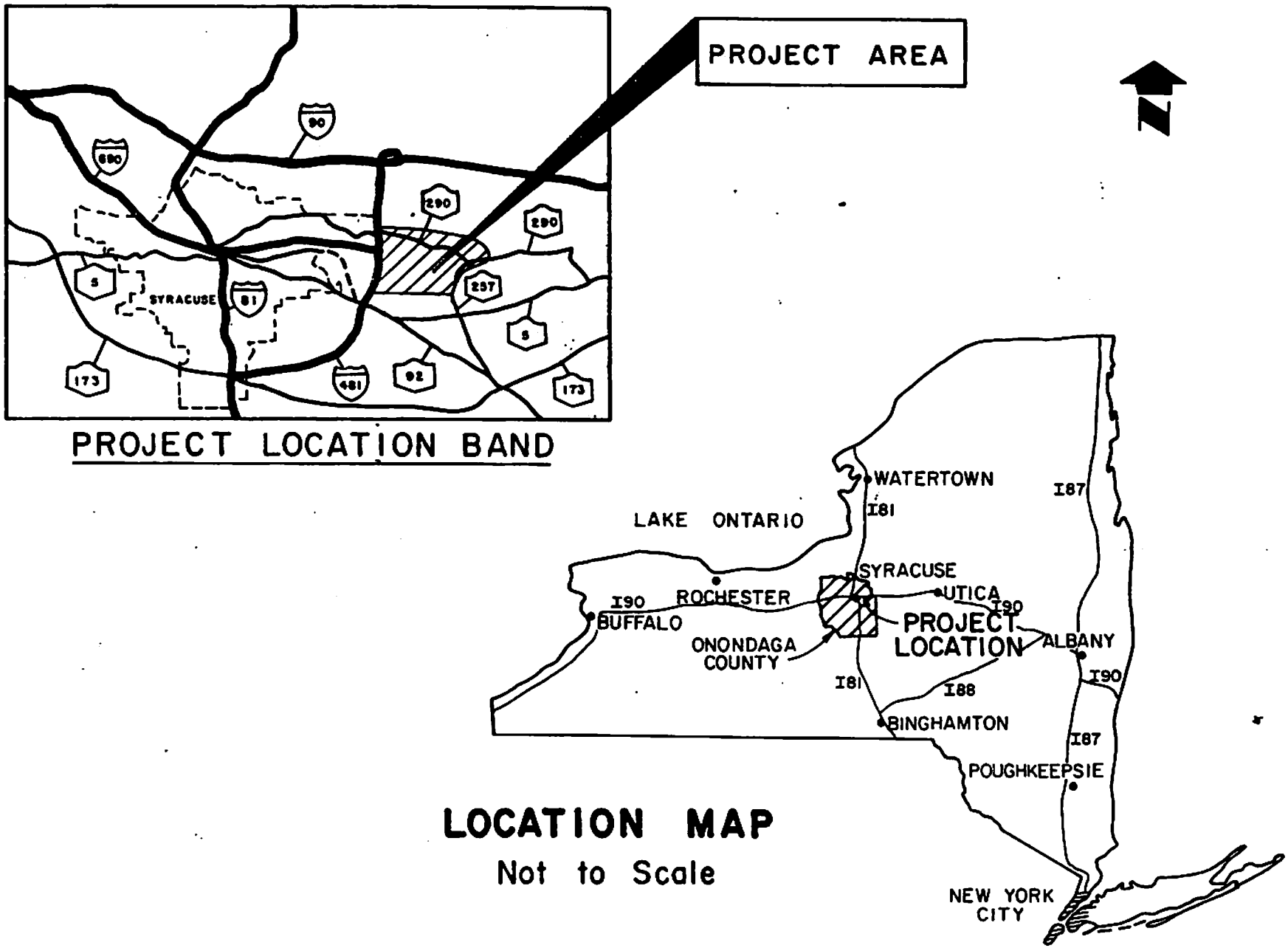

PROJECT AREA
N
90
690
290
290
5
SYRACUSE
81
257
5
173
481
92
173
PROJECT LOCATION BAND
WATERTOWN
I87
I81
LAKE ONTARIO
SYRACUSE
ROCHESTER
UTICA
I90
I90
BUFFALO
PROJECT LOCATION
ONONDAGA COUNTY
ALBANY
I90
I81
I88
BINGHAMTON
I87
POUGHKEEPSIE
NEW YORK CITY
LOCATION MAP
Not to Scale

FIGURE A-1

This section would require the relocation of Butternut Drive and the construction of a 350 to 400 foot long bridge to span Butternut Creek.

Butternut Drive would be maintained as a through road which would pass beneath the proposed facility. This would require the relocation of approximately a 1,850 foot section of Butternut Drive. At its maximum distance, relocated Butternut Drive would be located approximately 300 feet east of its existing location.

For all design design alternatives, the project typical section provides for two 12-foot wide travel lanes in each direction separated by a 16-foot wide flush median. Left hand turn lanes will be provided within the proposed median at intersection locations. In addition, Fisher, Bowman, Burdick and N. Manlius Roads will be widened to provide left hand turn lanes at their intersections with the proposed facility. At the Butternut Interchange, on and off ramps will be provided to facilitate full access between the proposed facility and Interstate Routes 481 and 690.

Construction of the proposed facility will occur in a west to east fashion according to a staged construction schedule which may involve two or more successive construction contracts. Initial stages may involve the construction of a two lane facility with widening to four lanes in subsequent phases. The exact nature and extent of each construction phase will be determined at a later date and will be based upon a consideration of traffic needs and funding availability. However, this noise analysis was based on a four lane facility.

Alternative 1 - Alternative 1 follows the southern alignment location throughout the study area. It begins at the Butternut Interchange and follows a common alignment across Butternut Creek to a point approximately 1,250 feet west of Fisher Road. From this point, Alternative 1 curves to the northeast and crosses Fisher Road at a point approximately 3,500 feet south of Route 290. From Fisher Road, Alternative 1 continues in a northeasterly direction, crosses Bowman Road approximately 500 feet north of Taylor Road and then curves to the southeast and crosses Burdick Street 200 feet north of Taylor Road. East of Burdick Street, Alternative 1 continues in a southeasterly direction for approximately 4,500 feet and then crosses Limestone Creek and the Old Erie Canal on a single structure before terminating with a tee connection to Route 257. Total length of Alternative 1 is 2.4 miles.

Alternative 2 - Alternative 2 follows the northern alignment location throughout the study area. From its western terminus at the Butternut Interchange eastward to a point approximately 1,250 feet west of Fisher Road, it shares a common alignment with Alternative 1. From this point, Alternative 2 curves to the northeast and crosses Fisher Road approximately 3,000 feet south of existing Route 290 and aligns itself with the abandoned railroad before crossing Bowman Road. At a point approximately 1,100 feet east of Bowman Road, Alternative 2 curves to the southeast, crosses Burdick Street and passes immediately to the south of the DOW Lumber Yard. From Burdick Street, Alternative 2 proceeds in an east northeast direction for approximately 2,200 feet and then meets the abandoned railroad tracks. From this point eastward, there are three options available for Alternative 2. These options are referred to as Options A, B and C.

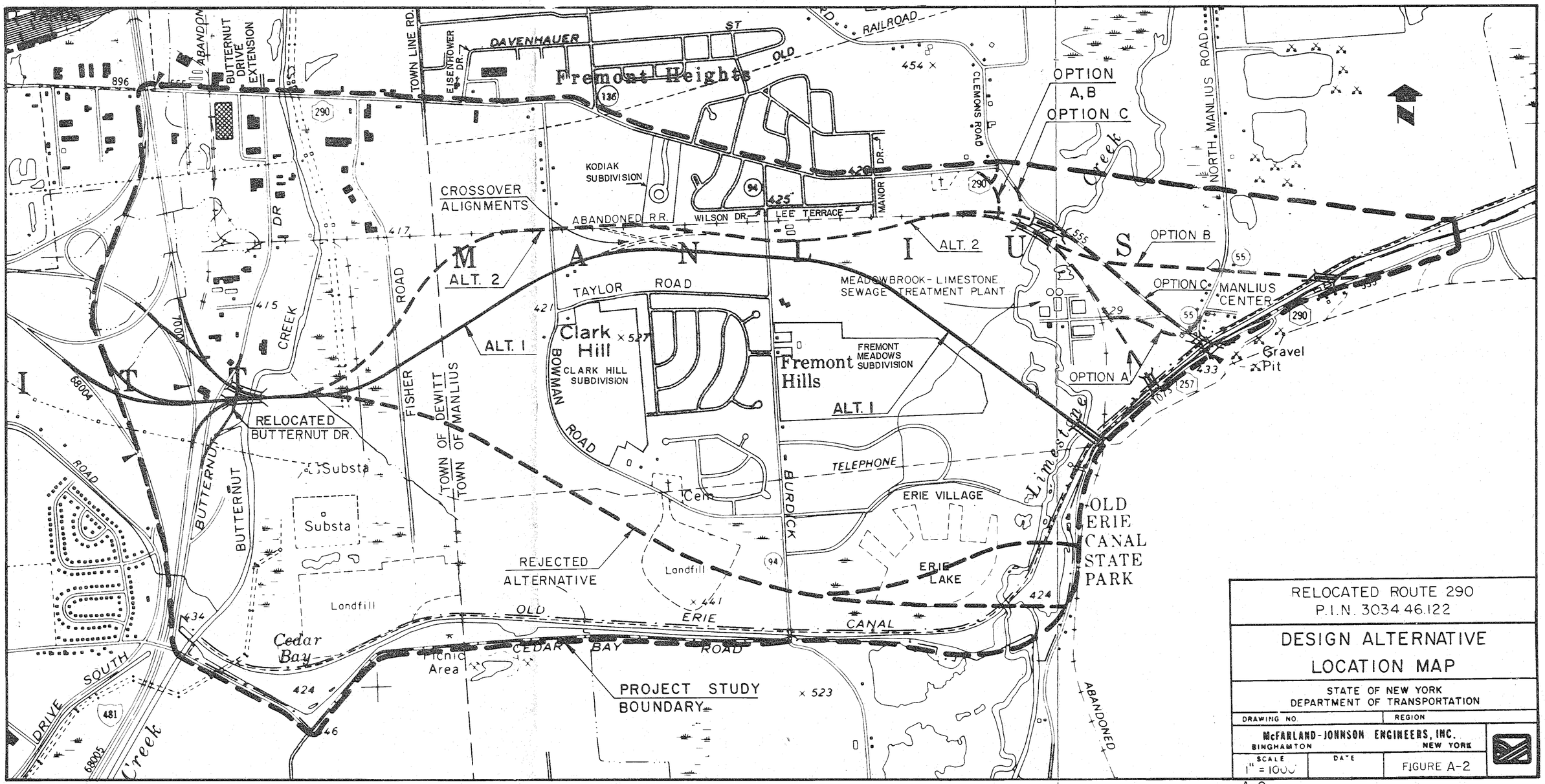
Option A - From a point approximately 1,250 feet west of Limestone Creek, Option A would proceed in a southeasterly direction along the abandoned railroad and cross Limestone Creek. Continuing in a southerly direction, Option A would then cross the access road to the Meadowbrook Limestone Sewage Treatment Plant at a point approximately 700 feet west of existing Route 290. Option A would then continue in a southeasterly direction, cross the Old Erie Canal and terminate with a tee intersection at Route 257. Included in this option is the provision of a connection between N. Manlius Road and the proposed facility. This connection would run from the existing Route 290/North Manlius Road intersection westward to the intersection of Option A and the access road to the sewage treatment plant. Total length of Alternative 2 with Option A is 2.7 miles.

Option B - From a point approximately 1,250 feet west of Limestone Creek, Option B would continue to follow the alignment of the abandoned railroad and would cross Limestone Creek. After crossing Limestone Creek, Option B would proceed in an easterly direction, cross existing Route 290 approximately 650 feet southeast of Limestone Creek and pass to the north of Manlius Center before crossing the Old Erie Canal. After crossing the canal, Option B would terminate with a connection to existing Route 290. Total length of Alternative 2 with Option B is 3.2 miles.

Option C - Option C would cross the abandoned railroad at a point approximately 1,250 feet west of Limestone Creek. It then curves to the southeast, crosses Limestone Creek and aligns itself with existing Route 290 and terminates at the Route 290/257 intersection at Manlius Center. Total length of Alternative 2 with Option C is 2.8 miles.

Alternative 1-2 - Alternative 1-2 follows the same alignment as Alternative 1 from the Butternut Interchange eastward to a point approximately 1,200 feet west of Burdick Street and then crosses over to follow the alignment of Alternative 2 for the remainder of the project. Options A, B and C would also apply to this alternative. Alternative 1-2 is 2.7 miles in length with Option A, 3.2 miles long with Option B and 2.7 miles in length with Option C.

Alternative 2-1 - Alternative 2-1 follows the same alignment as Alternative 2 from the Butternut Interchange eastward to a point approximately 500 feet east of Bowman Road and then crosses over and becomes identical with Alternative 1 for the remainder of the project. Total length of Alternative 2-1 is 2.5 miles.



RELOCATED ROUTE 290
P.I.N. 3034 46.122

DESIGN ALTERNATIVE LOCATION MAP

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO. | REGION

McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK

SCALE 1" = 1000' | DATE | FIGURE A-2

III - Present and Future Land Use

Land use patterns within and adjacent to the project area are typical of a growing suburban area which is strongly influenced by a large metropolitan area (Syracuse) and the proximity of a major highway/interchange (I-481/690 Butternut Interchange). In developed areas, the predominant land use includes residential, commercial and industrial activities. Undeveloped areas include wetlands and floodplains as well as cultivated land, abandoned gravel mines and landfill operations located along the southern portion of the study area. Other significant land uses within the project area include the Meadowbrook-Limestone Sewage Treatment Plant, the Old Erie Canal and an electric substation. Figure A-3 is a general land use map of the area.

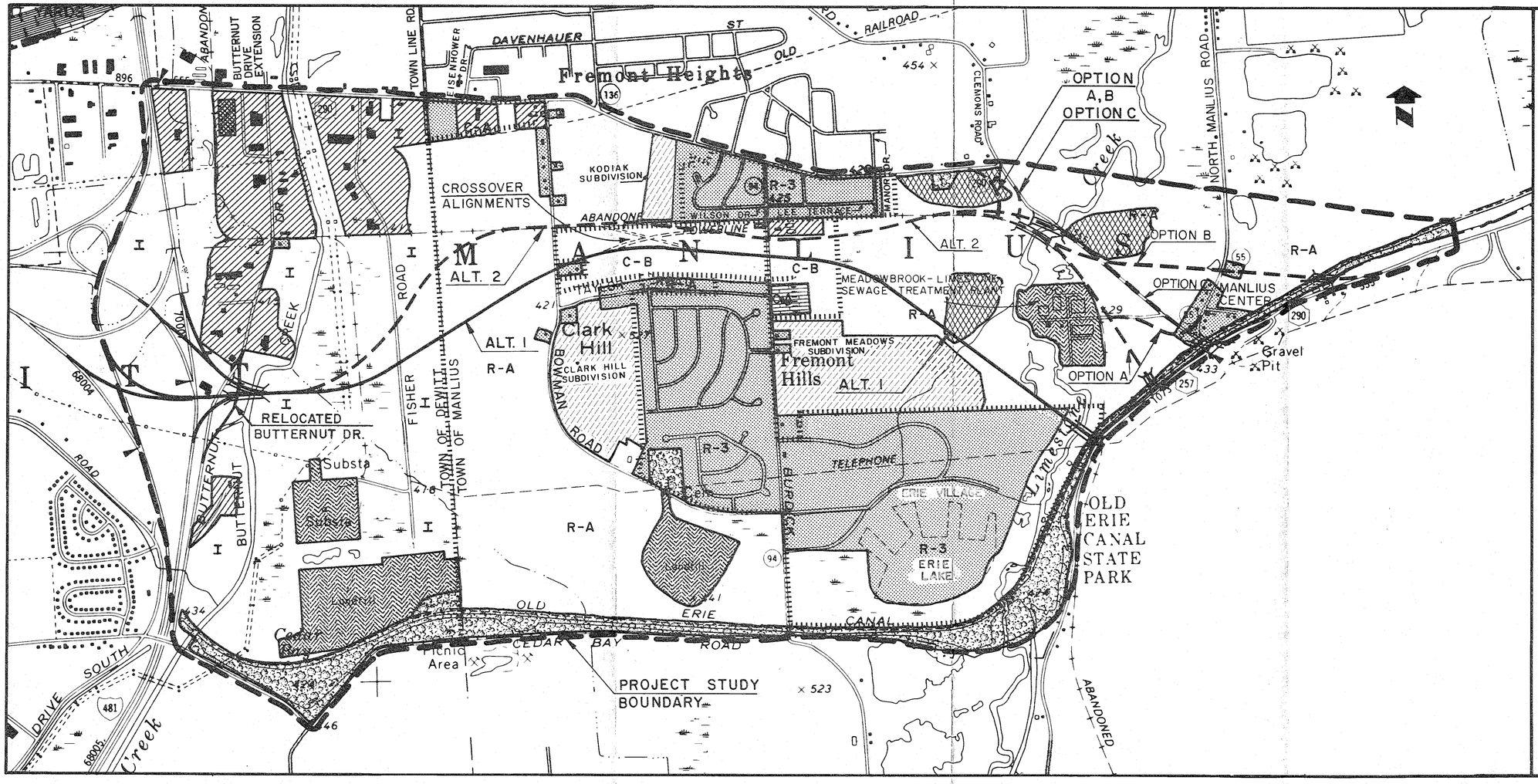
For the purpose of selecting the appropriate federal noise abatement criteria, it is appropriate to classify land adjacent to existing and proposed highways where development has taken place. According to Table 1, Noise Abatement Criteria/Land Use Relationship, the land use categories within the project are either B, C or D. Land Use Category B, applying to outdoor activities at residences, has an L_{10} noise abatement criteria of 70 dBA and is applicable to all residentially developed locations in the project area. The remaining developed lands fall under Land Use Category C and have a noise abatement criteria of 75 dBA (exterior). This includes all commercial and industrial development within the project study area. Land Use Category D applies to undeveloped lands which dominate the study area and has no noise abatement criteria.

TABLE 1

NOISE ABATEMENT CRITERIA/ACTIVITY RELATIONSHIP*

Activity Category	Noise Abatement Criteria Levels-dBA L_{eq}	L_{10}	Description of Activity Category
A	57 dBA (Exterior)	60 dBA (Exterior)	Tracts of land in which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	67 dBA (Exterior)	70 dBA (Exterior)	Residences, motel, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports area and parks.
C	72 dBA (Exterior)	75 dBA (Exterior)	Developed lands, properties or activities not included in Categories A and B above.
D	--	--	For undeveloped lands.
E	52 dBA (Interior)	55 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

*Requirements of the Federal Aid Highway Program Manual, Volume 7, Chapter 7, Section 3 (FHPM 7-7-3).



LEGEND

ZONING

DISTRICT BOUNDARY

TOWN OF DEWITT

I – INDUSTRIAL

TOWN OF MANLIUS

C-A COMMERCIAL A

C-B COMMERCIAL B

R-3 RESIDENTIAL

R-A RESTRICTED AGRICULTURAL

LAND USE	NOISE ACTIVITY CATEGORY
RESIDENTIAL	B
COMMERCIAL	C
COMMUNITY SERVICE	B
PUBLIC SERVICE	B
UNDEVELOPED / VACANT	D
OPEN SPACE ACTIVITIES, PARKS, CEMETERIES ETC.	D
ACTIVE AGRICULTURE	D
APPROVED SUBDIVISIONS	B

RELOCATED ROUTE 290
P.I.N. 3034.46.122

LAND USE AND ZONING

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO. | REGION

McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK

SCALE 1" = 1000' | DATE | FIGURE A-3

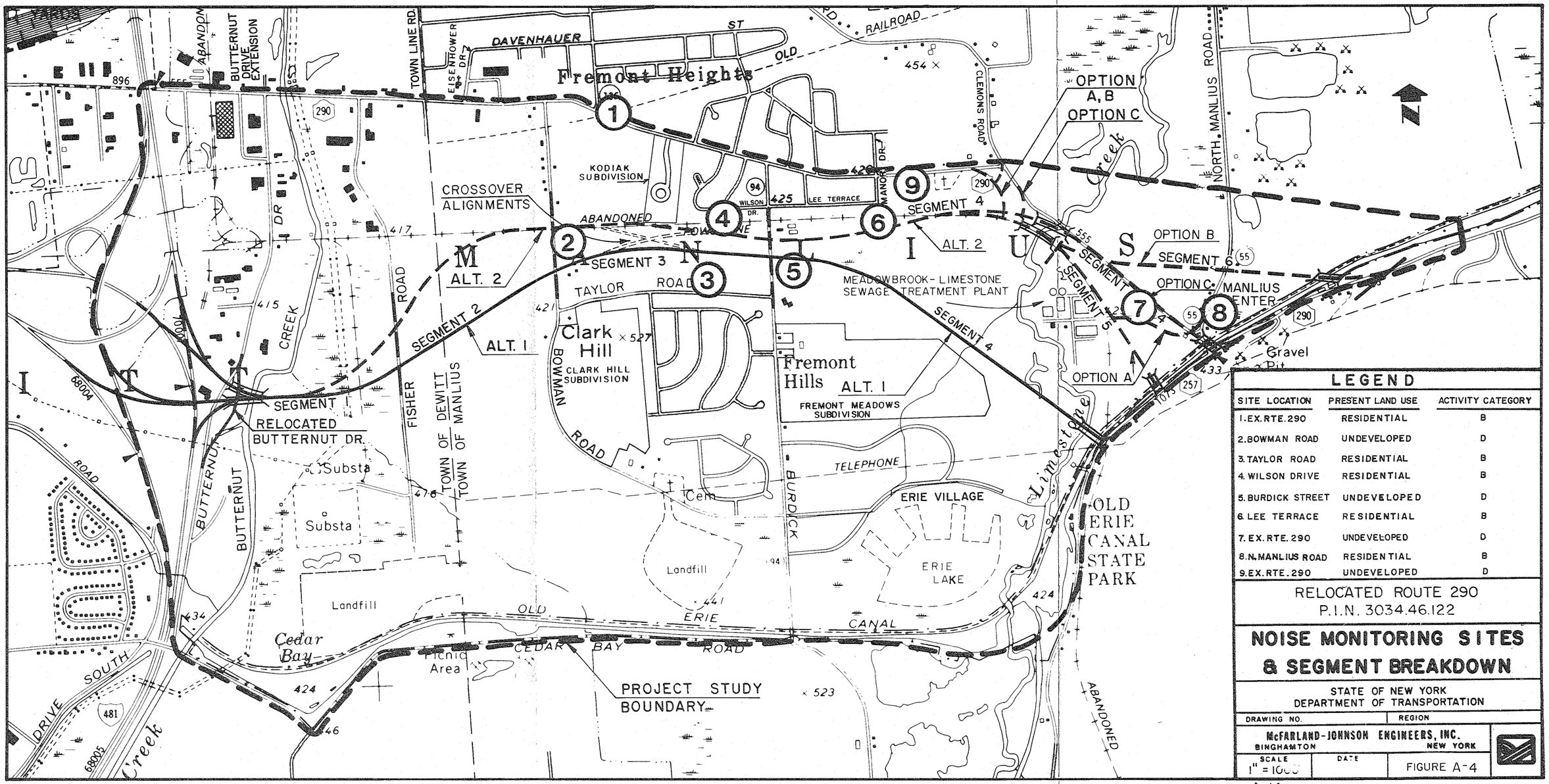
IV - Traffic Noise Analysis

A. Existing Noise Environment

Existing noise levels were measured at selected locations throughout the project area. All existing levels were measured in accordance with recommendations contained in the manual Field Measurement of Existing Noise Levels prepared by the New York State Department of Transportation Noise Measurement Unit and also in accordance with the methods described in Chapter 3 of the Report No. FHWA-HHI-HEV 73-7976-1, Fundamentals and Abatement of Highway Traffic Noise.

The existing noise at any location is made up of both natural and manmade sounds which normally contribute to the noise environment. Non-representative sounds or those which occur infrequently are not considered components of the existing noise level. Care was exercised during measurement periods to assure that unusual sounds were not reflected in the recorded noise levels (i.e., explosions, gun fire, wind gusts, low flying planes).

Nine (9) monitoring locations were selected within the study area and are shown in Figure A-4. Existing noise levels were monitored during both A.M. and P.M. hours in an attempt to cover the highest hourly traffic noise time periods or noise critical hours. The A.M. period ranged from 7:00 A.M. to 9:00 A.M. and the P.M. ranged from 3:00 P.M. to 5:00 P.M. Monitoring locations were selected to provide a general picture of the existing noise level over the entire project study area. Residential, commercial/industrial and background noise areas were typical of the locations monitored. A locational description of each area is given in Table 2.



LEGEND

SITE LOCATION	PRESENT LAND USE	ACTIVITY CATEGORY
1. EX. RTE. 290	RESIDENTIAL	B
2. BOWMAN ROAD	UNDEVELOPED	D
3. TAYLOR ROAD	RESIDENTIAL	B
4. WILSON DRIVE	RESIDENTIAL	B
5. BURDICK STREET	UNDEVELOPED	D
6. LEE TERRACE	RESIDENTIAL	B
7. EX. RTE. 290	UNDEVELOPED	D
8. N. MANLIUS ROAD	RESIDENTIAL	B
9. EX. RTE. 290	UNDEVELOPED	D

RELOCATED ROUTE 290
P.I.N. 3034.46.122

NOISE MONITORING SITES & SEGMENT BREAKDOWN

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO. | REGION

McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK

SCALE 1" = 1000 | DATE | FIGURE A-4

TABLE 2

NOISE MONITORING DESCRIPTION

Site	Location*
1	90 feet north of Route 290 and 480 feet east of Fremont Road (Route 136).
2	175 feet east of Bowman Road and 175 feet south of abandoned railroad bed.
3	200 feet north of Taylor Road and 775 feet west of Burdick Street.
4	180 feet south of Wilson Drive (on abandoned railroad bed) and 650 feet west of Burdick Street.
5	140 feet east of Burdick Street and 670 feet south of abandoned railroad bed.
6	500 feet south of Route 290 along Manor Drive on the abandoned railroad bed.
7	300 feet west of Route 290 along the Meadowbrook Limestone Sewage Treatment Plant access road and 60 feet due north of that entrance.
8	50 feet east of North Manlius Road, approximately 17 feet north from the corner of the Manlius Center Community Church.
9	75 feet south of Route 290, approximately 450 feet east of Manor Drive.

*All distances measured from centerline of existing pavements.

Noise monitoring equipment consisted of a Metrosonics dB-306 Metrologger, Model 306/16 sound level meter. This meter was calibrated by a Metrosonics CL-302 calibrator before and after each set of readings. Meteorological data was gathered using a Dwyer hand held wind meter and a Taylor Instrument Sling Psychrometer. All noise level readings were taken in decibels using the "A" weighting network which registers sound frequencies most closely corresponding to those heard by the human ear. L_{max} and L_{eq} noise levels were recorded for each monitoring location. The notation L_{max} is generally defined as the loudest noise level occurring during the measurement period. L_{eq} is the equivalent steady state sound level representative of a specific time interval. Measured noise levels will be described in L_{10} which is the sound level that is exceeded 10 percent of the time for the period under consideration ($L_{10} = L_{eq} + 3$ dBA).

Measured existing noise levels ranged from a low of 49 dBA (L_{10})at Site 3 to a high of 70 dBA (L_{10}) at Site 8. Table 3 lists the station number, activity category and corresponding A.M. and P.M. monitored noise levels. Within the project study area, 61 percent of the measured

noise levels were 65 dBA (L_{10}) or less. Areas of high noise levels were associated with locations near existing transportation routes such as Route 290, North Manlius Road, Burdick Street and Bowman Road. Areas of low noise levels were observed in or near undeveloped areas.

Noise levels for non-monitored sensitive locations of similar characteristics within the study area were estimated based upon the field measurements. They were adjusted for each particular location according to the noise attenuation rate of 3 dBA per doubling of distance for "hard" sites and 4.5 dBA per distance doubling for "soft" sites.

TABLE 3

MEASURED EXISTING NOISE LEVELS

Location	Activity Category	Abatement Criterion (L_{10})	A.M. L_{max}	A.M. L_{eq}	A.M. L_{10}*	P.M. L_{max}	P.M. L_{eq}	P.M. L_{10}*
1	B	70	79	63	66	75	62	65
2	D	NA	66	53	56	64	53	56
3	B	70	61	46	49	58	47	50
4	B	70	71	52	55	63	54	57
5	D	NA	70	59	62	71	58	61
6	B	70	87	65	68	80	62	65
7	D	NA	81	64	67	90	63	66
8	B	70	89	67	70	84	64	67
9	D	NA	74	60	63	77	61	64

*L_{10} levels computed by adding 3 dBA to measured L_{eq}.

B. Future Noise Environment

In the analysis of potential noise impacts within the project area, noise measurements were taken at nine representative locations and predictions were computed at various segments of each alternative. In order to fully assess the effects of each alternative, noise levels were computed for 1) future conditions for each of the alternatives, 2) future conditions if the project is not implemented and 3) existing conditions as discussed in the preceding section.

In order to determine the impact of the proposed project upon existing noise levels, design year (2011) traffic generated noise levels were calculated using the HUSH003 and Stamina 2.0/Optima Computer Programs. Design year noise levels were predicted for all alternatives under consideration including the no-build alternative and existing transportation system.

Among the parameters taken into consideration by the HUSH and Stamina noise prediction programs are total volume of traffic and vehicle mix (medium and heavy trucks, cars). In general, a vehicle mix with a higher volume of trucks will result in a higher noise level than one with a lower truck volume assuming equal speeds. For the build alternatives, the vehicle mix is 5 percent medium trucks, 2 percent heavy trucks and 93 percent automobiles. For the existing highway network and the no-build alternative, the vehicle mix ranges from 3.5 to 8 percent medium trucks, 2.5 to 7 percent heavy trucks and 85 to 94 percent autos. Other parameters taken into account are width of roadway, number of travel lanes, operating speeds, roadway grade, observer (receptor) distance and roadway angle in relation to the receptor.

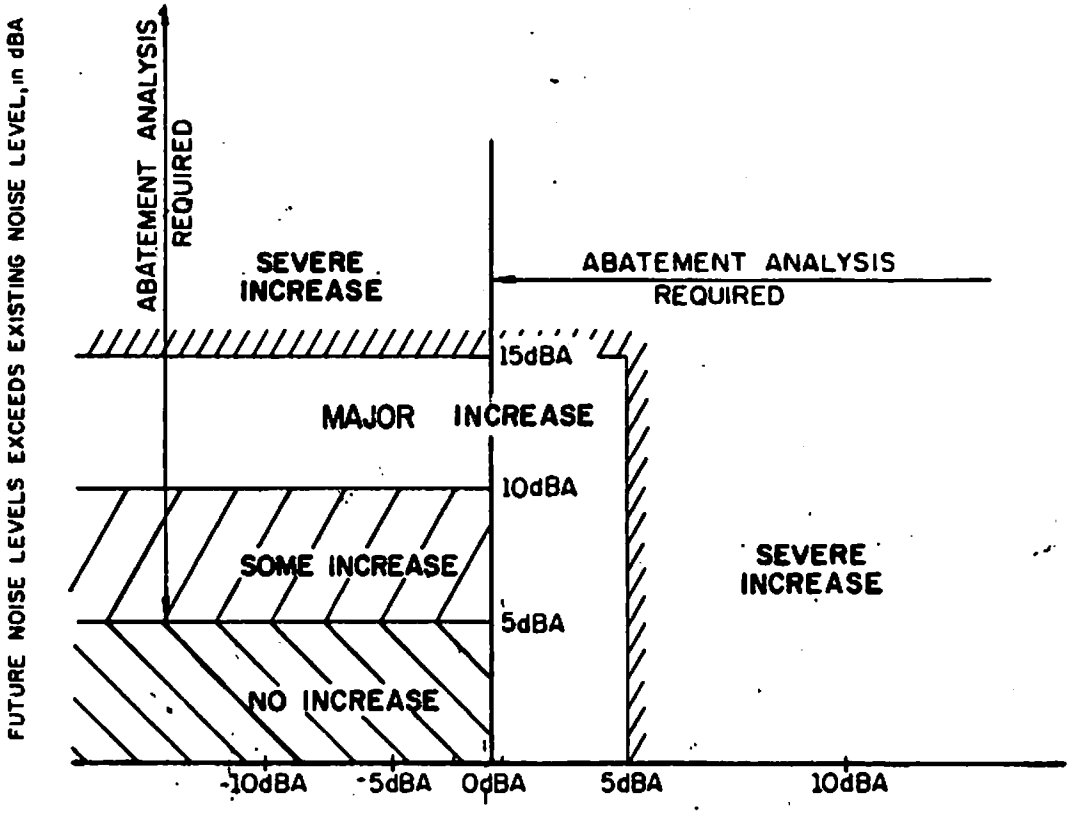
In the analysis of noise impacts which may occur as a result of this project, the Noise Abatement Criteria listed in Table 1, Page 8 represents absolute values of maximum acceptable levels of traffic generated noise. However, it has been demonstrated that annoyance or public reaction to an intruding noise for properties with a well defined exterior/interior (human) land use is also dependent on its relationship to the existing noise environment. An analysis of the above factors was conducted utilizing the "Noise Impact Evaluation Matrix" shown in Figure 5. This model basically states the following:

Future Exceeds Existing	Impact
0 to 5 dBA	None
6 to 10 dBA	Some
11 to 15 dBA	Major
Greater than 15 dBA	Severe

Future Exceeds Noise Abatement Criteria	Impact
0 to 5 dBA	Major
Greater than 5 dBA	Severe

FIGURE A-5

NOISE IMPACT EVALUATION MATRIX



Existing and predicted noise levels for the No-Build Alternative, the Build Alternatives and the existing Roadway Network are summarized in Table 4. For ease of description in Table 4, the Build Alternatives were divided into the following segments for noise analysis.

Segment 1 - I690/481 Interchange to Fisher Road (Alternatives 1 and 2)

Segment 2 - Fisher Road to Bowman Road (Alternatives 1 and 2)

Segment 3 - Bowman Road to Burdick Street (Alternatives 1, 2, 1-2, 2-1)

Segment 4 - Burdick Street to Routes 257/290 [Alternatives 1 and 2 (Option C)]

Segment 5 - Clemons Road Connection to Route 257 (Alternative 2, Option A)

Segment 6 - Abandoned Railroad to Route 290 (Alternative 2, Option B)

*See Figure A-4 for segment locations.

TABLE 4

NOISE ANALYSIS SUMMARY

Roadway	With Following Conditions	Worst Case Design Hour Traffic Volumes	Vehicle Breakdown % Med. Tk	% Hvy. Tk	% Auto	Traffic Speed (Auto, Tk.)	L_{10} (1) 70 dBA Contour Distance (CL Road)
Build Alternatives on New Location Analysis							
Segment 1	Alt. 1	1060 WB(AM) 1570 EB(PM)	5	2	93	55 (50)	116 Ft WB 170 Ft EB
	Alt. 2	990 WB(AM) 1315 EB(PM)	5	2	93	55 (50)	107 Ft WB 143 Ft EB
Segment 2	Alt. 1	830 WB(AM) 995 EB(PM)	5	2	93	55 (50)	84 Ft WB 100 Ft EB
	Alt. 2	730 WB(AM) 895 EB(PM)	5	2	93	55 (50)	73 Ft WB 88 Ft EB
Segment 3	Alt. 1	670 WB(AM) 805 EB(PM)	5	2	93	48 (42)	51 Ft WB 61 Ft EB
	Alt. 2	570 WB(AM) 705 EB(PM)	5	2	93	48 (42)	45 Ft WB 53 Ft EB
	Alt. 1-2 (2)	670 WB(AM) 805 EB(PM)	5	2	93	48 (42)	51 Ft WB 61 Ft EB
	Alt. 2-1 (2)	570 WB(AM) 705 EB(PM)	5	2	93	48 (42)	45 Ft WB 53 Ft EB

(1) L_{10} levels computed by adding 3 dBA to predicted L_{eq} levels.
(2) Alternatives 1-2 and 2-1 only analyzed at Segment 3. Remainder of segments same as Alternatives 1 and 2.

Segment 4	Alt. 1	580 WB(AM) 740 EB(PM)	5	2	93	50 (45)	50 Ft WB 65 Ft EB
	Alt. 2 (w/Option C)	480 WB(AM) 640 EB(PM)	5	2	93	50 (45)	43 Ft WB 56 Ft EB
Segment 5	Alt. 2A	730 WB(AM) 960 EB(PM)	5	2	93	50 (45)	64 Ft WB 90 Ft EB
Segment 6	Alt. 2B	690 WB(AM) 880 EB(PM)	5	2	93	50 (45)	60 Ft WB 80 Ft EB

Existing Roadway Analysis with Build and No-Build Conditions

Butternut Drive	1986 Existing	246	3.5	2.5	94	30 (30)	20 Ft.
	2011 No Build	655					36 Ft.
	All Build Alts.	485					30 Ft.
Fisher Rd.	1986 Existing	200	8	7	85	30 (30)	29 Ft.
	2011 No Build	315					38 Ft.
	All Build Alts.	715					64 Ft.
Bowman Rd.	1986 Existing	220	5	3	92	35 (35)	26 Ft.
	2011 No Build	345					32 Ft.
	All Build Alts.	540					44 Ft.
Burdick Rd.	1986 Existing	450	4	2	94	35 (35)	34 Ft.
	2011 No Build	820					49 Ft.
	Alts.1,2A,2C	830					50 Ft.
	Alt. 2B	990					56 Ft.
N. Manlius Road	1986 Existing	233	6	5	89	35 (35)	32 Ft.
	2011 No Build	785					69 Ft.
	All Build Alts.	785					69 Ft.
Ex. Route 290 (West of Fremont Rd)	1986 Existing	1100	5	2	93	40 (35)	68 Ft.
	2011 No BUild	2080					104 Ft.
	All Build Alts.	1150					70 Ft.

Ex. Route 290 (West of N. Manlius Rd.)	1986 Existing	1100	5	2	93	45 (40)	82 Ft.
	2011 No Build	1730					111 Ft.
	All Build Alts	810					67 Ft.
Ex. Route 290 (East of N. Manlius Rd.)	1986 Existing	1100	5	2	93	45 (40)	82 Ft.
	2011 No Build	1105					82 Ft.
	Alts. 1,2A,2B	1095					82 Ft.
	Alt. 2C	1095					82 Ft.
Ex. Route 257	1986 Existing	321	6	2	92	45 (40)	37 Ft.
	2011 No Build	650					60 Ft.
	Alt. 1	1005					79 Ft.
	Alts. 2A,2C	780					67 Ft.
	Alt. 2B	610					57 Ft.

In analyzing the noise impacts which will occur as a result of the build alternatives, the following was found.

Alternative	Number of Impacted Properties	Location
1	50 Residential[1]	Seg. 3 (Taylor Rd.) - 15 Res. Seg. 4 (Fremont Meadows Sub.) - 35 Res.
2A	27 Residential[2]	Seg. 3 (Wilson Dr.) - 11 Res. Seg. 3 (Kodiak Sub.) - 2 Res. Seg. 4 (Lee Terrace) - 14 Res.
2B	29 Residential[2]	Seg. 3 (Wilson Dr.) - 11 Res. Seg. 3 (Kodiak Sub.) - 2 Res. Seg. 4 (Lee Terrace) - 14 Res. Seg. 6 (N. Manlius Rd.) - 2 Res.
2C	27 Residential	Seg. 3 (Wilson Dr.) - 11 Res. Seg. 3 (Kodiak Sub.) - 2 Res. Seg. 4 (Lee Terrace) - 14 Res.
1-2A	27 Residential	Seg. 3 (Taylor Rd.) - 13 Res. Seg. 4 (Lee Terrace) - 14 Res.
1-2B	29 Residential	Seg. 3 (Taylor Rd.) - 13 Res. Seg. 4 (Lee Terrace) - 14 Res. Seg. 6 (N. Manlius Rd.) - 2 Res.
1-2C	27 Residential	Seg. 3 (Taylor Rd.) - 13 Res. Seg. 4 (Lee Terrace) - 14 Res.
2-1	47 Residential[1]	Seg. 3 (Taylor Rd.) - 12 Res. Seg. 4 (Fremont Meadows Sub.) - 35 Res.

*Note:

[1] 35 of these residential impacts occur at the proposed Fremont Meadows Subdivision.

[2] 2 of these residential impacts occur at the proposed Kodiak Subdivision.

All of the above impacts associated with the build alternatives are a result of predicted noise levels increasing six (6) to fourteen (14) dBA L_{10} above existing noise levels. In no instances do the build alternatives result in noise levels which exceed the federal noise abatement criteria level of 70 dBA L_{10} for residential properties.

Also, in no instances do noise impacts occur along the existing roadway network within the study area as a direct result of this project. Most residential properties along existing Route 290 are currently experiencing noise impacts and many will continue to experience noise impacts with or without this project. In addition, some properties along existing roadways within the study area will experience reduced noise levels (see

Table 4, Noise Analysis Summary, 70 dBA Contour Distances) with any of the build alternatives because traffic will be rerouted from existing roadways to the new facility.

Figures A-6 thru A-9 identify the 70 dBA L_{10} noise contour distances and noise impacts occurring with each build alternative. Table 5 provides further detailed noise data for the impacted areas.

As shown in Figure A-6, Alternative 1 passing just north of Clark Hill, impacts fifteen (15) residential properties along Taylor Road. Due to traffic generated noise levels along Burdick Street, these impacts begin approximately 250 feet west of Burdick and extend west to Bowman Road occurring primarily along backyard property lines adjacent to the proposed facility. Alternative 1 then crosses Burdick Street and continues southeast through the proposed Fremont Meadows Subdivision where present engineering plans indicate up to thirty-five (35) residential properties could be impacted.

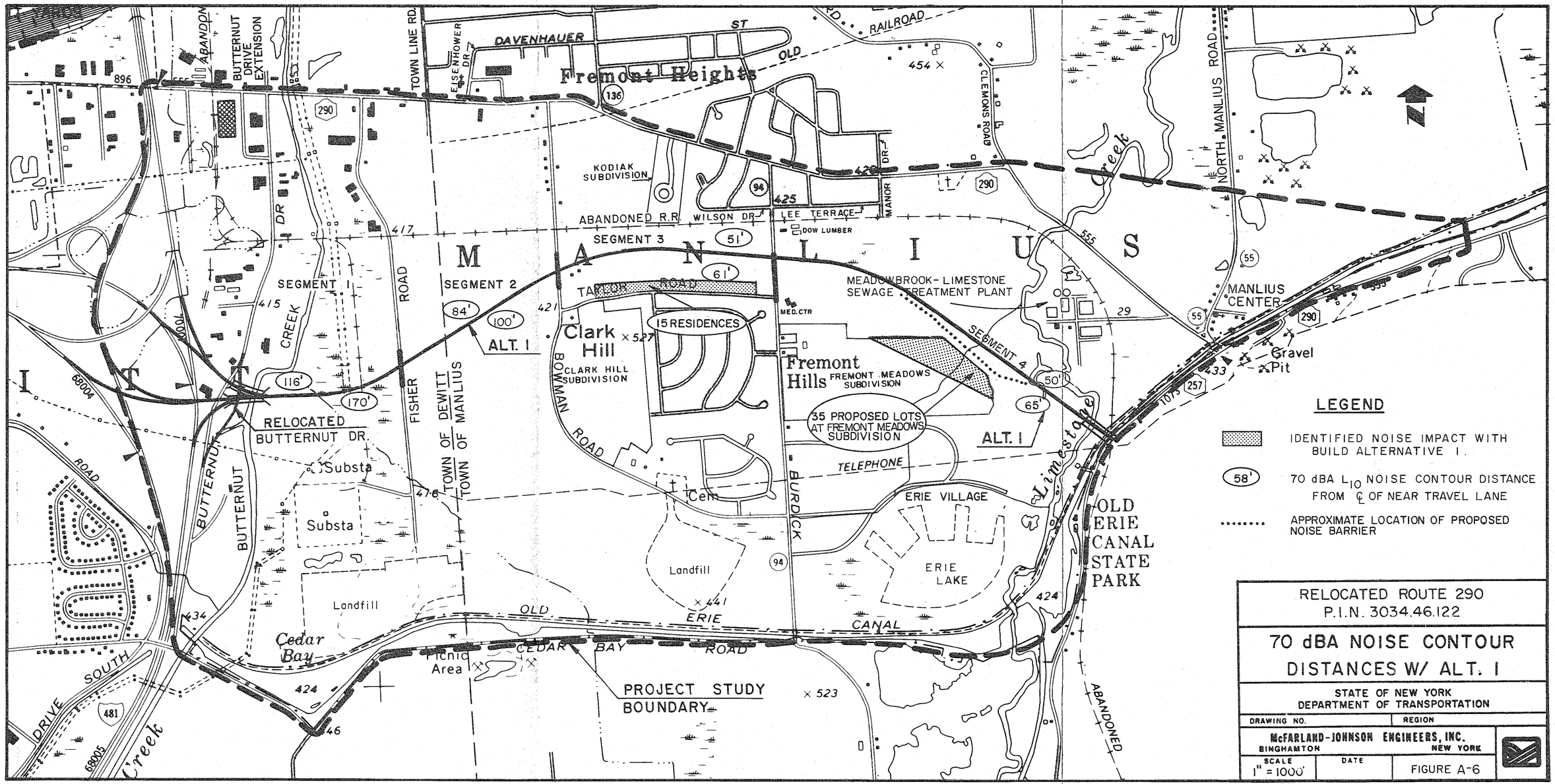
Alternative 2A (Figure A-7), by following the abandoned railroad, impacts eleven (11) residential properties off Wilson Drive and two (2) proposed lots at the Kodiak Subdivision. Due to traffic generated noise levels along Burdick Street, these impacts begin 300 feet west of Burdick Street and extend westward approximately 1,400 feet. Alternative 2A, continuing eastward, crosses Burdick Street and impacts fourteen (14) residential properties along Lee Terrace. Again, due to traffic noise along Burdick Street and the DOW Lumber Yard acting as a natural noise barrier, these impacts begin 500 feet east of Burdick Street and extend eastward to Manor Drive. All these impacts occur along the backyard property lines.

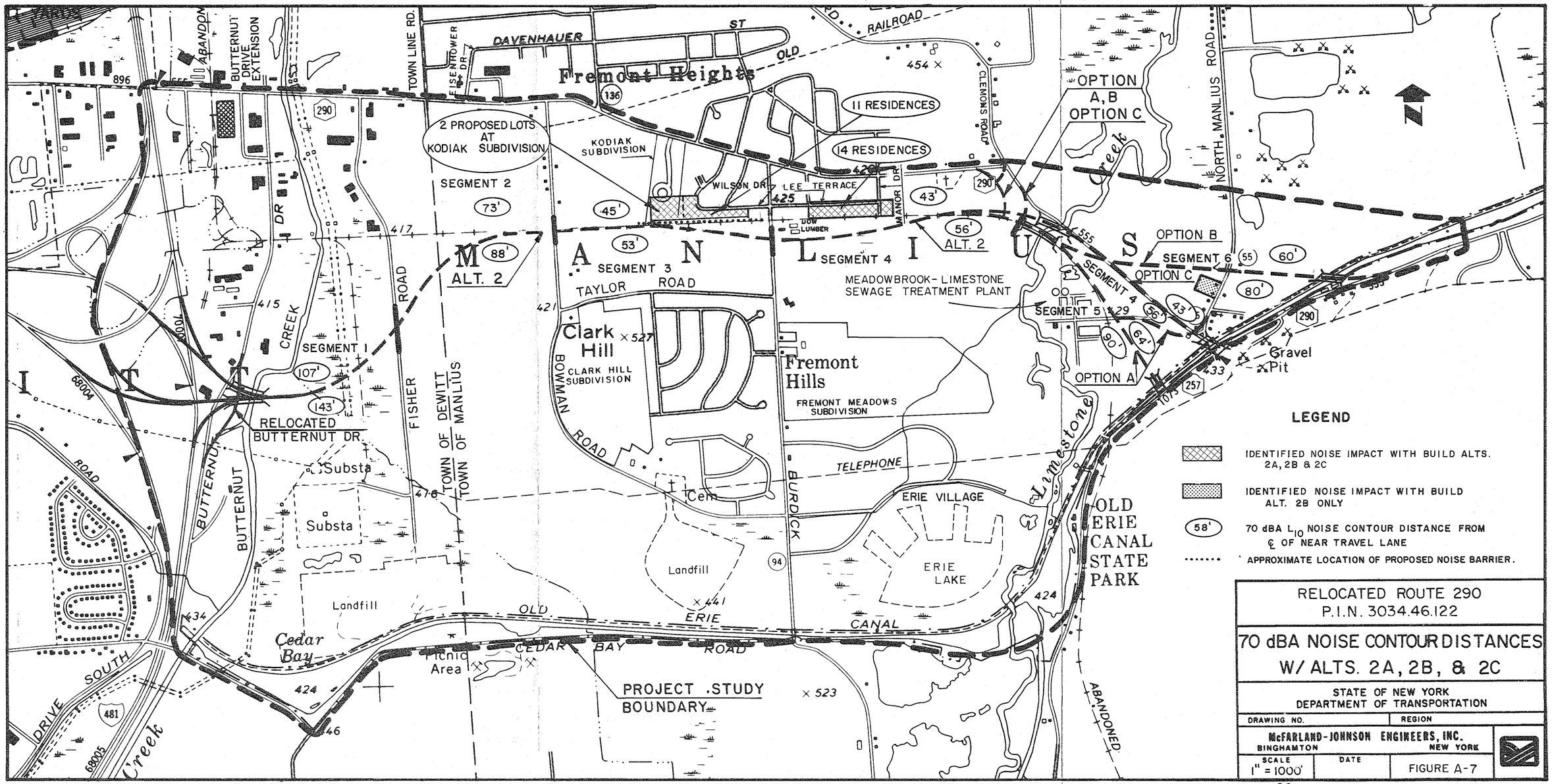
Alternative 2B (Figure A-7) impacts the same properties along Wilson Drive (11), the Kodiak Subdivision (2) and Lee Terrace (14). In addition, Alternative 2B also impacts two (2) residential properties along the west side of North Manlius Road immediately south of the alternative. These impacts also occur along the backyard property lines.

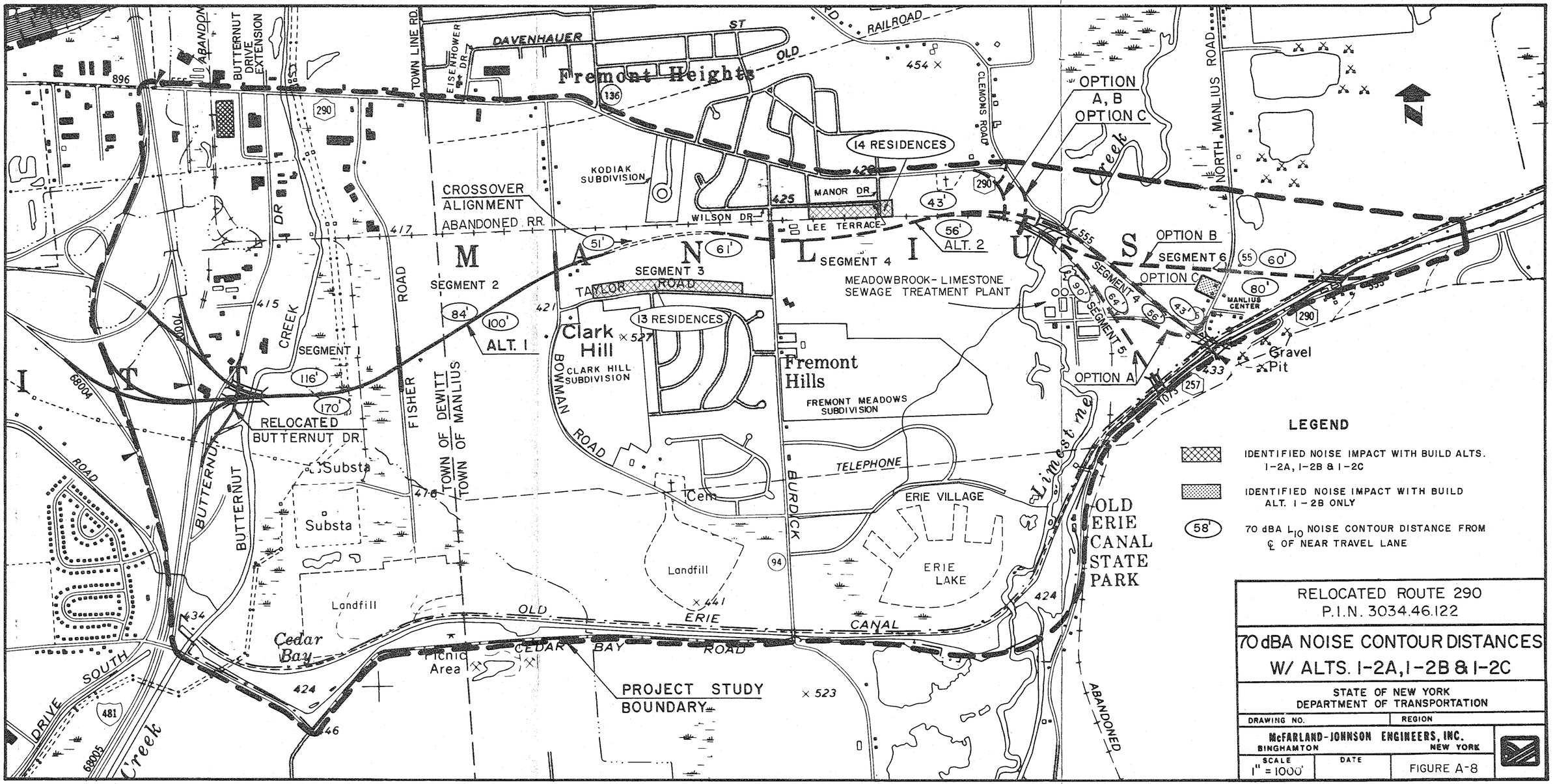
Alternative 2C (Figure A-7), following the same basic alignment as Alternatives 2A and 2B to a point 1,250 feet west of Limestone Creek, impacts the same properties as Alternative 2A.

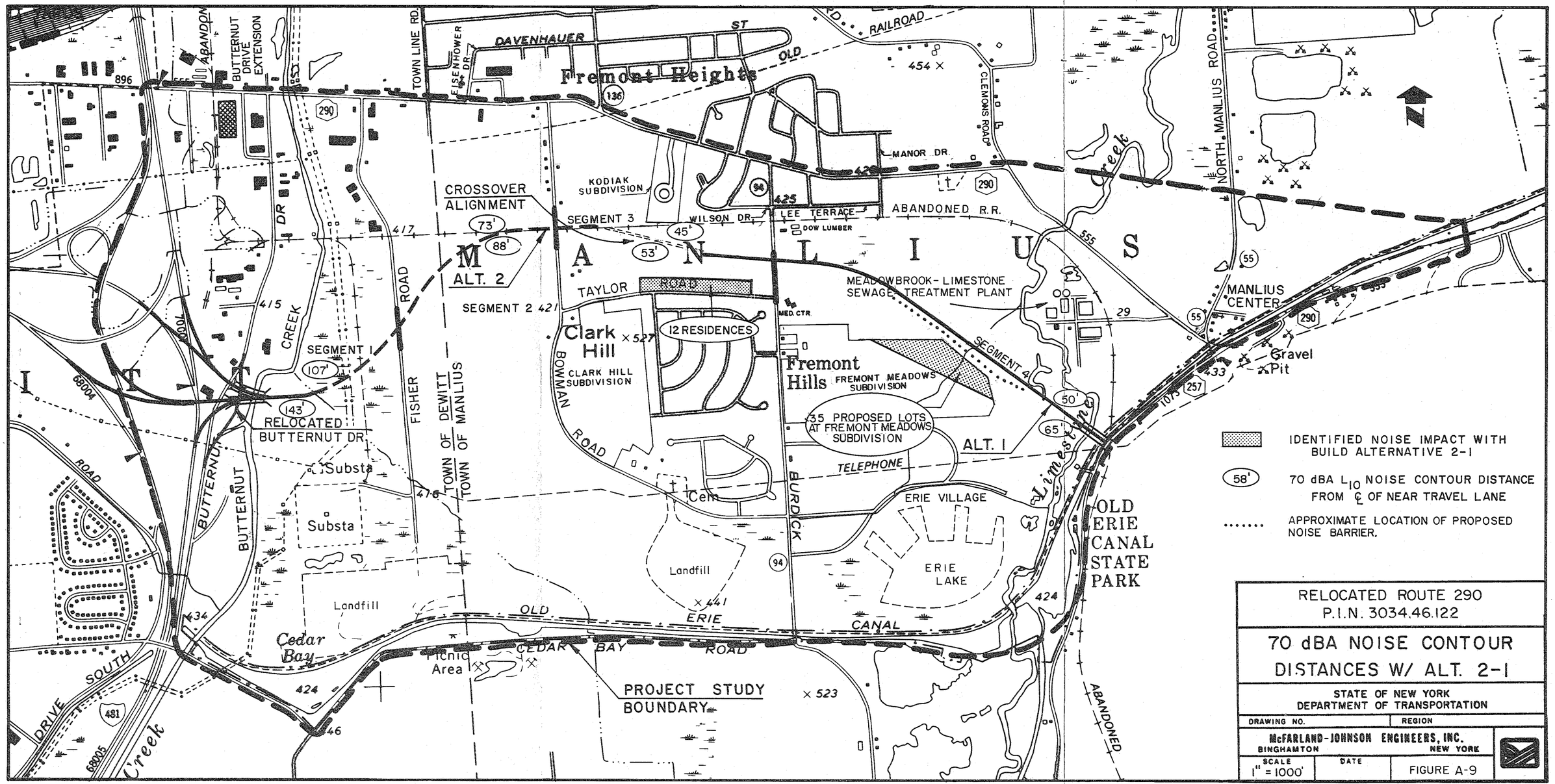
Alternatives 1-2A, 1-2B and 1-2C (Figure A-8) are crossover alignments from Alternative 1 to Alternative 2. By doing so, they impact thirteen (13) residential properties off Taylor Road and have the same impacts east of Burdick Street that occur with Alternatives 2A, 2B and 2C (i.e, Lee Terrace, North Manlius Road). The impacts along Taylor Road begin 400 feet west of Burdick Street due to traffic generated noise along Burdick and a more northerly alignment of Alternatives 1-2A, B and C than Alternative 1.

Alternative 2-1 (Figure A-9) follows the same alignment as Alternative 2 to a point 500 feet east of Bowman Road and then crosses over and becomes identical with Alternative 1. This alignment results in the same impacts as identified with Alternative 1 with the exception of three (3) less residential impacts off Taylor Road near Bowman Road due to a more northerly alignment than Alternative 1.


DAVENHAUER ST
OLD RAILROAD
Fremont Heights
TOWN LINE RD.
EISENHOWER DR.
ABANDONED
BUTTERNUT DRIVE EXTENSION
CLEMONS ROAD
NORTH MANLIUS ROAD
KODIAK SUBDIVISION
ABANDONED R.R.
WILSON DR.
LEE TERRACE
MANOR DR.
DOW LUMBER
SEGMENT 3
SEGMENT 2
SEGMENT 1
MANLIUS
MEADOWBROOK- LIMESTONE SEWAGE TREATMENT PLANT
MANLIUS CENTER
TAYLOR ROAD
MED.CTR
15 RESIDENCES
Clark Hill
CLARK HILL SUBDIVISION
Fremont Hills
FREMONT MEADOWS SUBDIVISION
35 PROPOSED LOTS AT FREMONT MEADOWS SUBDIVISION
SEGMENT 4
ALT. I
Gravel Pit
RELOCATED BUTTERNUT DR.
BUTTERNUT ROAD
BUTTERNUT CREEK
FISHER ROAD
TOWN OF DEWITT
TOWN OF MANLIUS
BOWMAN ROAD
BURDICK
TELEPHONE
ERIE VILLAGE
Limestone
OLD ERIE CANAL STATE PARK
ERIE LAKE
OLD ERIE CANAL
CEDAR BAY ROAD
Cedar Bay
Picnic Area
Substa
Landfill
Cem
SOUTH DRIVE
PROJECT STUDY BOUNDARY
ABANDONED
LEGEND
IDENTIFIED NOISE IMPACT WITH BUILD ALTERNATIVE I.
70 dBA L_{10} NOISE CONTOUR DISTANCE FROM ℄ OF NEAR TRAVEL LANE
APPROXIMATE LOCATION OF PROPOSED NOISE BARRIER
RELOCATED ROUTE 290
P.I.N. 3034.46.122
70 dBA NOISE CONTOUR DISTANCES W/ ALT. I
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE
FIGURE A-6


Fremont Heights
DAVENHAUER ST
OLD RAILROAD
ABANDONED
BUTTERNUT DRIVE EXTENSION
TOWN LINE RD.
EISENHOWER DR
896
290
136
454
CLEMONS ROAD
OPTION A, B
OPTION C
NORTH MANLIUS ROAD
Creek
11 RESIDENCES
14 RESIDENCES
2 PROPOSED LOTS AT KODIAK SUBDIVISION
KODIAK SUBDIVISION
SEGMENT 2
73'
WILSON DR
LEE TERRACE
MANOR DR
425
43'
45'
DOW LUMBER
56' ALT. 2
OPTION B
SEGMENT 6
55
60'
OPTION C
80'
417
M
88' ALT. 2
A
N
L
I
U
S
53'
SEGMENT 3
SEGMENT 4
SEGMENT 5
29
555
SEGMENT 4
TAYLOR ROAD
MEADOWBROOK-LIMESTONE SEWAGE TREATMENT PLANT
421
415
CREEK
FISHER ROAD
Clark Hill
×527
CLARK HILL SUBDIVISION
BOWMAN ROAD
Fremont Hills
FREMONT MEADOWS SUBDIVISION
56'
43'
64'
90'
OPTION A
433
257
107'
Gravel Pit
SEGMENT 1
107'
143'
I
T
T
68004
RELOCATED BUTTERNUT DR.
TOWN OF DEWITT
TOWN OF MANLIUS
Substa
Substa
416
Cem
TELEPHONE
BURDICK
ERIE VILLAGE
Limestone
OLD ERIE CANAL STATE PARK
ROAD
BUTTERNUT
BUTTERNUT
Landfill
94
ERIE LAKE
Landfill
×441
ERIE
CANAL
424
434
OLD
Cedar Bay
CEDAR BAY ROAD
Picnic Area
PROJECT STUDY BOUNDARY
×523
SOUTH
DRIVE
481
68005
46
Creek
ABANDONED
LEGEND
IDENTIFIED NOISE IMPACT WITH BUILD ALTS. 2A, 2B & 2C
IDENTIFIED NOISE IMPACT WITH BUILD ALT. 2B ONLY
58' 70 dBA L_{10} NOISE CONTOUR DISTANCE FROM ℄ OF NEAR TRAVEL LANE
APPROXIMATE LOCATION OF PROPOSED NOISE BARRIER.
RELOCATED ROUTE 290
P.I.N. 3034.46.122
70 dBA NOISE CONTOUR DISTANCES
W/ ALTS. 2A, 2B, & 2C
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE
FIGURE A-7


Fremont Heights
DAVENHAUER ST
OLD RAILROAD
TOWN LINE RD.
EISENHOWER DR.
ABANDONED
BUTTERNUT DRIVE EXTENSION
CLEMONS ROAD
NORTH MANLIUS ROAD
OPTION A, B
OPTION C
14 RESIDENCES
KODIAK SUBDIVISION
CROSSOVER ALIGNMENT
ABANDONED RR
MANOR DR.
WILSON DR.
LEE TERRACE
ALT. 2
OPTION B
SEGMENT 6
OPTION C
MANLIUS CENTER
SEGMENT 4
SEGMENT 5
OPTION A
SEGMENT 2
SEGMENT 3
TAYLOR ROAD
ALT. 1
MEADOWBROOK-LIMESTONE SEWAGE TREATMENT PLANT
13 RESIDENCES
Clark Hill
CLARK HILL SUBDIVISION
Fremont Hills
FREMONT MEADOWS SUBDIVISION
Gravel Pit
RELOCATED BUTTERNUT DR.
FISHER ROAD
BOWMAN ROAD
BURDICK
TOWN OF DEWITT
TOWN OF MANLIUS
BUTTERNUT CREEK
Substa
Cem
TELEPHONE
ERIE VILLAGE
Landfill
ERIE LAKE
OLD ERIE CANAL STATE PARK
Limestone Creek
OLD ERIE CANAL
CEDAR BAY ROAD
Cedar Bay
Picnic Area
PROJECT STUDY BOUNDARY
SOUTH DRIVE
ABANDONED
Creek
LEGEND
IDENTIFIED NOISE IMPACT WITH BUILD ALTS. I-2A, I-2B & I-2C
IDENTIFIED NOISE IMPACT WITH BUILD ALT. I-2B ONLY
70 dBA L_{10} NOISE CONTOUR DISTANCE FROM ℄ OF NEAR TRAVEL LANE
RELOCATED ROUTE 290
P.I.N. 3034.46.122
70 dBA NOISE CONTOUR DISTANCES
W/ ALTS. I-2A, I-2B & I-2C
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE
FIGURE A-8


ABANDONED
BUTTERNUT DRIVE EXTENSION
TOWN LINE RD.
EISENHOWER DR.
DAVENHAUER ST
OLD RAILROAD
Fremont Heights
CLEMONS ROAD
NORTH MANLIUS ROAD
MANOR DR.
KODIAK SUBDIVISION
CROSSOVER ALIGNMENT
SEGMENT 3
WILSON DR.
LEE TERRACE
ABANDONED R.R.
DOW LUMBER
MANLIUS
CREEK
ROAD
ALT. 2
SEGMENT 2
TAYLOR ROAD
MEADOWBROOK- LIMESTONE SEWAGE TREATMENT PLANT
MED. CTR.
MANLIUS CENTER
Clark Hill
CLARK HILL SUBDIVISION
12 RESIDENCES
SEGMENT 1
SEGMENT 4
Fremont Hills
FREMONT MEADOWS SUBDIVISION
35 PROPOSED LOTS AT FREMONT MEADOWS SUBDIVISION
ALT. 1
Gravel Pit
RELOCATED BUTTERNUT DR.
FISHER ROAD
BOWMAN ROAD
BURDICK
TELEPHONE
Limestone Creek
TOWN OF DEWITT
TOWN OF MANLIUS
Substa
Cem
ERIE VILLAGE
OLD ERIE CANAL STATE PARK
ERIE LAKE
Landfill
OLD ERIE CANAL
CEDAR BAY ROAD
Cedar Bay
Picnic Area
SOUTH DRIVE
Creek
ABANDONED
PROJECT STUDY BOUNDARY
IDENTIFIED NOISE IMPACT WITH BUILD ALTERNATIVE 2-1
70 dBA L_{10} NOISE CONTOUR DISTANCE FROM ℄ OF NEAR TRAVEL LANE
APPROXIMATE LOCATION OF PROPOSED NOISE BARRIER.
RELOCATED ROUTE 290
P.I.N. 3034.46.122
70 dBA NOISE CONTOUR DISTANCES W/ ALT. 2-1
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE
FIGURE A-9

Identified in Table 5 are typical noise levels which will occur at the identified impact areas.

TABLE 5

TYPICAL DESIGN YEAR (2011) NOISE LEVELS (L_{10}) at Impacted Areas*

Site	Existing Noise Level **	Design Year (2011) Noise Level with Project	Noise Level Increase	Number of Properties Impacted
Wilson Drive w/Alts. 2A, B, C	56	64	8	11
Kodiak Sub-division w/Alts. 2A, B, C	56	62	6	2
Taylor Road w/Alt. 1	51	62	11	15
Taylor Road w/Alts. 1-2 A, B & C	51	60	9	13
Taylor Road w/Alt. 2-1	51	59	8	12
Lee Terrace w/Alts. 2A, B, C & 1-2A, B, C	55	63	8	14
Fremont Meadows Sub. w/Alts. 1 & 2-1	50	64	14	35
N. Manlius Rd. w/Alts. 2B, 1-2B	59	68	9	2

*L_{10} noise levels computed by adding 3 dBA to L_{eq} levels.

**Existing noise levels not measured were referenced to monitoring site with similar characteristics and background conditions.

C. Noise Mitigation and Recommendations

In those areas where noise impacts have been identified, various mitigative measures were investigated. As a result, the following conclusions have been made regarding noise abatement for this project.

1. Noise insulation of structures is not a possible abatement measure since soundproofing of private dwellings is not permitted under current New York State Law.

2. Traffic management abatement measures such as truck restrictions, reduced speed limits and lane restrictions are not applicable to this project since the proposed facility is a controlled access expressway facility with a 55 mph speed limit.

3. Various physical, cultural and natural features within the study area posed constraints with respect to the positioning and alignment of the design alternatives. Precautions were taken when positioning alternatives between Fremont Hills (Taylor Road) and Fremont Heights (Wilson Road, Lee Terrace) to avoid as many residential noise impacts as possible.

4. The use of noise barriers is the only feasible noise abatement measure available for this project.

All impacts occurring as a result of this project were investigated in regards to possible mitigation with noise barriers.

The installation of noise barriers along Alternatives 2A, B or C as they parallel the proposed Kodiak Subdivision is possible but due to the preliminary nature of the design of both this project and the subdivision, their effectiveness in terms of mitigation are general estimates at this time. It is recommended that additional analysis is performed at this site once the subdivision is fully developed and prior to the start of highway construction.

It can be assumed that installation of a noise barrier along Wilson Drive with either Alternatives 2A, B or C will provide some noise attenuation (2-3 dBA L_{10}) to the adjacent Kodiak Subdivision. The barrier could also be extended westward to provide maximum attenuation at the subdivision.

Also, the installation of a noise barrier along Alternatives 2B or 1-2B as it crosses North Manlius Road is not feasible due to its poor cost effectiveness (i.e., high barrier cost vs. two (2) residences protected).

Therefore, the only areas where barriers can be closely investigated are Wilson Drive (Monitored Site 4), Taylor Road (Monitored Site 3), Lee Terrace (Monitored Site 6) and the Fremont Meadows Subdivision (similar to Monitored Site 3).

Wilson Drive - This site consists of a grouping of 11 residential properties which will be impacted by Alternatives 2A, 2B or 2C. These impacts are a result of noise increases over existing levels of 5.5 to 8 dBA L_{10}. Preliminary calculations indicate that a 1,200 foot long 10 foot high barrier would result in noise reductions of approximately 2 to 6 dBA L_{10} at the eleven impacted residences. This 6 dBA noise reduction would equate to present day or existing background noise levels. Approximate

cost would be $180,000 or $16,364 per residence. The barrier is presently designed on the abandoned railroad bed and could be shifted slightly (as can Alternatives 2A, 2B and 2C) to help reduce impacts and barrier costs (see Figure A-10).

Taylor Road - This site consists of a grouping of 15 residential properties which would be impacted with Alternative 1. Of this 15, only twelve residences would be impacted by Alternative 2-1 and 13 residences with Alternative 1-2. These impacts are a result of noise increases over existing levels of 5.5 to 11 dBA L_{10}. With Alternative 1, preliminary calculations indicate that a 2,270 foot long 10 foot high barrier will result in noise reductions of only 0-3 dBA L_{10} resulting in an acoustically ineffective noise barrier. Approximate costs would be $340,500 or $22,700 per residence. Increasing the barrier height to 12 feet will increase noise reductions by only 1 dBA L_{10} and increase costs by $68,100 or approximately $4,540 per residence.

With Alternative 2-1, preliminary calculations indicate that a 1,500 foot long 10 foot high barrier will result in noise reductions of 0 to 3 dBA L_{10} at the twelve impacted residences resulting in a total cost of approximately $225,000 or $18,750 per residence. Increasing the barrier height to 12 feet would increase noise reductions by only 1 dBA L_{10} and increase costs by $45,000 or $3,750 per residence. Again, this barrier would be acoustically ineffective and is not recommended.

With Alternative 1-2, preliminary calculations indicate that a 2,000 foot long by 10 foot high barrier will result in noise reductions of 0-3 dBA L_{10} at the thirteen impacted residences. Total costs would be $300,000 or $23,077 per residence. Increasing the barrier height to 12 feet would increase noise reductions by only 1 dBA L_{10} and increase costs by $60,000 or $4,615 per residence. This barrier is also acoustically ineffective and therefore not recommended.

Lee Terrace - This site consists of a grouping of 14 residential properties which would experience impacts as a result of noise increases of 5.5 to 8 dBA L_{10} over existing conditions. These impacts would occur with any of the following alternatives: 2A, 2B, 2C, 1-2A, 1-2B and 1-2C. Preliminary calculations indicate that a 1,700 foot long, 10 foot high barrier will result in noise reductions of approximately 0 to 3 dBA L_{10}. Approximate costs for this barrier would be $255,000 or $18,214 per residence. Increasing the barrier height to 12 feet will increase noise reductions by only 1 dBA L_{10} and increase costs by $51,000 or $3,643 per residence. A barrier at this site would be acoustically ineffective as only a 3 dBA reduction would occur with a 10 foot high barrier.

Fremont Meadows - This is a 158 unit subdivision presently under construction. Up to 35 proposed units within Fremont Meadows could be impacted with either Alternatives 1 or 2-1. These impacts would be a result of noise levels increasing by up to 14 dBA L_{10} over existing present day levels. With either Alternatives 1 or 2-1, preliminary calculations indicate that a 2,100 foot long 14 foot high barrier on top of a 10 foot high earth berm would result in noise reductions of 5 to 11 dBA L_{10} at nineteen of the impacted proposed units (see Figure A-10). The other sixteen units would receive noise reductions of 2-4 dBA L_{10}. Total cost of this barrier

would be approximately $651,000 or $34,263 per residence (above 5 dBA noise reduction).

A noise barrier at this location appears to be both acoustically effective and cost effective. However, due to the fact that;

- o The subdivision is not yet fully developed and changes in engineering plans could affect the noise analysis/barrier design;

and

- o The proposed Route 290 relocation project is a staged construction project which could affect the noise analysis/barrier design at this site;

it is recommended that additional analysis be performed at this site once the subdivision is fully developed and prior to the start of highway construction. This will help to realistically re-establish background noise levels and reaffirm the required noise analysis and barrier recommendations.

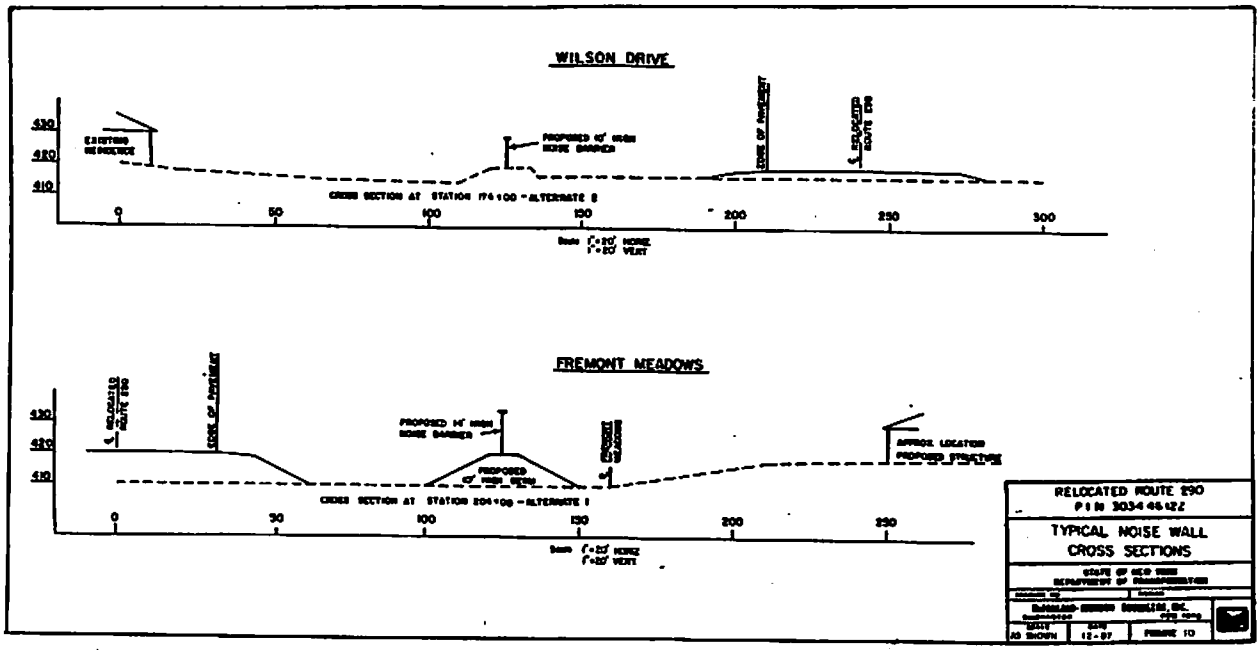
Shown below is a brief summary of the noise barrier investigations:

Possible Barrier Location	With Alternative	No. of Residences Affected	Barrier Cost Per Residence*	Maximum Attenuation
Wilson Drive	2A, 2B, 2C	11	$16,364	6 dBA
Lee Terrace	2A, 2B, 2C 1-2A, 1-2B, 1-2C	14	$18,214	3 dBA
Taylor Road	1	15	$22,700	3 dBA
	2-1	12	$18,750	3 dBA
	1-2	13	$23,077	3 dBA
Fremont Meadows	1, 2-1	35	$34,263	11 dBA

*Barrier cost based on $15/sq.ft.

Preliminary investigations suggest that noise barriers along Taylor Road and Lee Terrace result in minor noise reductions, thus suggesting that noise barriers at these sites would be acoustically ineffective and are not recommended. A noise barrier along Wilson Drive although not attaining the desired 10 dBA noise reduction per residence, does result in noise attentuation (i.e., 6 dBA) which compares to existing conditions. Also, a noise barrier at Fremont Meadows, although cost effective and acoustically effective, warrants additional studies once the subdivision is completed.

Figure A-10



The Department will continue to coordinate with local officials and the affected community regarding the desirability, effectiveness and need for appropriate noise mitigation through the final design stages of this project.

D. Coordination with Local Officials

As part of the project development process, local officials of the Towns of DeWitt and Manlius in addition to officials of Onondaga County will receive copies of this report. The findings of the noise study outlined in this report should aid the Towns and County in planning future development within the project area. The 70 dBA noise contour distances given in this report will be useful in establishing setbacks from the proposed facility that will ensure the compatibility of future land use with the appropriate design noise levels.

V - Construction Noise

Construction related noise can result in significant short term impacts, the duration and magnitude of which will vary widely during the period of construction. The parameters which determine the nature and magnitude of the construction noise impacts include the type, age and condition of construction equipment, operation cycles, the number of pieces of construction equipment being run simultaneously, the distance between the construction activities and receptors and the location of haul routes with respect to receptors. These parameters cannot be precisely defined until the specific location of the proposed highway has been determined and final plans and specifications have been prepared and the contractor has a work schedule. However, in order to gain a general insight into the potential construction noise impacts which may result from this project, the noise characteristics of various types of construction equipment should be identified. Table 6 provides a list of typical noise levels associated with various pieces of construction equipment.

TABLE 6

TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS

Type of Equipment	Typical Sound Level at 50 feet (dBA L_{eq})
Dump Truck	88
Portable Air Compressor	81
Concrete Mixer (Truck)	85
Jack Hammer	88
Scraper	88
Dozer	87
Paver	89
Generator	76
Piledriver	101
Rock Drill	98
Pump	76
Pneumatic Tools	85
Backhoe	85

Source: USDOT Federal Highway Administration "Highway Construction Noise: Measurement, Protection and Mitigation".

It is too early to determine the specific number and types of construction equipment to be used on this project and therefore impossible to accurately predict the total noise level resulting from the simultaneous operation of various pieces of equipment. However, noise predictions at various distances from the construction site for individual pieces of equipment can be developed by applying the distance attenuation rate of 6 dBA per distance doubling (point sources) to the typical sound levels identified in Table 6.

This project is anticipated to be a staged construction project and occurs in an area of numerous open spaces. Therefore, construction noise

impacts will be limited to residential areas. These areas will be located primarily in the saddle area between Taylor Road and Wilson Drive.

All of the build alternatives which are near residentially developed areas would result in short term construction noise impacts. Construction noise in these areas will be a result of paving and/or earthmoving operations and result in levels of approximately 85 to 90 dBA (L_{10}). However, it should be noted that these are moving operations and would result in short term impacts at specific sites during the construction period which is anticipated to last 2 construction seasons.

The specific construction noise mitigation measures which will be used on this project cannot be fully determined at this time since the construction activities and equipment needed and the length of time and operating cycle cannot yet be accurately determined.

However, control of noise at the source can be accomplished by the following actions:

- Use of less noisy equipment in good working order.
- Restrictions on the hours of operation, work locations and the number of simultaneous operations allowed within a specific area.
- Locating stationary equipment as far as possible from sensitive receptors such as high density residential areas.
- Routing off site hauling away from densely populated areas and other noise sensitive sites.
- Early construction of noise barriers in areas where they have been recommended to help negate construction noise.

Tolerance of noise at the receptor is possible through a public relations and community awareness program featuring the following elements:

- Scheduled news releases, paid ads and/or specific brochures to make the public aware of upcoming construction activities and the anticipated severity and duration of the attendant noise.
- Coordination of construction activities with local officials.

The mitigation of construction noise for the proposed project will be continuously evaluated during the detail design phase of this project. Those measures which are determined to be effective and feasible will be included in the Contract Documents.

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APPENDIX B

TERRESTRIAL AND AQUATIC ECOLOGY ANALYSIS

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
P.I.N. 3034.46

RELOCATED ROUTE 290
BUTTERNUT INTERCHANGE TO MANLIUS CENTER
TOWNS OF DEWITT/MANLIUS
ONONDAGA COUNTY

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I. Introduction

The purpose of this report is to briefly inventory the aquatic and terrestrial flora and fauna within the study area identified below, to assess the potential impacts of the proposed project and to outline temporary and permanent measures that could minimize any identified impacts.

The location of the proposed project is shown in Figure B-1. The project is listed under New York State Department of Transportation Project Identification Number (PIN) 3034.46 - "Relocated Route 290, Butternut Interchange to Manlius Center, Onondaga County". It provides for a Relocated Route 290 in the Towns of DeWitt and Manlius and a four lane arterial highway on new location with at grade signalized intersections. As shown in Figure B-2, the proposed facility begins at the Butternut Interchange, proceeds in an easterly direction for approximately three (3) miles and terminates with a direct connection to Route 290 or 257 in the vicinity of Manlius Center.

Bridges will be provided at the proposed crossings of Butternut Creek, Limestone Creek and the Old Erie Canal.

II. Environmental Setting

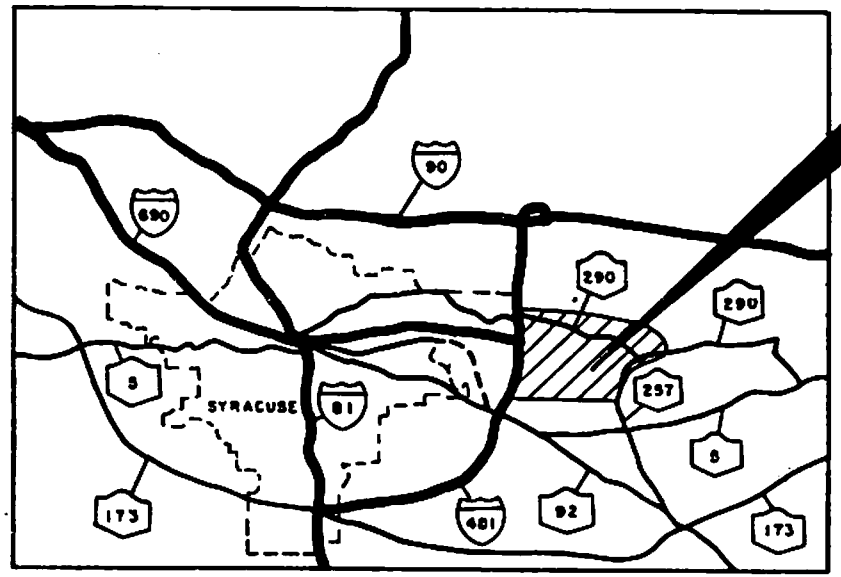
A. General

The project study area is located within the Towns of DeWitt and Manlius east of the City of Syracuse. At this general location, the southern Allegheny Plateau ends and the northern Erie-Ontario Plain begins. The Onondaga Limestone escarpment is the divider between these two physiographic designations. Predominant soil associations were derived from glacial deposits containing varying amounts of limestone, shale and sandstone.

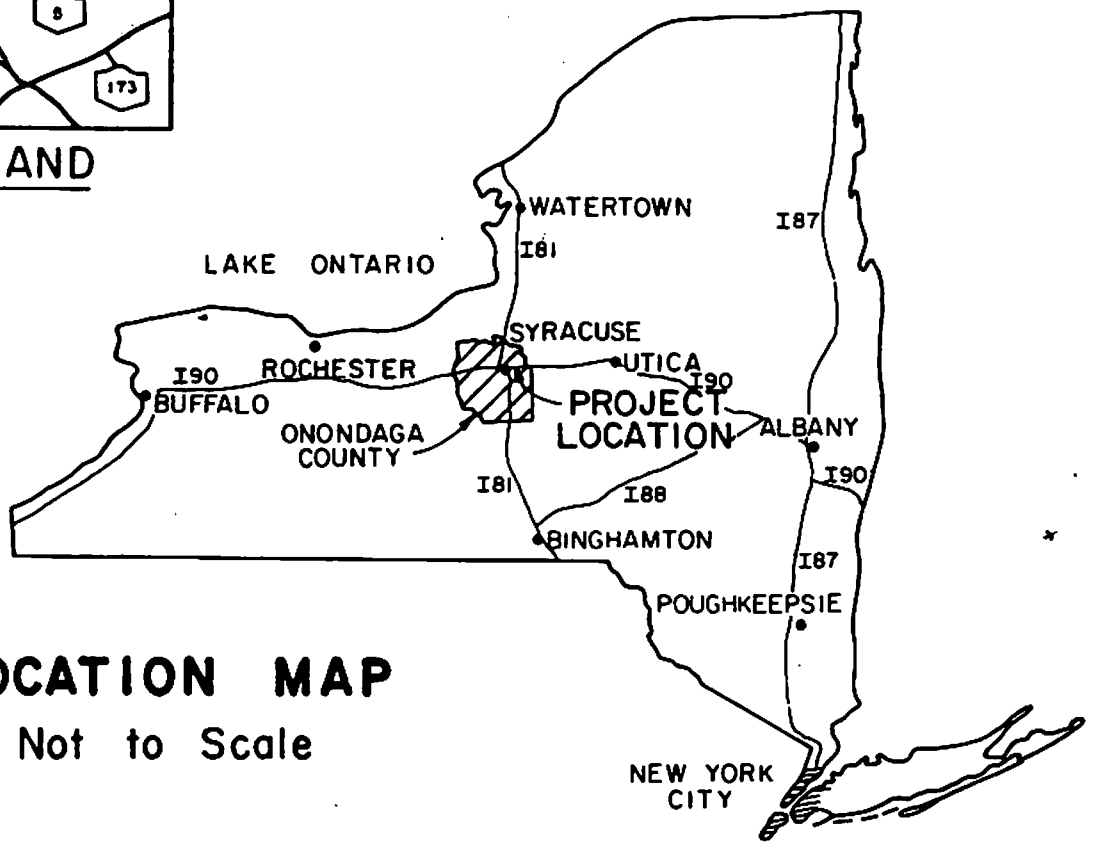
The topography of the area is relatively level to rolling with two prominent hills and numerous poorly drained areas. The general slope of the land is south to north.

The western portion of the study area is drained by Butternut Creek while the eastern portion is drained by Limestone Creek. There are six (6) water courses located within the study area encompassing approximately 53,500 lineal feet of stream channel ranging from the Old Erie Canal to large streams with intermittent tributaries. Stream depth ranges from inches to 10-15 feet.

Wetland vegetation encompasses some 7,385 (plus or minus) acres throughout the Towns of DeWitt and Manlius. Approximately 790 (plus or minus) acres of that total wetland acreage is located within the project study area. Of this 790 acres of wetland vegetation, 775 acres are NYSDEC protected wetlands.



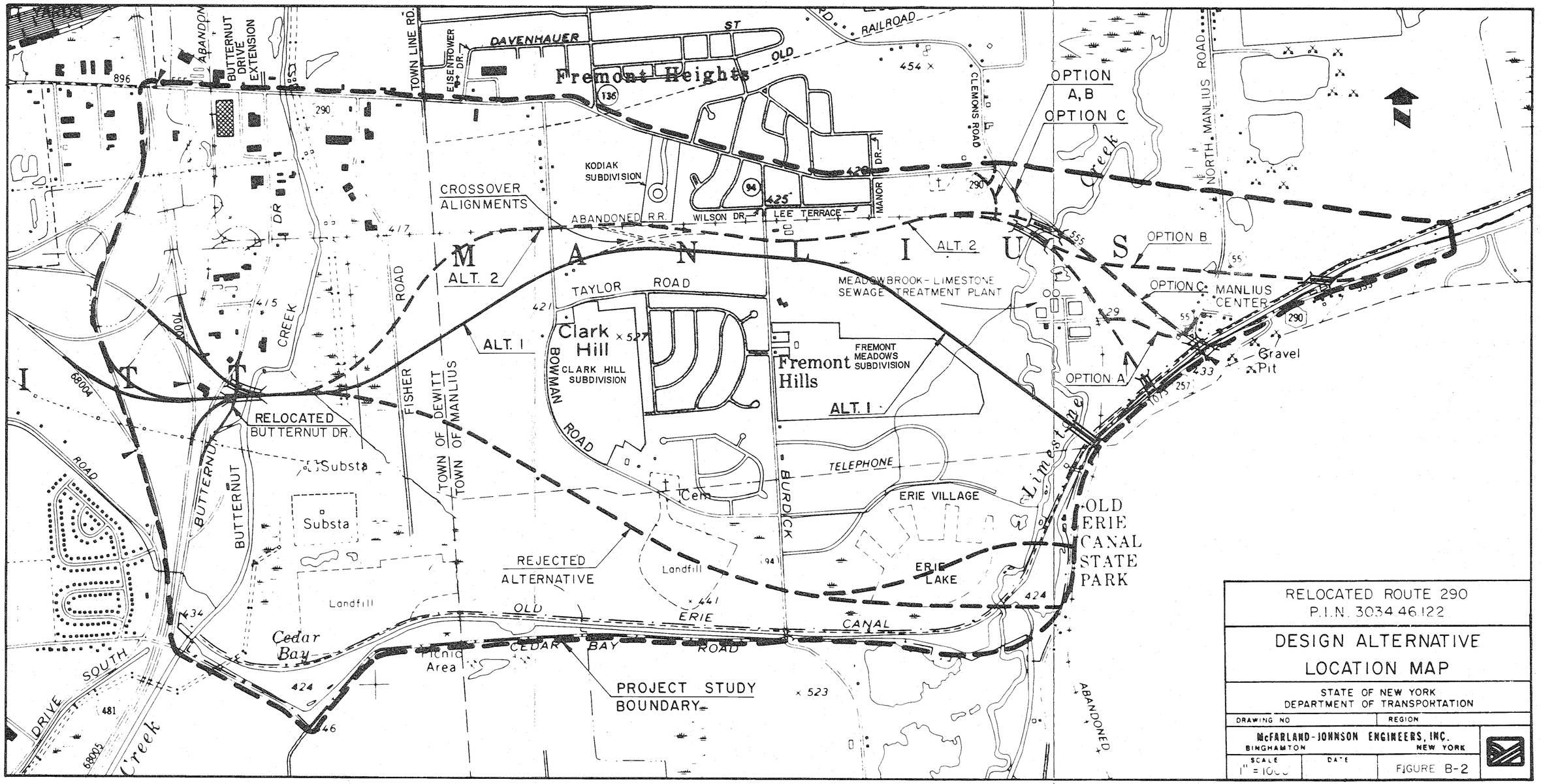
PROJECT LOCATION BAND



LOCATION MAP

Not to Scale

FIGURE B-1


RELOCATED ROUTE 290
P.I.N. 3034 46122
DESIGN ALTERNATIVE
LOCATION MAP
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE
1" = 1000
DATE
FIGURE B-2
CROSSOVER ALIGNMENTS
ALT. 2
ALT. 1
OPTION A, B
OPTION C
OPTION A
OPTION B
OPTION C
RELOCATED BUTTERNUT DR.
REJECTED ALTERNATIVE
PROJECT STUDY BOUNDARY
Fremont Heights
Clark Hill
CLARK HILL SUBDIVISION
Fremont Hills
FREMONT MEADOWS SUBDIVISION
KODIAK SUBDIVISION
MEADOWBROOK - LIMESTONE SEWAGE TREATMENT PLANT
MANLIUS CENTER
ERIE VILLAGE
ERIE LAKE
OLD ERIE CANAL STATE PARK
Gravel Pit
Landfill
Cedar Bay
Picnic Area
ABANDONED RR
TAYLOR ROAD
DAVENHAUER ST
WILSON DR.
LEE TERRACE
MANOR DR.
CLEMONS ROAD
NORTH MANLIUS ROAD
TOWN LINE RD.
EISENHOWER DR.
BUTTERNUT DRIVE EXTENSION
BUTTERNUT DR
FISHER ROAD
BOWMAN ROAD
BURDICK
TELEPHONE
OLD ERIE CANAL
CEDAR BAY ROAD
SOUTH DRIVE
TOWN OF DEWITT
TOWN OF MANLIUS
Limestone Creek
Butternut Creek
N

B. Terrestrial Flora

Natural vegetation within the project study area is dominated by four (4) community types: upland successional fields, emergent wetland, flooded deciduous shrubs and flooded deciduous trees. In addition, the study area contains approximately 93 acres of agricultural croplands.

A vegetation/land cover analysis of the area was performed during the spring and summer of 1985 and 1986. Mapping showing the various existing community types is presented in Figure B-3. Within the identified community types, a wide variety of plant species occur. The following is a list of some of the more common plant species found in each of these community types:

1. Flooded Deciduous Trees

Red Maple (Acer rubrum)
Silver Maple (Acer saccharinum)
Eastern Cottonwood (Populus deltoides)
American Elm (Ulumus americana)
Green Ash (Fraxinus pennsylvanica)
Box Elder (Acer negundo)
Willow (Salix spp.)

This community is identified as containing 25% or more of species 15 feet or more in height. Common associates and understory species would be those species identified under flooded deciduous shrubs.

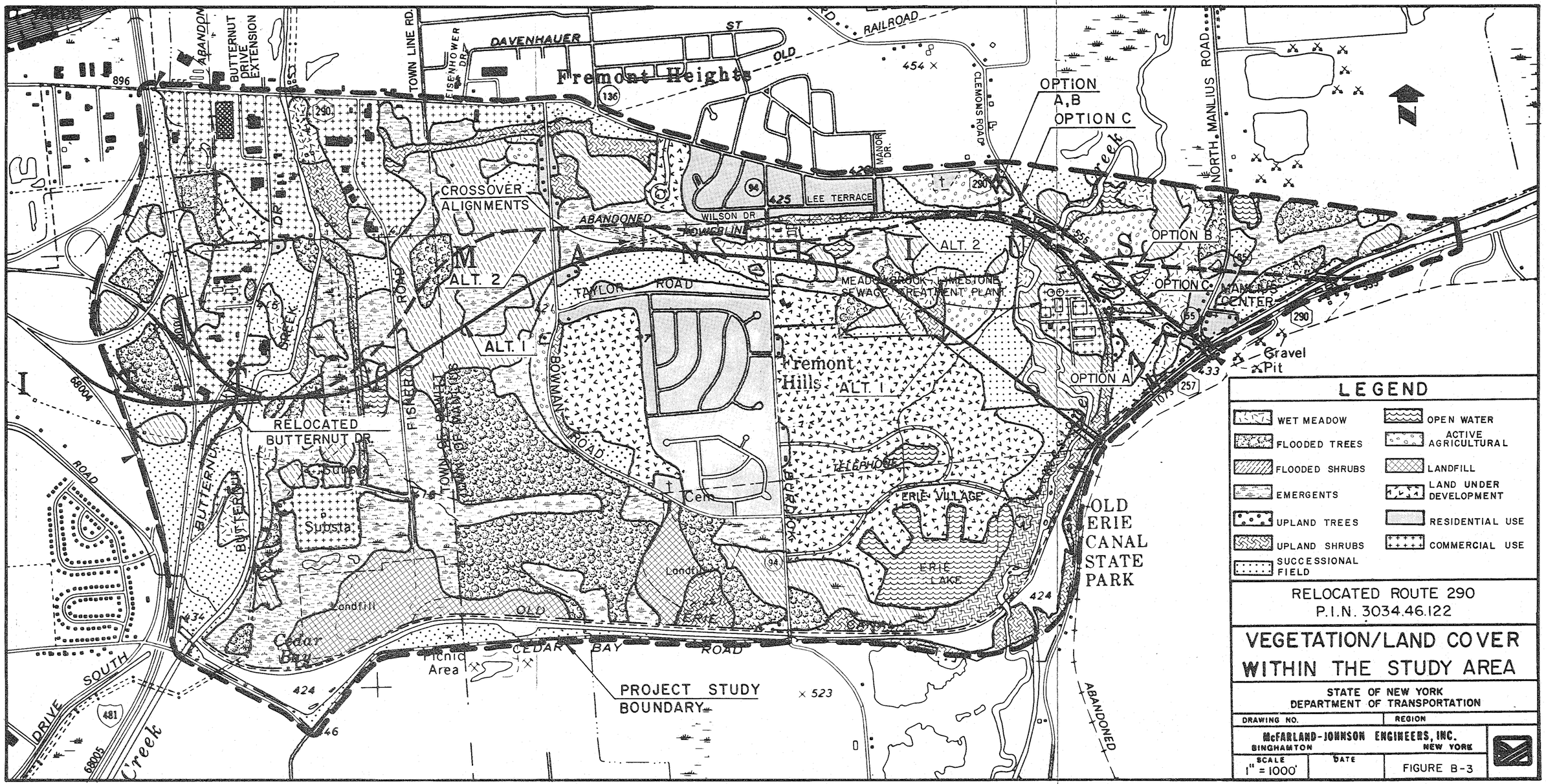
2. Upland Deciduous Trees

Sugar Maple (Acer saccharum)
Red Maple (Acer rubrum)
Sycamore (Platanus occidentalis)
American Beech (Fagus grandifolia)
American Horn Bean (Carpinus caroliniana)
Eastern Hemlock (Tsuga canadensis)
Hickories (Carya spp.)
Oaks (Quercus spp.)
Pines (Pinus spp.)

This community is identified as containing 25% or more of species 15 feet or more in height with common associates and understory species being identified under upland deciduous shrubs.

3. Flooded Deciduous Shrubs

Red Maple (Acer rubrum)
Silver Maple (Acer saccharum)
Green Ash (Fraxinus pennsylvanica)
Box Elder (Acer negundo)
Alder (Alnus spp.)
Dogwood (Cornus spp.)
White Ash (Fraxinus americana)



LEGEND

- WET MEADOW
- FLOODED TREES
- FLOODED SHRUBS
- EMERGENTS
- UPLAND TREES
- UPLAND SHRUBS
- SUCCESSIONAL FIELD
- OPEN WATER
- ACTIVE AGRICULTURAL
- LANDFILL
- LAND UNDER DEVELOPMENT
- RESIDENTIAL USE
- COMMERCIAL USE

RELOCATED ROUTE 290
P.I.N. 3034.46.122

VEGETATION/LAND COVER WITHIN THE STUDY AREA

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE 1" = 1000'	DATE
FIGURE B-3	

This vegetative community is identified as being woody wetland vegetation where 25% or more of the species are less than 15 feet in height.

4. Upland Deciduous Shrubs

Hawthorn (Crataegus spp.)
Dogwood (Cornus spp.)
Staghorn Sumac (Rhus typhina)
Wild Grape (Vitis parthenocissus)
Virginia Creeper (Parthenocissus quinquefolia)
Rose (Rosa spp.)
Crabapple (Malus spp.)
Cherries (Prunus spp.)
Blackberries (Rubus spp.)
Red Maple (Acer Rubrum)
Box Elder (Acer negundo)

This community is also identified as being woody vegetation where 25% or more of the species are less than 15 feet in height.

5. Wet Meadow

Sedges (Carex spp.)
Cattails (Typha spp.)
Rushes (Juncus spp.)
Purple Loosestrife (Lythrum salicaria)
Spikerush (Eleocharis spp.)
Swamp Loosestrife (Decodon Verticillatus)
Horsetail (Equistum spp.)

This community is typically found in shallow depressions that are generally wet. They are usually adjacent to existing water bodies or are in combination with other wetland vegetation.

6. Emergents

Cattails (Typha spp.)
Purple Loosestrife (Lythrum salicaria)
Swamp Loosestrife (Decodon verticillatus)
Bulrush (Scirpus spp.)
Bur-reeds (Sparganium spp.)
Reed (Phragmites spp.)
Arrowheads (Sagittaria spp.)
Horsetail (Equisteum spp.)
Waterweed (Elodea canadensis)
Pondweeds (Potamogeton spp.)
Cladophora (Cladophora spp.)

This community is found throughout the study area in uniform stands of a single species, as a mixture of several emergent species or in combination with other wetland communities (i.e., wet meadow, flooded trees and shrubs).

7. Successional Field

Broomegrass (Bromus spp.)
Canarygrass (Phalaris spp.)
Panicgrass (Panicum spp.)
Bristlegrass (Setaria spp.)
Pigweeds (Amaranthus spp.)
Goldenrods (Solidago spp.)
Milkweeds (Asclepias spp.)
Asters (Aster spp.)
Hawkweeds (Hieracium spp.)
Ragweeds (Ambrosia spp.)
Dandelions (Taraxacum spp.)
Fescugrass (Festuca spp.)
Orchard Grass (Dactylis glomerata)
Coltsfoot (Tussilago fanfara)
Curlyleaved Dock (Rumex crispus)
Clovers (Trifolium spp.)
Poison Ivy (Rhus radicans)
Queen Ann's Lace (Daucus carota)
Cocklebur (Xanthus spp.)

This community serves as the first stage in the successional sequence following land abandonment.

8. Agriculture

This community represents land that is or recently has been cultivated for agricultural purposes. Common crops in the study area are corn and cover crops (i.e, hay, clover, timothy, etc.).

9. Water

This community primarily identifies large streams/canals, ponds and open water areas in wetlands. Within the project study boundaries, most open water areas (with the exception of large streams and Old Erie Canal) are surrounded by other wetland habitat types to form a wetland complex.

10. Residential

Included in this community are mowed lawn areas and ornamental plantings around residences and cemeteries.

11. Commercial

There are no identified vegetative species. This community designates buildings, parking lots, storage yards and other associated facilities.

12. Site Development

This community identifies on-going site excavation and/or clearing for the purpose of construction activities.

13. Landfill

Public landfills and/or local dumping grounds are identified by this community.

Plant succession on sites previously occupied by well developed communities or succession on sites where nutrients and conditions of existence are already favorable such as abandoned croplands, plowed grasslands, cleared woodlots, etc. is called secondary succession. This type of succession is occurring within the project study area.

The usual concept of secondary succession is that following a disturbance, an orderly sequence of plant communities will develop, culminating in a final community capable of maintaining itself indefinitely. This community is called a climax community. Each preceeding community is known as a sub-climax community.

Most secondary succession research has been conducted on abandoned agricultural land or old fields which are located throughout the project study area. The general concept assumes that annual plants, herbaceous perennials, shrubs and trees occur in an orderly sequence or series of stages and that each stage tends to modify the site, making it less suitable for the existing community and more suitable for the next stage. An example of this successional concept occurring within the study area would be the following:

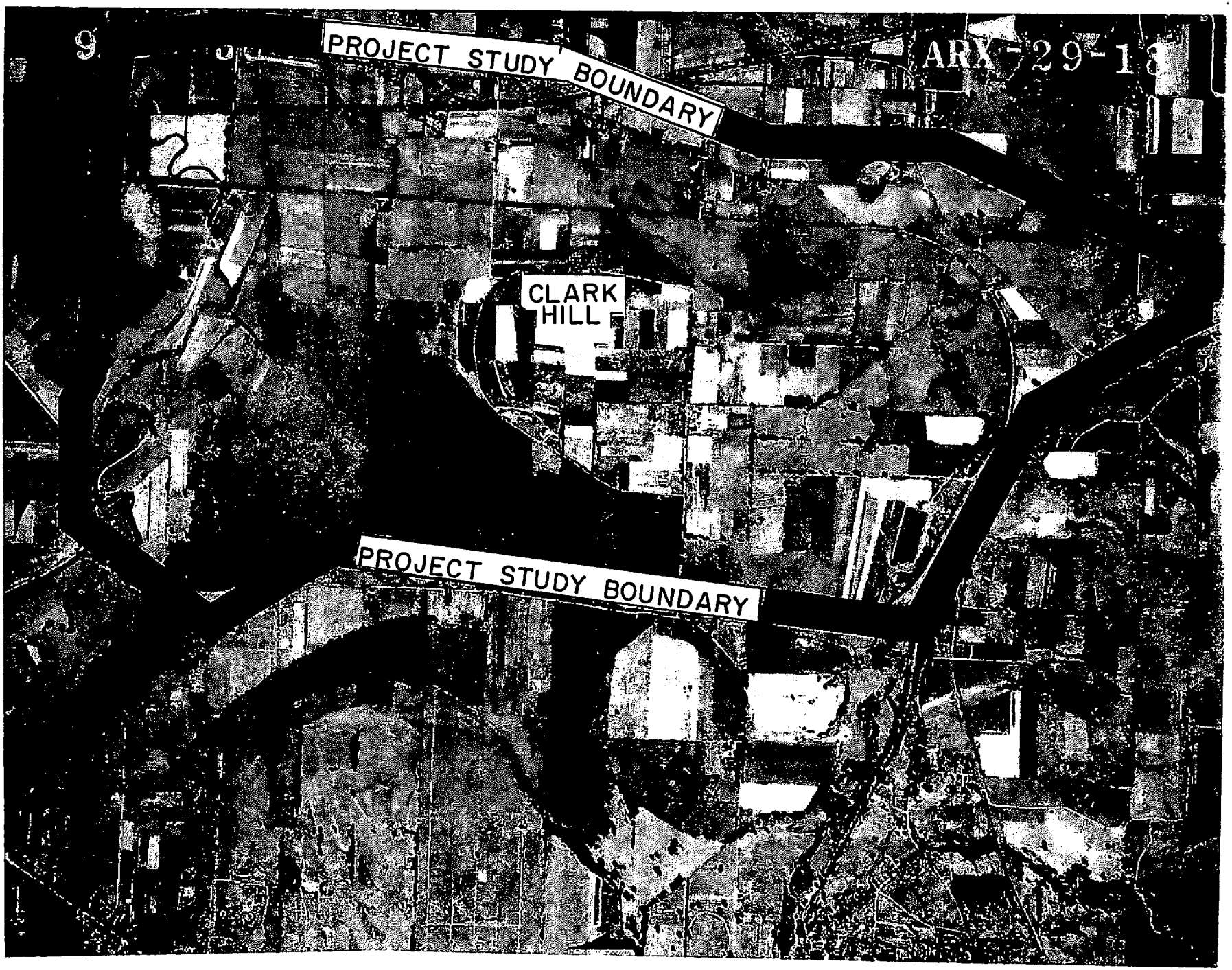
> Plowed field ... fallow field ... successional field ... successional field-dedicuous shrub ... successional deciduous shrub-deciduous tree ... successional deciduous tree ... mature deciduous tree.

Plowed fields would begin the intial stages of succession with fallow field through successional deciduous trees being sub-climax communities, all culminating in the climax community of mature deciduous trees. Species present within this successional chain would be those discussed earlier under the various communities identified in the vegetation/land cover mapping.

A prime example of this successional sequence is shown in a 1938 aerial photo (Plate 4-1) of the study. Fifty years ago, approximately two-thirds of the study area was devoted to agricultural operations. Since that time, abandonment of farming activities has resulted in secondary succession culminating in wetland/upland vegetation covering most of the earlier farmed areas.

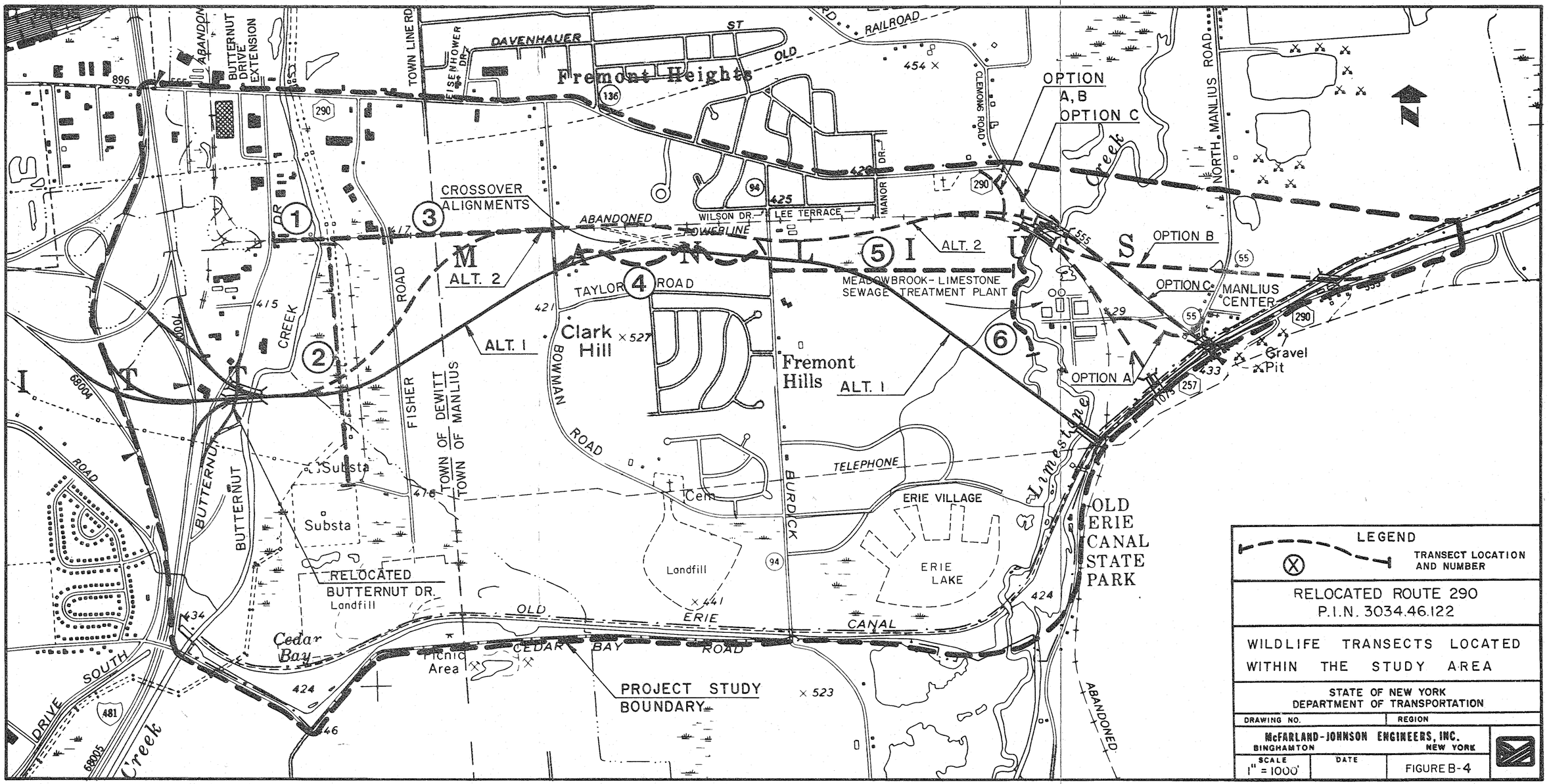
C. Terrestrial Fauna

Wildlife exists only in combination with its habitat. Specific vegetative cover types singly or in combination support specific kinds of wildlife. During the months of February 1985 thru April, 1986, wildlife throughout the study area was inventoried. Transect locations were established along various habitat types in the project area and were walked monthly. The location of these transects is shown in Figure B-4. A



1938 AERIAL PHOTOGRAPH
OF STUDY AREA

PLATE 4-1


Fremont Heights
DAVENHAUER ST
OLD RAILROAD
TOWN LINE RD
EISENHOWER DR
ABANDONED
BUTTERNUT DRIVE EXTENSION
896
290
136
454
CLEMONS ROAD
OPTION A, B
OPTION C
NORTH MANLIUS ROAD
Creek
CROSSOVER ALIGNMENTS
1
2
3
4
5
6
ABANDONED POWERLINE
WILSON DR
LEE TERRACE
MANOR DR
425
420
94
ALT. 2
MEADOWBROOK- LIMESTONE SEWAGE TREATMENT PLANT
OPTION B
OPTION C
MANLIUS CENTER
55
555
529
TAYLOR ROAD
421
Clark Hill
527
ALT. 1
Fremont Hills
OPTION A
433
257
Gravel Pit
68004
415
CREEK
FISHER ROAD
TOWN OF DEWITT
TOWN OF MANLIUS
BOWMAN ROAD
BURDICK
TELEPHONE
Limestone
Substa
Substa
Cem
ERIE VILLAGE
OLD ERIE CANAL STATE PARK
ERIE LAKE
RELOCATED BUTTERNUT DR.
Landfill
Landfill
441
ERIE CANAL
OLD
424
434
Cedar Bay
Picnic Area
CEDAR BAY ROAD
PROJECT STUDY BOUNDARY
523
SOUTH DRIVE
481
68005
446
ABANDONED
LEGEND
TRANSECT LOCATION AND NUMBER
RELOCATED ROUTE 290
P.I.N. 3034.46.122
WILDLIFE TRANSECTS LOCATED WITHIN THE STUDY AREA
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE
FIGURE B-4

listing of wildlife species and the transects along which they were identified are shown in Table II-1.

Table II-1

Officially Identified Wildlife

Species	Status	Identified Along Transect					
(Avian)		1	2	3	4	5	6
Common Crow (Corvus brachyrhynchos)	Resident*	x	x	x	x	x	x
Herring Gull (Larus argentatus)	Resident	x	x	x	x	x	x
Song Sparrow (Melospize melodia)	Resident-Migratory*	x	x	x	x	x	x
Field Sparrow (Spizella pusilla)	Resident-Migratory	x		x	x	x	
Chipping Sparrow (Spizella passergina)	Resident-Migratory*	x	x	x		x	x
Starling (Sturnus vulgaris)	Resident*	x	x	x	x	x	x
Robin (Turdus migratorius)	Migratory*	x	x	x	x	x	x
Killdeer (Charadrius vociferus)	Resident-Migratory*		x		x	x	
Blue Jay (Cyanocitta cristata)	Resident*	x	x	x	x	x	x
Great Blue Heron (Ardea berodias)	Resident-Migratory		x				
Green Heron (Butorides striatus)	Resident-Migratory	x	x				x
Red-Winged Blackbird (Agelaius phoeniceus)	Migratory*	x	x		x	x	x
Common Grackle (Quiscalus quiscula)	Resident-Migratory*		x	x	x	x	x
House Finch (Carpodacus mexicanus)	Resident*		x	x	x	x	
Mourning Dove (Zenaidura macroura)	Resident*	x	x	x	x	x	x
Eastern Meadowlark (Sturnella magna)	Migratory*				x		
White-Breasted Nuthatch (Sitta carolinensis)	Resident*		x	x		x	x
Purple Martin (Progne subis)	Migratory*				x		
American Goldfinch (Carduelis tristis)	Migratory*	x	x	x		x	x
Black-Capped Chickadee (Parus atricapillus)	Resident*	x	x	x	x	x	x
Cardinal (Richmondena cardinalis)	Resident*	x	x	x		x	x
House Wren (Troglodytes aedon)	Migratory*	x	x	x	x	x	x
Downy Woodpecker (Picoides pubescens)	Resident*	x	x	x		x	
Yellow Warbler (Dendroica petechia)	Migratory*		x	x	x	x	x
Common Yellowthroat (Geothlypis trichas)	Migratory*	x	x	x		x	
Common Flicker (Colaptes auratus)	Migratory*			x	x	x	x
Belted Kingfisher (Ceryle alcyon)	Migratory*		x				x
Red-Tailed Hawk (Buteo jamaicensis)	Resident-Migratory*		x		x	x	
American Kestrel (Falco sparverius)	Resident-Migratory*		x		x		
Ring-Necked Pheasant (Phasianus colchicus)	Resident		x			x	
Mallard (Anas platyrhynchos)	Resident-Migratory*	x		x			x
Woodduck (Aix sponsa)	Migratory*	x					x
Canada Goose (Branta canadensis)	Resident-Migratory			x		x	
Least Flycatcher (Empidunax minimus)	Migratory		x				
Ruby Crowned Kinglet (Regulus calendula)	Migratory						x
Eastern Phoebe (Sayornis phoebe)	Migratory			x			
Rock Dove (Pigeon) (Columba livia)	Resident			x		x	
Common Nighthawk (Chordeiles minor)	Resident-Migratory						x
House Sparrow (Passer domesticus)	Resident*	x		x		x	
Swamp Sparrow (Melospiza georgiana)	Resident-Migratory*		x				

Species	Status	Identified Along Transect					
(Mammals)		1	2	3	4	5	6
Brown-Headed Cowbird (Molothrus ater)	Migratory*		x		x		
Dark-Eyed Junco (Junco hyemalis)	Resident-Migratory			x			x
Snow Bunting (Plectrophenax nivalis)	Migratory				x		
Purple Finch (Carpodacus purpureus)	Migratory		x	x			
Oppossum (Didelphis marsupialis)	Resident		x		x		
Striped Skunk (Mephitis mephitis)	Resident	x					
Red Squirrel (Tamiasciurus hudsonicus)	Resident	x	x	x		x	x
Grey Squirrel (Sciurus carolinensis)	Resident					x	
Eastern Cottontail (Sylvilagus floridanus)	Resident	x	x	x	x	x	x
Woodchuck (Marmota manax)	Resident		x	x		x	x
Raccoon (Procyon lotor)	Resident	x	x	x		x	x
Muskrat (Ondatra zibethica)	Resident	x	x			x	x
Red Fox (Vulpes fulva)	Resident		x	x		x	
Whitetail Deer (Odocoileus virginianus)	Resident		x	x		x	x
Mink (Mustela vison)	Resident						x
Beaver (Castor canadensis)	Resident						x

*Confirmed by NYSDEC and the Federation of New York State Bird Clubs "Breeding Bird Atlas" project, as breeding within or near the project study area.

In addition to the species noted in Table II-1, the following generalized list of wildlife were also identified throughout the study area:

Mice	Frogs	Turtles
Voles	Toads	Snakes

Wildlife species which are uncommon, threatened or endangered may be sensitive to changes in the existing environment. In a letter to the Department of Transportation dated June 12, 1985 (see Appendix B-2), the United States Department of the Interior Fish and Wildlife Service indicated that except for occasional transient individuals, no federally listed or proposed endangered or threatened species under their jurisdiction are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is required with the Fish and Wildlife Service.

As mentioned earlier, wildlife exists only in combination with its habitat. It is the key to production of any wildlife species be it fish, bird or mammal. Each species has differing requirements for cover and food from other living things that might occupy the same area. The following habitat types were evaluated in regards to value and use by wildlife in the study area (acreage indicates amount of habitat type within study area):

1. Flooded Deciduous Trees (201 Acres): Deciduous swamps primary functions in regards to wildlife is its use for nesting, breeding and feeding activities. Waterfowl (mallard, wood-duck), marshbirds (heron), mammals (muskrat, raccoon) and songbirds (redwing) utilize this wetland type within the study area. In addition, numerous species of frogs, toads, turtles and snakes also thrive within this habitat type.

2. Upland Deciduous Trees (8 Acres): Due to the wet nature of the study area, very little of this habitat type exists offering minor amounts of nesting, breeding and feeding cover.

3. Flooded Deciduous Shrubs (220 Acres): As with flooded deciduous trees, shrub wetlands offer nesting, breeding and feeding habitat to a variety of animals throughout the study area. Within these wetlands occurs a mixture of wet meadow and emergent vegetation. This aquatic marsh vegetation offers additional food and nesting cover.

4. Upland Deciduous Shrubs (115 Acres): This habitat type is utilized by most of the wildlife present within the study area. Nesting, feeding, breeding, winter cover, escape and travel routes are functions of these low growing woody plants.

5. Wet Meadow (76 Acres): This habitat type when associated with other cover types is valuable for wildlife, especially for nesting wetland birds. However, in pure stands, it is of relatively low value.

6. Emergents (293 Acres): This habitat type is the most abundant wetland cover type in the study area and generally the most valuable. It provides numerous wildlife species with nesting habitat, food and cover. Within the study area, it provides habitat diversity and non-polluting nutrients to food chains.

7. Successional Field (300 Acres): This habitat type's biggest asset is providing cover to small game, especially nesting cover. Its importance lies in its location in regards to other habitat types. Successional fields near escape or travel cover will be used more extensively than if located near commercial or residential type land lacking in wildlife.

8. Agriculture (36 Acres): The single most important cultivated crop within the study area is field corn. It is a palatable and nutritious wildlife food that ranks high on the list for pheasants, squirrels, cottontails and deer. Its stiff, tough stalks hold ears above snow cover in winter and if cut for silage or picked for grain offers leftovers for dove, waterfowl and various bird species. However, its requirement for space - meaning wide rows and a minimum of weed competition, offers consequent low cover values.

9. Open Water (137 Acres): This habitat type within the study area includes all open water canal and stream areas in addition to open water in wetlands. They are used as feeding, nesting and loafing areas by waterfowl, both resident and migratory, in addition to shore birds and various mammals.

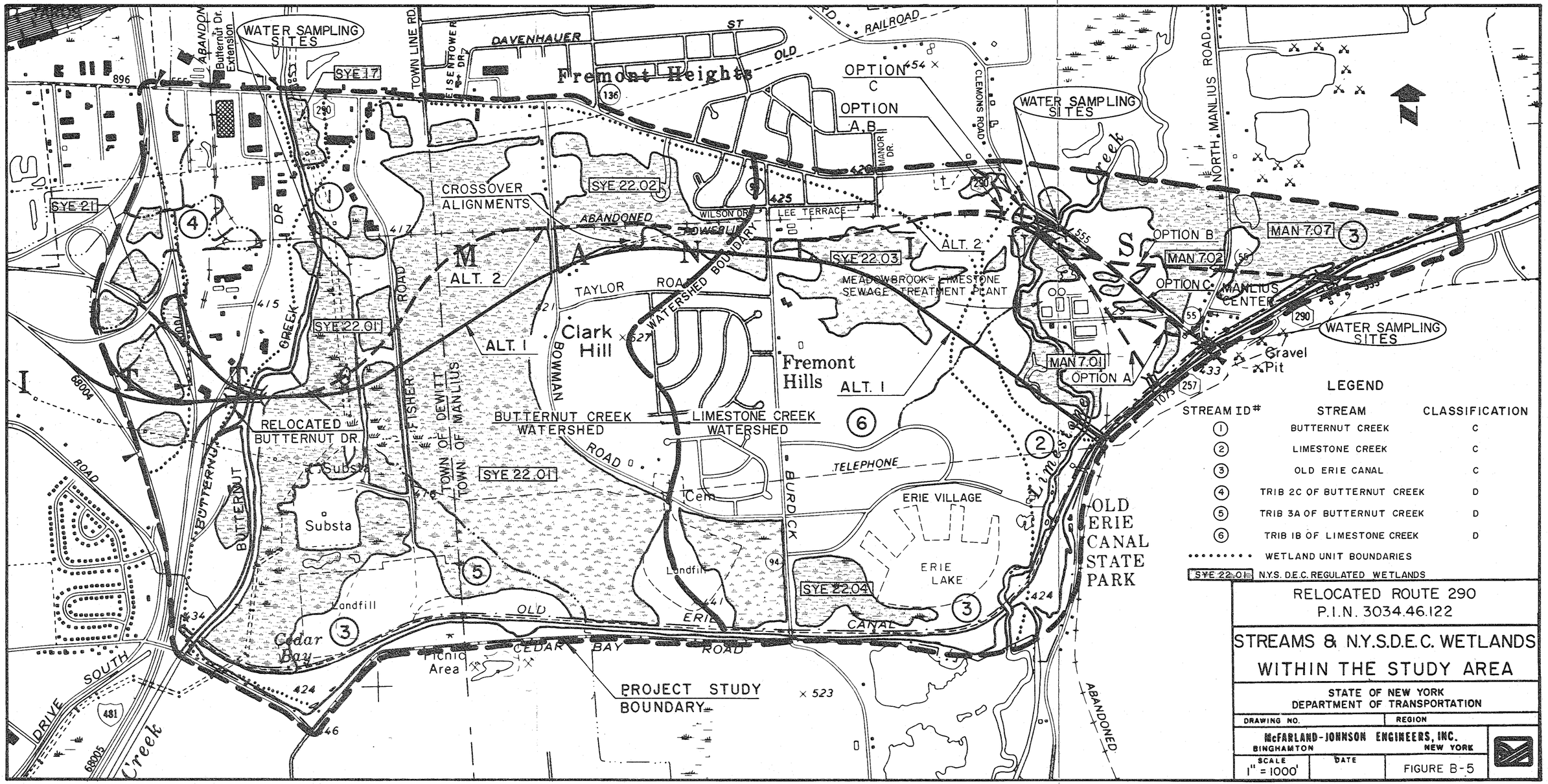
10. Stream Bank Area: There are approximately 107,000 lineal feet of stream bank area within the study area. Not only do they provide habitat for amphibians, reptiles and fish life but also for various species of wildlife. Feeding, nesting and breeding cover for waterfowl and furbearers (i.e., muskrats, raccoon, mink), winter cover for cottontails and other mammals and nesting and feeding cover for various songbirds are functions of streams and bank areas within the study area.

D. Aquatic Environment

Surface and Groundwater

There are six (6) canals, streams and tributary streams located within the study area, encompassing approximately 53,500 lineal feet of stream channel. These watercourses range from intermittent tributaries to medium sized streams and the Old Erie Canal. Stream depth ranges from inches to 10-15 feet. See Figure B-5 for stream locations. Groundwater is present in both the unconsolidated deposits and in the bedrock in the study area.

Natural water quality of both the surface and groundwater is related to the geology of the area and the composition of the underlying bedrock. The project area lies near the border of two different rock types. The area to the south of the project area is underlain by shale and limestone (calcium carbonate). The project area itself is underlain by shale, gypsum (calcium sulfate) and salt (sodium chloride). Limestone and Butternut Creeks originate in the limestone area to the south and their chemistry is dominated in their headwaters by calcium and bicarbonate ions. As these streams flow to the north across the project area, they begin to mix with the water contributed by the underlying bedrock. Thus, total dissolved solids, chloride and sulfate concentrations begin to increase. To the north and west of the project area, the natural water quality of many streams exceeds drinking water standards for hardness and sulfate. Historical data for Limestone and Butternut Creeks is presented in Appendix B-4. More recent analysis conducted for this project in 1985 and 1986 is shown in Table II-2.



LEGEND

STREAM ID#	STREAM	CLASSIFICATION
1	BUTTERNUT CREEK	C
2	LIMESTONE CREEK	C
3	OLD ERIE CANAL	C
4	TRIB 2C OF BUTTERNUT CREEK	D
5	TRIB 3A OF BUTTERNUT CREEK	D
6	TRIB 1B OF LIMESTONE CREEK	D

..... WETLAND UNIT BOUNDARIES

SYE 22.01 N.Y.S. D.E.C. REGULATED WETLANDS

RELOCATED ROUTE 290
P.I.N. 3034.46.122

STREAMS & N.Y.S.D.E.C. WETLANDS WITHIN THE STUDY AREA

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO. | REGION

McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK

SCALE 1" = 1000' | DATE | FIGURE B-5

Table II-2

Seasonal Water Quality Data (1985-1986)

Stream	Spring (March-May) High-Low(Avg)	Summer (June-Aug) High-Low(Avg)	Fall (Sept-Nov) High-Low(Avg)	Winter (Dec-Feb) High-Low(Avg)
Butternut Creek				
Temp.*	15.1-2.4(8.6)	22.9-17.0(20.3)	14.4- 3.5(9.5)	1.2- 0.5 (0.9)
pH*	8.01-7.41(7.36)	8.14-7.78(7.95)	8.03-7.69(7.88)	7.89-7.68(7.77)
DO*	12.6-10.9(11.8)	7.6 -6.9 (7.4)	12.1-8.2(9.9)	13.6-12.2(12.8)
Chlorides*	37.0-8.1(29.2)	45.0-24.3(35.4)	61.5-31.9(50.0)	56.7-36.6(43.9)
Trib. 3A of Butternut				
Temp.	13.0-2.8 (9.0)	19.9-13.4(16.8)	14.0-3.5(9.1)	2.3-2.0(2.1)
pH	7.55-6.82(7.33)	7.53-7.08(7.33)	7.63-7.16(7.42)	7.35-7.12(7.22)
DO	12.3-8.8(9.9)	3.8-2.0(2.8)	9.4-6.9(7.9)	7.8-7.4(7.6)
Chlorides	Not sampled			
Limestone Creek				
Temp.	15.1-3.2(8.9)	21.0-15.9(18.3)	13.8-3.3(9.2)	1.6-1.0(1.3)
pH	8.04-7.68(7.89)	8.07-7.84(7.97)	9.17-8.15(8.55)	8.00-7.71(7.88)
DO	12.2-9.7(11.2)	8.4-7.7(8.1)	13.2-9.7(11.0)	14.4-12.6(13.4)
Chlorides	39.0-15.0(29.2)	45.0-32.6(37.9)	44.9-24.1(35.2)	34.8-32.5(33.8)
Old Erie Canal				
Temp.	19.5-3.6(11.3)	25.0-20.4(22.4)	16.0-2.6(10.2)	1.4-1.1(1.2)
pH	7.99-7.45(7.78)	8.13-7.61(7.95)	8.79-8.12(8.35)	7.43-7.21(7.35)
DO	12.7-12.0(12.4)	10.8-4.9(7.9)	13.6-7.1(9.7)	13.2-12.4(12.8)
Chlorides	104.0-17.0(68.7)	52.0-33.7(44.2)	54.6-39.4(49.4)	152.0-10.6(93.2)

*Note: 1) Temperature measured in °C
2) pH measured in Su
3) Dissolved oxygen measured in mg/l
4) Chlorides measured in mg/l (ppm) from Station upstream of Existing Route 290

All streams within the project area have a water quality classification of "C" or "D". The New York State Department of Environmental Conservation definition of Class "C" waters is as "suitable for fishing and all other uses except as a source of water supply for drinking, culinary or food processing purposes and primary contact recreation". Within the project area, Limestone Creek, Butternut Creek and the Old Erie Canal have a classification of "C" and all support a warmwater fishery. Remaining tributary streams in the area are Class D waters.

Groundwater in the study area can be obtained from both the bedrock and the overlying unconsolidated deposits. The median well yield, from the Middle Shale unit which is present in the study area, is 20 gallons per minute. Water quality may be poor, however, as iron, manganese, hardness or salt content may be excessive.

Higher well yields are possible from sand and gravel in the study area. The sand and gravel is generally buried beneath silt or other less permeable materials. The eastern portion of the study area is reported to be more productive - there is a record of a former well near Manlius Center which produced 600 gallons per minute. Water quality is likely to be better but even wells in the sand and gravel could be salty, reflecting the influence of the underlying bedrock.

There are no designated sole source aquifers within the study area.

Nearly the entire study area is served by a public water supply provided by the Onondaga County Water Authority (see Appendix B-5). A major 48 inch diameter OCWA water supply main runs through the middle of the study area in the vicinity of the Meadowbrook-Limestone sewage treatment plant.

The public water supply source for the study area is Otisco Lake. There are no public water supply wells or reservoirs located within the study area.

There are only a few residences in the study area which are dependent on private wells for their water supply. These include a single residence on Bowman Road and approximately 5 residences located either on Route 257 or on existing Route 290 north of its intersection with Route 257.

Wetlands

Wetland vegetation encompasses some 7,385 acres in the Towns of DeWitt and Manlius and 790 acres within the study area. Of these 790 acres, 775 acres (4 wetland units) are officially designated by the Department of Environmental Conservation as regulated freshwater wetlands. The remaining 15 acres are isolated areas of wetland vegetation which do not qualify for regulation under NYSDEC criteria for size or quality. All of the 790 acres within the study area meet the basic wetland definition contained in Federal Rules and Regulations. Figure 5 identifies streams and NYSDEC regulated wetlands located within the study area.

Table II-3 further describes the DEC wetlands with additional detailed information contained in the Onondaga County Environmental Management Council's "Wetland Inventory" for the Towns of DeWitt and Manlius and in Appendix B-1 "Wetland Descriptions/Mapping".

Table II-3

NYSDEC Designated Wetlands Within the Study Area

Wetland	Date of Onondaga County EMC Inspection	Wetland Class	Size Total Acres	Acres in Study Area
SYE 17	9-76	Class III	91 Ac.	7 Ac.
SYE 21	9-76	Class II	166 Ac.	34 Ac.
SYE 22	9-76/4-78	Class II	893 Ac.	605 Ac.
MAN 7	8-76/3-78	Class I	1,699 Ac.	129 Ac.
			2,849 Ac.	775 Ac.

Source: NYSDEC and Onondaga County Environmental Management Council, Towns of DeWitt and Manlius Wetlands Inventory.

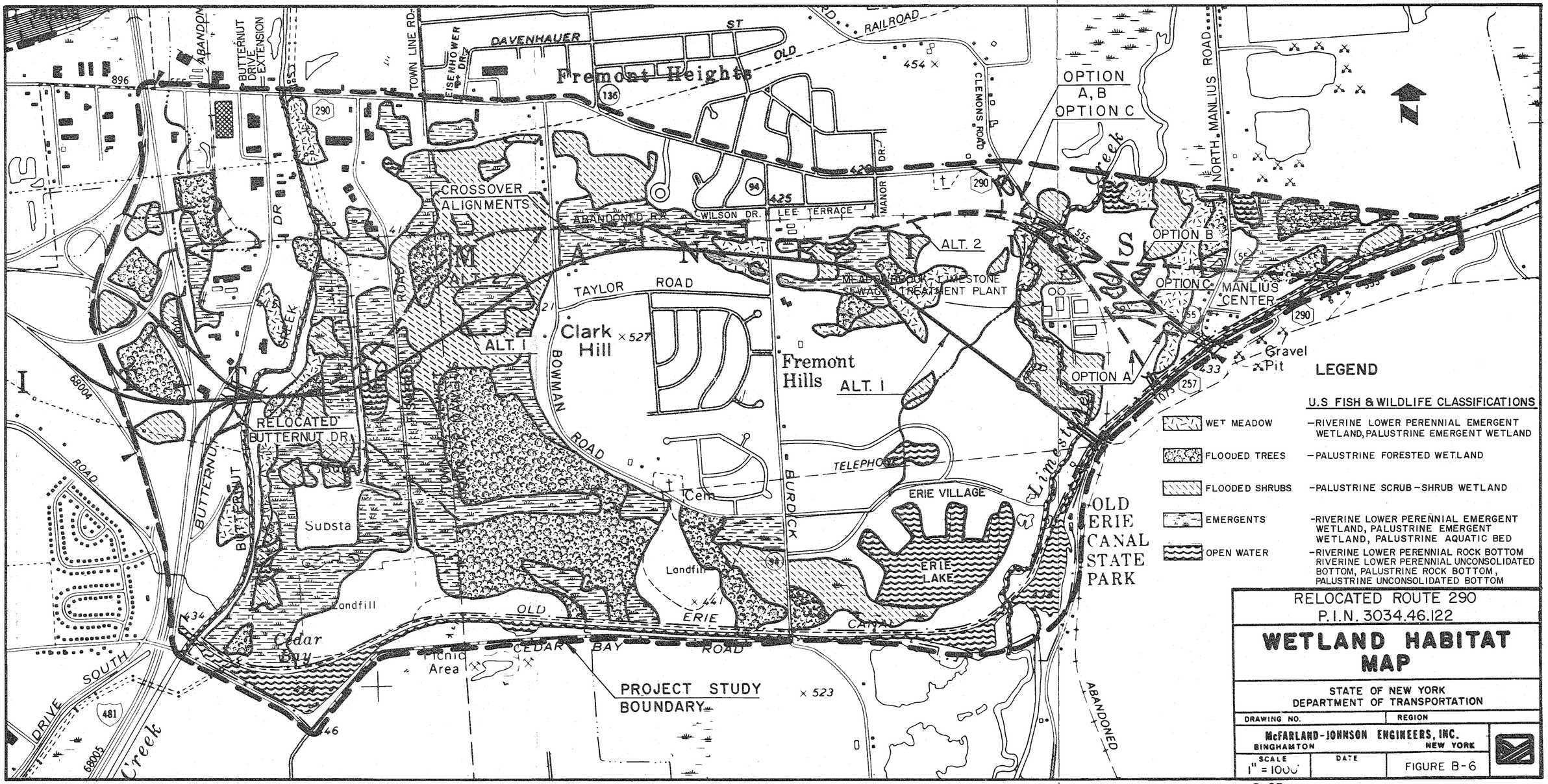
In addition to NYSDEC designated wetland acreage, additional wetland habitat acreage according to the U.S. Fish and Wildlife Service "Classification of Wetlands and Deepwater Habitats" exists throughout the study area. This wetland habitat is shown in Figure B-6 and described below in Table II-4.

Table II-4

Wetland Habitats Within the Study Area*

Habitat Type	U.S. Fish & Wildlife Classification	Acres Within Study Area
Wet Meadow	a) Riverine Lower Perennial Emergent Wetland b) Palustrine Emergent Wetland	76 Ac.
Flooded Trees	a) Palustrine Forested Wetland	201 Ac.
Flooded Shrubs	a) Palustrine Scrub-Shrub Wetland	220 Ac.
Emergents	a) Riverine Lower Perennial Emergent Wetland b) Palustrine Emergent Wetland c) Palustrine Aquatic Bed	293 Ac.
Open Water	a) Riverine Lower Perennial Rock Bottom b) Riverine Lower Perennial Unconsolidated Bottom c) Palustrine Rock Bottom d) Palustrine Unconsolidated Bottom	137 Ac.
	Total	927 Ac.

*Includes wetlands identified in Table II-3



RELOCATED ROUTE 290
P.I.N. 3034.46.122

WETLAND HABITAT MAP

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE 1" = 1000'	DATE
FIGURE B-6	

Additional detailed mapping of the wetland habitats within the study area is shown in Appendix B-1. This information was obtained from the Onondaga County Environmental Management Councils' Wetland Inventory for the Towns of DeWitt and Manlius.

Subsequent to the selection of the design alternative, further detailed wetland habitat mapping will occur in conjunction with regulatory permitting processes and final alternative design for the FEIS.

The various wetland types identified within the study area are generally typical of those found within and adjacent to floodplain or drainage areas within the Towns of Manlius and DeWitt. Together they form a diverse biological system within the study area which in turn constitutes variable habitats for different wildlife species.

According to the FHWA Report, "A Method for Wetland Functional Assessment", wetlands within the study area could provide the following functions:

Groundwater Recharge
Groundwater Discharge
Flood Storage and Desynchronization
Shoreline Anchorage and Dissipation of Erosive Forces
Sediment Trapping
Nutrient Retention and Removal
Food Chain Support
Habitat for Fisheries
Habitat for Wildlife
Active Recreation
Passive Recreation and Heritage Value

A more detailed discussion on site specific wetland benefits is contained in Appendix B-1 of this report, "Wetland Descriptions".

Aquatic ecosystems ranging from narrow slow moving streams to swampy wetlands provide a variety of habitats for aquatic flora and fauna within the study area.

Aquatic organisms are classified as to living habitat: planktonic organisms float with stream flow (phytoplankton, zooplankton, fish eggs and larve), benthic organisms rest on, attach to or burrow in the bottom (mollusks, macrophytes, worms, insects), while nektonic organisms actively swim (fish, large insets, amphibian larvae) (Odum 1971).

Although all the above aquatic organisms are present within the study area, only fish (Nektonic), the largest and most ecologically dominant aquatic organism will be discussed. Stream surveys conducted by the NYSDEC and the U.S. Fish and Wildlife Service/U.S. Army Corps of Engineers have identified the species listed in Table II-5 as being present in streams within and around the study area.

Table II-5

Fish Species Present In/Around Study Area

Game Species	Forage Species
Brown Trout (Salmo trutta)	Carp (Cyprinus carpio)
Rockbass (Ambloplites ruspestris)	White Sucker (Catostomus commersoni)
Common Bluegill (Lepomis macrochirus)	Northern Hogsucker (Hypentelium nigricans)
Smallmouth Bass (Micropterus dolomieui)	Fallfish (Semotilus corporalis)
Chain Pickerel (Esox niger)	Cutlips Minnow (Exoglossum maxillingua)
Pumpkinseed (Lepomis gibbosus)	Bluntnose Minnow (Pimephales notatus)
Northern Pike (Esox lucius)	Common Shiner (Notropis cornutus)
Walleye (Stizostedion canadense)	Creek Chub (Semotilus atromaculatus)
Black Crappie (Pomoxis nigromaculatus)	Fantail Darter (Etheostoma flabellare)
White Perch (Morone americanus)	Johnny Darter (Etheostoma nigrum)
Yellow Perch (Perca flavescens)	Blacknose Dace (Rhinichthys atratulus)
	Longnose Dace (Rhinichthys cataractae)
	Spottail Shiner (Notropis hudsonius)
	Channel Darter (Percina copelandi)
	Logperch (Percina caprodes)
	Bowfin (Amia calua)

The above species (with the exception of Brown Trout) are typical of a pickerel/smallmouth bass fishery. The environmental factors resulting in this type of warmwater fishery are instream water temperatures and dissolved oxygen.

E. Significance of Area

Due to the large amount of undeveloped land in the form of wooded, wetland and farmed areas in and around the project study area, opportunities for outdoor recreation activities exist. Even though most land in the study area is privately owned, permission can be obtained for numerous activities such as hunting, fishing, trapping, hiking, bird watching, cross-country skiing, etc. The Old Erie Canal State Park bordering the southern portion of the study area offers 283 acres of walking/bike paths, picnic areas and numerous other outdoor activities.

Wildlife in the study area is diverse and somewhat abundant. Populations of most common wildlife exist throughout the county, town and study area. This wildlife is not particularly unique and can also be found throughout similar habitats in western and central New York State. There are no critical habitat areas (i.e, deer wintering yards) within the study area nor do any endangered or threatened wildlife species commonly visit or reside in the area. However, rare plants have been identified by the New York Natural Heritage Program and the Syracuse Botanical Club (see Appendix

B-2). Those species identified by the New York Natural Heritage Program are located adjacent to the study area (i.e., 3 miles south @ Jamesville) whereas the species identified by the Syracuse Botanical Club are located within the study area (i.e., south of Bowling Alley on existing Route 290 just west of Bowman Road). However, none of the build alternatives disturb this area.

Utilization of the study area in regards to recreational activities may provide some economic input into the local community. However, its overall impact on the area's economy would be negligible.

III. Impact Analysis

A. Primary Impacts

Primary or direct impacts as a result of this project can be divided into two groups, short and long term. Short term impacts are predominantly construction related whereas long term impacts are a result of operation and existence of the project.

Decreases in surface water quality, loss of vegetative cover and increases in visual human activity and noise are considered short term impacts which will be realized as a result of construction of any one of the build alternatives.

Water courses within the study area will experience a temporary increase in turbidity and sedimentation caused by erosion during the construction period. Large amounts of erodible earth material will be exposed by clearing and grubbing, excavation and borrow and fill. Certain circumstances such as a serious rain storm during grading operations or before adequate vegetative cover can be re-established could cause erosion problems. However, preventive and mitigative measures described in the following chapter will reduce or prevent the occurrence of impacts of this nature.

With construction, there will occur an increase of man's presence within the area. This visual increase of human activity in addition to the noise associated with construction can affect breeding, nesting, roosting and feeding activities of wildlife residing in the area. However, this is a temporary impact and will cease once construction is completed.

Long term impacts caused by the construction, operation and existence of any one of the build alternatives will vary for each alternative. Acreage disturbance was determined on a case by case basis. Disturbance as a result of new roadway embankments was calculated from toe of slope to toe of slope plus 10 (plus or minus) feet additional disturbance from construction vehicles.

Impacts to the following areas of concern will be discussed and analyzed for each build alternative: wetlands, streams, water quality, aquatic and terrestrial flora/habitats and aquatic and terrestrial fauna.

1. Wetlands

The impacts of highway construction on wetlands can be grouped into two categories: direct physical impacts and indirect impacts (which may occur during construction or during long term highway use). The major direct impact would simply be the loss of wetland acreage due to filling which is required to put in base material to support a roadbed. Turbidity increases in areas adjacent to construction could also be termed direct effects since they would directly inhibit growth of submerged plants (aquatic machrophytes) or bury benthic invertebrates.

In addition, the splitting of wetland areas is also considered a direct effect since it would physically divide the wetland into separate units. This is most noticeable in wetland unit SYE 22.01, between Bowman and Fisher Roads, as all alternates would cross this wetland. In some cases, splitting of wetlands create hydrological impacts by restricting movement of both surface and ground water. However, at this location, water retained by this wetland is released westward and will not be significantly affected by the east/west crossing of any of the build alternatives. Culverts, equalizer pipes and/or french drains to maintain surface flows and groundwater flows from isolated areas will be provided as necessary at this and other wetland crossings during the detailed final design of this project.

Indirect impacts on wetlands with this project include the loss and/or redistribution of wildlife which utilized wetland acreage lost during construction, avoidance of affected areas by wildlife due to human activity and noise and effects of trace amounts of hydrocarbons, spilled materials, lead or deicing salts on wetland species. Table III-1 identifies the wetlands affected by the project.

The wetland benefits provided by each wetland unit within the study area are described in Appendix B-1 "Wetland Descriptions". Those benefits impacted as a result of the build alternatives would be in direct proportion to the acres of wetland lost and would generally be the same for the two wetlands impacted:

Flood and Storm Water Control	- with all Alternatives
Wildlife Habitat	- with all Alternatives
Pollution/Soil Filtration	- with all Alternatives
Open Space & Aesthetic Appreciation	- with all Alternatives
Recreation	- with all Alternatives

Table III-1

Designated Wetlands Affected by Construction of Build Alternatives

Wetland	Total Acres	Acreage Within Study Area	Alternatives 1	2A	2B	2C	1-2A	1-2B	1-2C	2-1
SYE-17	91	7	--	--	--	--	--	--	--	--
SYE-21	166	34	--	--	--	--	--	--	--	--
SYE-22	893	605	19.8	21.8	21.8	21.8	18.7	18.7	18.7	24.2
MAN-7	1,699	129	1.3	2.3	6.7	2.0	2.3	6.7	2.0	1.3
Total	2,849	755	21.1	24.1	28.5	23.8	21.0	25.4	20.7	25.5

As identified above in Table III-1, each design alternate disturbs varying amounts of wetland acreage.

Alternative 1 requires the actual disturbance of three (3) wetland areas within wetland unit SYE-22 totalling 19.8 acres or 2.6 percent of the NYSDEC designated wetland acreage within the project study area.

Beginning at the I-481/690 Butternut Interchange, Alternative 1 splits wetland SYE 22.01 in half disturbing 12.2 acres. This splitting of wetland 22.01 results in 139 acres of wetland 22.01 being isolated north of Alternative 1 and 335 acres isolated south of Alternative 1. It then proceeds north of Clark Hill disturbing the southern boundary of wetlands SYE 22.02 and SYE 22.03 removing 2.6 acres and 5.0 acres respectively. It also disturbs 1.3 acres of the southern boundary of wetland MAN 7.01 before connecting with Route 257. In many cases, splitting of wetlands create hydrological impacts by restricting movement of both surface and ground water. However, at wetlands SYE 22.01 and MAN 7.01, water retained by these wetlands is primarily released westward and will not be significantly affected by the east/west crossing of any of the build alternatives. Culverts, equalizer pipes and/or french drains to maintain isolated surface flows and groundwater flows will be provided as necessary at this location and all wetland crossings during the detailed final design of this project.

Alternative 2A requires the disturbance of four (4) separate wetlands within wetland units SYE-22 and Man-7, totalling 24.1 acres.

From its western terminus at the Butternut Interchange, Alternative 2A proceeds north and eastward intersecting the northern portions of wetlands SYE 22.01, 22.02 and 22.03 and removing 12.6 acres, 6.3 acres and 2.9 acres of wetland respectively. It results in the severing of wetlands 22.01 and 22.02, isolating 129 acres to the north of Alternative 2. However, much of this acreage is presently isolated by the abandoned railroad.

Approximately 1,250 feet west of Limestone Creek, Alternative 2A proceeds southeasterly along the abandoned railroad, intersecting wetland MAN 7.01, removing 2.3 acres and isolating 6 acres to the north. Again, this six acres is already isolated by the abandoned railroad. Alternative 2A then connects with Route 257.

Alternative 2B requires the most wetland disturbance of all the alternatives under consideration. It impacts six (6) wetlands within wetland units SYE-22 and MAN-7 and results in the taking of 28.5 acres or 3.7 percent of the designated wetland acreage within the study area.

Alternative 2B follows the same alignment as Alternative 2A and results in the same impacts on wetland SYE-22 (21.8 acres) and isolates the same 129 acres to the north. Then from a point 1,250 feet west of Limestone Creek, Alternative 2B would continue to follow the abandoned railroad and cross Limestone Creek, disturbing 1.7 ares of wetland MAN 7.01. It then proceeds east across existing Route 290 north of Manlius Center, crosses the Erie Canal and connects with existing Route 290 impacting 2.9 acres of wetland MAN 7.02 and 2.1 acres of wetland MAN 7.07. In addition, eleven (11) acres of wetland 7.02 and 7.07 will be isolated to the south of Alternative 2B. Hydrological impacts will be minimal as water retained by MAN-7 is primarily released westward and will not be significantly affected by this east/west crossing.

Alternative 2C results in the disturbance of five (5) wetlands within wetland units SYE-22 and MAN-7. Total wetland acreage disturbed is 23.8 acres or 3.1 percent of the study area wetlands.

Alternative 2C follows the same alignment as Alternatives 2A and 2B and results in the identical taking and isolation of 21.8 acres and 129 acres respectively of wetland unit SYE-22. Approximately 1,250 feet west of Limestone Creek, Alternative 2C crosses the abandoned railroad and Limestone Creek, impacting 1.3 acres of wetland MAN 7.01. It then curves southeasterly, aligns itself with existing Route 290 and terminates at the Route 290/257 intersection, impacting 0.7 acres of wetland MAN 7.02 along existing Route 290.

Alternative 1-2 follows the same alignment as Alternative 1 from the Butternut Interchange eastward to a point approximately 1,200 feet west of Burdick Street. This would result in the disturbance of 18.7 acres of wetlands SYE 22.01, 22.02 and 22.03 and result in the isolation of 139 acres to the north. The alignment then crosses over to follow the alignment of Alternative 2 for the remainder of the project. Options A, B and C are available and would create the following additional impacts:

Option	Wetland Disturbance (Acres)	Wetland Isolation (Acres)
A	2.3 (MAN 7.01)	6 (MAN 7.01)
B	1.7 (MAN 7.01) 2.9 (MAN 7.02) 2.1 (MAN 7.07)	6 (MAN 7.01) 7 (MAN 7.02) 4 (MAN 7.07)
C	1.3 (MAN 7.01) 0.7 (MAN 7.02)	6 (MAN 7.01)

Thus, the total wetland area disturbed (isolated) by Alternative 1-2 is 23.8 acres (6 acres) with Option A, 28.2 acres (17 acres) with Option B and 23.5 acres (6 acres) with Option C.

Alternative 2-1 requires the disturbance of four (4) wetlands within wetland units SYE-22 and MAN-7. Total wetland acreage disturbed is 24.2 acres or 3.1 percent of the study area wetlands. Alternative 2-1 follows the same alignment as Alternative 2 from the Butternut Interchange eastward to 500 feet east of Bowman Road. It then crosses over and becomes identical with Alternative 1 for the remainder of the project. Wetland isolated by Alternative 2-1 totals 129 acres within wetland SYE 22.

The direct loss of wetland acreage is not simply a spatial consideration. The overall qualities and functions of these wetland areas include flood control, pollution control, open space aesthetics, recreation and wildlife habitat. Each of these has been examined in the context of total wetland area adjacent to the project and other aspects of the project which address identical issues. Floodplain analysis for the proposed facility indicated that elimination of existing floodway constrictions would permit construction of the project with no increase in flood elevation. Thus, there would be no significant effect on the flood control function of the wetland areas. Based on the location, overall size, adjacent land uses and character of the affected wetland areas, it can be surmized that they presently serve no major role within the project site in regards to pollution control, open space aesthetics or recreation on a per acre basis. The loss or removal of less than one percent of the four designated wetland units will not have a significant effect on pollution control, open space aesthetics or recreational functions. The most significant and measurable impact of wetland removal will be the direct loss of wildlife habitat.

2. Streams

Stream modification requirements are a major consideration in all highway development projects. Stream disturbance is normally encountered in areas where the proposed roadway would cross, closely follow or displace the natural flow of a watercourse.

With this project, most disturbance will occur at locations where the proposed alternatives cross streams or where isolated temporary crossing structures will be required during construction. Even though all major stream crossings (i.e., support bridges) utilize long span bridges which cross both water courses and regulated floodways, some stream bank disturbance will occur. This disturbance will be similar for all alternatives as each require three (3) major stream crossings. Also, Alternatives 1 and 2-1 require two (2) minor stream crossings (i.e., culvert crossings of intermittent tributaries) which is one more than Alternatives 2A, B, C and 1-2A, B and C. These stream crossings could result in increased turbidity and a resulting decrease in surface water quality during the temporary installation and removal of construction culverts or bridges. However, proper construction techniques and adherence to State and Federal Regulatory Permit conditions will minimize this impact.

The only other instream work in addition to temporary construction crossings will be the removal of the existing Route 290 bridges over Limestone Creek and the Old Erie Canal (w/Alternatives 2A, B, C and 1-2A, B, C) and removal of the abandoned railroad bridges over Butternut and Limestone Creeks occurring with all alternatives.

Two types of impacts on aquatic ecosystems often result from highway construction procedures; direct construction impacts include removal or physical alteration of aquatic habitats while secondary impacts result from road maintenance and use. The latter will be discussed under Water Quality Impacts in this section.

The most obvious direct impacts as a result of stream disturbance would result from earth moving or activities which bury or grade away existing substrata. Bottom dwelling invertebrates and aquatic vegetation are particularly subject to destruction by this aspect of construction. Fish populations also can be affected through loss of habitat and/or spawning sites.

In addition to burial and removal of habitat, adverse effects to aquatic life can occur as a result of water quality degradation resulting from construction activities which produce increased turbid runoff. However, as already mentioned under short term impacts, turbidity and suspended sediments from runoff flocculates or settles out within a short period of time.

Removal of existing shade vegetation associated with localized stream disturbance will increase exposure to summer sun resulting in increased light exposure and to a minor degree, increase in water temperatures. Increased water temperatures could in turn result in reduced oxygen levels, thereby reducing fish habitat quality. However, this will be a negligible impact as only approximately one percent of the existing stream bank vegetation will be removed with any of the build alternatives. Also, the construction of long span bridges will help negate this impact.

3. Water Quality

Water quality impacts associated with highway usage and maintenance can occur as runoff containing trace amounts of hydrocarbon waste, lubricants, lead and other substances associated with road maintenance/vehicle operation enter surface waters. These pollutants would enter the study area streams in proportion to increased vehicle miles traveled (VMT).

Impacts associated with roadway maintenance would be similar for all build alternatives as evidenced below in Table III-2 and described in Appendix B-3.

Table III-2

Chloride Contributions to Study Area Streams

Build Alternative	Limestone Creek		Butternut Creek	
	Lane Miles	Chlorides Mg/L	Lane Miles	Chlorides Mg/L
1	4.4	0.28	5.6	0.50
2A	6.0	0.38	6.0	0.53
2B	6.8	0.43	6.0	0.53
2C	5.2	0.33	6.0	0.53
1-2A	6.0	0.38	5.6	0.50
1-2B	6.8	0.43	5.6	0.50
1-2C	5.2	0.33	5.6	0.50
2-1	4.4	0.28	6.0	0.50

Note: Based on a preliminary analysis, the Old Erie Canal does not receive a significant amount of runoff from any of the build alternatives. Therefore, it was not included in this table.

Ice removal compounds (sodium and calcium chloride) used to maintain safe travel conditions during winter months will reach surface water within the study area in the form of highway runoff.

The highest predicted chloride concentration resulting from this project under normal deicing application rates would occur with Alternative 2B as it contributes 0.43 mg/l to Limestone Creek and 0.53 mg/L to Butternut Creek [shock level conditions (extreme ice or snow) would be 0.86 mg/l and 1.06 mg/l respectfully]. These predictions when added to monitored worst case background conditions of 61.5 mg/l for Butternut Creek and 45.0 mg/l for Limestone Creek are well below New York State Department of Environmental Conservation's current standard of 250 mg/l for fresh water.

Water quality impacts associated with highway usage can occur as runoff containing trace amounts of hydrocarbon waste, lubricants, lead and other substances associated with vehicle operation enter surface waters. These pollutants would enter the study area streams in proportion to increased vehicle miles traveled (VMT) and the alternatives proximity to water courses. Intrusion of these pollutants would be similar for all alternatives as they have similar VMT's [99,667 (Alternative 1) to 103,352 (Alternative 2A)] and a similar amount of stream crossings. The significance of this impact will be minor as no alternatives parallel existing streams and only low levels of pollutants would intrude at stream crossings. Technical studies (i.e., FHWA/RD-84/062-066) by the Federal Highway Administration conclude that storm water runoff from medium traffic volume (30,000 ADT) rural highways exerts minimal to no impact on the aquatic components of most receiving waters.

4. Water Supply

There will be no impacts on public water supply sources as a result of this project. Water quality in the few domestic wells in the

study area will not be impacted because the incremental increase in road salt application is negligible. Several of the residences which utilize private wells may be acquired in full under a build alternative.

Construction of a new 48 inch water line along Bowman Road to connect the end of the present southward extension from Route 290 to the line extending west from Burdick Street is currently being contemplated by the Onondaga County Water Authority. All of the construction alternatives would cross this proposed waterline construction area. This crossing impact will be negligible as it is considered a routine type construction crossing.

5. Aquatic and Terrestrial Flora/Habitats

The direct impact of highway construction with regard to flora and wildlife habitats is the loss of woodlands, wetlands, old fields and other natural vegetation acreage. Upland successional fields, emergent wetland, flooded deciduous shrubs and flooded deciduous trees comprise the majority of the natural vegetation in the study area totaling 47 percent (1,014 acres) of the 2,170± acres of all land. The magnitude of highway construction impact upon these natural areas can be expressed as the number of acres of natural vegetation destroyed compared to the total number of acres of natural vegetation found in the study area.

A detailed breakdown of natural vegetation and wildlife habitats required for each alternative is shown in Table III-3.

Table III-3

Wildlife Habitats Impacted by Construction of Build Alternatives

Habitat Type	Acres in Study Area	Alternatives 1	2A	2B	2C	1-2A	1-2B	1-2C	2-1
Flooded Trees	201	0.8	3.2	3.5	3.0	1.2	1.9	1.0	2.8
Upland Trees	8	1.6	2.2	0.3	-	2.2	0.3	-	1.6
Flooded Shrubs	220	7.3	8.8	8.6	8.1	8.0	7.4	7.3	8.1
Upland Shrubs	115	-	1.5	0.7	0.6	1.5	0.6	0.6	-
Wet Meadow	76	3.7	2.3	3.1	3.0	2.8	3.6	3.4	3.7
Emergents	293	8.2	9.1	12.6	9.1	7.7	11.2	7.7	10.4
Successional Field	300	12.1	15.5	16.2	12.9	19.4	20.0	16.8	8.1
Agriculture	36	-	2.5	2.5	0.6	2.5	2.5	0.6	-
Open Water	137	1.2	0.7	0.7	0.7	1.3	1.3	1.3	0.6
Total	1,386	34.9	45.8	48.2	38.0	46.6	48.8	38.7	35.3

As can be observed from Table III-3, Alternatives 1-2B and 2B impact the most vegetation/habitat acreage of any of the alternatives under consideration. Alternative 1-2B removes approximately 48.8 acres or 3.5 percent of the 1,386 acres of available habitat within the study area. Alternative 2B, impacts 48.2 acres or 3.5 percent of the habitat. Alternatives 1 and 2-1 impact the least amount (2.5%) of habitat acreage, 34.9 acres and 35.3 acres respectively.

Of the 1,386 acres of available wildlife habitat, 1,014 acres (flooded trees and shrubs, emergents and successional field) are considered important habitats in terms of size, value and use. Alternatives 2B and 1-2B again have the greatest impacts as they occupy 40.9 acres and 40.5 acres respectively. Alternatives 1 (28.4 acres) and 2-1 (29.4 acres) impact the least amount of important wildlife habitats.

6. Aquatic and Terrestrial Fauna

Fish and wildlife exist as a direct result of their habitat. Construction of any one of the eight alternative routes would directly and adversely affect fish and wildlife populations within the study area through loss of habitat and indirectly due to increase in road kills.

Since the natural carrying capacity of a given area is closely correlated with the amount of natural vegetation of that area, the destruction of any vegetation must also be viewed as an adverse impact on wildlife. However, the minor loss of habitat (3% or 49 acres) will not significantly affect resident wildlife populations. Wildlife forced to leave an area will migrate to adjacent habitats. If these habitats are at maximum carrying capacity, then redistribution of wildlife would be a short term phenomena followed by some degree of actual loss. However, in contrast, populations of non-game small birds and mannals could be enhanced by habitats created by right-of-way vegetation and also within the highway ecotone.

In describing road kills, increases would be proportional to new highway mileage because the areas of exposure between wildlife and automobiles would increase. However, exceptions to this may be noted. Whitetail deer appear to cross smaller open areas more frequently (i.e., county and town roads) as opposed to wider open areas (i.e., expressway right-of-way) and therefore, deer may tend to avoid the proposed highway. Smaller mammals such as cottontails, woodchuck and raccoon would comprise most of the road kills along the proposed highway. However, the actual amount of wildlife killed will be reduced somewhat by right-of-way fencing and roadkills should not significantly reduce wildlife populations.

B. Secondary Impacts

Secondary impacts in the form of land use changes are a common result of most highway development projects. These changes would be most prevalent in areas of major intersections (i.e., proposed expressway crossing an existing roadway). Here, roadside and service related business will attempt to capitalize on the increased traffic and accessibility.

Commercially and industrially zoned districts adjacent to the project are areas which are likely to experience an increased rate of development. An analysis of existing zoning within the study area indicate two such districts are present adjacent to the various alternatives under consideration.

All of the design alternatives from the Butternut Interchange to the DeWitt/Manlius Town Line would cross an industrial zoned area. Development of this area is presently occurring and can be expected to continue with this project. Complete development of this area could eventually impact 345 acres of wildlife habitat. However, a more realistic figure would be 185 acres, as much of the existing habitat in this industrially zoned area is NYSDEC regulated wetlands (SYE-22).

The other area subject to development would be the commercially zoned district between Bowman Road eastward to approximately 800 feet east of Burdick Street bounded by the Abandoned Railroad on the north and Taylor Road to the south. A total of approximately 60 acres of habitat could be subject to increased development pressure with any of the design alternatives. However, as in the Town of DeWitt, much of this acreage (31 acres) is NYSDEC regulated wetlands, leaving only 25 acres of developable property.

IV. MITIGATION

A. Mitigation of Short Term Impacts

Many of the initial direct impacts to water quality, vegetation, terrestrial fauna and aquatic fauna can be minimized or eliminated by proper construction techniques. The following mitigation procedures may be incorporated into contract specifications in order to reduce short term impacts:

1. Vegetation - Clearing of trees, shrubs and other natural vegetation would be restricted to as small an area as possible. Plantings and seeding of exposed soil areas would be completed as soon as practical. Adequate mulching and fertilization would be used to insure rapid growth, thereby minimizing erosion.

2. Erosion/Soil Loss - Limit the amount of erodible earth material exposed at any one time to 750,000 square feet. Where practical, work operations shall be accomplished in one operation without delay between construction phases. Control air-born dust by watering or controlled applications of calcium chloride.

3. Water Quality - Minimize the direct discharge of any pollutants into streams, ponds or wetlands. Erosion control and filtering devices such as grass ditches, berms, dikes, dams, sediment basins, fiber mats, slope drains and revegetation would be used and coordinated with permanent erosion control features during the design stage of the project. Stream fording will be kept to a minimum.

4. Wetlands - All work shall be in compliance with the required U.S. Army Corps of Engineers Section 404 and DEC Article 24 (Freshwater Wetlands) permit conditions and specifications. All access in and around wetland areas would be kept to the minimum necessary. Disturbance would be limited to that area deemed necessary for construction.

   All excavated materials unsuitable for reuse shall be removed from the wetland and will be deposited at an approved upland site.

5. Aquatic Fauna - Normal flow and water levels should be maintained to preserve natural conditions for fish and wildlife. All stream disturbance shall be mitigated to meet existing conditions.

6. Terrestrial Fauna - Limit the amount of clearing and grubbing to the minimum necessary for construction. Avoid natural vegetation (habitat) areas as much as possible.

All these measures in combination with each other will help minimize short term impacts. In addition, the proposed method of construction (i.e., staged construction) will help eliminate cumulative impacts such as sheet erosion on large disturbed and unvegetated areas which occur with large construction projects.

Also, during the development of the project, features will be incorporated into the design to minimize potential impacts. These features necessary to effectively control erosion and water pollution during construction are outlined in Sections 107 and 209 of the New York State Standard Specifications for Construction and Materials.

B. Mitigation of Long Term Impacts

Mitigation of long term impacts resulting from the proposed project may involve the replacement of habitat to offset or compensate for that displaced during project development. It may also involve intensive management of other properties to improve their wildlife value.

Identified below is a general discussion on mitigation measures which could occur. Once selection of a final design alternative is made, individual site disturbances will be investigated and possible mitigation could occur by one or more of the following measures:

1. In-Kind Replacement - This mitigation measure basically involves replacement of destroyed habitat with the same type habitat. If X amount of acres of scrub-shrubland is destroyed by this project, planting adjacent areas with shrub species attractive to wildlife will create additional habitat for wildlife species, thereby reducing stress on similar habitats. Table IV-1 is a list of plant species ranked according to their value to wildlife in the northeastern United States. These species and others could be used in plantings of disturbed areas.

TABLE IV-1

Plant Species Valuable to Wildlife in the Northeast

Ranking	Woody Species	Weed Species	Marsh Species	Cultivated Species
1	Oak	Ragweed	Smartweed	Corn
2	Blackberry	Bristlegrass	Pondweed	Wheat
3	Cherry	Sedge	Wildrice	Oats
4	Pine	Crabgrass	Bulrush	Apple
5	Dogwood	Panicgrass	Wildcelery	Cherry
6	Grape	Pigweed	Naiad	Timothy
7	Maple	Clover	Cordgrass	Barley
8	Beech	Sheepsorrel	Widgeongrass	--
9	Blueberry	Goosefoot	Cutgrass	--
10	Birch	Dropseedgrass	Spikerush	--

Source: American Wildlife and Plants - A Guide to Wildlife Food Habitats, Martin-Zim-Nelson, 1951.

2. Out of Kind Replacement - This measure involves replacement of one kind of habitat with a different kind. If the proposed expressway intersects an old field area between two woodlots, it could disrupt wildlife travel patterns. Replacement of this old field habitat with hedgerow plantings along the right-of-way could possibly even improve wildlife movement and use of the area by providing escape/travel routes to and from bedding and feeding areas.

3. Quality vs. Quantity - An example of this mitigative measure would be replacement of x amount of acres of emergent marshland with x + y amount of acres of newly constructed marshland. Although the quality of the emergent marsh isn't replaced, the increased acreage of new wetland areas will in most cases offset the quality lost with quantity gained.

4. On Site vs. Off Site - This mitigation measure involves compensation occurring directly on the impacted sites or on adjacent sites. Habitat areas lost in the eastern section of the study area could be compensated by their replacement in the western portion. Or, areas adjacent to impacted areas could be managed and upgraded to a degree which would allow them to accept displaced wildlife without degrading existing populations.

C. Wetland Mitigation

As mentioned earlier, wetland mitigation measures for this project cannot be accurately defined due to the present stage of project development. However, on June 23, 1987, an agency workshop on wetland mitigation was held in the NYSDOT Region 3 office in Syracuse, New York. In attendance were various state and federal agencies. Memos and correspondence from that meeting are contained in Appendix B-2 of this report, "Correspondence and Coordination".

The purpose of that meeting was to review possible wetland mitigation plans and solicit comments and suggestions on additional mitigation measures for further agency coordination.

In order to lessen wetland impacts and offset or compensate for those areas disturbed, the following discussions on wetland mitigation methods were introduced during the workshop:

1. Avoidance - The extensive amount of wetlands within and adjacent to the project study area is a major consideration which has influenced the location of the design alternatives for this project. In order to avoid involvement with designated wetland areas to the maximum practical extent, all build design alternatives were located in a manner which favored higher upland areas and the use of the abandoned railroad whenever feasible. However, use of the abandoned railroad in the vicinity of Fremont Heights was ruled out because of its close proximity to residential backyard areas. East of Burdick Street, designated wetland SYE 22.03 was avoided as much as possible by locating the design alternative along its northern and southern perimeters. Total avoidance of this wetland either to the north or south would involve encroachment within residential areas and displacement of commercial operations (DOW Lumber and Medical Center East) and is therefore not recommended.

Due to the extensive nature of the wetland areas particularly in relation to the location of the project terminus, i.e., Buttternut Interchange on the west and the vicinity of Manlius Center to the east, total wetland avoidance by any of design alternatives and options (with the exception of the No-Build Alternative) is not possible within the limits of the project study area. However, of the build alternatives, Alternatives 1, 1-2A and 1-2C would require the least amount (21± acres) of wetland involvement.

2. Alignment Selection - Various physical, cultural and natural features within the location band posed constraints with respect to the positioning and alignment of the design alternatives. These constraints were carefully considered during the development and evaluation of preliminary alignment alternatives for this project. Provided below is a list of specified features within the study area which directly influenced the location of the various alignments.

a. Erie Village Subdivision - This 110+ acre subdivision which is presently under construction is located east of Burdick Street in the southeast portion of the study area. Ultimate plans call for the development of 500 residential townhouse units.

b. Fremont Hills - A residential areas located in the central portion of the study area.

c. Fremont Heights - A residential area located in the north central portion of the study area.

d. Kodiak Subdivision - A proposed 21 unit residential subdivision located wet of Fremont Heights in the north central portion of the location band.

e. Clark Hill Subdivision - A proposed 143 unit residential subdivision located west of Fremont Hills and east of Bowman Road in the central portion of the location band (presently under construction).

f. Fremont Meadows Subdivision - A proposed 158 unit residential subdivision located east of Burdick Street and north of Erie Village in the east central portion of the location band (presently under construction).

g. Medical Center East - A professional health care facility located on the east side of the Taylor Road/ Burdick Street intersection.

h. Commercial/industrial development in the vicinity of the Butternut Interchange.

i. Electric substations.

j. Sanitary Landfills.

k. Extensive floodplain areas.

l. The Meadowbrook-Limestone Sewage Treatment Plant.

m. Abandoned railroad tracks traversing the northern and eastern portions of the study area.

n. Existing development in the vicinity of Manlius Center.

In order to minimize involvement with designated wetland areas to the maximum practical extent, all design alternatives were located in a manner which favored higher upland areas and the use of the abandoned railroad wherever feasible. They also incorporated design consideration which utilize steeper slopes, retaining walls and other various construction methods which minimize wetland involvement. East of Burdick Street, a large wetland area was avoided as much as possible by locating the design alternatives along its northern and southern perimeters.

3. Design Methods - The following design mitigation measures will be utilized on this project to minimize the amount of wetland acres subject to highway filling:

a. Use of 2:1 highway embankment side slopes for all low fills within wetland areas versus typical 4:1 side slopes.

b. Use of reinforced earth wall for the high fill area between the Butternut Interchange and Fisher Road.

Assuming an average fill depth of six feet, the use of a 2:1 fill slope would reduce the width of the highway embankment at its base by 24 feet and thus reduce the amount of wetland filling by approximately four acres. The use of the steeper 2:1 fill slopes could be implemented in all

wetland areas subject to low (6' or less) fill embankments. These areas are located mainly east of Fisher Road.

West of Fisher Road, fill depths ranging from approximately 6 to 30 feet are required to provide proper vertical alignment for the proposed highway as it passes over Butternut Creek, Butternut Drive and connects with the Butternut Interchange. In this area, 2:1 fill slopes are presently being proposed. However to further reduce spatial requirement of fill within the wetland area west of Fisher Road, reinforced earth retaining walls were examined. Reinforced earth walls would increase project construction cost by approximately $1,000,000.00 but could only reduce the amount of wetland filling by approximately 1.1 acres and therefore is not considered a prudent expenditure of public funds.

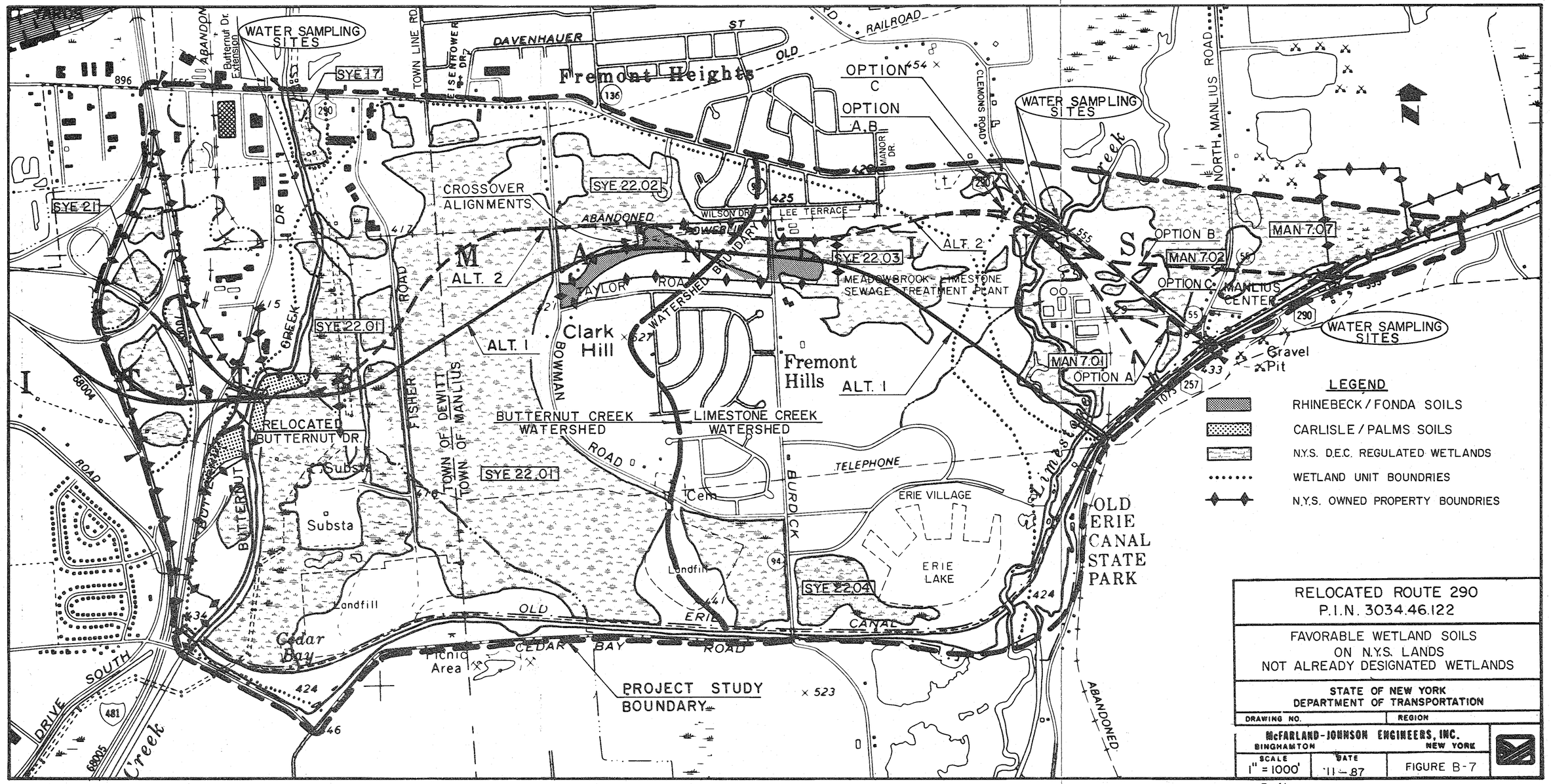
4. On-Site Compensation - Approximately 36% of the project study area contains NYSDEC designated wetlands.

Within the 2,170 acre project study area, NYSDOT and NYS Parks presently own approximately 205 acres of land which would be available for use as wetland mitigation (an additional 20 acres of park land is available off-site along the Old Erie Canal State Park). However, of this 205 acres, 85 acres are already NYSDEC designated wetlands. Of the remaining 120 acres of state owned land, only approximately 26 acres presently contain soil conditions which would lend themselves to wetland construction (see Appendix B-6). A majority of this preferred soil (14 acres) is located in the saddle between Clark Hill and Fremont Heights where wetland construction would most likely receive public opposition. The remaining 12 acres occurs east of Butternut Drive along Butternut Creek. These areas are shown on Figure B-7, "Favorable Wetland Soils on NYS Lands".

During the analysis of wetland mitigation, various sites, methods and modifications/enhancements were investigated. These include:

a. Proposed ROW Takings - Standard specifications call for an average right of way taking of 10 to 15 feet beyond the projects slope limits. Where feasible and practical, ROW takings could be extended to provide for enhancement and/or creation of wetlands within the ROW. This would occur primarily west of Bowman Road on parcels of land contiguous with the selected alignment and would vary with the alternative selected.

b. Butternut Interchange Infields - Presently owned by NYSDOT, these infield areas already contain designated wetland areas which could be enhanced or enlarged. For estimation purposes, approximately 20 acres of wetland could be created in addition to the 34 acres presently there. These wetlands primarily serve as visual aesthetics relief from the highway and water retention basins.



RELOCATED ROUTE 290
P.I.N. 3034.46.122

FAVORABLE WETLAND SOILS
ON N.Y.S. LANDS
NOT ALREADY DESIGNATED WETLANDS

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION

McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK

SCALE	DATE	
1" = 1000'	11-87	FIGURE B-7

c. Use of Abandoned Railroad Bed as Borrow - Depending on the alternative selected (Alternative 2 uses railroad bed), the existing abandoned railroad bed could be removed and used as borrow. This removal of the bed west of Burdick Street would enhance wetland SYE-22 by removing a barrier which isolates surface and subsurface water flow between this wetland. Approximately 6 acres of wetland would be created by removal of the railroad bed (6,000 LF) between Butternut Creek and Burdick Street (with Alternative 1 and 1-2).

d. Clark Hill Saddle - Presently owned by NYSDOT, this area is located between Clark Hill and Fremont Heights and already contains designated wetland areas. It also contains approximately 14 acres of non-wetland areas which have soils which are preferred for wetland construction.

e. Fremont Meadows Retention Pond - With either Alternative 1 or 2-1, the proposed Fremont Meadows Subdivision storm water retention pond could be converted to a wetland mitigation area. For estimation purposes, approximately 5 acres of wetland could be created.

f. New York State Parks Property - Approximately 37 acres of state owned park land is located east of North Minoa Road along the Old Erie Canal Park. Almost all of this 37 acres is NYSDEC designated wetland MAN-7. Mitigation measures in the form of enhancement could occur here. With wetland MAN-7 being a Class I wetland with important aesthetic, recreational and educational benefits, it seems appropriate to enhance these characteristics. A wetland interpretative area could be installed to offer users a view of various wetland habitats and their important functions. Walkways, bird viewing and vista areas could be installed.

5. Off-Site Compensation - Areas considered as possible borrow sites which are not within the project right-of-way or on NYS owned lands, could be investigated in regards to use as wetland mitigation areas. These areas would require a Mined Land Reclamation Permit from the New York State Department of Environmental Conservation [Article 23 (6NYCRR, 420-426)] and are shown on Figure B-8, "Off Site Mitigation Areas".

The following sites were considered and rejected:

Site 12 - North Burdick Street - This 50.5 acre parcel is an old gravel pit with high bank areas and deep open water. Its use as a borrow area is not recommended due to its closeness to the Erie Canal and Limestone Creek.

Sites 14 and 15 - DeWitt and Manlius Landfills - The use of landfills as wetland mitigation areas is not a recommended practice due to the required excavation of substantial quantities of unknown materials.

Site 16 - Cedar Bay Road - This 4 acre parcel was once a gravel pit. It has relatively deep water but has gently sloping shores which would lend themselves well to wetland creation. However, due to surrounding development its future use as a borrow area is questionable.

The following off-site areas are considered feasible for borrow areas and thus could be used as wetland mitigation areas:

Site 10 - North Manlius - Minoa Road Gravel Pits - This area consists of approximately 25 acres of already mined open water area. An additional 25 acres appears to be suitable for borrow material. Present wetland value is poor as these areas contain steep banks and deep water. If used as borrow, mitigation measures could occur by flattening banks and varying bottom contours to enhance diversity and values.

Site 11 - Fisher Road - This 16 acre area was once a gravel pit which has since been partially filled. The remaining area (5± acres) has reverted to emergent wetland. If used as a borrow area, this area could be re-excavated and organic undercut material brought in for revegetation. This area could be designed to provide for hydrologic recharge from seasonal high water and from periodic storm events.

Site 13 - Cedar Bay @ North Burdick Street - Mitigation at this site could occur if this parcel is used as a borrow area. Excavation could be to the proper elevation so that the wetland to the west could be extended east creating an additional 2 acres of wetland.

6. Construction - In wetland areas subject to highway construction activities, the following mitigation techniques will be employed:

a. Excavation and removal of wetland soils beneath proposed highway fill areas.

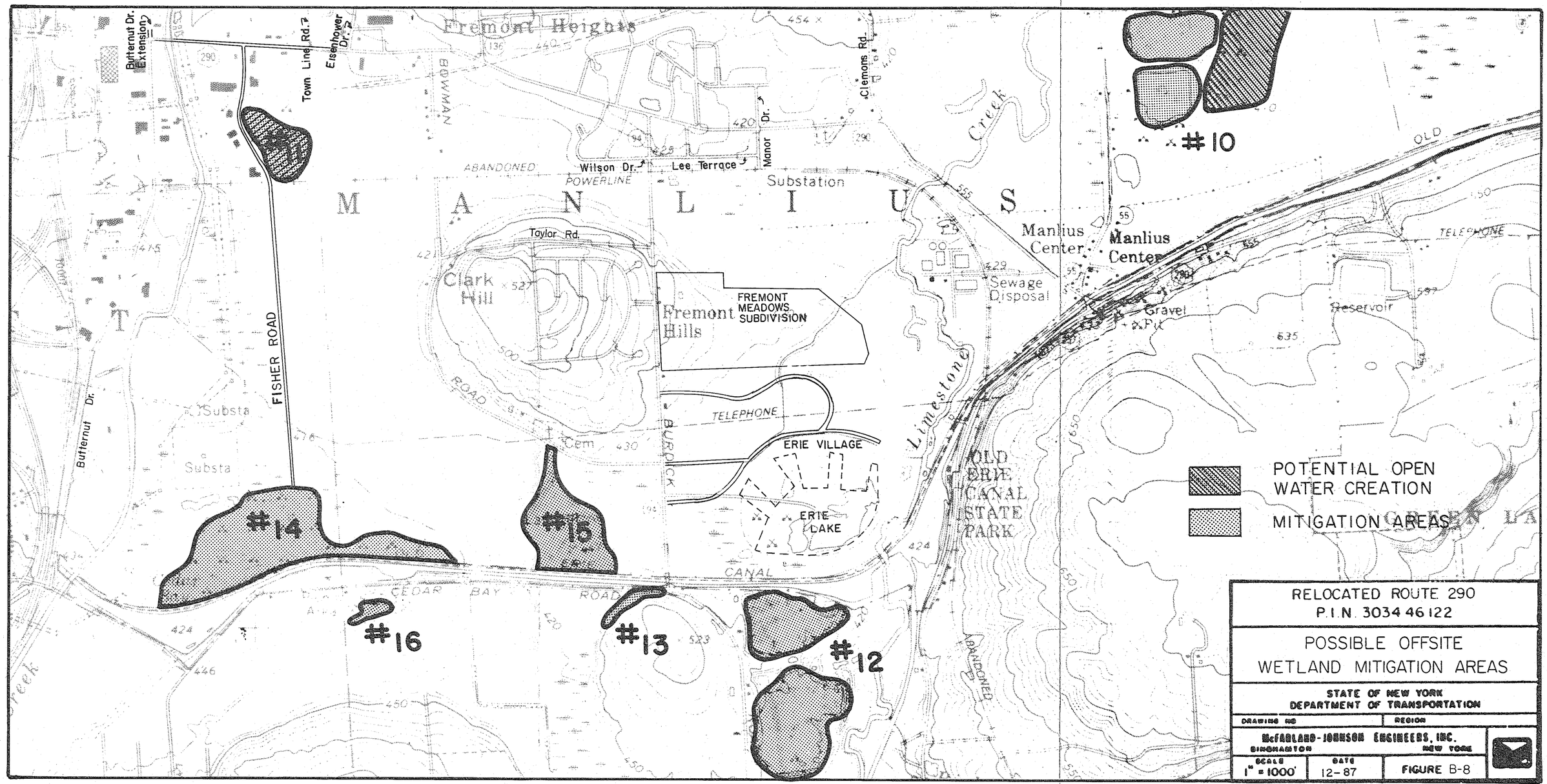
b. Replacement of the excavated wetland soils with suitable granular fill material which allows the hydrologic regime of the affected wetland to function as near as possible to its preconstruction state.

c. Whenever possible, consideration shall be given to the feasibility of using the excavated wetland soils for wetland creation, enhancement or replacement purposes.

d. All excavated materials unsuitable for reuse will be removed from the wetland and deposited at an approved upland site.

e. All access in and around wetland areas will be kept to the minimum necessary and disturbance of wetland areas will be limited to the minimum area necessary to facilitate construction operations.

f. All construction activities shall be in compliance with the required U.S. Army Corps of Engineers Section 404 and NYSDEC Article 24 (Freshwater Wetlands) permit conditions and specifications.


Fremont Heights
Butternut Dr. Extension
Town Line Rd.
Eisenhower Dr.
Bowman
Clemons Rd.
Creek
ABANDONED POWERLINE
Wilson Dr.
Lee Terrace
Manor Dr.
Substation
M A N L I U S
Taylor Rd.
Clark Hill
FREMONT MEADOWS SUBDIVISION
Fremont Hills
Manlius Center
Manlius Center
Sewage Disposal
Gravel Pit
Reservoir
TELEPHONE
FISHER ROAD
Butternut Dr.
Substa
Substa
ROAD
Cem
BURDOCK
TELEPHONE
ERIE VILLAGE
ERIE LAKE
Limestone
OLD ERIE CANAL STATE PARK
CANAL
CEDAR BAY ROAD
ABANDONED
#10
#14
#15
#16
#13
#12
POTENTIAL OPEN WATER CREATION
MITIGATION AREAS
RELOCATED ROUTE 290
P.I.N. 3034 46 122
POSSIBLE OFFSITE
WETLAND MITIGATION AREAS
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE 12-87
FIGURE B-8

7. General Recommendations for Wetland Construction

The creation of wetland areas require the knowledge of project site hydrology, substrata and wetland biology.

Wetland construction for mitigation purposes with this project will achieve the following:

- o Habitat Diversity - Will be reached through variation in physical habitat and species propagation.
- o In-Kind Replacement - Native wetlands will be replicated by duplicating conditions of hydrology, substrata and plant species.
- o On-Site vs. Off-Site - Compensation for wetlands lost with the selected alternative could be compensated outside the project ROW taking in borrow areas.

To achieve these goals, the following wetland construction recommendations should be followed:

A. Hydrology

1. Both deep (approximately 60 cm) and shallow (approximately 30 cm) water should be used in order to enhance diversity and values associated with each.
2. Care should be taken that there is some variation in bottom contour at each depth so that maximum habitat diversity for plant growth can occur.
3. Gently sloping shores of the constructed wetlands should be provided. These will provide a broad ecotone of intermittent inundation and habitat diversity. Slopes of 1 unit of vertical rise for 10 units of horizontal distance or less steep are recommended.
4. Wetlands should be designed to provide for hydrologic recharge from seasonal high water and from periodic storm events.
5. Wetland inlet and discharge passages should be across natural vegetated berms rather than through culverts, constructed weirs or other structures. This will minimize maintenance.
6. Care must be taken to assure that all slopes and areas subject to erosion are appropriately stabilized.

7. Depth of excavation should be designed, if possible, such that the basic water supply is from the water table with complementary filling from surface drainage. Drawdown will then relate to two factors, seasonal weather patterns and water table fluctuations. This system will provide the wetlands with the function of ground water recharge.

B. Substrate

1. Wetland soil should be used as a substrate over some part of the wetlands. It appears to be more influential in producing denser wetland plant growth.

2. Upland soil is an appropriate substrate. It is particularly effective when cores are planted in shallow water.

3. A mixture of the area covered by wetland and area covered by upland soil should be provided; a ratio of 3:1 wetland to upland in deeper water and 1:1 in shallow water is recommended.

4. Wetland soil should be chosen from sites with long periods of inundation. These soils will be gleys or histosols. Soils with a high mineral content are recommended.

5. Alluvial soils from upland or wetland sites can substitute for upland soils but must not be used as wetland soils. Wetlands with alluvial soils do not normally support species that will thrive in semipermanently flooded, constructed wetlands.

6. Wetland soils should be taken from more than one wetland whenever this is feasible. This will increase the potential for species diversity.

7. Species composition on the wetland sites, where soil is taken, should be an important concern. Those wetland soils supporting species that will be expected to survive should be used.

8. Wetland soils should be taken from sites that do not contain such aggressive wetland species as Typha latifolia (cattail), Phragmites austrailis (reeds) or Lythrum salicaria (purple loostrife). These species if planted, via wetland soil, may become aggressive weeds and methods to control them will be required.

9. Wetland soils may be stored for a period of time but they should not be allowed to dry completely. If they are stored, a plastic covering or periodic waterings may be effective in retaining viability of propagules.

10. Soils should be selected that have a texture that renders them friable and sufficiently soft to facilitate hand planting.

C. Planting

1. Plantings can be effectively conducted in patches of a few square meters.

2. Any particular patch should represent a monotypic planting.

3. Plantings employing different species and techniques should be juxtaposed.

4. Rhizome plantings are effective and should be used. Species planted by rhizomes must be selected and planted for optimum water depth.

5. Nuphar spp. (yellow pond lily) rhizomes are recommended for planting in standing water, both deep and shallow.

6. Juncus spp. (rushes) is for planting by rhizomes in the drawdown zone in the wetland edge.

7. Core plantings of Sparganium spp. (burrreeds) on one meter centers are highly recommended in both deep and shallow water.

8. Since wetland soils do not appear to enhance core or rhizome plantings, these planting techniques may be used effectively in upland soil.

9. Small plantings with rhizomes and cores of species not present in this project site is recommended.

10. It is recommended that only about 30% to 40% of the wetland area needs to be planted. Much of this could be devoted to cores of Sparganium spp. (burrreeds) and rhizomes of various species.

11. An individual with experience in wetland biology and wetland plant identification should be employed in a supervisory/advisory capacity during wetland construction and planting. This is a requirement that is necessary both to implement these recommendations and to provide advice under

situations not anticipated by these recommendations.

All wetland disturbance will require wetland permits from the New York State Department of Environmental Conservation (Article 24) and the U.S. Army Corps of Engineers (Section 404). Prior to preparation of permit applications, the proposed action will include all practicable measures to minimize harm to wetlands as a result of construction and to provide mitigation measures for the disturbed areas in compliance with the conditions of Article 24 and Section 404 as well as Section 209 of the New York State Standard Specifications for Construction and Materials and Part 502 of 6 NYCRR "Floodplain Management Criteria for New York State Projects".

The mitigation plan adopted by the Department as a result of selection of any build alternative will address the actual area disturbed and the specific ecological value of these wetland areas for the specific alternative. As a minimum, it will confirm the Department decision to avoid additional disturbances by elimination of the Butternut Drive-Fisher Road Connector and it will emphasize the Department's commitment to minimize disturbance by utilization of appropriate construction details. Embankment side slopes will be steepened to reduce encroachments, french drains and/or equalizer pipes will be provided to maintain surface and groundwater hydrologic regimes, and a detailed plan for Soil Erosion and Water Pollution Control will be included in the contract documents for construction of the selected alternative. In addition, the establishment of new right of way acquisition limits will include space for the enhancement of adjacent wetland areas and to provide landscaping consistent with the edge ecotone adjacent to the new facility. The mitgation plan will include replacement or enhancement of wetland areas by first utilizing property already owned or controlled by the State, i.e, Butternut Interchange infield areas, previous acquisitons for Relocated 290 and the abandoned railroad right-of-way. Wetland replacement is also anticipated to involve the utilization of isolated parcels of private land adjacent to the proposed facility and designated off site borrow areas. The Department's basic proposal for mitigation of wetland impacts, contingent on regulatory agency acceptance is outlined in Table IV-2 "Wetland Disturbance and Mitigation Proposal".

The proposed mitigation shown in Table IV-2 will offset those impacts described earlier. A discussion of general mitigation sites and their mitigation purposes are as follows:

- NYS Property - Creation of 6 to 9 acres of wetland (open water and vegetated) will offset the general impacts on pollution/soil filtration and aesthetics. Wildlife habitats will benefit directly by creating replacement acreage.

- Proposed ROW - Creation of 5 to 6 acres of open water or vegetated wetlands will provide aesthetic relief from the roadway in accition to valuable wildlife habitat (i.e., open water adjacent to existing vegetated wetland).

TABLE IV-2

WETLAND DISTURBANCE AND MITIGATION PROPOSAL TABLE

		Mitigative Engineering Practices			Proposed Mitigation (Acres)						
Alternate	Acres Disturbed	Butternut Drive Fisher Road Connector	Equalizer Pipes, French Drains	Steep Side Slopes	NYS Property	Proposed ROW	Butternut Interchange	Aband. RR	Fremont Meadows	Off Site Borrow Areas	Total
1	21.1	Deleted	Included	4 Acre Reduction	8	0	10	4	5	10	37
2A	24.1	Deleted	Included	4 Acre Reduction	7	6	10	4	0	10	37
2B	28.5	Deleted	Included	4 Acre Reduction	7	6	10	4	0	10	37
2C	23.8	Deleted	Included	4 Acre Reduction	7	5	10	4	0	10	36
2-1	25.5	Deleted	Included	4 Acre Reduction	6	0	10	4	5	10	35
1-2A	21.0	Deleted	Included	4 Acre Reduction	9	0	10	4	0	10	33
1-2B	25.4	Deleted	Included	4 Acre Reduction	9	0	10	4	0	10	33
1-2C	20.7	Deleted	Included	4 Acre Reduction	9	5	10	4	0	10	38

- Butternut Interchange - Creation of 10 acres of open water will mitigate aesthetic impacts by providing pleasant views for interstate travelers and will also provide open water habitat for waterfowl.

- Abandoned Railroad - Removal of the old railroad bed will improve flood and storm water control in addition to improving existing wetland surface and subsurface water flows. Creation of 4 acres of open water will also benefit existing wildlife habitat.

- Fremont Meadows - The proposed use of the Fremont Meadows Subdivision retention pond with Alternatives 1 or 2-1 will help negate minor pollution and soil filtration impacts and habitat impacts.

- Off Site Borrow Areas - Creation of 10 acres of wetland habitat (open water and vegetated) in a typically sterile area (i.e., gravel mine) will negate habitat impacts by providing valuable waterfowl habitat.

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APPENDIX B-1

WETLAND DESCRIPTIONS

Wetland Descriptions

The following is a description of the four wetland units within the study area:

WETLAND SYE-17 is a Class III wetland (NYSDEC classification) because of its aesthetic valve and hydrological benefits. It totals 91 acres in all, of which only 7 acres are located in the project area. It will not be impacted as a result of this project.

SYE-17 - 7 Acres - Vegetation is dominated by wet meadow with a mixture of other habitat types. It is adjacent to Butternut Creek and is surrounded by land under heavy utilization.

Wetland SYE-17 exhibits limited hydrological benefits to the surrounding area and is presently experiencing reductions in its integrity.

WETLAND SYE-21 is a Class II wetland because of its hydrological benefits and its containing two or more wetland structural groups. It totals 166 acres in all, of which 34 acres are located within the project study area.

SYE-21 - 34 acres - Vegetation is dominated by a combination of emergents, deciduous trees and shrubs. It is divided into approximately one dozen wetland areas by the Route I-690/I-481 Interchange.

Within the study area, Wetland SYE-21 primarily serves as water retention basins and is also important aesthetically as it adds visual diversity to a developed area (i.e., different view than mowed medians).

WETLAND SYE-22 is a Class II wetland because of its hydrological benefits and its containing two or more wetland structural groups. It totals 839 acres in all, of which 605 acres are located within the project study area in four major groupings:

SYE 22.01 - 486 Acres - Has 3 vegetation types - emergents, deciduous trees and shrubs. Some wet meadow along western margins - dead trees, floating vegetation and open water scattered throughout.

SYE 22.02 - 55 Acres - Has shrubs, wet meadow and emergent vegetation. Shrubs dominate northern 1/3 of wetland with balance of area dominated by wet meadow and emergent vegetation.

SYE 22.03 - 43 Acres - Has mixture of five habitat types - wet meadow, emergents, open water and deciduous trees and shrubs. Trees dominate central region of wetland while dominance is shared by other types along its periphery.

SYE 22.04 - 21 Acres - Consists of woody habitat (deciduous trees and shrubs) with emergent vegetation as a lesser associate. It is located adjacent to the open water area of Erie Village.

Wetland SYE-22 offers a large and valued biological system different from characteristic upland fauna and flora. Its major wetland benefits include:

APPENDIX B-2

CORRESPONDENCE AND COORDINATION

APPENDIX B-2

Correspondence and Coordination

The following is a chronological listing of important correspondence and coordination with various agencies and individuals which has occurred during the preparation of this technical memoranda.

Dated	Agency
June 12, 1985	United States Department of Interior, Fish and Wildlife Service, Cortland, New York
June 18, 1985	United States Department of the Army Corps of Engineers, Buffalo District, Buffalo, New York
July 30, 1985	Consultant Minutes of Project Meeting
August 5, 1985	New York State Department of Environmental Conservation, Division of Regulatory Affairs, Cortland, New York
August 9, 1985	United States Department of the Interior, Fish and Wildlife Service, Cortland, New York
September 10, 1985	United States Department of Commerce, National Oceanic and Atmospheric Administration, Highlands, New Jersey
September 16, 1985	United States Environmental Protection Agency, New York, New York
September 17, 1985	New York State Office of Parks, Recreation and Historic Preservation, Albany, New York
September 19, 1985	United States Department of the Interior, Fish and Wildlife Service, Cortland, New York
September 25, 1985	New York Natural Heritage Program, Wildlife Resources Center, Delmar, New York
November 18, 1986	Syracuse Botanical Club, Fayetteville, New York
June 9, 1987	New York State Office of Parks, Recreation and Historic Preservation, Jamesville, New York
June 19, 1987	Consultant Minutes of FHWA Project Meeting
June 22, 1987	United States Department of Commerce, National Marine Fisheries Service, Highlands, New Jersey
June 23, 1987	United States Department of the Army Corps of Engineers, Buffalo District, Buffalo, New York

June 24, 1987	Consultant Minutes of Wetland Mitigation Workshop Meeting
July 1, 1987	United States Department of the Interior, Fish and Wildlife Service, Cortland, New York
July 8, 1987	United States Department of Agriculture, Soil Conservation Service, Syracuse, New York
August 10, 1987	New York State Department of Environmental Conservation, Cortland, New York

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
100 Grange Place
Room 202
Cortland, New York 13045

RECEIVED
JUN 14 1985
McFARLAND-JOHNSON

June 12, 1985

Mr. Richard J. Tarnowski
Senior Environmental Analyst
EMJ/McFarland-Johnson Engineering, Inc.
171 Front Street
Binghamton, New York 13905

Dear Mr. Tarnowski:

This responds to your inquiry of May 29, 1985 regarding the relocation of Route 290 (P.I.N. 3034.46) beginning at the Butternut Interchange (I-690/I-481) and terminating at Manlius Center in the Town of Manlius.

Except for occasional transient individuals, no federally listed or proposed endangered or threatened species under our jurisdiction are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of listed and proposed threatened and endangered species in New York is enclosed for your information.

This response relates primarily to endangered species under our jurisdiction. It provides only technical assistance regarding other Service concerns under the Fish and Wildlife Coordination Act or other legislation.

A wide range of wetlands are found in the project area interspersed with areas of upland and the immediate vicinity. Much of the area south of the abandoned railroad tracks lies within the 100 year floodplain of Butternut Creek and/or Limestone Creek. The importance of these wetlands are enhanced due to their close proximity to highly developed areas around them.

About 150 different species of avians, mammals (including furbearers and deer), amphibians, and reptiles are known to utilize the project area. Recent beaver (Castor canadensis) activity is very obvious at several locations. Recent surveys for Butternut Creek are enclosed, however they do not provide a complete survey of the project area.

Certain permits may be required from the New York State Department of Environmental Conservation and the U. S. Army Corps of Engineers, Buffalo District, particularly if work in wetlands or flowing water is involved. Thank you for your interest in the biological aspects of the project area. If we can be of further assistance, please contact Mr. Stoll of my staff at 607-753-9334.

Sincerely yours,

Paul P. Hamilton

Paul P. Hamilton
Field Supervisor

Enclosures

cc: NYSDEC, Cortland, NY

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO ATTENTION OF
NCBPD-ER

18 JUN 1985

SUBJECT: Route 290 Interchange, Corps Permit Jurisdiction, and Butternut Creek - Limestone Creek Project Information. Letter Received 3 June 1985

Mr. Richard J. Tarnowski
Senior Environmental Analyst
McFarland-Johnson Engineers, Inc.
171 Front Street
Binghamton, N.Y. 13905

EMI/McFARLAND-JOHNSON ENGINEERS INC.
RECEIVED
JUN 18 1985
BINGHAMTON, N.Y.

Dear Mr. Tarnowski:

Thank you for giving me the opportunity to provide input on the Route 290 Relocation and Butternut Interchange to Manlius Center, Onondaga County, N.Y. As noted in your 30 May 85 letter the Buffalo District is conducting two Section 205 flood control studies in the project vicinity; one on Butternut Creek at DeWitt, N.Y. and one on Limestone Creek at Fayetteville, N.Y. Please keep me advised of your study progression.

The Secretary of the Army, acting through the Chief of Engineers has regulatory authority under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act. Section 10 of the River and Harbor Act prohibits the unauthorized obstruction or alteration of any "Navigable Water of the United States." Section 404 of the Clean Water Act prohibits the unauthorized discharge of dredged or fill material into "Waters of the United States" including wetlands. Plans for the project relative to these authorities should be coordinated with the Buffalo District's Regulatory Branch for determination of permit requirements.

To assist you in developing the necessary information to address the needs of the Corps permit program, I have enclosed a list of minimum information needs. In addition, I have enclosed a copy of the Corps of Engineers permit regulations, the U.S. Environmental Protection Agency Guidelines for review of discharges of dredge and fill material into waters of the United States and permit application forms.

I suggest that you contact the U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service and obtain their input on water quality and fish and wildlife resources. You should also contact the New York State Department of Environmental Conservation on these matters and on State permit requirements. The Federal Emergency Management Agency (FEMA) is the key

agency relative to flood plain management. You can reach these agencies by writing in care of the following addresses:

Mr. Richard Walka
Director
Regional Office - Region II
U.S. Environmental Protection Agency
26 Federal Plaza
New York, N.Y. 10007
(212) 264-2525

Mr. Paul Hamilton
Area Supervisor
Department of the Interior
Fish and Wildlife Service
100 Grange Place
Cortland, New York 13045
(607) 753-9334

Mr. William Krichbaum
Regional Director
New York State Dept. of
Environmental Conservation - Region 7
7481 Henry Clay Blvd.
Liverpool, N.Y. 13088
(315) 473-8301

Mr. Stanley MacIntosh
Regional Director
Federal Emergency Management
Administration (FEMA)
26 Federal Plaza
New York, N.Y. 10007
(212) 264-4734

Regarding flood plain activities, the Corps does not have authority to regulate development in the flood plain. The Corps serves in an advisory capacity and can provide technical information that is readily available to corporations upon request on a site-by-site basis. Under the National Flood Insurance Program administered by the Federal Emergency Management Agency, communities are required to adopt certain regulations that meet the minimum requirements. State or local requirements can be more stringent. Thus, construction in the flood plain is regulated at the local level. Any future projects in flood plains that could affect future flood heights or be damaged by flooding should be coordinated with local officials to insure the construction complies with local ordinances.

A copy of our preliminary draft Section 205 Reconnaissance Report for Butternut Creek at DeWitt, New York was forwarded to your office during the third week of May 1985 per your recent telephone request. A copy of our Draft Detailed Project Report and Draft Environmental Impact Statement and Appendix for the Section 205 study on Limestone Creek at Fayetteville, New York is enclosed for your information.

If you have any questions or require additional information regarding the need for Corps permits, the point of contact is Mr. Walter Fray of my Regulatory Funtions Branch. For matters pertaining to the Corps planning projects in the area, the point of contact is Mr. Zoltan Montvai of my Small Projects Branch.

Correspondence pertaining to this matter should be addressed to the District Commander, U.S. Army Engineer District, Buffalo, New York 14207, ATTN: Messrs. Fray and/or Montvai. If you have any questions or require additional

NCBPD-ER
SUBJECT: Route 290 Interchange, Corps Permit Jurisdiction, and Butternut Creek - Limestone Creek Project Information. Letter Received 3 June 1985.

information please contact Messrs. Fray and/or Montvai at (716) 876-5454 extensions 2315 and 2145 respectively.

The Buffalo District -- Leadership in Engineering.

Sincerely,

for ROBERT R. HARDIMAN
Colonel, Corps of Engineers
District Commander

4 Enclosures
as Stated

EMJ / McFARLAND-JOHNSON ENGINEERS, INC.

	MEMORANDUM
To: Record	Date: July 30, 1985
From: R. Woidt	
Subject: PIN 3034.46, Relocated Route 290	Project No. 84-3527.0

A scoping meeting discussing preliminary alignment alternatives for Relocated Route 290 was held Friday, July 26 at the NYSDOT Region offices. Invited agencies included NYS Dept. of Environmental Conservation, U.S. Dept. of Interior - Fish and Wildlife, U.S. Army Corps of Engineers, Onondaga County Planning Agency and the Federal Highway Administration, N.Y. Division.

The purpose of the meeting was to familiarize the aforementioned agencies with the Relocated 290 project and to discuss and obtain comments concerning the various preliminary alternatives presented.

Persons in attendance are listed below.

James F. Byron	- NYSDOT-Albany
Myron Shirley	- NYSDOT-Region 3 Design
William Schotz	- NYSDOT-Region 3 Design
Gordon C. DeAngelo	- NYSDOT-Region 3 Landscape
Willard Ketchum	- NYSDOT-Region 3 Design
Richard Simberg	- NYSDOT-Region 3 Director
William Van Alst	- Larsen Engineers/Architects
Ray Nolan	- NYSDEC
Michael F. Stoll	- USDOI - Fish & Wildlife
Mike Cunningham	- Onondaga County Planning Agency
Bill Thomas	- Onondaga County Planning Agency
Captain Robert Pauley	- U.S. Army Corps of Engineers
Gary E. Larsen	- FHWA, N.Y. Division
Donald Lawson	- U.S. Army Corps of Engineers
Ron Holdsworth	- McFarland-Johnson
Rick Tarnowski	- McFarland-Johnson
Rick Woidt	- McFarland-Johnson

Preliminary alternatives showing approx. pavement widths, construction limits and R.O.W. limits were presented on unedited 1"=100' scale mapping. DEC regulated wetlands and the 100 year floodplain and floodway as defined by FEMA (Federal Emergency Management Agency) were also depicted on the map. The various features of each alternative and their potential impacts on wetlands and floodplains were explained by McFarland-Johnson personnel and were opened to general comments by the invited agencies.

The comments generated at the scoping meeting are summarized below:

Both DEC and Fish and Wildlife representatives had few specific comments. Each representative requested that they be sent a copy of the 1"=100' scale mapping and after closer examination they will generate more specific

	MEMORANDUM
To: Record	Date: July 30, 1985
From: R. Woidt	
Subject: PIN 3034.46, Relocated Route 290	Project No. 84-3527.0

comments. In general each said they wished to minimize the impact on freshwater wetlands to the greatest degree possible. Ray Nolan (NYSDEC) expressed his concern over the wetland involvement of Relocated Butternut Road. If possible, he would prefer to see Butternut Road Dead Ended if projected traffic volumes so warrant.

Captain Robert Pauley (U.S. Army Corps of Engineers) was concerned with the western terminus of the project because it will directly impact a proposed U.S. Army Corps of Engineers levee project located along Butternut Creek near the existing NYSDOT maintenance garage. Captain Pauley requested the latest information for the alignments and profiles of the interconnecting ramps of Relocated 290 with I-690 and I-481 as he may wish to terminate his levee into the fill section of the proposed 290 facility.

Additionally, the Corps will need to know what will happen to the NYSDOT maintenance facility if the 290 project is built. If the garage is moved out of the study area, it will impact the Corps benefit-cost ratio for their project. Finally Captain Pauley noted that the Relocated Route 290 corridor will be utilized as a flood storage in conjunction with their proposed levee project which in turn will raise 100 year flood levels slightly.

Upon completion of their preliminary hydraulic analysis NYSDOT-Albany will provide the Corps with a copy of their findings concerning the hydraulic impacts of Relocated Route 290 on Butternut Creek.

Representatives of Onondaga County Planning Agency noted that there were no alternatives to the south of Freemont Hills near the landfill site. They noted that as part of the original planning report this was considered a viable alternative. Thus we will have to be able to defend why a detailed look was not considered during this stage.

Gary Larsen, FHWA, noted that several left handed exit ramps exist at the I-690 - I-481 interchange with the proposed 290 facility which in general is not consistent with FHWA policy.

It was noted that detailed traffic data, both mainline link and turning movements will be needed to finalize and substantiate design alternatives. Myron Shirley (NYSDOT-Region 3) said that unapproved traffic volumes should be available in about 4 weeks. Final approval of preliminary traffic volumes will probably require another months time.

EMJ / McFARLAND-JOHNSON ENGINEERS, INC.

	MEMORANDUM
To: Record	Date: July 30, 1985
From: R. Woidt	
Subject: PIN 3034.46, Relocated Route 290	Project No. 84-3527.0

There was some discussion on whether to proceed with the planned public informational meeting in mid-September 1985 without detailed traffic volumes. The general consensus was to go ahead with the meeting with available information.

NYSDOT Region 3 has requested that McFarland-Johnson perform a 'dry run' of the public informational presentation at the Region 3 offices prior to the actual meeting date.

There was some confusion as to alternative labeling, McFarland-Johnson will look into utilizing a clearer labeling system.

M-J will send DOT a revised noise monitoring location plan based on the 100' scale alignments. Upon approval, field noise monitoring can begin in August 1985.

RW/smd

New York State Department of Environmental Conservation
Division of Regulatory Affairs, Region 7
PO Box 5170, Fisher Avenue
Cortland, NY 13045-5170
(607) 753-3095

Henry G. Williams
Commissioner

RECEIVED
DESIGN GROUP
AUG 07 1985

W. Ketchum
J. Skelly
W. Schatz
E. Loftus
G. DeAngelo
M. Cregg

AUG 12 1985
RECEIVED

August 5, 1985

Mr. Richard Simberg, Regional Director
NYS Department of Transportation
333 E. Washington Street
Syracuse, NY 13202

Re: Relocated Route 290
Butternut Interchange to Manlius Center
Onondaga County, PIN 3034.36

Dear Mr. Simberg,

This letter follows our initial meeting regarding the above referenced project held on July 26, 1985.

I have not as yet received the large scale drawings of the project area but this Department has identified, at least initially, the following areas of concern:

1. A previously discarded alternate route located south of the present project area remains unidentified in our files.

2. The no-action alternative has not been disclosed to this office as yet.

3. Relocation of Butternut Drive will impact the wetland area without obvious need. The suggested construction of cul-de-sacs at each terminus of Butternut Drive is preferred.

4. A combination of Alt. 2 with Alt. 1A appears to create the least disturbance to wetland area.

Please note that this office is concerned with impacts to wetland SYE-22 that may result from the construction of the proposed levee on the west side of Butternut Creek. At this point in time I am not sure if the Corps project interrelates with the Route 290 relocation.

This office appreciates the opportunity to discuss this project early

RD REG. 3 RECD
AUG 7 '85

on in its development.

If you have any questions regarding this letter, please feel free to contact me or Wes Stiles at this office.

Very truly yours,

Raymond J. Nolan

Raymond J. Nolan
Environmental Analyst

RJN:jh

cc: W. Stiles
P. Snyder
U.S. Fish & Wildlife Service (M. Stoll)
Onondaga Co. EMC

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
100 Grange Place
Room 202
Cortland, New York 13045

RECEIVED
DESIGN GROUP
AUG 12 1985

August 9, 1985

W. Ketchum
J. Shelly
W. Schutz
S. Loftus
G. DeAngelo
M. Craig
MCF-5

REC'D REGIONAL OFF
DEPT. OF TRANSP.
AUG 12 '85
SYR.

Mr. Richard Simberg
Regional Director
NYS Dept. of Transportation
333 East Washington St.
Syracuse, NY 13202

Dear Mr. Simberg:

This letter provides additional information regarding our concerns relative to the proposed Relocation of Route 290, Butternut Interchange to Manlius Center, Onondaga County, P.I.N. 3034.46, as promised at the July 26, 1985, "Scoping Meeting". These comments are intended as technical assistance only and do not constitute the report of the Secretary of the Interior within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Our mission is protection of fish and wildlife resources and their habitats with particular emphasis on wetlands. The project area contains numerous freshwater wetlands grading from open water (POW) in Butternut Creek, Limestone Creek, and the Old Erie Barge Canal through wet meadow and emergent vegetation (PEM), beds of aquatic vegetation (PAB), shrub/scrub (PSS), deciduous woods (PFO1), dead trees (PFO5) to areas of standing water (LOW). Wetlands designated by the Onondaga Environmental Management Council as SYE17, SYE21, SYE22.01, SYE22.02 and SYE22.04 are dominated by PEM type habitat. SYE22.01 (portions of) and SYE22.03 contain mixtures of all types of habitat. MAN7.01, MAN7.02 and MAN7.07 (only a portion of the total wetland falls in the project area) contain all types of habitat interspersed in a highly complex fashion.

Your attention is also drawn to page 125 of your July 1982 Transportation Project Report where you state a "principal hydraulic characteristic is the large flood plains in the study area" and that "the expected fill would be a negative impact on the adjacent wetlands of the study area." You further state that "alternatives constructed by extending I-690 eastward from the existing Butternut Interchange would have the most impact on the hydraulics of the study area." The proposed extensive filling integral to the several alternatives could isolate or adversely change the wetland habitats.

Currently, the three bodies of flowing water support warm water sports fisheries and in conjuction with the wetlands are a basis for several forms of outdoor recreation. Additionally, they provide a diverse range of habitats for fish and wildlife resources.

RD REG. 3 REC'D
AUG 12 '85

Due to the large losses of freshwater wetland inherent in the proposed alternatives and the disruption which would result to their integrity and water movement we request further consideration of the "do nothing alternative" alone or in conjunction with the upgrading of existing facilities to accomplish the desired project objectives. Moreover, we cannot support the proposed connector between Butternut Drive and Fisher Road ("common to all alternatives") because it would result in unnecessary filling of freshwater wetlands and would promote access and adverse impact to an area currently served by a dead end which could result in increased development and consequent adverse impact to the adjacent wetlands.

Additionally, other alternatives which make maximum use of the abandoned railroad right-of-way passing north of the wetlands adjacent to Butternut Creek might still be feasible.

Provision of the 1"=100' location map is appreciated. We look forward to working with you in the future toward an alternative which meets your objectives and has less adverse impact on fish and wildlife resources.

Sincerely,

Paul P. Hamilton

Paul P. Hamilton
Field Supervisor

cc:
NYSDEC, Cortland, NY
Onondaga County EMC

PREL | FINAL
DESIGN | LANDSCAPE
RECEIVED
FACILITIES DESIGN DIVISION
SEP 12 1985
CIRC. | FILE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Branch
Sandy Hook Marine Laboratory
Highlands, New Jersey 07732

JCC

SEP 10 1985

SEP 19 1985

Mr. Robert K. Radliff
Preliminary Plan Review Bureau
New York State Department of Transportation
1220 Washington Avenue
State Campus
Albany, New York 12232

Dear Mr. Radliff:

The National Marine Fisheries Service (NMFS) has reviewed the information which accompanied your letter of August 20, 1985, regarding the relocation of Route 290 between the Butternut Interchange and Manlius Center in the Towns of Dewitt and Manlius, Onondaga County, New York. This project is entering the "Discussion of Design Alternatives" phase of review.

Our preliminary review reveals that both of the primary alternatives, as well as the Butternut Drive Connector to the substation access road, on the western boundary of the project, will encroach into wetland areas. The NMFS believes that mitigation and possibly compensation of forfeit wetlands should be investigated and developed, as appropriate, within the framework of the preferred designs. The crossing of Limestone Creek, on the east side of the project, is also, apparently, an aspect of all the design options. However, without more information about how the crossings will be undertaken, the NMFS cannot, at this time, provide any meaningful imput to the discussion process on this topic.

Should you wish to discuss this matter further, please contact Michael Ludwig at our facility at 212 Rogers Avenue, Milford, Connecticut, 06460.

Sincerely,

Stanley W. Gorski
Assistant Branch Chief

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

PREL.	FINAL
DESIGN	LANDSCAPE

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FACILITIES DESIGN DIVISION
SEP 19 1985

SEP 16 1985

Mr. Robert K. Radliff
Preliminary Plan Review Bureau
New York State Department of Transportation
Albany, New York 12232

Dear Mr. Radliff:

This is in regard to our review of three proposed highway projects. Based upon our review of the information provided, we offer the following comments for the below referenced projects.

1. Route 33, Kensington Expressway, Erie County (PIN 5512.23). We have no objections to the preferred alternative addressed in the design report/environmental assessment (DR/EA). We do not anticipate any significant adverse environmental impacts to result from the proposed project.

2. Hooper Road, County Road 508, Town of Union, Broome County (PIN 9750.65). We believe that the proposed minor highway modifications addressed in the DR/EA are needed to improve safety and traffic conditions. The solutions discussed in the DR/EA appear to be environmentally sound changes to the existing highway which will reduce or eliminate present traffic hazards. Thus, we have no objections to the proposed improvements and do not anticipate any significant environmental impacts to result from these changes.

3. Relocated Route 290, Buttermut Interchange to Manlius Center, Towns of Dewitt and Manlius, Onondaga County. We have reviewed the notice of intent to prepare a draft environmental impact statement (EIS) and project study area map for the project. From the information provided, the preliminary design alternatives show that the alignments will potentially impact an area designated as a wetland. In accordance with Environmental Protection Agency (EPA) policy, we believe that federally designated wetland areas should be avoided to the greatest extent practicable. Where these environmentally sensitive areas can not be avoided and no practicable alternatives exist, EPA recommends that mitigation measures for the project include wetland habitat creation of 1 to 1 compensation of equal or greater value for wetlands destroyed. We believe that this mitigation should be considered during preliminary design and that consideration be given to eliminating any potential impacts to wetlands.

If there are any questions concerning our comments, please call Mr. Christopher Militscher of my staff at (212) 264-5387.

Sincerely yours,

Christopher A. Militscher

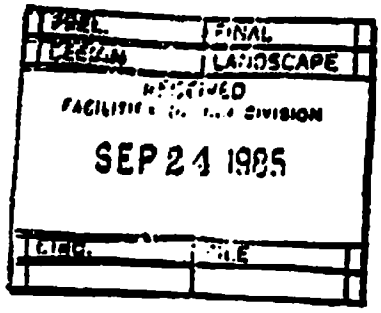
for Robert W. Hargrove, Chief
Federal Activities Section
Environmental Impacts Branch

New York State Office of Parks, Recreation and Historic Preservation
The Governor Nelson A. Rockefeller Empire State Plaza
Agency Building 1, Albany, New York 12238

518-474-0456

Orin Lehman
Commissioner

JCC



Sept 17, 1985

Robert K. Radliff
Preliminary Plan Review Bureau
NYS Deptartment of Transportation
State Campus
Albany, N. Y 12232

Re: Relocated Route 290
Butternut Interchange to
Manlius Center
Towns of Dewitt & Manlius
Onondoga County

Dear Mr. Radliff,

The proposed Butternut Interchange project may have social, economic and environmental effects related to Old Erie Canal State Park. I understand that the 1982 documents prepared for this project are no longer available for review. Hence, we cannot adequately evaluate our potential concerns. When materials become available on your proposed alternatives, we will review them and offer comments related to the state park facility.

Sincerely,

Robert A. Anderson

Robert A. Anderson, Phd.
Director, Planning & Research

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
100 Grange Place
Room 202
Cortland, New York 13045

PHSL | FINAL
DESIGN | LANDSCAPE
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23 1985
FILE

September 19, 1985

Mr. Robert K. Radliff
Preliminary Plan Review Bureau
NY State Dept. of Transportation
1220 Washington Ave., State Campus
Albany, NY 12232

Dear Mr. Radliff:

This responds to your letter of August 20, 1985, regarding proposals to relocate New York State Route 290, Butternut Interchange to Manlius Center, Towns of Dewitt and Manlius, Onondaga County, New York (P.I.N. 3034.46). The following comments are intended as technical assistance only and do not constitute the report of the Secretary of the Interior within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), nor do they preclude separate and/or additional comment on any Department of the Army permits that may be required under Section 10 of the River and Harbors Act of 1899 and/or Section 404 of the Federal Water Pollution Control Act Amendments of 1972.

Our mission is protection of fish and wildlife resources and their habitats with particular emphasis on wetlands. The project area contains numerous freshwater wetlands grading from open water (POW) in Butternut Creek, Limestone Creek, and the Old Erie Barge Canal through wet meadow and emergent vegetation (PEM), beds of aquatic vegetation (PAB), shrub/scrub (PSS), deciduous woods (PF01), dead trees (PF05) to areas of standing water (LOW). Wetlands designated by the Onondaga Environmental Management Council as SYE17, SYE21, SYE22.01, SYE22.02 and SYE22.04 are dominated by PEM type habitat. SYE22.01 (portions of) and SYE22.03 contain mixtures of all types of habitat. MAN7.01, MAN7.02 and MAN7.07 (only a portion of the total wetland falls in the project area) contain all types of habitat interspersed in a highly complex fashion. A site reconnaissance conducted September 6, 1985, confirmed the above with the exception that the freshwater wetland designated SYE22.04 has been lost to the Erie Village condominium development around bodies of open water (POW).

Your attention is also drawn to page 125 of your July 1982 Transportation Project Report where you state a "principal hydraulic characteristic is the large flood plains in the study area" and that "the expected fill would be a negative impact on the adjacent wetlands of the study area." You further state that "alternatives constructed by extending I-690 eastward from the existing Butternut Interchange would have the most impact on the hydraulics of the study area." The proposed extensive filling integral to all alternatives, amounts to about 800 acres of various kinds of freshwater wetlands. The proposed filling

of these freshwater wetlands could isolate or adversely change the nature of the existing wetland habitats, decrease the flood water storage capacity of the wetlands and the floodplains, change the extent of the floodplains, adversely effect flood and storm water retention times, and impact the water filtration processes of the wetlands.

Currently, Butternut Creek, Old Erie Barge Canal, and Limestone Creek support warm water sports fisheries and in conjunction with the wetlands are a basis for several forms of outdoor recreation. Additionally, they provide a diverse range of habitats for fish and wildlife resources.

Due to the proposed loss of around 800 acres of freshwater wetland inherent in the proposed alternatives and disruption which would occur to water movement, we request further consideration of the "do nothing alternative" alone or in conjunction with the upgrading of existing facilities to accomplish the desired project objectives. Moreover, under no condition can we support the proposed connector between Butternut Drive and Fisher Road (this proposed connector is "common to all alternatives") because it would result in unnecessary filling of freshwater wetlands and would promote access and adverse impact to an area currently served by a dead end which could result in increased development and consequent adverse impact to the adjacent wetlands.

Lastly, we will continue as a cooperating agency to the extent of providing technical assistance and timely comments as required by Federal laws and regulations. Please keep us informed of ongoing project developments so that potential problems and/or issues can be resolved in a timely fashion. Should you have further informational needs or questions please contact Mr. Stoll of my staff.

Sincerely,

Paul P. Hamilton

Paul P. Hamilton
Field Supervisor

cc:
NYSDEC, Albany, NY
NYSDEC, Cortland, NY
USACOE, Buffalo District

NYSDOT Response: This project would involve some highway construction within wetland areas. However, as shown in Table 4-7A on page 4- under worst case conditions, less than 29 acres of New York State Department of Environmental Conservation designated wetlands would be adversely affected. The Department of Transportation will coordinate with the New York State Department of Environmental Conserviation, the U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers through final design to develop appropriate mitigation for the wetland disturbance resulting from this project.

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SEP 30 1985
McFARLAND-JOHNSO

New York Natural Heritage Program

Wildlife Resources Center
Delmar, New York 12054
(518) 439-7488

Rick Tarnowski
McFarland Johnson Co.
PO Box 1950
Binghamton NY 13902

25 September 1985

Dear Mr. Tarnowski:

In reviewing our maps, I have found the following rare plants near Manlius. Although they are not on the area indicated for construction they should be looked for there. The plants are:

Isotria medeoloides
Phyllitis scolopedrium
Botrychium lunaria
Botrychium minganense
Aplectrum hyemale
Betula nigra
Phacelia dubia
Triglochin palustris

Sincerely,

Steven Clemants

Steven E. Clemants

New York State Department of Environmental Conservation and The Nature Conservancy
with support from Return a Gift to Wildlife contributions

11-18-86

Syracuse Botanical Club
306 Cleveland Boulevard
Fayetteville NY 13066

Gordon DeAngelo
NY State Dept. of Transportation
333 East Washington St.
Syracuse, NY 13202

Dr. Mildred Faust has sent me the following list of plants which may be found in the Fremont area.
Plants behind or south of Fremont Lanes Bowling on the protected list are:

Cypripedium calceolus var. parviflorum
small yellow ladyslipper

Spiranthes cernua - nodding lady's tresses

Spiranthes lucida - wide leaved lady's tresses

Asclepias tuberosa - butterfly weed

Lobelia cardinalis - cardinal flower

Rare

Solidago ohiensis - ohio goldenrod

not common

Parnassia glauca - grass-of-Parnassus.

South of the bowling alley off Bowman Road there is a very extensive amount of

Helianthus giganthus - giant sunflower.

Sincerely yours,
Virginia Gilbert,
secretary

Janet Holmes, President of Syracuse Botanical Club, may be contacted at the heading address.

Dr. Mildred Faust at:
1216 Westcott St.
Syracuse, New York 13210.

DIRECTOR
STENO SUPPORT
FAU
ACTION
INFO
NOV 21 1986
IN-HOUSE DESIGN
CONSULTANT MGT.
FILE

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DESIGN GROUP
NOV 18 1986
R.D.E.
State Design
Engr. Liaison
Structures
Utilities
Landscape
Soils

New York State Office of Parks, Recreation and Historic Preservation
Central Region—Jamesville, New York 13078 315-492-1756

Commission Chairman
Executive Aswad
Commission Members
Thomas V. Ciarrocchi
Robert C. Kerr
Richard MacPherson
Angelina Kay Mannion
Mary E. Verdon

Orin Lehman, Commissioner
Armond Magnarelli, Regional Director

June 9, 1987

Mr. Robert K. Radliff
Preliminary Plan Review Bureau
NYS Department of Transportation
Albany, New York 12232

RE: Relocated Route 290 - PIN 3034.46
Onondaga County

Dear Mr. Radliff:

This office has reviewed the subject project as per your June 2, 2987 request.

Our recommended solution would be Alternate 2, Option B in that it eliminates vehicle/pedestrian conflicts at Manlius Center, provides possibilities for park patron parking at Manlius Center, provides a clear crossing of the Canal and Towpath Trail and also improves access to Green Lakes better than the other alternatives.

We would hope that Route 290 between this project and the Green Lakes entrance could be improved as well and that a traffic light could be installed at the park entrance.

There appears to be several options on mitigating measures to compensate for the use of parkland which we will be pleased to discuss with your department in detail.

We appreciate the opportunity to comment on this project and plan to have a representative at the June 23, 1987 meeting in Syracuse.

Very truly yours,

Walter E. Schoenborn
Senior Landscape Architect

WES:eat

Preliminary
Plan Review Bureau
JUN 1987
RECEIVED

EMJ / McFARLAND-JOHNSON ENGINEERS, INC.

FILE

MEMORANDUM

To: Record

From: Dave Bors CFW 6/26/87

Subject: PIN 3034.46
Relocated Route 290

Date: 6/19/87

Project No. 84-3527.0

On Tuesday, June 16 at 10:00 AM, a meeting was held at the NYSDOT Design Bureau Conference Room in Albany concerning the above referenced project. Persons in attendance at this meeting are listed below:

Name	Affiliation
James Byron	NYSDOT - Design Bureau
James Schad	NYSDOT - Region 3
John Conboy	NYSDOT - PPRB Albany
Mark Sengenberger	NYSDOT - Landscape Arch. Bureau
A. D. Kenyon	NYSDOT - PPRB
Douglas P. Conlan	Federal Highway Administration
Richard Moore	Federal Highway Administration
Rick Woidt	EMJ/McFarland-Johnson
Rick Tarnowski	EMJ/McFarland-Johnson
Dave Bors	EMJ/McFarland-Johnson

The purpose of this meeting was to present to FHWA a preview of the upcoming interagency workshop scheduled for Tuesday, June 23, 1987, focusing specifically on the wetland mitigation workplan being prepared for this project. This meeting was also intended as a means of soliciting from FHWA further comments and/or clarification relating to their review of the pre-Draft Environmental Impact Statement. A summary of key issues discussed follows:

A. WETLAND MITIGATION

1. All mapping, evaluations and mitigation strategies must address wetlands as defined by the U.S. Fish and Wildlife Service wetland classification system in addition to NYSDEC classifications.

2. Wetland mapping based upon the federal definition (USF&WS) will be prepared for the upcoming workshop. This mapping will also show NYSDEC designated wetlands.

3. Relocated Butternut Drive Option 1 (Fisher Road connection) will be treated as an alternate that was considered but dropped from further consideration due to its extensive wetland involvement. However, the elimination of Option 1 should not be presented as a major component of the wetland mitigation strategy.

4. All wetland mitigation should be tied directly to those specific wetland values and functions that are impacted by the project.

		MEMORANDUM
To:	Record	Date: 6/19/87
From:	Dave Bors	
Subject:	PIN 3034.46 Relocated Route 290	Project No. 84-3527.0

5. Mitigation within the Butternut Interchange infields should be geared toward the upgrading of existing wetland habitat values.

6. All mitigation strategies in upland areas must be directly related to wetland impacts; eg. modifying upland vegetation to compensate for lost wetland habitat. However, FHWA will not participate in mitigating upland habitat impacts.

B. PRE-DEIS

1. FHWA feels that the alternative analysis in the DEIS should provide more detail to make it clear that there are no other practical or prudent alternatives. Specific items recommended by FHWA for further discussion in the DEIS include:

   a. Consideration of an alternative north of existing Rt. 290.
   b. Reconstruction of existing Rt. 290.
   c. More continuity between previous planning studies and the alternatives presented in the DEIS.

2. According to FHWA, the DEIS must consider the full range of alternatives which satisfy the project objectives and must clearly demonstrate that the alternatives being presented are the most feasible, practical and prudent of all alternatives considered based upon social, economic and environment considerations as well as engineering and cost evaluation. Without this documentation FHWA will not even begin to consider the wetland mitigation being proposed for this project.

3. The feasibility and location of all proposed noise barriers should be stated more decisively in the EIS.

4. The background (ambient) CO level of the project study area should be checked to be sure it has been included in the predicteed CO levels.

DPB/tmr

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Branch
Sandy Hook Marine Laboratory
Highlands, New Jersey 07732

JUN 2 2 1987

PREL. | FINAL
DESIGN | LANDSCAPE
RECEIVED
FACILITIES PLANNING DIVISION
JUN 25 1987
87
FILE

Mr. Robert K. Radliff
Director, Preliminary Plan Review Bureau
New York State
Department of Transportation
1220 Washington Avenue
State Campus
Albany, New York 12232

Dear Mr. Radliff:

We have reviewed the information which accompanied your letter regarding the relocation of Route 290 (Butternut Interchange to Manlius Center) in the Towns of Dewitt and Manlius in Onondaga County, New York. The project is further identified as P.I.N. 3034.46.

While we conclude that all the project alternatives will not adversely impact resources for which we are responsible, we are concerned about the flood plain and wetland losses associated with the proposed project implementation. The use of the second option at the Butternut Drive/Fisher Road location, however, begins to address those concerns. We recommend that the other flood plain and wetland encroachments receive a similar assessment of construction alternatives.

Sincerely,

Stanley W. Gorski
Assistant Branch Chief

Preliminary
Plan Review Bureau
JUN 25 1987
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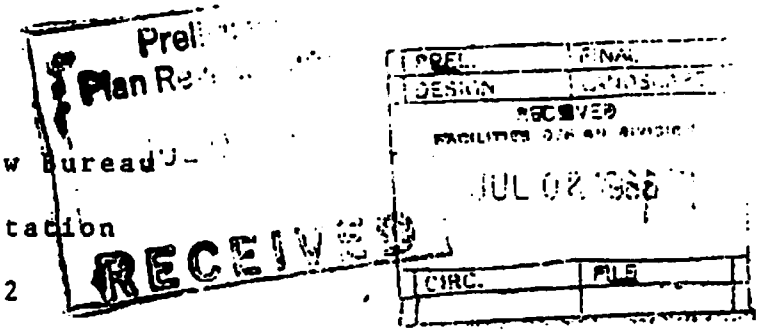
DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO ATTENTION OF

June 23, 1987

Regulatory Branch

SUBJECT: Relocated Route 290, PIN 3034.46, Butternut Interchange to Manlius Center, Towns of DeWitt and Manlius, Onondaga County, New York.



Mr. Robert K. Radliff
Preliminary Plan Review Bureau
State of New York
Department of Transportation
1220 Washington Avenue
Albany, New York 12232

Dear Mr. Radliff:

This pertains to the Interim Report and Fish and Wildlife Inventory for the subject project forwarded with your letter dated June 1, 1987 (received June 4, 1987). These reports have been reviewed with respect to Department of the Army (DA) regulatory jurisdiction under Section 404 of the Clean Water Act.

Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material into waters of the United States, including wetlands, without DA authorization. Project features noted in the report which appear to entail such discharges and thus will require DA authorization include, but are not limited to, temporary construction stream crossings, wetland roadway and embankment fills, and culverted stream crossings. Any fills associated with stream bank protection, cofferdams or channel relocation also require DA authorization.

The proposed project is subject to review under the United States Environmental Protection Agency (USEPA) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (Title 40 Code of Federal Regulations Part 230). A copy of the Guidelines is enclosed.

Section 230.10 of the Guidelines states that " . . . no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem. . ." The Guidelines further state that "where the activity associated with the discharge which is proposed for a special aquatic site (i.e. wetlands) does not require access or proximity to or siting within the special aquatic site in

Regulatory Branch
SUBJECT: Relocated Route 290, PIN 3034.46, Butternut Interchange to Manlius Center, Towns of DeWitt and Manlius, Onondaga County, New York

question to fulfill its basic purpose (i.e. is not "water dependent") practicable alternatives that do not involve a discharge into a special aquatic site are presumed to be available unless clearly demonstrated otherwise." In effect the Guidelines require consideration and documentation of all practicable alternatives that would reduce or eliminate the need to fill aquatic areas, while still accomplishing the overall project purpose.

Fill for a roadway is not water-dependent, thus alternatives which do not involve a discharge of dredged or fill material into the wetland are presumed to exist. Sections IV-B and IV-C of the Interim Report provide a relatively complete analysis of the social, economic and environmental impacts of the proposed alternatives, but these alternatives all entail extensive wetland fill.

You need to address alternatives which will further reduce or eliminate the wetland fill, such as bridging the wetland areas, and constructing the remaining roadway sections through upland areas.

Regarding the relocation of Butternut Drive, Option 1 does not appear to be in compliance with the USEPA Guidelines. Option 2 clearly accomplishes this aspect of the project purpose while eliminating wetland fills.

It is anticipated that your final design will include wetland creation to mitigate for wetland losses. Such mitigation does not preclude the requirement under 40 CFR 230.10 to reduce or eliminate wetland fills.

The November 13, 1986 regulations governing the conduct of the Corps of Engineers Regulatory Programs state at 33 CFR 320.4(a)(1) that for activities involving Section 404 discharges, a permit will be denied if the discharge that would be authorized by such permit would not comply with the USEPA Guidelines.

Questions pertaining to this matter may be directed to Ms. Kathryn Jahn at 716-876-5454, extension 2307 or by writing to the above address.

Sincerely,

Daniel R. Clark
Colonel, U.S. Army
Commanding

Enclosure

EMJ / McFARLAND-JOHNSON ENGINEERS, INC.

	MEMORANDUM
To: Record	**Date:** 6/24/87
From: Dave Bors	
Subject: PIN 3034.46 Relocated Route 290	**Project No.** 84-3527.0
	Page 1 of 3

On Tuesday, June 23, 1987 at 10:00 AM an interagency workshop meeting was held at the NYSDOT Region 3 offices in Syracuse, New York. Agency representatives and attendees at this meeting are listed below:

Name	Agency
Les Monostory	Onondaga County Env. Management Council
Karen Kitney	Syracuse/Onondaga County Planning Agency
Margaret Napoleon	Syracuse Metropolitan Transportation Committee
Neal Denno	Syracuse Metropolitan Transportation Committee
Michael Stoll, Sr.	U.S. Fish and Wildlife Service
Thomas Stoddard	NYS Office of Parks and Recreation, Central Region
Bill Werick	U.S. Army Corps of Engineers
Willard Ketchum	NYSDOT, Region 3
James Byron	NYSDOT, Design Bureau, Albany
Myron Shirley	NYSDOT, Region 3
James Shad	NYSDOT, Region 3
John Conboy	NYSDOT, PPRB, Albany
Dick Lucas	NYSDOT, Region 3, Planning & Development
Mark Sengenberger	NYSDOT, Albany, Landscape Arch. Bureau
Gordon DeAngelo	NYSDOT, Region 3, Landscape Architect
Richard Moore	Federal Highway Administration
Rick Tarnowski	McFarland-Johnson
Rick Woidt	McFarland-Johnson
Dave Bors	McFarland-Johnson

The primary objective of this meeting was to summarize impacts associated with the Relocated Route 290 project and discuss various mitigation strategies presently being considered by the Department of Transportation and their consultants (McFarland-Johnson)as a means of compensating for or minimizing these impacts. The major areas of concern centered around the project's involvement with wetlands, floodplains and the Erie Canal State Park facilities.

James Byron, NYSDOT Design Bureau, opened the meeting by summarizing the project history and status of the preliminary design and environmental studies. Mr. Byron stressed the importance of receiving input from the various regulatory agencies in developing specific mitigation strategies to reduce the project impacts on wetlands, floodplains and park facilities.

Rick Tarnowski, McFarland-Johnson, then discussed the project's involvement with wetlands and presented the wetland mitigation strategies presently under consideration.

		MEMORANDUM
To:	Record	Date: 6/24/87
From:	Dave Bors	
Subject:	PIN 3034.46 Relocated Route 290	Project No. 84-3527.0

Following Mr. Tarnowski's presentation, meeting attendees were asked to offer comments and suggestions. A summary of comments by agency follows:

Army Corps of Engineers

1. Any wetland mitigation involving the removal of the abandoned railroad embankment should carefully consider any potential flooding ramifications.

2. The Corp's planned flood control projects will require borrow material which may directly compete with this project's local borrow requirements. However, the Corps is willing to coordinate its borrow requirements with this project, if feasible.

Onondaga County Environmental Management Council (EMC)

1. The concept of removing the abandoned railroad embankment for wetland mitigation purposes appears to be an acceptable mitigation strategy.

2. The project should avoid wetland Man. 7, a Class I wetland, if at all possible.

3. Alternatives 1 and 1-2(C) appear to be least damaging to the wetlands.

4. EMC would prefer to see existing Rt. 290 reconstructed instead of a new relocated Rt. 290.

5. The traffic and economic benefits of the design alternatives must be of sufficient magnitude to justify the wetland impacts.

NYS Office of Parks and Recreation

1. From a park usage standpoint, Alternatives 1 and 2C are least desirable because they would maintain the existing at-grade Rt. 290 crossing at the project's eastern terminus in Manlius Center. All other alternatives provide for a grade separation (bridge over the Canal and Towpath) at the eastern terminus and the removal of the existing Rt. 290 grade crossing and bridge in Manlius Center and thus eliminate vehicular/pedestrian conflicts in this portion of the park.

		MEMORANDUM
To:	Record	Date: 6/24/87
From:	Dave Bors	
Subject:	PIN 3034.46 Relocated Route 290	Project No. 84-3527.0

2. The mitigation concept of providing a wetland interpretative area on the state park property east of Manlius Center is acceptable as long as parking is provided.

3. Project impacts (if any) upon traffic congestion at the Green Lakes State Park entrance should be studied further. Parks and Recreation would like to see a traffic signal and turning lanes installed at this location.

US Fish and Wildlife Service (USF&WS)

1. Without additional project justification, USF&WS would still support the No-Build Alternative over any of the build alternatives.

2. Enhancement of existing wetlands is a questionable mitigation strategy. USF&WS will be very critical of such mitigation for this project.

3. The hydrologic impacts of removing the abandoned railroad embankment as they relate to existing wetland limits should be thoroughly evaluated.

4. Butternut Drive Option 2 (Fisher Road Connection) should be dropped from further consideration.

5. Of the various mitigation strategies presented, off-site mitigation appears to be most feasible.

General Agency Consensus

1. It was the general consensus of all the agencies represented at this meeting that additional project justification is needed is in light of the extensive wetland and floodplain involvement.

DPB/tmr

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

100 Grange Place
Room 202
Cortland, New York 13045

PLNG.
DESIGN

July 1, 1987

Preliminary
Plan Review Bureau
RECEIVED

Mr. Robert K. Radliff
Preliminary Plan Review Bureau
New York State Department of
Transportation
1220 Washington Avenue, State Campus
Albany, New York 12232

Dear Mr. Radliff:

This letter responds to your request of June 1, 1987 for input regarding the Interim Report Cooperative Agency Review Scoping Follow-Up/Pre Draft Environmental Impact Statement (Draft) and the Fish and Wildlife Inventory/Analysis (Inventory) for the proposed Relocation of Route 290, Butternut Interchange to Manlius Center, Onondaga County, P.I.N. 3034.46, as promised at the July 26, 1985, "Scoping Meeting". These comments are intended as technical assistance only and do not constitute the report of the Secretary of the Interior within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Our mission is protection of fish and wildlife resources and their habitats with particular emphasis on wetlands. The project area contains numerous freshwater wetlands grading from open water (POW) in Butternut Creek, Limestone Creek, and the Old Erie Barge Canal through wet meadow and emergent vegetation (PEM), beds of aquatic vegetation (PAB), shrub/scrub (PSS), deciduous woods (PFO1), dead trees (PFO5) to areas of standing water (LOW). Wetlands designated by the Onondaga Environmental Management Council as SYE17, SYE21, SYE22.01, SYE22.02 and SYE22.04 are dominated by PEM type habitat. SYE22.01 (portions of) and SYE22.03 contain mixtures of all types of habitat. MAN7.01, MAN7.02 and MAN7.07 (only a portion of the total wetlands falls in the project area) contain all types of habitat interspersed in a highly complex fashion.

Your attention is also drawn to page 125 of your July 1982 Transportation Project Report where you state a "principal hydraulic characteristic is the large flood plains in the study area" and that "the expected fill would be a negative impact on the adjacent wetlands of the study area." You further state that "alternatives constructed by extending I-690 eastward from the existing Butternut Interchange would have the most impact on the hydraulics of the study area." The proposed extensive filling integral to the several alternatives could isolate or adversely change the wetland habitats.

Currently, the three bodies of flowing water support warm water sport fisheries and in conjunction with the wetlands are a basis for several forms of outdoor recreation. Additionally, they provide a diverse range of habitats for fish and wildlife resources.

Both the Draft and the Inventory appear to adequately describe what exists in the area, and what will be lost, etc. However, we note that the Relocated Butternut Drive (Option 1) is still being considered. As previously indicated in our letter of August 9, 1985, we do not support this proposed connector between Butternut Drive and Fisher Road. This connector would result in the unnecessary filling of freshwater wetlands and would promote access and adverse impact to an area currently served by a dead end road. Further, this option could result in increased development and consequent adverse impact to the adjacent wetlands. Improvements to existing wetlands is considered as enhancement. Mitigation is where lost habitat is actually replaced elsewhere in kind or with similar habitat.

The following specific comments are offered:

Draft

Page 4-25, paragraphs 3-5. While it is shown that increased amounts of chemical compounds resulting from the proposal will not adversely affect public water supplies, the same is not shown relative to the potential affect upon the indigenous fish and wildlife resources.

Page 4-30. It has been shown that the floodway will not be affected. It should be similarly demonstrated that the water surface levels in the major water bodies of the area will not be affected.

Inventory

Page 24, paragraph 2. If the proposed project is allowed to proceed such that existing freshwater wetlands are isolated or bisected, culverts should be incorporated to provide maintenance of surface flows.

Page 24, paragraph 3. Actual loss of wildlife is more likely than redistribution of wildlife, since the surrounding area is probably already at carrying capacity.

Large losses of freshwater wetlands continue to be inherent in the proposed alternatives. The disruption which would result to the integrity of these freshwater wetlands make it necessary for the Service to continue our request for further consideration of the Do Nothing Alternative. In any event, we do not support the Relocated Butternut Drive (Option 1). We still feel that greater use of the abandoned railroad right-of-way passing basically north of the wetlands to be feasible.

Should you have further questions or require any other assistance, please contact Michael Stoll of my staff at 607-753-9334.

Sincerely yours,

Paul P. Hamilton

Paul P. Hamilton
Field Supervisor

cc: NYSDEC, Cortland, NY
NYSDOT, Syracuse, NY
Onondaga Co. EMC
COE, Buffalo, NY
EPA, New York, NY

United States Department of Agriculture

Soil Conservation Service

James M. Hanley Federal Building
Room 771, 100 South Clinton Street
Syracuse, New York 13260

Preliminary
Plan Review Bureau
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July 8, 1987

Robert K. Radliff, Director
Preliminary Plan Review Bureau
State of New York
Department of Transportation
Albany, NY 12232

Dear Mr. Radliff:

We have reviewed the Transportation Project Report titled Interim Report Cooperative Agency Review Scoping Follow-Up/Pre Deis for PIN 3034.46 Relocated Route 290 Butternut Interchange to Manlius Center Onondaga County. The document covers items of interest and concern to this agency.

The document would be more complete if it acknowledged using and considering the data and procedures set out in 7 CFR 658.5 developed to implement the Farmland Protection Policy Act (PL 97-98). Accordingly, enclosed is a copy of Form AD-1006 completed by SCS to the extent required by the procedure. Your agency should complete Part VI and the other applicable part as explained in 7 CFR 658(b) which is attached.

In completing Form AD-1006, we have made our evaluation only on that portion of the project area zoned R - A, prime farmland soils and farmland soil of statewide importance, developed before a certain date are not considered such under the FPPA. There are other exceptions as listed under the definitions section of the CFR.

We appreciate the opportunity to review and comment upon this proposal.

Sincerely,

Paul A. Dodd

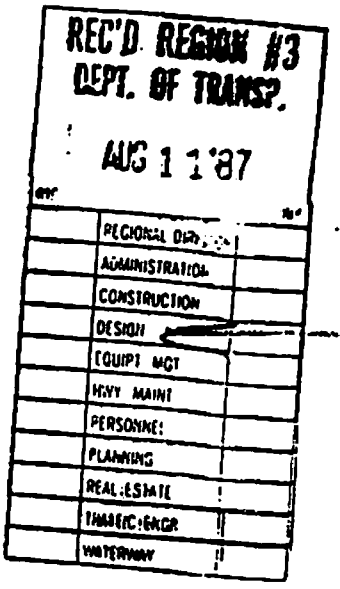
Paul A. Dodd
State Conservationist

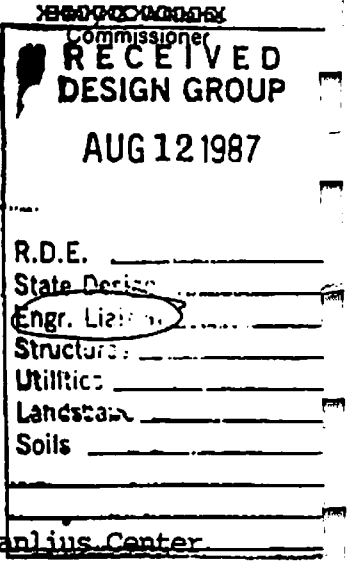
Enclosures

cc:
Paul W. Webb, District Conservationist, SCS, Syracuse, NY, with a copy of Form AD-1006 and a copy of the Federal Register notice
Thomas W. Christensen, Area Conservationist, SCS, New Hartford, NY

New York State Department of Environmental Conservation
Region 7
Division of Regulatory Affairs
PO Box 5170
Cortland, NY 13045-5170
(607) 753-3095

Thomas C. Jorling
Commissioner





August 10, 1987

Richard Simberg, P.E.
Regional Director of Transportation
Region 3
NYS Dept. of Transportation
333 East Washington Street
Syracuse, NY 13202

Re: Relocated Route 290
Butternut Interchange to Manlius Center
Onondaga Co. PIN 3034.46

Dear Mr. Simberg,

This letter is in response to the material you provided in your July 3, 1987 communication regarding the above referenced project. The following confirms comments provided during a telephone conversation with Mr. James Shad of your office.

1. All alternatives still are characterized by substantial impacts to the wetlands involved. This office does not believe that the "no action" alternative has been fully and satisfactorily explored, particularly in view of the proposed improvements to existing Route 290 that are moving toward implementation. Issuance of the necessary wetland permits does require a complete exploration of the "no action" alternatives, which, by this letter, is now requested.

2. At the initial meeting, the U.S. Army Corps of Engineers suggested the possibility of utilizing a portion of the proposed relocated Route 290 as part of a proposed flood control dike system. At that time concern was expressed as to the consequence on the flood plain of Butternut Creek by this action particularly the possibility of extending westward the current west boundary of the flood plain. There is no indication that such an action by the Corp is not still being considered; consequently this issue needs to be explored for alternatives and impacts.

3. The relocation of Butternut Drive (option 1) is not acceptable to this Department. Such an action would add further direct impact to the adjacent wetland and cause future demand for development in the wetland adjacent to the new Butternut Drive. At the initial meeting a suggestion

was made without immediate objection, to cul-de-sac Butternut Drive or explore the possibility of bridging it. These options still require further study and comment.

I hope that these comments prove of use to your office. Please feel free to contact this office whenever you have further needs regarding this matter. Your continued concerns and cooperation is appreciated.

Very truly yours,

Raymond J. Nolan jh

Raymond J. Nolan
Environmental Analyst

RJN:jh

cc: W. Stiles
DRA Staff

APPENDIX B-3

CHLORIDE ANALYSIS

CHLORIDE ANALYSIS

The purpose of this analysis is to assess the potential impacts of the proposed project (i.e., road salt application) on the study area streams.

Sodium and calcium chloride salts are used to maintain safe travel conditions during winter months. These deicing salts reach surface water in the form of highway runoff. To properly evaluate the possible impact of these deicing salts on surface waters, a quantative analysis based on the report "Effects of De-Icing Chemicals on Surface and Groundwater" by L. Toler was performed.

This analysis was performed on Butternut and Limestone Creeks only, as the Old Erie Canal does not receive a significant amount of runoff from any of the proposed design alternatives. Predicted chloride concentrations are shown below in Table A.

TABLE A

CHLORIDE CONCENTRATION PREDICTIONS

	Butternut Creek		Limestone Creek	
Design Alt.	Lane Miles	Chlorides(Mg/L)	Lane Miles	Chlorides(Mg/L)
1	5.6	0.50	4.4	0.28
2A	6.0	0.53	6.0	0.38
2B	6.0	0.53	6.8	0.43
2C	6.0	0.53	5.2	0.33
1-2A	5.6	0.50	6.0	0.38
1-2B	5.6	0.50	6.8	0.43
1-2C	5.6	0.50	5.2	0.33
2-1	6.0	0.50	4.4	0.28

The highest predicted chloride concentration resulting from this project under normal de-icing application rates (10 tons per lane mile) would occur with Alternative 2B as it contributes 0.53 mg/l to Butternut Creek and 0.43 mg/l to Limestone Creek. An estimated level of shock loads (extreme ice or snow resulting in sudden high concentrations of short duration) would be 1.06 mg/l to Butternut Creek and 0.86 mg/l to Limestone Creek with Alternative 2B. Prediction methods and corresponding data is given in Table B.

These predictions when added to monitored worst case background conditions (see Section D, Table II-2 "Seasonal Water Quality Data") of 61.5 mg/l for Butternut Creek and 45.0 mg/l for Limestone Creek are well below New York State Department of Environmental Conservation's current standard of 250 mg/l for fresh water.

A field review of the study area 1/2 mile downstream of the study alternatives revealed no sensitive users of surface waters. Therefore, with the insignificant increases being added to the already low existing concentrations of chlorides, no impacts will be realized in the study area streams.

TABLE B

PREDICTION METHODS AND CORRESPONDING DATA

Source: Toler Method
New York State Department of Transportation
Interim Report Development Guidelines - Transmittal #15

The formula developed by Larry Toler which was used in this analysis is:

$$\frac{(T \times M)}{(I \times A)}(K) = C$$

Where:

C = Chloride concentration in water (mg/l)

T = Tons of salt used per lane mile (assumed 10 tons per lane mile for this calculation)

M = Lane miles of new construction

I = Inches of run-off per year (based on average annual precipitation for Syracuse area of 36.4 inches per year times a run-off factor of 0.4 - assumes average percentage of impervious surface to be 40%)

A = Area of drainage basin in study area (90 sq. mi. for Limestone Creek and 65 sq. mi. for Butternut Creek)

K = Concentration factor for chloride (8.37)

Shock Load Concentration:

Sudden high concentrations of chlorides (shock load) can be estimated by multiplying the final concentrations by 2.0.

APPENDIX B-4

HISTORICAL WATER QUALITY DATA FOR LIMESTONE AND BUTTERNUT CREEKS

Historical Water Quality Records[1]

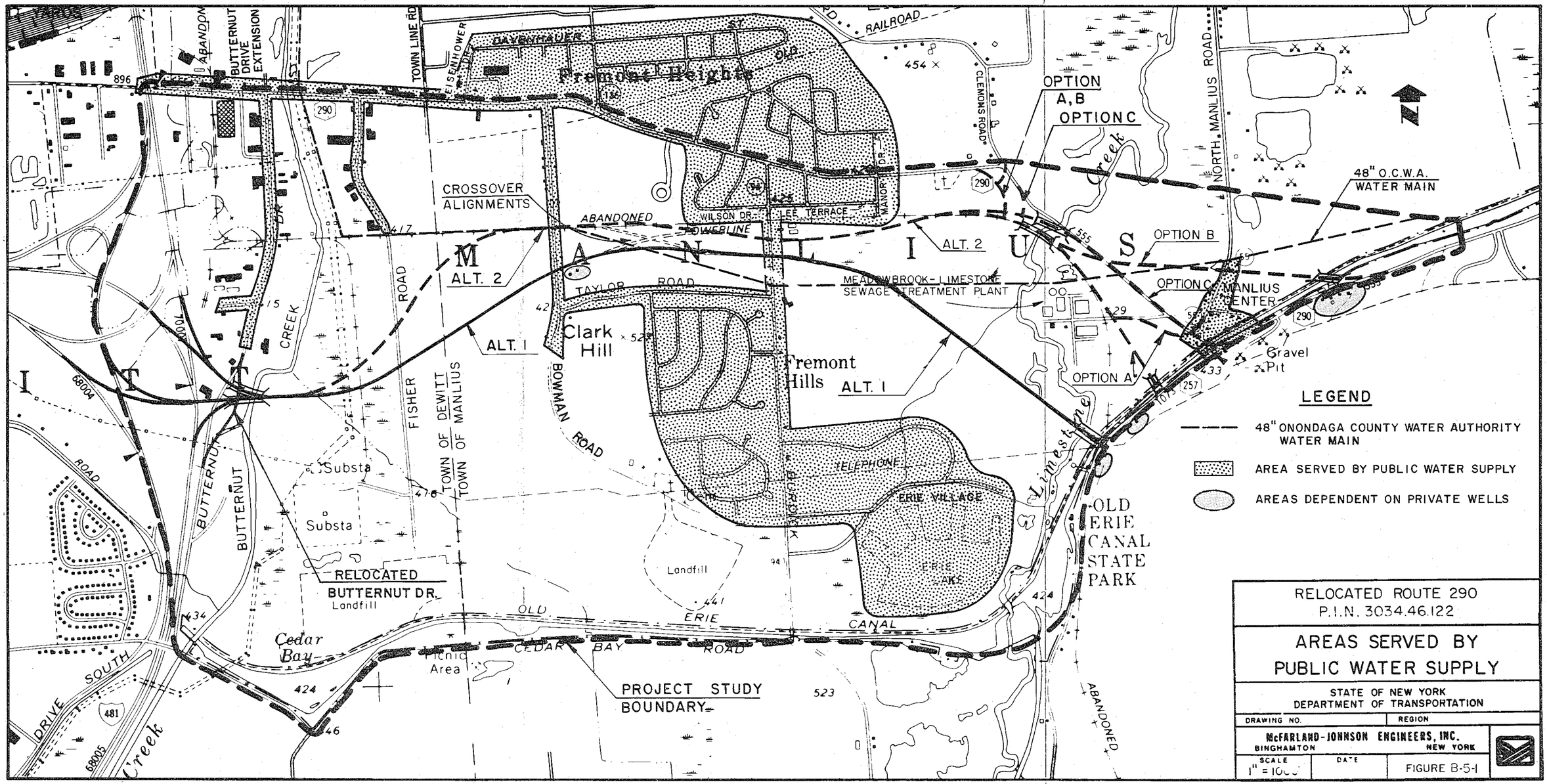
Parameter[2]	Butternut Creek at DeWitt		Limestone Creek at Manlius	
	9/1/66	3/29/67	8/31/66	3/29/67
Calcium	146	75	101	54
Magnesium	30	15	22	10
Sodium	9	4.8	7.2	3.4
Potassium	3.4	1.2	1.6	1.1
Bicarbonate	208	230	217	166
Sulfate	288	53	163	35
Chloride	22	10	9.6	7.3
Fluoride	0.2	0.2	0.1	0.2
Nitrate	0.6	4.1	0.9	3.9
Ammonia	0.0	0.2	0.0	0.0
Total Phosphate	0.0	0.15	0.0	0.12
Total Dissolved Solids	694	290	454	205
Carbonate Hardness	488	249	343	176
Non-Carbonate Hardness	317	60	165	40
Specific Conductance	919	472	663	342
pH	7.9	7.5	8.0	7.3

[1]Source: Shampine, 1973

[2]All concentrations in milligrams per liter except Specific Conductance (micro mhos/cm) and pH (pH units).

APPENDIX B-5

AREA SERVED BY PUBLIC WATER SUPPLY


Fremont Heights
Fremont Hills
Clark Hill
CROSSOVER ALIGNMENTS
ALT. 1
ALT. 2
OPTION A, B
OPTION C
OPTION A
OPTION B
OPTION C
ABANDONED POWERLINE
MEADOWBROOK-LIMESTONE SEWAGE TREATMENT PLANT
MANLIUS CENTER
48" O.C.W.A. WATER MAIN
Gravel Pit
RELOCATED BUTTERNUT DR.
Landfill
PROJECT STUDY BOUNDARY
OLD ERIE CANAL STATE PARK
ERIE VILLAGE
ERIE LAKE
Cedar Bay
Picnic Area
Substa
Substa
TAYLOR ROAD
BOWMAN ROAD
FISHER ROAD
BUTTERNUT DRIVE EXTENSION
ABANDONED
BUTTERNUT DRIVE SOUTH
TOWN LINE RD.
EISENHOWER DR.
DAVENHAUER ST.
OLD RAILROAD
CLEMONS ROAD
NORTH MANLIUS ROAD
WILSON DR.
LEE TERRACE
MANOR DR.
TELEPHONE
OLD ERIE CANAL
CEDAR BAY ROAD
Limestone Creek
Butternut Creek
TOWN OF DEWITT
TOWN OF MANLIUS
LEGEND
48" ONONDAGA COUNTY WATER AUTHORITY WATER MAIN
AREA SERVED BY PUBLIC WATER SUPPLY
AREAS DEPENDENT ON PRIVATE WELLS
RELOCATED ROUTE 290
P.I.N. 3034.46.122
AREAS SERVED BY PUBLIC WATER SUPPLY
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE 1" = 1000'
DATE
FIGURE B-5-1

- o Wetland retention basin
- o Pollution and soil filtration system
- o Aesthetic, recreation and education usage close to a large population center

Wetland MAN-7 is a Class I wetland due to its size (largest in Town of Manlius), hydrological benefits, structural groupings and closeness to urban population center (Syracuse). It totals 1,699 acres in all, of which 129 acres are located within the study area. This acreage is grouped in three areas:

MAN 7.01 - 42 Acres - Consists of two wetland areas divided by railroad track. To the west, deciduous shrubs dominate and surround sewage treatment plant - deciduous trees and wet meadow are secondary habitat types. To the east of railroad tracks, wet meadow and emergent vegetation codominate in these low lying easily flooded areas.

MAN 7.02 - 43 Acres - Follows the meanders of Limestone Creek. Floodplain swamps (deciduous trees and shrubs) border sections of stream bed and are connected by intervening wet areas dominated by open water, emergents and wet meadow vegetation. Dead trees are also present in limited quantity.

MAN 7.07 - 44 Acres - Old flooded quarry pits provide open water habitats in the western portions - surrounding the open water are emergents, deciduous trees and shrubs and wet meadow. Within the study area emergents and deciduous trees and shrubs dominate the area.

Wetland MAN-7 is a large and varied biological system. It provides wetland benefits which include:

- o Hydrological benefits
- o Water retention
- o Important aesthetic, recreational and education benefits by being adjacent to Old Erie Canal Park

APPENDIX B-6

WETLAND MITIGATION SOIL DESCRIPTIONS

Soil Descriptions

RF - Rhinebeck/Fonda - Deep somewhat poorly drained.

Rhinebuck soils are fair for wetland plants and shallow water areas. They are fair for wetland construction.

NC - Niagara/Collamer - Deep moderately drained to somewhat poorly drained soils.

Niagara soils are fair for wetland plants, shallow water areas and wetland construction.

C - Cazenovia - Deep moderately well drained and well drained soils.

Cazenovia soils are very poor for wetland construction.

CP - Carlisle/Palms - Deep very poorly drained organic soils.

Carlisle and Palms soils are good for wetland construction.

WT - Wayland/Teel - Deep poorly drained and very poorly drained soils.

Wayland soils are good for wetland construction. Teel soils are fair for wetland plants but poor for shallow water areas and wetland construction.

APPENDIX C

GLOSSARY

APPENDIX C

GLOSSARY

Prime Farmland Soils - Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oil seed crops and is also available for these uses (the land could be cropland, pasture land, range land, forest land or other land but not urban built-up land or water).

Unique Farmland Soils - Land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season and moisture supply needed to economically produce sustained high quality and/or high yields of specific crops when tested and managed according to acceptable farming methods.

Additional Farmland of Statewide Importance - Land in addition to prime and unique farmlands that is of statewide importance for the production of food, feed, fiber, forage and oil seed crops. Criteria for defining and delineating this land are to be determined by the appropriate state agency or agencies.

dBA - Abbreviation for decibel utilizing the A-weighting network.

L_{10} - Sound levels exceeded 10 percent of the time for the period under consideration.

Floodplain - Lowland and relatively flat area adjoining inland and coastal waters that are subject to a one percent or greater chance of flooding in any given year.

Interspecific - Interrelationships between populations of different species.

Intraspecific - Interrelationships between populations of the same species.

Design Hour Traffic Volumes - The volume of traffic expected to be traveling during the thirtieth (30th) highest or critical hour during the design year for determining the design capacity of a facility.

Level of Service A - Level of Service "A" represents a condition of free flow of traffic with low volumes and high speeds. Little or no restriction of movement is caused by the presence of other vehicles and there are no significant delays. At a signalized intersection on no approach is the green phase fully utilized by traffic and no vehicles wait longer than one red phase.

Level of Service B - Level of Service "B" is the zone of stable flow with operating speeds beginning to be restricted somewhat by traffic conditions. Drivers still have reasonable freedom to select their speed and lane of operation. The lower limit of this level of service has been associated with service volumes used in the design of rural highways.

Level of Service C - Level of Service "C" is still in the zone of stable flow but speeds and maneuverability are more closely controlled by higher volumes. Fully utilized signal phases are still intermittent but some drivers may be forced to wait through more than one red signal indication and traffic may occasionally back up behind turning vehicles. Level of Service "C" is an average, satisfactory traffic condition.

Level of Service D - Level of Service "D" approaches unstable flow with tolerable operating speeds being maintained though considerably affected by changes in operating conditions. Drivers have little freedom to maneuver and comfort and convenience are low but conditions can be tolerated for short periods of time.

Level of Service E - Level of Service "E" cannot be described by speed alone but represents operations at even lower operating speeds than in Level D with volumes at or near the capacity of the highway. Flow is unstable and there may be stoppages of momentary duration.

Level of Service F - Level of Service "F" describes forced flow operation at low speeds where volumes are below capacity. These conditions usually result from queues of vehicles backing up from a restriction downstream. Speeds are reduced substantially and stoppages may occur for short or long periods of time because of the downstream congestion.

APPENDIX D

COORESPONDENCE AND COORDINATION*

*ADDITIONAL CORRESPONDENCE CONTAINED IN APPENDIX B

APPENDIX D

CORRESPONDENCE AND COORDINATION

The following is a chronological listing of important correspondence and coordination with various agencies and individuals which has occurred during the preparation of this DEIS.

Dated	Agency
June 12, 1985	United States Department of the Interior, Fish and Wildlife Service, Cortland, New York
June 18, 1985	United States Department of Agriculture, Cooperative Extension, Onondaga County, Syracuse, New York
June 18, 1985	United States Department of the Army Corps of Engineers, Buffalo District, Buffalo, New York
July 30, 1985	Consultant Minutes of Project Meeting
August 5, 1985	New York State Department of Environmental Conservation, Division of Regulatory Affairs, Cortland, New York
August 9, 1985	United States Department of the Interior Fish and Wildlife Service, Cortland, New York
September 10, 1985	United States Department of Commerce, National Oceanic and Atmospheric Administration, Highlands, New Jersey
September 16, 1985	United States Environmental Protection Agency, New York, New York
September 17, 1985	New York State Office of Parks, Recreation and Historic Preservation, Albany, New York
September 19, 1985	United States Department of the Interior Fish and Wildlife Service, Cortland, New York
September 25, 1985	New York Natural Heritage Program, Wildlife Resources Center, Delmar, New York
October 3, 1985	United States Department of Agriculture, Soil Conservation Service, Syracuse, New York
July 29, 1986	New York State Office of Parks, Recreation and Historic Preservation, Central Region, Jamesville, New York

November 18, 1986	Syracuse Botanical Club, Fayetteville, New York
May 28, 1987	New York State Office of Parks, Recreation and Historic Preservation, Albany, New York
June 9, 1987	New York State Office of Parks, Recreation and Historic Preservation, Jamesville, New York
June 19, 1987	Consultant Minutes of FHWA Project Meeting
June 22, 1987	United States Department of Commerce, National Marine Fisheries Service, Highlands, New Jersey
June 23, 1987	United States Department of the Army Corps of Engineers, Buffalo District, Buffalo, New York
June 24, 1987	Consultant Minutes of Wetland Mitigation Workshop Meeting
July 1, 1987	United States Department of the Interior Fish and Wildlife Service, Cortland, New York
July 8, 1987	United States Department of Agriculture, Soil Conservation Service, Syracuse, New York
August 10, 1987	New York State Department of Environmental Conservation, Cortland, New York
December 17, 1987	New York State Department of Transportation Minutes of Meeting with New York State Office of Parks, Recreation and Historic Preservation
January 7, 1988	New York State Office of Parks, Recreation and Historic Preservation, Albany, New York
February 8, 1988	New York State Office of Parks, Recreation and Historic Preservation, Albany, New York
March 9, 1988	New York State Department of Transportation, Albany, New York
April 27, 1988	Angelo Albanese, Mayor, Village of Manlius, New York

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
100 Grange Place
Room 202
Cortland, New York 13045

RECEIVED
JUN 14 1985
McFARLAND-JOHNSON

June 12, 1985

Mr. Richard J. Tarnowski
Senior Environmental Analyst
EMJ/McFarland-Johnson Engineering, Inc.
171 Front Street
Binghamton, New York 13905

Dear Mr. Tarnowski:

This responds to your inquiry of May 29, 1985 regarding the relocation of Route 290 (P.I.N. 3034.46) beginning at the Butternut Interchange (I-690/I-481) and terminating at Manlius Center in the Town of Manlius.

Except for occasional transient individuals, no federally listed or proposed endangered or threatened species under our jurisdiction are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of listed and proposed threatened and endangered species in New York is enclosed for your information.

This response relates primarily to endangered species under our jurisdiction. It provides only technical assistance regarding other Service concerns under the Fish and Wildlife Coordination Act or other legislation.

A wide range of wetlands are found in the project area interspersed with areas of upland and the immediate vicinity. Much of the area south of the abandoned railroad tracks lies within the 100 year floodplain of Butternut Creek and/or Limestone Creek. The importance of these wetlands are enhanced due to their close proximity to highly developed areas around them.

About 150 different species of avians, mammals (including furbearers and deer), amphibians, and reptiles are known to utilize the project area. Recent beaver (Castor canadensis) activity is very obvious at several locations. Recent surveys for Butternut Creek are enclosed, however they do not provide a complete survey of the project area.

Certain permits may be required from the New York State Department of Environmental Conservation and the U. S. Army Corps of Engineers, Buffalo District, particularly if work in wetlands or flowing water is involved. Thank you for your interest in the biological aspects of the project area. If we can be of further assistance, please contact Mr. Stoll of my staff at 607-753-9334.

Sincerely yours,

Paul P. Hamilton
Field Supervisor

Enclosures

cc: NYSDEC, Cortland, NY

COOPERATIVE EXTENSION

Cornell University
State University of New York
U S Department of Agriculture

Cooperative Extension Association of
Onondaga County
1050 W Genesee St. Syracuse NY 13204

Telephone 315-424-9485

June 18, 1985

EMJ/McFARLAND - JOHNSON
ENGINEERS INC.
RECEIVED
JUN 20 1985
BINGHAMTON, N.Y.

Richard J. Tarnowski
Senior Environmental Analyst
EMJ/McFarland-Johnson Engineers, Inc.
171 Front Street
Binghamton, NY 13905

Dear Mr. Tarnowski,

In response to your letter of May 30, 1985, please find enclosed a map showing the location of soils in the prime and statewide importance categories within the corridor.

There are no agricultural districts within the corridor and no agricultural production of any significance.

Sincerely,

Walter G. Neuhauser
Cooperative Extension Agent

d
enclosure

Cooperative Extension of New York State provides Equal Program and Employment Opportunities. New York State College of Agriculture and Life Sciences, New York State College of Human Ecology and New York State College of Veterinary Medicine at Cornell University, Cooperative Extension Associations, County Governing Bodies, and United States Department of Agriculture cooperating

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO ATTENTION OF
NCBPD-ER

18 JUN 1985

SUBJECT: Route 290 Interchange, Corps Permit Jurisdiction, and Butternut Creek - Limestone Creek Project Information. Letter Received 3 June 1985

Mr. Richard J. Tarnowski
Senior Environmental Analyst
McFarland-Johnson Engineers, Inc.
171 Front Street
Binghamton, N.Y. 13905

EMJ/McFARLAND-JOHNSON ENGINEERS INC.
RECEIVED
JUN 19 1985
BINGHAMTON, N.Y.

Dear Mr. Tarnowski:

Thank you for giving me the opportunity to provide input on the Route 290 Relocation and Butternut Interchange to Manlius Center, Onondaga County, N.Y. As noted in your 30 May 85 letter the Buffalo District is conducting two Section 205 flood control studies in the project vicinity; one on Butternut Creek at DeWitt, N.Y. and one on Limestone Creek at Fayetteville, N.Y. Please keep me advised of your study progression.

The Secretary of the Army, acting through the Chief of Engineers has regulatory authority under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act. Section 10 of the River and Harbor Act prohibits the unauthorized obstruction or alteration of any "Navigable Water of the United States." Section 404 of the Clean Water Act prohibits the unauthorized discharge of dredged or fill material into "Waters of the United States" including wetlands. Plans for the project relative to these authorities should be coordinated with the Buffalo District's Regulatory Branch for determination of permit requirements.

To assist you in developing the necessary information to address the needs of the Corps permit program, I have enclosed a list of minimum information needs. In addition, I have enclosed a copy of the Corps of Engineers permit regulations, the U.S. Environmental Protection Agency Guidelines for review of discharges of dredge and fill material into waters of the United States and permit application forms.

I suggest that you contact the U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service and obtain their input on water quality and fish and wildlife resources. You should also contact the New York State Department of Environmental Conservation on these matters and on State permit requirements. The Federal Emergency Management Agency (FEMA) is the key

agency relative to flood plain management. You can reach these agencies by writing in care of the following addresses:

Mr. Richard Walka
Director
Regional Office - Region II
U.S. Environmental Protection Agency
26 Federal Plaza
New York, N.Y. 10007
(212) 264-2525

Mr. Paul Hamilton
Area Supervisor
Department of the Interior
Fish and Wildlife Service
100 Grange Place
Cortland, New York 13045
(607) 753-9334

Mr. William Krichbaum
Regional Director
New York State Dept. of
Environmental Conservation - Region 7
7481 Henry Clay Blvd.
Liverpool, N.Y. 13088
(315) 473-8301

Mr. Stanley MacIntosh
Regional Director
Federal Emergency Management
Administration (FEMA)
26 Federal Plaza
New York, N.Y. 10007
(212) 264-4734

Regarding flood plain activities, the Corps does not have authority to regulate development in the flood plain. The Corps serves in an advisory capacity and can provide technical information that is readily available to corporations upon request on a site-by-site basis. Under the National Flood Insurance Program administered by the Federal Emergency Management Agency, communities are required to adopt certain regulations that meet the minimum requirements. State or local requirements can be more stringent. Thus, construction in the flood plain is regulated at the local level. Any future projects in flood plains that could affect future flood heights or be damaged by flooding should be coordinated with local officials to insure the construction complies with local ordinances.

A copy of our preliminary draft Section 205 Reconnaissance Report for Butternut Creek at DeWitt, New York was forwarded to your office during the third week of May 1985 per your recent telephone request. A copy of our Draft Detailed Project Report and Draft Environmental Impact Statement and Appendix for the Section 205 study on Limestone Creek at Fayetteville, New York is enclosed for your information.

If you have any questions or require additional information regarding the need for Corps permits, the point of contact is Mr. Walter Fray of my Regulatory Funtions Branch. For matters pertaining to the Corps planning projects in the area, the point of contact is Mr. Zoltan Montvai of my Small Projects Branch.

Correspondence pertaining to this matter should be addressed to the District Commander, U.S. Army Engineer District, Buffalo, New York 14207, ATTN: Messrs. Fray and/or Montvai. If you have any questions or require additional

NCBPD-ER
SUBJECT: Route 290 Interchange, Corps Permit Jurisdiction, and Butternut Creek - Limestone Creek Project Information. Letter Received 3 June 1985.

information please contact Messrs. Fray and/or Montvai at (716) 876-5454 extensions 2315 and 2145 respectively.

The Buffalo District -- Leadership in Engineering.

Sincerely,

FOR ROBERT R. HARDIMAN
Colonel, Corps of Engineers
District Commander

4 Enclosures
as Stated

EMJ / McFARLAND-JOHNSON ENGINEERS, INC.

	MEMORANDUM
To: Record	Date: July 30, 1985
From: R. Woidt	
Subject: PIN 3034.46, Relocated Route 290	Project No. 84-3527.0

A scoping meeting discussing preliminary alignment alternatives for Relocated Route 290 was held Friday, July 26 at the NYSDOT Region offices. Invited agencies included NYS Dept. of Environmental Conservation, U.S. Dept. of Interior - Fish and Wildlife, U.S. Army Corps of Engineers, Onondaga County Planning Agency and the Federal Highway Administration, N.Y. Division.

The purpose of the meeting was to familiarize the aforementioned agencies with the Relocated 290 project and to discuss and obtain comments concerning the various preliminary alternatives presented.

Persons in attendance are listed below.

James F. Byron	- NYSDOT-Albany
Myron Shirley	- NYSDOT-Region 3 Design
William Schotz	- NYSDOT-Region 3 Design
Gordon C. DeAngelo	- NYSDOT-Region 3 Landscape
Willard Ketchum	- NYSDOT-Region 3 Design
Richard Simberg	- NYSDOT-Region 3 Director
William Van Alst	- Larsen Engineers/Architects
Ray Nolan	- NYSDEC
Michael F. Stoll	- USDOI - Fish & Wildlife
Mike Cunningham	- Onondaga County Planning Agency
Bill Thomas	- Onondaga County Planning Agency
Captain Robert Pauley	- U.S. Army Corps of Engineers
Gary E. Larsen	- FHWA, N.Y. Division
Donald Lawson	- U.S. Army Corps of Engineers
Ron Holdsworth	- McFarland-Johnson
Rick Tarnowski	- McFarland-Johnson
Rick Woidt	- McFarland-Johnson

Preliminary alternatives showing approx. pavement widths, construction limits and R.O.W. limits were presented on unedited 1"=100' scale mapping. DEC regulated wetlands and the 100 year floodplain and floodway as defined by FEMA (Federal Emergency Management Agency) were also depicted on the map. The various features of each alternative and their potential impacts on wetlands and floodplains were explained by McFarland-Johnson personnel and were opened to general comments by the invited agencies.

The comments generated at the scoping meeting are summarized below:

Both DEC and Fish and Wildlife representatives had few specific comments. Each representative requested that they be sent a copy of the 1"=100' scale mapping and after closer examination they will generate more specific

	MEMORANDUM
To: Record	Date: July 30, 1985
From: R. Woidt	
Subject: PIN 3034.46, Relocated Route 290	Project No. 84-3527.0

comments. In general each said they wished to minimize the impact on freshwater wetlands to the greatest degree possible. Ray Nolan (NYSDEC) expressed his concern over the wetland involvement of Relocated Butternut Road. If possible, he would prefer to see Butternut Road Dead Ended if projected traffic volumes so warrant.

Captain Robert Pauley (U.S. Army Corps of Engineers) was concerned with the western terminus of the project because it will directly impact a proposed U.S. Army Corps of Engineers levee project located along Butternut Creek near the existing NYSDOT maintenance garage. Captain Pauley requested the latest information for the alignments and profiles of the interconnecting ramps of Relocated 290 with I-690 and I-481 as he may wish to terminate his levee into the fill section of the proposed 290 facility.

Additionally, the Corps will need to know what will happen to the NYSDOT maintenance facility if the 290 project is built. If the garage is moved out of the study area, it will impact the Corps benefit-cost ratio for their project. Finally Captain Pauley noted that the Relocated Route 290 corridor will be utilized as a flood storage in conjunction with their proposed levee project which in turn will raise 100 year flood levels slightly.

Upon completion of their preliminary hydraulic analysis NYSDOT-Albany will provide the Corps with a copy of their findings concerning the hydraulic impacts of Relocated Route 290 on Butternut Creek.

Representatives of Onondaga County Planning Agency noted that there were no alternatives to the south of Freemont Hills near the landfill site. They noted that as part of the original planning report this was considered a viable alternative. Thus we will have to be able to defend why a detailed look was not considered during this stage.

Gary Larsen, FHWA, noted that several left handed exit ramps exist at the I-690 - I-481 interchange with the proposed 290 facility which in general is not consistent with FHWA policy.

It was noted that detailed traffic data, both mainline link and turning movements will be needed to finalize and substantiate design alternatives. Myron Shirley (NYSDOT-Region 3) said that unapproved traffic volumes should be available in about 4 weeks. Final approval of preliminary traffic volumes will probably require another months time.

EMJ/ McFARLAND-JOHNSON ENGINEERS, INC.

	MEMORANDUM
To: Record	Date: July 30, 1985
From: R. Woidt	
Subject: PIN 3034.46, Relocated Route 290	Project No. 84-3527.0

There was some discussion on whether to proceed with the planned public informational meeting in mid-September 1985 without detailed traffic volumes. The general consensus was to go ahead with the meeting with available information.

NYSDOT Region 3 has requested that McFarland-Johnson perform a 'dry run' of the public informational presentation at the Region 3 offices prior to the actual meeting date.

There was some confusion as to alternative labeling, McFarland-Johnson will look into utilizing a clearer labeling system.

M-J will send DOT a revised noise monitoring location plan based on the 100' scale alignments. Upon approval, field noise monitoring can begin in August 1985.

RW/smd

Division

New York State Department of Environmental Conservation
Division of Regulatory Affairs, Region 7
PO Box 5170, Fisher Avenue
Cortland, NY 13045-5170
(607) 753-3095

Henry G. Williams
Commissioner

RECEIVED
DESIGN GROUP
AUG 07 1985

W. Ketchum
J. Shelly
W. Schatz
E. Loftus
G. DeAngelo
M. Craig

August 5, 1985

AUG 12 1985
RECEIVED

Mr. Richard Simberg, Regional Director
NYS Department of Transportation
333 E. Washington Street
Syracuse, NY 13202

Re: Relocated Route 290
Butternut Interchange to Manlius Center
Onondaga County, PIN 3034.36

Dear Mr. Simberg,

This letter follows our initial meeting regarding the above referenced project held on July 26, 1985.

I have not as yet received the large scale drawings of the project area but this Department has identified, at least initially, the following areas of concern:

1. A previously discarded alternate route located south of the present project area remains unidentified in our files.

2. The no-action alternative has not been disclosed to this office as yet.

3. Relocation of Butternut Drive will impact the wetland area without obvious need. The suggested construction of cul-de-sacs at each terminus of Butternut Drive is preferred.

4. A combination of Alt. 2 with Alt. 1A appears to create the least disturbance to wetland area.

Please note that this office is concerned with impacts to wetland SYE-22 that may result from the construction of the proposed levee on the west side of Butternut Creek. At this point in time I am not sure if the Corps project interrelates with the Route 290 relocation.

This office appreciates the opportunity to discuss this project early

RD REG. 3 RECD
AUG 7 '85

on in its development.

If you have any questions regarding this letter, please feel free to contact me or Wes Stiles at this office.

Very truly yours,

Raymond J. Nolan

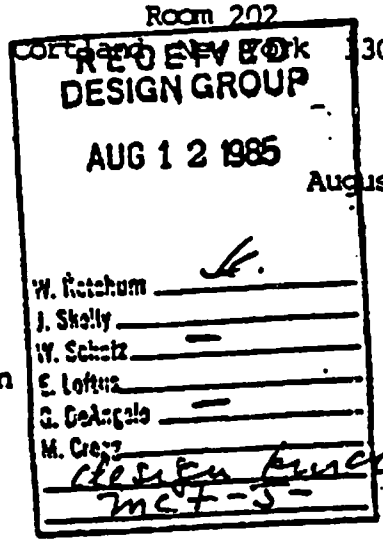
Raymond J. Nolan
Environmental Analyst

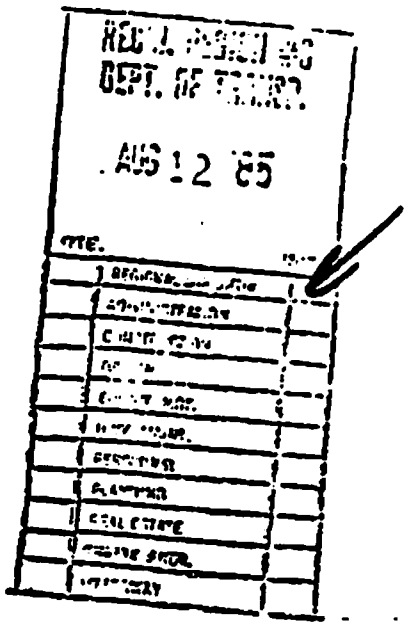
RJN:jh

cc: W. Stiles
P. Snyder
U.S. Fish & Wildlife Service (M. Stoll)
Onondaga Co. EMC

A Design

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
100 Grange Place
Room 202
Cortland, New York 13045





August 9, 1985

Mr. Richard Simberg
Regional Director
NYS Dept. of Transportation
333 East Washington St.
Syracuse, NY 13202

Dear Mr. Simberg:

This letter provides additional information regarding our concerns relative to the proposed Relocation of Route 290, Butternut Interchange to Manlius Center, Onondaga County, P.I.N. 3034.46, as promised at the July 26, 1985, "Scoping Meeting". These comments are intended as technical assistance only and do not constitute the report of the Secretary of the Interior within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Our mission is protection of fish and wildlife resources and their habitats with particular emphasis on wetlands. The project area contains numerous freshwater wetlands grading from open water (POW) in Butternut Creek, Limestone Creek, and the Old Erie Barge Canal through wet meadow and emergent vegetation (PEM), beds of aquatic vegetation (PAB), shrub/scrub (PSS), deciduous woods (PFO1), dead trees (PFO5) to areas of standing water (LOW). Wetlands designated by the Onondaga Environmental Management Council as SYE17, SYE21, SYE22.01, SYE22.02 and SYE22.04 are dominated by PEM type habitat. SYE22.01 (portions of) and SYE22.03 contain mixtures of all types of habitat. MAN7.01, MAN7.02 and MAN7.07 (only a portion of the total wetland falls in the project area) contain all types of habitat interspersed in a highly complex fashion.

Your attention is also drawn to page 125 of your July 1982 Transportation Project Report where you state a "principal hydraulic characteristic is the large flood plains in the study area" and that "the expected fill would be a negative impact on the adjacent wetlands of the study area." You further state that "alternatives constructed by extending I-690 eastward from the existing Butternut Interchange would have the most impact on the hydraulics of the study area." The proposed extensive filling integral to the several alternatives could isolate or adversely change the wetland habitats.

Currently, the three bodies of flowing water support warm water sports fisheries and in conjuction with the wetlands are a basis for several forms of outdoor recreation. Additionally, they provide a diverse range of habitats for fish and wildlife resources.



Due to the large losses of freshwater wetland inherent in the proposed alternatives and the disruption which would result to their integrity and water movement we request further consideration of the "do nothing alternative" alone or in conjunction with the upgrading of existing facilities to accomplish the desired project objectives. Moreover, we cannot support the proposed connector between Butternut Drive and Fisher Road ("common to all alternatives") because it would result in unnecessary filling of freshwater wetlands and would promote access and adverse impact to an area currently served by a dead end which could result in increased development and consequent adverse impact to the adjacent wetlands.

Additionally, other alternatives which make maximum use of the abandoned railroad right-of-way passing north of the wetlands adjacent to Butternut Creek might still be feasible.

Provision of the 1"=100' location map is appreciated. We look forward to working with you in the future toward an alternative which meets your objectives and has less adverse impact on fish and wildlife resources.

Sincerely,

Paul P. Hamilton

Paul P. Hamilton
Field Supervisor

cc:
NYSDEC, Cortland, NY
Onondaga County EMC

PRELIM. | FINAL
DESIGN | LANDSCAPE
RECEIVED
FACILITIES DESIGN DIVISION
SEP 12 1985
CIRC. | FILE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Branch
Sandy Hook Marine Laboratory
Highlands, New Jersey 07732

JCC

SEP 10 1985

SEP 19 1985

Mr. Robert K. Radliff
Preliminary Plan Review Bureau
New York State Department of Transportation
1220 Washington Avenue
State Campus
Albany, New York 12232

Dear Mr. Radliff:

The National Marine Fisheries Service (NMFS) has reviewed the information which accompanied your letter of August 20, 1985, regarding the relocation of Route 290 between the Butternut Interchange and Manlius Center in the Towns of Dewitt and Manlius, Onondaga County, New York. This project is entering the "Discussion of Design Alternatives" phase of review.

Our preliminary review reveals that both of the primary alternatives, as well as the Butternut Drive Connector to the substation access road, on the western boundary of the project, will encroach into wetland areas. The NMFS believes that mitigation and possibly compensation of forfeit wetlands should be investigated and developed, as appropriate, within the framework of the preferred designs. The crossing of Limestone Creek, on the east side of the project, is also, apparently, an aspect of all the design options. However, without more information about how the crossings will be undertaken, the NMFS cannot, at this time, provide any meaningful imput to the discussion process on this topic.

Should you wish to discuss this matter further, please contact Michael Ludwig at our facility at 212 Rogers Avenue, Milford, Connecticut, 06460.

Sincerely,

Stanley W. Gorski
Assistant Branch Chief

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK NEW YORK 10278

PREL.	FINAL
DESIGN	LANDSCAPE

RECEIVED
FACILITIES DESIGN DIVISION
SEP 19 1985

SEP 16 1985

Mr. Robert K. Radliff
Preliminary Plan Review Bureau
New York State Department of Transportation
Albany, New York 12232

Dear Mr. Radliff:

This is in regard to our review of three proposed highway projects. Based upon our review of the information provided, we offer the following comments for the below referenced projects.

1. Route 33, Kensington Expressway, Erie County (PIN 5512.23). We have no objections to the preferred alternative addressed in the design report/environmental assessment (DR/EA). We do not anticipate any significant adverse environmental impacts to result from the proposed project.

2. Hooper Road, County Road 508, Town of Union, Broome County (PIN 9750.65). We believe that the proposed minor highway modifications addressed in the DR/EA are needed to improve safety and traffic conditions. The solutions discussed in the DR/EA appear to be environmentally sound changes to the existing highway which will reduce or eliminate present traffic hazards. Thus, we have no objections to the proposed improvements and do not anticipate any significant environmental impacts to result from these changes.

3. Relocated Route 290, Butternut Interchange to Manlius Center, Towns of Dewitt and Manlius, Onondaga County. We have reviewed the notice of intent to prepare a draft environmental impact statement (EIS) and project study area map for the project. From the information provided, the preliminary design alternatives show that the alignments will potentially impact an area designated as a wetland. In accordance with Environmental Protection Agency (EPA) policy, we believe that federally designated wetland areas should be avoided to the greatest extent practicable. Where these environmentally sensitive areas can not be avoided and no practicable alternatives exist, EPA recommends that mitigation measures for the project include wetland habitat creation of 1 to 1 compensation of equal or greater value for wetlands destroyed. We believe that this mitigation should be considered during preliminary design and that consideration be given to eliminating any potential impacts to wetlands.

If there are any questions concerning our comments, please call Mr. Christopher Militscher of my staff at (212) 264-5387.

Sincerely yours,

Christopher A. Militscher

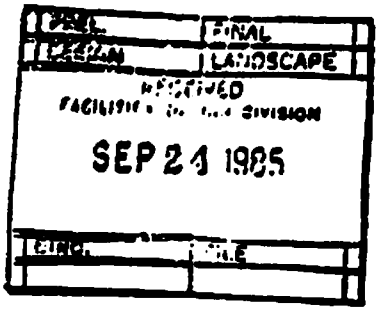
Robert W. Hargrove, Chief
Federal Activities Section
Environmental Impacts Branch

NEW YORK STATE
Onn Lenman
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
The Governor Nelson A. Rockefeller Empire State Plaza
Agency Building 1, Albany, New York 12238

518-474-0456

JCC



Sept 17, 1985

Robert K. Radliff
Preliminary Plan Review Bureau
NYS Deptartment of Transportation
State Campus
Albany, N. Y 12232

Re: Relocated Route 290
Butternut Interchange to
Manlius Center
Towns of Dewitt & Manlius
Onondoga County

Dear Mr. Radliff,

The proposed Butternut Interchange project may have social, economic and environmental effects related to Old Erie Canal State Park. I understand that the 1982 documents prepared for this project are no longer available for review. Hence, we cannot adequately evaluate our potential concerns. When materials become available on your proposed alternatives, we will review them and offer comments related to the state park facility.

Sincerely,

Robert A. Anderson

Robert A. Anderson, Phd.
Director, Planning & Research

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
100 Grange Place
Room 202
Cortland, New York 13045

PHASE | FINAL
DESIGN | LANDSCAPE
RECEIVED
FACILITIES DEVELOPMENT DIVISION
2 3 1985
FILE

September 19, 1985

Mr. Robert K. Radliff
Preliminary Plan Review Bureau
NY State Dept. of Transportation
1220 Washington Ave., State Campus
Albany, NY 12232

Dear Mr. Radliff:

This responds to your letter of August 20, 1985, regarding proposals to relocate New York State Route 290, Butternut Interchange to Manlius Center, Towns of Dewitt and Manlius, Onondaga County, New York (P.I.N. 3034.46). The following comments are intended as technical assistance only and do not constitute the report of the Secretary of the Interior within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), nor do they preclude separate and/or additional comment on any Department of the Army permits that may be required under Section 10 of the River and Harbors Act of 1899 and/or Section 404 of the Federal Water Pollution Control Act Amendments of 1972.

Our mission is protection of fish and wildlife resources and their habitats with particular emphasis on wetlands. The project area contains numerous freshwater wetlands grading from open water (POW) in Butternut Creek, Limestone Creek, and the Old Erie Barge Canal through wet meadow and emergent vegetation (PEM), beds of aquatic vegetation (PAB), shrub/scrub (PSS), deciduous woods (PFO1), dead trees (PFO5) to areas of standing water (LOW). Wetlands designated by the Onondaga Environmental Management Council as SYE17, SYE21, SYE22.01, SYE22.02 and SYE22.04 are dominated by PEM type habitat. SYE22.01 (portions of) and SYE22.03 contain mixtures of all types of habitat. MAN7.01, MAN7.02 and MAN7.07 (only a portion of the total wetland falls in the project area) contain all types of habitat interspersed in a highly complex fashion. A site reconnaissance conducted September 6, 1985, confirmed the above with the exception that the freshwater wetland designated SYE22.04 has been lost to the Erie Village condominium development around bodies of open water (POW).

Your attention is also drawn to page 125 of your July 1982 Transportation Project Report where you state a "principal hydraulic characteristic is the large flood plains in the study area" and that "the expected fill would be a negative impact on the adjacent wetlands of the study area." You further state that "alternatives constructed by extending I-690 eastward from the existing Butternut Interchange would have the most impact on the hydraulics of the study area." The proposed extensive filling integral to all alternatives, amounts to about 800 acres of various kinds of freshwater wetlands. The proposed filling

of these freshwater wetlands could isolate or adversely change the nature of the existing wetland habitats, decrease the flood water storage capacity of the wetlands and the floodplains, change the extent of the floodplains, adversely effect flood and storm water retention times, and impact the water filtration processes of the wetlands.

Currently, Butternut Creek, Old Erie Barge Canal, and Limestone Creek support warm water sports fisheries and in conjunction with the wetlands are a basis for several forms of outdoor recreation. Additionally, they provide a diverse range of habitats for fish and wildlife resources.

Due to the proposed loss of around 800 acres of freshwater wetland inherent in the proposed alternatives and disruption which would occur to water movement, we request further consideration of the "do nothing alternative" alone or in conjunction with the upgrading of existing facilities to accomplish the desired project objectives. Moreover, under no condition can we support the proposed connector between Butternut Drive and Fisher Road (this proposed connector is "common to all alternatives") because it would result in unnecessary filling of freshwater wetlands and would promote access and adverse impact to an area currently served by a dead end which could result in increased development and consequent adverse impact to the adjacent wetlands.

Lastly, we will continue as a cooperating agency to the extent of providing technical assistance and timely comments as required by Federal laws and regulations. Please keep us informed of ongoing project developments so that potential problems and/or issues can be resolved in a timely fashion. Should you have further informational needs or questions please contact Mr. Stoll of my staff.

Sincerely,

Paul P. Hamilton

Paul P. Hamilton
Field Supervisor

cc:
NYSDEC, Albany, NY
NYSDEC, Cortland, NY
USACOE, Buffalo District

NYSDOT Response: This project would involve some highway construction within wetland areas. However, as shown in Table 4-7 on page 4-26 under worst case conditions, less than 32 acres of New York State Department of Environmental Conservation designated wetlands would be adversely affected. The Department of Transportation will coordinate with the New York State Department of Environmental Conserviation, the U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers through final design to develop appropriate mitigation for the wetland disturbance resulting from this project.

RECEIVED
SEP 30 1985
McFARLAND-JOHNSO

New York Natural Heritage Program

Wildlife Resources Center
Delmar, New York 12054
(518) 439-7488

Rick Tarnowski
McFarland Johnson Co.
P.O. Box 950
Binghamton NY 13902.

25 September 1985

Dear Mr. Tarnowski:

In reviewing our maps, I have found the following rare plants near Manlius. Although they are not on the area indicated for construction they should be looked for there. The plants are:

Isotria medeoloides
Phyllitis scolopedrium
Botrychium lunaria
Botrychium minganense
Aplectrum hyemale
Betula nigra
Phacelia dubia
Triglochin palustris

Sincerely,

Steven Clemants

Steven E. Clemants

New York State Department of Environmental Conservation and The Nature Conservancy
with support from Return a Gift to Wildlife contributions

United States Department of Agriculture

Soil Conservation Service

James M. Hanley Federal Bldg.
100 S. Clinton St. Rm. 771
Syracuse, NY 13260

October 3, 1985

P.M. | R.A.
P.P.S.C.D. | LANDSCAPE
RECEIVED
FACILITIES DEVELOPMENT DIVISION
OCT 21 1985
CIRC. | FILE

Mr. Robert Radliff
Preliminary Plan Review Bureau
NY Department of State
Albany, NY 12232

Dear Mr. Radliff:

We have reviewed the data you submitted regarding the Alternative Locations for the Route 290 Butternut Interchange to Manlius Center (Towns of Dewitt and Manlius, Onondaga County).

To assist you in preparing your EIS, we submit soil survey sheets from the Onondaga County Soil Survey showing the soils involved in the alternatives. Also included are legend sheets, keyed to the soil survey sheet, that show whether the involved soils are prime or of statewide importance.

We appreciate the opportunity to review this project.

Sincerely,

Robert J. Kluge, Acting for

Paul A. Dodd
State Conservationist

Attachments - Soil Survey Sheets
Legend Sheets

OFFICE OF PARKS RECREATION AND HISTORIC PRESERVATION
NEW YORK STATE

New York State Office of Parks, Recreation and Historic Preservation
Central Region - Jamesville, New York 13708 315-492-1756

Commission Chairman
Esther M. Aswad
Commission Members
Duncan S. Briggs
Thomas V. Carrocchi
Ruth S. Kerr
Richard MacPherson
Adrienne Kay Mannion
Mary E. Peirce

Orin Lehman, Commissioner
Charles T. Mitchell, Regional Manager

54-3527

July 29, 1986

Mr. Mark Szymkowicz
McFarland-Johnson Engineers
171 Front Street
Binghamton, New York

RE: Proposed DOT Road Construction
From Rt. 481 (DeWitt) to Rt. 290 (Manlius Center)

Dear Mr. Szymkowicz:

Enclosed is a 100 scale set of 1927 vintage property maps for Old Erie Canal State Park from DeWitt to Green Lakes State Park. We have acquired some additional property as indicated in red. An up-to-date, composite property map is on file at Onondaga County, Planning Agency Syracuse - Onondaga County, Map Sales & Tax Maps, Syracuse, New York.

Existing park facilities along the trail are also shown on the 100 scale plans. Attendance figures for 1982 and 1983 are 237,000 and 261,000 respectively. Attendance has been increasing each year and the section from DeWitt to Green Lakes State Park is the most heavily used section of the trail. Enclosed is a guide map of the entire 35+ mile trail and park. Federal Land and Water Conservation funds were used to develop the park facilities.

We would be very concerned about creating additional car traffic at the at-grade crossing in Manlius Center. Trail users are forced to cross Rt. 290 at this busy intersection. Although there is no designated parking area at Manlius Center, trail users often park their cars along the road thereby causing additional safety hazards. Our preferred alternative would be a new structure to carry the road over the canal and trail with a 30± car parking lot in the Manlius Center area.

Dumping additional traffic onto Rt. 290 will also create additional congestion at the entrance to Green Lakes State Park. On warm summer weekends and at special events the park becomes filled to capacity and closes. Long lines of cars waiting to get in extend back onto Rt. 290. We would like to have a traffic light installed at the entrance to the park and have the right turning lane extended back to the DOT parking area.

Please contact us if there are questions.

Sincerely,

William Murray
Assistant Regional Director

Thomas Stoddard

By: Thomas S. Stoddard
Sr. Park Engineer

TSS:eat

CC: F. Randall

Enclosure

11-18-86

Syracuse Botanical Club
305 Cleveland Boulevard
Fayetteville NY 13066

Gordon DeAngelo
NY State Dept. of Transportation
333 East Washington St.
Syracuse, NY 13202

Dr. Mildred Faust has sent me the following list of plants which may be found in the Fremont area.

Plants behind or south of Fremont Lanes Bowling on the protected list are:

Cypripedium calceolus var. parviflorum
small yellow ladyslipper

Spiranthes cernua - nodding lady's tresses

Spiranthes lucida - wide leaved lady's tresses

Asclepias tuberosa - butterfly weed

Lobelia cardinalis - cardinal flower

Rare

Solidago ohiensis - ohio goldenrod

not common

Parnassia glauca - grass-of-Parnassus.

South of the bowling alley off Bowman Road there is a very extensive amount of

Helianthus giganthus - giant sunflower.

Sincerely yours,
Virginia Gilbert,
secretary

Janet Holmes, President of Syracuse Botanical Club, may be contacted at the heading address.

Dr. Mildred Faust at:
1216 Westcott St.
Syracuse, New York 13210.

DIRECTOR
STEVENS POINT
DAU
NOV 21 1986
INFO
ACTION
IN-HOUSE DESIGN
CONSULTANT MGT.
FILE

RECEIVED
DESIGN GROUP
NOV 18 1986
R.D.F.
State Design
Envr. Liaison
Structures
Utilities
Landscape
Soils

5034.46

11-18-86

Syracuse Botanical Club
306 Cleveland Boulevard
Fayetteville NY 13066

Gordon DeAngelo
NY State Dept. of Transportation
333 East Washington St.
Syracuse, NY 13202

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Asclepias tuberosa - butterfly weed

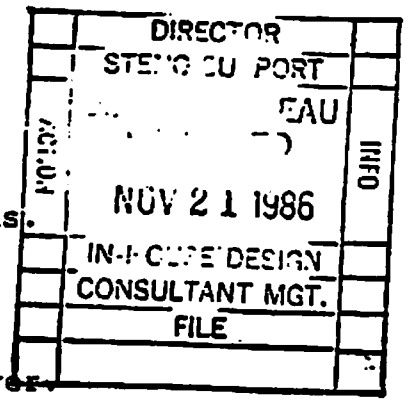
Lobelia cardinalis - cardinal flower

Rare

Solidago ohiensis - ohio goldenrod

not common

Parnassia glauca - grass-of-Parnassus.



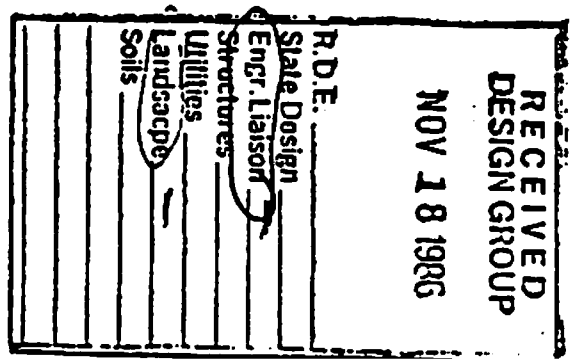
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Virginia Gilbert,
secretary

Janet Holmes, President of Syracuse Botanical Club, may be contacted at the heading address.

Dr. Mildred Faust at:
1216 Westcott St.
Syracuse, New York 13210.



OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION
NEW YORK STATE
Orin Lehman
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
The Governor Nelson A. Rockefeller Empire State Plaza
Agency Building 1, Albany, New York 12238

May 28, 1987

Mary Ivey
Environmental Analysis Bureau
Department of Transportation
State Campus, Bldg. 5, Room 303
1220 Washington Avenue
Albany, New York 12232

Dear Ms. Ivey:

Re: FHWA/DOT
3034.46
Manlius Center, Onondaga County

The State Historic Preservation Officer (SHPO) has reviewed the above referenced project in accordance with the Advisory Council on Historic Preservation's regulations, "Protection of Historic and Cultural Properties," 36 CFR 800.

In reference to archeology, it is the SHPO's opinion that the project will have no effect upon archeological resources eligible for or included in the National Register of Historic Places.

Regarding architectural resources, Structures 13, 16, 20 & 26 are of concern to SHPO. Additional information (see attached sheet) would be needed to make an eligibility and effect determination.

In addition, during our review of this project, we found the Erie Canal in the vicinity of the proposed project, to be eligible for the National Register of Historic Places (see eligibility attachment). In order to assess the project impact to this resource, more specific project information of the work proposed in the vicinity of the canal and canal related features will be needed.

If you have any questions, please contact the Project Review Staff at (518) 474-3176.

Sincerely,

Julia S. Stokes
Deputy Commissioner for
Historic Preservation

JSS:LLH:vr
Attachments
cc: Ivan Vamos

PROPERTY: 3034.46 ID#: FHWA/DOT

ADDRESS: Manlius Center COUNTY: Onondaga County

I. X PROPERTY IS INDIVIDUALLY LISTED ON NR/SR (NAME) _____
___ PROPERTY IS CONTRIBUTING COMPONENT OF A NR/SR LISTED DISTRICT SEE II b. BELOW (NAME): _____
___ DOCUMENTS IN NR/SR FILE

II. ___ PROPERTY IN THE OPINION OF THE SHPO MEETS THE NR/SR CRITERIA
___ PROPERTY IS PART OF HISTORIC DISTRICT THAT IN THE OPINION OF THE SHPO MEETS THE NR/SR CRITERIA

PRE SRB	X
POST SRB	___

SPECIFIC CRITERIA:
A. X Associated with events that have made a significant contribution to the broad patterns of our history; or
B. ___ Associated with lives of persons significant in our past; or
C. ___ Embodies the distinctive characteristics of a type, period, or method of construction; or represents the work of a master; or possesses high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction: or
D. ___ Have yielded, or may be likely to yield, information important in prehistory or history.

a. STATEMENT OF SIGNIFICANCE:

INDIVIDUAL PROPERTY ___
HISTORIC DISTRICT ___

See attached

___ SEE CONTINUATION SHEET

b. PROPERTY CONTRIBUTES TO SIGNIFICANCE OF HISTORIC DISTRICT:

DISCUSSION: _____

___ SEE CONTINUATION SHEET

Eligibility Attachment
PIN 3034.46

The Erie Canal is significant for its varied role in the making of New York history in the categories of engineering, transportation and local/ regional development and economic growth. This canal, as represented in "Clinton's Ditch", the first enlargement, and the New York State Barge Canal, established an uninterrupted route of water transportation from the Hudson River to Lake Erie. The Erie Canal is significant for:

1. The innovative engineering methods developed during construction.
2. The reduction of costs and travel time for transporting passengers and goods.
3. The stimulus provided to the growth and development of communities and support businesses along the several rights-of-way.

The contributing elements of the canal include any and all built engineering features such as the canal and retaining walls, towpaths, berm banks, bridges, locks, aqueducts, turning basins, culverts, waste weirs, feeders, dams and any buildings related to the canal. For any project affecting the canal, the specific boundaries will be determined based on the limits of canal resources within the project area and the integrity of the features noted above.

REQUEST FOR ADDITIONAL INFORMATION

Structures 13, 16 & 20 - Interior photographs of all typical significant and non-significant space, labelled as to description of view and location. (If this is not feasible, an interview with the owner that would provide details on the interior, would be sufficient).
- Project description in vicinity of these three structures.

Structure 26 - What is the construction of the substructure? Are there any other trestles of this period left on the rail line?
- Photographs of trestle from a distance.
- Photographs of surroundings.

New York State Office of Parks, Recreation and Historic Preservation
Central Region—Jamesville, New York 13078 315-492-1756

Commission Chairman
Commission Members
Orin Lehman, Commissioner
Armond Magnarelli, Regional Director

June 9, 1987

Mr. Robert K. Radliff
Preliminary Plan Review Bureau
NYS Department of Transportation
Albany, New York 12232

RE: Relocated Route 290 - PIN 3034.46
Onondaga County

Dear Mr. Radliff:

This office has reviewed the subject project as per your June 2, 2987 request.

Our recommended solution would be Alternate 2, Option B in that it eliminates vehicle/pedestrian conflicts at Manlius Center, provides possibilities for park patron parking at Manlius Center, provides a clear crossing of the Canal and Towpath Trail and also improves access to Green Lakes better than the other alternatives.

We would hope that Route 290 between this project and the Green Lakes entrance could be improved as well and that a traffic light could be installed at the park entrance.

There appears to be several options on mitigating measures to compensate for the use of parkland which we will be pleased to discuss with your department in detail.

We appreciate the opportunity to comment on this project and plan to have a representative at the June 23, 1987 meeting in Syracuse.

Very truly yours,

Walter E. Schoenborn
Senior Landscape Architect

WES:eat

Preliminary Plan Review Bureau
JUN 1987
RECEIVED

EMJ/ McFARLAND-JOHNSON ENGINEERS, INC.

FILE

MEMORANDUM

To: Record

From: Dave Bors CFW 6/26/87

Subject: PIN 3034.46
Relocated Route 290

Date: 6/19/87

Project No. 84-3527.0

On Tuesday, June 16 at 10:00 AM, a meeting was held at the NYSDOT Design Bureau Conference Room in Albany concerning the above referenced project. Persons in attendance at this meeting are listed below:

Name	Affiliation
James Byron	NYSDOT - Design Bureau
James Schad	NYSDOT - Region 3
John Conboy	NYSDOT - PPRB Albany
Mark Sengenberger	NYSDOT - Landscape Arch. Bureau
A. D. Kenyon	NYSDOT - PPRB
Douglas P. Conlan	Federal Highway Administration
Richard Moore	Federal Highway Administration
Rick Woidt	EMJ/McFarland-Johnson
Rick Tarnowski	EMJ/McFarland-Johnson
Dave Bors	EMJ/McFarland-Johnson

The purpose of this meeting was to present to FHWA a preview of the upcoming interagency workshop scheduled for Tuesday, June 23, 1987, focusing specifically on the wetland mitigation workplan being prepared for this project. This meeting was also intended as a means of soliciting from FHWA further comments and/or clarification relating to their review of the pre-Draft Environmental Impact Statement. A summary of key issues discussed follows:

A. WETLAND MITIGATION

1. All mapping, evaluations and mitigation strategies must address wetlands as defined by the U.S. Fish and Wildlife Service wetland classification system in addition to NYSDEC classifications.

2. Wetland mapping based upon the federal definition (USF&WS) will be prepared for the upcoming workshop. This mapping will also show NYSDEC designated wetlands.

3. Relocated Butternut Drive Option 1 (Fisher Road connection) will be treated as an alternate that was considered but dropped from further consideration due to its extensive wetland involvement. However, the elimination of Option 1 should not be presented as a major component of the wetland mitigation strategy.

4. All wetland mitigation should be tied directly to those specific wetland values and functions that are impacted by the project.

		MEMORANDUM
To:	Record	Date: 6/19/87
From:	Dave Bors	
Subject:	PIN 3034.46 Relocated Route 290	Project No. 84-3527.0
		Page 2 of 2

5. Mitigation within the Butternut Interchange infields should be geared toward the upgrading of existing wetland habitat values.

6. All mitigation strategies in upland areas must be directly related to wetland impacts; eg. modifying upland vegetation to compensate for lost wetland habitat. However, FHWA will not participate in mitigating upland habitat impacts.

B. PRE-DEIS

1. FHWA feels that the alternative analysis in the DEIS should provide more detail to make it clear that there are no other practical or prudent alternatives. Specific items recommended by FHWA for further discussion in the DEIS include:

   a. Consideration of an alternative north of existing Rt. 290.
   b. Reconstruction of existing Rt. 290.
   c. More continuity between previous planning studies and the alternatives presented in the DEIS.

2. According to FHWA, the DEIS must consider the full range of alternatives which satisfy the project objectives and must clearly demonstrate that the alternatives being presented are the most feasible, practical and prudent of all alternatives considered based upon social, economic and environment considerations as well as engineering and cost evaluation. Without this documentation FHWA will not even begin to consider the wetland mitigation being proposed for this project.

3. The feasibility and location of all proposed noise barriers should be stated more decisively in the EIS.

4. The background (ambient) CO level of the project study area should be checked to be sure it has been included in the predicteed CO levels.

DPB/tmr

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Branch
Sandy Hook Marine Laboratory
Highlands, New Jersey 07732

JUN 22 1987

PREL. | FINAL
DESIGN | LANDSCAPE
RECEIVED
FACILITY PLANNING DIVISION
JUN 25 1987
87
FILE

Mr. Robert K. Radliff
Director, Preliminary Plan Review Bureau
New York State
Department of Transportation
1220 Washington Avenue
State Campus
Albany, New York 12232

Dear Mr. Radliff:

We have reviewed the information which accompanied your letter regarding the relocation of Route 290 (Butternut Interchange to Manlius Center) in the Towns of Dewitt and Manlius in Onondaga County, New York. The project is further identified as P.I.N. 3034.46.

While we conclude that all the project alternatives will not adversely impact resources for which we are responsible, we are concerned about the flood plain and wetland losses associated with the proposed project implementation. The use of the second option at the Butternut Drive/Fisher Road location, however, begins to address those concerns. We recommend that the other flood plain and wetland encroachments receive a similar assessment of construction alternatives.

Sincerely,

Stanley W. Gorski
Assistant Branch Chief

Preliminary
Plan Review Bureau
JUN 25 1987
RECEIVED

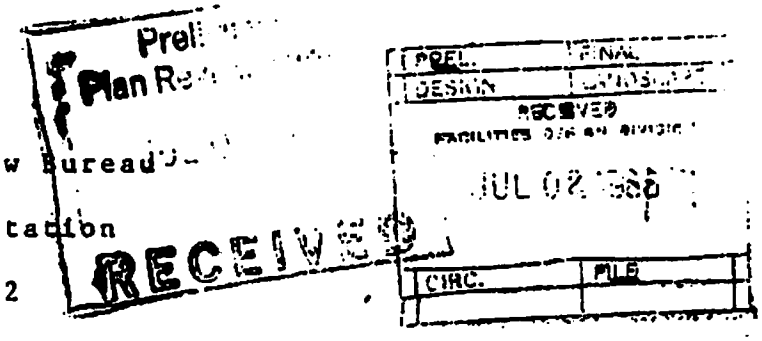
DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

June 23, 1987

REPLY TO ATTENTION OF

Regulatory Branch

SUBJECT: Relocated Route 290, PIN 3034.46, Butternut Interchange to Manlius Center, Towns of DeWitt and Manlius, Onondaga County, New York.



Mr. Robert K. Radliff
Preliminary Plan Review Bureau
State of New York
Department of Transportation
1220 Washington Avenue
Albany, New York 12232

Dear Mr. Radliff:

This pertains to the Interim Report and Fish and Wildlife Inventory for the subject project forwarded with your letter dated June 1, 1987 (received June 4, 1987). These reports have been reviewed with respect to Department of the Army (DA) regulatory jurisdiction under Section 404 of the Clean Water Act.

Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material into waters of the United States, including wetlands, without DA authorization. Project features noted in the report which appear to entail such discharges and thus will require DA authorization include, but are not limited to, temporary construction stream crossings, wetland roadway and embankment fills, and culverted stream crossings. Any fills associated with stream bank protection, cofferdams or channel relocation also require DA authorization.

The proposed project is subject to review under the United States Environmental Protection Agency (USEPA) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (Title 40 Code of Federal Regulations Part 230). A copy of the Guidelines is enclosed.

Section 230.10 of the Guidelines states that " . . . no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem. . ." The Guidelines further state that "where the activity associated with the discharge which is proposed for a special aquatic site (i.e. wetlands) does not require access or proximity to or siting within the special aquatic site in

question to fulfill its basic purpose (i.e. is not "water dependent") practicable alternatives that do not involve a discharge into a special aquatic site are presumed to be available unless clearly demonstrated otherwise." In effect the Guidelines require consideration and documentation of all practicable alternatives that would reduce or eliminate the need to fill aquatic areas, while still accomplishing the overall project purpose.

Fill for a roadway is not water-dependent, thus alternatives which do not involve a discharge of dredged or fill material into the wetland are presumed to exist. Sections IV-B and IV-C of the Interim Report provide a relatively complete analysis of the social, economic and environmental impacts of the proposed alternatives, but these alternatives all entail extensive wetland fill.

You need to address alternatives which will further reduce or eliminate the wetland fill, such as bridging the wetland areas, and constructing the remaining roadway sections through upland areas.

Regarding the relocation of Butternut Drive, Option 1 does not appear to be in compliance with the USEPA Guidelines. Option 2 clearly accomplishes this aspect of the project purpose while eliminating wetland fills.

It is anticipated that your final design will include wetland creation to mitigate for wetland losses. Such mitigation does not preclude the requirement under 40 CFR 230.10 to reduce or eliminate wetland fills.

The November 13, 1986 regulations governing the conduct of the Corps of Engineers Regulatory Programs state at 33 CFR 320.4(a)(1) that for activities involving Section 404 discharges, a permit will be denied if the discharge that would be authorized by such permit would not comply with the USEPA Guidelines.

Questions pertaining to this matter may be directed to Ms. Kathryn Jahn at 716-876-5454, extension 2307 or by writing to the above address.

Sincerely,

Daniel R. Clark
Colonel, U.S. Army
Commanding

Enclosure

EMJ / McFARLAND-JOHNSON ENGINEERS, INC.

	MEMORANDUM
To: Record	**Date:** 6/24/87
From: Dave Bors	
Subject: PIN 3034.46 Relocated Route 290	**Project No.** 84-3527.0
	Page 1 of 3

On Tuesday, June 23, 1987 at 10:00 AM an interagency workshop meeting was held at the NYSDOT Region 3 offices in Syracuse, New York. Agency representatives and attendees at this meeting are listed below:

Name	Agency
Les Monostory	Onondaga County Env. Management Council
Karen Kitney	Syracuse/Onondaga County Planning Agency
Margaret Napoleon	Syracuse Metropolitan Transportation Committee
Neal Denno	Syracuse Metropolitan Transportation Committee
Michael Stoll, Sr.	U.S. Fish and Wildlife Service
Thomas Stoddard	NYS Office of Parks and Recreation, Central Region
Bill Werick	U.S. Army Corps of Engineers
Willard Ketchum	NYSDOT, Region 3
James Byron	NYSDOT, Design Bureau, Albany
Myron Shirley	NYSDOT, Region 3
James Shad	NYSDOT, Region 3
John Conboy	NYSDOT, PPRB, Albany
Dick Lucas	NYSDOT, Region 3, Planning & Development
Mark Sengenberger	NYSDOT, Albany, Landscape Arch. Bureau
Gordon DeAngelo	NYSDOT, Region 3, Landscape Architect
Richard Moore	Federal Highway Administration
Rick Tarnowski	McFarland-Johnson
Rick Woidt	McFarland-Johnson
Dave Bors	McFarland-Johnson

The primary objective of this meeting was to summarize impacts associated with the Relocated Route 290 project and discuss various mitigation strategies presently being considered by the Department of Transportation and their consultants (McFarland-Johnson)as a means of compensating for or minimizing these impacts. The major areas of concern centered around the project's involvement with wetlands, floodplains and the Erie Canal State Park facilities.

James Byron, NYSDOT Design Bureau, opened the meeting by summarizing the project history and status of the preliminary design and environmental studies. Mr. Byron stressed the importance of receiving input from the various regulatory agencies in developing specific mitigation strategies to reduce the project impacts on wetlands, floodplains and park facilities.

Rick Tarnowski, McFarland-Johnson, then discussed the project's involvement with wetlands and presented the wetland mitigation strategies presently under consideration.

EMJ / McFARLAND-JOHNSON ENGINEERS, INC.

		MEMORANDUM
To:	Record	Date: 6/24/87
From:	Dave Bors	
Subject:	PIN 3034.46 Relocated Route 290	Project No. 84-3527.0

Following Mr. Tarnowski's presentation, meeting attendees were asked to offer comments and suggestions. A summary of comments by agency follows:

Army Corps of Engineers

1. Any wetland mitigation involving the removal of the abandoned railroad embankment should carefully consider any potential flooding ramifications.

2. The Corp's planned flood control projects will require borrow material which may directly compete with this project's local borrow requirements. However, the Corps is willing to coordinate its borrow requirements with this project, if feasible.

Onondaga County Environmental Management Council (EMC)

1. The concept of removing the abandoned railroad embankment for wetland mitigation purposes appears to be an acceptable mitigation strategy.

2. The project should avoid wetland Man. 7, a Class I wetland, if at all possible.

3. Alternatives 1 and 1-2(C) appear to be least damaging to the wetlands.

4. EMC would prefer to see existing Rt. 290 reconstructed instead of a new relocated Rt. 290.

5. The traffic and economic benefits of the design alternatives must be of sufficient magnitude to justify the wetland impacts.

NYS Office of Parks and Recreation

1. From a park usage standpoint, Alternatives 1 and 2C are least desirable because they would maintain the existing at-grade Rt. 290 crossing at the project's eastern terminus in Manlius Center. All other alternatives provide for a grade separation (bridge over the Canal and Towpath) at the eastern terminus and the removal of the existing Rt. 290 grade crossing and bridge in Manlius Center and thus eliminate vehicular/pedestrian conflicts in this portion of the park.

		MEMORANDUM
To:	Record	Date: 6/24/87
From:	Dave Bors	
Subject:	PIN 3034.46 Relocated Route 290	Project No. 84-3527.0

2. The mitigation concept of providing a wetland interpretative area on the state park property east of Manlius Center is acceptable as long as parking is provided.

3. Project impacts (if any) upon traffic congestion at the Green Lakes State Park entrance should be studied further. Parks and Recreation would like to see a traffic signal and turning lanes installed at this location.

US Fish and Wildlife Service (USF&WS)

1. Without additional project justification, USF&WS would still support the No-Build Alternative over any of the build alternatives.

2. Enhancement of existing wetlands is a questionable mitigation strategy. USF&WS will be very critical of such mitigation for this project.

3. The hydrologic impacts of removing the abandoned railroad embankment as they relate to existing wetland limits should be thoroughly evaluated.

4. Buttermut Drive Option 2 (Fisher Road Connection) should be dropped from further consideration.

5. Of the various mitigation strategies presented, off-site mitigation appears to be most feasible.

General Agency Consensus

1. It was the general consensus of all the agencies represented at this meeting that additional project justification is needed is in light of the extensive wetland and floodplain involvement.

DPB/tmr

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
100 Grange Place
Room 202
Cortland, New York 13045

PRELIM. ...
DESIGN ...

July 1, 1987

Preliminary
Plan Review Bureau
RECEIVED

Mr. Robert K. Radliff
Preliminary Plan Review Bureau
New York State Department of
Transportation
1220 Washington Avenue, State Campus
Albany, New York 12232

Dear Mr. Radliff:

This letter responds to your request of June 1, 1987 for input regarding the Interim Report Cooperative Agency Review Scoping Follow-Up/Pre Draft Environmental Impact Statement (Draft) and the Fish and Wildlife Inventory/Analysis (Inventory) for the proposed Relocation of Route 290, Butternut Interchange to Manlius Center, Onondaga County, P.I.N. 3034.46, as promised at the July 26, 1985, "Scoping Meeting". These comments are intended as technical assistance only and do not constitute the report of the Secretary of the Interior within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Our mission is protection of fish and wildlife resources and their habitats with particular emphasis on wetlands. The project area contains numerous freshwater wetlands grading from open water (POW) in Butternut Creek, Limestone Creek, and the Old Erie Barge Canal through wet meadow and emergent vegetation (PEM), beds of aquatic vegetation (PAB), shrub/scrub (PSS), deciduous woods (PFO1), dead trees (PFO5) to areas of standing water (LOW). Wetlands designated by the Onondaga Environmental Management Council as SYE17, SYE21, SYE22.01, SYE22.02 and SYE22.04 are dominated by PEM type habitat. SYE22.01 (portions of) and SYE22.03 contain mixtures of all types of habitat. MAN7.01, MAN7.02 and MAN7.07 (only a portion of the total wetlands falls in the project area) contain all types of habitat interspersed in a highly complex fashion.

Your attention is also drawn to page 125 of your July 1982 Transportation Project Report where you state a "principal hydraulic characteristic is the large flood plains in the study area" and that "the expected fill would be a negative impact on the adjacent wetlands of the study area." You further state that "alternatives constructed by extending I-690 eastward from the existing Butternut Interchange would have the most impact on the hydraulics of the study area." The proposed extensive filling integral to the several alternatives could isolate or adversely change the wetland habitats.

Currently, the three bodies of flowing water support warm water sport fisheries and in conjunction with the wetlands are a basis for several forms of outdoor recreation. Additionally, they provide a diverse range of habitats for fish and wildlife resources.

Both the Draft and the Inventory appear to adequately describe what exists in the area, and what will be lost, etc. However, we note that the Relocated Butternut Drive (Option 1) is still being considered. As previously indicated in our letter of August 9, 1985, we do not support this proposed connector between Butternut Drive and Fisher Road. This connector would result in the unnecessary filling of freshwater wetlands and would promote access and adverse impact to an area currently served by a dead end road. Further, this option could result in increased development and consequent adverse impact to the adjacent wetlands. Improvements to existing wetlands is considered as enhancement. Mitigation is where lost habitat is actually replaced elsewhere in kind or with similar habitat.

The following specific comments are offered:

Draft

Page 4-25, paragraphs 3-5. While it is shown that increased amounts of chemical compounds resulting from the proposal will not adversely affect public water supplies, the same is not shown relative to the potential affect upon the indigenous fish and wildlife resources.

Page 4-30. It has been shown that the floodway will not be affected. It should be similarly demonstrated that the water surface levels in the major water bodies of the area will not be affected.

Inventory

Page 24, paragraph 2. If the proposed project is allowed to proceed such that existing freshwater wetlands are isolated or bisected, culverts should be incorporated to provide maintenance of surface flows.

Page 24, paragraph 3. Actual loss of wildlife is more likely than redistribution of wildlife, since the surrounding area is probably already at carrying capacity.

Large losses of freshwater wetlands continue to be inherent in the proposed alternatives. The disruption which would result to the integrity of these freshwater wetlands make it necessary for the Service to continue our request for further consideration of the Do Nothing Alternative. In any event, we do not support the Relocated Butternut Drive (Option 1). We still feel that greater use of the abandoned railroad right-of-way passing basically north of the wetlands to be feasible.

Should you have further questions or require any other assistance, please contact Michael Stoll of my staff at 607-753-9334.

Sincerely yours,

Paul P. Hamilton

Paul P. Hamilton
Field Supervisor

cc: NYSDEC, Cortland, NY
NYSDOT, Syracuse, NY
Onondaga Co. EMC
COE, Buffalo, NY
EPA, New York, NY

United States Department of Agriculture

Soil Conservation Service

James M. Hanley Federal Building
Room 771, 100 South Clinton Street
Syracuse, New York 13260

Preliminary
Plan Review Bureau
JUL 10 1987
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July 8, 1987

Robert K. Radliff, Director
Preliminary Plan Review Bureau
State of New York
Department of Transportation
Albany, NY 12232

Dear Mr. Radliff:

We have reviewed the Transportation Project Report titled Interim Report Cooperative Agency Review Scoping Follow-Up/Pre Deis for PIN 3034.46 Relocated Route 290 Butternut Interchange to Manlius Center Onondaga County. The document covers items of interest and concern to this agency.

The document would be more complete if it acknowledged using and considering the data and procedures set out in 7 CFR 658.5 developed to implement the Farmland Protection Policy Act (PL 97-98). Accordingly, enclosed is a copy of Form AD-1006 completed by SCS to the extent required by the procedure. Your agency should complete Part VI and the other applicable part as explained in 7 CFR 658(b) which is attached.

In completing Form AD-1006, we have made our evaluation only on that portion of the project area zoned R - A, prime farmland soils and farmland soil of statewide importance, developed before a certain date are not considered such under the FPPA. There are other exceptions as listed under the definitions section of the CFR.

We appreciate the opportunity to review and comment upon this proposal.

Sincerely,

Paul A. Dodd

Paul A. Dodd
State Conservationist

Enclosures

cc:
Paul W. Webb, District Conservationist, SCS, Syracuse, NY, with a copy of Form AD-1006 and a copy of the Federal Register notice
Thomas W. Christensen, Area Conservationist, SCS, New Hartford, NY

New York State Department of Environmental Conservation
Region 7
Division of Regulatory Affairs
PO Box 5170
Cortland, NY 13045-5170
(607) 753-3095

Thomas C. Jorling
Commissioner

REC'D REGION #3
DEPT. OF TRANSP.
AUG 11 '87
REGIONAL DIR.
ADMINISTRATION
CONSTRUCTION
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EQUIPT MGT
HWY MAINT
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WATERWAY

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AUG 12 1987
R.D.E.
State Design
Engr. Liaison
Structures
Utilities
Landscape
Soils

August 10, 1987

Richard Simberg, P.E.
Regional Director of Transportation
Region 3
NYS Dept. of Transportation
333 East Washington Street
Syracuse, NY 13202

Re: Relocated Route 290
Butternut Interchange to Manlius Center
Onondaga Co. PIN 3034.46

Dear Mr. Simberg,

This letter is in response to the material you provided in your July 3, 1987 communication regarding the above referenced project. The following confirms comments provided during a telephone conversation with Mr. James Shad of your office.

1. All alternatives still are characterized by substantial impacts to the wetlands involved. This office does not believe that the "no action" alternative has been fully and satisfactorily explored, particularly in view of the proposed improvements to existing Route 290 that are moving toward implementation. Issuance of the necessary wetland permits does require a complete exploration of the "no action" alternatives, which, by this letter, is now requested.

2. At the initial meeting, the U.S. Army Corps of Engineers suggested the possibility of utilizing a portion of the proposed relocated Route 290 as part of a proposed flood control dike system. At that time concern was expressed as to the consequence on the flood plain of Butternut Creek by this action particularly the possibility of extending westward the current west boundary of the flood plain. There is no indication that such an action by the Corp is not still being considered; consequently this issue needs to be explored for alternatives and impacts.

3. The relocation of Butternut Drive (option 1) is not acceptable to this Department. Such an action would add further direct impact to the adjacent wetland and cause future demand for development in the wetland adjacent to the new Butternut Drive. At the initial meeting a suggestion

was made without immediate objection, to cul-de-sac Butternut Drive or explore the possibility of bridging it. These options still require further study and comment.

I hope that these comments prove of use to your office. Please feel free to contact this office whenever you have further needs regarding this matter. Your continued concerns and cooperation is appreciated.

Very truly yours,

Raymond J. Nolan jh

Raymond J. Nolan
Environmental Analyst

RJN:jh

cc: W. Stiles
DRA Staff

MEMORANDUM
DEPARTMENT OF TRANSPORTATION

TO: All Participants and Project File

FROM: James F. Byron, Project Engineer, MODB

SUBJECT: **RECORD OF MEETING**
PIN 3034.46, D001869
RELOCATED ROUTE 290
BUTTERNUT INTERCHANGE TO MANLIUS CENTER
ONONDAGA COUNTY

DATE: December 17, 1987

A meeting was held on Tuesday, December 8, 1987 at 1:30 P.M. in NYSDOT Main Office (Building 5, Room 419) to discuss the following concerns expressed by the SHPO:

1. Grade change for each design alternate included in the project.

2. Construction of bridge abutments or piers within or adjacent to the Old Erie Canal.

3. Background information and project proposals relevant to Structures 13, 16, and 20.

The following were in attendance:

Douglas Conlan, FHWA
Gary Owens, FHWA
Bruce Fullem, OPRHP (SHPO)
Betsy Farrell, OPRHP (SHPO)
Deborah Sucui, OPRHP (SHPO)
Edwina Belding, OPRHP (Planning)
Mary E. Ivey, NYSDOT, Env.Anal.Bur.
Karen McCann, NYSDOT, Env.Anal.Bur.
Myron Shirley, NYSDOT, R-3, Design
James Schad, NYSDOT, R-3, Design
Gordon C. DeAngelo NYSDOT, R-3, Landscape
Bill Winkler, NYSDOT, Structures
John Conboy, NYSDOT, PPRB
Bob Rivers, NYSDOT, Landscape
Jim Byron, NYSDOT, Des. Bur.

After opening remarks describing the purpose and objectives of the meeting a brief description of the project with emphasis on the easterly terminii of the four alternatives was presented. 100' scale drawings for each alternative in the vicinity of Manlius Center as well as enlargements of photographs showing existing roadways, proposed work, and structures along North Manlius Road were made available. A packet of xerox copies of 100' scale plans, profiles, and artist's simulations of proposed Route 290 bridges over the Erie Canal was distributed by the Design Bureau.

The first general concern with grade changes under each design alternate seemed to be resolved by the detail contained in the description of alternatives. Additional discussion of grade changes and bridges took place in reference to the Old Erie Canal State Park.

To assist in the discussion of Structure 13, Gordon DeAngelo provided SHPO with recent photographs, enlarged prints of certain photos with work limits sketched on, and information he had compiled on the interior of the building and the details of various structural elements. Similar information for Structures 16 and 20 was limited to additional exterior views of these buildings and their environs. From the description of proposed construction it was evident that no significant grade change was expected, no property acquisition is planned, and in the two alternatives most closely approaching these structures the major construction activity would place the roadway further away (Alt. 2 Options A and C). The expectation is that SHPO has sufficient information on the buildings and can likely arrive at a determination of "No Effect" perhaps conditioned on a need to seek additional comment from SHPO should our Design Alternatives change significantly with respect to the structures.

The remaining concern of SHPO involved construction in or adjacent to the Old Erie Canal. The canal definition is not simply the edge of water or property line but rather a functional unit consisting of the towpath and waterway as well as related structures. Piers in the waterway, at the very edge of the towpath (trail), or between the towpath and the waterway are not desirable and would likely result in a finding of adverse effect. SHPO appeared willing to provide findings on an alternate by alternate basis. Thus we expect that Alternate 1 and Alternate 2A would result in a "no effect" finding. Alternate 2B with the potential for a pier in the canal or an extraordinarily deep structure could constitute an adverse effect situation and additional discussion would be necessary with SHPO to examine alternate bridge details and mitigation measures. The structure over the canal in Alternate 2C is at approximately the same grade as existing Route 290 and represents essentially a replacement bridge. Thus DOT expected that this Alternative might also be a no effect situation. The Central New York Parks Region has previously expressed preference for a grade separated crossing of the canal, and provision of parking facilities in Manlius Center, and their concern with potential increased pedestrian-vehicular conflict at Manlius Center. The SHPO's determination will reflect this information as well as archaeological and historic considerations. SHPO would want to be consulted on the details of the canal crossing for the preferred alternative before Design Approval and during Final Design. As part of the foregoing discussion the Department processes for Structure Study Plans and approval of the Preliminary Design were described. The Structures Division would be responsible for providing information to the Environmental Analysis Bureau for consultation with SHPO during these activities.

The additional research conducted by Region 3 and the Design Bureau in preparing for this meeting identified the location of early structures along the south side of the canal in the vicinity of Alternate 2C. These first were recorded on the 1834 maps prepared by Holmes Hutchinson. And despite canal enlargement (widening) one building appears again on the 1862 Canal Atlas. This is situated in an area where archaeological survey work may not have been of sufficient detail to locate or discount this potential resource. Given the proximity to the existing Route 290 crossing of the canal this structure may have been removed in the process of replacing bridges over the canal. At least four structures served this crossing:

-- a bridge over the original canal-Clinton's Ditch (1826)

-- a bridge over the enlarged Erie Canal (1849) probably of wood construction.

-- an iron truss bridge noted in 1910 highway record plans.

-- the present concrete box culvert constructed in 1926 by DPW-Waterways forces.

In order to verify that no cultural resource exists which would be impacted by bridge construction for Alternate 2C additional field work will be necessary. Subsequent to the meeting arrangements were made by the Design Bureau to have personnel from the Public Archaeology Facility at SUNY Binghamton survey the area and formulate a subsurface testing program as warranted by their observations. Work on this task began December 17, 1987.

The discussions at this meeting will be reflected in appropriate sections of the Draft Environmental Impact Statement and the formal comments from SHPO, expected in letter form, will be included in the Correspondence and Communication Appendix. Project targets call for submission of the DEIS to FHWA for signature around the end of the year and a public hearing in late winter (March 1988).

Comments, additions, or proposed modifications to this record may be directed to the Design Bureau for appropriate action.

prepared by: James F. Byron

James F. Byron
Project Engineer
Design Bureau

JFB:NJR

OFFICE OF PARKS, RECREATION, HISTORIC PRESERVATION
NEW YORK STATE
Orin Lehman
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
The Governor Nelson A. Rockefeller Empire State Plaza
Agency Building 1, Albany, New York 12238

518-474-0456

Ms. Mary Ivey
Environmental Analysis Bureau
Department of Transportation
State Campus, Bldg 5, Rm. 303
1220 Washington Avenue
Albany, New York 12232

January 7, 1988

Dear Ms. Ivey:

RE: FHWA/DOT
PIN 3034.46.122
Relocation of Route 290
Manlius Center, Onondaga County

The State Historic Preservation Officer (SHPO) has reviewed the above project in accordance with Section 106 of the National Historic Preservation Act of 1966 and the Advisory Council on Historic Preservation's regulations, 36, CFR 800/801.

Based upon this review, it is the opinion of the SHPO that Structures #13 and #16 meet the criteria for inclusion in the National Register of Historic Places (see attached sheets for comments on eligibility).

As discussed in the meeting held on December 8, 1987, the SHPO offers the following comments:

Alternate 1 and Alternate 2, Option A: The SHPO has identified a potential problem with the proposed placement of support piers and abutments within the limits of the towpath and on the canal berm. The SHPO recommends the placement of abutments as far away from these canal features as possible. Once details of these items have been provided, the SHPO will be able to comment on its effect.

Alternate 2, Option B: As proposed, the placement of an abutment on the canal berm and a support pier within the waterway itself constitutes an adverse effect.

Alternate 2, Option C: The placement of abutments on the canal berm and in the towpath is of concern to the SHPO. In addition, it is the understanding of the SHPO that archaeological investigation will be performed in the project area for this alternate and any findings will be forwarded for evaluation. Finally, please note the Central New York Parks Region is concerned that the at-grade crossing will create pedestrian-vehicular conflict.

If you have any questions, please contact the Project Review Staff at (518) 474-3176.

Sincerely,

Julia S. Stokes
Deputy Commissioner for
Historic Preservation

JSS/BJF

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Orin Lehman
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
The Governor Nelson A. Rockefeller Empire State Plaza
Agency Building 1, Albany, New York 12238
518-474-0456

ELIGIBILITY ATTACHMENT

(Structures 13 & 16)

FHWA/DOT (Agency)
PIN: 3034.46.122
Relocation of Rte 290 (Project Name)
Mamlius Ctr., Onondaga (Location)

Attachment ___ of 1

I. X Property appears NR/SR eligible. PRE SRB X POST SRB ___

SPECIFIC CRITERIA:
A. ___ Associated with events that have made a significant contribution to the broad patterns of our history; OR
B. ___ Associated with lives of persons significant in our past; OR
C. X Embodies the distinctive characteristics of a type, period, or method of costruction; OR represents a significant and distinguishable entity whose components may lack individual distinction; OR
D. ___ Have yielded, or may be likely to yield, information important in pre-history or history.

II. ___ Property appears to be within the boundaries of a potential historic district. ___ PRE SRB ___ POST SRB (___ map attached)

___ Property contributes ___ does not contribute (to the historic district).

DISCUSSION: _____

III. ADDITIONAL COMMENTS:

See Attached

#109a (1-87)

Eligibility Attachment
PIN 3034.46.122
Manlius, Onondaga County

Structure 13, Canal Warehouse

The structure located adjacent to the Erie Canal on NY Route 290 in Manlius Center is architecturally and historically significant as an intact representative example of a store/warehouse associated with the Erie Canal. Constructed c. 1830, this two and one-half story, wood frame structure has a gable roof, mortise and tenon construction, and a random fieldstone foundation mixed with split Onondaga (local) limestone for two elevations. The two remaining elevations rest on a brick (not branded) foundation. Currently the window openings are boarded shut and the structure is sheathed with cedar shingles.

Structure 16, Manlius Community Church

The Manlius Community Church, located on Minoa Road in Manlius Center is architecturally significant as an intact representative example of a wood frame, late 19th Century church with Eastlake details in the front gable end. Constructed c. 1886, the two story church has a 1-1/2 story cross gable on the east side. The front facade incorporates a large nine pane stained glass window. Despite minor alterations, the structure has retained its architectural integrity.

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Orin Lehman
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
The Governor Nelson A. Rockefeller Empire State Plaza
Agency Building 1, Albany, New York 12238

518-474-0456

February 8, 1988

Mr. Mary Ivey
Environmental Analysis Bureau
Department of Transportation
State Campus, Bldg. 5, Room 303
1220 Washington Ave.
Albany, New York 12232

Dear Ms. Ivey:

RE: FHWA/DOT
Relocation of Rte. 290
PIN 3034.46.122
Manlius Center, Onondaga County

The State Historic Preservation Office (SHPO) has reviewed the additional information submitted on the above project in accordance with Section 106 of the National Historic Preservation Act of 1966 and the Advisory Council on Historic Preservation's regulations, 36 CFR 800/801.

Based on this review it is the opinion of the SHPO that alternate 2, Option C will not effect archaeological resources eligible for inclusion on the National Register of Historic Places on the South West/South East side of the existing bridge. All other concerns identified in our 1/7/88 letter still stand.

If you have any questions, please contact the Project Review Staff at (518) 474-3176.

Sincerely,

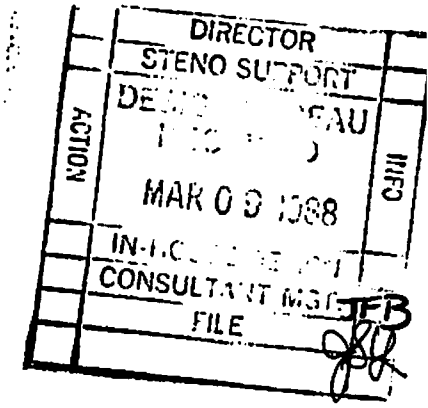
Julia S. Stokes
Deputy Commissioner for
Historic Preservation

JSS/DLS:nmb



STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
ALBANY, N.Y. 12232

FRANKLIN E. WHITE
COMMISSIONER



March 9, 1988

Mr. V. Stallone
Director, Management Systems
Parks, Recreation and Historic Preservation
Empire State Plaza
Agency Building #1
Albany, NY 12238

CFW
84-3527.D

Dear Mr. Stallone:

Re: Relocated Route 290, PIN 3034.46
Butternut Interchange to Manlius
Center, Towns of DeWitt and
Manlius, Onondaga County

This letter is to summarize the discussions at the meeting that we had in your office on February 18. The attendance sheet is included. Its purpose was to discuss the highway plans for Relocated Route 290 and the 6f involvement.

Reference was made to our January 13, 1988 letter. It noted the Proposed ROW Acquisition of 6f lands from Parks and Recreation for each of the 4 Alternates as well as the Potential Replacement Land. The Potential Replacement Land has to be equal or better in market value then the Proposal ROW Acquisition. The usefulness of the replacement parcel must be demonstrated. The 6f process can be continued after an alternate has been chosen. Then the following information should be supplied:

a) detailed map of the area.
b) substituted parcel.
c) appraisal of both parcels.

Reference was made to the 100' scale plans sent on January 13. The amount of land that DOT proposes to acquire from the Canal is in yellow shading with red crosshatching. The potential replacement land is just in yellow shading. The four alternates were explained. These were also discussed with the Central Region of Parks and Recreation on December 14, 1987. All alternates are acceptable to the main office of Parks and Recreation. However, there is one exception. Alternate 2C will have the canal park users cross Route 290 at grade. If this alternate is chosen by DOT, then additional work will have to be done on Alt. 2C in this area. More consideration will have to be given of the canal park user as this will have to be better explained before it is acceptable.

Another topic discussed was the DOT constructing a 6' wide path or interpretative trail through land owned by Parks and Recreation. This would act as mitigation for the taking of wetlands. V. Stallone considered this as an enhancement and not as a conversion. Therefore, this would not be another 6(f) involvement. He suggested that Ben Morey, Regional Grants Representative in the Central Region, should be contacted for his input on this matter.

The above is generally what we believe was discussed at the February 18 meeting. If you wish to comment, please respond to us.

Very truly yours,

P. D. Kenyon

for ROBERT K. RADLIFF, Director
Preliminary Plan Review Bureau

Att.

cc R. F. Novak, Acting Regional Director, Region #3
J. Skelly, Acting Regional Design Engineer, Region #3
P. J. Clark, Design Bureau, Rm. G-01, Bldg. #4

Attendance Sheet

Subject: PIN 3034.46
Relocated Route 290
Onondaga County

Date: February 18, 1988

Location: Agency Bldg 1, South Mall, Albany

Time: 9:30 AM

Purpose: Discuss the highway plans for Relocated Route 290 and 6f.

Name	Dept and Bureau	
John Conboy	DOT	Prel Plan Review Bur.
A. D. Kenyon	"	"
Vincent Stallone Jr	OPRHP	Mgt Systems
Chris J. Van Verse	OPRHP	Grants-in-Aid
James F. Byron	NYSDOT	MODB

NEW YORK STATE OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION

REGION	COUNTIES
ALLEGANY REGION SALAMANCA, NY 14779 (716) 354-2535 HUGH DUNNE - REGIONAL DIRECTOR MIKE KELLEY - REGIONAL GRANTS REPRESENTATIVE	ALLEGANY, CATTARAUGUS, CHAUTAUQUA
CENTRAL REGION JAMESVILLE, NY 13078 (315) 492-1756 ARMOND MAGNARELLI - REGIONAL DIRECTOR BEN MOREY - REGIONAL GRANTS REPRESENTATIVE	BROOME, CHENANGO, CORTLAND, DELAWARE, HERKIMER, MADISON, ONEIDA, ONONDAGA, OSWEGO, OTSEGO
FINGER LAKES REGION BOX 283, RD 3 TRUMANSBURG, NY 14886 (607) 387-7041 ANDREW MAZZELLA - REGIONAL DIRECTOR BOB GONET - REGIONAL GRANTS REPRESENTATIVE	CAYUGA, CHEMUNG, ONTARIO, SCHUYLER, SENECA, STEUBEN, TIOGA, TOMPKINS, WAYNE YATES
GENESEE REGION 1 LETCHWORTH STATE PARK CASTILE, NY 14427-1124 (716) 493-2611 RONALD FOLEY - REGIONAL DIRECTOR CATHY PHILLIPS - REGIONAL GRANTS REPRESENTATIVE	GENESEE, LIVINGSTON, MONROE, ORLEANS, WYOMING
LONG ISLAND REGION BELMONT LAKE STATE PARK PO BOX 247 BABYLON, NY 11702 (516) 669-1000 JOHN SHERIDAN - REGIONAL DIRECTOR JIM HUNTING - REGIONAL GRANTS REPRESENTATIVE	NASSAU, SUFFOLK
NIAGARA FRONTIER REGION PROSPECT PARK-NIAGARA RESERVATION NIAGARA FALLS, NY 14303 (716) 278-1770 MARIO PIRASTRU - REGIONAL DIRECTOR PAUL COLANGELO - REGIONAL GRANTS REPRESENTATIVE	ERIE, NIAGARA
PALISADES INTERSTATE PARK COMMISSION ADMINISTRATION BUILDING BEAR MOUNTAIN, NY 10911-0427 (914) 786-2701 NASH CASTRO - EXECUTIVE DIRECTOR PENNY SUNSHINE - REGIONAL GRANTS REPRESENTATIVE	ORANGE, ROCKLAND, SULLIVAN, ULSTER
SARATOGA-CAPITAL REGION BOX W SARATOGA SPRINGS, NY 12866 (518) 584-2000 WILLIAM KELLY - REGIONAL DIRECTOR HAROLD HAGEMANN - REGIONAL GRANTS REPRESENTATIVE	ALBANY, FULTON, GREENE, MONTGOMERY, RENSSELAER, SARATOGA, SCHENECTADY, SCHOHARIE, WARREN, WASHINGTON
TACONIC REGION STAATSBURG, NY 12580 (914) 889-4100 GUS THOMPSON - REGIONAL DIRECTOR JOHN MIDDLEBROOKS - REGIONAL GRANTS REPRESENTATIVE	COLUMBIA, DUTCHESS, PUTNAM, WESTCHESTER
THOUSAND ISLANDS REGION PO BOX 247 KEEWAYDIN STATE PARK ALEXANDRIA BAY, NY 13607 (315) 482-2593 CHARLES ELLIOTT - REGIONAL DIRECTOR MIKE QUENCER - REGIONAL GRANTS REPRESENTATIVE	CLINTON, ESSEX, FRANKLIN, HAMILTON, JEFFERSON, LEWIS, ST. LAWRENCE
NEW YORK CITY REGION 1700 BROADWAY NEW YORK CITY, NY 10019 (212) 977-8240 CLARE BECKHARDT - REGIONAL DIRECTOR RON RADER - REGIONAL GRANTS REPRESENTATIVE	BRONX, KINGS, NEW YORK, QUEENS, RICHMOND
DEPARTMENT OF ENVIRONMENTAL CONSERVATION 50 WOLF ROAD ALBANY, NY 12233-0001 (518) 457-2500 REGIONAL GRANTS REPRESENTATIVE - TO BE APPOINTED	ADIRONDACK AND CATSKILL FOREST PRESERVE

Design ~~Planning~~

880939

Village of Manlius

ONE ELMBROOK DRIVE WEST, MANLIUS, N.Y. 13104 • TELEPHONE (315) 682-9171

MAYOR: Angelo (Arkie) Albanese • *VILLAGE ADMINISTRATOR:* Vincent J. Palerino • *ATTORNEY:* Dennis R. Baldwin

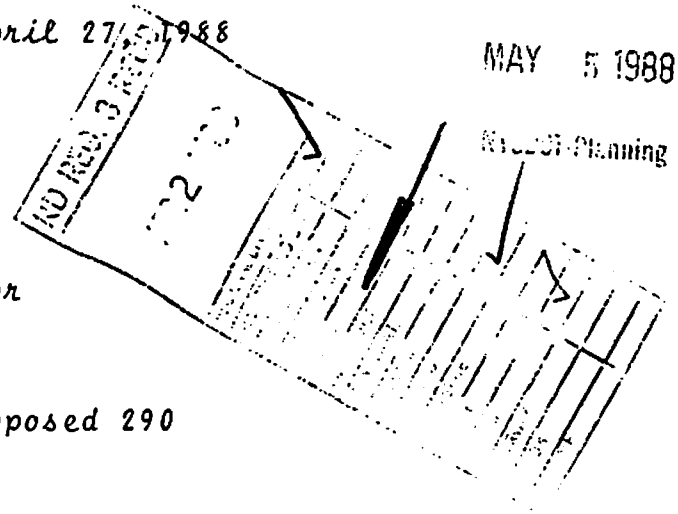
TRUSTEES: Mabel Boarner, Winthrop B. Collins, Jr., Thomas M. Hennigan, Harold H. Hopkinson, Edward Lowenstein, Richard A. Penhall

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DESIGN GROUP
MAY 10 1988

R.D.E. _____
State Design _____
Engr. Liaison _____
Structures _____
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Landscape _____
Soils _____

April 27, 1988

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MAY 5 1988
Region 3 Planning



c/o Regional II Engineer
NYS Dept. of Transportation
NYS Office Building, 7th Floor
Washington Street
Syracuse, NY 13202

Re: Support for Proposed 290 westerly bypass

Dear Sir:

The Manlius Village Board, at its April 26, 1988 meeting, unanimously resolved to support the need for a Route #290 bypass to divert vehicular traffic from the Villages of Manlius and Fayetteville.

We agree that the proposed bypass can be better directed to the new 690 extension at the Manlius Center location. We urge your office to provide this relief to our problem, and help a number of local towns and villages.

Thank you for your attention in this matter.

Sincerely yours,

A. Albanese

Angelo Arkie Albanese, Mayor
Village of Manlius

REC'D REGION #3
DEPT. OF TRANS.
APR 2 '88
RTE
STRUCTURES
CONSTRUCTION
DESIGN
CONST. MGT.
LAW BUREAU
PERSONNEL
PLANNING
REAL ESTATE
TRAFFIC ENGR

(12)
Project Area Co.
Comm. of Manlius
Village of Manlius
4A/88
PIN 3034.46

cc: Hon. T. Lombardi
Hon. H. Miller
Hon. N. Hoffmann
Hon. T. Pickard
Hon. W. Lipe
Hon. R. Lowenberg
Hon. J. Lannon
Hon. B. Lowitz

APPENDIX B

FARMLAND CONVERSION IMPACT RATING FORM

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request: June 1, 1987
Name Of Project: PIN 3034.46 Relocated Route 290 Buttermut Interchange to Manlius Center		Federal Agency Involved: US Department of Transportation, FHA
Proposed Land Use: Highway and Associated Interchange		County And State: Onondaga County, New York
PART II *(To be completed by SCS)*		Date Request Received By SCS: 6/5/87
Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form).*	Yes ☒ No ☐	Acres Irrigated: ---- Average Farm Size: 214
Major Crop(s): Corn	Farmable Land In Govt. Jurisdiction Acres: 450,470 % 87.5	Amount Of Farmland As Defined in FPPA Acres: 375,210 % 72.7
Name Of Land Evaluation System Used: Onondaga County	Name Of Local Site Assessment System:	Date Land Evaluation Returned By SCS: 6/23/87

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	1.0	2.45	2.45	0.6
B. Total Acres To Be Converted Indirectly	0	0	0	0
C. Total Acres In Site	36	36	36	36
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	0.8	1.5	0.8	4.7
B. Total Acres Statewide And Local Important Farmland	14.0	39.0	34.0	24.2
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	under 0.1%	under 0.1%	under 0.1%	under 0.1%
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	57.2	57.3	49.5	53.8
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	67.9	67.8	73.2	70.2

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use	15	12	12	12	12
2. Perimeter In Nonurban Use	10	7	7	7	7
3. Percent Of Site Being Farmed	20	0	0	0	0
4. Protection Provided By State And Local Government	20	0	0	0	0
5. Distance From Urban Builtup Area	NA	NA	NA	NA	NA
6. Distance To Urban Support Services	NA	NA	NA	NA	NA
7. Size Of Present Farm Unit Compared To Average	16	0	0	0	0
8. Creation Of Nonfarmable Farmland	25	0	0	0	0
9. Availability Of Farm Support Services	.5	5	5	5	5
10. On-Farm Investments	20	0	0	0	0
11. Effects Of Conversion On Farm Support Services	25	0	0	0	0
12. Compatibility With Existing Agricultural Use	10	0	0	0	0
TOTAL SITE ASSESSMENT POINTS	160	24	24	24	24
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	67.9	67.8	73.2	70.2
Total Site Assessment *(From Part VI above or a local site assessment)*	160	24.0	24.0	24.0	24.0
TOTAL POINTS *(Total of above 2 lines)*	260	91.9	91.8	97.2	94.2

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☒

Reason For Selection:

Alt 1 - shown under Site A
Alt 2 - Opt A shown under Site B
Alt 2 - Opt B shown under Site C
Alt 2 - Opt C shown under Site D

Site selection dependent on results of public hearing and DEIS circulation.

APPENDIX F

CONCEPTUAL RELOCATION PLAN

CONCEPTUAL STAGE RELOCATION PLAN

P.I.N. 3034.46
RELOCATED ROUTE 290
BUTTERNUT INTERCHANGE TO MANLIUS CENTER
ONONDAGA COUNTY

Location and Description of the Alternatives

The project provides for a relocated Route 290 in the Towns of Dewitt and Manlius and consists of a four lane arterial highway on new location with at grade signalized intersections. The proposed highway begins at the Butternut Interchange, proceeds in an easterly direction for approximately three miles and terminates with a direct connection to Route 290 or 257 in the vicinity of Manlius Center. Bridges will be constructed at the proposed crossings of Butternut Creek, Limstone Creek, and the Old Erie Canal.

Alternative 1

Alternative 1 follows a southern alignment through the project area. It begins at the Butternut Interchange and crosses Butternut Creek. It then curves to the northeast and crosses Fisher Road and Bowman Road. It then swings southeast to cross Burdick Street, Limestone Creek, and the Old Erie Canal and terminates with a direct connection to Route 257 in Manlius Center.

Alternative 2

Alternative 2 follows a northern alignment through the project area. It begins at the Butternut Interchange and crosses Butternut Creek. It then curves to the northeast and crosses Fisher Road and aligns itself with the abandoned railroad tracks before crossing Bowman Road. It then swings slightly to the southeast and crosses Burdick Street and then proceeds northeast to again meet the abandoned railroad tracks. From this point eastward, there are three options available for Alternative 2.

Option A

Option A proceeds southeasterly to a direct connection with Route 257 south of Manlius Center. Included in this option is the provision for a direct connection betweeen north Manlius Road and the proposed highway.

Option B

Option B proceeds in an easterly direction to a direct connection with Route 290, north of Manlius Center.

Option C

Option C aligns itself with existing Route 290 and terminates in a direct connection with Route 257 at Manlius Center.

Alternative 1-2

Follows Alternative 1 from the Butternut Interchange to the vicinity of Burdick Street. It then crosses over to Alternative 2 (Option A, B or C) for the remainder of the project.

Alternative 2-1

Follows Alternative 2 from the Butternut Interchange to the vicinity of Burdick Street and then crosses over to Alternative 1 for the remainder of the project.

In addition, there are 2 proposed options for relocating Butternut Drive in the vicinity of the bridges proposed for Alternatives 1 and 2. Neither option requires any buildings or results in any relocation problems.

Description of the Area

The project lies in the suburbs of the City of Syracuse, approximately 7 miles east of the city. It passes through the Towns of Dewitt and Manlius and the hamlet of Manlius Center, all located in Onondaga County.

The project area makes its way through some very diversified land uses including commercial and industrial development, residential subdivisions, floodplains and wetlands, a sanitary landfill, a sewage treatment plant, and the Old Erie Canal State Park.

The project will affect a few residential properties, all of which are located in rural residential areas and will be described in detail later.

None of the other areas will be affected to any great degree by the project. Any effects will be limited to strip takings, temporary occupants and easements and will not require the taking of any buildings or any relocations.

The majority of residents in the area commute by private transportation to jobs in the City of Syracuse. Syracuse, with a population of about 170,000, is the region's major metropolitan center due to its central location and well developed transportation network. Major employment is provided by Carrier Corporation and the General Electric Company, each with a workforce of over 6,000. Other large employers include Crouse Hinds, New Process Gear, Anheuser Busch, Inc., Fisher Body, and a host of others. At present, there are over 70 companies in the Syracuse area which employ over 100 persons each. The employment situation appears to be more or less stable at present, with both unemployment rate and per capita income at about the national average.

Recently, there has been a very active real estate market in the area due to the lower financing rates. There are many offerings on the market of both residential and commercial properties and the turnover rate is fairly high.

Alternative I - Relocation

Alternative I would require 3 residential properties (containing 3 residential units) and 1 garage. These residences have a value in the $50,000-$80,000 range. They are all on large lots in rural-type settings.

Depending on owners' preferences, comparable replacement housing can be found in several housing developments in the area (Franklin Park, Canterbury Woods). In addition, East Syracuse, Dewitt, Minoa, Fayetteville, Bridgeport, Kirkville, and Chittenango are all small villages with surrounding rural areas, and are all within 5 miles of the project area.

A survey of brokers and private listings of comparable residential offerings in these areas indicates that all the residential displacees can be successfully relocated.

Alternative II - Relocation

Option A

Option A requires one residence (one residential unit) in the $50,000-$60,000 value range. Availability of comparable replacement housing as covered under Alternative I indicates that all residential displacees can be successfully relocated.

Option B

Option B would require one residence (one residential unit) and garage in the $50,000-$60,000 value range. Availability of comparable replacement housing as covered under Alternative I indicates that all residential displacees can be successfully relocated.

Option C

Option C would require one single family residence and one structure with 3 tenant units (for a total of 4 residential units). Both properties have garages and are valued in the $40,000-$60,000 range. The three tenant units appear to be small, one or two bedroom apartments with rental values of approximately $300-$400/month.

Availability of comparable replacement housing indicates that all residential displacees (both owner occupant and tenant) can be successfully relocated.

Alternative 1-2 - Relocation

Alternative 1-2 would require 1 residential property (containing 1 residential unit) and 1 garage on the first half of the alternative. This residence including the garage has a value in the $70,000-$80,000 range, and was included in the Alternative 1 Relocations description.

A survey of brokers and private listings of comparable residential offerings in the surrounding areas indicates that the residential displacees can be successfully relocated.

The second half of Alternative 1-2 would follow Option A, B or C, and would require all the same buildings and relocation needs as previously described under Alternative II - Relocation.

Alternative 2-1 - Relocation

Alternative 2-1 would require 2 residential properties (containing 2 residential units) in the $50,000-$60,000 range. Both of these residences were included in the Alternative I - Relocation description.

A survey of brokers and private listings of comparable residential offerings in the surrounding areas indicates that the residential displacees can be successfully relocated.

Relocation Assistance and Services

In effecting the relocation activities on this project, the following assurances are made:

1. As part of the preparation procedure for the construction stage relocation plan, each site occupant will be personally interviewed to determine their specific relocation needs.

2. Relocation payments will be made to all eligible persons in accordance with the requirements and standards of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 as authorized by Section 30 of New York's Highway Law and implementing Rules and Regulations (Part 101).

3. All site occupants will be furnished a copy of the State's informational booklet, "If You Must Move".

4. No site occupant will be required to move from his property without at least 90 days written notice.

5. Comparable replacement housing will be available and offered to all occupants.

6. The relocation program will be carried out in an orderly, humane, and timely fashion.

Due to the close proximity of the project to the Regional Office, no on - site relocation office will be established.

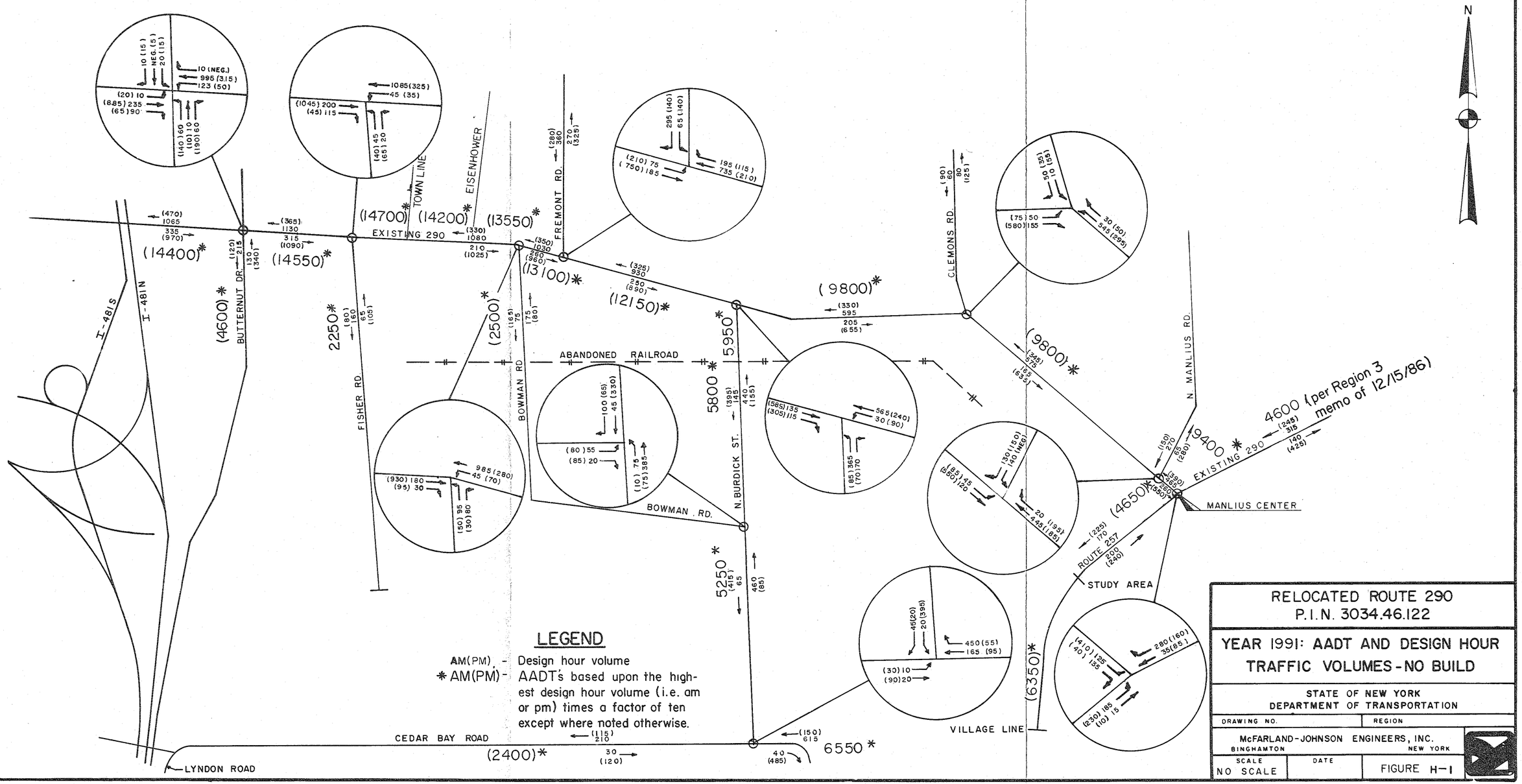
APPENDIX G

PLANS, PROFILES AND TYPICAL SECTIONS

(Separately Bound as Volume 2)

APPENDIX H

TRAFFIC FIGURES



RELOCATED ROUTE 290
P.I.N. 3034.46.122

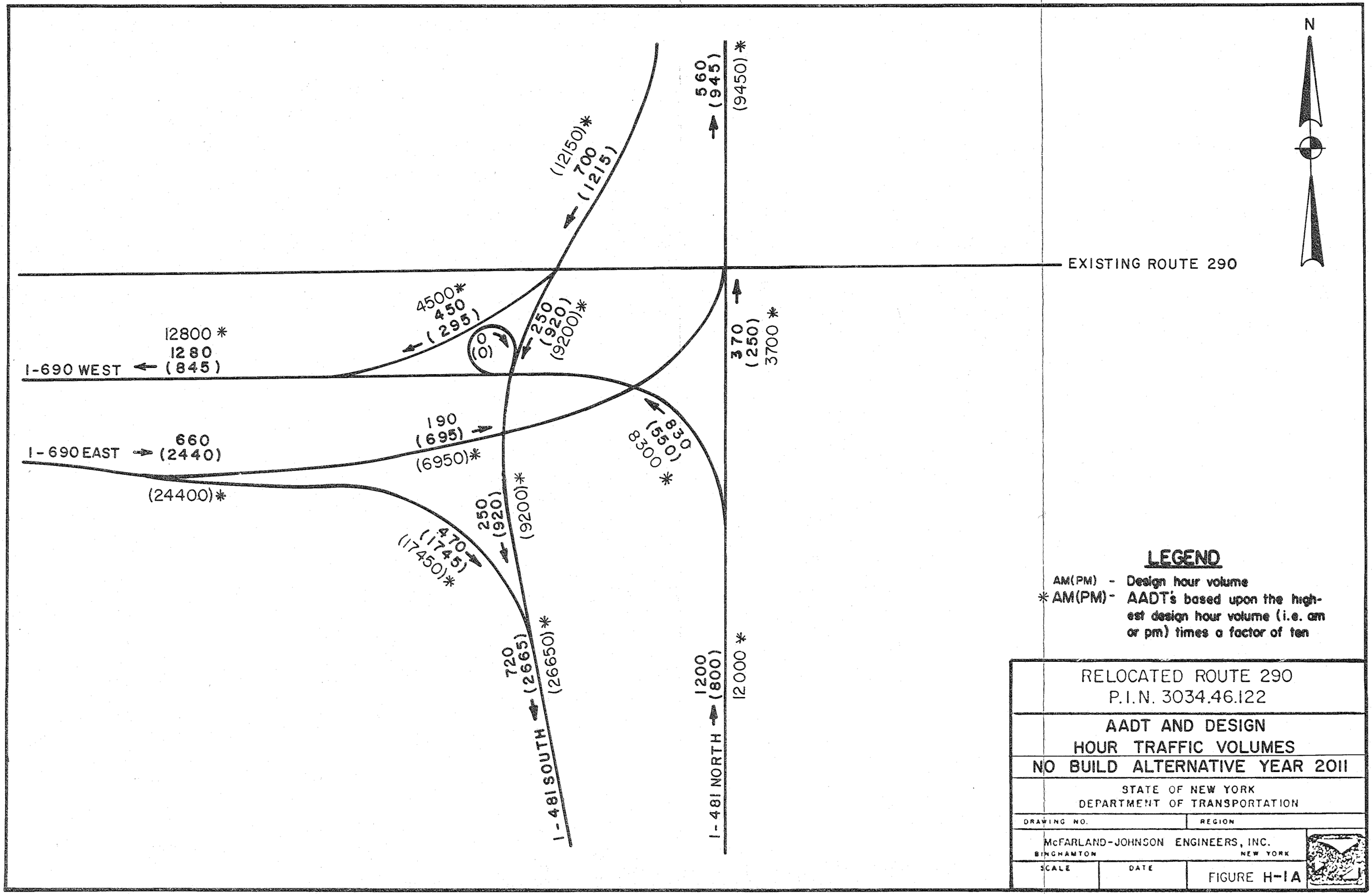
YEAR 1991: AADT AND DESIGN HOUR TRAFFIC VOLUMES - NO BUILD

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION

McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK

SCALE	DATE	
NO SCALE		FIGURE H-1



LEGEND

AM(PM) - Design hour volume

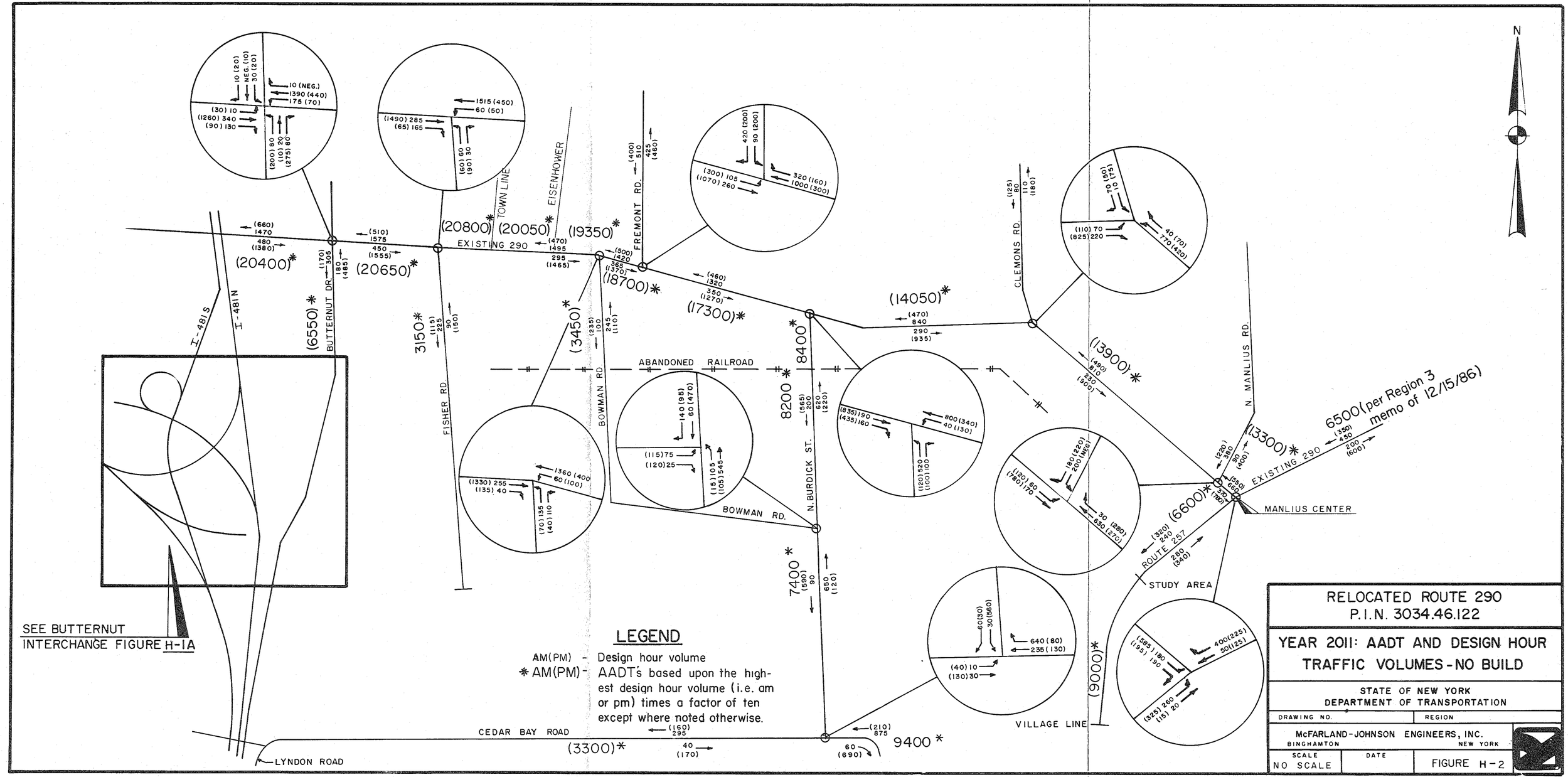
* AM(PM) - AADT's based upon the highest design hour volume (i.e. am or pm) times a factor of ten

RELOCATED ROUTE 290
P.I.N. 3034.46.122

AADT AND DESIGN
HOUR TRAFFIC VOLUMES
NO BUILD ALTERNATIVE YEAR 2011

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE / DATE	FIGURE H-1A



LEGEND

AM(PM) - Design hour volume

*AM(PM) - AADT's based upon the highest design hour volume (i.e. am or pm) times a factor of ten except where noted otherwise.

RELOCATED ROUTE 290
P.I.N. 3034.46.122

YEAR 2011: AADT AND DESIGN HOUR TRAFFIC VOLUMES - NO BUILD

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE: NO SCALE	DATE:
FIGURE H-2	

N

EXISTING ROUTE 290

BUTTERNUT DRIVE

620
(985)
(9850)*

(13550)*
740
(1355)

4500*
450
(295)

22200*
2220
(1250)
I-690 WEST

90
(60)

290
(1060)
(10600)*

18600*

10300*
1030
(465)

RELOCATED BUTTERNUT DRIVE

600*
60
(40)

190
(695)
(6950)*

I-690 EAST
1010
(3395)
(33950)*

(1400)*
40
(140)

830
(550)
8300*

390
(1095)
(10950)*

350
(955)
(9550)*

1090
(505)

470
(1415)
(19200)*

RELOCATED ROUTE 290

340
(980)
(9800)*

470
(1745)
(17450)*

80
(320)
(3200)*

810
(2725)
(27250)*
I-481 SOUTH

12800*
1280
(1120)
I-481 NORTH

LEGEND

AM(PM) - Design hour volume

* AM(PM) - AADT's based upon the highest design hour volume (i.e. am or pm) times a factor of ten

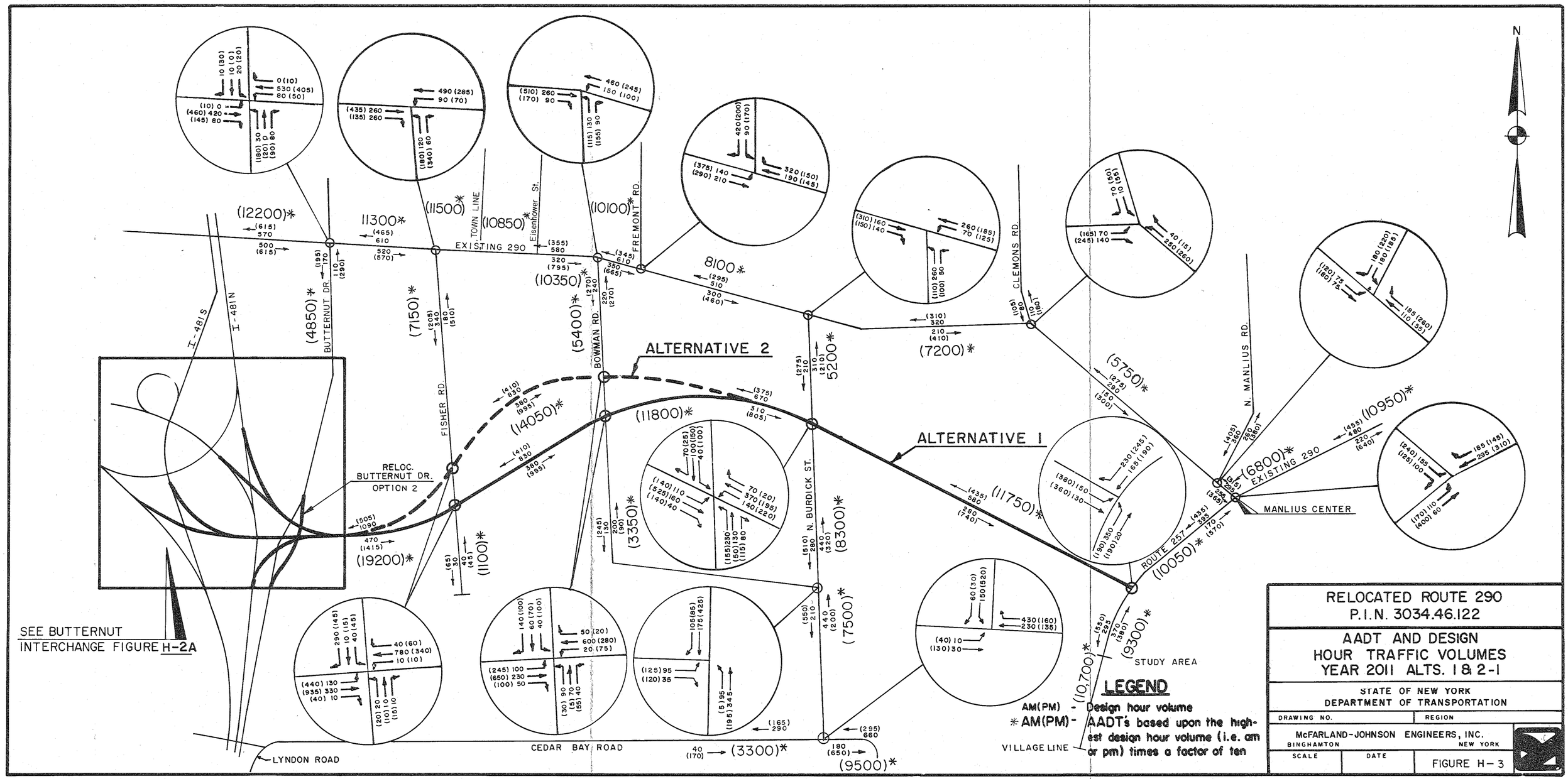
RELOCATED ROUTE 290
P.I.N. 3034.46.122

AADT AND DESIGN HOUR TRAFFIC VOLUMES (2011)
ALTERNATIVES 1 AND 2-1
BUTTERNUT INTERCHANGE

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE	DATE

FIGURE H-2A



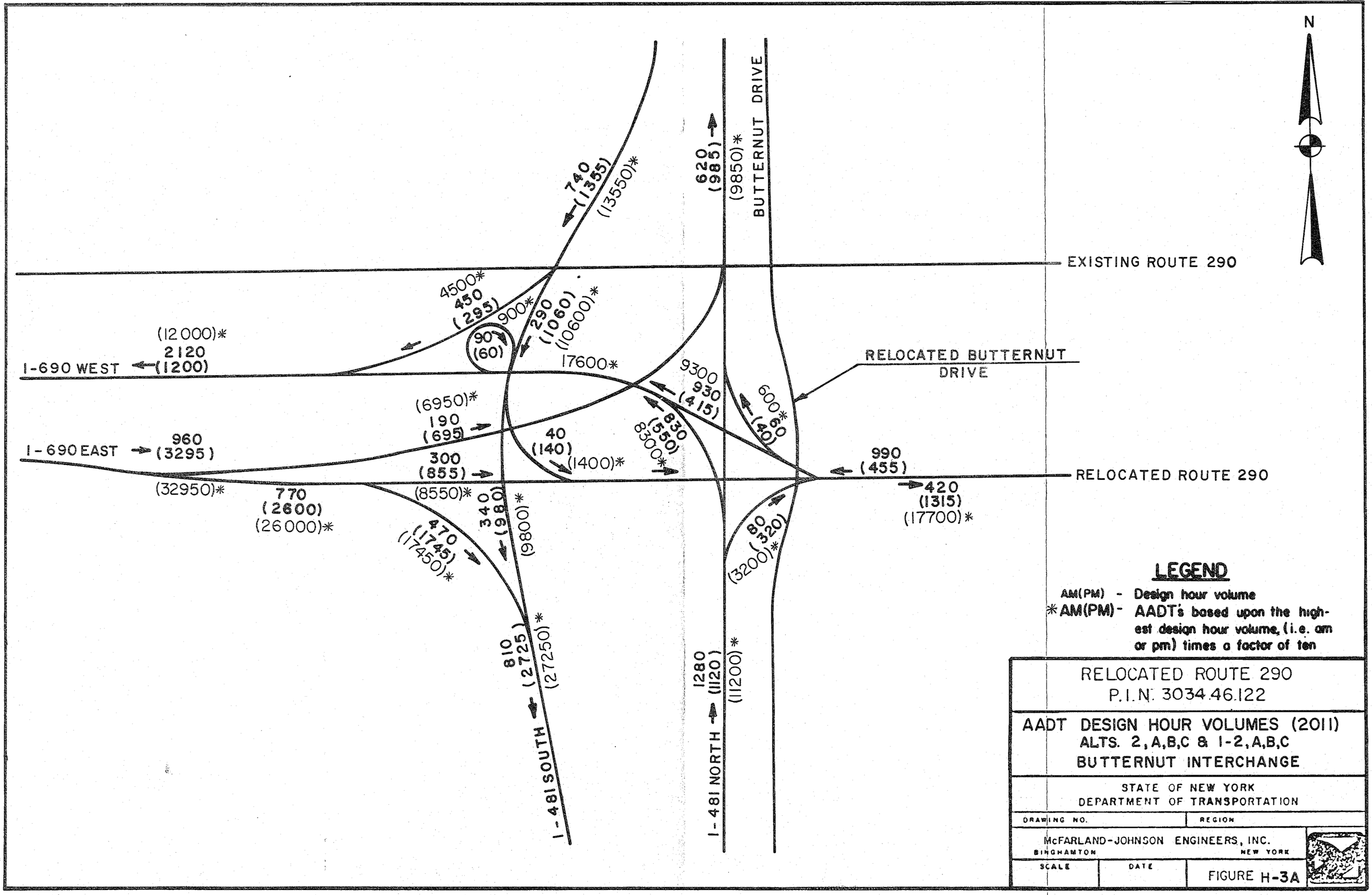
RELOCATED ROUTE 290
P.I.N. 3034.46.122

AADT AND DESIGN HOUR TRAFFIC VOLUMES YEAR 2011 ALTS. 1 & 2-1

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE	DATE

FIGURE H-3



LEGEND

AM(PM) - Design hour volume

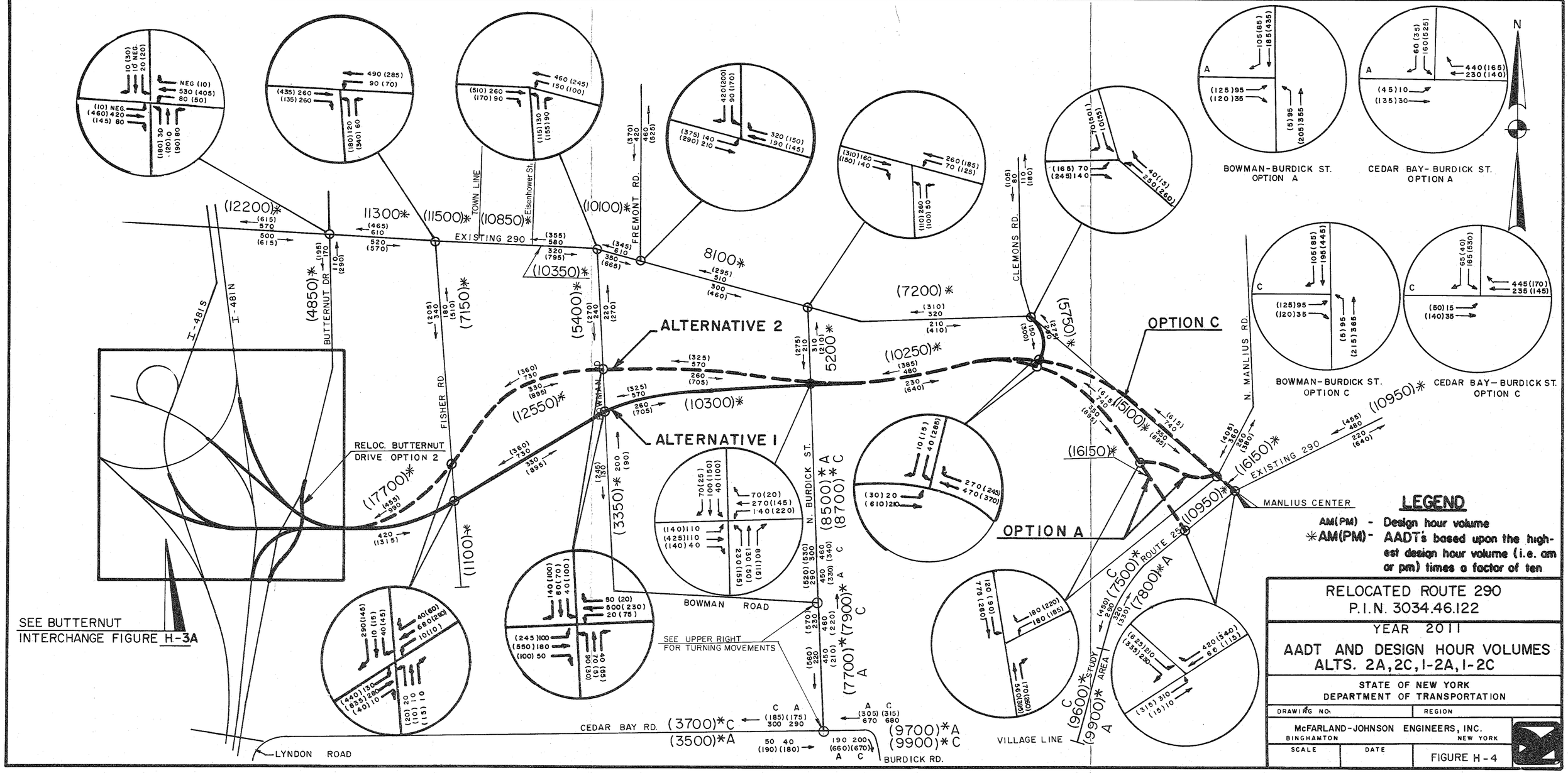
*AM(PM) - AADT's based upon the highest design hour volume, (i.e. am or pm) times a factor of ten

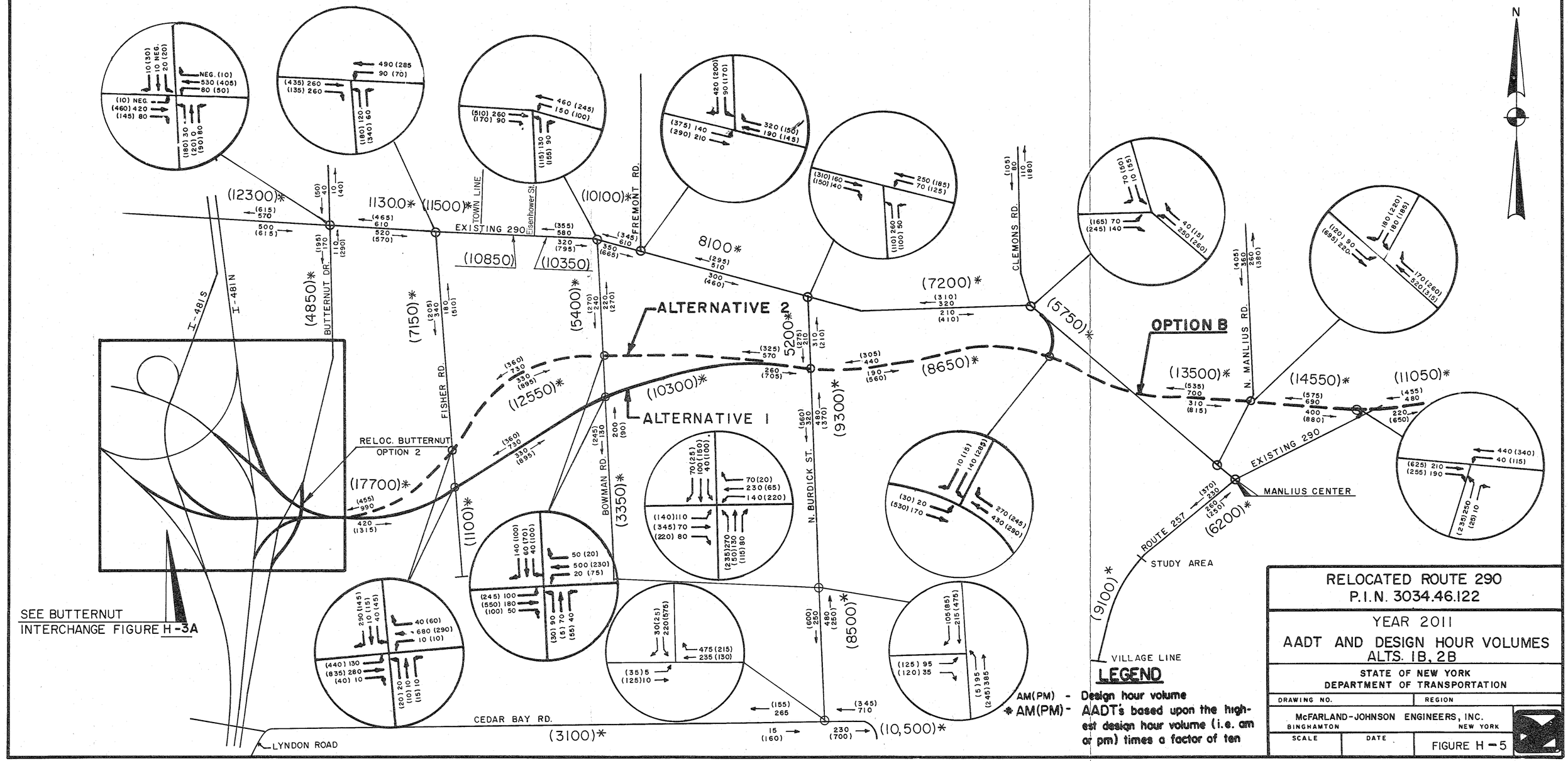
RELOCATED ROUTE 290
P.I.N. 3034.46.122

AADT DESIGN HOUR VOLUMES (2011)
ALTS. 2, A, B, C & 1-2, A, B, C
BUTTERNUT INTERCHANGE

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE / DATE	FIGURE H-3A


EXISTING 290
(12200)*
11300*
(11500)*
(10850)*
(10100)*
8100*
(7200)*
(5150)*
(4850)*
(7150)*
(5400)*
(10350)*
5200
(10250)*
(15100)*
(10950)*
(16150)*
(10300)*
(12550)*
(17700)*
(1100)*
(3350)*
(8500)*A
(8700)*C
(7700)*C
(7900)*A
(7500)*C
(7800)*A
(9600)*C
(9900)*A
(3700)*C
(3500)*A
(9700)*A
(9900)*C
ALTERNATIVE 2
ALTERNATIVE I
OPTION C
OPTION A
RELOC. BUTTERNUT
DRIVE OPTION 2
SEE BUTTERNUT
INTERCHANGE FIGURE H-3A
SEE UPPER RIGHT
FOR TURNING MOVEMENTS
I-481 S
I-481 N
BUTTERNUT DR.
FISHER RD.
TOWN LINE
Eisenhower St.
FREMONT RD.
BOWMAN RD.
N. BURDICK ST.
BOWMAN ROAD
CLEMONS RD.
N. MANLIUS RD.
ROUTE 257
MANLIUS CENTER
STUDY AREA
VILLAGE LINE
CEDAR BAY RD.
LYNDON ROAD
BURDICK RD.
BOWMAN-BURDICK ST. OPTION A
CEDAR BAY- BURDICK ST. OPTION A
BOWMAN-BURDICK ST. OPTION C
CEDAR BAY- BURDICK ST. OPTION C
N
LEGEND
AM(PM) - Design hour volume
*AM(PM)- AADT's based upon the highest design hour volume (i.e. am or pm) times a factor of ten
RELOCATED ROUTE 290
P.I.N. 3034.46.122
YEAR 2011
AADT AND DESIGN HOUR VOLUMES
ALTS. 2A, 2C, I-2A, I-2C
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
DRAWING NO.
REGION
McFARLAND-JOHNSON ENGINEERS, INC.
BINGHAMTON NEW YORK
SCALE
DATE
FIGURE H-4



RELOCATED ROUTE 290
P.I.N. 3034.46.122

YEAR 2011
AADT AND DESIGN HOUR VOLUMES
ALTS. 1B, 2B

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	REGION
McFARLAND-JOHNSON ENGINEERS, INC. BINGHAMTON NEW YORK	
SCALE	DATE
FIGURE H-5	

Design Report/Environmental Impact Study

for

Dewitt Bypass
Town of Dewitt
County of Onondaga, New York

Delivered to:
Gregory Sgromo, P.E.
Town of Dewitt
5400 Butternut Dr.
East Syracuse, NY 13057

December 17, 2015

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I- Introduction

This document is the Design Report for the DeWitt Bypass Project which includes a Traffic Impact study and an Environmental Impact study. The DeWitt Bypass Project is located in the Towns of Dewitt and Manlius, Onondaga County, New York.

This report documents the design considerations, environmental impacts and traffic impacts for a proposed bypass route in the towns of DeWitt and Manlius. The DeWitt Bypass Design report was originally proposed as a relocation of Route 290 in 1988. This report combines the information in the 1988 report with current data for the proposed construction area and traffic volumes. The proposed alignment of the bypass highway is a practical solution for the traffic problem that minimizes environmental impacts. Alternative alignments were considered and dismissed throughout the planning phase of the project. All design alternatives are discussed in this document.

II- Project Location, Evolution, Need and Objective

A. Project Location and Identification

This project is located in the Town of DeWitt and Manlius, Onondaga County, New York. Shown in Figure 1-1 is the project area and in Figure 1-2 is the location band. The official project designation is:
P.I.N. 1234.56
DeWitt Bypass
I-481/I-690 Interchange to Burdick Street
Onondaga County, NY

The beginning point of the project is located in the western side of the project area at the I-481 and I-690 Interchange, west of Butternut Drive. The end point of the project is located 1.3 miles east at the intersection of Bowman Rd and Burdick Street. The northern and southern limits are the existing Route 290 and the Old Erie Canal.

B. Project Evolution

This project has been discussed, debated and altered many times throughout its existence. Dating back to 1971 when the Policy Committee of the Syracuse Metropolitan Area Transportation Study developed a plan that called for a relocation of Route 5, where it would begin at the I-481/I-690 Interchange and terminate near Manlius Center. The planning and engineering studies for this proposal were conducted by the NYSDOT and stated that a 2 lane highway was sufficient for the transportation needs until 1995.

Seven years later, in 1978 the NYSDOT began another study to evaluate the relocated Route 5 proposal and to update the traffic needs. This study led to three more Project Reports. PR I and PR II began in January of 1982 and PR III began in July of 1982.

Project Reports I & II analyzed existing and future transportation needs of eastern Onondaga and western Madison counties. As a result of the analysis it was determined that additional freeway system access points were warranted.

From all previous reports and studies, four main alignments were selected. The four alignments developed into 25 different preliminary alternatives. These alternatives included new roadways, transits and improvements to the existing roadways. Each alternative was evaluated on the transportation effectiveness, environmental impact and consistency with the following community/project goals.

1. Provide Essential Transportation Service of High Quality.
2. Provide for Efficient Movement of People and Goods.
3. Maintain Well Being of Character of the Community.
4. Preserve and Enhance Natural Resources of the Study Area.
5. Promote Efficient Use of Energy Resources.

In the project reports, evaluations of the alignment alternatives, no bid alternative and transportation system management were considered. From the alignment alternatives it was determined that a four lane arterial highway be constructed. The no bid alternative and transportation system management alternatives were also considered viable though TSM received mixed community responses.

In March of 1982, Project Report I & II were completed. A new four lane arterial highway or TSM alternative were the two most favored project alternatives. The public and engineering concerns for the project were the environmental impact on the Old Erie Canal Park, soils related problems, floodplains, wetlands, fish and wildlife, aquatic habitat, energy consumption, noise and air pollution and adverse traffic effects.

In July of 1982, Project Report III was completed and developed specific recommendations based on the previous reports and public opinion. The report concluded that a four lane highway and elements of the TSM alternative were a practical solution and should be implemented. The highway shall start at the I-481/I-690 interchange and proceed easterly to Burdick Street, north of Fremont Hills. From there it will continue east by constructing a two lane highway or following a widened four lane Route 290 and end in Manlius Center.

The recommended four lane highway would provide benefits and eliminate the transportation problems in the Town of DeWitt and Manlius. It would increase East-West travel capacity while providing access to the freeway system, reduce traffic at existing intersections, minimizing housing and business displacement, provide substantial traffic reduction along route 290, improve access to the Interstate System for local businesses and utilize right of ways already acquired by the NYSDOT.

In June of 1988, the NYSDOT released a new Design Report/Draft Environmental Impact Statement. The report proposed 2 basic alignments and a no build alternative. Social, economic and environmental effects were considered and analyzed in the 1988 Report. The two alignments were developed so that the eastern and western portions could combine with other eastern and western alternatives.

C. Project Need and Resulting Objectives

Project needs are identified by analyzing existing and future transportation patterns and needs of the existing roadway network. Identifying the transportation deficiencies and providing a detailed solution for the current traffic problem while minimizing the environmental impacts is of highest importance. Transportation deficiencies occur during excess roadway capacity, travel delays, and at low Levels of Service.

The current roadway system is comprised of a variety of different streets, highways and intersections. The highways near the project area that carry most of the excess traffic are the east/west highways. The highways that run east/west are Route 290 and Route 5 and both see significant traffic at peak travel times. To the north, I-90 runs east/west and to the east I-690 runs

east/west. The major north/south roads are I-481, Burdick Street, Highbridge Street, North Manlius Road and Route 257.

Highways Impacting Traffic:

Interstate 481: Located west of the project area, runs north-south. Four lane controlled access facility with six lanes near the Butternut interchange.

Interstate 690: Located west of the project area and runs east-west. Two lane facility.

State Route 5: Located south of the project, runs east-west and is the main area of congestion. Two lane facility.

State Route 290: Located north of the project area and runs east-west. Two lane facility.

State Route 257: Located east of the project area and runs north-south. Two lane facility.

Interstate 90: Located north of the project area and runs east-west.

Local Roads Impacting Traffic:

Butternut Drive: Located west of Butternut Creek, provides access to commercial and industrial businesses in the area. Runs north-south.

Fisher Road: Located east of Butternut Creek, provides access to Route 290 and a municipal landfill. Dead end road that runs north-south.

Bowman Road: This road attaches Rt. 290 to Burdick Road and provides access to residential areas.

Taylor Road: This road runs east-west and connects Bowman Road to Burdick Street located north of Clark Hill.

Based on the evaluation of the capacity problems of the system of highways and roads in the Town of DeWitt and Manlius, the following is a summary of the needs which will be used to establish the basis for the project:

1. Reduce the congestion along Route 5 in the Town of DeWitt.
2. Reduce the congestion on the Route 5 and Route 481 interchange.
3. Eliminate the congestion on Route 290 and also raise the Level of Service.

Highest priority has been given to the design alternatives which would achieve the following objectives:

1. Reduce the congestion problem located at the Route 481 and Route 5 interchange due to overcapacity by attracting a portion of traffic to the bypass route. Specifically by drawing commuters traveling between Syracuse and Fayetteville/Manlius.

2. Reduce and/or eliminate the congestion problem along Route 290 by making the bypass route appealing to commuters travelling between Syracuse and Chittenango.

3. The design alternative that has the lowest environmental impact.

III- Alternatives

A. Objectives and Design Criteria

The design alternatives considered in the report have been refined in order to meet the needs and objectives previously established in section II. The needs and objectives have been determined by current traffic data, future trends and project area characteristics. Alignment configurations, intersection configurations, number of lanes, turning lanes placement and various other design alternatives have been considered and analyzed for this project. A bypass highway beginning at the butternut interchange and ending 1.5 miles east at Bowman Road is developed to reduce peak hour congestion, travel times and delays throughout the entire study area. Not only the intersections and roadways directly impacted by the construction of a bypass route but also the surrounding intersections, highways and streets. The design alternatives for this project have been developed in a manner that deals with the projected traffic growth of the area while minimally impacting natural environmental factors. The costs associated with every aspect of each design alternative was determined and factored into the decision of the chosen design alternative. The existing conditions of the area are integral in the decision making process.

The multiple intersections mentioned in this report are located on a multi directional arterial roadway surrounded by retail, commercial, and residential land uses. These intersections are analyzed to determine its contribution to the traffic congestion on Route 5 at the 5 way interchange (figure 2). Results gathered from the analysis of these intersections will also be considered during the design phase.



(Figure 2)

Specifically, the 5-way interchange of: Route 5, Lyndon Rd, E. Genesee, Highbridge Rd, and Bridgepath Road was thoroughly analyzed due to its high priority on this project. According to the NYSDOT 2008 traffic data viewer, the average annual daily traffic (AADT) is approximately 11,546 vehicles and a total volume of 53,121 vehicles. Due to the large volume, the 5 way intersection is unable to relieve the traffic build up and thus causing a traffic congestion that reaches the off ramp of 481. Analysis report for this intersection is included in APPENDIX.

B. Alternatives

Due to the project being located near many residential, industrial and commercial areas there were many physical obstacles that posed problems for our various alignments and alternatives. These physical constraints played a large role in the development of planning aspect of this project. The specific features that influenced the location of the alignment are listed below:

1. On and Off Ramps of I-690 and I-481: These on/off ramps are located at the western terminus. They played a significant role in determining the starting point of the project due to the fact they were constructed and never utilized fully.
2. The NYSDOT Facility: This building is located on the western side of the project area, just east of the On/Off ramps of I-690 and I481.
3. Erie Village Subdivision: This village is located 1 mile east of the western terminus with homes being on both sides of Burdick Street. A total area of about 375 Acres.
4. The Links at Erie Village: This golf course is located in the north east portion of the project area.
5. Doow Lumber: These buildings are located just west of The Links at Erie Village.
6. 20 homes located just north of Doow Lumber on Lee Terrace.
7. A body of water located about 1500 feet east of the on/off ramps of I-690 and I-481.
8. A landfill located approximately 1000 feet south of the body of water and another landfill located 1500 feet east of the previous landfill.

B-1 Alternatives Considered and Dismissed

Roundabout vs Signalized Intersection

A traffic circle and a signalized intersection are two controller types that were considered for the RT 481- RT 690 interchange. It is recommended that the roundabout was the most feasible alternative design for the project for a number of reasons:

- Roundabout presents lower cost and maintenance
- Roundabouts promote a continuous flow of traffic
- Achieves higher safety for vehicles approaching the RT 481 off ramp

Appropriate exit route of the bypass road

There were two possible exit routes for the bypass road: 1.) Bowman intersection 2.) RT-290 before the RT 290- Minoa Rd. intersection. It is recommended that the exit route for the bypass road will be placed at Bowman Road for a number of reasons:

- Construction cost would be less with a shorter bypass route intersecting with Bowman Road.
- Avoid property issues for the construction of the bypass road by intersecting with Bowman Road.
- Placing the exit route at Bowman road would be a viable option for commuters heading to either Fayetteville or Chittenango.

Steel Bridge vs Concrete Bridge

Since the bypass route will occupy a body of water, a one-hundred foot bridge must be utilized to avoid the100-year FEMA flood plain. Two general types of bridges were considered during the planning stage: a concrete bridge and steel bridge. The specific bridge components will be determined during the design phase such as the abutment type, wingwall size, and bridge deck. Benefits of constructing a steel bridge is that the construction time is low and maintenance is easier, though the total cost is higher. Concrete bridges are more cost effect but the construction time is higher.

It is recommended that the bridge to be utilized should be a concrete bridge for a number of reasons:

- Overall costs of a concrete bridge is less than that of a steel bridge.
- Concrete bridges are more economical in terms of shorter bridge spans.

B-2 Design Study Alternatives

Alternative 1

A traffic circle will connect the on and off ramps of I-481 and I-690 to Butternut drive. A 300 foot traffic circle will be used in this alignment. Continuing in an easterly direction for approximately 150 feet, the proposed highway will include a bridge over Butternut Creek. Located approximately 1500 feet east of the bridge site is a body of water. The highway will run in a southeasterly direction and avoid the water. From there the proposed highway will continue straight crossing Fisher Road. From this point the highway will continue to Alternative 1a or Alternative 1b.

Alternative 1a: From Fisher Road the facility will continue for 4500 feet in a southeasterly direction to Burdick Street where it connects with a signalized intersection. The highway will be aligned so that it does not affect the landfill located 500 feet east of Burdick Street.

Alternative 1b: From Fisher Road heading in an eastern direction, the facility will take a turn northward and continue for 2000 feet to the abandoned railroad tracks. From there the highway will continue in an easterly direction following the railroad tracks for 3000 feet where it will connect with Burdick Street where a signalized intersection will be installed. The highway will continue for approximately 1750 feet where it will then make an "S" shape connecting to Route 290. A variety of horizontal alignments will be considered for the curves in the highway. It will be necessary to purchase properties for this alignment.

Alternative 2

Alternative two is similar to alternative 1 with respect to the highway alignments. Rather than a traffic circle, a signalized intersection will be utilized. A signalized intersection will connect the on and off ramps of I-481 and I-690 to Butternut drive. Continuing in an easterly direction for approximately 150 feet, the proposed highway will include a bridge over Butternut Creek. Located approximately 1500 feet east of the bridge site is a body of water. The highway will run in a southeasterly direction and avoid the water. From there the proposed highway will continue straight crossing Fisher Road. From this point the highway will continue to Alternative 2a or Alternative 2b.

Alternative 2a: From Fisher Road the facility will continue for 4500 feet in a southeasterly direction to Burdick Street where it connects with a signalized intersection. The highway will be aligned so that it does not affect the landfill located 500 feet east of Burdick Street.

Alternative 2b: From Fisher Road heading in an eastern direction, the facility will take a turn northward and continue for 2000 feet to the abandoned railroad tracks. From there the highway will continue in an easterly direction following the railroad tracks for 3000 feet where it will connect with Burdick Street where a signalized intersection will be installed. The highway will continue for approximately 1750 feet where it will then make an "S" shape connecting to Route 290. A variety of horizontal alignments will be considered for the curves in the highway. It will be necessary to purchase properties for this alignment.

B-3 Fulfillment of Objectives

All build design alternatives would improve the Level of Service (LOS) at the congested intersection. The addition of either one of the alternative routes would improve the Level of Service on most intersection within the project site with at least a LOS C or better. In addition, all build design alternatives will avoid floodplain, historical, and preservation areas within the project site.

C. Engineering Considerations

The design alternatives meet each design criteria presented in Chapter III, Section A. There are other details that must be considered regarding different aspects of the project including, design, construction, as well as other minor considerations. Descriptions of these considerations are detailed in the following sections.

C-1 Traffic Data

The general purpose of a traffic impact study is to assess the effects of a particular development's traffic to the transportation network of the project. These studies can be used to help evaluate the existing traffic and as a planning tool to develop the type of transportation improvements that may be necessary.
Traffic impacts will be analyzed at all the intersections within the project site mentioned in section A. The following intersections (signalized and unsignalized) that were analyzed are:

1. Butternut Creek Drive-Route 290 **(signalized)**
2. Bowman Road-North Route 290 **(signalized)**
3. Fremont Road- Route 290 **(signalized)**
4. North Burdick Street-Route 290 **(signalized)**
5. Route 257-Route 290 **(unsignalized)**
6. East Genesee Street-Route 257 **(signalized)**
7. Route 257-Salt Spring Road **(signalized)**
8. Highbridge Road-East Genesee Street **(signalized)**
9. East Genesee Street-North Burdick Street **(signalized)**
10. Cedar Bay Road-North Burdick Street **(signalized)**
11. Bowman Road-North Burdick Street **(unsignalized)**
12. Cedar Bay Road-Kinne Road **(unsignalized)**
13. Butternut Creek Drive-Kinne Road **(unsignalized)**
14. 5 way interchange (Route 5-Lyndon Rd- E. Genesee- Highbridge Rd-Bridgepath Road) **(signalized)**
15. Route 5-Wegmans entry point **(signalized)**

The study considers the weekday (5 days) evening (PM) peak hours, to accurately reflect peak traffic directly related to the use of the project site. This report analyzes traffic impacts at the intersections mentioned above.
Pedestrian travel was observed to be very light at the times of the study and therefore not considered to be an impact for intersection analysis.
The operational conditions within a traffic stream, in terms of: speed, travel time, maneuverability, traffic interruptions, and comfort of the study areas, will be designated with Level of Service (LOS) quality grading of A through F. "LOS A" representing the best conditions and "LOS F" representing the worst. Google Earth Pro was also utilized to gather storage length measurements and as a template guide during the Synchro model construction. Analysis Report for existing and design alternative conditions are included in APPENDIX.

C-2 Bridges and Hydraulic Considerations

Due to the location of the I-690/I-481 interchange and the emphasis on using the previously constructed on/off ramps it is necessary to cross Butternut Creek for each alternative alignment. The final bridge will be designed so that it does not have an effect on the 100 year flood. A thorough study on the 100 year flood will be performed and the results will be used in determining the design of the bridge.

There are two alternative bridge types that are considered in this report. One bridge constructed of structurally reinforced concrete and another constructed with steel were studied. Each bridge will have a length of +/- 100 feet.

C-3 Highway Drainage

The system for highway storm water drainage will be the same for each alternative. Each design will utilize catch basins along the sides of the road and will be in accordance with federal and state regulations. The design of the storm water management system for road will not affect the natural drainage of the area nor the 100 year flood plain.

During the construction phase, there will be an emphasis on minimizing negative effects on the environment due to temporary unavoidable damage to the terrain and excessive runoff. NYSDOT procedures and regulations for runoff will be implemented in order to minimize erosion and siltation of nearby streams.

C-4 Utilities

Due to the project location and type of work being performed it is necessary to impact existing utilities. Minimum interruption of utility service will be of high priority. Powerlines crossing the construction area will be a concern during construction. It is anticipated that the powerlines will need to be raised. The water mains located along Butternut Drive, Burdick Street, and Route 290 will be affected depending on the alternative utilized. The following is a summary of the impacted utilities:

1. Water: Onondaga County Water Authority
2. Electric: National Grid
3. Sanitary: Department of Drainage and Sanitation (WEP)
4. Gas: Syracuse Suburban Gas Company

C-5 Soils

The project area contains twelve major soil associations (Figure 3). The soils in the area are generally poor in strength for foundations. Also prolonged wetness, seasonally high water tables, flooding and frost action contribute to the low strength of the soils in the area. It is anticipated that additional roadway soil will be needed in order to meet the strength and quantity requirements.



(Figure 3)

C-6 Construction Cost Comparisons

Each design and alignment alternative has various costs associated with it. The main alternative costs for specific large ticket items that were compared for this project are the following:

1. Roundabout vs. Signalized intersection: Located at the Butternut interchange, two types of intersections were considered. The cost of the roundabout was estimated at $441,000 and the cost of the signalized intersection was estimated at $280,000.
2. Concrete Bridge vs. Steel Bridge: Two bridge types were considered for the bridge over Butternut Creek. The concrete bridge was estimated at $772,000 and the steel bridge was estimated at $842,000.
3. Alignment A vs. Alignment B: Alignment A spans between Butternut Drive and Bowman Road, while Alignment B spans from Butternut Drive to Route 290. The estimated cost of Alignment A is $4,300,000. The estimated cost of Alignment B is $9,600,000.

While calculating the estimated total cost of the project, various pay item prices and quantities were determined. The costs for each pay item were determined using the NYSDOT weighted average item price report (WAIPR) for 2014. The quantities for the pay items were estimated using various techniques. For the concrete and steel bridges, the prices were estimated using the NYSDOT Preliminary Cost Estimating Worksheet for New and Replacement Bridges. The methodology used in the worksheet is based on the bridge shoulder break. All other pay items were determined using the approximate dimensions of the roadway, intersection alterations, type of soil and the topography of the project area. The specific pay items, unit prices and quantities are shown in the appendix. The Summary of Design Alternatives Costs Table is located below.

Summary	
Item	Cost
Concrete Bridge	$722,450.00
Steel Bridge	$842,140.00
Butternut Roundabout	$440,924.19
Butternut Intersection	$279,698.64
Highway Alignment 1	$4,292,475.99
Highway Alignment 2	$9,554,283.76

		WZTC	Contingency	Survey	Design	Inspection	
		5%	20%	10%	10%	9%	Total Cost
Alt 1a (w/concrete bridge)	$5,455,850.18	$2,727,925.09	$1,091,170.04	$545,585.02	$545,585.02	$491,026.52	$10,857,141.85
Alt 1a (w/steel bridge)	$5,575,540.18	$2,787,770.09	$1,115,108.04	$557,554.02	$557,554.02	$501,798.62	$11,095,324.95
Alt 1b (w/concrete bridge)	$10,717,657.95	$5,358,828.97	$2,143,531.59	$1,071,765.79	$1,071,765.79	$964,589.22	$21,328,139.32
Alt 1b (w/steel bridge)	$10,837,347.95	$5,418,673.97	$2,167,469.59	$1,083,734.79	$1,083,734.79	$975,361.32	$21,566,322.42
Alt 2a (w/concrete bridge)	$5,294,624.63	$2,647,312.32	$1,058,924.93	$529,462.46	$529,462.46	$476,516.22	$10,536,303.02
Alt 2a (w/steel bridge)	$5,414,314.63	$2,707,157.32	$1,082,862.93	$541,431.46	$541,431.46	$487,288.32	$10,774,486.12
Alt 2b (w/concrete bridge)	$10,556,432.40	$5,278,216.20	$2,111,286.48	$1,055,643.24	$1,055,643.24	$950,078.92	$21,007,300.48
Alt 2b (w/steel bridge)	$10,676,122.40	$5,338,061.20	$2,135,224.48	$1,067,612.24	$1,067,612.24	$960,851.02	$21,245,483.58

IV-Impacts

A. Introduction

The project area is located in the Towns of Dewitt and Manlius which encompasses a total of 2,170 acres of land. Of this land 682 acres are developed residential and commercial property and 1,184 acres are undeveloped land. Within this project land 775 acres are NYSDEC protected wetlands. The following sections provide a detailed evaluation of the social, economic and environmental impacts on the study area. This environmental impact study compares information obtained from a previous study that was conducted in 1988 with the current information to understand how we may be impacting the area that we propose to place the bypass.

B. Social, Economic and Environmental Impacts

B-1 Topography, Geology and Soils

The project area is in the Erie-Ontario Plains with the northern boundary lying along Route 290 at elevations ranging from 410 feet at the boundary to 420 feet at the base of the Old Erie Canal. The topographic relief in this area is generally low with rolling hills and level lake plains. The Old Erie Canal sits at the eastern and southern boundaries with the southern boundary at the base of the escarpment on the northern border of the Appalachian Plateau. Onondaga Limestone, that is erosion-resistant, forms the escarpment. Limestone and Butternut Creeks and their respective tributaries, which are low gradient and flow northward, drain into the Chittenango Creek.

There are a variety of soils in the general project area. The soil types that will mainly be affected in the areas where the project construction will occur include, but are not limited to those listed in Table B1:

Table B1:

Soil Type	**Map Symbol**
Camillus silt loam, 2 to 6 percent slopes	CaB
Camillus silt loam, 6 to 12 percent slopes, eroded	CaC2
Canandaigua mucky silt loam	Cd
Carlisle muck	Ce
Cut and Fill Land	CFL
Fonda mucky silty clay loam	Fo
Hamlin silt loam	Hb
Hilton loam, 0 to 3 percent slopes	HIA
Lockport and Brockport silty clay loams, 0 to 6 percent slopes	LvB
Made Land	ML
Niagara silt loam, 0 to 4 percent slopes	NgA
Ontario loam, 2 to 8 percent slopes	OgB
Ontario gravelly loam, 8 to 15 percent slopes	OnC
Palms muck	Pb
Rhinebeck silt loam	Rh
Teel silt loam	Te
Urban land	Ub
Water	W
Wayland soils complex, 0 to 3 percent slopes, frequently flooded	Wn

The bedrock located in the project area is mostly Devonian and Silurian age sedimentary rock. This rock dips southward at 50 feet per mile causing the rocks to outcrop in bands oriented in an east-west direction. Bedrock can be found 30 feet or less throughout this area. The bedrock situated beneath the project area is the called the "Syracuse Formation", which consists of dolomite, shale, gypsum and salt. Bedrock units from the Silurian Age Vernon Formation (shale and dolomite), the Cobleskill Limestone and the Bertie and Camillus dolomite and shale are found amongst the "Syracuse Formation".

Found within the project area are unconsolidated deposits of glacial origin. The deposits in this area include glacial till, glacial outwash laid down by melt water streams and lacustrine sediments deposited in glacial lakes.

The proposed project will not significantly impact or change the overall topography because the physiographic features are mostly level and therefore unfavorable aspects of construction will be minimal like cut and fill will not be necessary. During the design phase of this project soil borings will be obtained and analyzed to ensure that proper construction techniques are used in areas containing soils of poor characteristics.

B-2 Water Resources

The project area, which is a part of the Eastern Oswego River Basin, is drained by Butternut Creek in the western portion of the study area and is drained by Limestone Creek in the eastern portion of the study area. Both of these creeks are slow moving, somewhat meandering streams with an approximately flat gradient of 3 feet/mile. The six water courses encompass 53,500 lineal feet of stream channel ranging from the Old Erie Canal to large streams and intermittent tributaries. The stream depths range from 10-15 feet.

The water classification of the Old Erie Canal, Limestone Creek and Butternut Creek has a classification of "Class C". As characterized by the New York State Department of Environmental Conservation any water resource with a "Class C" classification is "Suitable for fishing and all other uses except as a source of water supply for drinking, culinary or food processing purposes and primary contact recreation". All remaining tributaries are classified as a "Class D". Any water resource that is classified as a Class D is characterized as "Unsuitable for secondary contact recreation (activities where body contact with water is minimal and ingestion of water is not possible). The waters of "Class D" will not support the breeding of fish this is due to natural conditions such as like intermittency of flow and water conditions.

Groundwater can be obtained from the bedrock and overlying unconsolidated deposits. The Middle Shale unit that is present in the project area has a median well yield of 20 gallons per minute. The water in this area contains elements such as iron and manganese. Due to these elements, hardness and salt the water tends to be classified as poor quality.

There are no sole source aquifers located in this area leaving nearly the entire study area to be served by the Onondaga County Water Authority (OCWA) for their source of clean drinking water. A 48in diameter water supply main runs through the middle of the project area. It is assumed that all residents of this area obtain their water from the public water facility.

Short term negative impacts may occur to the water resources within the project area due to construction of stream crossings and associated stream bank disturbances that may result in increased turbidity and sedimentation. Both build alternatives will cross Butternut Creek. As of now there will not be any piers or other obstructions placed in the streams and there are no proposed channel relocations. Being that there are no proposed channel relocations there should be minimal stream bed disturbances at any of the major stream crossings. Minor impacts on the surface water quality will result from ice removal compounds (sodium chloride) during the winter season. Stormwater runoff from medium traffic volumes will produce minimal to no

impact on aquatic environments of the receiving waters as determined by the Federal Highway Administration. Overall there will be long term consequences to the public water supplies, surface water and/or groundwater during the construction of this project. Prior to any construction that will affect these streams a U.S. Department of the Army Corps of Environmental Conservation of Freshwater Wetlands and a 401 Water Quality Certification will be obtained before there is any disturbance of the designated wetlands.

B-3 Wetlands

The New York State Department of Environmental Conservation (NYSDEC) defines freshwater wetlands as lands and submerged lands commonly called marshes, swamps, sloughs, bogs and flats supporting aquatic or semi-aquatic vegetation. Federal regulations classify wetlands as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas (Federal Register/Vol. 51 No. 219/Thursday, November 13, 1986)."

Under the USF&WS criteria the open water areas of Butternut Creek, Limestone Creek, Erie Lake and the Old Erie Canal are classified as wetland whereas under the NYSDEC definition they are not considered wetland areas. This being the main difference between the two classification systems, the NYSDEC has a system of classifying each wetland based on its ability to perform wetland functions and benefits. In the appendix there are two maps that layout the wetlands, both Federal and State, of the project area and display a route of our two alternatives that may impact those areas. From a previous study it was found that approximately 17 percent of the Class I wetland acreage was within the study area. The wetlands are classified in different classes from Class I wetland having the highest rank and ability to perform functions as a wetland. Class II and Class III wetlands are found to be within 82 percent and 1 percent respectively of our project wetlands. Wetlands serve many purposes and functions in communities. Below is a list of some of the many benefits and functions.

1. Flood and storm water control through hydrologic absorption and retention.
2. Provides a place for breeding, nesting and feeding grounds and cover for many forms of wildlife, waterfowl and shorebirds.
3. Protection of surface and subsurface water resources.
4. Providing an area for hunting, fishing, bird watching, camping and living classrooms which ensures limited recreation and education.
5. Serving as a biological and chemical oxidation basin wetlands treat pollution.
6. By serving as sedimentation areas and filtering areas by absorbing silt and organic matter, wetlands provide turbidity control for local waters.

Previously some of these wetlands prior to being wetlands were prime farmlands, especially in the area of south and east Clark Hill.

Disruptions of wetlands may occur during construction because filling is required to install a roadbed. There are two different types of impacts that highway construction of the proposed bypass could cause on the present wetlands, direct physical impacts and indirect impacts. Direct impact would be the loss of wetland acreage and/or a decrease in wetland

benefits/functions in the area when filling is taking place to install the roadbed. In some of the adjacent areas to the construction could be directly impacted by increasing the turbidity of water and therefore inhibiting the growth of submerged plants and bury benthic invertebrates. Indirectly the wetlands would be affected by the proposed project from lost wetland acreage, avoidance of affected areas by wildlife due to human activity, noise and trace amounts of hydrocarbons, lead and/or deicing salts on the wetland species. Any wetland disturbances will require permits from the U.S. Army Corps of Engineers and the NYSDEC.

Throughout the construction many actions will be taken to mitigate the impacts on the wetlands such as:

1. In Kind Replacement- This is where the destroyed habitat is replaced with the same type of habitat.
2. Out of Kind Replacement- where the destroyed habitat is replaced with a habitat of a different kind.
3. Quality vs. Quantity- replacement of x amount of acres of emergent marshland with y amount of acres of newly constructed marshland, where y is greater than or equal to x.
4. On Site vs. Off Site- Compensation occurs directly on impacted sites or on adjacent sites.

Once a build alternative has been selected the disturbances will be addressed more specifically.

B-4 Floodplains

The project area is located within the 100 year floodplains of Limestone and Butternut Creeks. A 100 year floodplain is an area that is subject to flooding from a waterway that has the probability of flooding is on average one percent in any given year as defined by the Federal Emergency Management Agency (FEMA).

The floodplains are located adjacent to Butternut and Limestone Creeks that flow northward through the study area. The expanse of the 100 year floodplain is due to the flat, low lying terrain adjacent to these two streams that carry runoff northward from the Appalachian Uplands south of the study area, according to the Flood Insurance Studies prepared by FEMA for the towns of Manlius and Dewitt.

Both build alternatives will cross the regulatory floodway of Butternut Creek. In the proposed alternatives the railroad bridge will be removed and one of the alternatives' paths will take its place. The U.S. Army Corps of Engineers provided a detailed hydraulic analysis that showed that this alternative design will not increase the water surface elevations of the FEMA 100 year or the floodway water surface. For Limestone Creek the build alternatives could potentially span the majority of the floodway widths. All bridges will have a minimum of 2 feet of freeboard for the 50 year storm although the actual amount of freeboard will be determined during the design phase. Through a study conducted in the 1980s it was understood that there is no significant risk or impacts on natural and beneficial flood plains if construction took place in or around the 100 year floodway.

B-5 Vegetation

The project area contains 1213 acres of natural vegetation. As documented in the appendix the project area has a vast variety of plant species such as flooded trees and shrubs, upland trees and shrubs, emergent wetlands, wet meadow and successional fields. There are 36 acres of agricultural vegetation in the form of active agricultural crops. The project area is surrounded by 790 acres or 38 percent of wetland vegetation.

There are no critical habitats present within the study area as reported by the New York State Department of Environmental Conservation's Regional Office in Cortland, NY. Located near Manlius and within some areas of the project field there are threatened and/or endangered species of plants (See Appendix D) that are identified by the New York Natural Heritage Program and the Syracuse Botanical Club.

Approximately 1,014 acres of the 2170+/- acres of study area are considered important habitats in relation to size, value and use. These habitats are comprised of natural vegetation which contains upland successional fields, emergent wetlands, flooded deciduous shrubs and flooded deciduous trees. With the construction of a major highway there is concern that there could be possible destruction of flora and wildlife habitats through the loss of woodlands, wetlands, and old fields. To mitigate the loss of these valuable lands these disturbed areas will be revegetated. During the design phase there will be a more in-depth study of how the construction will affect the vegetation.

B-6 Fish and Wildlife

There is a large area of undeveloped land that is abundant with diverse wildlife. Animal populations in this area include deer, rabbits, squirrel, fox, duck and an array of songbirds. With the two Creeks, their tributaries and wetland habitats comes a variety of amphibians, reptiles and fish life. This area also contains various species of fish, frogs, toads, turtles and non-poisonous snakes as identified by the U.S. Army Corps of Engineers/U.S. Fish and Wildlife Service. There are no critical fish or wildlife habitats present in the study area and there are no threatened or endangered fish or wildlife species residing within the study area indicated by the NYS Department of Environmental Conservation Fish and Wildlife personnel in Cortland, NY, with the exception of some transient species that may be found on occasion as indicated by the U.S. Department of Interior Fish and Wildlife Service.

Butternut Creek, located in Onondaga County, begins near Apulia Station, flows through Jamesville Reservoir, and then combines with Chittenango Creek at Minoa. Butternut Creek runs through the middle of our study area and contains both wild and stocked brown trout, stocked brook trout and the occasional wild brook trout can be found in this small to medium sized stream. There is approximately 8.1 miles of Public Fishing Rights along the stream and there are seven official PFR parking areas.

Stocked and wild brown and brook trout can be found in Butternut creek, with wild brook trout being less common. The upper section of stream is small and brushed line. Most of the fishing pressure takes place during spring and early-summer shortly after the trout are stocked.

The section of Butternut Creek from its mouth (where it combines with Chittenango Creek) to Route 20 is open to trout fishing year-round.

Butternut Creek is stocked annually by Onondaga County's Carpenter's Brook Fish Hatchery with around 5,200 one year-old brown trout (8-9"), 2,400 two year-old brown trout (12-14") and 600 brook trout (8-10").

During the construction phase there may be some fish and wildlife populations that are affected through the elimination of habitats due to loss of habitat or indirectly due to increase in road kills. The fisheries could be affected both in the short term and the long term. The short term impacts include a decrease in water quality from turbidity and sedimentation in the streams due to construction. Long term impacts are associated with the removal of abandoned railroad bridges over Butternut and Limestone Creek to be replaced with either bike trails or part of the proposed bypass. Water quality in the long term may be affected by runoff from the roads that may include pollutants such as hydrocarbon waste, lubricants, lead, pesticides and other such chemicals that are a result of vehicle operation and bridge/roadway maintenance. Several steps will be taken to help reduce the erosion and sedimentation during the construction process such as:

1. Dewatering operations will be routed the sediment or filtering basins before discharging the water back into the streams.
2. During the placement of concrete special care will be taken to ensure there is no spillage into the streams.
3. Dredged soil material will be placed in a predetermined location that is located above and beyond the 100 year floodplain elevation of the streams and wetland areas within the project area.

The wildlife in the proposed project area will also be affected in the short term and long term. Short term impacts on wildlife include decreased surface water quality, reduction in vegetation cover and increase human activity and noise. The long term impacts include permanent loss of natural vegetation, which affects nesting, breeding and/or feeding sites and wildlife may have to migrate to adjacent habitats. As some of the wildlife migrate to other habitats this could be beneficial for the other habitats in the long by creating right-of-way vegetation and highway ecotone. If the chosen alternative crosses natural vegetation area(s) there potentially could be an increase in road kill because these vegetation areas are a travel-way and feed area for the wildlife. During the design process of the bypass a more in-depth study will take place to see what types of wildlife are living in the project area and if any of these are on the endangered species list.

B-7 Agriculture

As of today only 36 acres of the project area is actively used as farmland whereas, fifty years ago approximately two-thirds of the land was used for agricultural operations. The 1.7 percent of land that is farmed mainly contains crops such as corn for grain and feed or cover crops.

Although there are not any agricultural districts in the project area (as stated by the U.S. Department of Agriculture Cooperative Extension Office in Syracuse, NY) there are important farmland soils as defined by the USDA Soil Conservation Service and can be viewed in the map in Figure 3.

Prime farmland soils are occupied by development or are located within wetland areas and are unavailable for farming although they do occupy 44 percent or 965 acres of the project area. As of today there is little prime farmland left that wouldn't be greatly affected by the construction of the proposed alternatives and there is not enough acreage in this area for an adequate farm size due to the fact that the land surrounding what is left for the farmland has been mostly developed.

B-8 Noise Levels

The noise analysis prepared for this project includes a noise survey of the project area done for the New York State DOT for a project in the same study area. The noise survey included existing noise measurements and identified land uses, activities, and sensitive receptors (i.e., schools, residences, churches etc.) in the project area which are subject to potential traffic noise impacts resulting from this project.

Measured existing noise levels ranged from a low 49 dBA in a backyard residential area off of Taylor Road to a high of 70 dBA in the vicinity of existing Route 290 and North Manlius Road. However, 61 percent of the measured noise levels were less than 65 dBA (70 dBA is the federal noise abatement criteria level for residential properties). Areas of high noise levels were primarily limited to locations near existing transportation routes such as Route 290, Route 257, North Manlius Road, Burdick Street, and Bowman Road. Areas of low noise levels were observed in undeveloped or quiet residential neighborhoods.

Temporary increases in noise levels due to construction and long term increases due to new traffic are unavoidable impacts of this project. All of the design alternatives would result in significant short term construction noise impacts, and increased traffic noise in the area of the alternative. In no cases will the noise exceed the federal noise abatement criteria levels.

B-9 Air Quality

The air quality analysis for this project evaluates the impacts of each build alternative on existing air quality within the immediate project area.

Temporary degradation of air quality will occur during construction, largely as a result of particulates generated during excavation and earth moving activities. These impacts can be mitigated by the use of water and other dust control measures and will be lessened with proper construction techniques.

B-10 Transportation

The present highway system is comprised of a low density road network. The major east-west roads are the New York State Thruway (I-90), State Route 5, 92, and 290 and Kirkville Road west of Manlius Center. The major north-south roads are I-481, Burdick Street, Highbridge Street, North Manlius Road, and State Route 257 from Manlius Center south to the Village of Manlius.

Route 5 is a six lane facility with left turn pockets from I-481 to Lyndon Road, a four lane facility with some left turn pockets from Lyndon Road to Limestone Plaza and a two lane facility from Limestone Plaza to the Village of Chittenango. I-481 is a four lane controlled access facility. All other roads in the study area are two lane facilities with widenings at appropriate intersection approaches.

West of the project area, CNY CENTRO, Inc. provides bus service between downtown Syracuse and East Syracuse, Penn Central Station, Shopping town, Wegmans, and Cooks Shopping Center along various routes including James Street, Route 290, Route 5, Butternut Drive, and Jamesville Road. Bus service is also provided between downtown Syracuse and the Villages of Fayetteville and Manlius along three designated routes utilizing portions of Route 5, 92, 257, and 173 south of the project area. North of the project area, CNY CENTRO operates a county shuttle between Syracuse, Minoa, and Bridgeport. Bus service between Syracuse and Utica is provided by Central New York Coach Lines utilizing Route 5 with stops in the Village of Fayetteville, Mycenae, and Chittenango.

Freight transportation includes both truck and rail traffic and is primarily associated with industrial and commercial pickup and delivery operations. Within the study area, most of the vehicular freight traffic occurs along Route 290 and accounts for approximately 20 percent of the average daily traffic along this route. This heavy volume of truck traffic is primarily the result of the industrial and warehousing activities in the area, and activity associated with the DeWitt freight yards. The closest active rail facilities to the study area, the DeWitt Freight Yards, are located north of Fremont Heights and are owned and operated by CSX.

Syracuse Hancock International Airport, located approximately 4.5 miles northwest of the study area, provides air cargo and passenger service to the area. This airport has runways of 9,000 and 7,500 feet in length which can accommodate the largest aircraft. Presently, Hancock

International Airport is served by many commercial passenger air carriers, and air cargo companies which include Federal Express, UPS, and Wiggins Airways.

This project will allow the existing highway network within the study area to operate at an improved level of service throughout the design period. This will reduce peak hour congestion, traffic delays and travel times within and through the study area.

B-11 Housing and Relocation Impacts

The total number of housing units within Onondaga County increased by 0.5 percent between 2010 and 2013. The City of Syracuse as well as the Town of Manlius experienced decreases in total housing units during this period. The total number of housing units for the years 2010 and 2013 are provided below, using the U.S. Bureau of the Census, and Census of Population and Housing.

Table 1
Total Housing Units, 2010 and 2013

	2010	2013	Percent Change
Onondaga County	201,871	202,816	+ 0.5 %
Syracuse	66,542	64,722	- 2.7 %
Town of Dewitt	10,853		
Town of Manlius	2,120	1,960	- 7.5 %

This project will result in the relocation of some housing units depending on which alternative we go with.

B-12 Economic Setting

The local economy of the area is closely tied to its strategic location and proximity to local transportation corridors. The good regional transportation accessibility within the Town of DeWitt afforded by I-481 and its connections to I-81, I-690 and the New York State Thruway is a major factor influencing the existing and future economic development of the area. This accessibility has resulted in warehousing, distribution, freight related and commercial development in the western portion of the study area within the vicinity of the Butternut interchange. Further to the east, residential areas such as Fremont Heights, Fremont Hills, and Erie Village represent bedroom communities which are closely tied to the major employment centers of the Syracuse metropolitan area west of I-481.

Right of way requirements for this project will have negligible effects on the total assessed valuation of the Towns of DeWitt and Manlius. This reduction should be offset by increased property values within residentially, commercially and industrially zoned districts along crossroads as a result of improved accessibility. Project induced development in these

areas could result in a long term increase in employment and commercial and industrial activity which could further strengthen the area's economic base.

B-13 Public Services, Community and Recreations

The Towns of DeWitt and Manlius are served by volunteer fire departments, private ambulance service, and full time police departments. The project study area falls within the jurisdiction of the East Syracuse and Minoa Fire Protection Districts.

The New York State Department of Transportation highway maintenance facility is located east of Butternut Drive in the vicinity of the Butternut Interchange.

Northeast Medical Center, a health care facility, is located along Burdick Street within the study area. Hospital facilities surround the study area with the nearest being St. Joseph's (Syracuse) located approximately 6 miles away. An average response time for ambulance service is 6-7 minutes.

No schools are located within the study area. The nearest schools are Fremont Elementary School, Pine grove Middle School, Woodland Middle School, and East Syracuse-Minoa Central High School. School bus service is provided to students within the study area. Library facilities are located both in the Village of Fayetteville and Minoa.

Institutions of higher education in the area offer a wide variety of educational opportunities. Syracuse University in the City of Syracuse and LeMoyne College in the Town of DeWitt are located to the west of the project area.

There are two State Parks located within or adjacent to the study area: the Old Erie Canal State Park and Green Lakes State Park. The Old Erie Canal State Park, which parallels the southern and eastern boundaries of the study area, is a linear park which encompasses the Old Erie Canal and its associated towpath. In its entirety, the park stretches over thirty miles from the Town of DeWitt in Onondaga County eastward to the vicinity of Rome in Oneida County, New York. Throughout most of the study area, the park is approximately 150 feet wide and occupies approximately 283 acres. The principle recreational uses of the park are walking, jogging, biking, and cross-country skiing along the towpath. Picnicking facilities are also located at various locations within the park. At its intersection with Burdick Street, the park receives approximately 132,000 users per year.

Green Lakes State Park is a 1,955 acre facility owned and operated by the New York Department of Parks and Recreation located just east of the study areas. Facilities at the park include an 18 hole golf course, hiking trails, camping areas, and a swimming area. In the winter, recreational activities include cross country skiing. Annually, Green Lakes State Park attracts approximately 1 million visitors. Access to the park is provided by way of Route 290 at a point approximately 2 miles east: of Route 290/257 junction in Manlius Center.

There is one golf course located in the study area. The Links at Erie Village is located in the study area just east of North Burdick Street and just south of Manlius Center Road. The Links at Erie Village is a semi-private golf course open to both members and the public.

Cultural facilities such as museums, theatres, civic centers, etc. used by the residents of the study area are primarily concentrated within the City of Syracuse.

B-14 Cultural Resources

A corridor wide cultural resources reconnaissance survey was previously conducted (Versaggi, 1979) during an earlier phase of the transportation planning process for this project. The study area of the 1979 reconnaissance included the current study area and encompassed additional areas to the north, South, and East. A cultural resource survey was also conducted by the Public Archeology Facility of the State University of New York at Binghamton (July 30, 1986 and December 1987). These cultural resource surveys included supplemental background research on the history and prehistory of the project area, a walkover of the project area to locate testable locations at wetland margins and within wetlands, and subsurface investigations of these areas and of all testable portions of creek crossings, of the saddle area between Clark Hill and Fremont Heights, and of the Old Erie Canal at Manlius Center in the vicinity of the existing Route 290 crossing.

Based on the aforementioned studies, the cultural resources of the study area are summarized below:

Prehistoric Resources

There are no prehistoric sites within the project area listed with the New York State Office of Parks, Recreation and Historic Preservation. No prehistoric material was discovered and no soil anomalies indicative of prehistoric activity were encountered in shovel test pits during the 1986 cultural resources survey.

Historic Resources

The New York State Department of Parks, Recreation and Historic Preservation lists no historic site within the project area. During the 1986 survey, historic artifacts were recovered from two locations associated with structures visible on historic maps depicting the project area. These are School House No. 19 (dating to about 1854) and a structure identified as the "WSRR" company which was erected between 1874 and 1889. Both were located on the present Route 290 and neither structure is presently standing.

The Old Erie Canal in the vicinity of the project is considered eligible for listing on the National Register of Historic Places. The canal is now functioning as a linear state park.

The Syracuse and Chenango Railroad was constructed through the project area between the years 1850 and 1874. The railroad crossed the Erie Canal via an elevated trestle east of Limestone Creek, subsequently turning west across the creek and traveling west to the north of Clark Hill. This rail line, now abandoned, does not appear to have any scientific or local historical significance.

There are no structures, within the study area, listed on the National Register of Historic Places. The State Historic Preservation Officer has determined that two buildings in the Hamlet of Manlius Center are potentially eligible for listing on the National Register. These structure are the Manlius Center Community Church on North Manlius Road and an abandoned warehouse adjacent to the Old Erie Canal at the existing Route 290 crossing.

None of the alternatives will affect historical features eligible for the National Register of Historic Places.

B-15 Visual Quality

The project is located at the physiographic division known as the Onondaga Limestone escarpment, where the southern Allegheny Plateau ends and the northern Erie- Ontario Plain begins. This landform is the result of recent glaciation and consists of low lying wooded hills and drumlins surrounded by a nearly level and gently sloping lake plain to the north. Numerous water coursen bisect and drain the project area also characterized by vegetated wetlands in the valley floor. All of these features are evident within the project study area, which when viewed from prominent points reflects the physiographic transition of the escarpment values for its scenic and recreational resources.

The land use pattern consists primarily of single family residential developments on the wooded slopes and northern boundary, commercial developments to the the northwest, site development/excavation and landfills on the floor and a recreational (water related) corridor along the southern boundary.

To provide a framework for analysing the visual environment, one major visual landscape unit was distinguished that encompasses the the project area. This unit is referred to as the Onondaga Escarpment Unit. Due to the variety of character areas within the project study area and sensitivity of specific viewers, three additional landscape units were divided out of the one major unit for micro-analysis, they are:

1. Manlius Center Visual Landscape Unit
2. Canal Park Visual Landscape Unit
3. Fremont Visual Landscape Unit

Foreground views of the existing Route 290 and 257 intersection and tree-lined canal are typical of views in the Manlius Center Unit. Both the scale of the community and proximity to the canal are assumed resources valued by local people.

Views within the Fremont Unit are often short foreground to middleground backyard views of the vegetated wetlands and wooded residential hillsides. Both the wetlands and hillsides are natural attractions and valued local resources. Views within the Canal Park Unit are generally limited foreground to middleground views that include the linear tree-lined trail and water course, also valued as a cultural scenic, and recreational resource.

There are three general viewer groups identified within the project visual zone. Commuters, residents, and recreation users. These viewer groups are identified based on land use, travel routes, activity, and approximate numbers within the viewshed. Further characterization of viewer behavior and exposure, as they relate to key views, substantiates assumptions of viewer sensitivity to the project. In general, the most sensitive groups are the residents and recreation users. Commuters have a greater exposure to the alternatives but their duration and awareness of the view lowers their sensitivity.

V – Appendix

Figures & Tables

Table 1: Cost Analysis

Cost Estimate	Alternative 1a: To Burdick with Roundabout				
Item	Unit	Unit Price	Quantity	Subtotal	Notes
Asphalt for Road					12 foot lanes
Gravel (Subbase)	SF	1.84	173400	$319,056.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	173400	$527,136.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	173400	$260,100.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	173400	$170,799.00	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Asphalt for Shoulder					10 foot shoulders
Gravel(subbase)	SF	2.26	144500	$326,570.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	1.52	144500	$219,640.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.5	144500	$216,750.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	144500	$142,332.50	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Excavation:cut	CY	17.75	814	$14,448.50	203.02 Unclassified Excavation and disposal
Fill(on site)	CY	21.12	7359	$155,422.08	610.1401 TOPSOIL - REUSE ON-SITE MATERIALS
Fill(import)	CY	46.59	22076	$1,028,520.84	610.1402 TOPSOIL - ROADSIDE
Clearing & Grubbing	SY	2.11	9319	$19,663.09	201.07000004
Seeding	SY	0.73	24083.33	$17,580.83	610.1601 Turf Establishment-roadside
Erosion Control	SF	12	14450	$173,400.00	S54.18000017 COMP REIN EROSION MAT COVER LAUNCH SOIL / SF
Drainage Stucture Inlet	LF	21.21	7225	$153,242.25	209.1703 DRAINAGE STRUCTURE INLET PROT, PREFAB TM / LF
Water main	LF	50	1000	$50,000.00	663.4112 R&D EXIST WTR MAIN,12"
Storm Water Treatment	EA	80000	1	$80,000.00	604.51020915 STORMWATER TREATMENT SYSTEM(MAX 188 G/S)
Guide Rails	LF	25.94	1000	$25,940.00	606.10 BOX BEAM GUIDE RAILING
Lighting	EA	5669	5	$28,345.00	670.10020005 LIGHT STANDARD, SPECIAL
Striping(white)	LF	1.10	14450	$15,895.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	14450	$5,635.50	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
MPT	D	1533.33	180	$275,999.40	619.01040063 BSIC M & P OF TRFC FOR NON-INTER HW ESCW
Building Demolition	SF	3	22000	$66,000.00	
Bedrock	LS		0	$0.00	
Roundabout					
Gravel (Subbase)	SF	1.84	27331	$50,289.04	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	27331	$83,086.24	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	27331	$40,996.50	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	27331	$26,921.04	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Gravel(subbase)(shoulder	SF	2.26	8000	$18,080.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base(shoulder)	SF	1.52	8000	$12,160.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder(shoulder)	SF	1.5	8000	$12,000.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top(shoulder)	SF	0.985	8000	$7,880.00	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Lighting	EA	5669	20	$113,380.00	670.10020005 LIGHT STANDARD, SPECIAL
Striping(white)	LF	1.10	14450	$15,895.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	14450	$5,635.50	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
Seeding	SY	0.73	507	$370.11	610.1601 Turf Establishment-roadside
Fill(import)	CY	46.59	1164	$54,230.76	610.1402 TOPSOIL - ROADSIDE
Bridge					
Concrete Bridge	LS		1	$722,450.00	
Steel Bridge	LS		1	$842,140.00	
Intersection Modification					
Traffic Signal Pole	EA	1100	6	$6,600.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	6	$4,290.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Signal Cable	LF	1.7	1000	$1,700.00	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Red Light	EA	83.29	10	$832.90	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	10	$950.90	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	10	$951.10	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	10	$885.40	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	10	$894.90	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	10	$925.30	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Cost with Concrete Bridge				$5,475,709.68	
Cost with Steel Bridge				$5,595,399.68	

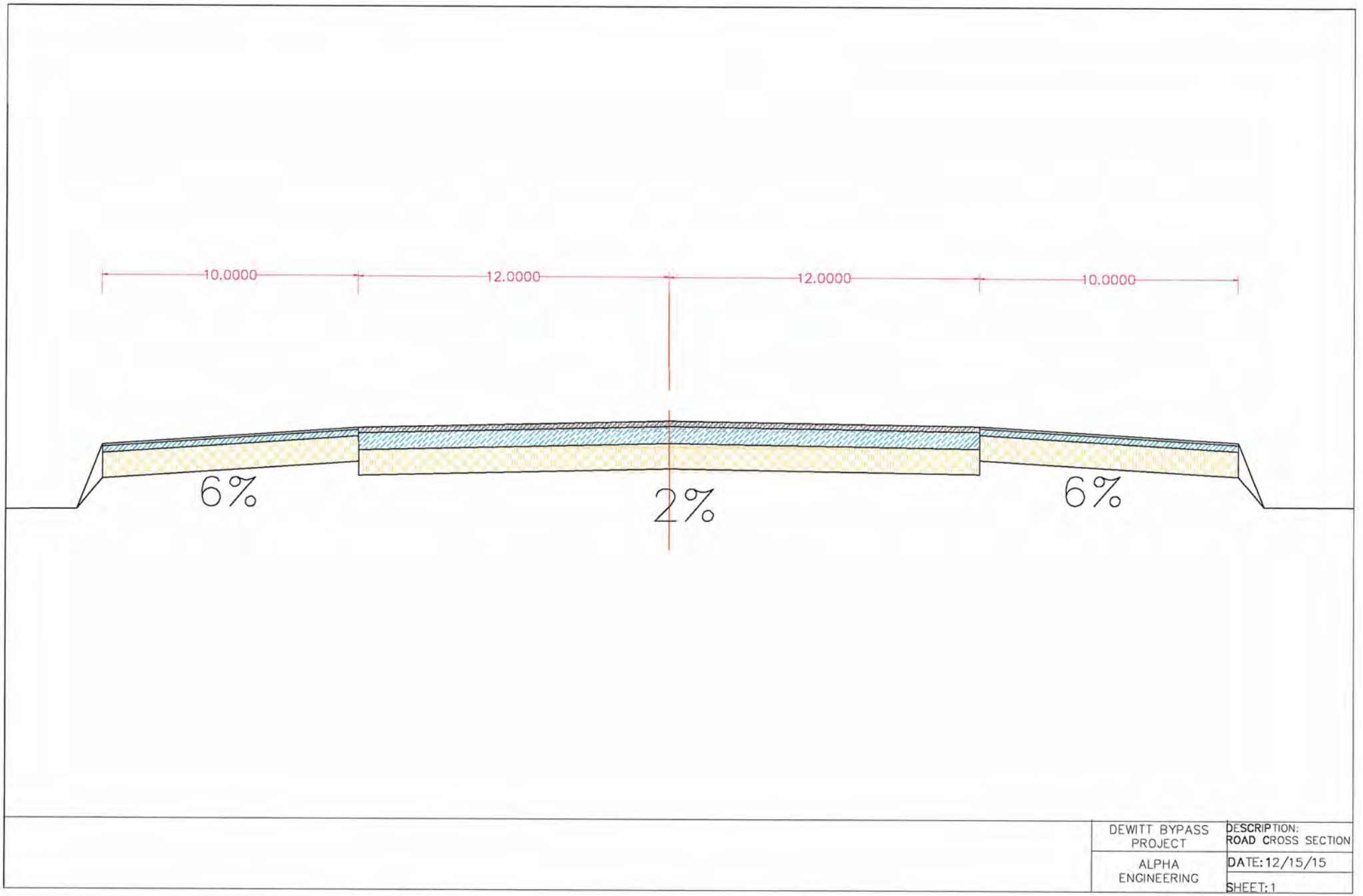
Cost Estimate	Alternative 1b: To RT290 with Roundabout				
Item	Unit	Unit Price	Quantity	Subtotal	Notes
Asphalt for Road					12 foot lanes
Gravel (Subbase)	SF	1.84	291096	$535,616.64	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	291096	$884,931.84	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	291096	$436,644.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	291096	$286,729.56	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Asphalt for Shoulder					10 foot shoulders
Gravel(subbase)	SF	2.26	242580	$548,230.80	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	1.52	242580	$368,721.60	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.5	242580	$363,870.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	242580	$238,941.30	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Excavation:cut	CY	17.75	1100	$19,525.00	203.02 Unclassified Excavation and disposal
Fill(on site)	CY	21.12	74121	$1,565,435.52	610.1401 TOPSOIL - REUSE ON-SITE MATERIALS
Fill(import)	CY	46.59	74121	$3,453,297.39	610.1402 TOPSOIL - ROADSIDE
Clearing & Grubbing	SY	2.11	33612	$70,921.32	201.07000004
Seeding	SY	0.73	26953	$19,675.93	610.1601 Turf Establishment-roadside
Erosion Control	SF	16.46	5000	$82,300.00	Includes material, labor and equipment.
Drainage Stucture Inlet	LF	21.21	12129	$153,242.25	209.1703 DRAINAGE STRUCTURE INLET PROT, PREFAB TM / LF
Water main	LF	50	1000	$50,000.00	
Storm Water Treatment	EA	80000	1	$80,000.00	604.51020915 STORMWATER TREATMENT SYSTEM(MAX 188 G/S)
Guide Rails	LF	25.94	300	$7,782.00	606.10 BOX BEAM GUIDE RAILING
Lighting	EA	5669.4	5	$28,347.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 5 lights for bridge
Striping(white)	LF	1.10	12129	$13,341.90	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	12129	$4,730.31	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
MPT	d	180	1533.33	$275,999.40	619.01040063 BSIC M & P OF TRFC FOR NON-INTER HW ESCW
Building Demolition	SF	3	22000	$66,000.00	
Bedrock	LS		0	$0.00	
Roundabout					
Gravel (Subbase)	SF	1.84	27331	$50,289.04	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	27331	$83,086.24	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	27331	$40,996.50	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	27331	$26,921.04	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Gravel(subbase)(shoulder	SF	2.26	8000	$18,080.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base(shoulder)	SF	1.52	8000	$12,160.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder(shoulder)	SF	1.5	8000	$12,000.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top(shoulder)	SF	0.985	8000	$7,880.00	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Lighting	EA	2600	20	$52,000.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 8 inside, 12 outside
Striping(white)	LF	1.10	14450	$15,895.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	14450	$5,635.50	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
Seeding	SY	0.73	507	$370.11	610.1601 Turf Establishment-roadside
Fill(import)	CY	46.59	1164	$54,230.76	610.1402 TOPSOIL - ROADSIDE
Bridge					
Concrete Bridge	LS		1	$722,450.00	
Steel Bridge	LS		1	$842,140.00	
Intersection Modification					
Traffic Signal Pole	EA	1100	6	$6,600.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	6	$4,290.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Signal Cable	LF	1.7	1000	$1,700.00	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Red Light	EA	83.29	10	$832.90	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	10	$950.90	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	10	$951.10	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	10	$885.40	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	10	$894.90	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	10	$925.30	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Cost with Concrete Bridge				$10,676,137.45	
Cost with Steel Bridge				$10,795,827.45	

Cost Estimate	Alternative 2a: To Burdick with Signalized Intersection				
Item	Unit	Unit Price	Quantity	Subtotal	Notes
Asphalt for Road					12 foot lanes
Gravel (Subbase)	SF	1.84	173400	$319,056.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	173400	$527,136.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	173400	$260,100.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	173400	$170,799.00	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Asphalt for Shoulder					10 foot shoulders
Gravel(subbase)	SF	2.26	144500	$326,570.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	1.52	144500	$219,640.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.5	144500	$216,750.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	144500	$142,332.50	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Excavation:cut	CY	17.75	814	$14,448.50	203.02 Unclassified Excavation and disposal
Fill(on site)	CY	21.12	7359	$155,422.08	610.1401 TOPSOIL - REUSE ON-SITE MATERIALS
Fill(import)	CY	46.59	22076	$1,028,520.84	610.1402 TOPSOIL - ROADSIDE
Clearing & Grubbing	SY	2.11	27957	$58,989.27	201.07000004
Seeding	SY	0.73	24083.33	$17,580.83	610.1601 Turf Establishment-roadside
Erosion Control	SF	12	14450	$173,400.00	554.18000017 COMP REIN EROSION MAT COVER LAUNCH SOIL / SF
Drainage Stucture Inlet	LF	21.21	7225	$153,242.25	209.1703 DRAINAGE STRUCTURE INLET PROT, PREFAB TM / LF
Water main	LF	50	1000	$50,000.00	
Storm Water Treatment	EA	80000	1	$80,000.00	604.51020915 STORMWATER TREATMENT SYSTEM(MAX 188 G/S)
Guide Rails	LF	25.94	1000	$25,940.00	606.10 BOX BEAM GUIDE RAILING
Lighting	EA	$669.4	5	$28,347.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 5 lights for bridge
Striping(white)	LF	1.10	14450	$15,895.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	14450	$5,635.50	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
MPT	d	1533.33	180	$275,999.40	619.01040063 BSIC M & P OF TRFC FOR NON-INTER HW ESCW
Building Demolition	SF	3	22000	$66,000.00	
Bedrock	LS		0	$0.00	
Signalized Intersection					
Gravel (Subbase)	SF	1.84	26928	$49,547.52	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	26928	$81,861.12	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	26928	$40,392.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	26928	$26,524.08	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Lighting	EA	2600	20	$52,000.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 1 light/50 feet,
Striping(white)	LF	1.10	2700	$2,970.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	600	$234.00	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
Traffic Signal Pole	EA	1100	4	$4,400.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	4	$2,860.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Pedestrian Signal Pole	EA	152	4	$608.00	680.10040006 POWDER COATING PEDESTRIAN SIGNAL POLE
Signal Cable	LF	1.7	768	$1,305.60	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Signal Control & Cabinet	EA	12450	1	$12,450.00	680.80140002 16 PHASE NEMA TRFC SIGNAL CONTRL&CABINET
Red Light	EA	83.29	4	$333.16	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	4	$380.36	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	4	$380.44	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	6	$531.24	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	6	$536.94	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	6	$555.18	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Bridge					
Concrete Bridge	LS		1	$722,450.00	
Steel Bridge	LS		1	$842,140.00	
Intersection Modification					
Traffic Signal Pole	EA	1100	6	$6,600.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	6	$4,290.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Signal Cable	LF	1.7	1000	$1,700.00	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Red Light	EA	83.29	10	$832.90	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	10	$950.90	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	10	$951.10	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	10	$885.40	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	10	$894.90	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	10	$925.30	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Cost with Concrete Bridge				$5,353,812.31	
Cost with Steel Bridge				$5,473,502.31	

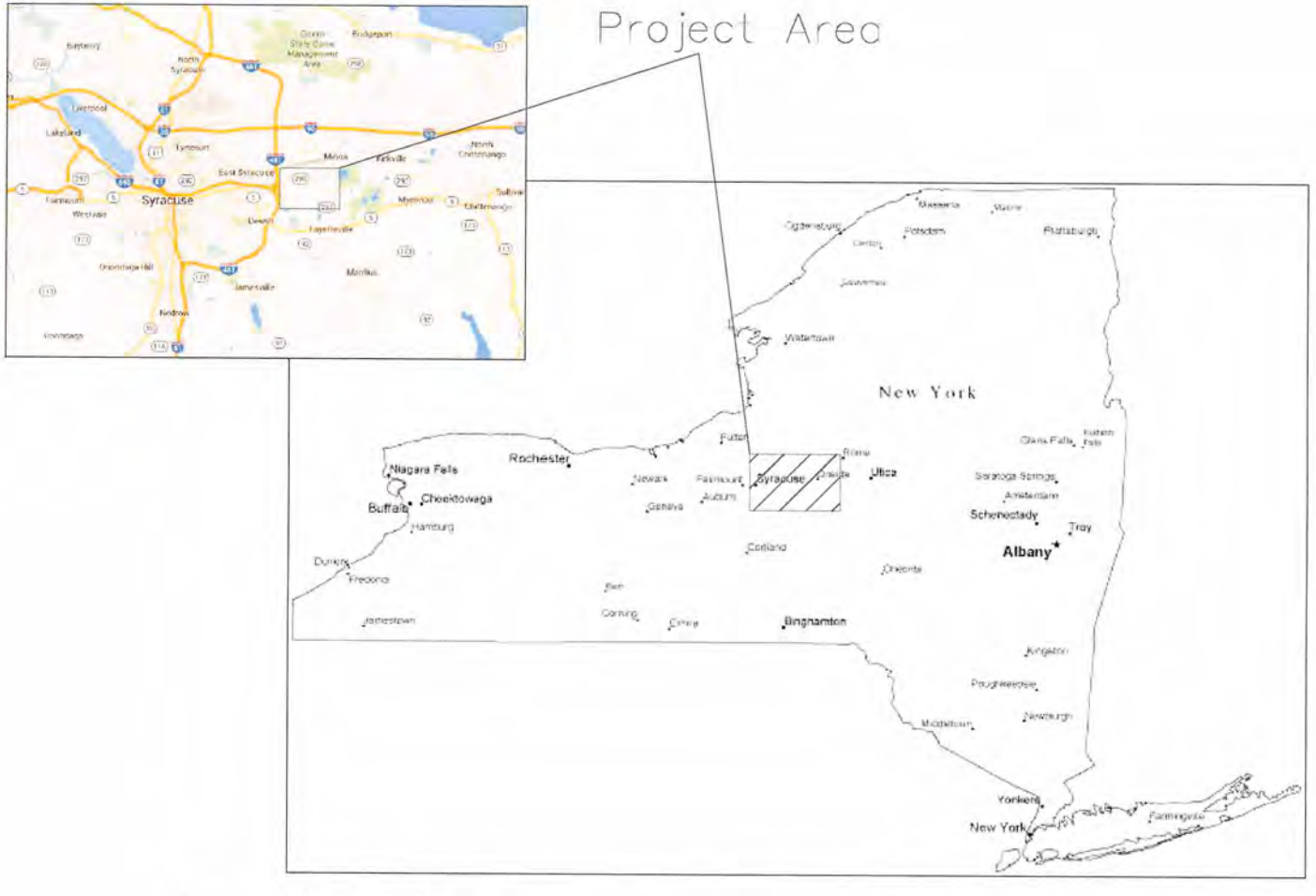
Cost Estimate	Alternative 2a: To RT 290 with Signalized Intersection				
Item	Unit	Unit Price	Quantity	Subtotal	Notes
Asphalt for Road					12 foot lanes
Gravel (Subbase)	SF	1.84	291096	$535,616.64	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	291096	$884,931.84	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	291096	$436,644.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	291096	$286,729.56	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Asphalt for Shoulder					10 foot shoulders
Gravel(subbase)	SF	2.26	242580	$548,230.80	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	1.52	242580	$368,721.60	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.5	242580	$363,870.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	242580	$238,941.30	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Excavation:cut	CY	17.75	1100	$19,525.00	203.02 Unclassified Excavation and disposal
Fill(on site)	CY	21.12	74121	$1,565,435.52	610.1401 TOPSOIL - REUSE ON-SITE MATERIALS
Fill(import)	CY	46.59	74121	$3,453,297.39	610.1402 TOPSOIL - ROADSIDE
Clearing & Grubbing	SY	2.11	26953	$56,871.53	201.07000004
Seeding	SY	0.73	26953	$19,675.93	610.1601 Turf Establishment-roadside
Erosion Control	SF	16.46	5000	$82,300.00	Includes material, labor and equipment.
Drainage Stucture Inlet	LF	21.21	12129	$153,242.25	209.1703 DRAINAGE STRUCTURE INLET PROT, PREFAB TM / LF
Water main	LF	50	1000	$50,000.00	
Storm Water Treatment	EA	80000	1	$80,000.00	604.51020915 STORMWATER TREATMENT SYSTEM(MAX 188 G/S)
Guide Rails	LF	25.94	300	$7,782.00	606.10 BOX BEAM GUIDE RAILING
Lighting	EA	5669.4	5	$28,347.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 5 lights for bridge
Striping(white)	LF	1.10	12129	$13,341.90	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	12129	$4,730.31	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
MPT	d	180	1533.33	$275,999.40	619.01040063 BSIC M & P OF TRFC FOR NON-INTER HW ESCW
Building Demolition	SF	3	22000	$66,000.00	
Bedrock	LS		0	$0.00	
Signalized Intersection					
Gravel (Subbase)	SF	1.84	26928	$49,547.52	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	26928	$81,861.12	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	26928	$40,392.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	26928	$26,524.08	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Lighting	EA	2600	20	$52,000.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 1 light/50 feet,
Striping(white)	LF	1.10	2700	$2,970.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	600	$234.00	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
Traffic Signal Pole	EA	1100	4	$4,400.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	4	$2,860.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Pedestrian Signal Pole	EA	152	4	$608.00	680.10040006 POWDER COATING PEDESTRIAN SIGNAL POLE
Signal Cable	LF	1.7	768	$1,305.60	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Signal Control & Cabinet	EA	12450	1	$12,450.00	680.80140002 16 PHASE NEMA TRFC SIGNAL CONTRL&CABINET
Red Light	EA	83.29	4	$333.16	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	4	$380.36	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	4	$380.44	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	6	$531.24	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	6	$536.94	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	6	$555.18	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Bridge					
Concrete Bridge	LS		1	$722,450.00	
Steel Bridge	LS		1	$842,140.00	
Intersection Modification					
Traffic Signal Pole	EA	1100	6	$6,600.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	6	$4,290.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Signal Cable	LF	1.7	1000	$1,700.00	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Red Light	EA	83.29	10	$832.90	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	10	$950.90	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	10	$951.10	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	10	$885.40	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	10	$894.90	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	10	$925.30	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Cost with Concrete Bridge				$10,562,242.12	
Cost with Steel Bridge				$10,681,932.12	

Table 2: Soil Types

Soil Type	**Map Symbol**
Camillus silt loam, 2 to 6 percent slopes	CaB
Camillus silt loam, 6 to 12 percent slopes, eroded	CaC2
Canandaigua mucky silt loam	Cd
Carlisle muck	Ce
Cut and Fill Land	CFL
Fonda mucky silty clay loam	Fo
Hamlin silt loam	Hb
Hilton loam, 0 to 3 percent slopes	HIA
Lockport and Brockport silty clay loams, 0 to 6 percent slopes	LvB
Made Land	ML
Niagara silt loam, 0 to 4 percent slopes	NgA
Ontario loam, 2 to 8 percent slopes	OgB
Ontario gravelly loam, 8 to 15 percent slopes	OnC
Palms muck	Pb
Rhinebeck silt loam	Rh
Teel silt loam	Te
Urban land	Ub
Water	W
Wayland soils complex, 0 to 3 percent slopes, frequently flooded	Wn



DEWITT BYPASS PROJECT	DESCRIPTION: ROAD CROSS SECTION
ALPHA ENGINEERING	DATE: 12/15/15
	SHEET: 1



DEWITT BYPASS PROJECT	DESCRIPTION: PROJECT LOCATION
ALPHA ENGINEERING	DATE: 12/15/15
	SHEET: 1



DEWITT BYPASS PROJECT	DESCRIPTION: ALTERNATIVE ROUTES
ALPHA ENGINEERING	DATE: 12/15/15
	SHEET: 3

References

1. New York State Department of Transportation, Albany, New York - Weighted Average Item Price Report (WAIPR) and the Regional and Statewide Average Awarded Price Report (RSWAAPR), 2014.
2. New York State Department of Transportation, Albany, New York – Pay Item Catalog, 2014.
3. New York State Department of Transportation, Albany, New York – NYSDOT Traffic Viewer, 2008-2011.
4. Arizona Department of Transportation – Pros and Cons of Traffic Signals, 2015
5. United States Department of Agriculture – National Resources Conservation Service, Web Soil Survey, 2015
6. United States Fish & Wildlife Service - National Wetlands Inventory, 2015.
7. New York State Department of Transportation, Albany, New York –Transportation Project Report - Design Report/Draft Environmental Impact Statement, 1988.
8. United States Federal Emergency Management Agency – Flood Map Service, 2015.
9. New York State Department of Transportation, Albany, New York – US Customary Standard Sheets, 2015.

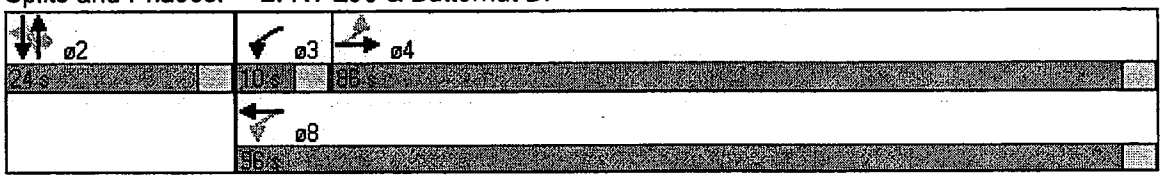


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	0		170	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987							0.850		0.943	
Flt Protected	0.950			0.950				0.963			0.979	
Satd. Flow (prot)	1770	1839	0	1770	1863	0	0	1794	1583	0	1720	0
Flt Permitted	0.508			0.151				0.774			0.865	
Satd. Flow (perm)	946	1839	0	281	1863	0	0	1442	1583	0	1519	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9							98		20	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2434			3735			3790			1791	
Travel Time (s)		55.3			84.9			86.1			40.7	
Volume (vph)	24	812	78	120	402	1	90	27	90	18	6	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	883	85	130	437	1	98	29	98	20	7	20
Lane Group Flow (vph)	26	968	0	130	438	0	0	127	98	0	47	0
Turn Type	Perm			pm+pt			Perm		Perm	Perm		
Protected Phases		4		3	8			2			2	
Permitted Phases	4			8			2		2	2		
Minimum Split (s)	20.0	20.0		8.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	86.0	86.0	0.0	10.0	96.0	0.0	24.0	24.0	24.0	24.0	24.0	0.0
Total Split (%)	71.7%	71.7%	0.0%	8.3%	80.0%	0.0%	20.0%	20.0%	20.0%	20.0%	20.0%	0.0%
Maximum Green (s)	82.0	82.0		6.0	92.0		20.0	20.0	20.0	20.0	20.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Walk Time (s)	5.0	5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	82.0	82.0		92.0	92.0			20.0	20.0		20.0	
Actuated g/C Ratio	0.68	0.68		0.77	0.77			0.17	0.17		0.17	
v/c Ratio	0.04	0.77		0.45	0.31			0.53	0.28		0.17	
Control Delay	6.5	17.8		11.0	5.6			54.7	10.7		30.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	6.5	17.8		11.0	5.6			54.7	10.7		30.0	
LOS	A	B		B	A			D	B		C	
Approach Delay		17.5			6.8			35.5			30.0	
Approach LOS		B			A			D			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	

Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:, Start of Green
Natural Cycle: 80
Control Type: Pretimed
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 16.7 Intersection LOS: B
Intersection Capacity Utilization 75.1% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: RT 290 & Butternut Dr



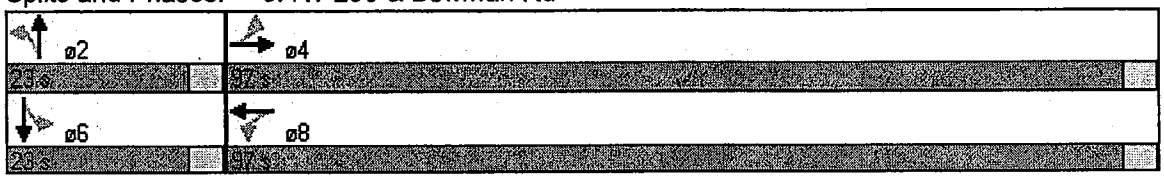


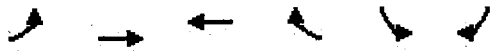
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	80		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.987			0.968			0.949	
Flt Protected	0.950			0.950				0.976			0.988	
Satd. Flow (prot)	1770	1825	0	1770	1839	0	0	1760	0	0	1747	0
Flt Permitted	0.446			0.296				0.789			0.922	
Satd. Flow (perm)	831	1825	0	551	1839	0	0	1423	0	0	1630	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			12			11			21	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		3735			623			4405			1426	
Travel Time (s)		84.9			14.2			100.1			32.4	
Volume (vph)	30	638	96	96	422	40	55	30	27	20	30	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	693	104	104	459	43	60	33	29	22	33	33
Lane Group Flow (vph)	33	797	0	104	502	0	0	122	0	0	88	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	97.0	97.0	0.0	97.0	97.0	0.0	23.0	23.0	0.0	23.0	23.0	0.0
Total Split (%)	80.8%	80.8%	0.0%	80.8%	80.8%	0.0%	19.2%	19.2%	0.0%	19.2%	19.2%	0.0%
Maximum Green (s)	93.0	93.0		93.0	93.0		19.0	19.0		19.0	19.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	93.0	93.0		93.0	93.0			19.0			19.0	
Actuated g/C Ratio	0.78	0.78		0.78	0.78			0.16			0.16	
v/c Ratio	0.05	0.56		0.24	0.35			0.52			0.32	
Control Delay	4.5	14.5		5.3	4.8			56.4			37.5	
Queue Delay	0.0	0.0		0.0	0.6			0.0			0.0	
Total Delay	4.5	14.5		5.3	5.5			56.4			37.5	
LOS	A	B		A	A			E			D	
Approach Delay		14.1			5.4			56.4			37.5	
Approach LOS		B			A			E			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	

Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 15.3 Intersection LOS: B
Intersection Capacity Utilization 66.3% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: RT 290 & Bowman Rd





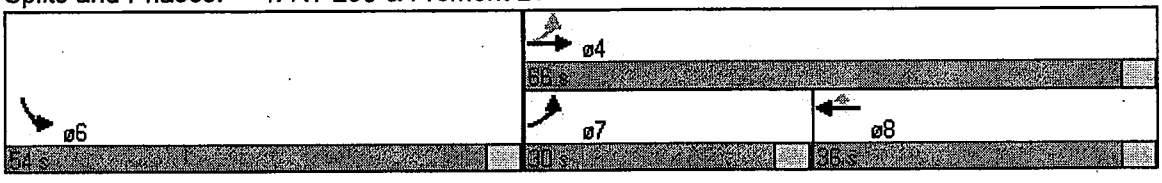
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400			180	0	0
Storage Lanes	1			1	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.921	
Flt Protected	0.950				0.980	
Satd. Flow (prot)	1770	1863	1863	1583	1681	0
Flt Permitted	0.353				0.980	
Satd. Flow (perm)	658	1863	1863	1583	1681	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				257	74	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		623	2296		1411	
Travel Time (s)		14.2	52.2		32.1	
Volume (vph)	340	358	238	236	224	320
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	370	389	259	257	243	348
Lane Group Flow (vph)	370	389	259	257	591	0
Turn Type	pm+pt			Perm		
Protected Phases	7	4	8		6	
Permitted Phases	4			8		
Detector Phases	7	4	8	8	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0	
Total Split (s)	30.0	66.0	36.0	36.0	54.0	0.0
Total Split (%)	25.0%	55.0%	30.0%	30.0%	45.0%	0.0%
Maximum Green (s)	26.0	62.0	32.0	32.0	50.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	Max	
Walk Time (s)		5.0	5.0	5.0	5.0	
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)		0	0	0	0	
Act Effct Green (s)	47.1	47.1	19.9	19.9	50.4	
Actuated g/C Ratio	0.45	0.45	0.19	0.19	0.48	
v/c Ratio	0.69	0.47	0.74	0.51	0.70	
Control Delay	26.3	21.3	44.3	6.7	26.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	26.3	21.3	44.3	6.7	26.2	
LOS	C	C	D	A	C	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach Delay		23.6	25.5		26.2	
Approach LOS		C	C		C	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 105.6
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 25.0 Intersection LOS: C
Intersection Capacity Utilization 73.4% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 4: RT 290 & Fremont Dr



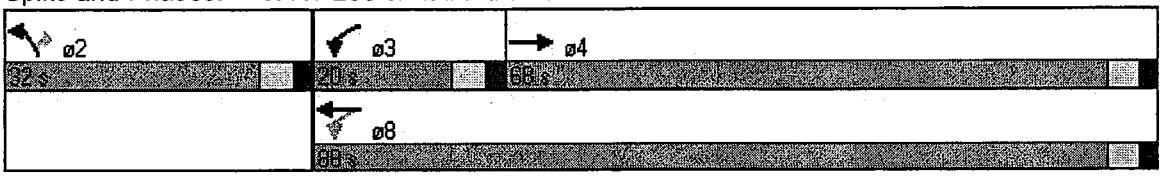
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	100		0	0
Storage Lanes		0	1		1	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50		50	50	50	50
Trailing Detector (ft)	0		0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.946					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1762	0	1770	1863	1770	1583
Flt Permitted			0.221		0.950	
Satd. Flow (perm)	1762	0	412	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	43					550
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	2296			6719	4313	
Travel Time (s)	52.2			152.7	98.0	
Volume (vph)	360	242	246	218	280	578
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	391	263	267	237	304	628
Lane Group Flow (vph)	654	0	267	237	304	628
Turn Type			pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phases	4		3	8	2	2
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	21.5		9.5	21.5	21.5	21.5
Total Split (s)	68.0	0.0	20.0	88.0	32.0	32.0
Total Split (%)	56.7%	0.0%	16.7%	73.3%	26.7%	26.7%
Maximum Green (s)	62.5		14.5	82.5	26.5	26.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	None	Max	Max
Walk Time (s)	5.0			5.0	5.0	5.0
Flash Dont Walk (s)	11.0			11.0	11.0	11.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	39.1		56.3	56.3	28.8	28.8
Actuated g/C Ratio	0.42		0.60	0.60	0.31	0.31
v/c Ratio	0.86		0.61	0.21	0.56	0.72
Control Delay	25.9		12.9	8.1	35.6	11.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	25.9		12.9	8.1	35.6	11.1
LOS	C		B	A	D	B

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach Delay	25.9			10.6	19.1	
Approach LOS	C			B	B	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 93.3
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 19.2 Intersection LOS: B
Intersection Capacity Utilization 76.2% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 5: RT 290 & N. Burdick St

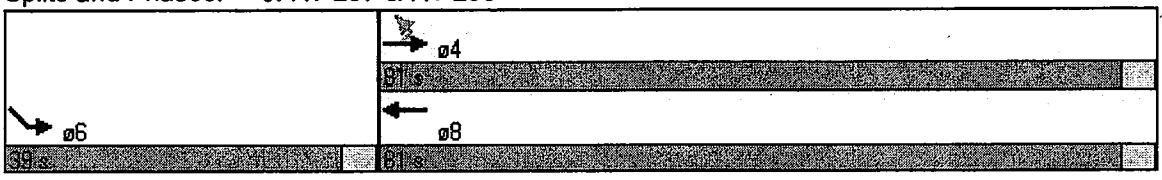




Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	
Trailing Detector (ft)	0	0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.875		0.968	
Flt Protected		0.971			0.963	
Satd. Flow (prot)	0	1809	1630	0	1736	0
Flt Permitted		0.689			0.963	
Satd. Flow (perm)	0	1283	1630	0	1736	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			271		13	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		10214	4049		6719	
Travel Time (s)		232.1	92.0		152.7	
Volume (vph)	100	67	20	249	746	230
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	73	22	271	811	250
Lane Group Flow (vph)	0	182	293	0	1061	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Detector Phases	4	4	8		6	
Minimum Initial (s)	4.0	4.0	4.0		4.0	
Minimum Split (s)	20.0	20.0	20.0		20.0	
Total Split (s)	81.0	81.0	81.0	0.0	39.0	0.0
Total Split (%)	67.5%	67.5%	67.5%	0.0%	32.5%	0.0%
Maximum Green (s)	77.0	77.0	77.0		35.0	
Yellow Time (s)	3.5	3.5	3.5		3.5	
All-Red Time (s)	0.5	0.5	0.5		0.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Recall Mode	None	None	None		Min	
Walk Time (s)	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0	0	0		0	
Act Effct Green (s)		13.1	13.1		36.6	
Actuated g/C Ratio		0.23	0.23		0.63	
v/c Ratio		0.63	0.51		0.96	
Control Delay		19.9	4.1		33.8	
Queue Delay		0.0	0.0		0.0	
Total Delay		19.9	4.1		33.8	
LOS		B	A		C	
Approach Delay		19.9	4.1		33.8	
Approach LOS		B	A		C	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 57.8	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 26.5	Intersection LOS: C
Intersection Capacity Utilization 90.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 6: RT 257 & RT 290





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	130		0	0		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.946			0.974			0.972	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1863	1863	0	1770	1762	0	1770	1814	0	1770	1811	0
Flt Permitted				0.429			0.476			0.664		
Satd. Flow (perm)	1863	1863	0	799	1762	0	887	1814	0	1237	1811	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					28			14			11	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		3334			2482			369			10214	
Travel Time (s)		75.8			56.4			8.4			232.1	
Volume (vph)	0	293	0	64	80	45	199	111	23	10	198	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	318	0	70	87	49	216	121	25	11	215	49
Lane Group Flow (vph)	0	318	0	70	136	0	216	146	0	11	264	0
Turn Type	Perm			Perm			D.P+P			Perm		
Protected Phases		6			2		3	3 4 8			4	
Permitted Phases	6			2			4			4		
Detector Phases	6	6		2	2		3	3 4 8		4	4	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0			4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		8.0			20.0	20.0	
Total Split (s)	51.0	51.0	0.0	32.5	32.5	0.0	20.0	113.0	0.0	48.0	48.0	0.0
Total Split (%)	42.9%	42.9%	0.0%	27.3%	27.3%	0.0%	16.8%	95.0%	0.0%	40.3%	40.3%	0.0%
Maximum Green (s)	47.0	47.0		28.5	28.5		16.0			44.0	44.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5			3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5			0.5	0.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0	
Recall Mode	None	None		Max	Max		None			None	None	
Walk Time (s)	5.0	5.0		5.0	5.0					5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0					11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0					0	0	
Act Effct Green (s)		28.9		28.9	28.9		24.7	28.7		14.3	14.3	
Actuated g/C Ratio		0.44		0.44	0.44		0.38	0.44		0.22	0.22	
v/c Ratio		0.39		0.20	0.17		0.46	0.18		0.04	0.66	
Control Delay		15.5		15.6	11.6		13.6	9.7		20.2	23.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		15.5		15.6	11.6		13.6	9.7		20.2	23.7	
LOS		B		B	B		B	A		C	C	

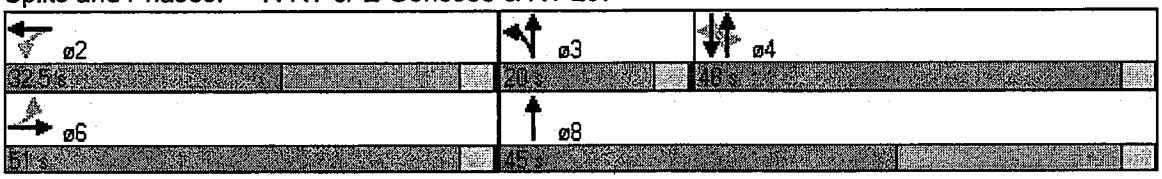
Lane Group	ø8
Lane Configurations	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Total Lost Time (s)	
Leading Detector (ft)	
Trailing Detector (ft)	
Turning Speed (mph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Headway Factor	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Volume (vph)	
Peak Hour Factor	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phases	
Minimum Initial (s)	4.0
Minimum Split (s)	20.0
Total Split (s)	45.0
Total Split (%)	38%
Maximum Green (s)	41.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		15.5			13.0			12.0			23.5	
Approach LOS		B			B			B			C	

Intersection Summary

Area Type: Other
Cycle Length: 119
Actuated Cycle Length: 65.7
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 15.9 Intersection LOS: B
Intersection Capacity Utilization 56.5% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 7: RT 5/ E Genesee & RT 257



Lane Group	SB
Approach Delay	
Approach LOS	

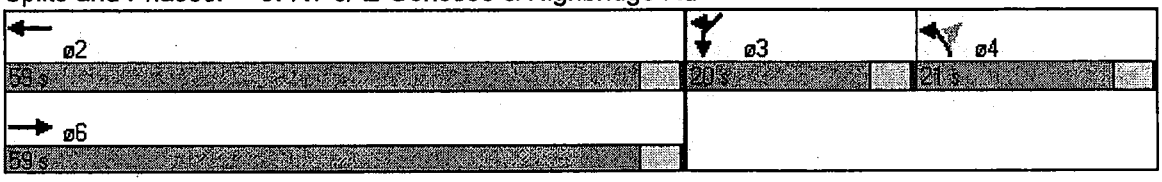
Intersection Summary



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50		50	50		50	50
Trailing Detector (ft)		0			0		0	0		0	0
Turning Speed (mph)	15		9	15		9	15	9	9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00
Frt					0.996			0.850			0.850
Flt Protected							0.950			0.950	
Satd. Flow (prot)	0	3539	0	0	3525	0	1770	1583	0	1770	1583
Flt Permitted							0.950			0.950	
Satd. Flow (perm)	0	3539	0	0	3525	0	1770	1583	0	1770	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)					5			100			201
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30		30			30	
Link Distance (ft)		767			3334		3116			1864	
Travel Time (s)		17.4			75.8		70.8			42.4	
Volume (vph)	0	1128	0	0	662	20	193	18	92	58	219
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1226	0	0	720	22	210	20	100	63	238
Lane Group Flow (vph)	0	1226	0	0	742	0	210	120	0	63	238
Turn Type							Prot				Prot
Protected Phases		6			2		4			3	3
Permitted Phases								4			
Detector Phases		6			2		4	4		3	3
Minimum Initial (s)		4.0			4.0		4.0	4.0		4.0	4.0
Minimum Split (s)		20.0			20.0		20.0	20.0		20.0	20.0
Total Split (s)	0.0	59.0	0.0	0.0	59.0	0.0	21.0	21.0	0.0	20.0	20.0
Total Split (%)	0.0%	59.0%	0.0%	0.0%	59.0%	0.0%	21.0%	21.0%	0.0%	20.0%	20.0%
Maximum Green (s)		55.0			55.0		17.0	17.0		16.0	16.0
Yellow Time (s)		3.5			3.5		3.5	3.5		3.5	3.5
All-Red Time (s)		0.5			0.5		0.5	0.5		0.5	0.5
Lead/Lag							Lag	Lag		Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0
Recall Mode		C-Max			C-Max		Max	Max		Max	Max
Walk Time (s)		5.0			5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0
Act Effct Green (s)		55.0			55.0		17.0	17.0		16.0	16.0
Actuated g/C Ratio		0.55			0.55		0.17	0.17		0.16	0.16
v/c Ratio		0.63			0.38		0.70	0.34		0.22	0.56
Control Delay		17.3			13.4		52.7	13.5		39.0	14.4
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0
Total Delay		17.3			13.4		52.7	13.5		39.0	14.4
LOS		B			B		D	B		D	B
Approach Delay		17.3			13.4		38.4			19.6	
Approach LOS		B			B		D			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow, Master Intersection	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 19.2	Intersection LOS: B
Intersection Capacity Utilization 55.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 9: RT 5/ E Genesee & Highbridge Rd





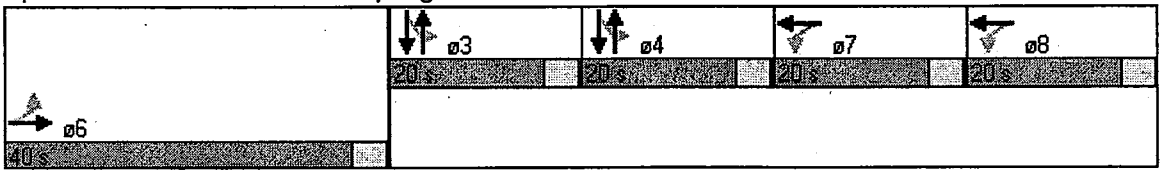
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50			50		50	50	
Trailing Detector (ft)	0	0		0	0			0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.941			0.878			0.983				
Flt Protected					0.995						0.971	
Satd. Flow (prot)	1863	1753	0	0	1627	0	0	1831	0	0	1809	0
Flt Permitted					0.937						0.707	
Satd. Flow (perm)	1863	1753	0	0	1532	0	0	1831	0	0	1317	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			149			6				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1596			1262			1315			369	
Travel Time (s)		36.3			28.7			29.9			8.4	
Volume (vph)	0	287	184	15	0	137	0	101	15	118	83	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	312	200	16	0	149	0	110	16	128	90	0
Lane Group Flow (vph)	0	512	0	0	165	0	0	126	0	0	218	0
Turn Type	Perm			Perm						Perm		
Protected Phases		6			7 8			3 4			3 4	
Permitted Phases	6			7 8						3 4		
Detector Phases	6	6		7 8	7 8			3 4		3 4	3 4	
Minimum Initial (s)	4.0	4.0										
Minimum Split (s)	20.0	20.0										
Total Split (s)	40.0	40.0	0.0	40.0	40.0	0.0	0.0	40.0	0.0	40.0	40.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	0.0%	0.0%	33.3%	0.0%	33.3%	33.3%	0.0%
Maximum Green (s)	36.0	36.0										
Yellow Time (s)	3.5	3.5										
All-Red Time (s)	0.5	0.5										
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0										
Recall Mode	Max	Max										
Walk Time (s)	5.0	5.0										
Flash Dont Walk (s)	11.0	11.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		36.1			17.2			28.1			28.1	
Actuated g/C Ratio		0.39			0.18			0.30			0.30	
v/c Ratio		0.74			0.41			0.23			0.55	
Control Delay		32.2			8.9			24.6			31.8	
Queue Delay		0.0			0.0			0.0			0.1	
Total Delay		32.2			8.9			24.6			31.9	
LOS		C			A			C			C	

Lane Group	ø3	ø4	ø7	ø8
Lane Configurations				
Ideal Flow (vphpl)				
Storage Length (ft)				
Storage Lanes				
Total Lost Time (s)				
Leading Detector (ft)				
Trailing Detector (ft)				
Turning Speed (mph)				
Lane Util. Factor				
Frt				
Flt Protected				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Right Turn on Red				
Satd. Flow (RTOR)				
Headway Factor				
Link Speed (mph)				
Link Distance (ft)				
Travel Time (s)				
Volume (vph)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type				
Protected Phases	3	4	7	8
Permitted Phases				
Detector Phases				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0
Total Split (%)	17%	17%	17%	17%
Maximum Green (s)	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Max	None	None	None
Walk Time (s)	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0
Act Effct Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		32.2			8.9			24.6			31.9	
Approach LOS		C			A			C			C	

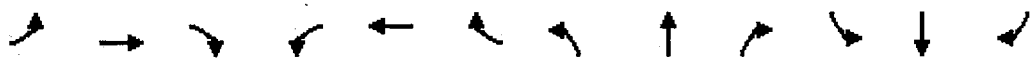
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 93.5			
Natural Cycle: 110			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 27.4		Intersection LOS: C	
Intersection Capacity Utilization 50.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 10: Salt Spring Rd & RT 257



Lane Group	ø3	ø4	ø7	ø8
Approach Delay				
Approach LOS				

Intersection Summary

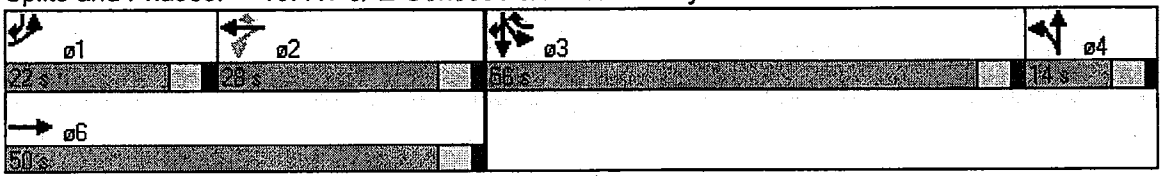


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		150	0		0	0		0
Storage Lanes	1		0	0		1	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	50
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.982				0.850		0.974				0.850
Flt Protected	0.950				0.995			0.975		0.950	0.974	
Satd. Flow (prot)	1770	3476	0	0	3522	1583	0	1769	0	1681	1724	1583
Flt Permitted	0.950				0.837			0.975		0.950	0.974	
Satd. Flow (perm)	1770	3476	0	0	2962	1583	0	1769	0	1681	1724	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15				343		8				176
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		9296			767			2053			6316	
Travel Time (s)		211.3			17.4			46.7			143.5	
Volume (vph)	191	426	60	42	371	696	54	30	20	871	275	294
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	463	65	46	403	757	59	33	22	947	299	320
Lane Group Flow (vph)	208	528	0	0	449	757	0	114	0	607	639	320
Turn Type	Prot			Perm		pm+ov	Split			Split		pt+ov
Protected Phases	1	6			2	3	4	4		3	3	3 1
Permitted Phases				2		2						
Detector Phases	1	6		2	2	3	4	4		3	3	3 1
Minimum Initial (s)	6.0	20.0		20.0	20.0	6.0	4.0	4.0		6.0	6.0	
Minimum Split (s)	11.0	25.0		25.0	25.0	11.0	9.0	9.0		11.0	11.0	
Total Split (s)	22.0	50.0	0.0	28.0	28.0	56.0	14.0	14.0	0.0	56.0	56.0	78.0
Total Split (%)	18.3%	41.7%	0.0%	23.3%	23.3%	46.7%	11.7%	11.7%	0.0%	46.7%	46.7%	65.0%
Maximum Green (s)	17.0	45.0		23.0	23.0	51.0	9.0	9.0		51.0	51.0	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.5		1.5	1.5	
Lead/Lag	Lead			Lag	Lag	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max	None	None	None		None	None	
Act Effct Green (s)	17.2	47.8			26.6	81.0		9.8		50.4	50.4	67.6
Actuated g/C Ratio	0.14	0.40			0.22	0.68		0.08		0.42	0.42	0.56
v/c Ratio	0.82	0.38			0.68	0.64		0.75		0.86	0.88	0.33
Control Delay	45.4	25.5			50.0	8.4		77.0		42.9	44.5	3.8
Queue Delay	0.0	0.0			0.0	0.4		0.0		0.0	0.0	0.0
Total Delay	45.4	25.5			50.0	8.7		77.0		42.9	44.5	3.8
LOS	D	C			D	A		E		D	D	A
Approach Delay		31.1			24.1			77.0			35.6	
Approach LOS		C			C			E			D	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 32.2 Intersection LOS: C
Intersection Capacity Utilization 83.8% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 15: RT 5/ E Genesee & N Brudick/ Lyndon





Lane Group	EBL	EBT	EBR	EBR2	WBT	NBL	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0			0		0			0	
Storage Lanes	1		1			0		0			0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50	50			50	50	50
Trailing Detector (ft)	0	0	0		0	0	0			0	0	0
Turning Speed (mph)	15		9	9		15		9	9	15	15	
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850				0.923					0.903
Flt Protected	0.950						0.981					0.989
Satd. Flow (prot)	1770	3539	1583	0	3539	0	1687	0	0	0	0	1664
Flt Permitted	0.270						0.706					0.905
Satd. Flow (perm)	503	3539	1583	0	3539	0	1214	0	0	0	0	1522
Right Turn on Red				Yes					Yes			
Satd. Flow (RTOR)			3				29					94
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30		30					30
Link Distance (ft)		1735			9296		2642					5337
Travel Time (s)		39.4			211.3		60.0					121.3
Volume (vph)	84	829	1161	29	555	30	4	10	35	9	35	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	901	1262	32	603	33	4	11	38	10	38	10
Lane Group Flow (vph)	91	901	1294	0	603	0	86	0	0	0	0	207
Turn Type	pm+pt		pt+ov			Perm				Perm	Perm	
Protected Phases	1	5	3 5		2		8					8
Permitted Phases	5					8				8	8	
Detector Phases	1	5	3 5		2	8	8			8	8	8
Minimum Initial (s)	4.0	10.0			10.0	4.0	4.0			4.0	4.0	4.0
Minimum Split (s)	10.0	17.5			25.0	12.0	12.0			12.0	12.0	12.0
Total Split (s)	13.0	59.0	94.0	0.0	46.0	26.0	26.0	0.0	0.0	26.0	26.0	26.0
Total Split (%)	10.8%	49.2%	78.3%	0.0%	38.3%	21.7%	21.7%	0.0%	0.0%	21.7%	21.7%	21.7%
Maximum Green (s)	7.0	51.5			38.5	18.0	18.0			18.0	18.0	18.0
Yellow Time (s)	3.5	3.5			3.5	3.5	3.5			3.5	3.5	3.5
All-Red Time (s)	2.5	4.0			4.0	4.5	4.5			4.5	4.5	4.5
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0			3.0	3.0	3.0
Recall Mode	None	C-Max			C-Max	None	None			None	None	None
Walk Time (s)					5.0							
Flash Dont Walk (s)					11.0							
Pedestrian Calls (#/hr)					0							
Act Effct Green (s)	59.4	59.4	94.4		46.7		17.6					17.6
Actuated g/C Ratio	0.50	0.50	0.79		0.39		0.15					0.15
v/c Ratio	0.27	0.51	1.04		0.44		0.42					0.68
Control Delay	11.2	11.5	54.0		21.2		34.2					32.2
Queue Delay	0.0	0.0	0.0		0.0		0.0					0.0
Total Delay	11.2	11.5	54.0		21.2		34.2					32.2
LOS	B	B	D		C		C					C



Lane Group	SBR	NWL	NWR
Lane Configurations			
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)	0	0	0
Storage Lanes	0	2	0
Total Lost Time (s)	4.0	4.0	4.0
Leading Detector (ft)		50	
Trailing Detector (ft)		0	
Turning Speed (mph)	9	15	9
Lane Util. Factor	1.00	0.97	0.95
Frt		0.992	
Flt Protected		0.955	
Satd. Flow (prot)	0	3423	0
Flt Permitted		0.955	
Satd. Flow (perm)	0	3423	0
Right Turn on Red	Yes		
Satd. Flow (RTOR)			
Headway Factor	1.00	1.00	1.00
Link Speed (mph)		30	
Link Distance (ft)		4458	
Travel Time (s)		101.3	
Volume (vph)	137	802	44
Peak Hour Factor	0.92	0.92	0.92
Adj. Flow (vph)	149	872	48
Lane Group Flow (vph)	0	920	0
Turn Type			
Protected Phases		3	
Permitted Phases			
Detector Phases		3	
Minimum Initial (s)		10.0	
Minimum Split (s)		18.5	
Total Split (s)	0.0	35.0	0.0
Total Split (%)	0.0%	29.2%	0.0%
Maximum Green (s)		27.5	
Yellow Time (s)		3.5	
All-Red Time (s)		4.0	
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)		3.0	
Recall Mode		None	
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
Act Effct Green (s)		31.0	
Actuated g/C Ratio		0.26	
v/c Ratio		1.04	
Control Delay		84.8	
Queue Delay		0.0	
Total Delay		84.8	
LOS		F	

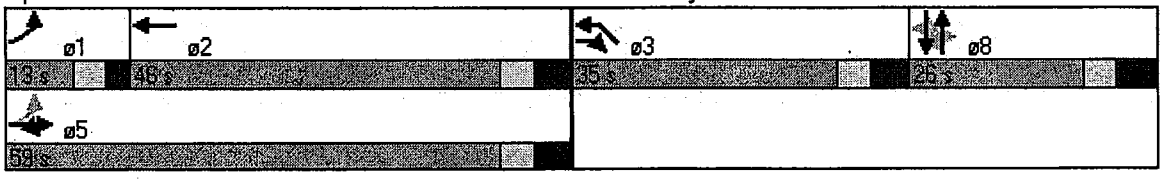


Lane Group	EBL	EBT	EBR	EBR2	WBT	NBL	NBT	NBR	NBR2	SBL2	SBL	SBT
Approach Delay		35.6			21.2		34.2					32.2
Approach LOS		D			C		C					C

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBT and 5:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 44.3 Intersection LOS: D
Intersection Capacity Utilization 93.2% ICU Level of Service F
Analysis Period (min) 15

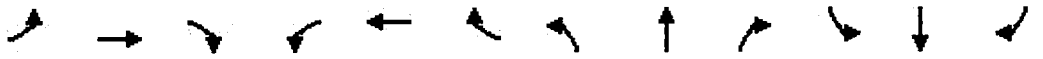
Splits and Phases: 16: RT 5/ E Genesee & N Brudick/ Lyndon





Lane Group	SBR	NWL	NWR
Approach Delay		84.8	
Approach LOS		F	

Intersection Summary

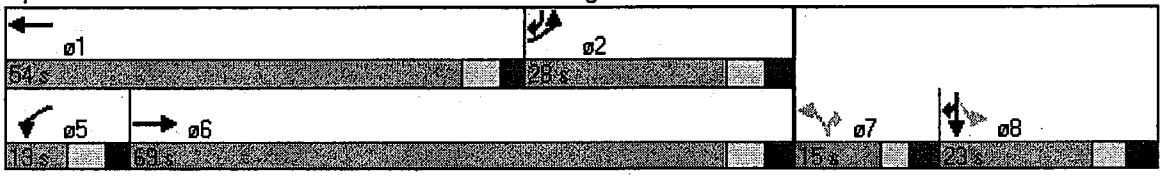


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	430		0	230		0	0		0	0		0
Storage Lanes	2		0	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50		50	50	50	50
Trailing Detector (ft)	0	0		0	0		0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.995			0.980				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950	0.954	
Satd. Flow (prot)	3433	5060	0	1770	4984	0	1770	0	1583	1681	1688	1583
Flt Permitted	0.950			0.950			0.364			0.950	0.954	
Satd. Flow (perm)	3433	5060	0	1770	4984	0	678	0	1583	1681	1688	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			30				20			34
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1878			1735			1633			1378	
Travel Time (s)		42.7			39.4			37.1			31.3	
Volume (vph)	472	1723	59	47	1207	187	79	0	18	274	5	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	513	1873	64	51	1312	203	86	0	20	298	5	34
Lane Group Flow (vph)	513	1937	0	51	1515	0	86	0	20	149	154	34
Turn Type	Prot			Prot			custom		custom	Perm		pt+ov
Protected Phases	2	6		5	1						8	2 8
Permitted Phases							7		7	8		
Detector Phases	2	6		5	1		7		7	8	8	2 8
Minimum Initial (s)	6.0	15.0		4.0	15.0		4.0		4.0	4.0	4.0	
Minimum Split (s)	13.0	22.0		10.5	21.5		10.0		10.0	11.0	11.0	
Total Split (s)	28.0	69.0	0.0	13.0	54.0	0.0	15.0	0.0	15.0	23.0	23.0	51.0
Total Split (%)	23.3%	57.5%	0.0%	10.8%	45.0%	0.0%	12.5%	0.0%	12.5%	19.2%	19.2%	42.5%
Maximum Green (s)	21.0	62.0		6.5	47.5		9.0		9.0	16.0	16.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0		3.0	3.5	3.5	
All-Red Time (s)	3.0	3.0		2.5	2.5		3.0		3.0	3.5	3.5	
Lead/Lag	Lag	Lag		Lead	Lead		Lead		Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes		Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None		None	None	None	
Act Effct Green (s)	24.0	69.1		9.0	51.7		11.0		11.0	17.3	17.3	41.3
Actuated g/C Ratio	0.20	0.58		0.08	0.43		0.09		0.09	0.14	0.14	0.34
v/c Ratio	0.75	0.66		0.38	0.70		1.39		0.12	0.62	0.63	0.06
Control Delay	52.8	19.8		59.5	20.7		288.1		21.5	56.5	57.1	5.4
Queue Delay	0.0	0.0		0.0	0.0		0.0		0.0	0.0	0.0	0.0
Total Delay	52.8	19.8		59.5	20.7		288.1		21.5	56.5	57.1	5.4
LOS	D	B		E	C		F		C	E	E	A
Approach Delay		26.7			22.0						51.6	
Approach LOS		C			C						D	

Intersection Summary

Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 68.5 (57%), Referenced to phase 1:WBT and 6:EBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.39	
Intersection Signal Delay: 32.0	Intersection LOS: C
Intersection Capacity Utilization 65.3%	ICU Level of Service C
Analysis Period (min) 15	

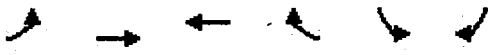
Splits and Phases: 21: RT 5/ E Genesee & Wegmans Dr





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.878	
Flt Protected	0.950			0.974		
Satd. Flow (prot)	1770	1583	0	1814	1635	0
Flt Permitted	0.950			0.974		
Satd. Flow (perm)	1770	1583	0	1814	1635	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	2056			5337	7654	
Travel Time (s)	46.7			121.3	174.0	
Volume (vph)	368	168	46	40	19	188
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	400	183	50	43	21	204
Lane Group Flow (vph)	400	183	0	93	225	0
Sign Control	Stop			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 47.7%		ICU Level of Service A	
Analysis Period (min) 15			

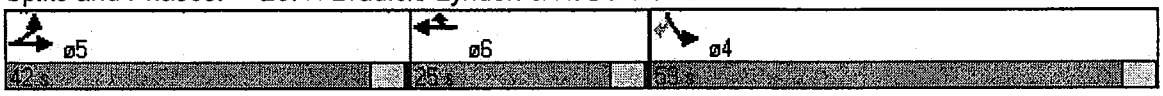


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			330	0	0
Storage Lanes	1			1	1	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1863	1583	1770	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1863	1583	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				604		40
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		7654	6316		1719	
Travel Time (s)		174.0	143.5		39.1	
Volume (vph)	63	351	136	556	614	44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	382	148	604	667	48
Lane Group Flow (vph)	68	382	148	604	667	48
Turn Type	Split			Prot		Perm
Protected Phases	5	5	6	6	4	
Permitted Phases						4
Detector Phases	5	5	6	6	4	4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	8.0	20.0	20.0	20.0	20.0
Total Split (s)	42.0	42.0	25.0	25.0	53.0	53.0
Total Split (%)	35.0%	35.0%	20.8%	20.8%	44.2%	44.2%
Maximum Green (s)	38.0	38.0	21.0	21.0	49.0	49.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lead	Lag	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	None	None
Act Effct Green (s)	25.3	25.3	21.7	21.7	41.9	41.9
Actuated g/C Ratio	0.25	0.25	0.21	0.21	0.41	0.41
v/c Ratio	0.15	0.82	0.37	0.74	0.91	0.07
Control Delay	31.0	40.9	42.3	10.0	38.9	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	40.9	42.3	10.0	38.9	8.1
LOS	C	D	D	A	D	A
Approach Delay		39.4	16.3		36.8	
Approach LOS		D	B		D	

Intersection Summary

Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 101.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 29.4	Intersection LOS: C
Intersection Capacity Utilization 59.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 26: N Brudick/ Lyndon & N. Burdick St



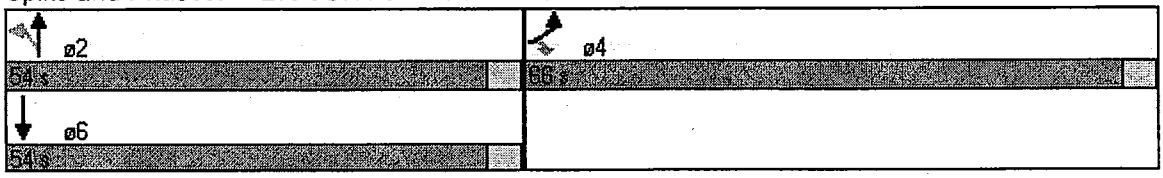


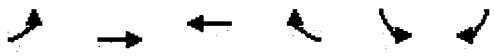
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.953	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1775	0
Flt Permitted	0.950		0.323			
Satd. Flow (perm)	1770	1583	602	1863	1775	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		293			28	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	3056			1719	4313	
Travel Time (s)	69.5			39.1	98.0	
Volume (vph)	497	270	190	225	260	140
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	540	293	207	245	283	152
Lane Group Flow (vph)	540	293	207	245	435	0
Turn Type		Perm	Perm			
Protected Phases	4			2	6	
Permitted Phases		4	2			
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	66.0	66.0	54.0	54.0	54.0	0.0
Total Split (%)	55.0%	55.0%	45.0%	45.0%	45.0%	0.0%
Maximum Green (s)	62.0	62.0	50.0	50.0	50.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	
Lead/Lag						
Lead-Lag Optimize?						
Act Effct Green (s)	62.0	62.0	50.0	50.0	50.0	
Actuated g/C Ratio	0.52	0.52	0.42	0.42	0.42	
v/c Ratio	0.59	0.31	0.82	0.32	0.58	
Control Delay	23.5	2.6	58.9	24.9	28.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	23.5	2.6	58.9	24.9	28.7	
LOS	C	A	E	C	C	
Approach Delay	16.1			40.5	28.7	
Approach LOS	B			D	C	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL, Start of Green	
Natural Cycle: 40	
Control Type: Pretimed	
Maximum v/c Ratio: 0.82	

Intersection Signal Delay: 25.7 Intersection LOS: C
Intersection Capacity Utilization 70.3% ICU Level of Service C
Analysis Period (min) 15

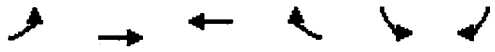
Splits and Phases: 27: SUNY POLY BLVD & N. Burdick St





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.966		0.986	
Flt Protected	0.950				0.957	
Satd. Flow (prot)	1770	1863	1799	0	1758	0
Flt Permitted	0.950				0.957	
Satd. Flow (perm)	1770	1863	1799	0	1758	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		4848	3056		4405	
Travel Time (s)		110.2	69.5		100.1	
Volume (vph)	28	677	235	80	90	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	736	255	87	98	11
Lane Group Flow (vph)	30	736	342	0	109	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 47.9%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.940		0.954	
Flt Protected		0.988			0.968	
Satd. Flow (prot)	0	1840	1751	0	1720	0
Flt Permitted		0.988			0.968	
Satd. Flow (perm)	0	1840	1751	0	1720	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		2160	2056		3635	
Travel Time (s)		49.1	46.7		82.6	
Volume (vph)	123	403	114	90	154	80
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	438	124	98	167	87
Lane Group Flow (vph)	0	572	222	0	254	0
Sign Control		Stop	Stop		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.9%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	WBT	WBR	NBT	NBR	SBT	SBR2	NER	NER2
Lane Configurations								
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Turning Speed (mph)		9		9		9	9	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850			0.850	
Flt Protected								
Satd. Flow (prot)	1863	1583	1863	1583	1863	1863	1583	1863
Flt Permitted								
Satd. Flow (perm)	1863	1583	1863	1583	1863	1863	1583	1863
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30		30			
Link Distance (ft)	4848		3635		3790			
Travel Time (s)	110.2		82.6		86.1			
Volume (vph)	235	15	178	35	204	0	670	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	255	16	193	38	222	0	728	0
Lane Group Flow (vph)	255	16	193	38	222	0	728	0
Sign Control	Stop		Yield		Yield			

Intersection Summary

Area Type: Other

Control Type: Roundabout

Intersection Capacity Utilization 65.6% ICU Level of Service C

Analysis Period (min) 15

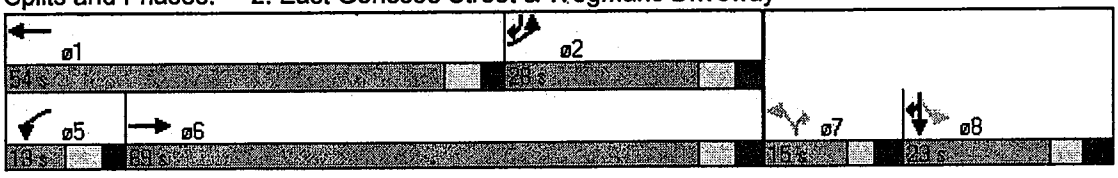


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	410		0	230		0	0		0	0		0
Storage Lanes	2		0	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	60	286		60	286		20		20	60	60	60
Trailing Detector (ft)	-10	10		-10	10		0		0	-10	-10	-10
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.996			0.982				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950	0.954	
Satd. Flow (prot)	3433	5065	0	1770	4994	0	1770	0	1583	1681	1688	1583
Flt Permitted	0.950			0.950			0.364			0.950	0.954	
Satd. Flow (perm)	3433	5065	0	1770	4994	0	678	0	1583	1681	1688	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			24				20			34
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2577			1394			1472			1777	
Travel Time (s)		58.6			31.7			33.5			40.4	
Volume (vph)	472	2143	59	47	1407	187	79	0	18	274	5	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	513	2329	64	51	1529	203	86	0	20	298	5	34
Lane Group Flow (vph)	513	2393	0	51	1732	0	86	0	20	149	154	34
Turn Type	Prot			Prot			custom		custom	Perm		pt+ov
Protected Phases	2	6		5	1						8	2 8
Permitted Phases							7		7	8		
Detector Phases	2	6		5	1		7		7	8	8	2 8
Minimum Initial (s)	6.0	15.0		4.0	15.0		4.0		4.0	4.0	4.0	
Minimum Split (s)	13.0	22.0		10.5	21.5		10.0		10.0	11.0	11.0	
Total Split (s)	28.0	69.0	0.0	13.0	54.0	0.0	15.0	0.0	15.0	23.0	23.0	51.0
Total Split (%)	23.3%	57.5%	0.0%	10.8%	45.0%	0.0%	12.5%	0.0%	12.5%	19.2%	19.2%	42.5%
Maximum Green (s)	21.0	62.0		6.5	47.5		9.0		9.0	16.0	16.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0		3.0	3.5	3.5	
All-Red Time (s)	3.0	3.0		2.5	2.5		3.0		3.0	3.5	3.5	
Lead/Lag	Lag	Lag		Lead	Lead		Lead		Lead	Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0		3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None		None	None	None	
Act Effct Green (s)	24.0	69.0		9.1	51.6		11.0		11.0	17.4	17.4	41.4
Actuated g/C Ratio	0.20	0.58		0.08	0.43		0.09		0.09	0.14	0.14	0.34
v/c Ratio	0.75	0.82		0.38	0.80		1.39		0.12	0.61	0.63	0.06
Control Delay	52.8	24.7		72.7	36.3		288.1		21.5	56.4	57.1	5.4
Queue Delay	0.0	0.0		0.0	0.0		0.0		0.0	0.0	0.0	0.0
Total Delay	52.8	24.7		72.7	36.3		288.1		21.5	56.4	57.1	5.4
LOS	D	C		E	D		F		C	E	E	A
Approach Delay		29.7			37.4						51.6	
Approach LOS		C			D						D	

Intersection Summary

Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 69 (58%), Referenced to phase 1:WBT and 6:EBT, Start of Yellow	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.39	
Intersection Signal Delay: 38.1	Intersection LOS: D
Intersection Capacity Utilization 70.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: East Genesee Street & Wegmans Driveway



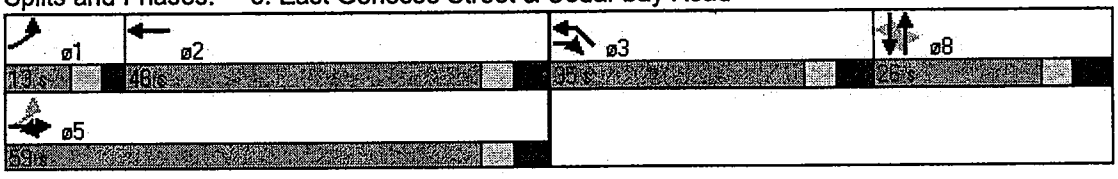


Lane Group	EBL	EBT	EBR	EBR2	WBT	NBL	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0			0		0			0	
Storage Lanes	1		1			0		0			0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50	50			50	50	50
Trailing Detector (ft)	0	0	0		0	0	0			0	0	0
Turning Speed (mph)	15		9	9		15		9	9	15	15	
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850				0.923					0.903
Flt Protected	0.950						0.981					0.989
Satd. Flow (prot)	1770	3539	1583	0	3539	0	1687	0	0	0	0	1664
Flt Permitted	0.154						0.706					0.905
Satd. Flow (perm)	287	3539	1583	0	3539	0	1214	0	0	0	0	1522
Right Turn on Red				Yes					Yes			
Satd. Flow (RTOR)			3				29					94
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30		30					30
Link Distance (ft)		1394			7517		1744					4285
Travel Time (s)		31.7			170.8		39.6					97.4
Volume (vph)	84	1249	1161	29	765	30	4	10	35	9	35	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	1358	1262	32	832	33	4	11	38	10	38	10
Lane Group Flow (vph)	91	1358	1294	0	832	0	86	0	0	0	0	207
Turn Type	pm+pt		pt+ov			Perm				Perm	Perm	
Protected Phases	1	5	3 5		2		8					8
Permitted Phases	5					8				8	8	
Detector Phases	1	5	3 5		2	8	8			8	8	8
Minimum Initial (s)	4.0	10.0			10.0	4.0	4.0			4.0	4.0	4.0
Minimum Split (s)	10.0	17.5			17.5	12.0	12.0			12.0	12.0	12.0
Total Split (s)	13.0	59.0	94.0	0.0	46.0	26.0	26.0	0.0	0.0	26.0	26.0	26.0
Total Split (%)	10.8%	49.2%	78.3%	0.0%	38.3%	21.7%	21.7%	0.0%	0.0%	21.7%	21.7%	21.7%
Maximum Green (s)	7.0	51.5			38.5	18.0	18.0			18.0	18.0	18.0
Yellow Time (s)	3.5	3.5			3.5	3.5	3.5			3.5	3.5	3.5
All-Red Time (s)	2.5	4.0			4.0	4.5	4.5			4.5	4.5	4.5
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0			3.0	3.0	3.0
Recall Mode	None	C-Max			C-Max	None	None			None	None	None
Act Effct Green (s)	59.4	59.4	94.4		45.8		17.6					17.6
Actuated g/C Ratio	0.50	0.50	0.79		0.38		0.15					0.15
v/c Ratio	0.35	0.78	1.04		0.62		0.42					0.68
Control Delay	16.7	30.6	60.9		33.3		34.2					32.2
Queue Delay	0.0	0.0	0.0		0.0		0.0					0.0
Total Delay	16.7	30.6	60.9		33.3		34.2					32.2
LOS	B	C	E		C		C					C
Approach Delay		44.4			33.3		34.2					32.2
Approach LOS		D			C		C					C

Intersection Summary

Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:WBT and 5:EBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 49.5	Intersection LOS: D
Intersection Capacity Utilization 93.2%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: East Genesee Street & Cedar bay Road





Lane Group	SBR	NWL	NWR
Lane Configurations			
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)	0	0	0
Storage Lanes	0	2	0
Total Lost Time (s)	4.0	4.0	4.0
Leading Detector (ft)		50	
Trailing Detector (ft)		0	
Turning Speed (mph)	9	15	9
Lane Util. Factor	1.00	0.97	0.95
Frt		0.992	
Flt Protected		0.955	
Satd. Flow (prot)	0	3423	0
Flt Permitted		0.955	
Satd. Flow (perm)	0	3423	0
Right Turn on Red	Yes		
Satd. Flow (RTOR)			
Headway Factor	1.00	1.00	1.00
Link Speed (mph)		30	
Link Distance (ft)		1779	
Travel Time (s)		40.4	
Volume (vph)	137	802	44
Peak Hour Factor	0.92	0.92	0.92
Adj. Flow (vph)	149	872	48
Lane Group Flow (vph)	0	920	0
Turn Type			
Protected Phases		3	
Permitted Phases			
Detector Phases		3	
Minimum Initial (s)		10.0	
Minimum Split (s)		18.5	
Total Split (s)	0.0	35.0	0.0
Total Split (%)	0.0%	29.2%	0.0%
Maximum Green (s)		27.5	
Yellow Time (s)		3.5	
All-Red Time (s)		4.0	
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)		3.0	
Recall Mode		None	
Act Effct Green (s)		31.0	
Actuated g/C Ratio		0.26	
v/c Ratio		1.04	
Control Delay		84.8	
Queue Delay		0.0	
Total Delay		84.8	
LOS		F	
Approach Delay		84.8	
Approach LOS		F	

Intersection Summary

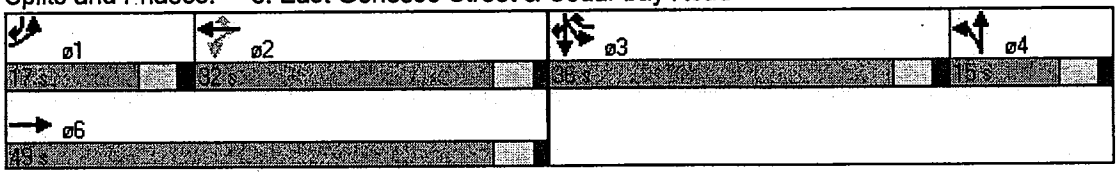


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		150	0		0	0		0
Storage Lanes	1		0	0		1	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	50
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.990				0.850		0.974				0.850
Flt Protected	0.950				0.997			0.975		0.950	0.979	
Satd. Flow (prot)	1770	3504	0	0	3529	1583	0	1769	0	1681	1732	1583
Flt Permitted	0.950				0.813			0.975		0.950	0.979	
Satd. Flow (perm)	1770	3504	0	0	2877	1583	0	1769	0	1681	1732	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				411		10				187
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		7517			553			1082			5007	
Travel Time (s)		170.8			12.6			24.6			113.8	
Volume (vph)	191	846	60	42	581	576	54	30	20	661	275	294
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	920	65	46	632	626	59	33	22	718	299	320
Lane Group Flow (vph)	208	985	0	0	678	626	0	114	0	496	521	320
Turn Type	Prot			Perm		pm+ov	Split			Split		pt+ov
Protected Phases	1	6			2	3	4	4		3	3	3 1
Permitted Phases				2		2						
Detector Phases	1	6		2	2	3	4	4		3	3	3 1
Minimum Initial (s)	6.0	20.0		20.0	20.0	6.0	4.0	4.0		6.0	6.0	
Minimum Split (s)	11.0	25.0		25.0	25.0	11.0	9.0	9.0		11.0	11.0	
Total Split (s)	17.0	49.0	0.0	32.0	32.0	36.0	15.0	15.0	0.0	36.0	36.0	53.0
Total Split (%)	17.0%	49.0%	0.0%	32.0%	32.0%	36.0%	15.0%	15.0%	0.0%	36.0%	36.0%	53.0%
Maximum Green (s)	12.0	44.0		27.0	27.0	31.0	10.0	10.0		31.0	31.0	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.5		1.5	1.5	
Lead/Lag	Lead			Lag	Lag	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max	None	None	None		None	None	
Act Effct Green (s)	13.4	45.8			28.4	64.4		10.2		32.0	32.0	45.4
Actuated g/C Ratio	0.13	0.46			0.28	0.64		0.10		0.32	0.32	0.45
v/c Ratio	0.88	0.61			0.83	0.54		0.60		0.92	0.94	0.39
Control Delay	77.8	22.4			39.9	8.9		50.1		57.8	60.5	5.4
Queue Delay	0.0	0.0			0.0	0.5		0.0		0.0	0.0	0.0
Total Delay	77.8	22.4			39.9	9.4		50.1		57.8	60.5	5.4
LOS	E	C			D	A		D		E	E	A
Approach Delay		32.1			25.3			50.1			46.3	
Approach LOS		C			C			D			D	

Intersection Summary

Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 35.2	Intersection LOS: D
Intersection Capacity Utilization 87.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 8: East Genesee Street & Cedar bay Road



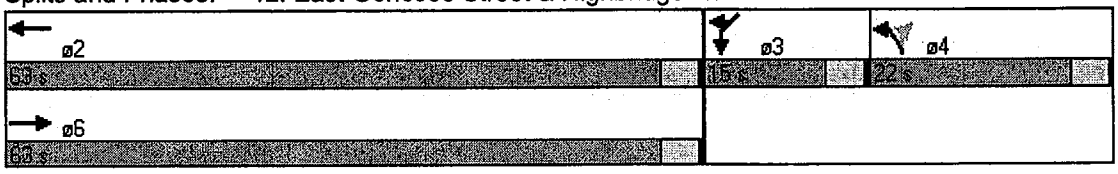
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	330		0	0	0		0	0
Storage Lanes	0		0	1		0	1	0		0	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50		50	50		50	50
Trailing Detector (ft)		0			0		0	0		0	0
Turning Speed (mph)	15		9	15		9	15	9	9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95
Frt		0.983			0.996			0.850		0.925	0.850
Flt Protected							0.950			0.976	
Satd. Flow (prot)	0	3479	0	0	3525	0	1770	1583	0	1682	1504
Flt Permitted							0.950			0.976	
Satd. Flow (perm)	0	3479	0	0	3525	0	1770	1583	0	1682	1504
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		24			5			100		40	175
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30		30			30	
Link Distance (ft)		553			2710		1209			1393	
Travel Time (s)		12.6			61.6		27.5			31.7	
Volume (vph)	0	1338	172	0	752	20	193	18	92	58	219
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1454	187	0	817	22	210	20	100	63	238
Lane Group Flow (vph)	0	1641	0	0	839	0	210	120	0	126	175
Turn Type							Prot				Prot
Protected Phases		6			2		4			3	3
Permitted Phases								4			
Detector Phases		6			2		4	4		3	3
Minimum Initial (s)		4.0			4.0		4.0	4.0		4.0	4.0
Minimum Split (s)		20.0			20.0		20.0	20.0		8.0	8.0
Total Split (s)	0.0	63.0	0.0	0.0	63.0	0.0	22.0	22.0	0.0	15.0	15.0
Total Split (%)	0.0%	63.0%	0.0%	0.0%	63.0%	0.0%	22.0%	22.0%	0.0%	15.0%	15.0%
Maximum Green (s)		59.0			59.0		18.0	18.0		11.0	11.0
Yellow Time (s)		3.5			3.5		3.5	3.5		3.5	3.5
All-Red Time (s)		0.5			0.5		0.5	0.5		0.5	0.5
Lead/Lag							Lag	Lag		Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0
Recall Mode		C-Max			C-Max		Max	Max		None	None
Walk Time (s)		5.0			5.0		5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0			
Act Effct Green (s)		59.0			59.0		19.7	19.7		9.3	9.3
Actuated g/C Ratio		0.59			0.59		0.20	0.20		0.09	0.09
v/c Ratio		0.80			0.40		0.60	0.31		0.66	0.59
Control Delay		14.8			11.7		45.5	12.6		39.8	13.5
Queue Delay		0.2			0.0		0.0	0.0		0.0	0.0
Total Delay		15.0			11.7		45.5	12.6		39.8	13.5
LOS		B			B		D	B		D	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR
Approach Delay		15.0			11.7		33.5			24.5	
Approach LOS		B			B		C			C	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow, Master Intersection
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 17.0 Intersection LOS: B
Intersection Capacity Utilization 70.9% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 12: East Genesee Street & Highbridge Rd



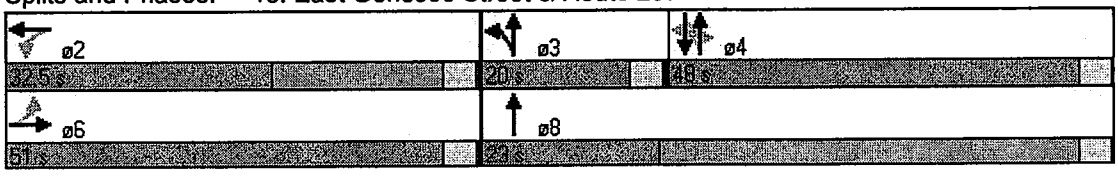


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	130		0	0		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.969			0.974			0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	0	1770	1805	0	1770	1814	0	1770	1809	0
Flt Permitted	0.525			0.191			0.488			0.664		
Satd. Flow (perm)	978	1863	0	356	1805	0	909	1814	0	1237	1809	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					13			14			11	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2710			1216			270			8133	
Travel Time (s)		61.6			27.6			6.1			184.8	
Volume (vph)	34	503	0	64	170	45	199	111	23	10	189	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	547	0	70	185	49	216	121	25	11	205	49
Lane Group Flow (vph)	37	547	0	70	234	0	216	146	0	11	254	0
Turn Type	Perm			Perm			D.P+P			Perm		
Protected Phases		6			2		3	3 4 8			4	
Permitted Phases	6			2			4			4		
Detector Phases	6	6		2	2		3	3 4 8		4	4	
Minimum Initial (s)	6.0	6.0		6.0	6.0		1.0			4.0	4.0	
Minimum Split (s)	22.0	22.0		20.0	20.0		20.0			20.0	20.0	
Total Split (s)	51.0	51.0	0.0	32.5	32.5	0.0	20.0	91.0	0.0	48.0	48.0	0.0
Total Split (%)	42.9%	42.9%	0.0%	27.3%	27.3%	0.0%	16.8%	76.5%	0.0%	40.3%	40.3%	0.0%
Maximum Green (s)	47.0	47.0		28.5	28.5		16.0			44.0	44.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5			3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5			0.5	0.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0	
Recall Mode	Min	Min		None	None		None			None	None	
Act Effct Green (s)	30.4	30.4		30.4	30.4		21.6	37.1		13.4	13.4	
Actuated g/C Ratio	0.52	0.52		0.52	0.52		0.36	0.51		0.22	0.22	
v/c Ratio	0.07	0.57		0.38	0.25		0.46	0.16		0.04	0.62	
Control Delay	13.9	17.6		21.7	13.5		13.6	9.9		23.3	23.4	
Queue Delay	0.0	0.0		0.2	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.9	17.6		21.9	13.5		13.6	9.9		23.3	23.4	
LOS	B	B		C	B		B	A		C	C	
Approach Delay		17.4			15.5			12.1			23.4	
Approach LOS		B			B			B			C	

Intersection Summary

Area Type:	Other
Cycle Length: 119	
Actuated Cycle Length: 58.8	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 15.8	Intersection LOS: B
Intersection Capacity Utilization 68.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 15: East Genesee Street & Route 257



Lane Group	ø8
Lane Configurations	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Total Lost Time (s)	
Leading Detector (ft)	
Trailing Detector (ft)	
Turning Speed (mph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Headway Factor	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Volume (vph)	
Peak Hour Factor	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phases	
Minimum Initial (s)	1.0
Minimum Split (s)	20.0
Total Split (s)	23.0
Total Split (%)	19%
Maximum Green (s)	19.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary



Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.872		0.955	
Flt Protected		0.971			0.968	
Satd. Flow (prot)	0	1809	1624	0	1722	0
Flt Permitted		0.971			0.968	
Satd. Flow (perm)	0	1809	1624	0	1722	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		8133	2410		5404	
Travel Time (s)		184.8	54.8		122.8	
Volume (vph)	100	67	20	364	366	180
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	73	22	396	398	196
Lane Group Flow (vph)	0	182	418	0	594	0
Sign Control		Stop	Stop		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 73.9%		ICU Level of Service D	
Analysis Period (min) 15			

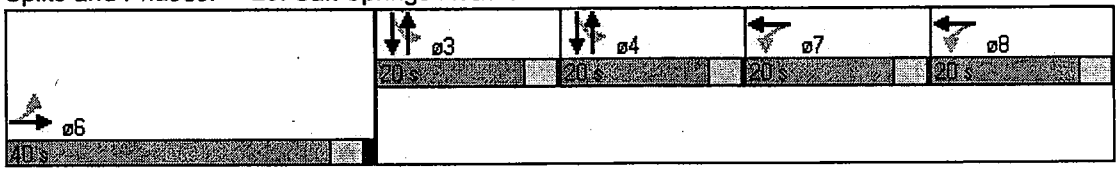


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50			50		50	50	
Trailing Detector (ft)	0	0		0	0			0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.941			0.878			0.983				
Flt Protected					0.995						0.971	
Satd. Flow (prot)	1863	1753	0	0	1627	0	0	1831	0	0	1809	0
Flt Permitted					0.937						0.707	
Satd. Flow (perm)	1863	1753	0	0	1532	0	0	1831	0	0	1317	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			149			6				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1002			1727			2053			270	
Travel Time (s)		22.8			39.3			46.7			6.1	
Volume (vph)	0	287	184	15	0	137	0	101	15	118	83	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	312	200	16	0	149	0	110	16	128	90	0
Lane Group Flow (vph)	0	512	0	0	165	0	0	126	0	0	218	0
Turn Type	Perm			Perm						Perm		
Protected Phases		6			7 8			3 4			3 4	
Permitted Phases	6			7 8						3 4		
Detector Phases	6	6		7 8	7 8			3 4		3 4	3 4	
Minimum Initial (s)	6.0	6.0										
Minimum Split (s)	22.0	22.0										
Total Split (s)	40.0	40.0	0.0	40.0	40.0	0.0	0.0	40.0	0.0	40.0	40.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	0.0%	0.0%	33.3%	0.0%	33.3%	33.3%	0.0%
Maximum Green (s)	35.0	35.0										
Yellow Time (s)	3.5	3.5										
All-Red Time (s)	1.5	1.5										
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0										
Recall Mode	Max	Max										
Act Effct Green (s)		36.3			15.2			24.8			24.8	
Actuated g/C Ratio		0.41			0.17			0.28			0.28	
v/c Ratio		0.70			0.43			0.24			0.59	
Control Delay		28.3			9.0			24.1			31.2	
Queue Delay		0.0			0.0			0.0			1.0	
Total Delay		28.3			9.0			24.1			32.1	
LOS		C			A			C			C	
Approach Delay		28.3			9.0			24.1			32.1	
Approach LOS		C			A			C			C	

Intersection Summary

Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 88.4	
Natural Cycle: 115	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 25.5	Intersection LOS: C
Intersection Capacity Utilization 50.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 20: Salt Springs Road & Route 257



Lane Group	ø3	ø4	ø7	ø8
Lane Configurations				
Ideal Flow (vphpl)				
Storage Length (ft)				
Storage Lanes				
Total Lost Time (s)				
Leading Detector (ft)				
Trailing Detector (ft)				
Turning Speed (mph)				
Lane Util. Factor				
Frt				
Flt Protected				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Right Turn on Red				
Satd. Flow (RTOR)				
Headway Factor				
Link Speed (mph)				
Link Distance (ft)				
Travel Time (s)				
Volume (vph)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type				
Protected Phases	3	4	7	8
Permitted Phases				
Detector Phases				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0
Total Split (%)	17%	17%	17%	17%
Maximum Green (s)	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None
Act Effct Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				

Intersection Summary

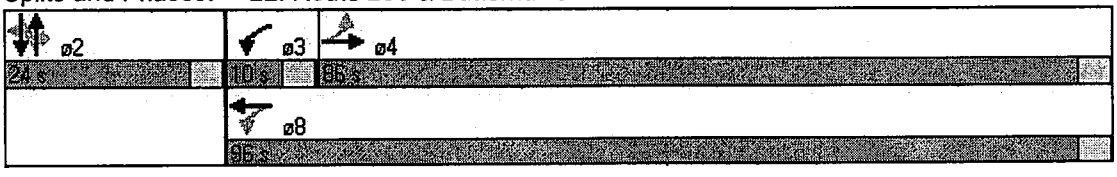


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	0		170	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990							0.850		0.943	
Flt Protected	0.950			0.950				0.958			0.979	
Satd. Flow (prot)	1770	1844	0	1770	1863	0	0	1785	1583	0	1720	0
Flt Permitted	0.453			0.047				0.751			0.870	
Satd. Flow (perm)	844	1844	0	88	1863	0	0	1399	1583	0	1528	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7							98		20	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		3472			2950			5997			2598	
Travel Time (s)		78.9			67.0			136.3			59.0	
Volume (vph)	24	1062	78	120	517	1	90	12	90	18	6	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	1154	85	130	562	1	98	13	98	20	7	20
Lane Group Flow (vph)	26	1239	0	130	563	0	0	111	98	0	47	0
Turn Type	Perm			pm+pt			Perm		Perm	Perm		
Protected Phases		4		3	8			2			2	
Permitted Phases	4			8			2		2	2		
Minimum Split (s)	20.0	20.0		8.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	86.0	86.0	0.0	10.0	96.0	0.0	24.0	24.0	24.0	24.0	24.0	0.0
Total Split (%)	71.7%	71.7%	0.0%	8.3%	80.0%	0.0%	20.0%	20.0%	20.0%	20.0%	20.0%	0.0%
Maximum Green (s)	82.0	82.0		6.0	92.0		20.0	20.0	20.0	20.0	20.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Walk Time (s)	5.0	5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	82.0	82.0		92.0	92.0			20.0	20.0		20.0	
Actuated g/C Ratio	0.68	0.68		0.77	0.77			0.17	0.17		0.17	
v/c Ratio	0.05	0.98		0.86	0.39			0.48	0.28		0.17	
Control Delay	6.5	40.5		63.2	4.8			53.0	10.7		30.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	6.5	40.5		63.2	4.8			53.0	10.7		30.0	
LOS	A	D		E	A			D	B		C	
Approach Delay		39.8			15.7			33.1			30.0	
Approach LOS		D			B			C			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	

Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 31.4 Intersection LOS: C
Intersection Capacity Utilization 87.7% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 22: Route 290 & Butternut Creek Drive





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.940		0.954	
Flt Protected		0.992			0.968	
Satd. Flow (prot)	0	1848	1751	0	1720	0
Flt Permitted		0.992			0.968	
Satd. Flow (perm)	0	1848	1751	0	1720	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1577	1657		5997	
Travel Time (s)		35.8	37.7		136.3	
Volume (vph)	88	438	114	90	154	80
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	476	124	98	167	87
Lane Group Flow (vph)	0	572	222	0	254	0
Sign Control		Stop	Stop		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		



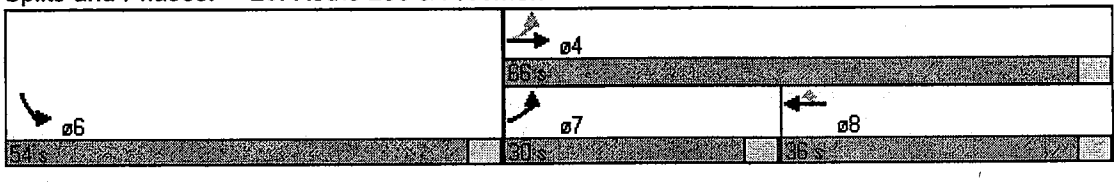
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400			180	0	0
Storage Lanes	1			1	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.921	
Flt Protected	0.950				0.980	
Satd. Flow (prot)	1770	1863	1863	1583	1681	0
Flt Permitted	0.159				0.980	
Satd. Flow (perm)	296	1863	1863	1583	1681	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				216	74	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		541	1873		2674	
Travel Time (s)		12.3	42.6		60.8	
Volume (vph)	340	608	368	236	224	320
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	370	661	400	257	243	348
Lane Group Flow (vph)	370	661	400	257	591	0
Turn Type	pm+pt			Perm		
Protected Phases	7	4	8		6	
Permitted Phases	4			8		
Detector Phases	7	4	8	8	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0	
Total Split (s)	30.0	66.0	36.0	36.0	54.0	0.0
Total Split (%)	25.0%	55.0%	30.0%	30.0%	45.0%	0.0%
Maximum Green (s)	26.0	62.0	32.0	32.0	50.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	Max	
Walk Time (s)		5.0	5.0	5.0	5.0	
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)		0	0	0	0	
Act Effct Green (s)	55.2	55.2	27.8	27.8	50.4	
Actuated g/C Ratio	0.49	0.49	0.24	0.24	0.44	
v/c Ratio	0.83	0.73	0.88	0.47	0.75	
Control Delay	37.9	27.2	53.5	10.2	31.7	
Queue Delay	0.0	7.6	0.0	0.0	0.1	
Total Delay	37.9	34.8	53.5	10.2	31.8	
LOS	D	C	D	B	C	

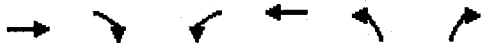


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach Delay		35.9	36.6		31.8	
Approach LOS		D	D		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 113.6			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 35.0		Intersection LOS: D	
Intersection Capacity Utilization 80.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 25: Route 290 & Freemont Road



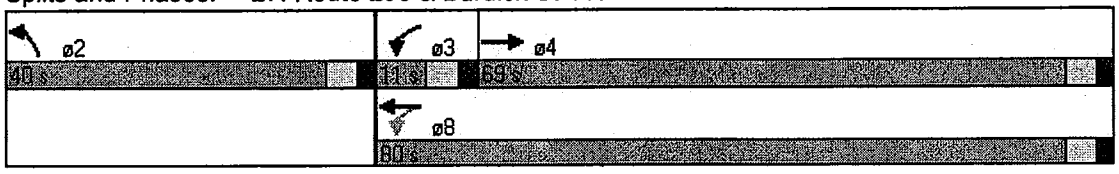


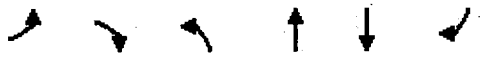
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	100		0	0
Storage Lanes		0	1		1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50		50	50	50	
Trailing Detector (ft)	0		0	0	0	
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.954				0.949	
Flt Protected			0.950		0.970	
Satd. Flow (prot)	1777	0	1770	1863	1715	0
Flt Permitted			0.058		0.970	
Satd. Flow (perm)	1777	0	108	1863	1715	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	34				26	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	1873			5404	3530	
Travel Time (s)	42.6			122.8	80.2	
Volume (vph)	560	292	116	348	280	168
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	609	317	126	378	304	183
Lane Group Flow (vph)	926	0	126	378	487	0
Turn Type			pm+pt			
Protected Phases	4		3	8	2	
Permitted Phases			8			
Detector Phases	4		3	8	2	
Minimum Initial (s)	4.0		4.0	4.0	4.0	
Minimum Split (s)	21.5		9.5	21.5	21.5	
Total Split (s)	69.0	0.0	11.0	80.0	40.0	0.0
Total Split (%)	57.5%	0.0%	9.2%	66.7%	33.3%	0.0%
Maximum Green (s)	63.5		5.5	74.5	34.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	None	
Act Effct Green (s)	65.0		76.0	76.0	34.7	
Actuated g/C Ratio	0.55		0.64	0.64	0.29	
v/c Ratio	0.94		0.75	0.32	0.94	
Control Delay	42.2		48.1	10.7	61.9	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	42.2		48.1	10.7	61.9	
LOS	D		D	B	E	
Approach Delay	42.2			20.1	61.9	
Approach LOS	D			C	E	

Intersection Summary

Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 118.7	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 41.4	Intersection LOS: D
Intersection Capacity Utilization 89.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 27: Route 290 & Burdick Street





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.910				0.995	
Flt Protected	0.983			0.988		
Satd. Flow (prot)	1666	0	0	1840	1853	0
Flt Permitted	0.983			0.988		
Satd. Flow (perm)	1666	0	0	1840	1853	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	6650			1284	3530	
Travel Time (s)	151.1			29.2	80.2	
Volume (vph)	30	60	70	225	260	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	65	76	245	283	11
Lane Group Flow (vph)	98	0	0	321	294	0
Sign Control	Stop			Free	Free	

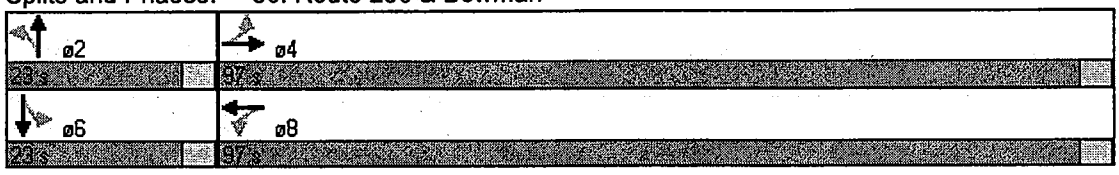
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.4%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	80		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.985			0.990			0.968			0.949	
Flt Protected	0.950			0.950				0.976			0.988	
Satd. Flow (prot)	1770	1835	0	1770	1844	0	0	1760	0	0	1747	0
Flt Permitted	0.371			0.175				0.789			0.922	
Satd. Flow (perm)	691	1835	0	326	1844	0	0	1423	0	0	1630	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			10			11			21	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2950			541			6650			648	
Travel Time (s)		67.0			12.3			151.1			14.7	
Volume (vph)	30	888	96	96	552	40	55	30	27	20	30	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	965	104	104	600	43	60	33	29	22	33	33
Lane Group Flow (vph)	33	1069	0	104	643	0	0	122	0	0	88	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	97.0	97.0	0.0	97.0	97.0	0.0	23.0	23.0	0.0	23.0	23.0	0.0
Total Split (%)	80.8%	80.8%	0.0%	80.8%	80.8%	0.0%	19.2%	19.2%	0.0%	19.2%	19.2%	0.0%
Maximum Green (s)	93.0	93.0		93.0	93.0		19.0	19.0		19.0	19.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	93.0	93.0		93.0	93.0			19.0			19.0	
Actuated g/C Ratio	0.78	0.78		0.78	0.78			0.16			0.16	
v/c Ratio	0.06	0.75		0.41	0.45			0.52			0.32	
Control Delay	4.8	18.9		10.1	5.7			50.8			37.5	
Queue Delay	0.0	0.5		0.0	1.3			0.4			0.1	
Total Delay	4.8	19.4		10.1	7.1			51.2			37.6	
LOS	A	B		B	A			D			D	
Approach Delay		19.0			7.5			51.2			37.6	
Approach LOS		B			A			D			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 75	

Control Type: Pretimed
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 17.5 Intersection LOS: B
Intersection Capacity Utilization 79.5% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 30: Route 290 & Bowman





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			300	0	0
Storage Lanes	0			1	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.987	
Flt Protected		0.989			0.957	
Satd. Flow (prot)	0	1842	1863	1583	1759	0
Flt Permitted		0.989			0.957	
Satd. Flow (perm)	0	1842	1863	1583	1759	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				474	6	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		6114	5007		1284	
Travel Time (s)		139.0	113.8		29.2	
Volume (vph)	98	351	136	436	404	44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	382	148	474	439	48
Lane Group Flow (vph)	0	489	148	474	487	0
Turn Type	custom			Prot		
Protected Phases	5	5	6	6	4	
Permitted Phases	5					
Detector Phases	5	5	6	6	4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.0	8.0	20.0	20.0	20.0	
Total Split (s)	37.0	37.0	25.0	25.0	38.0	0.0
Total Split (%)	37.0%	37.0%	25.0%	25.0%	38.0%	0.0%
Maximum Green (s)	33.0	33.0	21.0	21.0	34.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lead	Lead	Lag	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	Max	Max	None	
Walk Time (s)			5.0	5.0	5.0	
Flash Dont Walk (s)			11.0	11.0	11.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effct Green (s)		26.7	21.6	21.6	27.4	
Actuated g/C Ratio		0.30	0.25	0.25	0.31	
v/c Ratio		0.88	0.32	0.64	0.88	
Control Delay		38.2	33.8	7.7	37.8	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		38.2	33.8	7.7	37.8	
LOS		D	C	A	D	

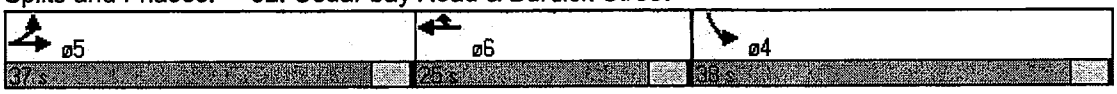


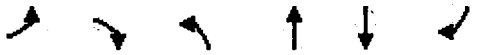
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach Delay		38.2	13.9		37.8	
Approach LOS		D	B		D	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 88.1
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 28.6 Intersection LOS: C
Intersection Capacity Utilization 66.1% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 32: Cedar bay Road & Burdick Street





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.878	
Flt Protected	0.950			0.974		
Satd. Flow (prot)	1770	1583	0	1814	1635	0
Flt Permitted	0.950			0.974		
Satd. Flow (perm)	1770	1583	0	1814	1635	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	1657			4285	6114	
Travel Time (s)	37.7			97.4	139.0	
Volume (vph)	424	168	46	40	19	188
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	461	183	50	43	21	204
Lane Group Flow (vph)	461	183	0	93	225	0
Sign Control	Stop			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		

Estimate and Schedule

For

DeWitt Bypass

Town of DeWitt
Onondaga County, New York

April 2016

1234.56
DeWitt Bypass

ALPHA ENGINEERING

SUNY POLYTECHNIC INSTITUTE
100 Seymour Road
Utica, New York

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Introduction

The estimate and schedule in this report are done for the DeWitt bypass project located in the Town of Dewitt and Manlius, Onondaga County, New York. All eight alternatives cost estimations are included in this report. Alternative 1a was selected in the preliminary design phase. Alternative 1a is a yearlong construction project that involves a concrete bridge, 150 foot diameter roundabout, highway and detention pond. All calculations were done using Microsoft Excel and NYSDOT worksheets. The quantities and cost for each item were obtained using NYS Department of Transportation specifications. All quantities were calculated in US customary units. Detailed cost estimates are located in the Appendix. The scheduling is a 3 phase construction sequence. The phasing is a suggested sequence of construction activities that minimizes traffic and environmental impacts. The construction contractor will determine specific dates of completion.

Estimate

This cost estimate includes a total of 8 alternatives. The cost of each alternative was compared and considered in the choice of the final design. The parts of the project which are included in the cost estimate are materials, labor, survey, work zone traffic control and design. Each design and alignment alternative has various costs associated with it. Due to the similarities between the two alignments (Alignment A & Alignment B) the lower cost items had minimal impact on the decision. These low cost items are laid out in the appendix. The main alternative costs for high price items are listed below:

1. **Roundabout vs. Signalized intersection**: Located at the Butternut interchange, two types of intersections were considered. The cost of the roundabout was estimated at $441,000 and the cost of the signalized intersection was estimated at $280,000.
2. **Concrete Bridge vs. Steel Bridge**: Two bridge types were considered for the bridge over Butternut Creek. The concrete bridge was estimated at $772,000 and the steel bridge was estimated at $842,000.
3. **Alignment A vs. Alignment B**: Alignment A spans between Butternut Drive and Bowman Road, while Alignment B spans from Butternut Drive to Route 290. The estimated cost of Alignment A is $4,300,000. The estimated cost of Alignment B is $9,600,000.

While calculating the estimated total cost of the project, various pay item prices and quantities were determined. The costs for each pay item were determined using the NYSDOT weighted average item price report (WAIPR) for 2014. The quantities for the pay items were estimated using various techniques. For the concrete and steel bridges, the prices were estimated using the NYSDOT Preliminary Cost Estimating Worksheet for New and Replacement Bridges (Appendix 1). The methodology used in the worksheet is based on the bridge shoulder break method (Appendix 2). All other pay items were determined using the approximate dimensions of the roadway, intersection alterations, type of soil and the topography of the project area. Based on NYS Department of Transportation standards and estimates specific costs were added to the base cost which includes work zone traffic control, contingency, survey, design and inspection. The specific pay items, unit prices and quantities are shown in Appendix 3. The Summary of Design Alternatives Costs Table is located below.

Final Cost Estimates for All Eight Alternatives

		WZTC	Contingency	Survey	Design	Inspection	
		5%	20%	10%	10%	9%	Total Cost
Alt 1a (w/concrete bridge)	$5,455,850.18	$2,727,925.09	$1,091,170.04	$545,585.02	$545,585.02	$491,026.52	$10,857,141.85
Alt 1a (w/steel bridge)	$5,575,540.18	$2,787,770.09	$1,115,108.04	$557,554.02	$557,554.02	$501,798.62	$11,095,324.95
Alt 1b (w/concrete bridge)	$10,717,657.95	$5,358,828.97	$2,143,531.59	$1,071,765.79	$1,071,765.79	$964,589.22	$21,328,139.32
Alt 1b (w/steel bridge)	$10,837,347.95	$5,418,673.97	$2,167,469.59	$1,083,734.79	$1,083,734.79	$975,361.32	$21,566,322.42
Alt 2a (w/concrete bridge)	$5,294,624.63	$2,647,312.32	$1,058,924.93	$529,462.46	$529,462.46	$476,516.22	$10,536,303.02
Alt 2a (w/steel bridge)	$5,414,314.63	$2,707,157.32	$1,082,862.93	$541,431.46	$541,431.46	$487,288.32	$10,774,486.12
Alt 2b (w/concrete bridge)	$10,556,432.40	$5,278,216.20	$2,111,286.48	$1,055,643.24	$1,055,643.24	$950,078.92	$21,007,300.48
Alt 2b (w/steel bridge)	$10,676,122.40	$5,338,061.20	$2,135,224.48	$1,067,612.24	$1,067,612.24	$960,851.02	$21,245,483.58

Schedule/Phasing

The Contractor is required by the NYSDOT to submit to the Engineer for approval, a construction/progress schedule showing the order in which the Contractor proposes to carry on the work, the date on which the work on the project will start, the major items of work (earth work, excavation, mobilization, soil erosion control measures, highway reconstruction etc.), the critical features and the completed dates for completing each task.

The Contractor's work schedule and methods shall be consistent with the amended SWPPP. Once approved, the progress schedule shall become a part of the SWPPP.

The following list is a suggested phasing and sequence of major construction activities for the project.

Phase 1:

Roundabout

- Clear and grub construction site in preparation for grading.
- Install erosion control measures.
- Temporarily relocate utilities including waterlines and power lines.
- Grade construction site including relocated Butternut Drive, roundabout and Exit/Entrance ramps and storm water detention pond. Exclude existing Butternut Drive to avoid traffic impact.
- Lay subbase for relocated Butternut Drive, roundabout and Exit/Entrance ramps.
- Install storm water drainage system and pipes.
- Pave roundabout and relocated Butternut Drive.
- Re-establish waterlines and power lines.
- Paint pavement markings for relocated Butternut Drive and Roundabout.
- Install roundabout lighting and signs.
- Close Existing Butternut Drive and allow traffic to flow from south Butternut Drive through the roundabout and to north Butternut Drive. Do not allow traffic to take exits/entrances or bypass road.
- Remove Existing Butternut Drive.
- Pave exit/entrance ramps.
- Complete sign installations and pavement markings for exit/entrance ramps.

Phase 2:

Bridge

- Install piles and pier caps. Complete bridge abutments and miscellaneous sub-structure concrete work and closure pours.
- Construct bridge approaches.
- Install all under drain, drainage and utility conduits as needed.
- Construct and install concrete girders.
- Pour bridge deck.
- Install sidewalk and bridge rails.
- Install lighting.

Phase 3: Phase 3 may be constructed concurrently with Phase 2.

Bypass Road

- Clear and grub construction site in preparation for grading.
- Install erosion control measures.
- Grade bypass road.
- Lay subbase.
- Install highway drainage system.
- Pave bypass road.
- Install traffic signals for intersection of bypass road and Bowman Road.
- Install guiderails.
- Complete sign installations and pavement markings for bypass road and bridge.
- Complete landscaping of entire project.
- When vegetation is established, remove silt fence and any other temporary erosion control measures that remain and clean out any sedimentation in the drainage pipes and swales. Reseed/repair any areas damaged during these activities.
- Open bypass road and exit/entrance ramps to traffic.

Conclusion

The total cost of the project and the schedule proposed in the report are estimates for DeWitt bypass project located in the Town of Dewitt and Manlius, Onondaga County, New York. Alternative 1a was selected in the preliminary design phase with a total cost estimate of 10.9 million dollars. This project involves a concrete bridge, 150 foot diameter roundabout, highway and detention pond which were all considered in the cost and schedule sequencing. The quantities and cost for each item were obtained using NYS Department of Transportation specifications and standards. The scheduling is a 3 phase construction sequence that minimizes traffic and environmental impacts.

APPENDIX

Appendix 1: Concrete Bridge and Steel Bridge

Concrete Bridge

PRELIMINARY COST ESTIMATE WORKSHEET (NEW AND REPLACEMENT BRIDGES)									
P.I.N	1234.56	B.I.N		PS&E					
Bridge Name:	Butternut Bridge			Over	Butternut Creek				
Prepared by:	Gabriel Stinebrickner			date:					
Number of Spans:	1			Width (ft):	32	OR (m):		(Width of opening for culvert & 3-sided frame)	
Span:	1							(Length along the barrel for culvert & 3-sided frame)	
Length of Spans(ft):	100								
OR Spans (m):									
Superstructure type:	PC box beam			Radius (ft)	10	OR (m):			
Abutment type:	solid cantilever			Average Abutment Height (ft):	12	OR (m):			
Foundation type:	CIP			skew in degrees:					
Length of wingwalls > 60 ft:	0	OR (m):		Average ww height ft:	12			(Length > 60 ft for all wingwalls combined.)	
Number of Cofferdams	0	water depth, ftg bottom to OHW:	none						
Over Roadway Height (ft):	20	OR (m):		(From roadway to bottom of culvert)					
Bottom Angle (ft):	100	OR (m):		(Length of barrel for culvert & 3-sided frame)					
Work Zone Traffic Control:	off site detour			Painted:	yes				
Shoulder Break Area (sq ft):	5760								
1A) Base ($/sq ft shoulder break area)		$91							
1B) Culverts & Three sided frames		$0		for openings 20 ft to 40 ft					
2) Foundations		$15							
3) Abutments		$0							
4) Cofferdams		$0							
5) Span Adjustment:		$11							
6) Curved Girders		$0							
7) Long Wingwalls		$0							
8) Stage Construction		$0							
9) Miscellaneous		$0							
Total Cost $/sq ft shoulder break area		$117	X SB Area	5760	=	$675,187			
				Remove Existing Bridge:		$0			
				Detour or WZTC:		$0			
				Channel work or other slope protection:		$0			
				Utilities, Asthetics, or MSE Walls:		$0			
				Overhead:		$0			
last updated				3% Inflation and 4% Mobilization:		$47,263			
3/17/15				**TOTAL ESTIMATED BRIDGE SHARE:**		**$722,450**			

Steel Bridge

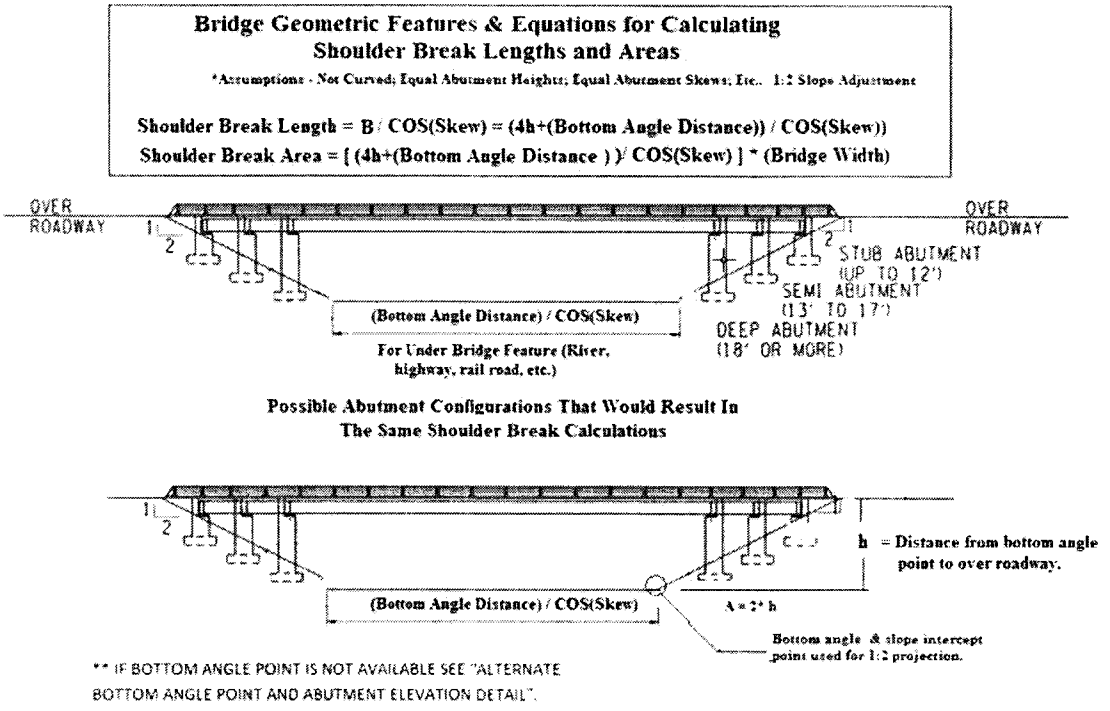
PRELIMINARY COST ESTIMATE WORKSHEET (NEW AND REPLACEMENT BRIDGES)

P.I.N	1234.56	B.I.N		PS&E				
Bridge Name:	Butternut Bridge			Over	Butternut Creek			
Prepared by:	Gabriel Stinebrickner			date:	11/18/15			
Number of Spans:	1			Width (ft):	32	OR (m):		(Width of opening for culvert & 3-sided frame)
Span:	1							(Length along the barrel for culvert & 3-sided frame)
Length of Spans(ft):	100							
OR Spans (m):								
Superstructure type:	Steel straight			Radius (ft)	10	OR (m):		
Abutment type:	solid cantilever			Average Abutment Height (ft):	12	OR (m):		
Foundation type:	CIP			skew in degrees:	0			
Length of wingwalls > 60 ft:	0	OR (m):		Average ww height ft:	12			(Length > 60 ft for all wingwalls combined.)
Number of Cofferdams	0	water depth, ftg bottom to OHW:	Substructure in 8 ft to 12 ft of w					
Over Roadway Height (ft):	20	OR (m):		(From roadway to bottom of culvert)				
Bottom Angle (ft):	100	OR (m):		(Length of barrel for culvert & 3-sided frame)				
Work Zone Traffic Control:	off site detour			Painted:	yes			
Shoulder Break Area (sq ft):	5760							

1A) Base ($/sq ft shoulder break area)	$101			
1B) Culverts & Three sided frames	$0	for openings 20 ft to 40 ft		
2) Foundations	$15			
3) Abutments	$0			
4) Cofferdams	$0			
5) Span Adjustment:	$16			
6) Curved Girders	$0			
7) Long Wingwalls	$0			
8) Stage Construction	$0			
9) Miscellaneous	$5			
Total Cost $/sq ft shoulder break area	$137	X SB Area	5760 =	$787,046
			Remove Existing Bridge:	$0
			Detour or WZTC:	$0
			Channel work or other slope protection:	$0
			Utilities, Asthetics, or MSE Walls:	$0
			Overhead:	$0
last updated			3% Inflation and 4% Mobilization:	$55,093
3/17/20+A1:O5815			**TOTAL ESTIMATED BRIDGE SHARE:**	**$842,140**

Appendix 2: Shoulder Break Method

Figure 1.



Appendix 3: Detailed Cost Estimates

Cost Estimate	Alternative 1a: To Burdick with Roundabout				
Item	Units	Unit Price	Quantity	Subtotal	Item Number/Notes
Asphalt for Road					12 foot lanes
Gravel (Subbase)	SF	1.84	173400	$319,056.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	173400	$527,136.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	173400	$260,100.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	173400	$170,799.00	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Asphalt for Shoulder					10 foot shoulders
Gravel(subbase)	SF	2.26	144500	$326,570.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	1.52	144500	$219,640.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.5	144500	$216,750.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	144500	$142,332.50	402.125202, 40mm top, 12.5 F1 TOP CR5 HMA, 50 SERIES COMPACT @ $98.50/ton
Excavation:cut	CY	17.75	814	$14,448.50	203.02 Unclassified Excavation and disposal
Fill(on site)	CY	21.12	7359	$155,422.08	610.1401 TOPSOIL - REUSE ON-SITE MATERIALS
Fill(import)	CY	46.59	22076	$1,028,520.84	610.1402 TOPSOIL - ROADSIDE
Clearing & Grubbing	SY	2.11	9319	$19,663.09	201.07000004
Seeding	SY	0.73	24083.33	$17,580.83	610.1601 Turf Establishment-roadside
Erosion Control	SF	12	14450	$173,400.00	554.18000017 COMP REIN EROSION MAT COVER LAUNCH SOIL / SF
Drainage Stucture Inlet	LF	21.21	7225	$153,242.25	209.1703 DRAINAGE STRUCTURE INLET PROT, PREFAB TM / LF
Water main	LF	50	1000	$50,000.00	663.4112 R&D EXIST WTR MAIN,12"
Storm Water Treatment	EA	80000	1	$80,000.00	604.51020915 STORMWATER TREATMENT SYSTEM(MAX 188 G/S)
Guide Rails	LF	25.94	1000	$25,940.00	606.10 BOX BEAM GUIDE RAILING
Lighting	EA	5669	5	$28,345.00	670.10020005 LIGHT STANDARD, SPECIAL
Striping(white)	LF	1.10	14450	$15,895.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	14450	$5,635.50	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
MPT	D	1533.33	180	$275,999.40	619.01040063 BSIC M & P OF TRFC FOR NON-INTER HW ESCW
Building Demolition	SF	3	22000	$66,000.00	
Bedrock	LS		0	$0.00	
Roundabout					
Gravel (Subbase)	SF	1.84	27331	$50,289.04	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	27331	$83,086.24	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	27331	$40,996.50	402.19S902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	27331	$26,921.04	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Gravel(subbase)(shoulder	SF	2.26	8000	$18,080.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base(shoulder)	SF	1.52	8000	$12,160.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder(shoulder)	SF	1.5	8000	$12,000.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top(shoulder)	SF	0.985	8000	$7,880.00	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Lighting	EA	5669	20	$113,380.00	670.10020005 LIGHT STANDARD, SPECIAL
Striping(white)	LF	1.10	14450	$15,895.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	14450	$5,635.50	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
Seeding	SY	0.73	507	$370.11	610.1601 Turf Establishment-roadside
Fill(import)	CY	46.59	1164	$54,230.76	610.1402 TOPSOIL - ROADSIDE
Bridge					
Concrete Bridge	LS		1	$722,450.00	
Steel Bridge	LS		1	$842,140.00	
Intersection Modification					
Traffic Signal Pole	EA	1100	6	$6,600.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	6	$4,290.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Signal Cable	LF	1.7	1000	$1,700.00	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Red Light	EA	83.29	10	$832.90	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	10	$950.90	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	10	$951.10	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	10	$885.40	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	10	$894.90	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	10	$925.30	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Cost with Concrete Bridge				$5,475,709.68	
Cost with Steel Bridge				$5,595,399.68	

Cost Estimate	Alternative 1b: To RT290 with Roundabout				
Item	Unit	Unit Price	Quantity	Subtotal	Notes
Asphalt for Road					12 foot lanes
Gravel (Subbase)	SF	1.84	291096	$535,616.64	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	291096	$884,931.84	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	291096	$436,644.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	291096	$286,729.56	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Asphalt for Shoulder					10 foot shoulders
Gravel(subbase)	SF	2.26	242580	$548,230.80	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	1.52	242580	$368,721.60	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.5	242580	$363,870.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	242580	$238,941.30	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Excavation:cut	CY	17.75	1100	$19,525.00	203.02 Unclassified Excavation and disposal
Fill(on site)	CY	21.12	74121	$1,565,435.52	610.1401 TOPSOIL - REUSE ON-SITE MATERIALS
Fill(import)	CY	46.59	74121	$3,453,297.39	610.1402 TOPSOIL - ROADSIDE
Clearing & Grubbing	SY	2.11	33612	$70,921.32	201.07000004
Seeding	SY	0.73	26953	$19,675.93	610.1601 Turf Establishment-roadside
Erosion Control	SF	16.46	5000	$82,300.00	Includes material, labor and equipment.
Drainage Stucture Inlet	LF	21.21	12129	$153,242.25	209.1703 DRAINAGE STRUCTURE INLET PROT, PREFAB TM / LF
Water main	LF	50	1000	$50,000.00	
Storm Water Treatment	EA	80000	1	$80,000.00	604.51020915 STORMWATER TREATMENT SYSTEM(MAX 188 G/S)
Guide Rails	LF	25.94	300	$7,782.00	606.10 BOX BEAM GUIDE RAILING
Lighting	EA	5669.4	5	$28,347.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 5 lights for bridge
Striping(white)	LF	1.10	12129	$13,341.90	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	12129	$4,730.31	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
MPT	d	180	1533.33	$275,999.40	619.01040063 BSIC M & P OF TRFC FOR NON-INTER HW ESCW
Building Demolition	SF	3	22000	$66,000.00	
Bedrock	LS		0	$0.00	
Roundabout					
Gravel (Subbase)	SF	1.84	27331	$50,289.04	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	27331	$83,086.24	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	27331	$40,996.50	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	27331	$26,921.04	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Gravel(subbase)(shoulder	SF	2.26	8000	$18,080.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base(shoulder)	SF	1.52	8000	$12,160.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder(shoulder)	SF	1.5	8000	$12,000.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top(shoulder)	SF	0.985	8000	$7,880.00	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Lighting	EA	2600	20	$52,000.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 8 inside, 12 outside
Striping(white)	LF	1.10	14450	$15,895.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	14450	$5,635.50	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
Seeding	SY	0.73	507	$370.11	610.1601 Turf Establishment-roadside
Fill(import)	CY	46.59	1164	$54,230.76	610.1402 TOPSOIL - ROADSIDE
Bridge					
Concrete Bridge	LS		1	$722,450.00	
Steel Bridge	LS		1	$842,140.00	
Intersection Modification					
Traffic Signal Pole	EA	1100	6	$6,600.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	6	$4,290.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Signal Cable	LF	1.7	1000	$1,700.00	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Red Light	EA	83.29	10	$832.90	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	10	$950.90	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	10	$951.10	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	10	$885.40	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	10	$894.90	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	10	$925.30	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH

Cost Estimate	Alternative 2a: To Burdick with Signalized Intersection				
Item	Unit	Unit Price	Quantity	Subtotal	Notes
Asphalt for Road					12 foot lanes
Gravel (Subbase)	SF	1.84	173400	$319,056.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	173400	$527,136.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	173400	$260,100.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	173400	$170,799.00	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Asphalt for Shoulder					10 foot shoulders
Gravel(subbase)	SF	2.26	144500	$326,570.00	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	1.52	144500	$219,640.00	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.5	144500	$216,750.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	144500	$142,332.50	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Excavation:cut	CY	17.75	814	$14,448.50	203.02 Unclassified Excavation and disposal
Fill(on site)	CY	21.12	7359	$155,422.08	610.1401 TOPSOIL - REUSE ON-SITE MATERIALS
Fill(import)	CY	46.59	22076	$1,028,520.84	610.1402 TOPSOIL - ROADSIDE
Clearing & Grubbing	SY	2.11	27957	$58,989.27	201.07000004
Seeding	SY	0.73	24083.33	$17,580.83	610.1601 Turf Establishment-roadside
Erosion Control	SF	12	14450	$173,400.00	554.18000017 COMP REIN EROSION MAT COVER LAUNCH SOIL / SF
Drainage Stucture Inlet	LF	21.21	7225	$153,242.25	209.1703 DRAINAGE STRUCTURE INLET PROT, PREFAB TM / LF
Water main	LF	50	1000	$50,000.00	
Storm Water Treatment	EA	80000	1	$80,000.00	604.51020915 STORMWATER TREATMENT SYSTEM(MAX 188 G/S)
Guide Rails	LF	25.94	1000	$25,940.00	606.10 BOX BEAM GUIDE RAILING
Lighting	EA	5669.4	5	$28,347.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 5 lights for bridge
Striping(white)	LF	1.10	14450	$15,895.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	14450	$5,635.50	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
MPT	d	1533.33	180	$275,999.40	619.01040063 BSIC M & P OF TRFC FOR NON-INTER HW ESCW
Building Demolition	SF	3	22000	$66,000.00	
Bedrock	LS		0	$0.00	
Signalized Intersection					
Gravel (Subbase)	SF	1.84	26928	$49,547.52	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	26928	$81,861.12	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	26928	$40,392.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	26928	$26,524.08	402.125202, 40mm top, 12.5 F1 TOP CR5 HMA, 50 SERIES COMPACT @ $98.50/ton
Lighting	EA	2600	20	$52,000.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 1 light/50 feet,
Striping(white)	LF	1.10	2700	$2,970.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	600	$234.00	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
Traffic Signal Pole	EA	1100	4	$4,400.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	4	$2,860.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Pedestrian Signal Pole	EA	152	4	$608.00	680.10040006 POWDER COATING PEDESTRIAN SIGNAL POLE
Signal Cable	LF	1.7	768	$1,305.60	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Signal Control & Cabinet	EA	12450	1	$12,450.00	680.80140002 16 PHASE NEMA TRFC SIGNAL CONTRL&CABINET
Red Light	EA	83.29	4	$333.16	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	4	$380.36	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	4	$380.44	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	6	$531.24	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	6	$536.94	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	6	$555.18	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Bridge					
Concrete Bridge	LS		1	$722,450.00	$279,698.64
Steel Bridge	LS		1	$842,140.00	
Intersection Modification					
Traffic Signal Pole	EA	1100	6	$6,600.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	6	$4,290.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Signal Cable	LF	1.7	1000	$1,700.00	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Red Light	EA	83.29	10	$832.90	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	10	$950.90	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	10	$951.10	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	10	$885.40	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	10	$894.90	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	10	$925.30	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Cost with Concrete Bridge				$5,353,812.31	
Cost with Steel Bridge				$5,473,502.31	

Cost Estimate	Alternative 2a: To RT 290 with Signalized Intersection				
Item	Unit	Unit Price	Quantity	Subtotal $$$	Notes
Asphalt for Road					12 foot lanes
Gravel (Subbase)	SF	1.84	291096	$535,616.64	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	291096	$884,931.84	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	291096	$436,644.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	291096	$286,729.56	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Asphalt for Shoulder					10 foot shoulders
Gravel(subbase)	SF	2.26	242580	$548,230.80	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	1.52	242580	$368,721.60	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.5	242580	$363,870.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	242580	$238,941.30	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Excavation:cut	CY	17.75	1100	$19,525.00	203.02 Unclassified Excavation and disposal
Fill(on site)	CY	21.12	74121	$1,565,435.52	610.1401 TOPSOIL - REUSE ON-SITE MATERIALS
Fill(import)	CY	46.59	74121	$3,453,297.39	610.1402 TOPSOIL - ROADSIDE
Clearing & Grubbing	SY	2.11	26953	$56,871.53	201.07000004
Seeding	SY	0.73	26953	$19,675.93	610.1601 Turf Establishment-roadside
Erosion Control	SF	16.46	5000	$82,300.00	Includes material, labor and equipment.
Drainage Stucture Inlet	LF	21.21	12129	$153,242.25	209.1703 DRAINAGE STRUCTURE INLET PROT, PREFAB TM / LF
Water main	LF	50	1000	$50,000.00	
Storm Water Treatment	EA	80000	1	$80,000.00	604.51020915 STORMWATER TREATMENT SYSTEM(MAX 188 G/S)
Guide Rails	LF	25.94	300	$7,782.00	606.10 BOX BEAM GUIDE RAILING
Lighting	EA	5669.4	5	$28,347.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 5 lights for bridge
Striping(white)	LF	1.10	12129	$13,341.90	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	12129	$4,730.31	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
MPT	d	180	1533.33	$275,999.40	619.01040063 BSIC M & P OF TRFC FOR NON-INTER HW ESCW
Building Demolition	SF	3	22000	$66,000.00	
Bedrock	LS		0	$0.00	
Signalized Intersection					
Gravel (Subbase)	SF	1.84	26928	$49,547.52	623.11 , 300mm thickness, CRUSHED GRAVEL @ $58.46/ton
Base	SF	3.04	26928	$81,861.12	402.376902, 150mm base,37.5 F9 BASE HMA, 60 SERIES COMPACTION @ $82.25/ton
Binder	SF	1.50	26928	$40,392.00	402.195902 65mm binder, 19 F9 BINDER HMA, 50 SERIES COMPACTION @ $93.78/Ton
Top	SF	0.985	26928	$26,524.08	402.125202, 40mm top, 12.5 F1 TOP CRS HMA, 50 SERIES COMPACT @ $98.50/ton
Lighting	EA	2600	20	$52,000.00	670.00040105 ALUM RDWY LGHT STD TOP MNTD LED FIX TY C, 1 light/50 feet,
Striping(white)	LF	1.10	2700	$2,970.00	685.11 WHT EPOXY REFLEC PAVE STR - 20 MILS
Striping(Yellow)	LF	0.39	600	$234.00	685.12 YEL EPOXY REFLEC PAVE STR - 20 MILS
Traffic Signal Pole	EA	1100	4	$4,400.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	4	$2,860.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Pedestrian Signal Pole	EA	152	4	$608.00	680.10040006 POWDER COATING PEDESTRIAN SIGNAL POLE
Signal Cable	LF	1.7	768	$1,305.60	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Signal Control & Cabinet	EA	12450	1	$12,450.00	680.80140002 16 PHASE NEMA TRFC SIGNAL CONTRL&CABINET
Red Light	EA	83.29	4	$333.16	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	4	$380.36	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	4	$380.44	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	6	$531.24	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	6	$536.94	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	6	$555.18	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Bridge					
Concrete Bridge	LS		1	$722,450.00	
Steel Bridge	LS		1	$842,140.00	
Intersection Modification					
Traffic Signal Pole	EA	1100	6	$6,600.00	680.10010005 POWDER COATING TRAFFIC SIGNAL POLES
Traffic Signal Pole Arm	EA	715	6	$4,290.00	680.10020005 POWDER COATING TRAFFIC SIGNAL MAST ARM
Signal Cable	LF	1.7	1000	$1,700.00	680.730214 SIGNAL CABLE 2 CONDUCTORS, 14 AWG
Red Light	EA	83.29	10	$832.90	680.810101 T.S. MODULE - 12 INCH, RED BALL, LED
Yellow Light	EA	95.09	10	$950.90	680.810103 T.S. MODULE- 12 INCH, YELLOW BALL LED
Green Light	EA	95.11	10	$951.10	680.810105 T.S. MODULE - 12 INCH GREEN BALL, LED
Red Arrow	EA	88.54	10	$885.40	680.810102 T.S. MODULE - 12 INCH, RED ARROW, LED
Yellow Arrow	EA	89.49	10	$894.90	680.810104 T.S. MODULE- 12 INCH, YELLOW ARROW LED
Green Arrow	EA	92.53	10	$925.30	680.810106 T.S. MODULE - 12 INCH GREEN ARROW, LED
Traffic Signal Section	EA	182.9	10	$1,829.00	680.810601 T.S. SECTION - POLY, TYPE I, 12 INCH
Cost with Concrete Bridge				$10,562,242.12	
Cost with Steel Bridge				$10,681,932.12	

Floodplain Analysis

For

DeWitt Bypass

Town of DeWitt
Onondaga County, New York

April 2016

1234.56
DeWitt Bypass

ALPHA ENGINEERING

SUNY POLYTECHNIC INSTITUTE
100 Seymour Road
Utica, New York

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1 Location
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3 FIRM – Flood Insurance Rate Map
4 Existing Flood Map
5 Proposed Flood Map
6 Draft FIRM – Flood Insurance Rate Map
7 Flood Elevation Summary Table

APPENDICES

A Existing Effective Model
B Proposed Effective Model
C Summary Tables

Introduction

This Floodplain Analysis has been prepared for the DeWitt Bypass project. As part of the Floodplain Regulations of the Town of DeWitt code and the Town of Manlius Code, any proposed development within a floodplain must demonstrate that the development will not result in an increase to the elevation of the 100-year floodplain on the studied stream. In this case, the analysis must demonstrate that construction of the proposed bypass highway will not result in a significant increase in the elevation of the 100-year floodplain on Butternut Creek, which flows through the project area.

Site Location

The DeWitt Bypass project is located on 370 acres of New York State land east of I-481. The beginning point of the project is located on the western side of the project area at the I-481 and I-690 Interchange, west of Butternut Drive. The end point of the project is located 1.3 miles east at the intersection of Bowman Rd and Burdick Street. The northern and southern limits are the existing Route 290 and the Old Erie Canal in the Town of DeWitt, Onondaga County, New York (FIGURE 1).

Project Description

The project involves the construction of a 150 foot diameter traffic circle which will connect the on and off ramps of I-481 and I-690 to Butternut Creek Drive. Continuing in an easterly direction for approximately 150 feet, the proposed highway will include a bridge over Butternut Creek. The highway will continue in a southeasterly direction avoiding a body of water approximately 1500 feet east of the bridge site. From there the proposed highway will continue straight crossing Fisher Road and continue for 4500 feet in a southeasterly direction to Burdick Street where it connects with a proposed signalized intersection. Butternut Creek which has been studied by the Federal Emergency Management Agency (FEMA), runs through the project area.

A Stormwater Pollution Prevention Plan for the DeWitt Bypass was also prepared in accordance with NYSDEC Standards including existing and proposed stormwater runoff calculations. These calculations show a slight increase in flows from the existing site to the proposed site as a result of the project. This increase in flows was incorporated into this Flood Study.

Floodplain Analysis Process

The FEMA study, last revised in 1978 indicates the limits and elevation of the 100-year design storm (a storm having a 1% chance of occurring in any given year) and is used as a tool by FEMA to determine how property is affected by the 100-year flood (FIGURE 3). The study shows that the DeWitt Bypass project is located within the floodplain of Butternut Creek.

This study was prepared using a HEC RAS model. Topography was obtained from a Preliminary Plan, which included a combination of 2-foot and 4-foot topographic data for the proposed site.

To complete the Floodplain Analysis, the data used by FEMA to prepare the original floodplain mapping was obtained and a duplicate model of the original data was created. This duplicate model confirms the results of the original study (FIGURE 4). The original flow data for the 100 year storm was used in both models, 3400 cfs.

The final step was to prepare a proposed effective model. This model shows how the floodplain for the creek is affected by the proposed project, including the construction and grading of a 150 foot diameter traffic circle, and a 72 foot wide bridge. The result of this model (FIGURE 5) must show that the floodplain elevations following completion of the project are not significantly higher than before the project was in place, and that no residential or commercial areas inundated by the 100-year floodplain are at a greater risk than before. The water surface elevation comparison table in APPENDIX C shows that the highest increase in water surface elevation was a tenth of a foot near a power station to the south of the project area. This increase in water surface elevation is not significant enough to cause concern, and will have no effect on the power station. Also, the water surface elevation comparison table shows that water surface elevations go back down to existing levels after crossing under our proposed bridge. It should be noted that FEMA is currently in the process of redrafting the Flood Study for Onondaga County using updated data. A Draft Flood Insurance Rate Map (FIGURE 6) is currently under review by FEMA.

Analysis Results

Included with this analysis is the cross section data and computer mapping output for the existing effective model and the proposed effective model. FIGURE 8, is a Summary Table showing the pre-development flood elevations versus the post development flood elevations. Additional Summary Tables have been provided in APPENDIX C. The first table shows water surface elevations from the actual HEC RAS data obtained from FEMA compared to water surface elevations from the existing effective model prepared using HEC RAS. According to FEMA regulations, the water surface elevations must be within .5 feet of each other to

demonstrate a working existing model and our model meets these regulations. The second Summary Table shows a comparison between the existing effective model and the proposed effective model.

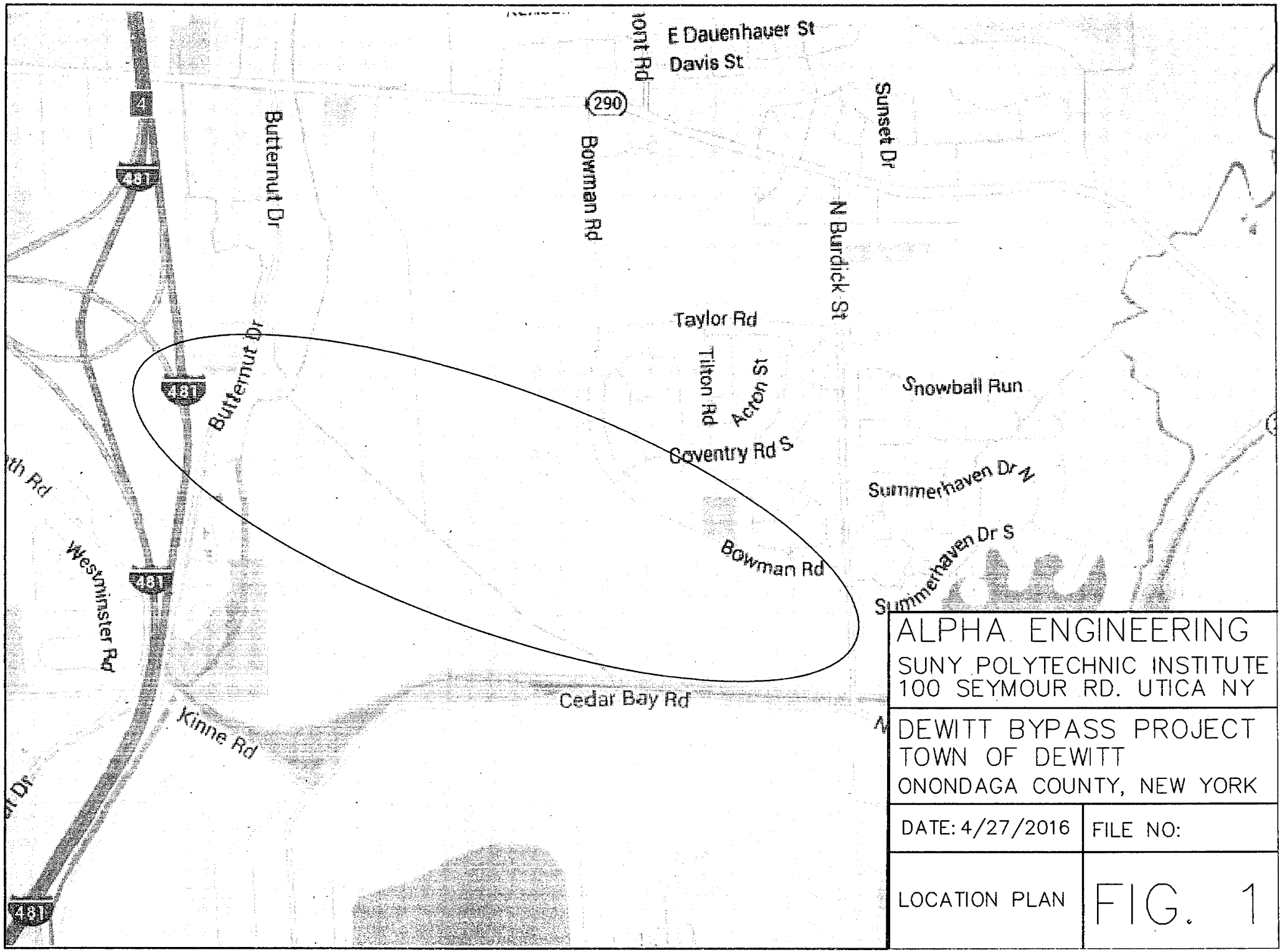
Conclusion

In conclusion, the results of this study show that the proposed development will slightly increase the floodplain elevations on the south side of the project site by less than a tenth of a foot on average. There are several commercial buildings and a power station on the south side of the project area that will not be affected by this increase. The study shows this minimal increase in flood elevations only upstream of the project site. Flood surface elevations return to existing conditions after crossing under our proposed bridge. The Proposed Flood Map (FIGURE 5) shows that the construction of the bypass highway, including grading, stormwater management, and creek modifications, results in a minimal increase in the floodplain area.

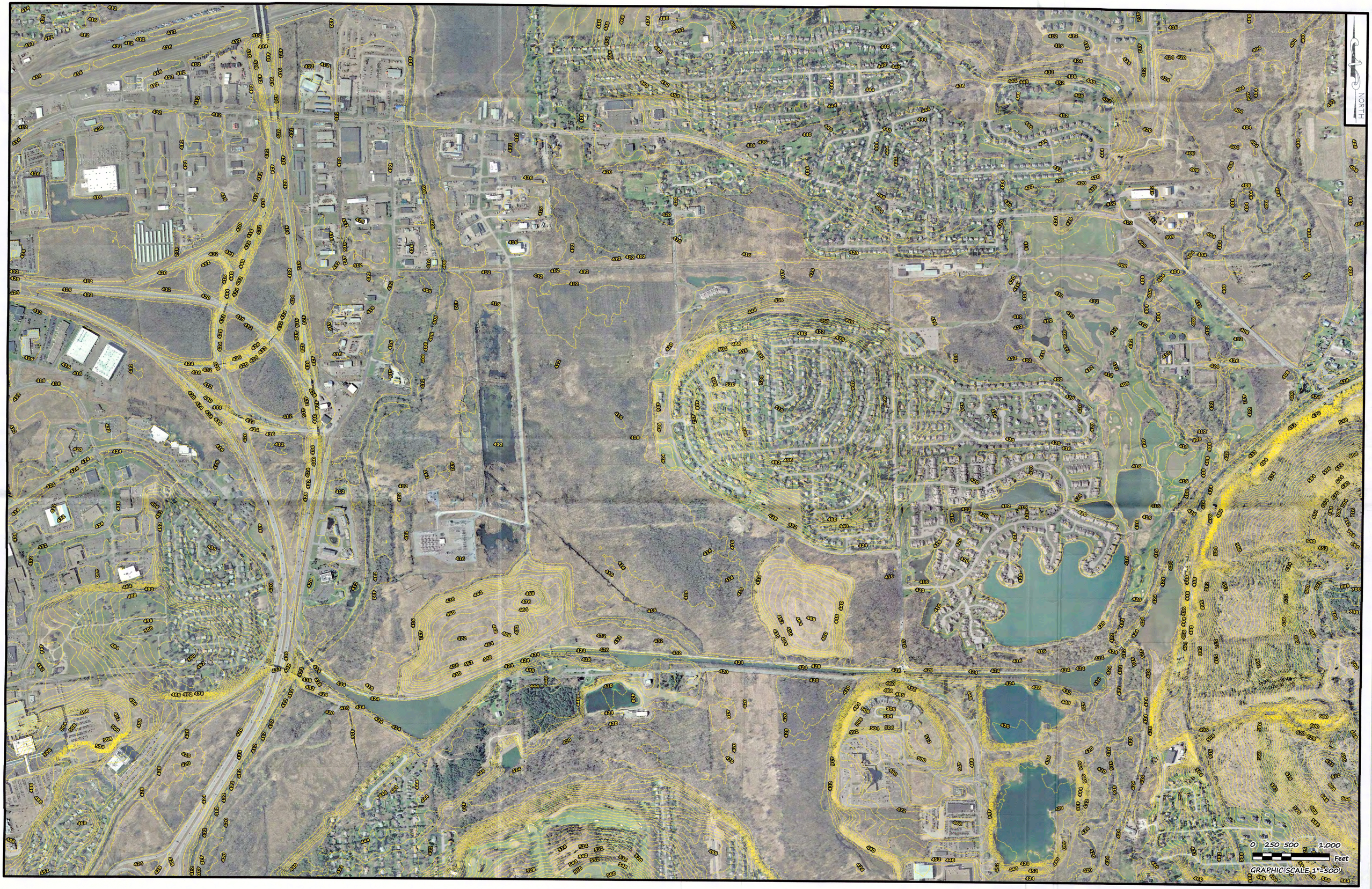
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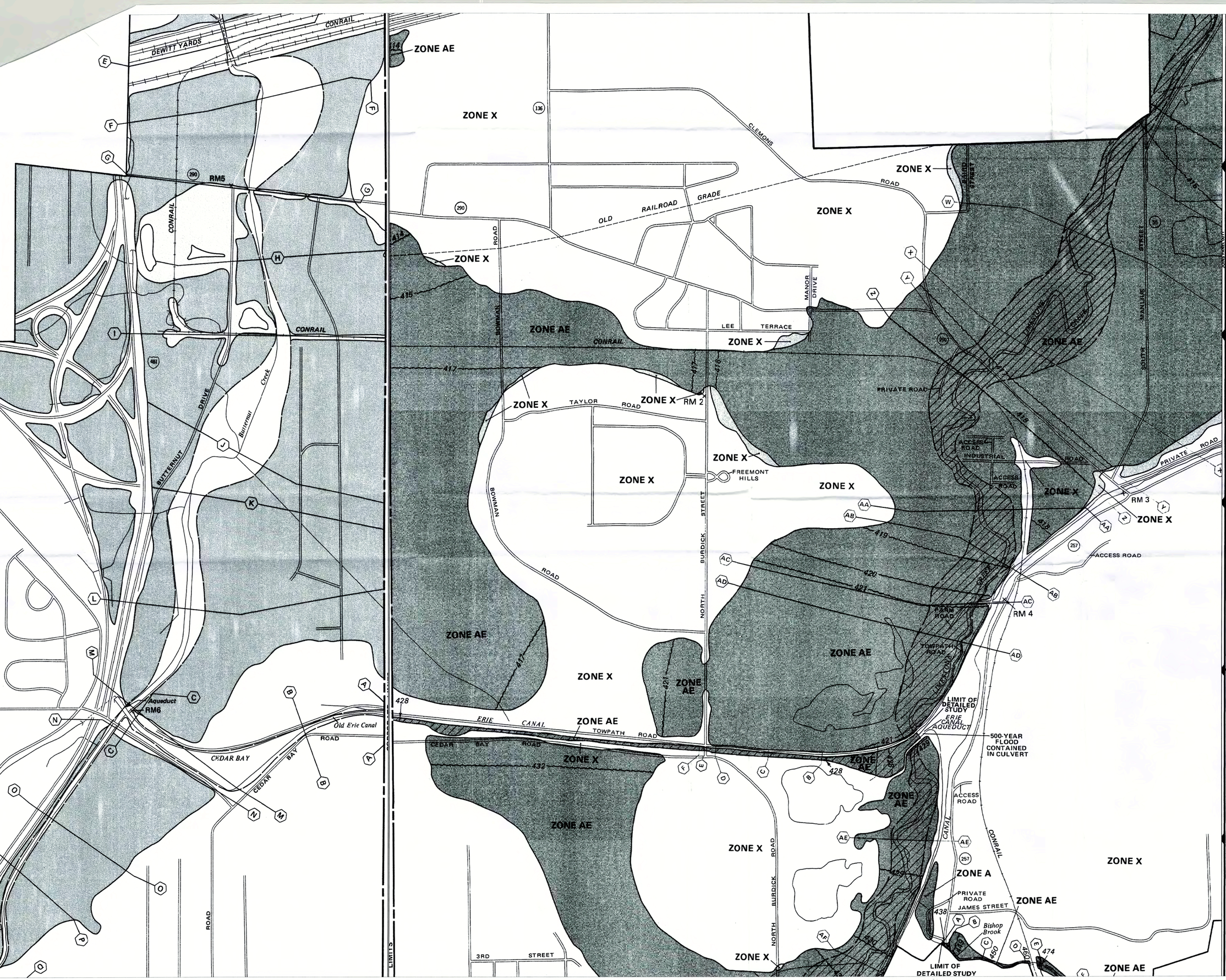
U.S. Department of Housing and Urban Development Federal Insurance Administration; Flood Insurance Study; Town of DeWitt, New York, Onondaga County; September 1978.

FIGURES



ALPHA ENGINEERING SUNY POLYTECHNIC INSTITUTE 100 SEYMOUR RD. UTICA NY	
DEWITT BYPASS PROJECT TOWN OF DEWITT ONONDAGA COUNTY, NEW YORK	
DATE: 4/27/2016	FILE NO:
LOCATION PLAN	FIG. 1


NORTH
0 250 500 1,000
Feet
GRAPHIC SCALE 1"=500'



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- **ZONE A** No base flood elevations determined.
- **ZONE AE** Base flood elevations determined.
- **ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- **ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
- **ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- **ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- **ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside 500-year floodplain.
- **ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 Base Flood Elevation Line; Elevation in Feet*

(D)—(D) Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone*

RM7X Elevation Reference Mark

•M1.5 River Mile

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Elevation reference marks are described in the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

MAP REPOSITORY

Town Hall, Fayetteville, New York 13066 (Maps available for reference only, not for distribution).

INITIAL IDENTIFICATION:
FEBRUARY 22, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:
DECEMBER 19, 1975

FLOOD INSURANCE RATE MAP EFFECTIVE:
DECEMBER 15, 1982

FLOOD INSURANCE RATE MAP REVISIONS:
July 3, 1985 - to change special flood hazard areas, to change zone designations, and to change base flood elevations.

February 5, 1992 - to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, to update format, to add roads and road names, and to incorporate previously issued letters of map revision.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-4620.

APPROXIMATE SCALE
800 0 800 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

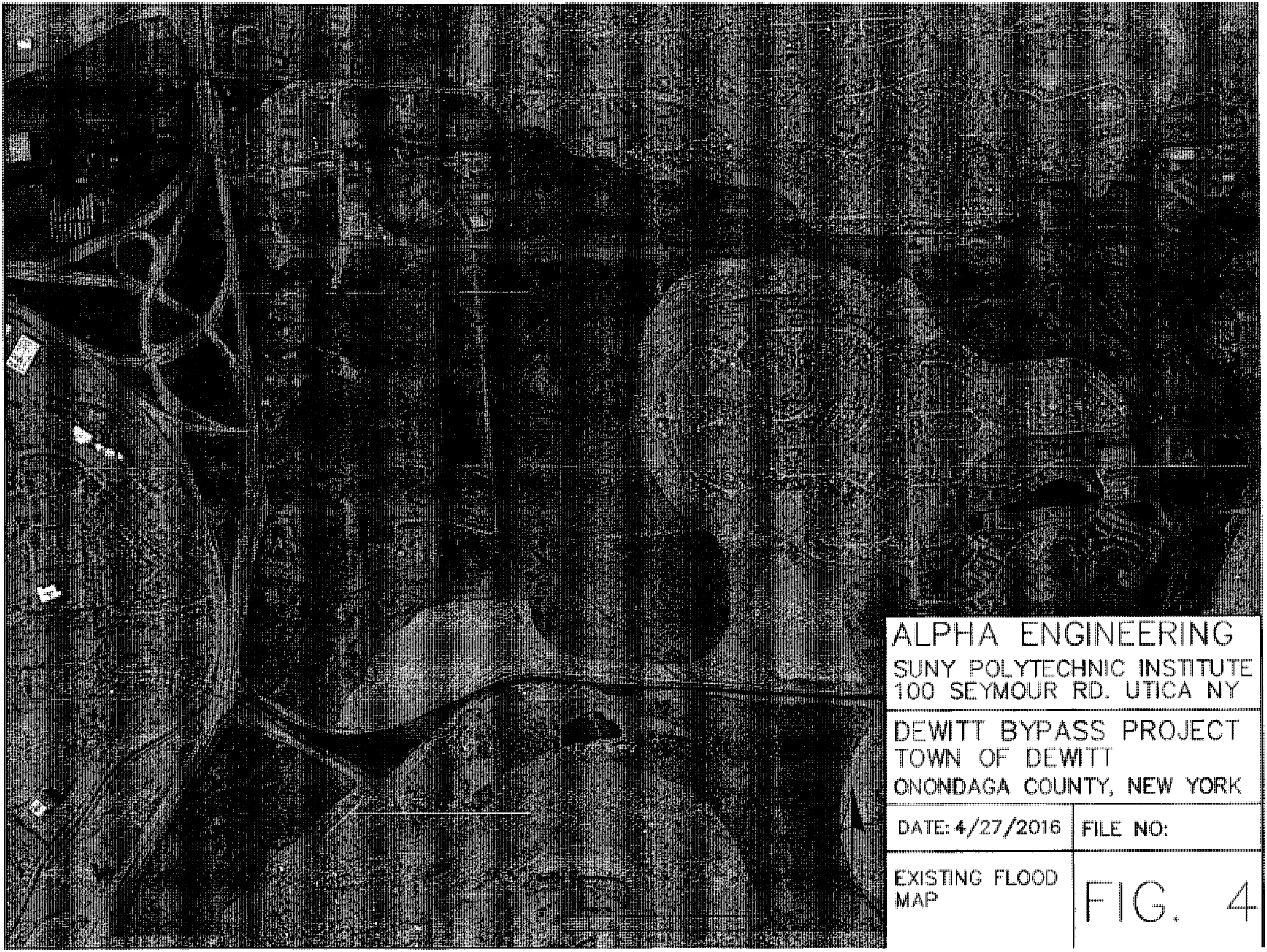
TOWN OF
MANLIUS,
NEW YORK
ONONDAGA COUNTY

PANEL 10 OF 25
(SEE MAP INDEX FOR PANELS NOT PRINTED)

PANEL LOCATION

COMMUNITY-PANEL NUMBER
360584 0010 D

MAP REVISED:
FEBRUARY 5, 1992



ALPHA ENGINEERING
SUNY POLYTECHNIC INSTITUTE
100 SEYMOUR RD. UTICA NY

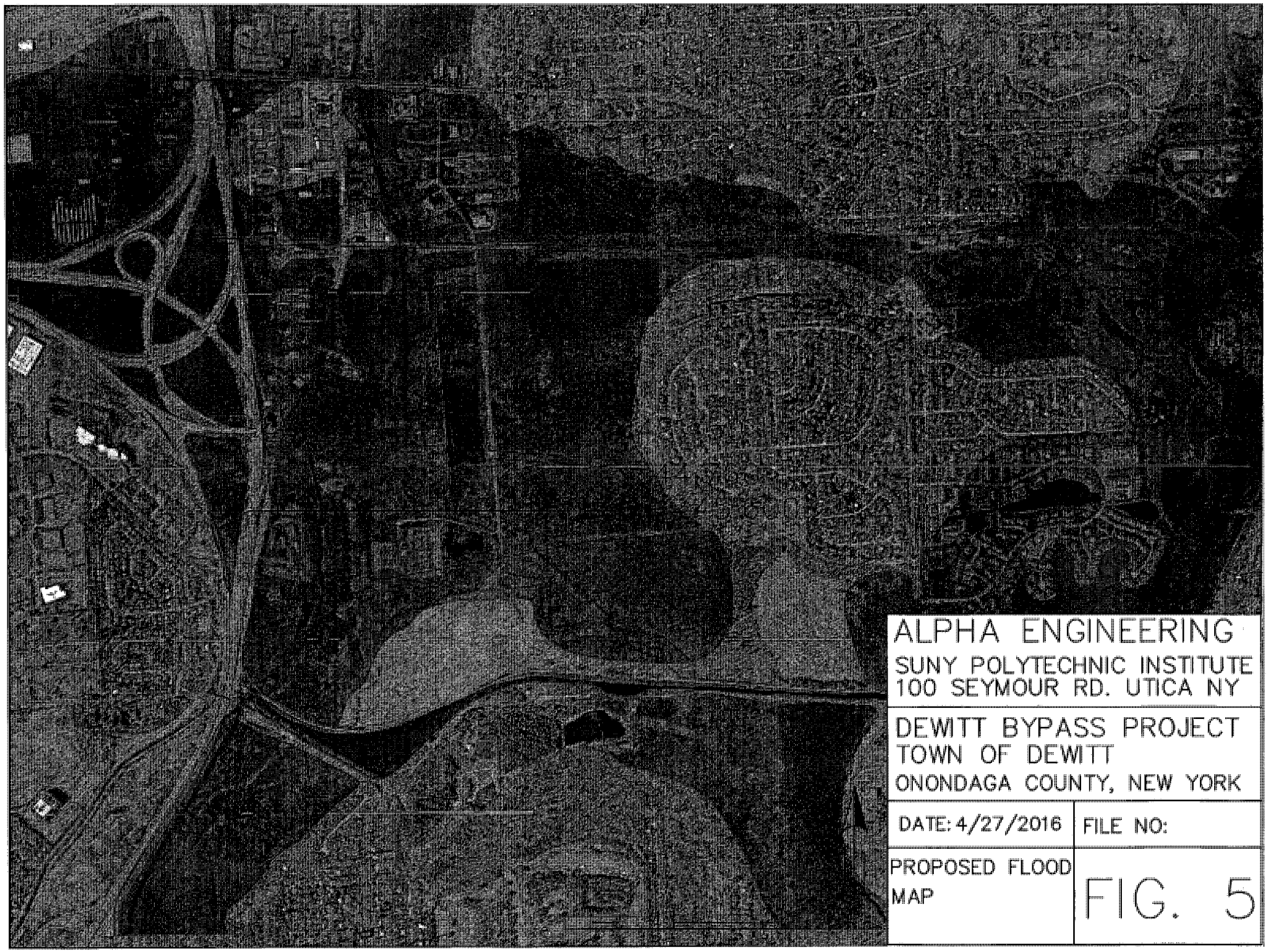
DEWITT BYPASS PROJECT
TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK

DATE: 4/27/2016

FILE NO:

EXISTING FLOOD MAP

FIG. 4



ALPHA ENGINEERING
SUNY POLYTECHNIC INSTITUTE
100 SEYMOUR RD. UTICA NY

DEWITT BYPASS PROJECT
TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK

DATE: 4/27/2016

FILE NO:

PROPOSED FLOOD MAP

FIG. 5

NOTES TO USERS

...ır use in administering the National Flood Insurance Program. It ...cessarily identify all areas subject to flooding, particularly from local ...ources of small size. The **community map repository** should be ...r for possible updated or additional flood hazard information.

...btain more detailed information in areas where **Base Flood Elevations** ...FEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 18. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC- 3, #9202
1315 East- West Highway
Silver Spring, MD 20910- 3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from digital orthophotography provided by the New York Office of Cyber Security & Critical Infrastructure from photography dated April 2006.

This map reflects more detailed and up- to- date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

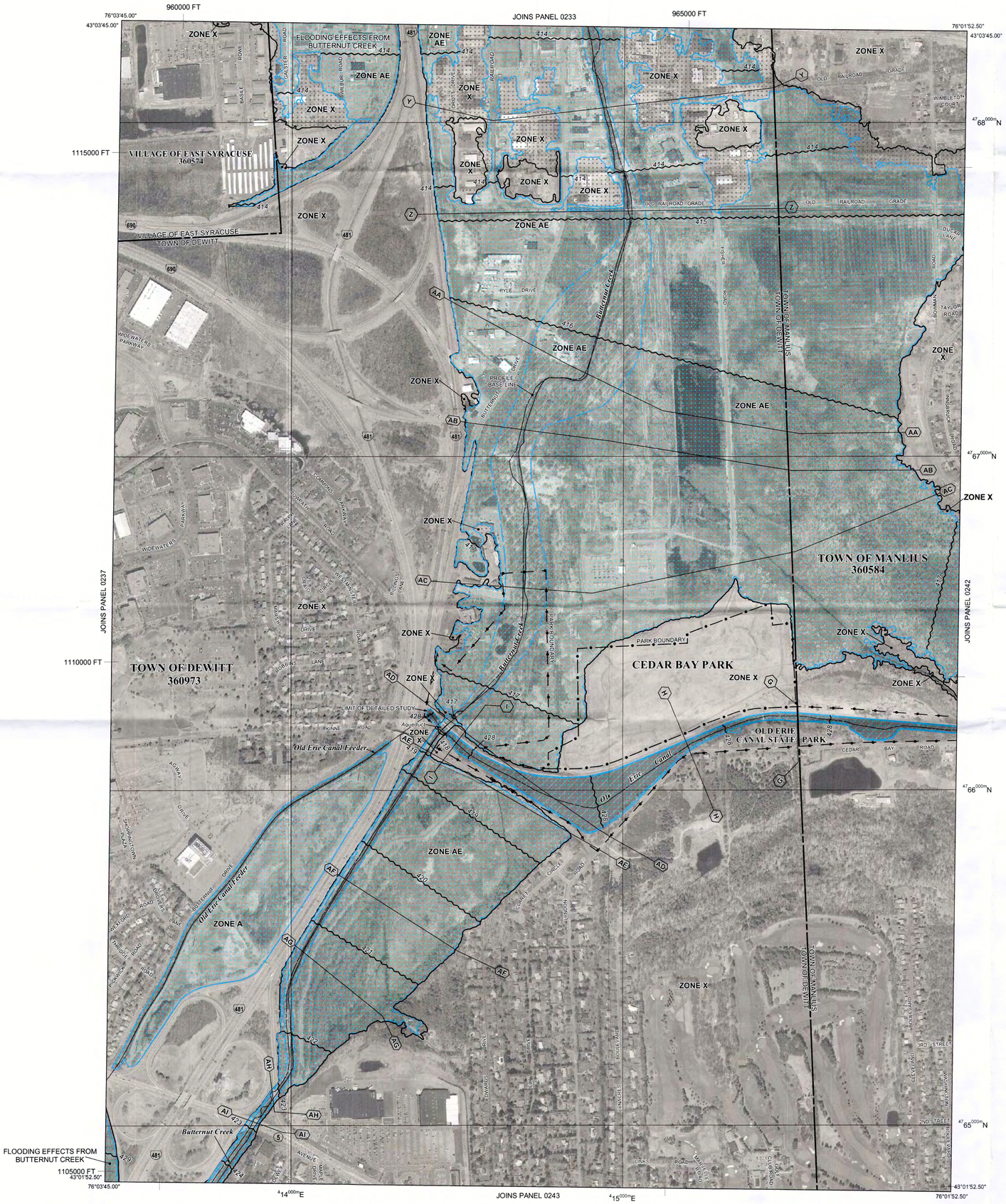
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de- annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1- 800- 358- 9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report,* and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1- 800- 358- 9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1- 877- 336- 2627) or visit the FEMA website at http://www.fema.gov/.

This digital FIRM was produced through a unique cooperative partnership between the New York State Department of Environmental Conservation (NYSDEC) and FEMA. As part of the effort, NYSDEC has joined in a Cooperative Technical Partnership agreement to produce and maintain FEMA's digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- (A) — (A) Cross section line
- (23) — (23) Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4375000mN — 1000-meter Universal Transverse Mercator grid values, zone 18
- 6000000 FT — 5000-foot grid ticks: New York State Plane coordinate system, central zone (FIPSZONE 3102), Transverse Mercator
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1- 800- 638- 6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0241F

FIRM
FLOOD INSURANCE RATE MAP
ONONDAGA COUNTY, NEW YORK
(ALL JURISDICTIONS)

PANEL 241 OF 520
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DEWITT, TOWN OF	360973	0241	F
EAST SYRACUSE, VILLAGE OF	360574	0241	F
MANLIUS, TOWN OF	360584	0241	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36067C0241F
EFFECTIVE DATE

Federal Emergency Management Agency

FLOOD ELEVATION SUMMARY TABLE

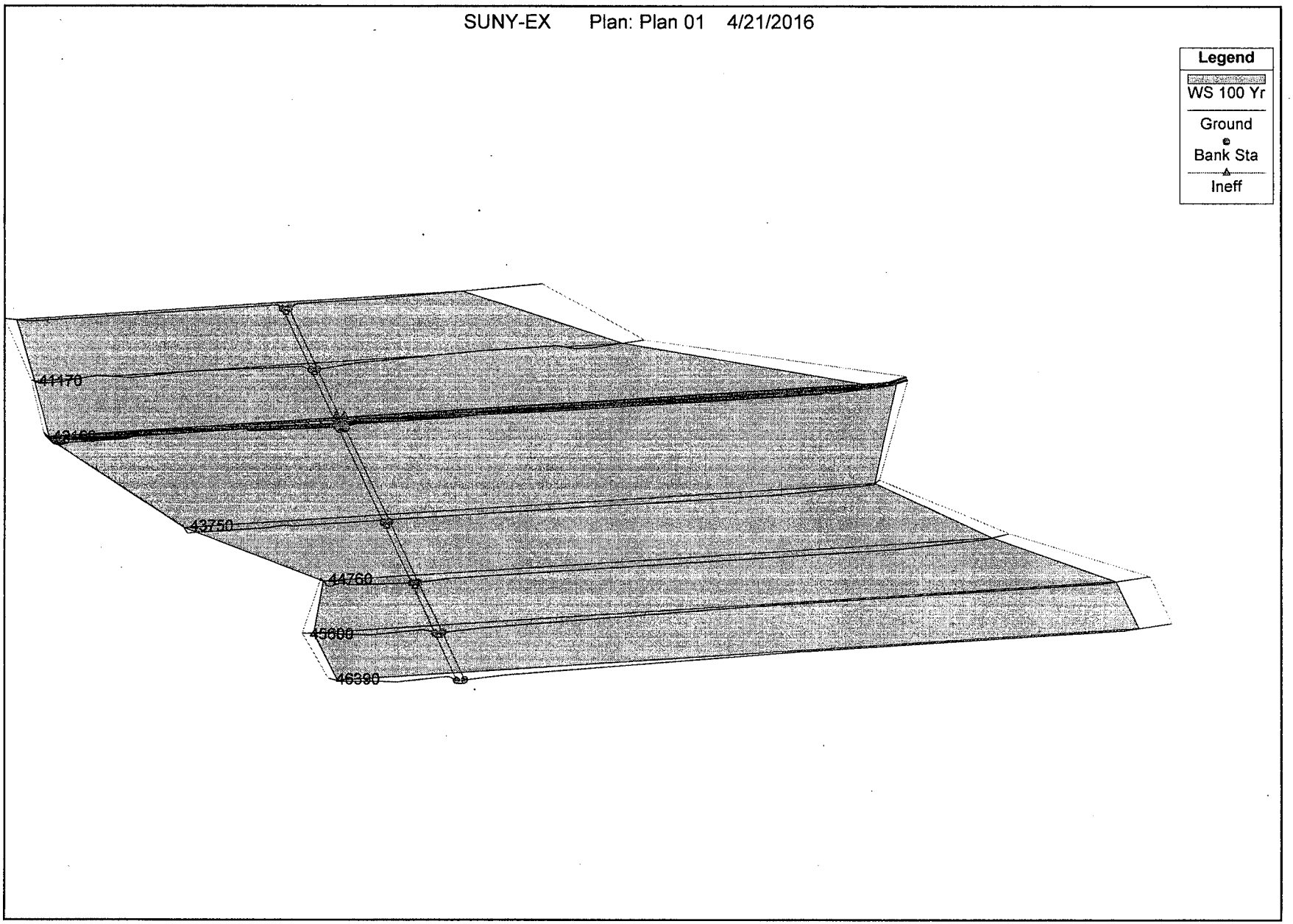
RIVER	RIVER STA.	PRE-DEVELOPMENT 100 YEAR FLOOD ELEVATION	POST-DEVELOPMENT 100 YEAR FLOOD ELEVATION
BUTTERNUT CREEK	46,390	417.26	417.30
BUTTERNUT CREEK	45,600	417.18	417.28
BUTTERNUT CREEK	44,760	417.17	417.23
BUTTERNUT CREEK	43,750	417.16	417.16
BUTTERNUT CREEK	42,160	417.15	417.15
BUTTERNUT CREEK	42,100	414.50	414.50
BUTTERNUT CREEK	41,170	414.33	414.33
BUTTERNUT CREEK	40,150	414.10	414.10

APPENDIX A

EXISTING MODEL

HEC-RAS Plan: Plan 01 River: BUTTERNUT Reach: 1 Profile: 100 Yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	46390	100 Yr	3400.00	406.90	417.26		417.26	0.000044	1.49	13227.44	4995.65	0.08
1	45600	100 Yr	3400.00	405.80	417.18		417.19	0.000044	1.56	12982.86	5002.24	0.08
1	44760	100 Yr	3400.00	404.80	417.17		417.18	0.000010	0.74	20938.47	4169.90	0.04
1	43750	100 Yr	3400.00	404.40	417.16		417.17	0.000010	0.58	21171.41	4311.01	0.03
1	42160	100 Yr	3400.00	405.60	417.15	411.94	417.15	0.000007	0.50	25459.07	5300.97	0.03
1	42150		Bridge									
1	42100	100 Yr	3400.00	404.40	414.50	410.99	415.56	0.002715	8.45	440.86	5116.59	0.48
1	41170	100 Yr	3400.00	403.40	414.33		414.44	0.000309	3.91	4692.66	2655.10	0.21
1	40150	100 Yr	3400.00	402.60	414.10	409.50	414.17	0.000213	3.29	5712.03	2795.25	0.18


SUNY-EX Plan: Plan 01 4/21/2016
Legend
WS 100 Yr
Ground
Bank Sta
Ineff
41170
43750
44760
45600
46390

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL EXISTING			
RIVER STATION	46,390 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	790
		DS REACH (CL)	790
		DS REACH (RB)	790

CROSS SECTION DATA		
STATION	ELEVATION (FT)	DESCRIPTION
-825	420	GR
-785	418	GR
-735	416	GR
-525	414	GR
-395	412	GR
-125	414	GR
-75	414	GR
-45	412	GR
-25	410	LEFT BANK
-20	406.9	CHANNEL
20	406.9	CHANNEL
25	410	RIGHT BANK
275	412	GR
2095	416	GR
4135	416	GR
4435	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL EXISTING			
RIVER STATION	45,600 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	840
		DS REACH (CL)	840
		DS REACH (RB)	840

CROSS SECTION DATA

STATION	ELEVATION (FT)	DESCRIPTION
-850	418	GR
-675	416	GR
-575	414	GR
-425	412	GR
-100	414	GR
-50	412	GR
-25	410	LEFT BANK
-20	405.8	CHANNEL
20	405.8	CHANNEL
25	410	RIGHT BANK
275	412	GR
2095	416	GR
4135	416	GR
4435	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL EXISTING			
RIVER STATION	44,760 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	1010
		DS REACH (CL)	1010
		DS REACH (RB)	1010

CROSS SECTION DATA

STATION	ELEVATION (FT)	DESCRIPTION
-585	420	GR
-545	412	GR
-515	412	GR
-465	414	GR
-425	414	GR
-415	412	GR
-20	410	LEFT BANK
-15	404.8	CHANNEL
15	404.8	CHANNEL
20	410	RIGHT BANK
215	412	GR
3015	412	GR
3555	416	GR
3705	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL EXISTING			
RIVER STATION	43,750 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.04	DS REACH (LB)	1590
		DS REACH (CL)	1590
		DS REACH (RB)	1590

CROSS SECTION DATA

STATION	ELEVATION (FT)	DESCRIPTION
-1280	420	GR
-1250	412	GR
-740	412	GR
-670	413	GR
-630	413	GR
-590	412	GR
-40	412	GR
-20	410	LEFT BANK
-15	404.4	CHANNEL
15	404.4	CHANNEL
20	410	RIGHT BANK
30	412	GR
2430	412	GR
3030	416	GR
3070	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL EXISTING			
RIVER STATION	42,160 FT	EXPANSION	0.5
DATA YEAR	1978	CONTRACTION	0.3
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.04	DS REACH (LB)	60
		DS REACH (CL)	60
		DS REACH (RB)	60

CROSS SECTION DATA

STATION	ELEVATION (FT)	DESCRIPTION
-1865	420	GR
-1815	412	GR
-1775	410	GR
-1715	412	GR
-1355	412	GR
-1315	414	GR
-655	414	GR
-605	414	GR
-585	412	GR
-25	410	GR
-20	408	LEFT BANK
-15	405.6	CHANNEL
15	405.6	CHANNEL
20	408	RIGHT BANK
25	410	GR
85	412	GR
695	412	GR
845	413	GR
875	413	GR
1375	412	GR
2985	412	GR
3005	413	GR
3035	413	GR
3055	412	GR
3425	416	GR
3525	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL EXISTING			
RIVER STATION	42,100 FT	EXPANSION	0.5
DATA YEAR	1978	CONTRACTION	0.3
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.04	DS REACH (LB)	930
		DS REACH (CL)	930
		DS REACH (RB)	930

CROSS SECTION DATA

STATION	ELEVATION (FT)	DESCRIPTION
-1865	420	GR
-1815	412	GR
-1775	410	GR
-1715	412	GR
-1355	412	GR
-1315	414	GR
-655	414	GR
-605	414	GR
-585	412	GR
-25	410	GR
-20	408	LEFT BANK
-15	404.4	CHANNEL
15	404.4	CHANNEL
20	408	RIGHT BANK
25	410	GR
85	412	GR
695	412	GR
845	413	GR
875	413	GR
1375	412	GR
2985	412	GR
3005	413	GR
3035	413	GR
3055	412	GR
3425	416	GR
3525	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL EXISTING			
RIVER STATION	41,170 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	1020
		DS REACH (CL)	1020
		DS REACH (RB)	1020

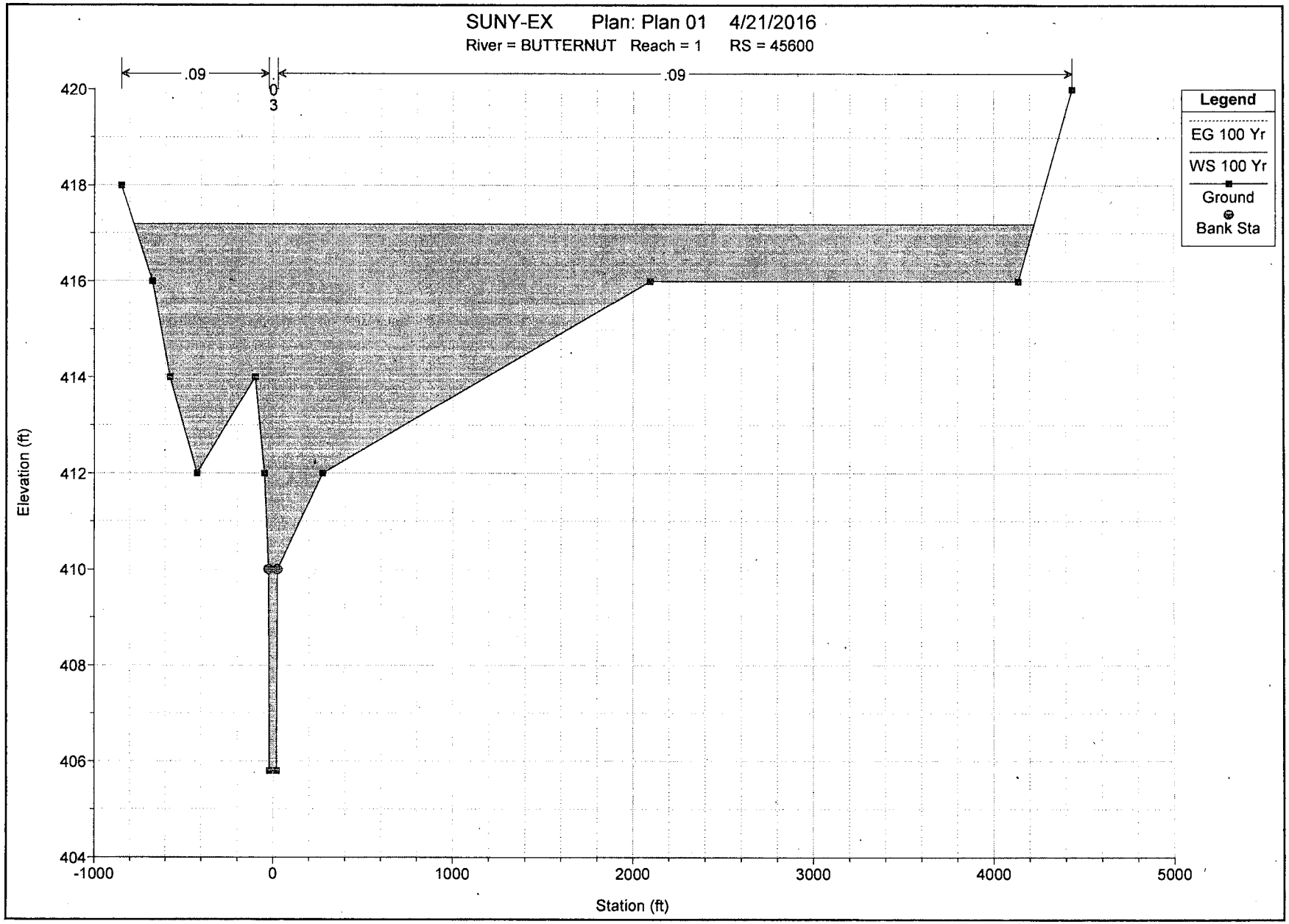
CROSS SECTION DATA		
STATION	ELEVATION (FT)	DESCRIPTION
-1780	416	GR
-1730	412	GR
-1630	412	GR
-1360	416	GR
-1160	412	GR
-1130	412	GR
-830	414	GR
-640	414	GR
-80	412	GR
-20	408	LEFT BANK
-15	403.4	CHANNEL
15	403.4	CHANNEL
20	408	RIGHT BANK
270	412	GR
1060	416	GR
1510	416	GR
1630	412	GR
1730	412	GR
2060	416	GR

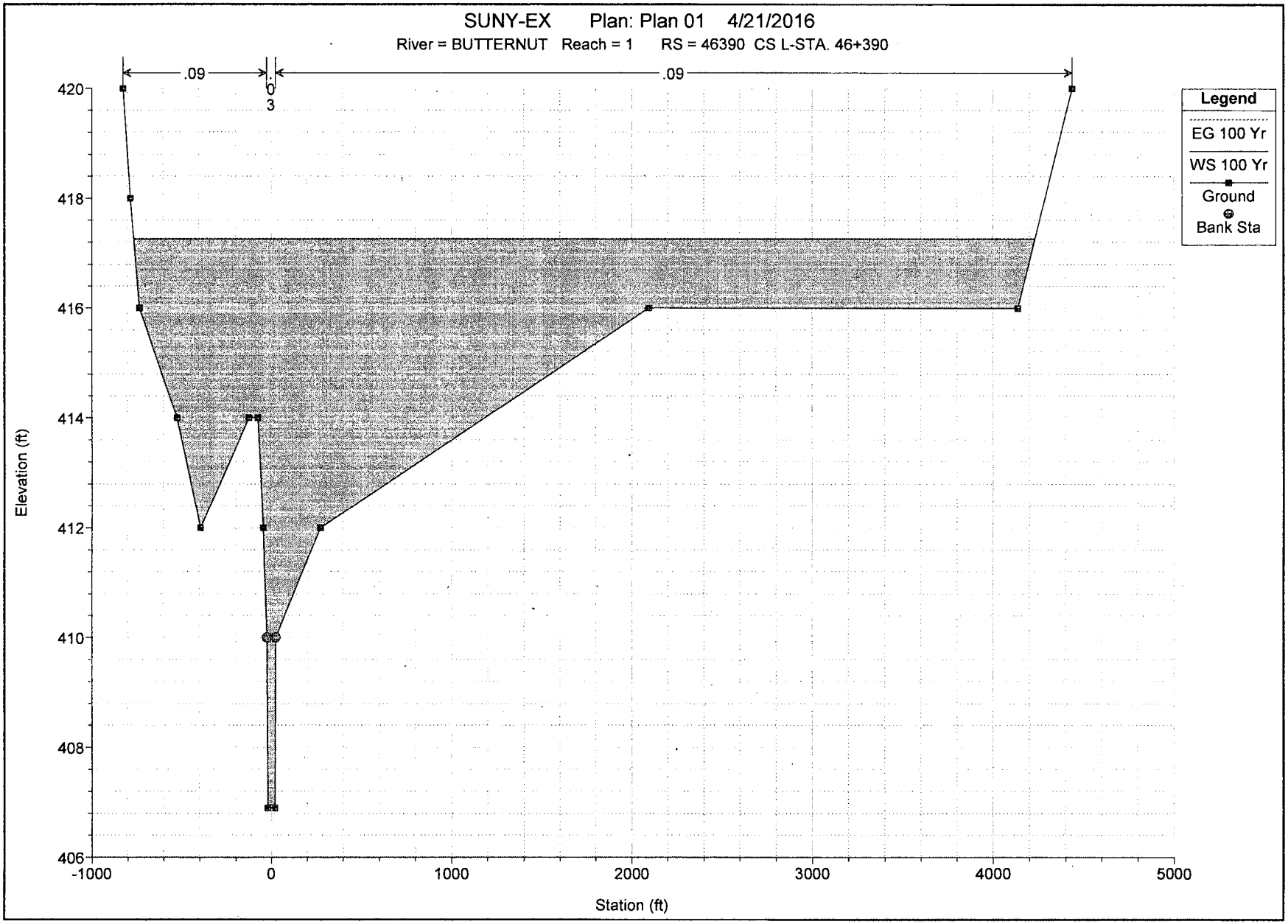
CROSS SECTION DATA (BUTTERNUT CREEK)

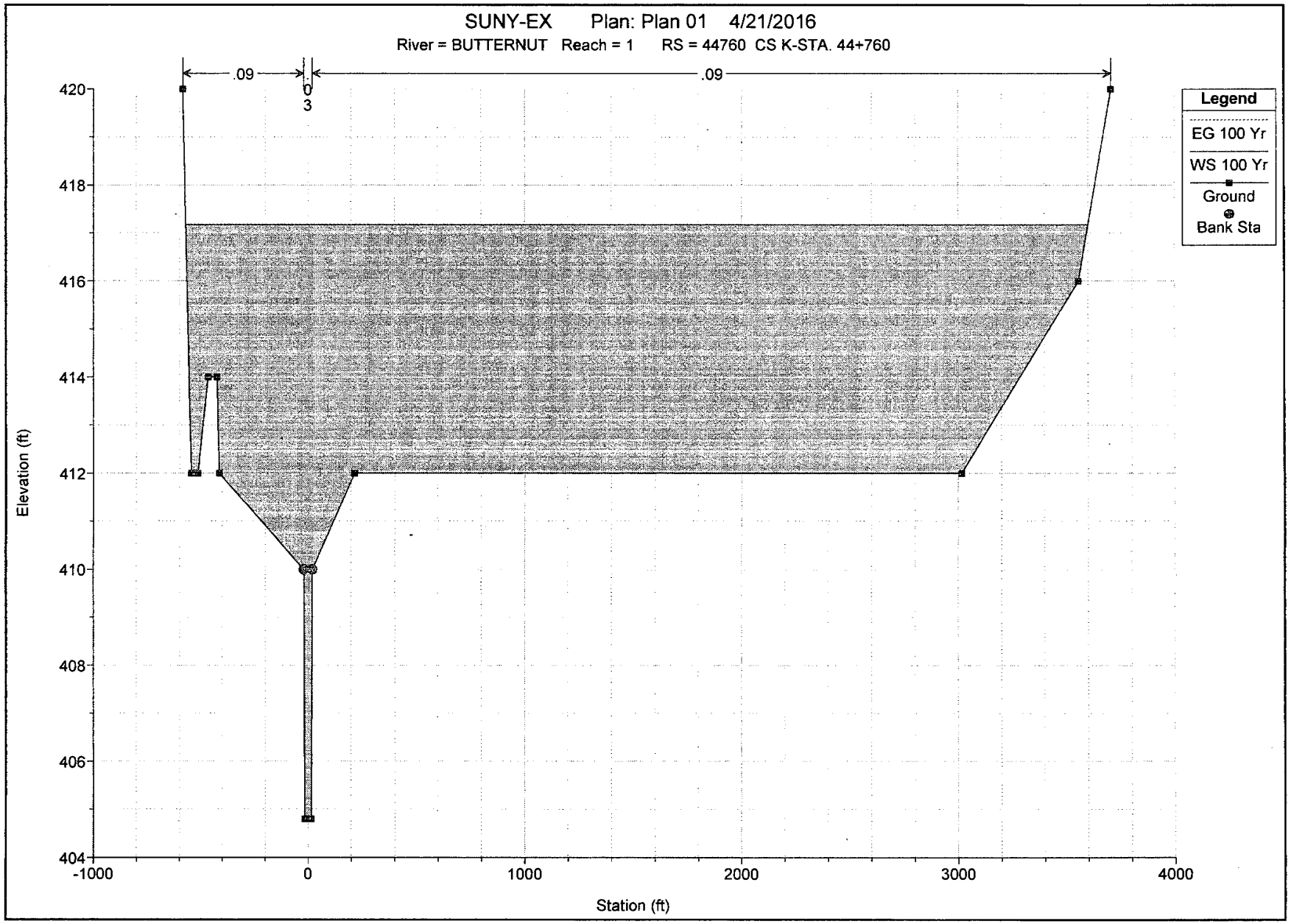
HECRAS MODEL EXISTING			
RIVER STATION	40,150 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	
		DS REACH (CL)	
		DS REACH (RB)	

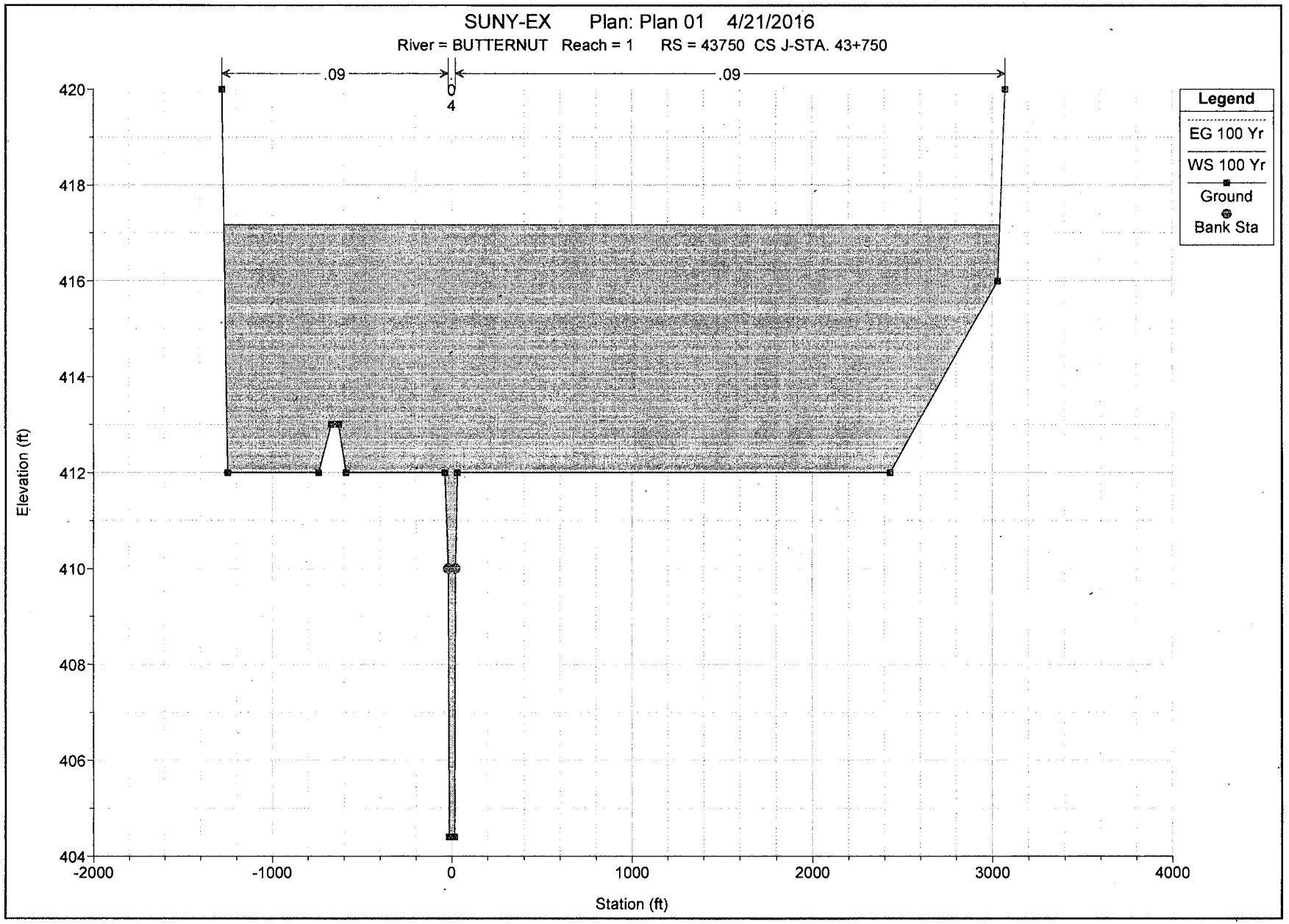
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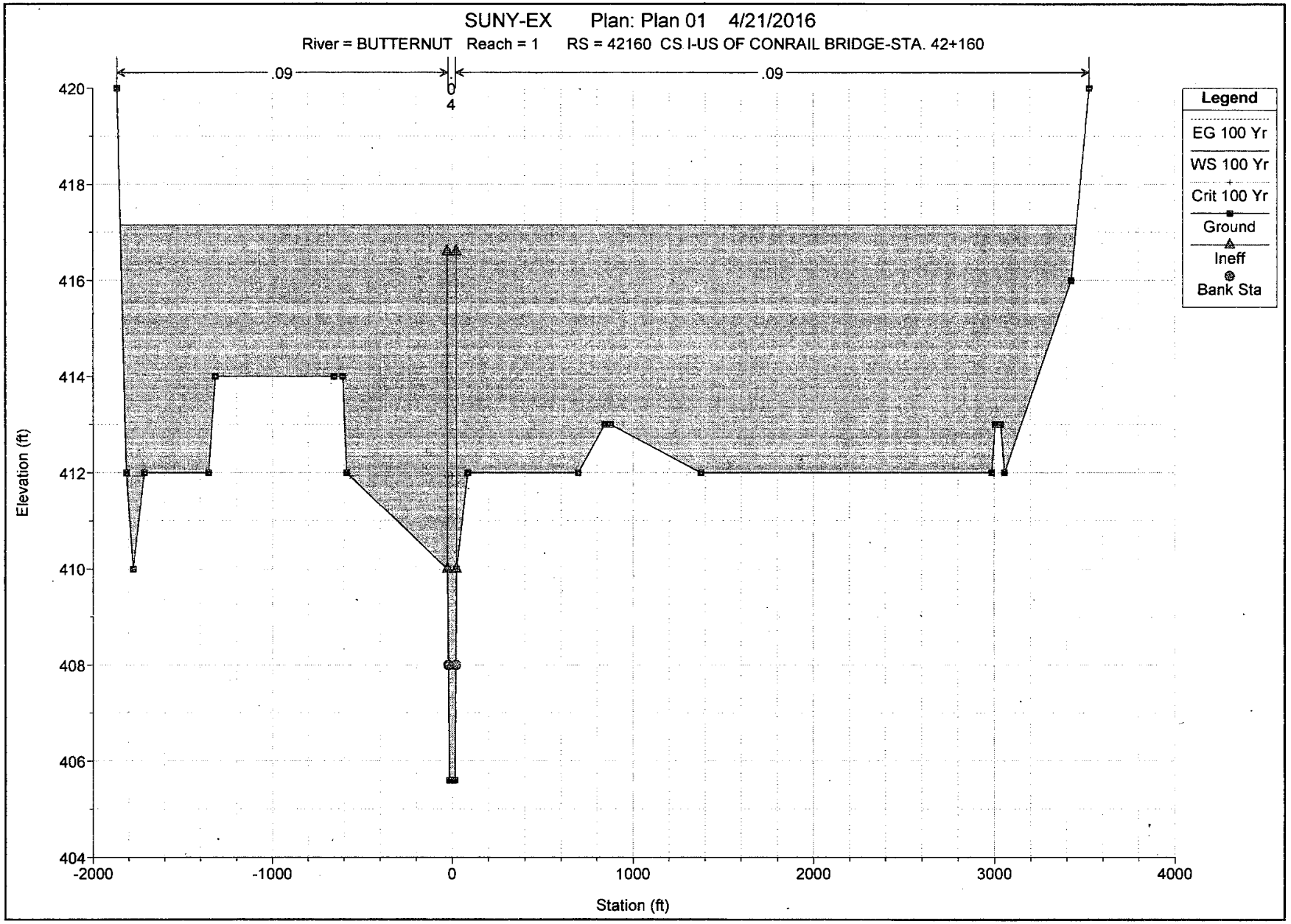
STATION	ELEVATION (FT)	DESCRIPTION
-1770	416	GR
-1610	412	GR
-50	412	GR
-20	408	LEFT BANK
-15	402.6	CHANNEL
15	402.6	CHANNEL
20	408	RIGHT BANK
70	412	GR
550	412	GR
1600	416	GR

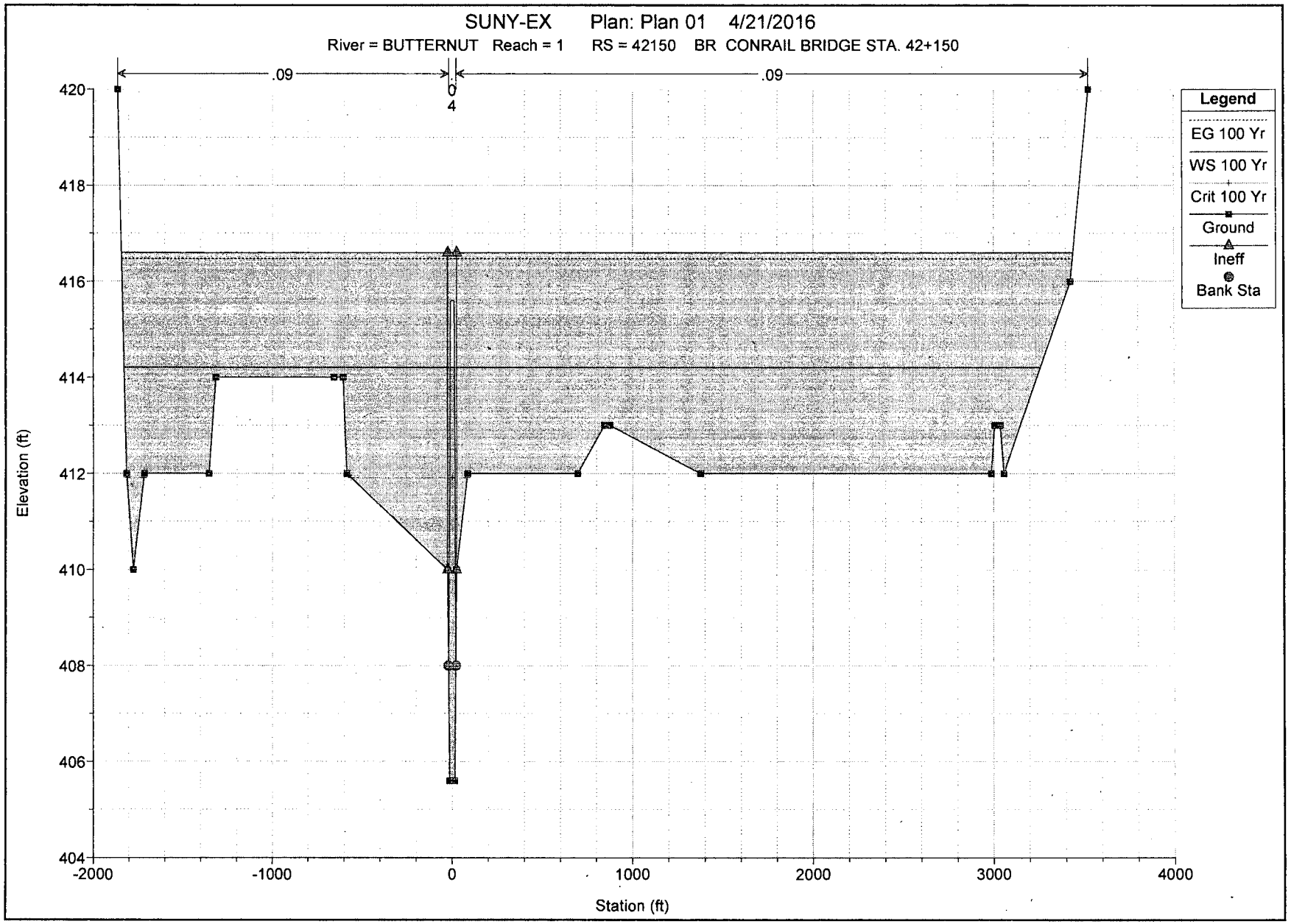

SUNY-EX Plan: Plan 01 4/21/2016
River = BUTTERNUT Reach = 1 RS = 45600
.09
0
3
.09
Legend
EG 100 Yr
WS 100 Yr
Ground
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-1000
0
1000
2000
3000
4000
5000
Station (ft)

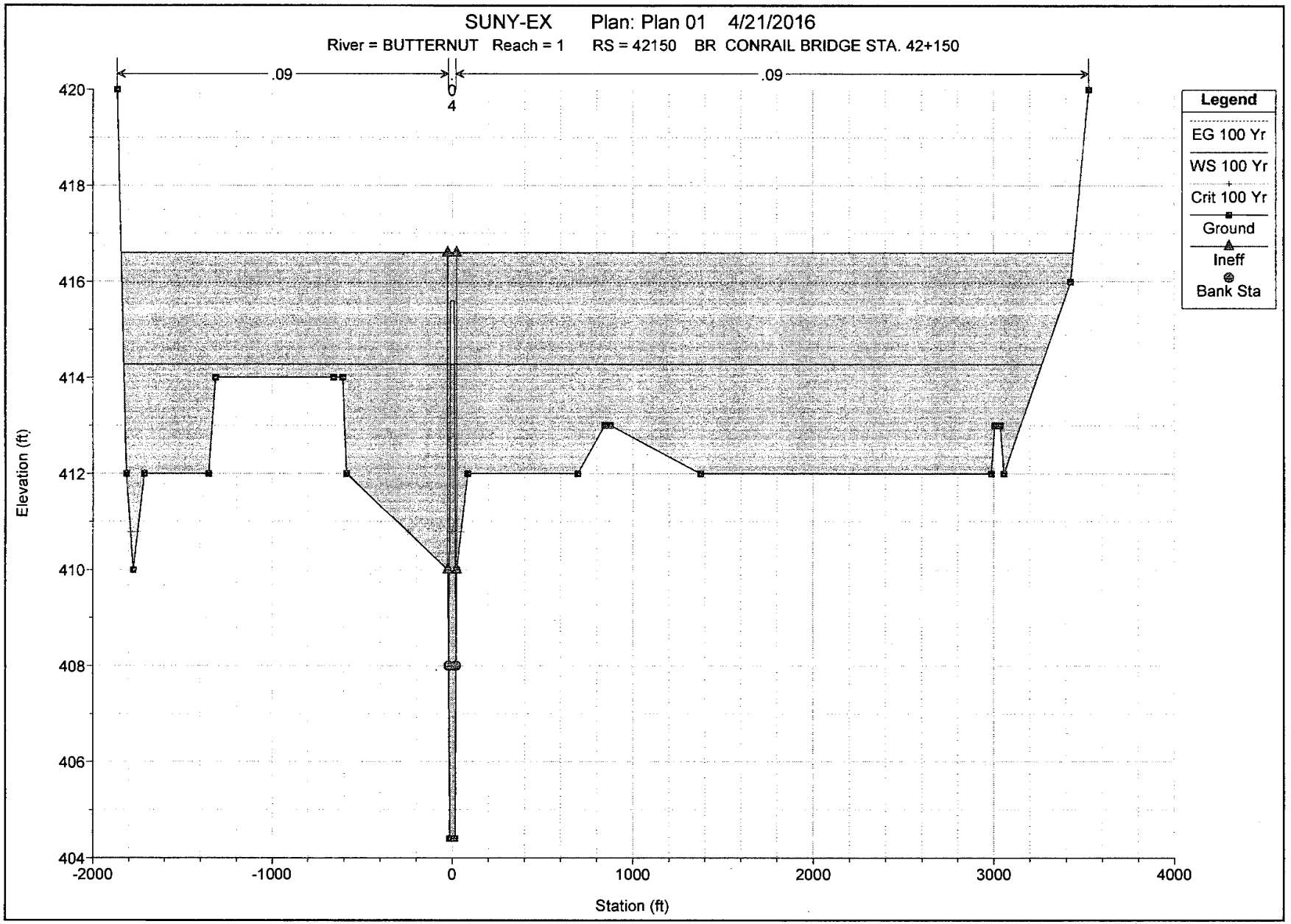

SUNY-EX Plan: Plan 01 4/21/2016
River = BUTTERNUT Reach = 1 RS = 46390 CS L-STA. 46+390
.09
.03
.09
Legend
EG 100 Yr
WS 100 Yr
Ground
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
-1000
0
1000
2000
3000
4000
5000
Station (ft)

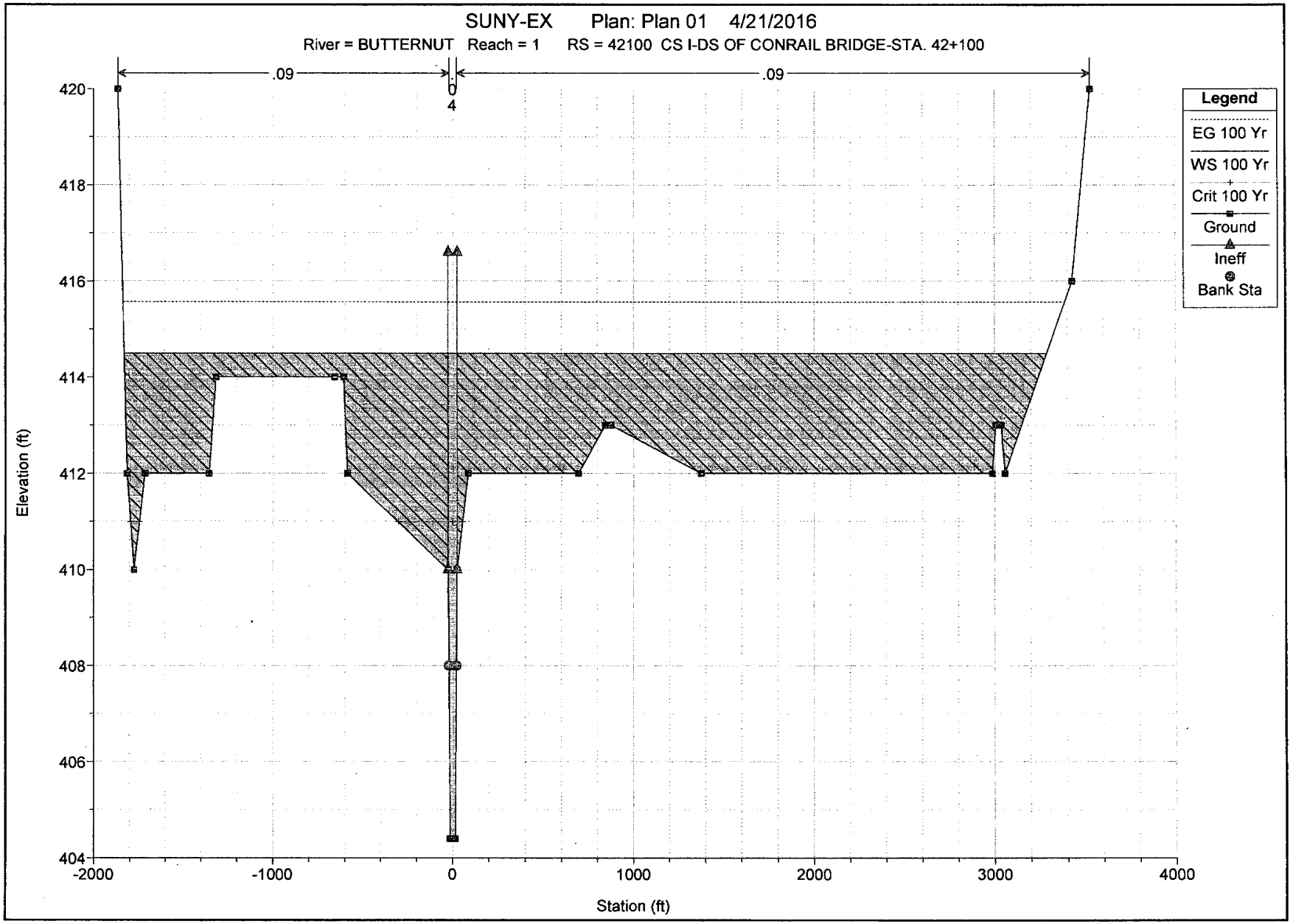

SUNY-EX Plan: Plan 01 4/21/2016
River = BUTTERNUT Reach = 1 RS = 44760 CS K-STA. 44+760
.09
.09
0.03
Legend
EG 100 Yr
WS 100 Yr
Ground
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-1000
0
1000
2000
3000
4000
Station (ft)

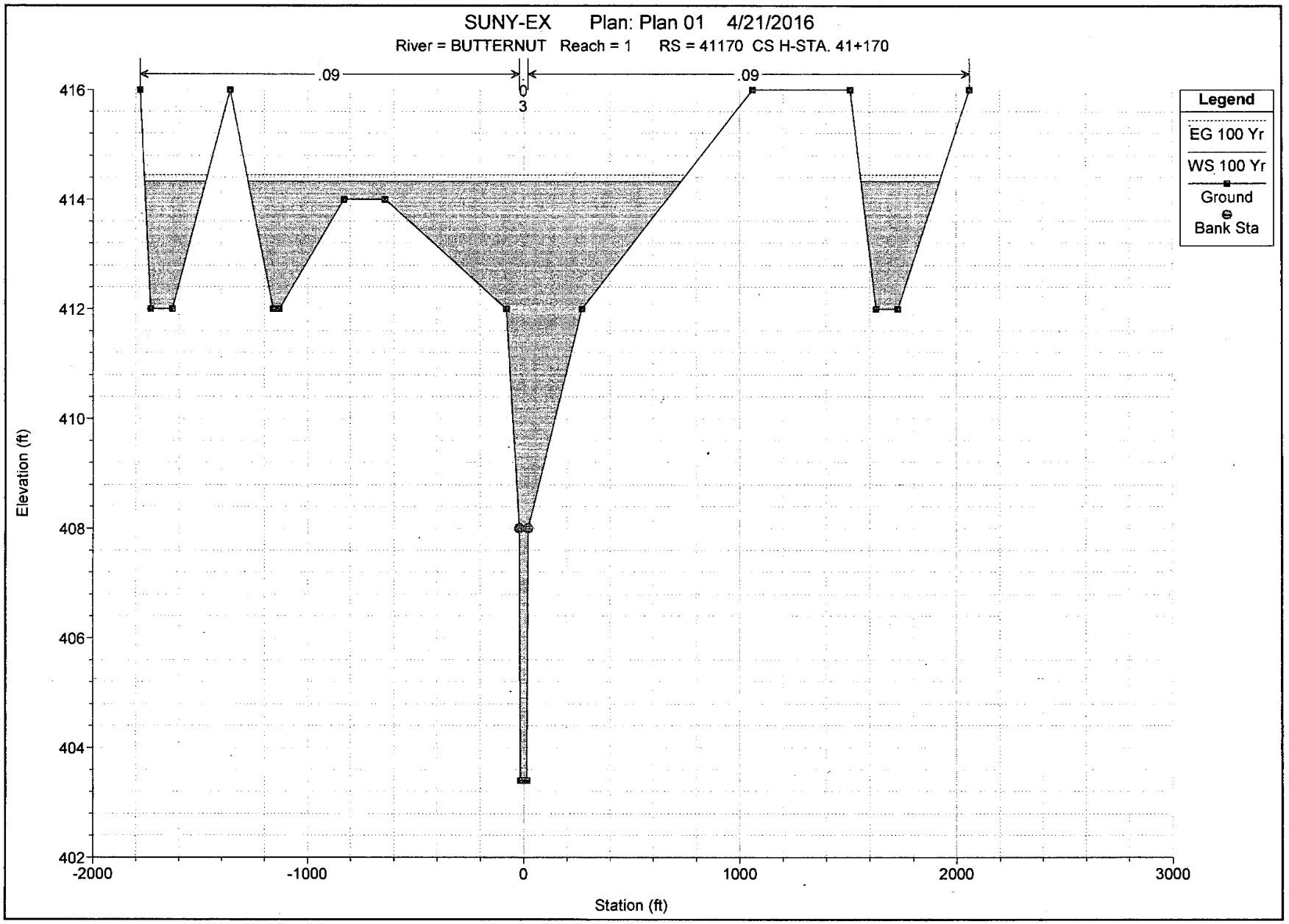

SUNY-EX Plan: Plan 01 4/21/2016
River = BUTTERNUT Reach = 1 RS = 43750 CS J-STA. 43+750
.09
.09
0
4
Legend
EG 100 Yr
WS 100 Yr
Ground
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-2000
-1000
0
1000
2000
3000
4000
Station (ft)

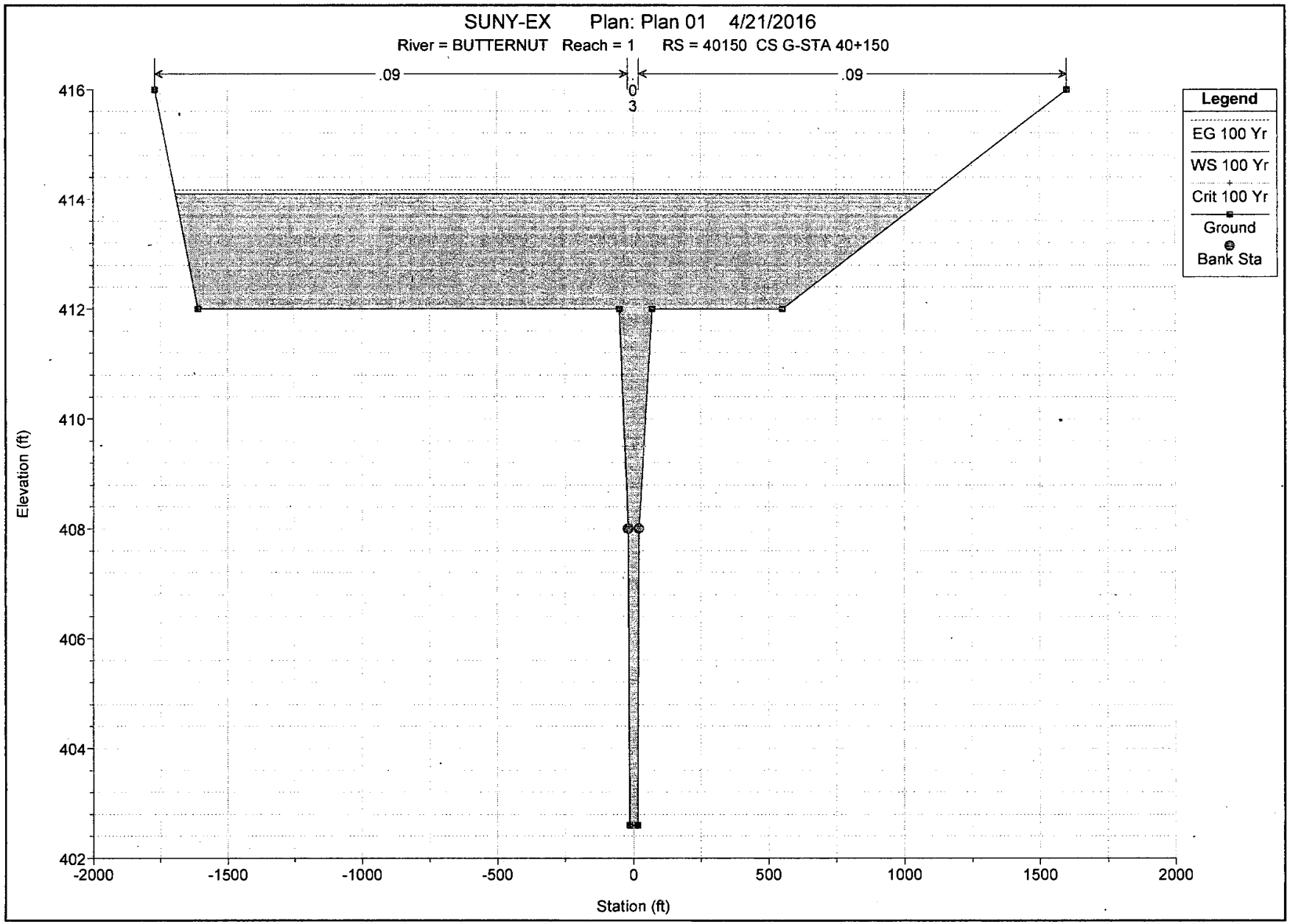

SUNY-EX Plan: Plan 01 4/21/2016
River = BUTTERNUT Reach = 1 RS = 42160 CS I-US OF CONRAIL BRIDGE-STA. 42+160
.09
.09
0.04
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-2000
-1000
0
1000
2000
3000
4000
Station (ft)


SUNY-EX Plan: Plan 01 4/21/2016
River = BUTTERNUT Reach = 1 RS = 42150 BR CONRAIL BRIDGE STA. 42+150
.09
.09
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
420
418
416
414
412
410
408
406
404
-2000
-1000
0
1000
2000
3000
4000


SUNY-EX Plan: Plan 01 4/21/2016
River = BUTTERNUT Reach = 1 RS = 42150 BR CONRAIL BRIDGE STA. 42+150
.09
.09
0
4
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-2000
-1000
0
1000
2000
3000
4000
Station (ft)


SUNY-EX Plan: Plan 01 4/21/2016
River = BUTTERNUT Reach = 1 RS = 42100 CS I-DS OF CONRAIL BRIDGE-STA. 42+100
.09
.09
0
4
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-2000
-1000
0
1000
2000
3000
4000
Station (ft)


SUNY-EX Plan: Plan 01 4/21/2016
River = BUTTERNUT Reach = 1 RS = 41170 CS H-STA. 41+170
.09
.09
0
3
Legend
EG 100 Yr
WS 100 Yr
Ground
Bank Sta
Elevation (ft)
416
414
412
410
408
406
404
402
-2000
-1000
0
1000
2000
3000
Station (ft)


SUNY-EX Plan: Plan 01 4/21/2016
River = BUTTERNUT Reach = 1 RS = 40150 CS G-STA 40+150
.09
.09
0
3
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Bank Sta
Elevation (ft)
416
414
412
410
408
406
404
402
-2000
-1500
-1000
-500
0
500
1000
1500
2000
Station (ft)

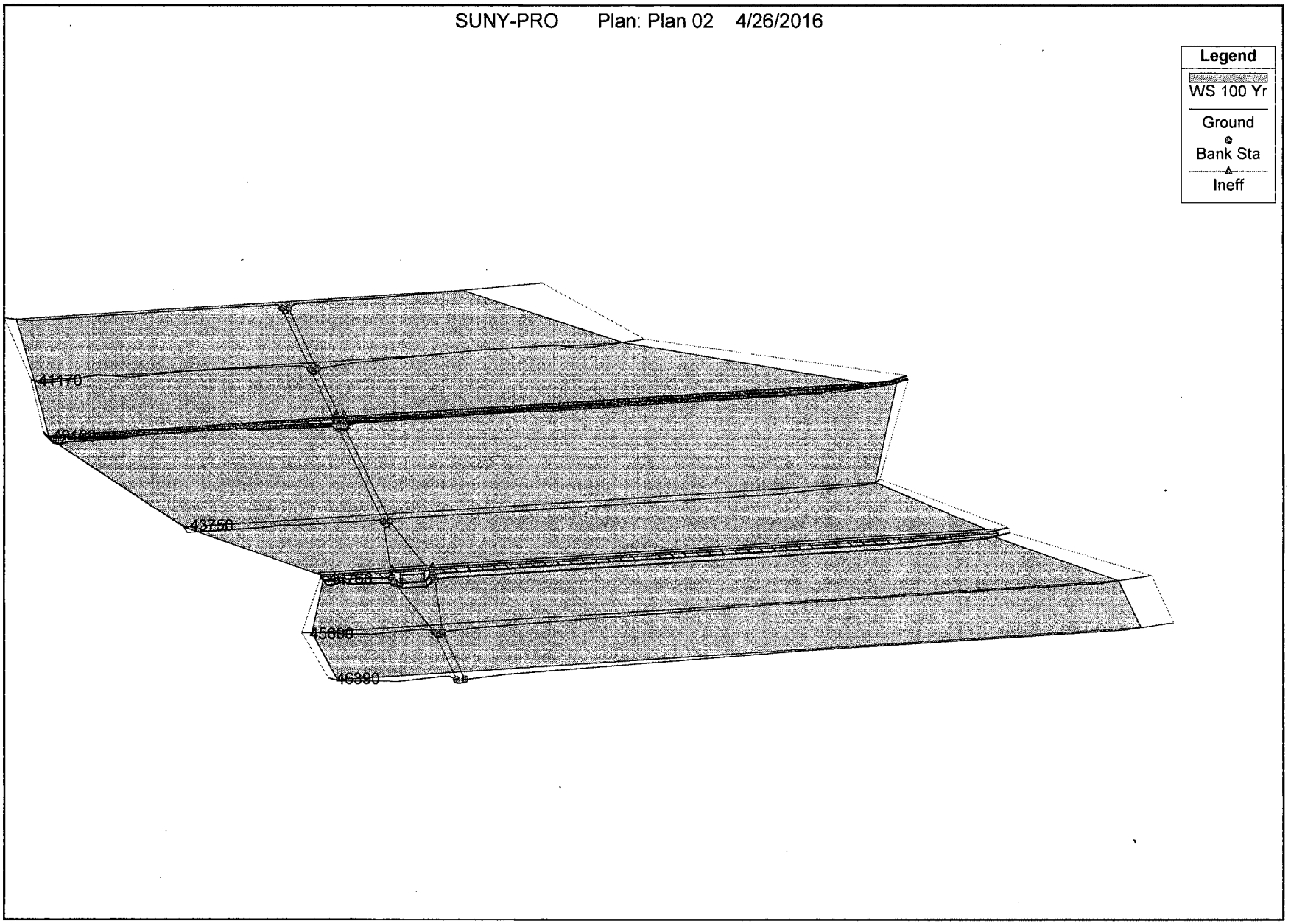
APPENDIX B

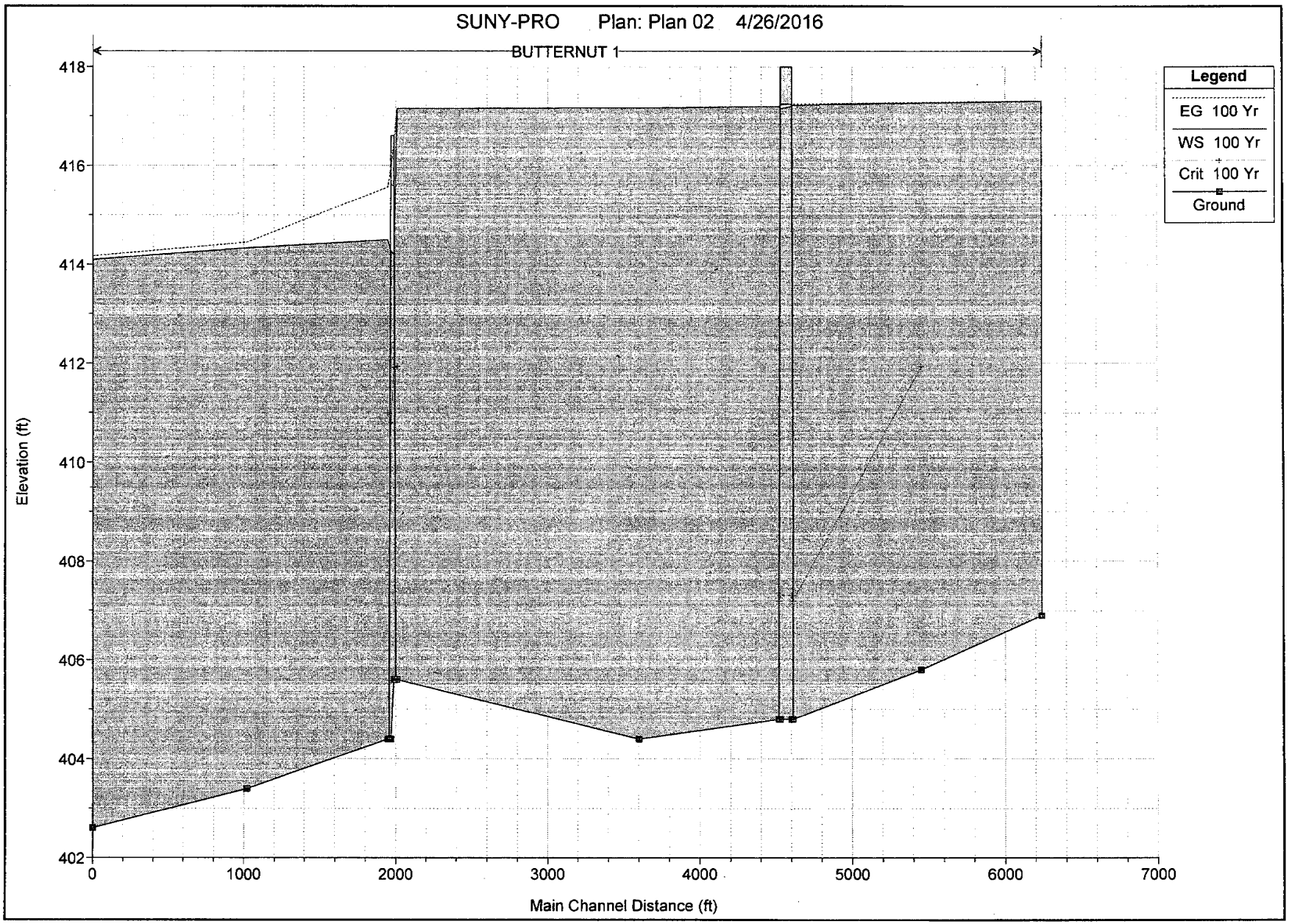
PROPOSED MODEL

HEC-RAS Plan: Plan 02 River: BUTTERNUT Reach: 1 Profile: 100 Yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	46390	100 Yr	3400.00	406.90	417.30		417.31	0.000042	1.46	13464.93	5000.40	0.08
1	45600	100 Yr	3400.00	405.80	417.28	411.93	417.28	0.000032	1.34	13449.01	5017.36	0.07
1	44760	100 Yr	3400.00	404.80	417.23	407.20	417.25	0.000024	1.21	2807.90	4172.13	0.06
1	44750		Bridge									
1	44668	100 Yr	3400.00	404.80	417.20	407.20	417.19	0.000024	1.21	2800.11	4170.81	0.06
1	43750	100 Yr	3400.00	404.40	417.16		417.17	0.000010	0.58	21171.41	4311.01	0.03
1	42160	100 Yr	3400.00	405.60	417.15	411.94	417.15	0.000007	0.50	25459.07	5300.97	0.03
1	42150		Bridge									
1	42100	100 Yr	3400.00	404.40	414.50	410.99	415.56	0.002715	8.45	440.86	5116.59	0.48
1	41170	100 Yr	3400.00	403.40	414.33		414.44	0.000309	3.91	4692.66	2655.10	0.21
1	40150	100 Yr	3400.00	402.60	414.10	409.50	414.17	0.000213	3.29	5712.03	2795.25	0.18

SUNY-PRO Plan: Plan 02 4/26/2016




SUNY-PRO Plan: Plan 02 4/26/2016
BUTTERNUT 1
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Elevation (ft)
418
416
414
412
410
408
406
404
402
0
1000
2000
3000
4000
5000
6000
7000
Main Channel Distance (ft)

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL PROPOSED			
RIVER STATION	46,390 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	790
		DS REACH (CL)	790
		DS REACH (RB)	790

CROSS SECTION DATA		
STATION	ELEVATION (FT)	DESCRIPTION
-825	420	GR
-785	418	GR
-735	416	GR
-525	414	GR
-395	412	GR
-125	414	GR
-75	414	GR
-45	412	GR
-25	410	LEFT BANK
-20	406.9	CHANNEL
20	406.9	CHANNEL
25	410	RIGHT BANK
275	412	GR
2095	416	GR
4135	416	GR
4435	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL PROPOSED			
RIVER STATION	45,600 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	840
		DS REACH (CL)	840
		DS REACH (RB)	840

CROSS SECTION DATA

STATION	ELEVATION (FT)	DESCRIPTION
-850	418	GR
-675	416	GR
-575	414	GR
-425	412	GR
-100	414	GR
-50	412	GR
-25	410	LEFT BANK
-20	405.8	CHANNEL
20	405.8	CHANNEL
25	410	RIGHT BANK
275	412	GR
2095	416	GR
4135	416	GR
4435	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL PROPOSED			
RIVER STATION	44,760 FT	EXPANSION	0.5
DATA YEAR	1978	CONTRACTION	0.3
CONDITIONS	PROPOSED	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	92
		DS REACH (CL)	92
		DS REACH (RB)	92

CROSS SECTION DATA

STATION	ELEVATION (FT)	DESCRIPTION
-585	420	GR
-545	412	GR
-515	412	GR
-465	414	GR
-425	414	GR
-415	412	GR
-125	410.5	LEFT BANK
-75	404.8	CHANNEL
75	404.8	CHANNEL
125	411.05	RIGHT BANK
215	412	GR
3015	412	GR
3555	416	GR
3705	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL PROPOSED			
RIVER STATION	44,668 FT	EXPANSION	0.5
DATA YEAR	1978	CONTRACTION	0.3
CONDITIONS	PROPOSED	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	918
		DS REACH (CL)	918
		DS REACH (RB)	918

CROSS SECTION DATA		
STATION	ELEVATION (FT)	DESCRIPTION
-585	420	GR
-545	412	GR
-515	412	GR
-465	414	GR
-425	414	GR
-415	412	GR
-125	410.5	LEFT BANK
-75	404.8	CHANNEL
75	404.8	CHANNEL
125	411.05	RIGHT BANK
215	412	GR
3015	412	GR
3555	416	GR
3705	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL PROPOSED			
RIVER STATION	43,750 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.04	DS REACH (LB)	1590
		DS REACH (CL)	1590
		DS REACH (RB)	1590

CROSS SECTION DATA		
STATION	ELEVATION (FT)	DESCRIPTION
-1280	420	GR
-1250	412	GR
-740	412	GR
-670	413	GR
-630	413	GR
-590	412	GR
-40	412	GR
-20	410	LEFT BANK
-15	404.4	CHANNEL
15	404.4	CHANNEL
20	410	RIGHT BANK
30	412	GR
2430	412	GR
3030	416	GR
3070	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL PROPOSED			
RIVER STATION	42,160 FT	EXPANSION	0.5
DATA YEAR	1978	CONTRACTION	0.3
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.04	DS REACH (LB)	60
		DS REACH (CL)	60
		DS REACH (RB)	60

CROSS SECTION DATA

STATION	ELEVATION (FT)	DESCRIPTION
-1865	420	GR
-1815	412	GR
-1775	410	GR
-1715	412	GR
-1355	412	GR
-1315	414	GR
-655	414	GR
-605	414	GR
-585	412	GR
-25	410	GR
-20	408	LEFT BANK
-15	405.6	CHANNEL
15	405.6	CHANNEL
20	408	RIGHT BANK
25	410	GR
85	412	GR
695	412	GR
845	413	GR
875	413	GR
1375	412	GR
2985	412	GR
3005	413	GR
3035	413	GR
3055	412	GR
3425	416	GR
3525	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

HECRAS MODEL PROPOSED			
RIVER STATION	42,100 FT	EXPANSION	0.5
DATA YEAR	1978	CONTRACTION	0.3
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.04	DS REACH (LB)	930
		DS REACH (CL)	930
		DS REACH (RB)	930

CROSS SECTION DATA

STATION	ELEVATION (FT)	DESCRIPTION
-1865	420	GR
-1815	412	GR
-1775	410	GR
-1715	412	GR
-1355	412	GR
-1315	414	GR
-655	414	GR
-605	414	GR
-585	412	GR
-25	410	GR
-20	408	LEFT BANK
-15	404.4	CHANNEL
15	404.4	CHANNEL
20	408	RIGHT BANK
25	410	GR
85	412	GR
695	412	GR
845	413	GR
875	413	GR
1375	412	GR
2985	412	GR
3005	413	GR
3035	413	GR
3055	412	GR
3425	416	GR
3525	420	GR

CROSS SECTION DATA (BUTTERNUT CREEK)

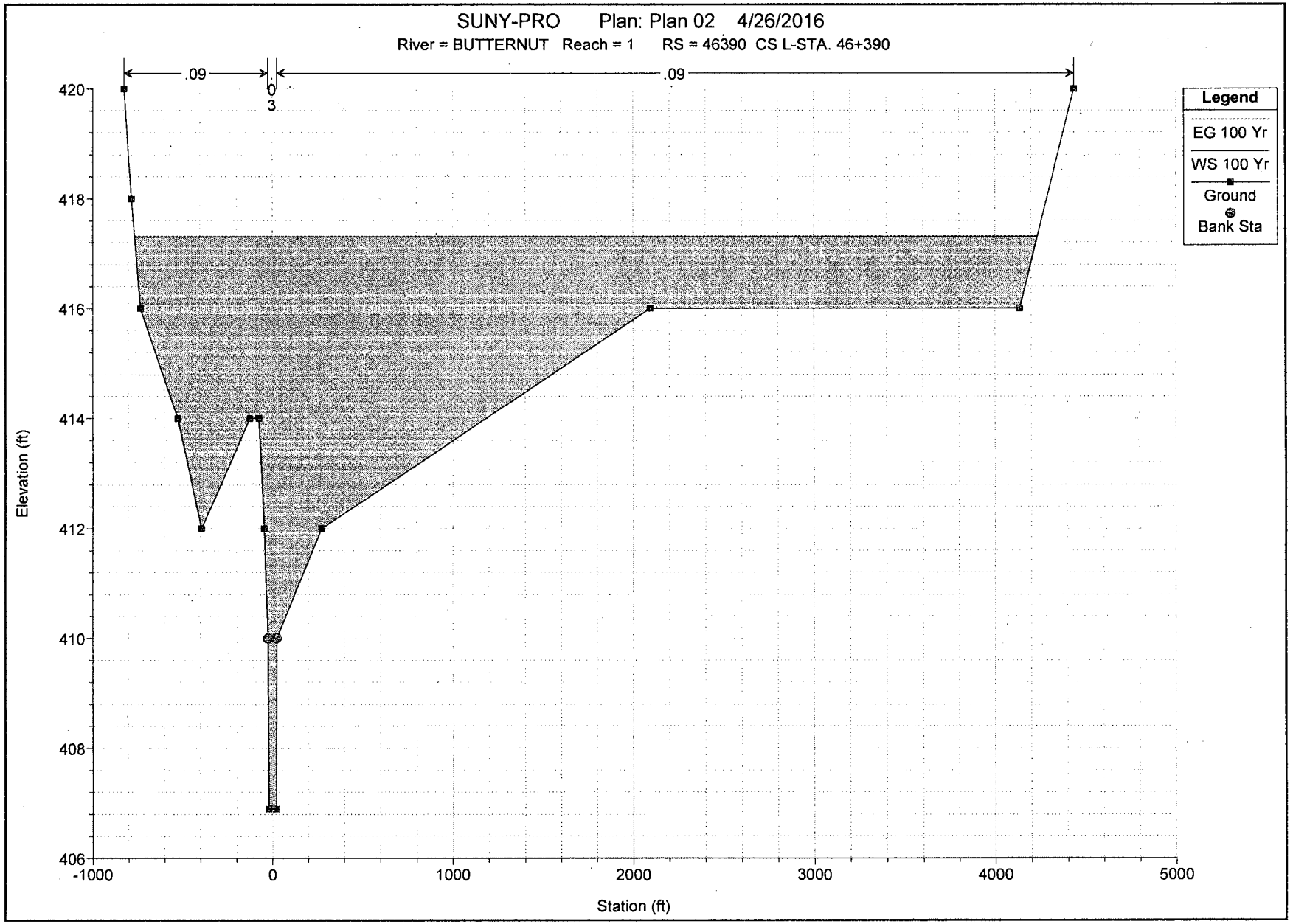
HECRAS MODEL PROPOSED			
RIVER STATION	41,170 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	1020
		DS REACH (CL)	1020
		DS REACH (RB)	1020

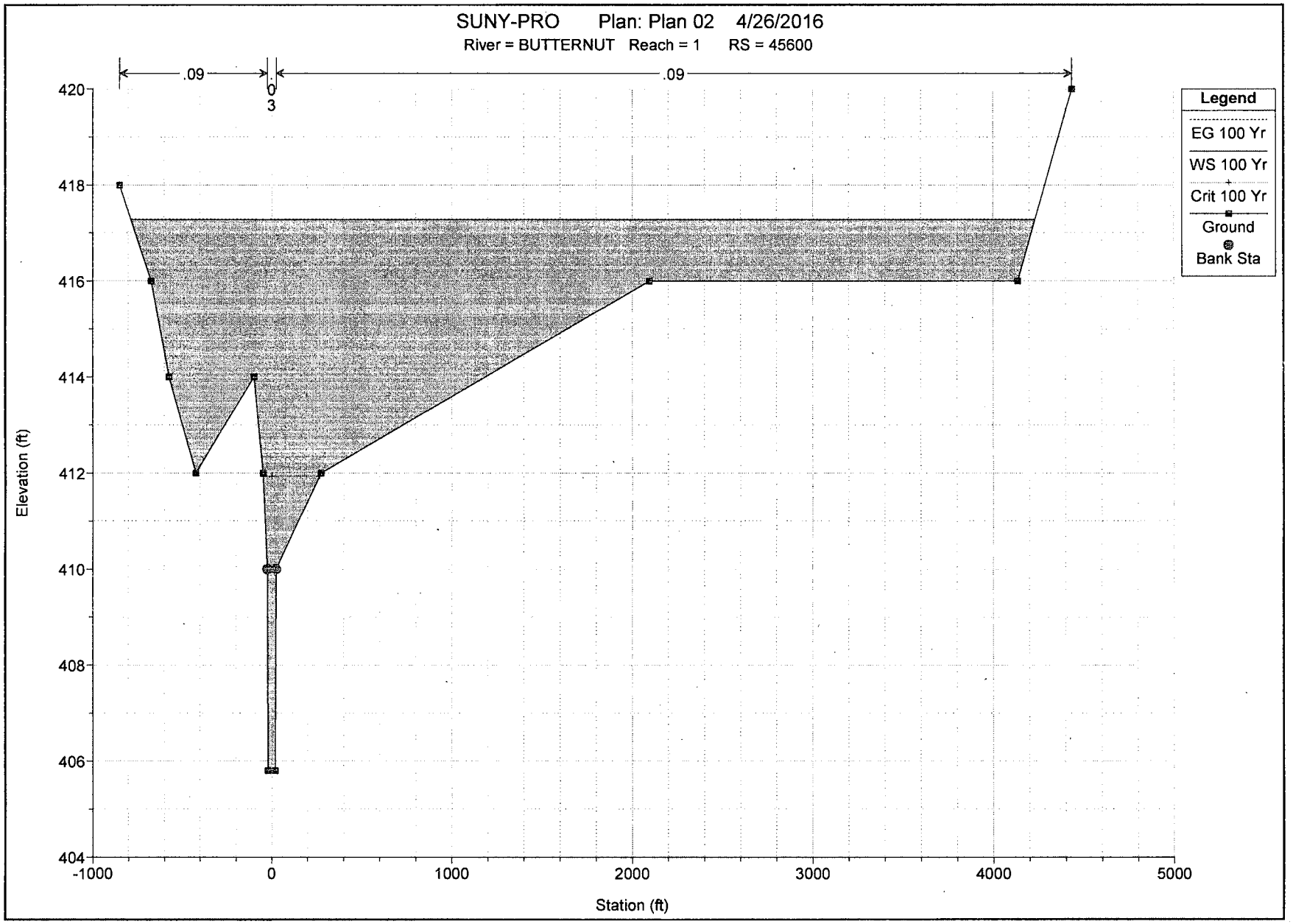
CROSS SECTION DATA		
STATION	ELEVATION (FT)	DESCRIPTION
-1780	416	GR
-1730	412	GR
-1630	412	GR
-1360	416	GR
-1160	412	GR
-1130	412	GR
-830	414	GR
-640	414	GR
-80	412	GR
-20	408	LEFT BANK
-15	403.4	CHANNEL
15	403.4	CHANNEL
20	408	RIGHT BANK
270	412	GR
1060	416	GR
1510	416	GR
1630	412	GR
1730	412	GR
2060	416	GR

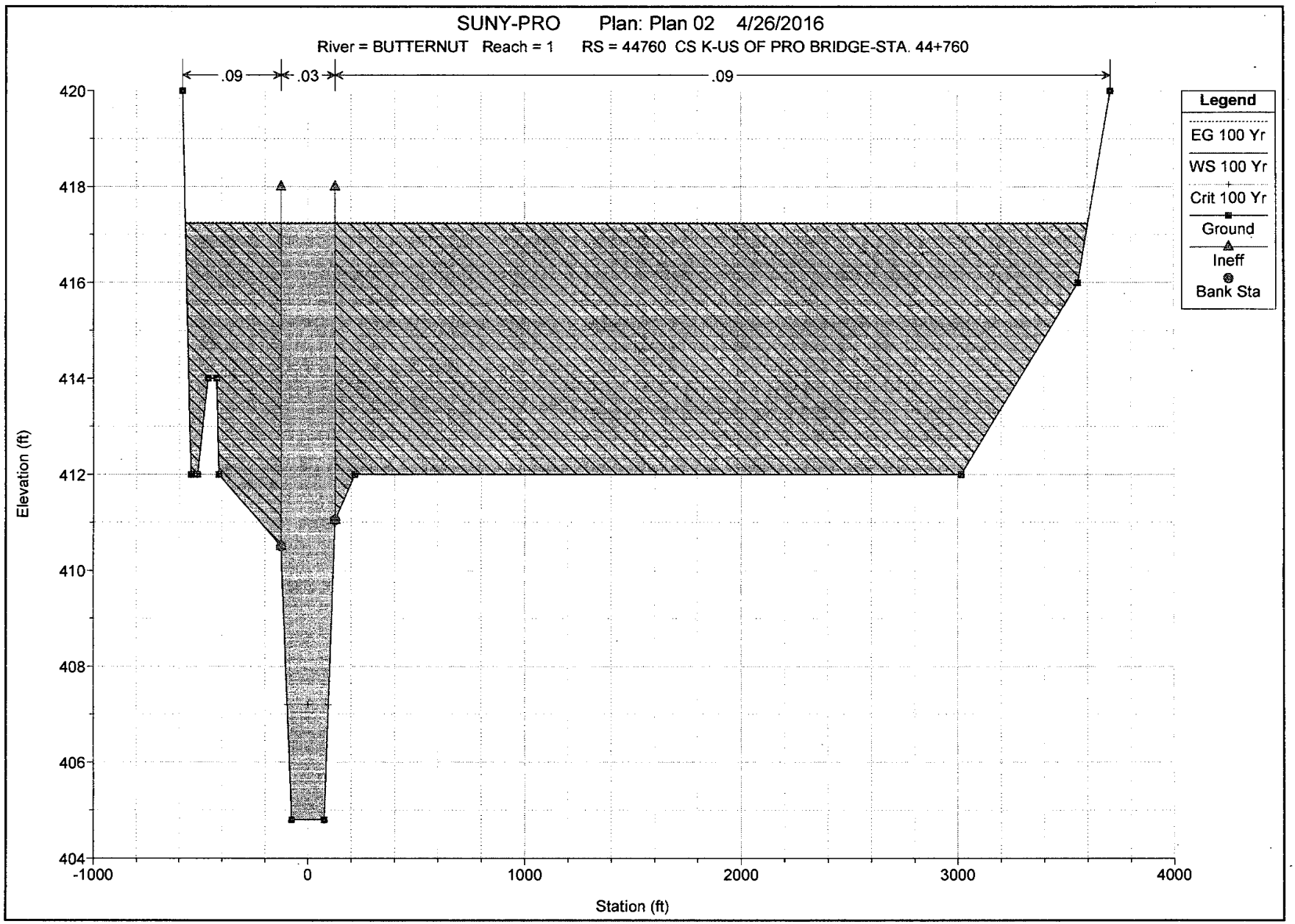
CROSS SECTION DATA (BUTTERNUT CREEK)

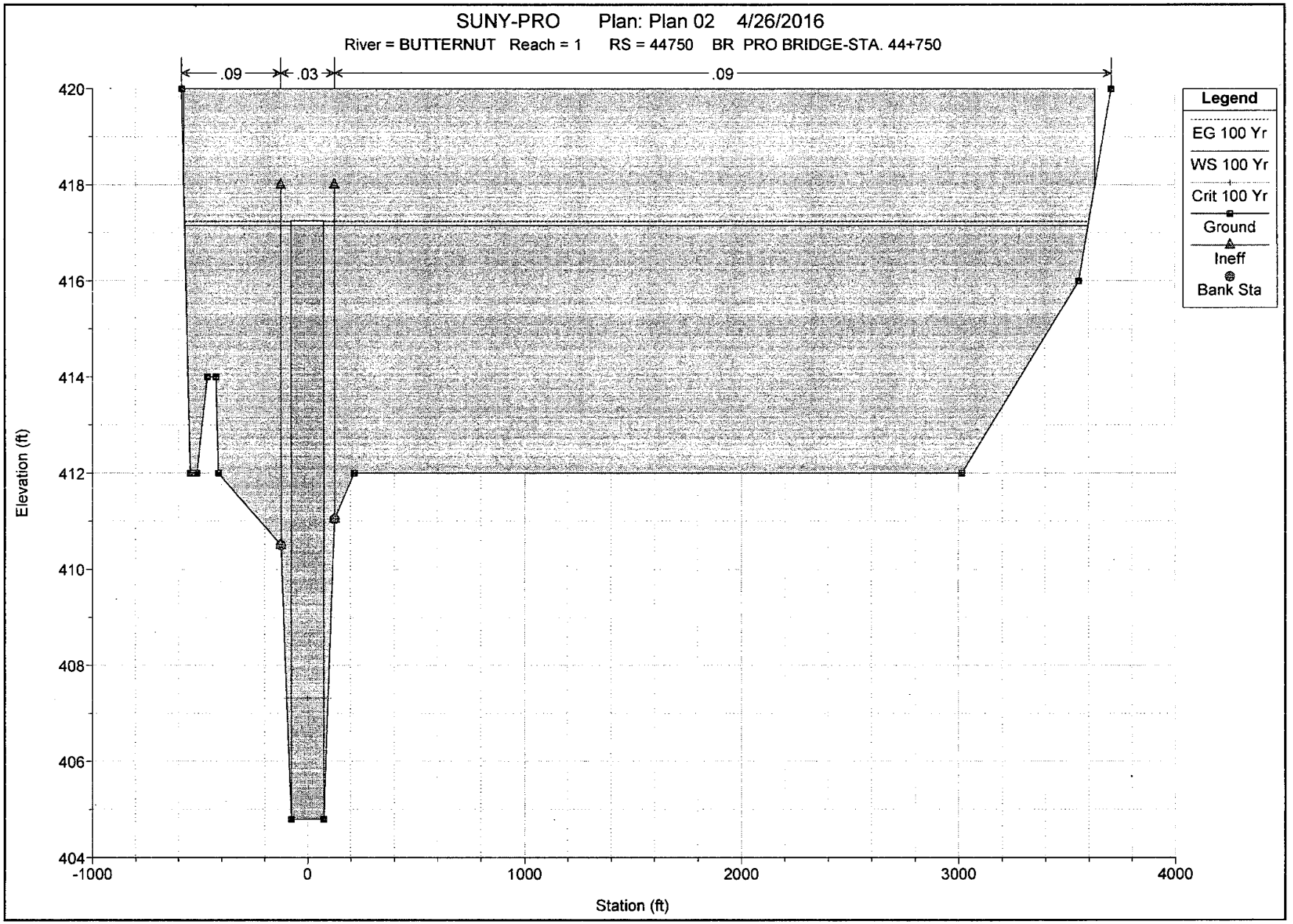
HECRAS MODEL PROPOSED			
RIVER STATION	40,150 FT	EXPANSION	0.3
DATA YEAR	1978	CONTRACTION	0.1
CONDITIONS	EXISTING	LEFT BANK"N"	0.09
FLOW	3400 CFS	RIGHT BANK "N"	0.09
N VALUE	0.03	DS REACH (LB)	
		DS REACH (CL)	
		DS REACH (RB)	

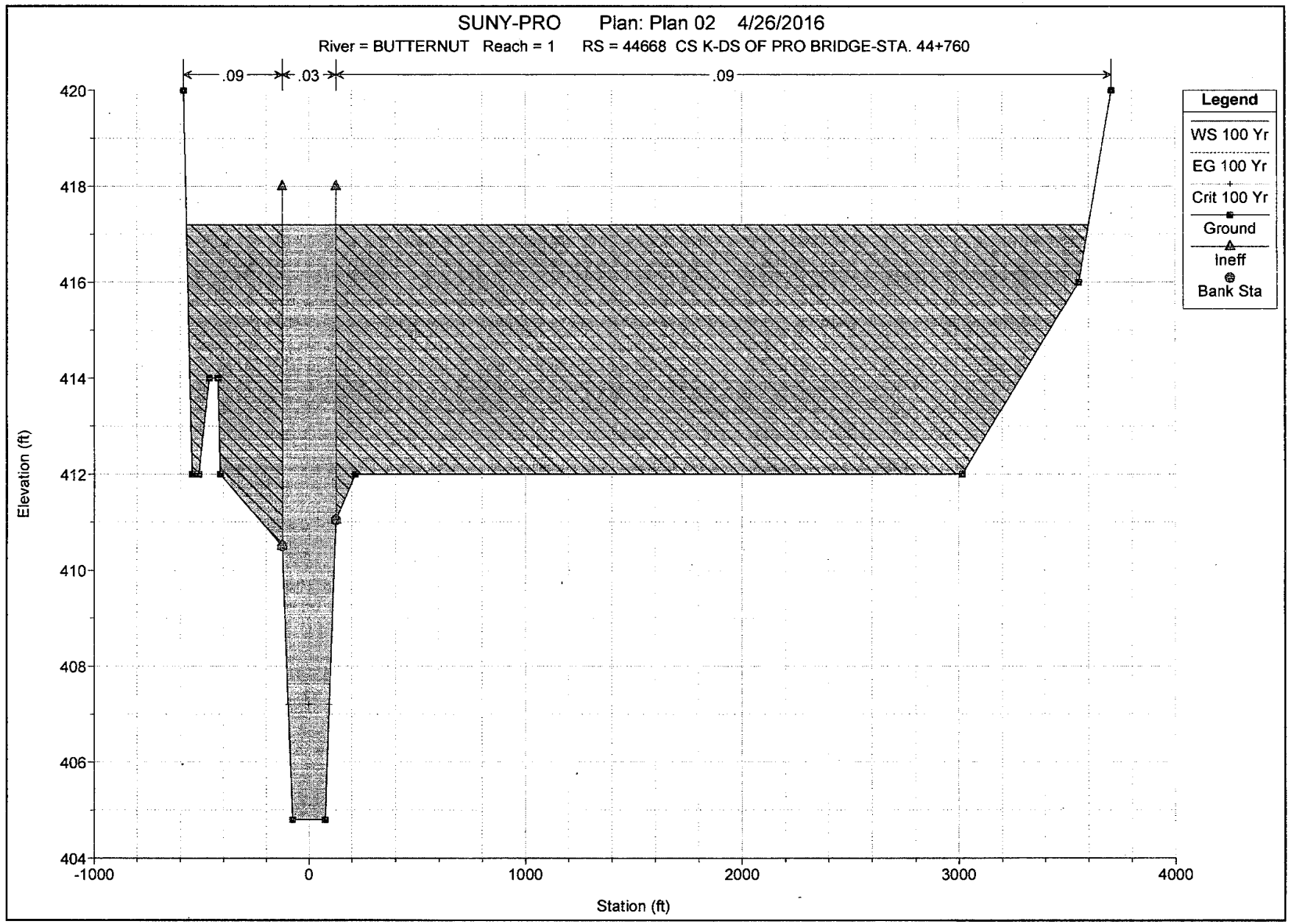
CROSS SECTION DATA		
STATION	ELEVATION (FT)	DESCRIPTION
-1770	416	GR
-1610	412	GR
-50	412	GR
-20	408	LEFT BANK
-15	402.6	CHANNEL
15	402.6	CHANNEL
20	408	RIGHT BANK
70	412	GR
550	412	GR
1600	416	GR

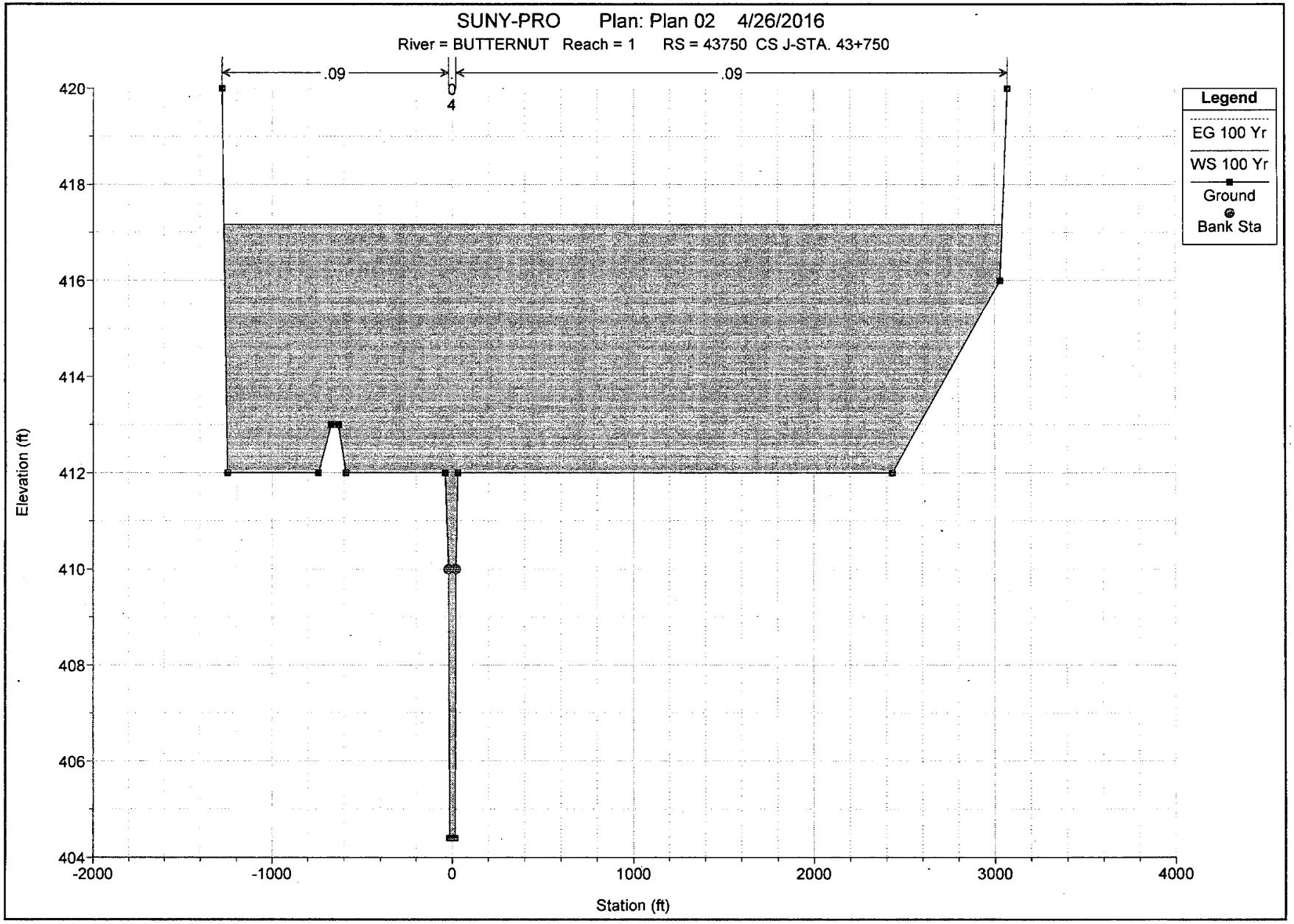

SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 46390 CS L-STA. 46+390
.09
.03
.09
Legend
EG 100 Yr
WS 100 Yr
Ground
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
-1000
0
1000
2000
3000
4000
5000
Station (ft)

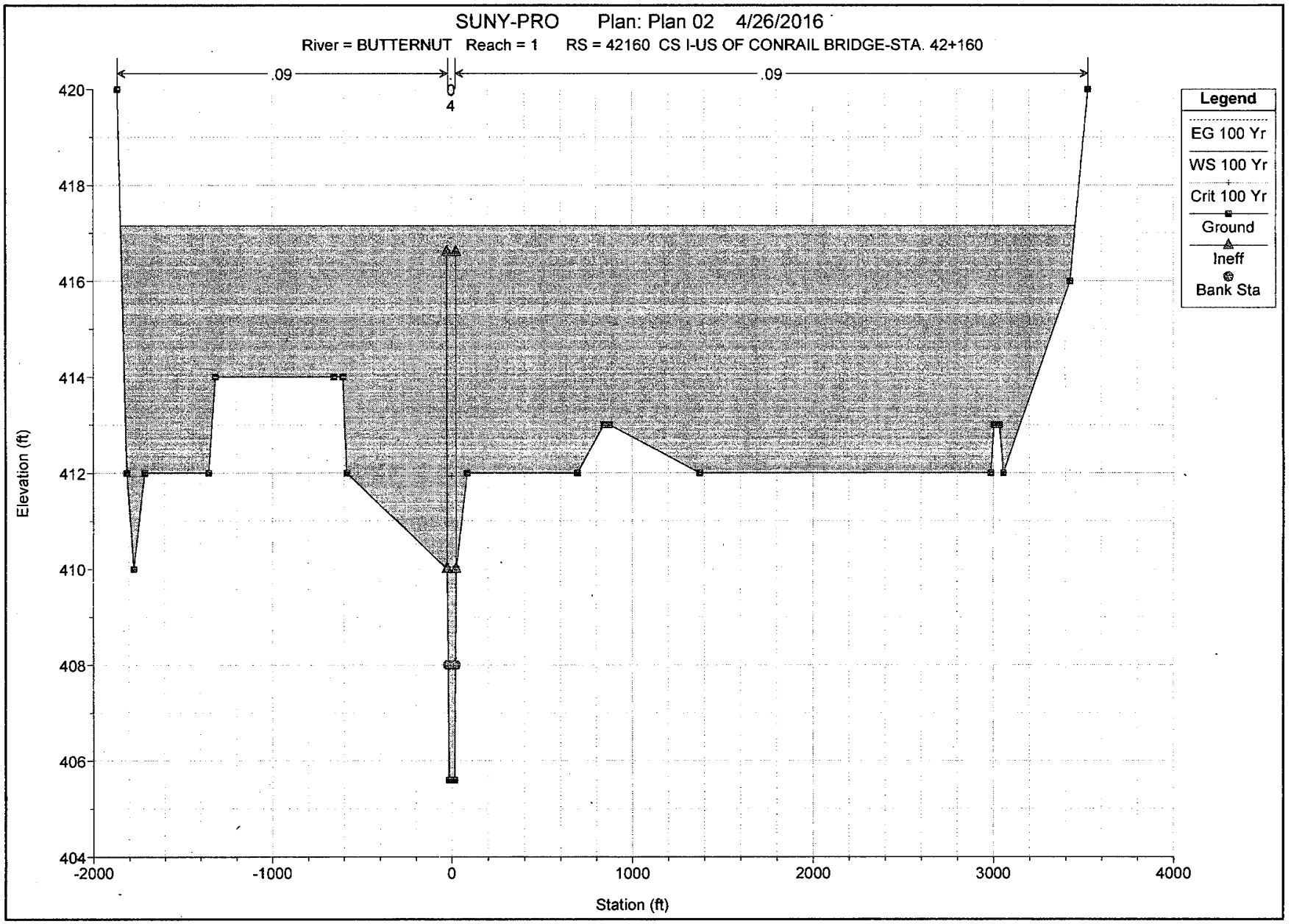

SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 45600
.09
0
3
.09
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-1000
0
1000
2000
3000
4000
5000
Station (ft)

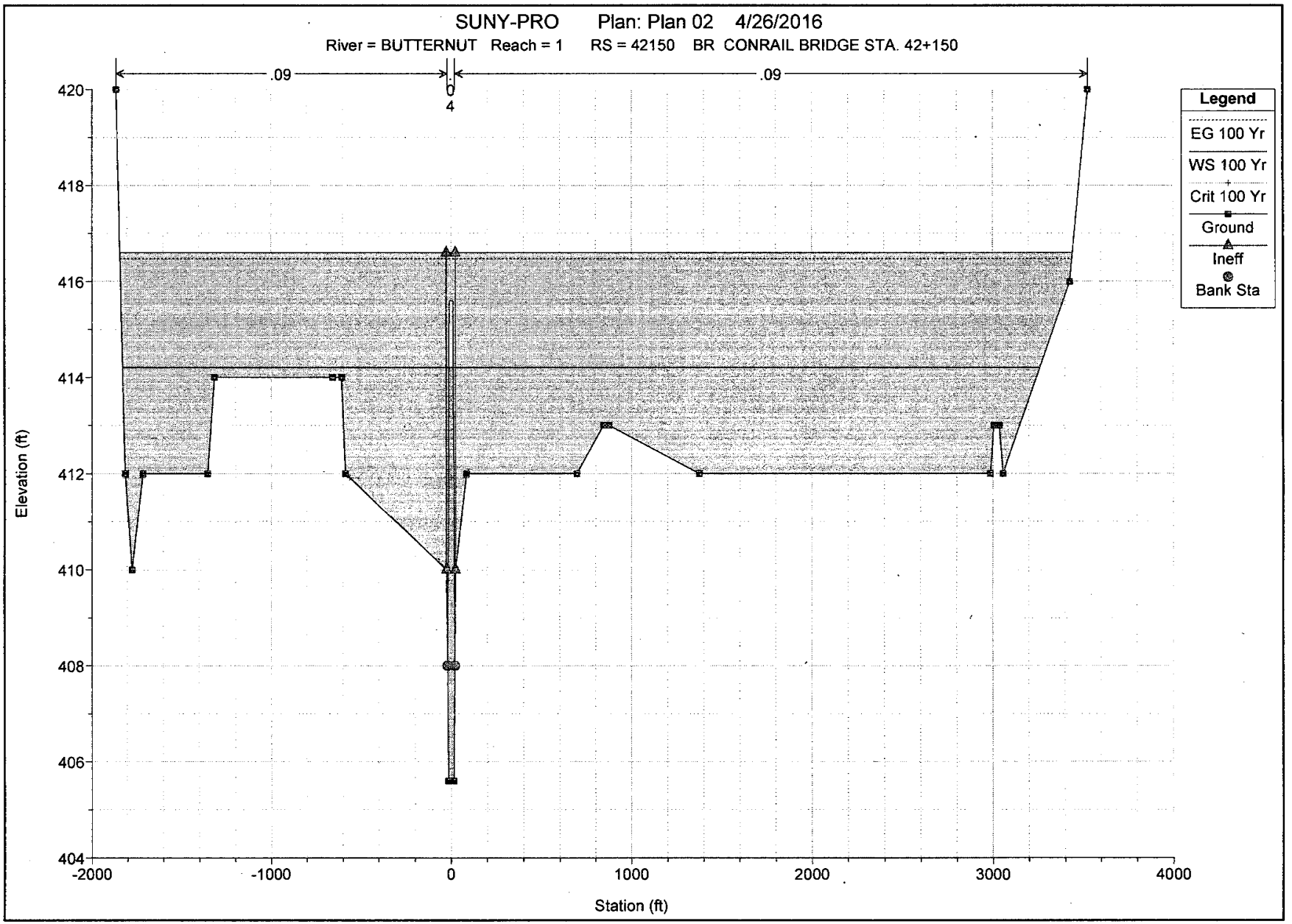

SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 44760 CS K-US OF PRO BRIDGE-STA. 44+760
.09
.03
.09
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-1000
0
1000
2000
3000
4000
Station (ft)

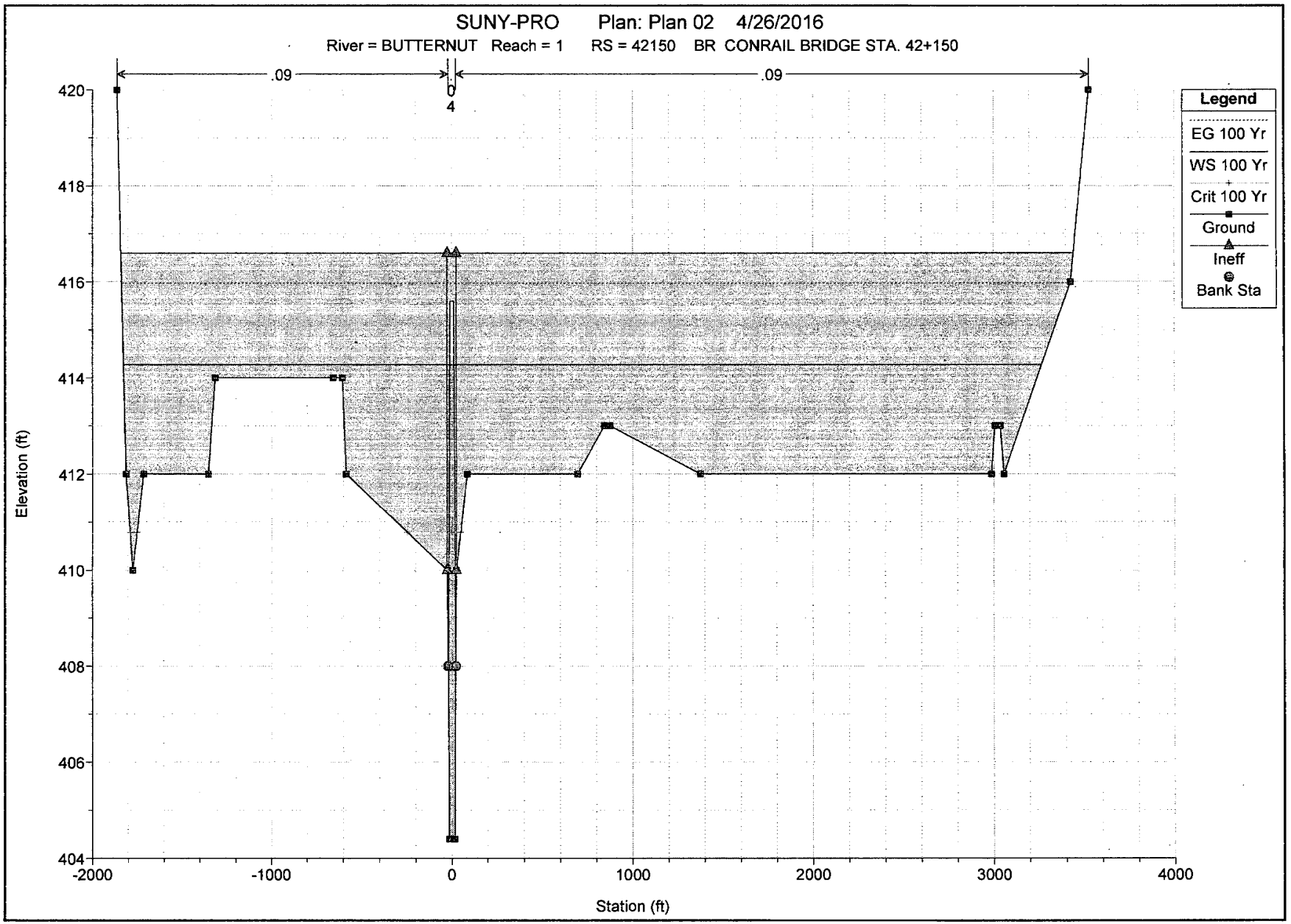

SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 44750 BR PRO BRIDGE-STA. 44+750
.09
.03
.09
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-1000
0
1000
2000
3000
4000
Station (ft)

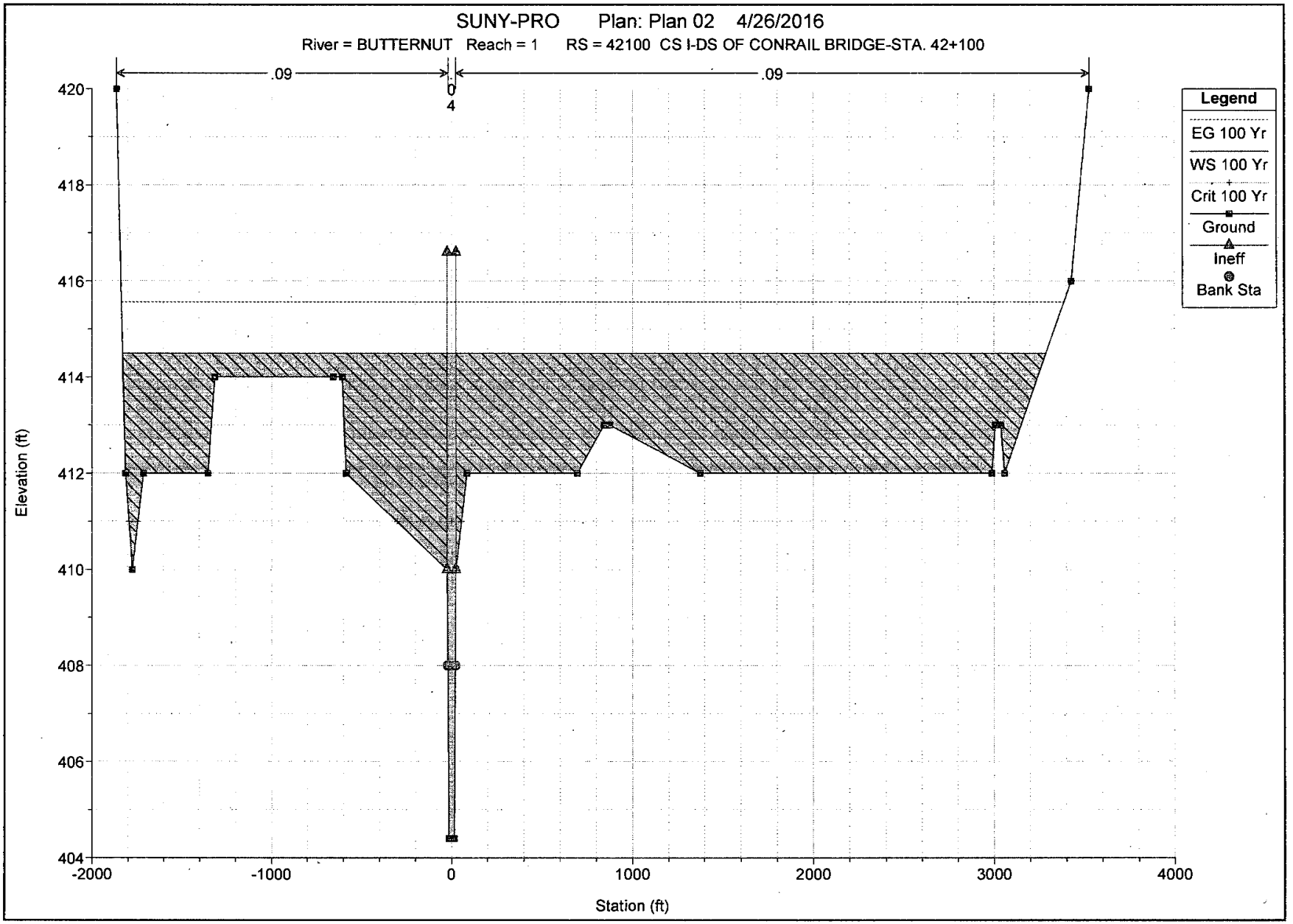

SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 44668 CS K-DS OF PRO BRIDGE-STA. 44+760
.09
.03
.09
Legend
WS 100 Yr
EG 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-1000
0
1000
2000
3000
4000
Station (ft)

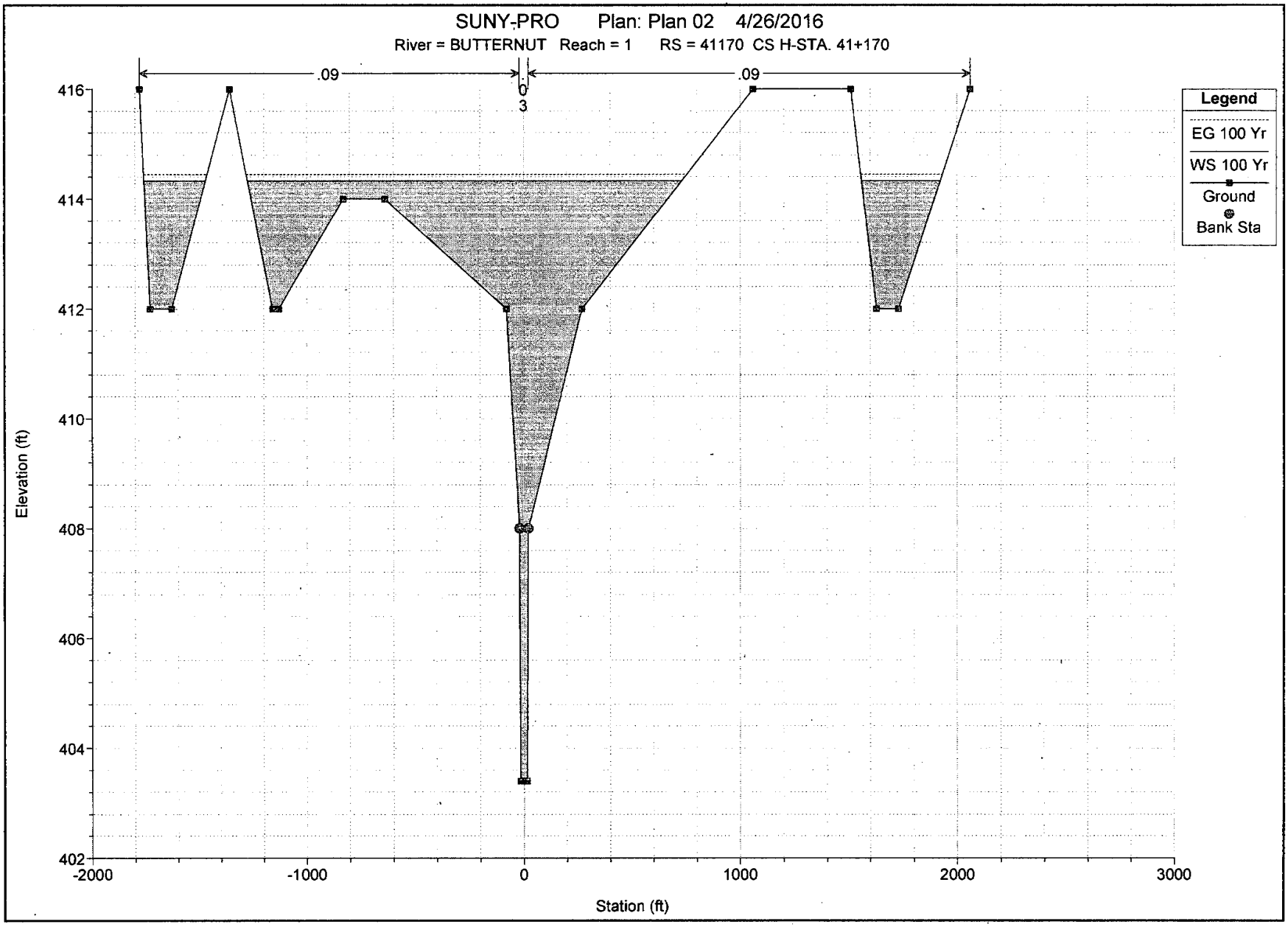

SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 43750 CS J-STA. 43+750
.09
.09
0
4
Legend
EG 100 Yr
WS 100 Yr
Ground
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-2000
-1000
0
1000
2000
3000
4000
Station (ft)

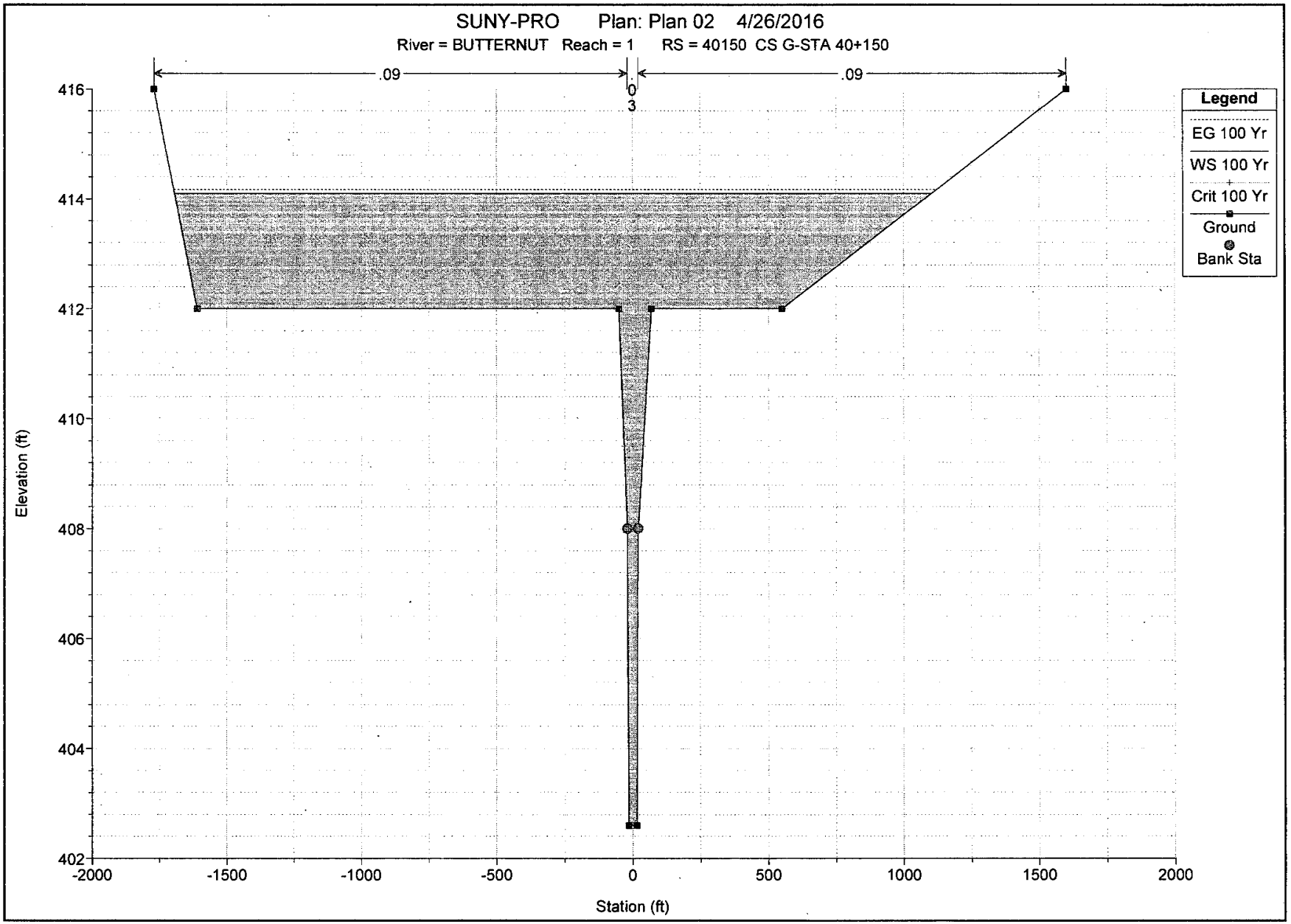

SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 42160 CS I-US OF CONRAIL BRIDGE-STA. 42+160
.09
.09
0
4
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-2000
-1000
0
1000
2000
3000
4000
Station (ft)


SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 42150 BR CONRAIL BRIDGE STA. 42+150
.09
.09
0.04
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
420
418
416
414
412
410
408
406
404
-2000
-1000
0
1000
2000
3000
4000


SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 42150 BR CONRAIL BRIDGE STA. 42+150
.09
.09
0
4
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-2000
-1000
0
1000
2000
3000
4000
Station (ft)


SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 42100 CS I-DS OF CONRAIL BRIDGE-STA. 42+100
.09
.09
0
4
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
420
418
416
414
412
410
408
406
404
-2000
-1000
0
1000
2000
3000
4000
Station (ft)


SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 41170 CS H-STA. 41+170
.09
.09
0.03
Legend
EG 100 Yr
WS 100 Yr
Ground
Bank Sta
Elevation (ft)
416
414
412
410
408
406
404
402
-2000
-1000
0
1000
2000
3000
Station (ft)


SUNY-PRO Plan: Plan 02 4/26/2016
River = BUTTERNUT Reach = 1 RS = 40150 CS G-STA 40+150
.09
.09
0.03
Legend
EG 100 Yr
WS 100 Yr
Crit 100 Yr
Ground
Bank Sta
Elevation (ft)
416
414
412
410
408
406
404
402
-2000
-1500
-1000
-500
0
500
1000
1500
2000
Station (ft)

APPENDIX C

Summary Tables

Water Surface Elevations-Existing Model

RIVER	REACH	RIVER STA.	FEMA WS ELEV.	EX WS ELEV.	DIFFERENCE
BUTTERNUT CREEK	1	46,390	417.60	417.26	-0.34
BUTTERNUT CREEK	1	45,600		417.18	
BUTTERNUT CREEK	1	44,760	417.40	417.17	-0.23
BUTTERNUT CREEK	1	43,750	417.40	417.16	-0.24
BUTTERNUT CREEK	1	42,160	416.30	417.15	0.85
BUTTERNUT CREEK	1	42,100		414.50	
BUTTERNUT CREEK	1	41,170	414.30	414.33	0.03
BUTTERNUT CREEK	1	40,150	414.10	414.10	0.00

Water Surface Elevation Comparison-Existing VS. Proposed

RIVER	REACH	RIVER STA.	EX WS ELEV.	PRO WS ELEV.	DIFFERENCE
BUTTERNUT CREEK	1	46,390	417.26	417.30	0.04
BUTTERNUT CREEK	1	45,600	417.18	417.28	0.10
BUTTERNUT CREEK	1	44,760	417.17	417.23	0.06
BUTTERNUT CREEK	1	43,750	417.16	417.16	0.00
BUTTERNUT CREEK	1	42,160	417.15	417.15	0.00
BUTTERNUT CREEK	1	42,100	414.50	414.50	0.00
BUTTERNUT CREEK	1	41,170	414.33	414.33	0.00
BUTTERNUT CREEK	1	40,150	414.10	414.10	0.00

PROJECT PLANS

DEWITT BYPASS

Town of DeWitt
Onondaga County, New York

April 2016

α ALPHA ENGINEERING

DWG NO.	Description
SP 2	SITE PLAN ROUNDABOUT
DET 1	POND DETAILS
RSX 1	ROAD WITH MEDIAN CROSS SECTION
RSX 2	BYPASS ROAD CROSS SECTION
RSX 3	ROUNDABOUT CROSS SECTION

DWG NO.	Description
PRO 1	PROFILES: ROUNDABOUT, NORTH–NB, EAST–WB
PRO 2	PROFILES: East–WB
PRO 3	PROFILES: EAST–WB, EAST–EB
PRO 4	PROFILES: SOUTH–SB, SOUTH–NB, NORTH–NB, WEST–WB
PRO 5	PROFILES: ENTRANCE AND EXIT RAMPS
PRO 6	PROFILES: WEST–EB

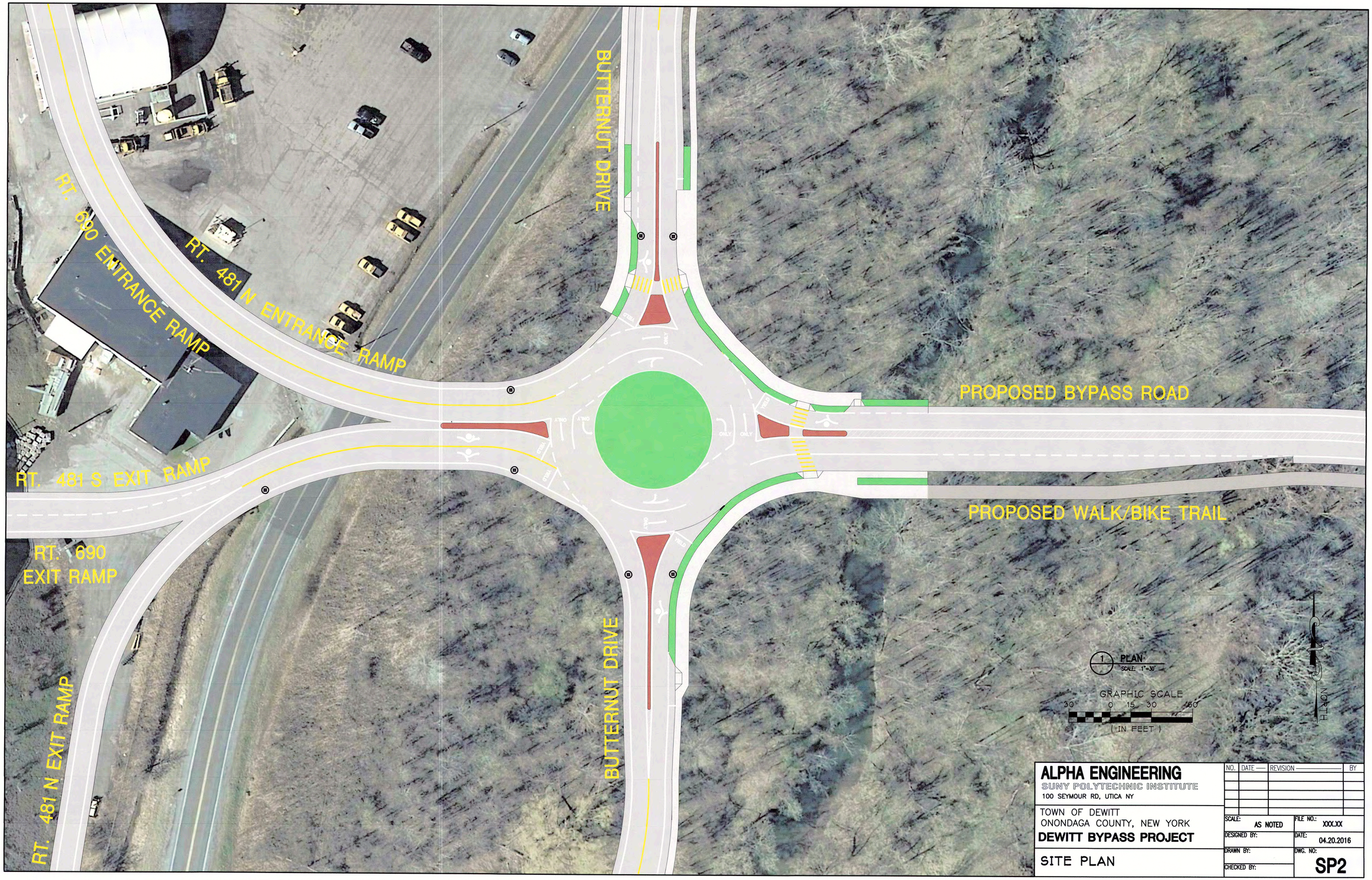
ALPHA ENGINEERING
SUNY POLYTECHNIC INSTITUTE
100 SEYMOUR RD, UTICA NY

TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

COVER PAGE

NO.	DATE	REVISION	BY

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FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
CHECKED BY:
DWG. NO: CPG



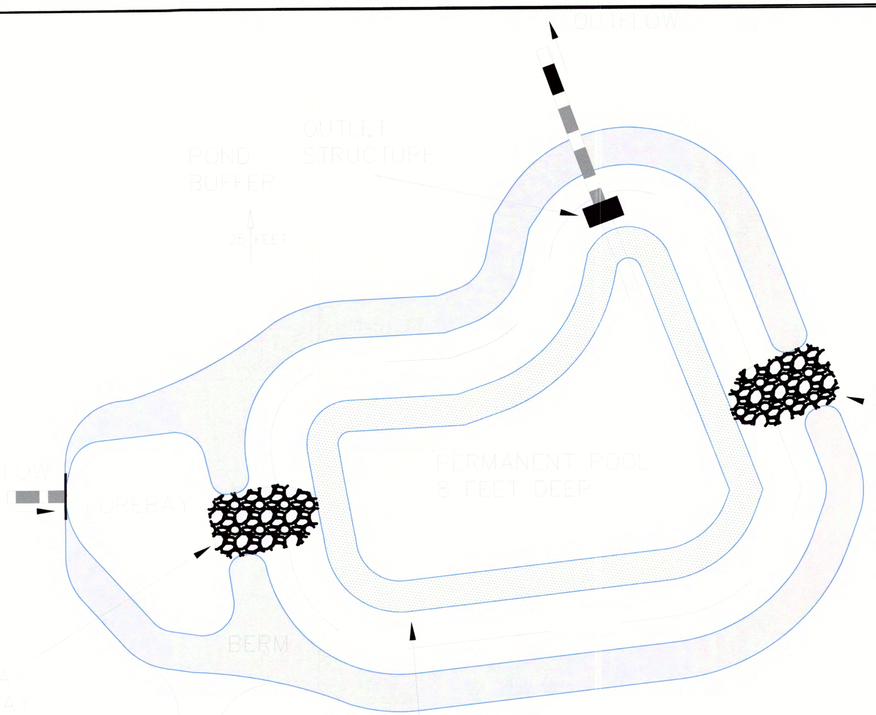
ALPHA ENGINEERING
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TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

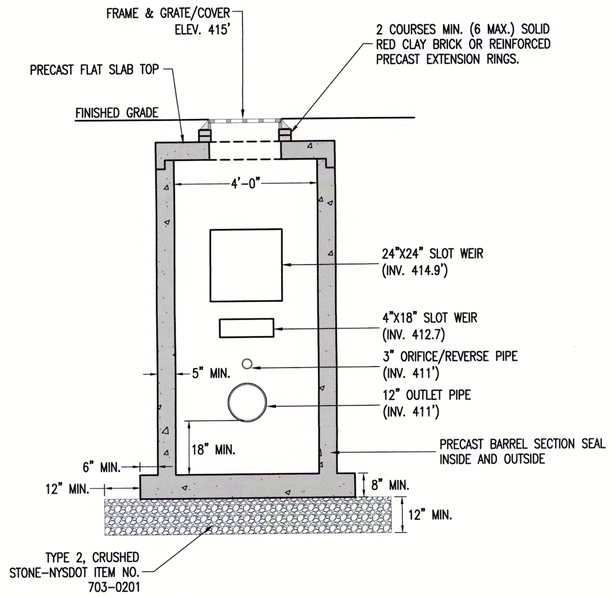
SITE PLAN

NO.	DATE	REVISION	BY

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DESIGNED BY:	DATE: 04.20.2016
DRAWN BY:	DWG. NO: SP2
CHECKED BY:	



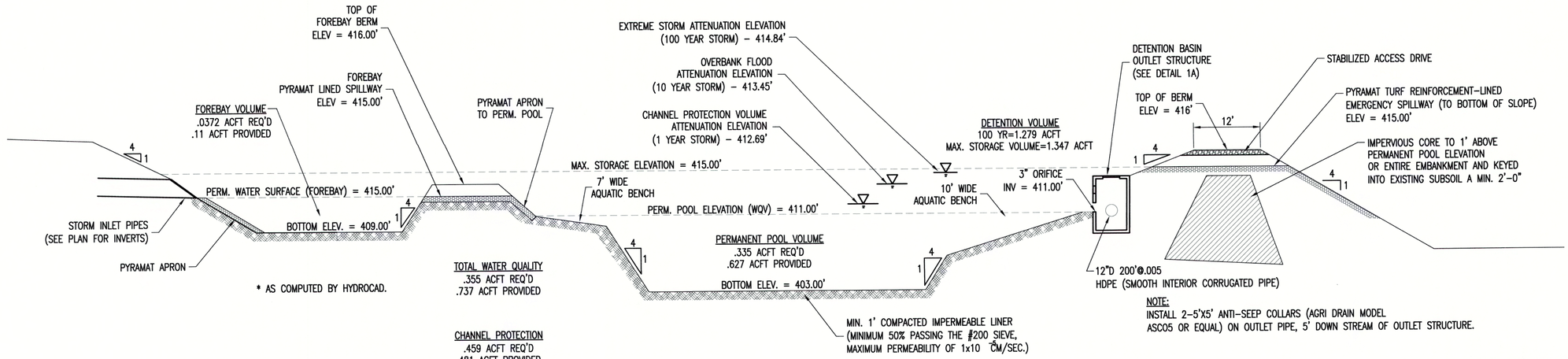
2 **DETAIL: WET POND AERIAL**
NOT TO SCALE



NOTES:

1. DESIGNED IN ACCORDANCE TO ASTM C478 WITH AASHTO HS-20 LOADING.
2. JOINTS SEALED IN ACCORDANCE WITH ASTM C990.
3. MANHOLE STEPS: ASTM C478 (IF REQUIRED).
4. REINFORCEMENT TO ASTM A615, A497, GRADE 60.
5. CONCRETE TO BE A MINIMUM 5000 PSI AT 28 DAYS, AIR ENTRAINED 5%-8%.
6. INSTALL STEPS IN STRUCTURES WITH A DEPTH GREATER THAN 4', AND IN ACCORDANCE WITH 604-3.06 OF THE NYSDOT STANDARD SPECIFICATIONS.

1A **DETAIL: PRECAST CONCRETE OUTLET STRUCTURE**
NOT TO SCALE



* AS COMPUTED BY HYDROCAD.

NOTE:
INSTALL 2-5'X5' ANTI-SEEP COLLARS (AGRI DRAIN MODEL ASCO5 OR EQUAL) ON OUTLET PIPE, 5' DOWN STREAM OF OUTLET STRUCTURE.

1 **DETAIL: WET POND**
NOT TO SCALE

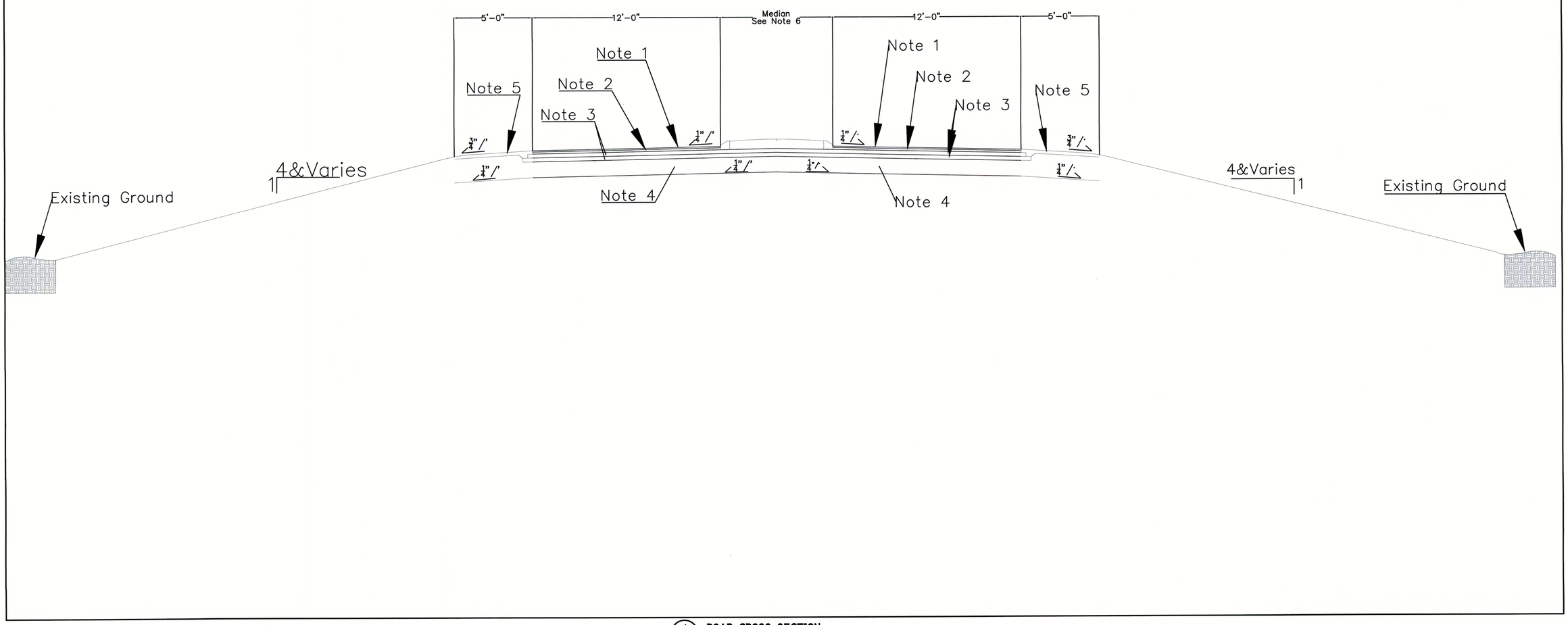
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ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

POND DETAILS

NO.	DATE	REVISION	BY

SCALE: NOT TO SCALE
FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
CHECKED BY:
DWG. NO: **DET1**



1 ROAD CROSS SECTION
NOT TO SCALE

No	Description
1	ASPHALT CONCRETE, TYPE 7 TOP COURSE (1")
2	ASPHALT CONCRETE, TYPE 3 BINDER COURSE (1.5")
3	ASPHALT CONCRETE, TYPE 1 BASE COURSE (3")
4	SUBBASE COURSE, OPTIONAL TYPE (12")
5	ASPHALT CONCRETE, TYPE 3 BINDER COURSE (2.5")
6	MEDIAN WIDTH VARIES ACCORDING TO DOT GUIDLINES

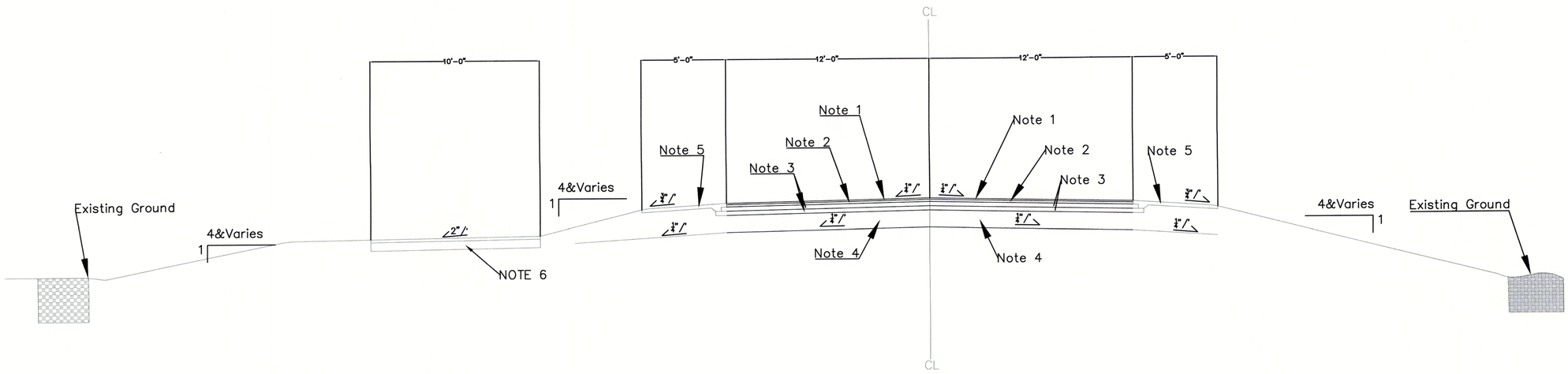
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TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

ROAD WITH MEDIAN X-SECTION

NO.	DATE	REVISION	BY

SCALE: NOT TO SCALE
FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
CHECKED BY:
DWG. NO: **RXS 1**



2 **ROAD CROSS SECTION**
NOT TO SCALE

No	Description
1	ASPHALT CONCRETE, TYPE 7 TOP COURSE (1")
2	ASPHALT CONCRETE, TYPE 3 BINDER COURSE (1.5")
3	ASPHALT CONCRETE, TYPE 1 BASE COURSE (3")
4	SUBBASE COURSE, OPTIONAL TYPE (12")
5	ASPHALT CONCRETE, TYPE 3 BINDER COURSE (2.5")
6	POROUS PAVEMENT WITH 12" STONE SUBBASE

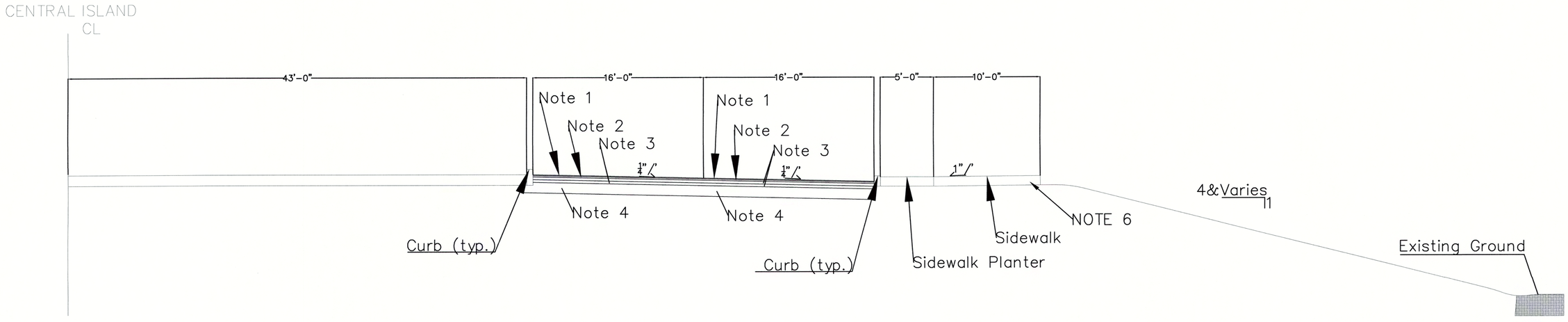
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TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

ROAD X-SECTION

NO.	DATE	REVISION	BY

SCALE: NOT TO SCALE
FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
DWG. NO: **RXS 2**
CHECKED BY:



3 **ROUNDABOUT CROSS SECTION**
NOT TO SCALE

No	Description
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2	ASPHALT CONCRETE, TYPE 3 BINDER COURSE (1.5")
3	ASPHALT CONCRETE, TYPE 1 BASE COURSE (3")
4	SUBBASE COURSE, OPTIONAL TYPE (12")
5	ASPHALT CONCRETE, TYPE 3 BINDER COURSE (2.5")
6	POROUS PAVERS WITH 12" STONE SUBBASE

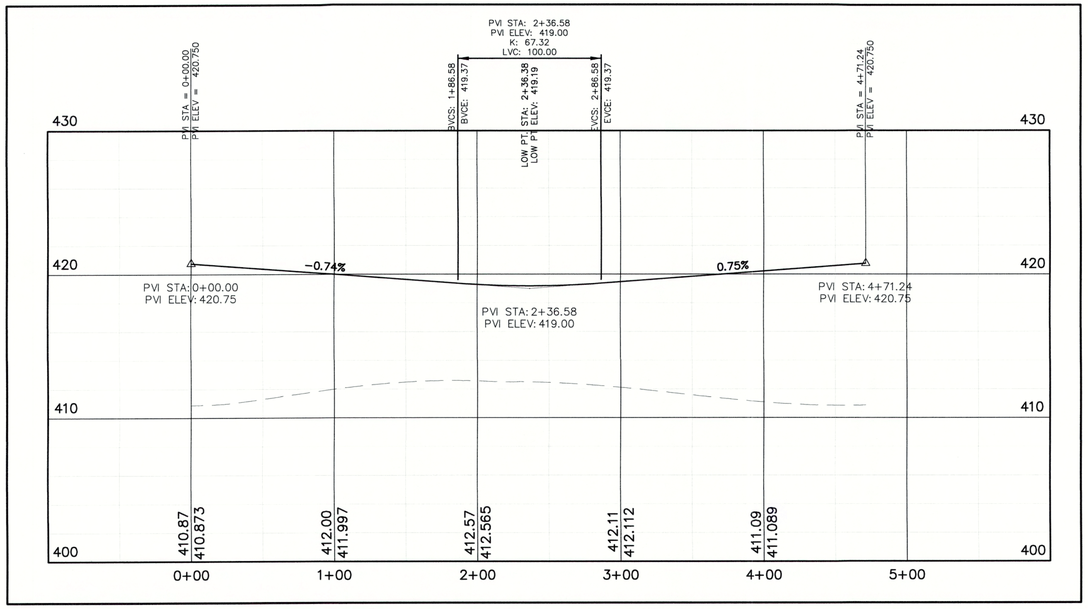
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TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

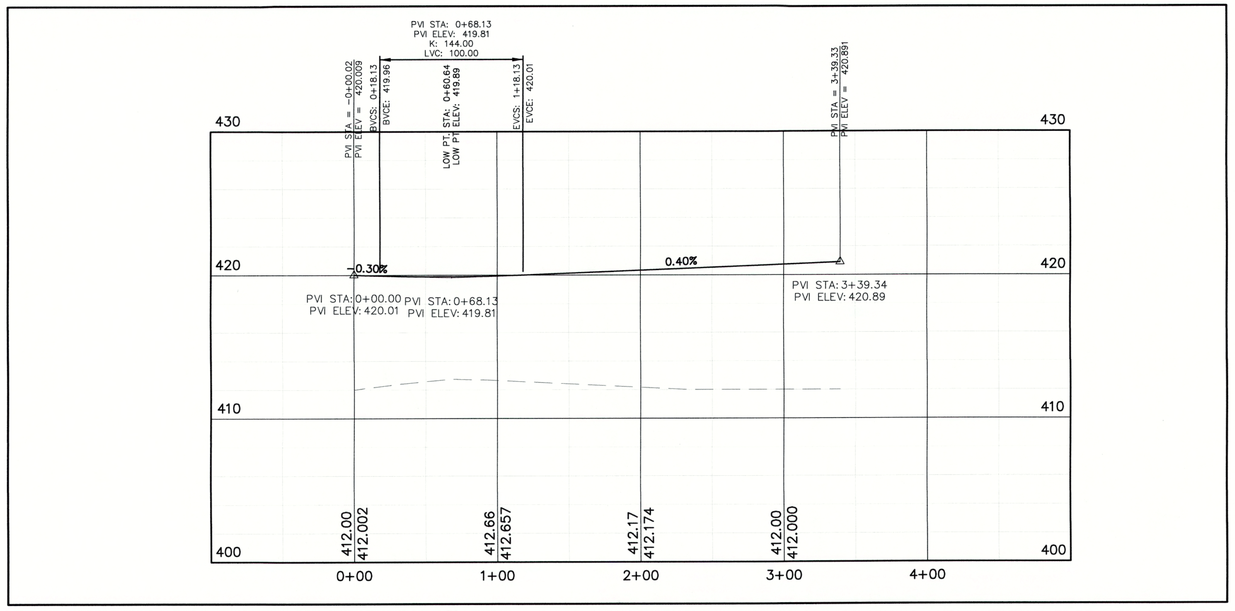
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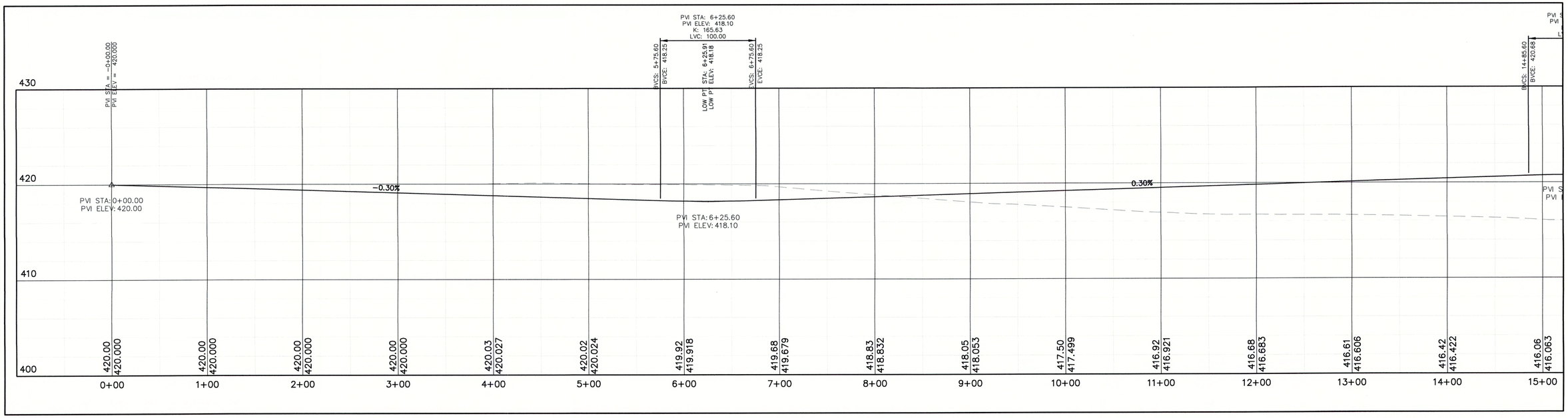
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DATE: 04.20.2016
DRAWN BY:
DWG. NO: **RXS 3**
CHECKED BY:



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3 **PROFILE-EAST-WB (STA. 0+00 THRU 15+00)**
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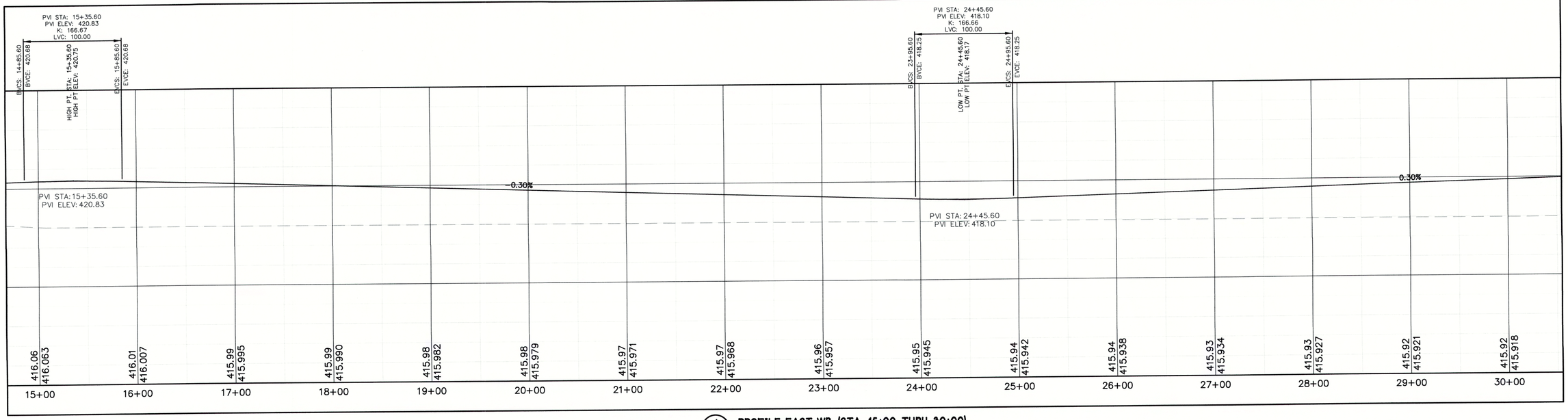
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TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

ROAD PROFILES

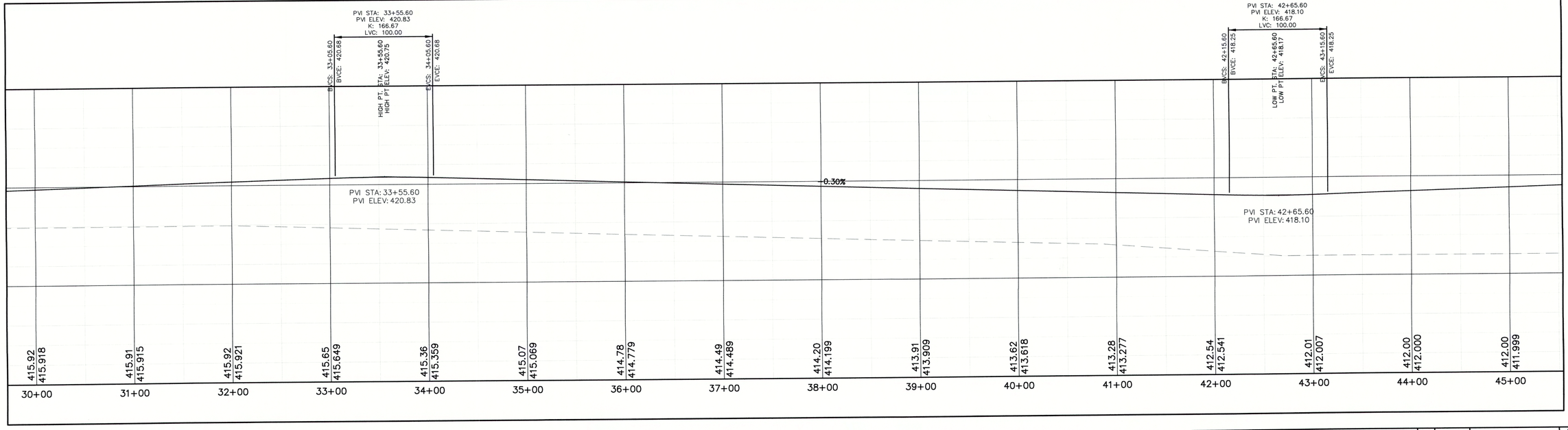
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SCALE: AS NOTED
FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
DWG. NO: **PRO 1**
CHECKED BY:



1 **PROFILE-EAST-WB (STA. 15+00 THRU 30+00)**

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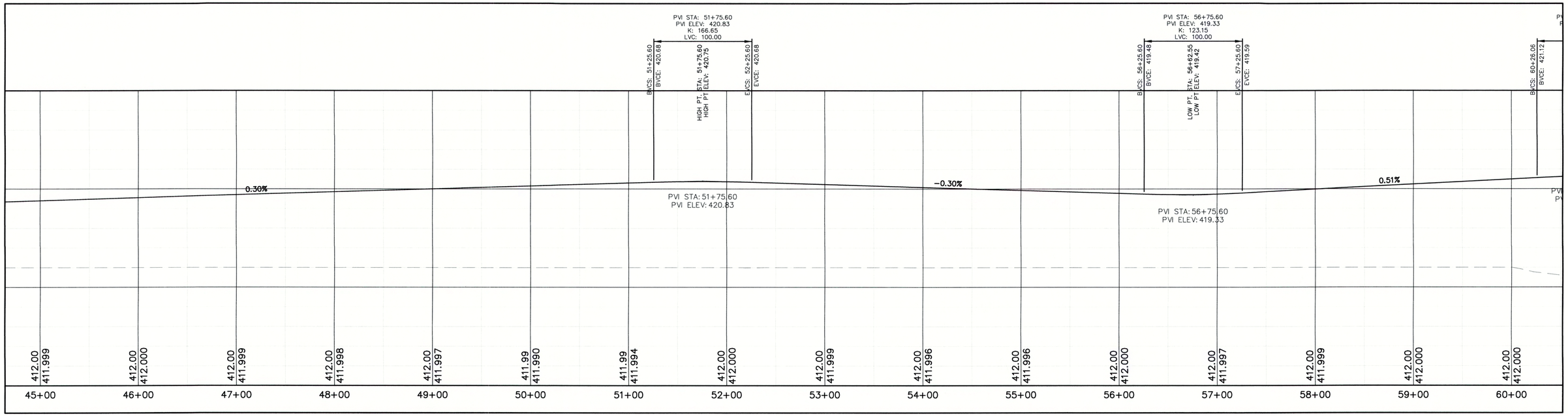
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TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

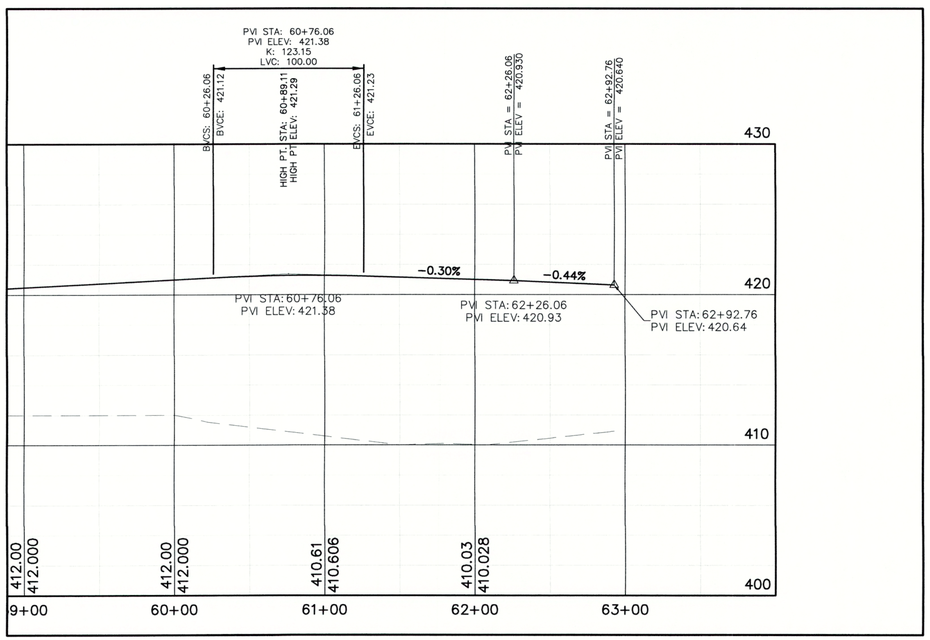
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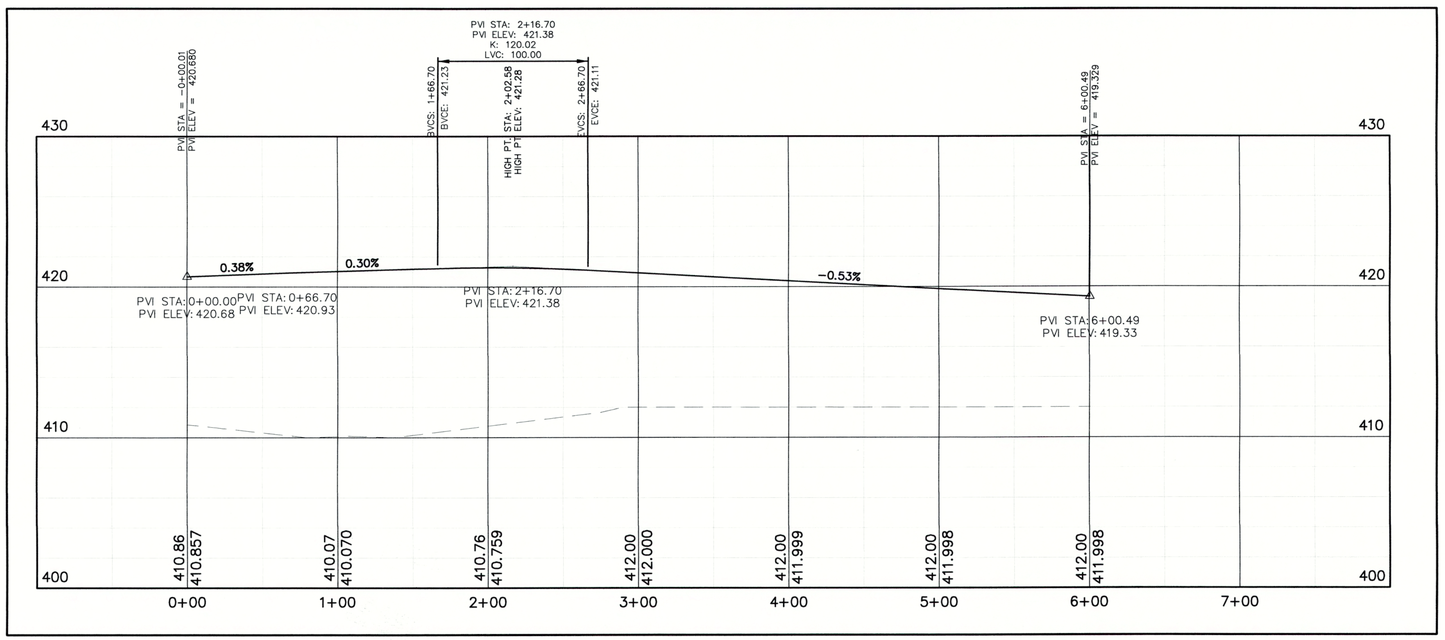
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DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
DWG. NO: **PRO 2**
CHECKED BY:



1 **PROFILE-EAST-WB (STA. 45+00 THRU 60+00)**
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2 **PROFILE-EAST-WB (STA. 60+00 THRU 62+92.76)**
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3 **PROFILE-EAST-EB (STA. 0+00 THRU 6+00.49)**
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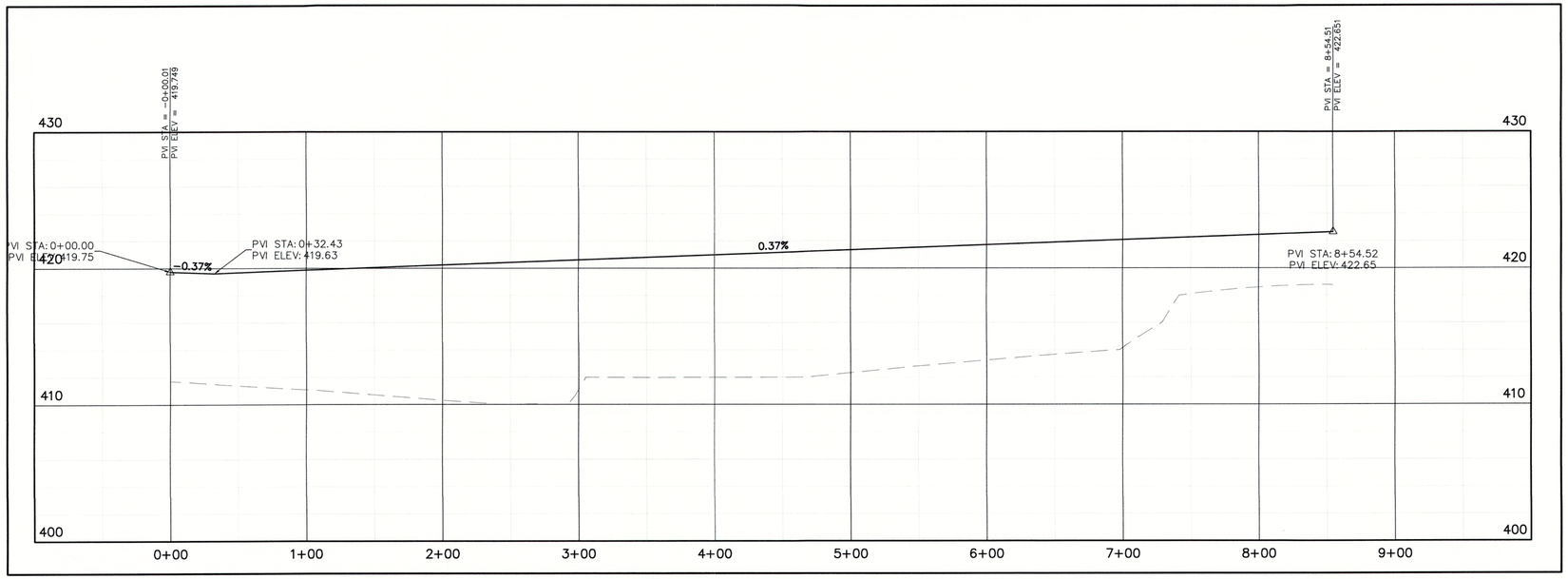
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ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

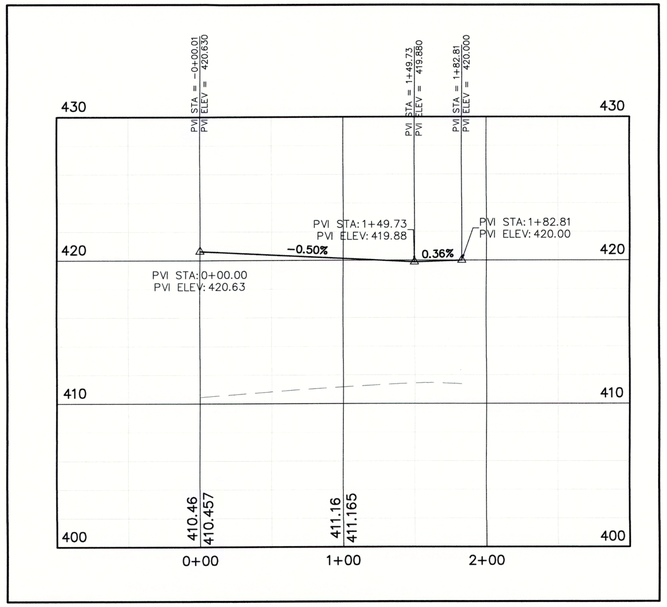
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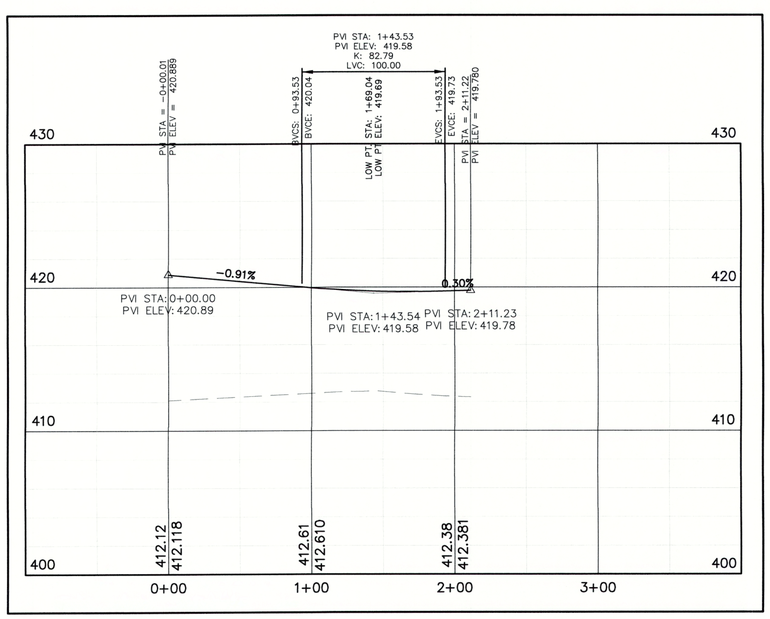
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DESIGNED BY:
DATE: 04.20.2016
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DWG. NO: **PRO 3**
CHECKED BY:



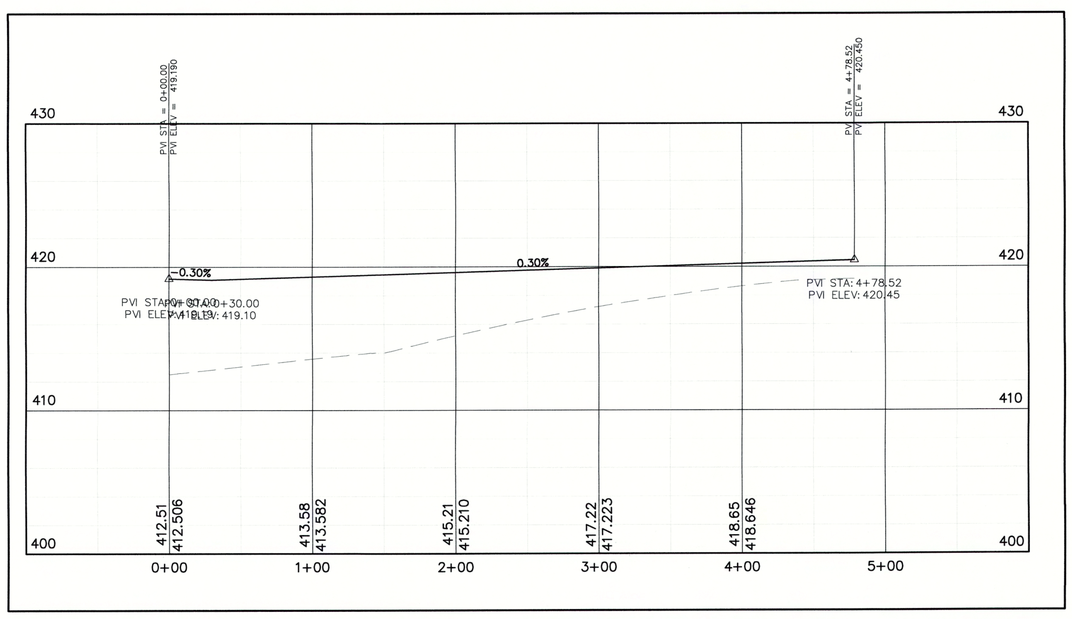
1 **PROFILE-SOUTH-SB (STA. 0+00 THRU 8+54.51)**
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2 **PROFILE-SOUTH-NB (STA. 0+00 THRU 1+82.81)**
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3 **PROFILE-NORTH-SB (STA. 0+00 THRU 2+11.22)**
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4 **PROFILE-WEST-WB (STA. 0+00 THRU 4+78.52)**
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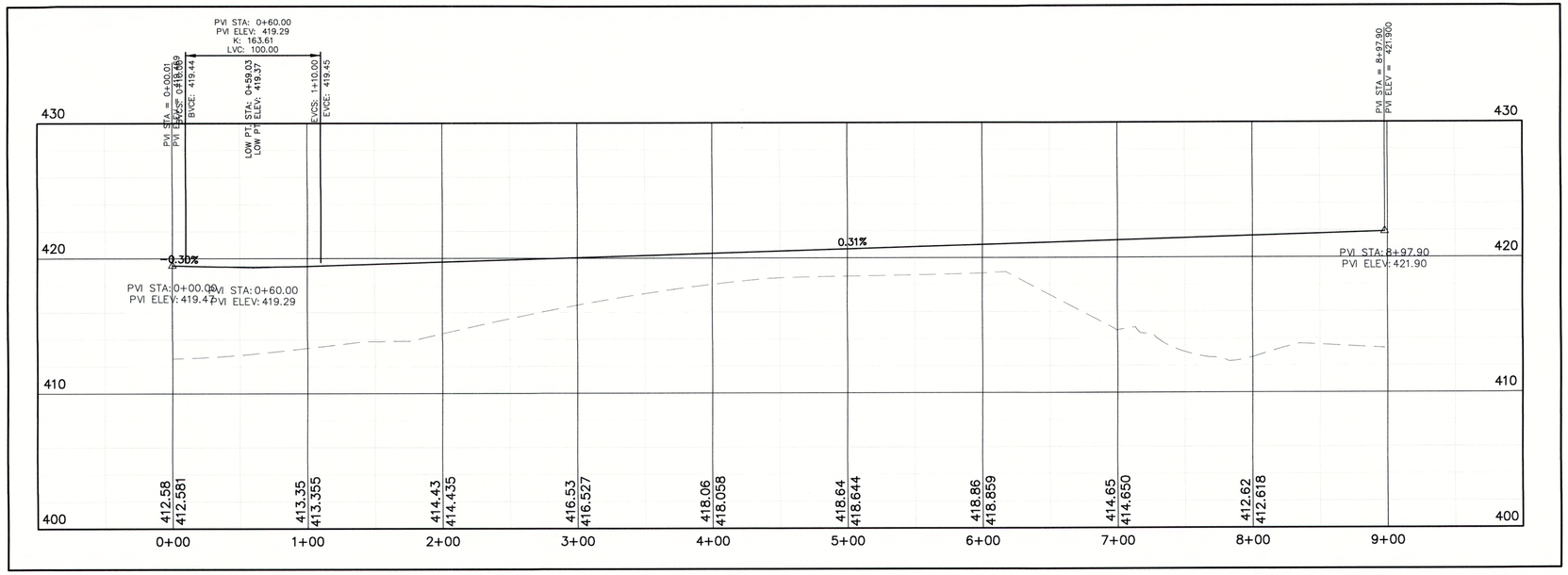
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TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

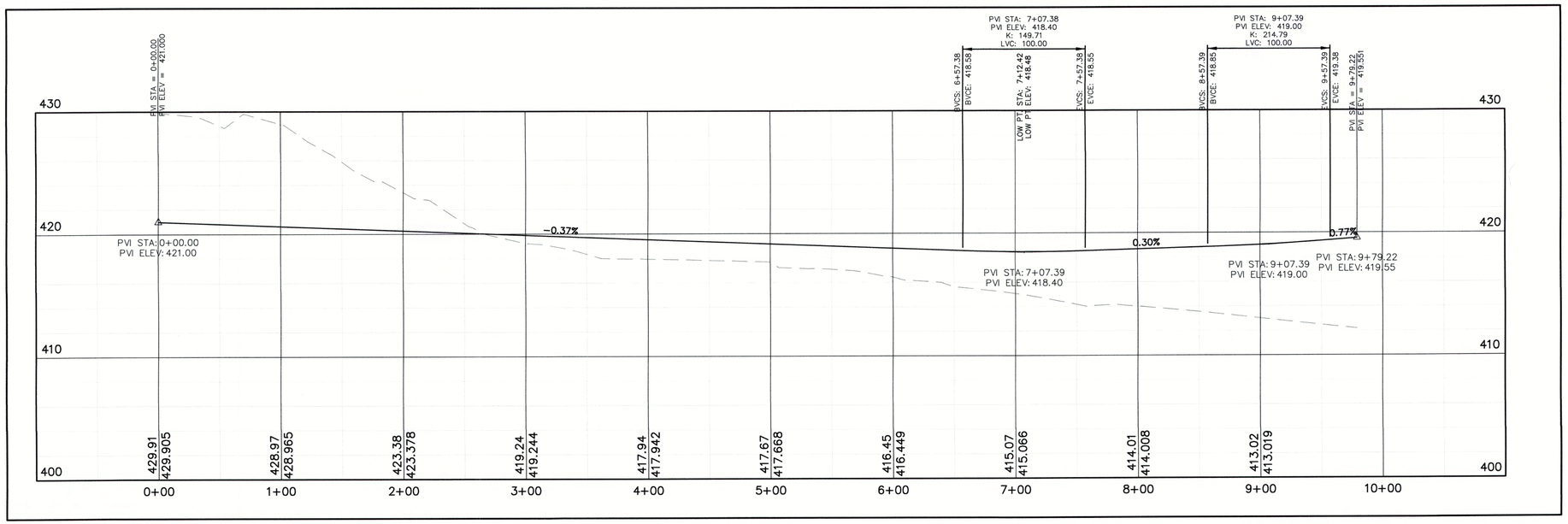
ROAD PROFILES

NO.	DATE	REVISION	BY

SCALE: AS NOTED
FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
DWG. NO: **PRO 4**
CHECKED BY:



1 **PROFILE-481 ENTRANCE RAMP (STA. 0+00 THRU 8+97.90)**
SCALE: VERTICAL 1"=5', HORZONTAL 1"=50'



2 **PROFILE-481 EXIT RAMP (STA. 0+00 THRU 9+79.22)**
SCALE: VERTICAL 1"=5', HORZONTAL 1"=50'

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TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

ROAD PROFILES

NO.	DATE	REVISION	BY

SCALE: AS NOTED
FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
DWG. NO: **PRO 5**
CHECKED BY:

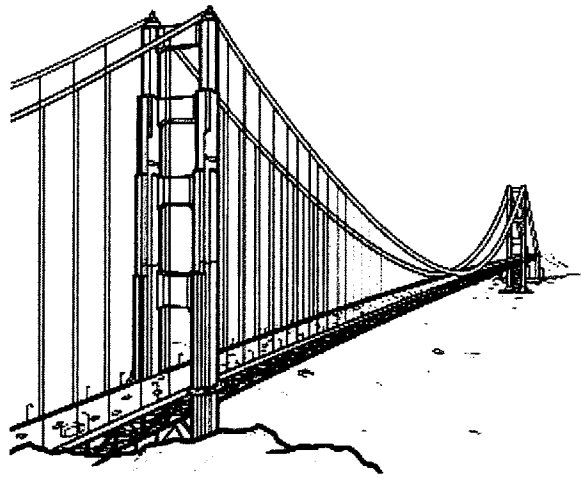
Proposal

for

DeWitt Bypass
Town of DeWitt
County of Madison, New York

Closing Date and Time: October 05, 2015, 16:00

Delivered to:
Gregory Sgromo
Town of Dewitt
5400 Butternut Dr.
East Syracuse, NY 13057



September 28, 2015

Mr. Gregory Sgromo, P.E.
Town of Dewitt
5400 Butternut Dr.
East Syracuse, NY 13057

Re: Request for Proposal-DeWitt Bypass
Town of Dewitt

Dear Mr. Sgromo, P.E.:

Thank you for the opportunity to submit the enclosed proposal for Consulting Engineering Services. I have been working with this company for over 3-years and find their dedication to ensuring quality services to the local area towns to be exceptional.

Our dedicated and hardworking staff at Alpha Engineers are highly qualified to provide the Town of Dewitt with all the necessary services.

Our staff has a wealth of knowledge and experience that relates to structural design and environmental and hydrological analysis. We are confident that our expertise in these fields will offer the Town of Dewitt the services and skills needed to effectively solve the problem regarding congestion along Rte. 5.

I feel very confident that Alpha Engineering will be a distinctive and desirable choice for the Town of Dewitt. With our small size firm and refined knowledge with similar projects we will be able to provide the Town of Dewitt with cost-effective, quality services.

We here at Alpha Engineering look forward to discussing with the Town of Dewitt in further detail the proposal for the Relocation of Rte. 290. Please feel free to contact me at your convenience if there are any questions regarding the Relocation of Rte. 290.

Sincerely,

Bianca Little

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Introduction

Alpha Engineering has prepared this proposal in response to the NYSDOT request for a solution to the congestion problem along Route 5 between The Town of Dewitt and Fayetteville, New York. In this proposal we address the possibility of constructing a bypass route to eliminate the congestion along Route 5.

This proposal establishes our understanding of the project and addresses the variety of concerns associated with it. A thorough analysis will be conducted to ensure a cost-effective solution to the Route 5 congestion problem.

Firm Introduction

Competence, dedication, success. Here at Alpha Engineering we hold these three values above all else. By maintaining a high level of commitment to our work, we consistently leave our clients feeling satisfied. Not only satisfied with the end result, but satisfied with each phase of the project from start to finish.

For over two years, our firm has delivered high quality work and exceptional clientele services. We have worked on a variety of projects including roadway design, hydrologic design of channels and multi-story structural Steel buildings but are now interested in expanding our business. We would like to broaden our expertise into the roadway design industry.

Alpha Engineering is a student owned and operated company that is looking to continue growing into a well-known local engineering firm. Throughout our time together we have established a strong group dynamic. We focus our resources on delivering quality products in a timely manner and strive to fulfill all of our client's needs. With our outstanding team chemistry we are able to perform difficult tasks. Our company focuses on structural steel design and environmental analysis but are capable of performing a variety of projects. From our reports to our meetings we aim to keep our clients up to speed on all aspects of our projects.

Our dedication to quality is apparent in all aspects of our work. Throughout our time together we have completed projects including; a 20 foot steel bridge design, a Renewable Energy Path, Parking lots and Parking Garages.

Our dedication and focus on quality will provide the Town of Dewitt with all of the services outlined in the Request for Proposal. Any services that we are unable to provide will be coordinated through other qualified firms.

Scope of Work

The proposed project "DeWitt Bypass" located in the Town of DeWitt and Manlius includes the construction of an arterial highway, multiple signalized intersections and a bridge over Butternut Creek. The purpose of the project is to eliminate the frequency of congestion at the intersection of Interstate 481 and Route 5, where routine congestion occurs. The proposed relocation will bypass Route 5 between the I-481 and Route 5 intersection and the Route 5 and North Burdick Street intersection. The construction of the highway will allow for faster travel times between East Syracuse and Manlius by avoiding Route 5. The site features wooded land, wetlands and floodplains which pose environmental concerns.

Two basic alignments, each having two alternative routes will be considered for preliminary plan development. A no build alternative will also be considered. Any minor design details are subject to change.

The project begins on the western side of the site where Interstate 481 and Interstate 690 meet Butternut Drive. Off ramps from I-690 East and I-481 South as well as the I-690 West and I-481 North on ramps are already constructed and will be utilized for each proposed alignment. The DOT facility located at the junction of the previously stated on and off ramps will need to be removed for each alignment.

A variety of specific details for each alignment will be considered to achieve the most suitable roadway. Our firm will consider additional turning lanes and lane width extensions for Butternut Drive, Burdick Street and Bowman Road. Additional considerations include the amount of lanes in each direction for the Highway, a bike path and the addition of a minor cutoff road from Bowman Road to the highway. Culverts may also be used for minor streams that cross any section of the highway.

Alternative 1

A traffic circle will connect the on and off ramps of I-481 and I-690 to Butternut drive. A 300 foot traffic circle will be used in this alignment. Continuing in an easterly direction for approximately 150 feet, the proposed highway will include a bridge over Butternut Creek. Located approximately 1500 feet east of the bridge site is a body of water. The highway will run in a southeasterly direction and avoid the water. From there the proposed highway will continue straight crossing Fisher Road. From this point the highway will continue to Alternative 1a or Alternative 1b.

Alternative 1a: From Fisher Road the facility will continue for 4500 feet in a southeasterly direction to Burdick Street where it connects with a signalized intersection. The highway will be aligned so that it does not affect the landfill located 500 feet west of Burdick Street.

Alternative 1b: From Fisher Road heading in an eastern direction, the facility will take a turn northward and continue for 2000 feet to the abandoned railroad tracks. From there the highway will continue in an easterly direction following the railroad tracks for 3000 feet where it will connect with Burdick Street where a signalized intersection will be installed. The highway will continue for approximately 1750 feet where it will then make an "S" shape connecting to Route 290. A variety of horizontal alignments will be considered for the curves in the highway. It will be necessary to purchase properties for this alignment.



GOOGLE Maps: https://www.google.com/maps/@43.0509477,-76.0313339,3700m/data=!3m1!1e3

Alternative 2

Alternative two is similar to alternative 1 with respect to the highway alignments. Rather than a traffic circle, a signalized intersection will be utilized. A signalized intersection will connect the on and off ramps of I-481 and I-690 to Butternut drive. Continuing in an easterly direction for approximately 150 feet, the proposed highway will include a bridge over Butternut Creek. Located approximately 1500 feet east of the bridge site is a body of water. The highway will run in a southeasterly direction and avoid the water. From there the proposed highway will continue straight crossing Fisher Road. From this point the highway will continue to Alternative 2a or Alternative 2b.

Alternative 2a: From Fisher Road the facility will continue for 4500 feet in a southeasterly direction to Burdick Street where it connects with a signalized intersection. The highway will be aligned so that it does not affect the landfill located 500 feet east of Burdick Street.

Alternative 2b: From Fisher Road heading in an eastern direction, the facility will take a turn northward and continue for 2000 feet to the abandoned railroad tracks. From there the highway will continue in an easterly direction following the railroad tracks for 3000 feet where it will connect with Burdick Street where a signalized intersection will be installed. The highway will continue for approximately 1750 feet where it will then make an "S" shape connecting to Route 290. A variety of horizontal alignments will be considered for the curves in the highway. It will be necessary to purchase properties for this alignment.



GOOGLE Maps: https://www.google.com/maps/@43.0509477,-76.0313339,3700m/data=!3m1!1e3

Deliverables

In an effort to eliminate the congestion occurring along Route 5, The Town of DeWitt is seeking potential roadway construction options to bypass the problem area without creating other areas of congestion. The potential construction of roadways poses environmental and traffic problems.

Alpha Engineering will assess any potential issues involving environmental and traffic related problems. Our firm will also look at three possible alternative locations for the bypass road.

Specifically, Alpha Engineers will:

Feasibility Study

In order to begin the "DeWitt Bypass project", Alpha Engineering will conduct a feasibility study on the potential engineering design to be utilized.

In the feasibility report, Alpha Engineering will address:

- The four (4) alternative engineering methods that may be taken in the course of the project.
  - Alternative 1a: Traffic circle- (from Fisher Road to Southeast direction to Burdick Street)
  - Alternative 1b: Traffic circle – (from Fisher Road to Northeast direction to Burdick Street)
  - Alternative 2a: Signalized intersection- (from Fisher Road to Southeast direction to Burdick Street)
  - Alternative 2b: Signalized intersection - (from Fisher Road to Northeast direction to Burdick Street)

- The technical, operational, and economical feasibility of each alternative.
  Evaluation criterion include and are not limited to:
  - Available space
  - Safety
  - Labor requirements
  - Completion time
  - Costs
  - Benefits

- Comparisons will be made in order to clearly distinguish the advantage and disadvantages of all alternative methods.

Traffic Impact Study

- Alpha Engineering will provide detailed traffic analysis data considering the traffic impact on the surrounding towns and nearby intersections. Our firm will ensure that an appropriate level of service is applied. We will provide:
  - Background Analysis
  - Future Traffic Projections
  - Trip Generation and Distribution

Highway Alignment and Design

- Alpha Engineering will establish an alignment and provide detailed geometric plans for the highway that best fits the area and consider:
  - Terrain
  - Cost of Land Acquisition
  - Vertical and Horizontal Curvature
  - Future Traffic Volume
  - Pavement materials
  - Storm Water Management

Intersection Configuration

- Alpha Engineering will provide detailed intersection plans including:
  - Traffic Light Timing
  - Lane Geometry
  - Surrounding Intersection Impact
  - Turning Lanes
- Specifically, we will look at the intersections of Burdick Street and the Bypass road as well as the intersection of Route 290 and the Bypass Road.
- Current traffic analysis data will be provided and considered for the feasibility report.

Environmental Impact Analysis

- Alpha Engineering will investigate how the construction of the Bypass Road will affect the environment and how we can mitigate any impacts that the construction process will have on the environment. Alpha Engineering will assess the potential impacts that construction will have on surface water, groundwater, soil and the air. Being that the proposed Bypass Road will be constructed in an area that is currently located on a wetland, we will investigate the wetland and determine how the construction phase will affect the wetland and species that are currently living in this area. Our firm will provide a detailed Environmental Impact Assessment that will be used to decide the most effective design with minimal environmental impact.

Traffic Circle Design

- Alpha Engineering will provide a traffic circle design layout including:
  - Lane Geometry and Configuration
  - Utilities and Drainage
  - Traffic Flow Analysis

One Span Bridge

- Alpha Engineering will provide a detailed design of a one span bridge over butternut creek considering:
  - Materials
  - Structural Steel Design
  - Concrete Design
  - Bridge Deck Design

Services/Work Not Included:

- Geotechnical Evaluation
- Surveying

Staffing Plan

Here in Alpha Engineering, we value the relationship we create with our clients. In order for us to do so, we would like to introduce you to the key members of the firm that will be actively present in your service. The following members are;

Mr. Gabriel Stinebrickner, is currently a senior in the Civil Engineering Program at SUNY Polytechnic Institute. He will be graduating in May of 2016 with a Bachelor of Science in Civil Engineering with an emphasis in Structural Engineering and a minor in Applied Mathematics. Gabriel will be pursuing an Engineer-In-Training position upon passing the Fundamentals of Engineering exam in the spring of 2016.

Mr. Stinebrickner has had two years of summer internship with the New York State Department of Transportation as a Transportation Construction Inspector. He worked extensively with bridge rehabilitation and maintenance.

Mr. Edcel Gales, is currently a senior in the Civil Engineering Program at SUNY Polytechnic Institute. He will be graduating in May of 2016 with a Bachelor of Science in Civil Engineering with an emphasis in Structural Engineering. Edcel will be pursuing an Engineer-In-Training position upon passing the Fundamentals of Engineering exam in the spring of 2016.

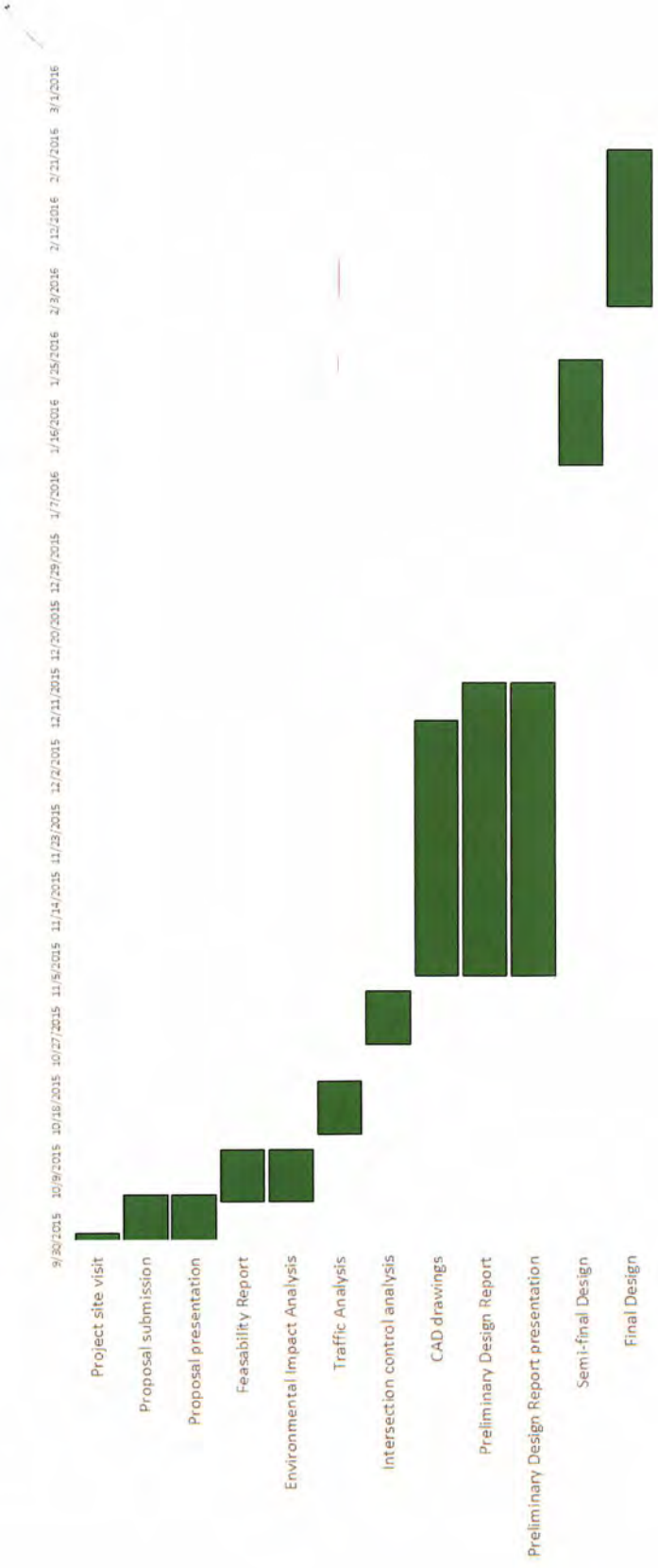
Mr. Gales has had two years of summer internship with the New York State Department of Transportation as a Transportation Construction Inspector. He was mainly involved with bridge lifting and bridge maintenance operations.

Ms. Bianca Little, is currently in her fourth year as a student at the SUNY Polytechnic Institute. Bianca is majoring in Civil Engineering and minoring in Applied Mathematics.

As for related engineering experience, Ms. Little served as a Student Assistant Researcher for one of the first research studies conducted in SUNY Polytechnic Institute. Ms. Little performed a literature review on environmental issues related to computer chip manufacturing and conducted laboratory tests.

Mr. Judge Mastrantone, is currently in his fourth year as a student at SUNY Polytechnic Institute. He will be graduating in May of 2016 with a Bachelor of Science degree in Civil Engineering with an emphasis in Structural Engineering. He will also be graduating with a minor in Applied Mathematics.

Schedule


9/30/2015
10/9/2015
10/18/2015
10/27/2015
11/5/2015
11/14/2015
11/23/2015
12/2/2015
12/11/2015
12/20/2015
12/29/2015
1/7/2016
1/16/2016
1/25/2016
2/3/2016
2/12/2016
2/21/2016
3/1/2016
Project site visit
Proposal submission
Proposal presentation
Feasability Report
Environmental Impact Analysis
Traffic Analysis
Intersection control analysis
CAD drawings
Preliminary Design Report
Preliminary Design Report presentation
Semi-final Design
Final Design

Compensation

Alpha Engineers will perform the work outlined in the Deliverables on a lump sum basis plus reimbursable expenses. We feel confident that our firm will be able to complete the tasks within the project budget.

We intend to provide services under the fee structure outlined below:

Services:

Task	Description	Cost
A	Kickoff Meeting	$1,200
B	Evaluation of two(2)main alignments	$10,000
C	Traffic Impact Study	$7,500
D	Environmental Impact Study	$10,000
E	Design of up to five(5) Intersections	$7,500
F	One Span Bridge Design	$17,500
G	Traffic Circle Design	$10,000
H	Highway Design	$18,000
I	Design/Preparation of Construction Plans	$7,500
J	Attendance at five(5) meetings	$2,500

Total Labor	$91,700

Billing Rates

Our billing will be on a monthly basis as per the Billing Rates. You will be notified in advance if a raise in costs are anticipated.

Alpha Engineers Billing Rates:

Position	Hourly Rate
Principal	$120
Associate	$100
Managing Engineer	$90
Engineer	$75

Reimbursable Expenses:

Expenses	Amount
Mileage passenger Vehicle	$0.55/mile
Plots	$1.75/Sq. ft.
Photocopies	$0.05/Sheet
Other	10% on total cost

Appendix

Résumés

Gabriel Stinebrickner
Principal

Education
B.S. Civil Engineering, SUNY Polytechnic Institute, May 2016

Certifications
ACI Concrete Field Testing, Soil Testing and Erosion Control.

Experience
NYSDOT Construction Inspector - Two summers of experience as an inspector for the NYSDOT. Reviewed plans, recorded and analyzed data and ensured construction operations were performed according to specifications.

Experience includes the inspection of paint, concrete, bridge joints, bearings and decks as well as project coordination and quantity calculations. Roadway and traffic experience includes inspection of Maintenance and Protection of Traffic operations.

Course Work
Relevant courses taken at SUNY Polytechnic Institute include Structural Analysis, Structural Steel Design, Reinforced Concrete Design, Computer Aided Design, Report Writing/Technical Communications, Geotechnical Engineering, Traffic Engineering and Environmental Engineering.

Membership
American Society of Civil Engineers, Student Chapter

Software Experience
AutoCAD, Microstation, Site Manager, Mastan2, Microsoft Office

Edcel Gales
Associate

Education
Associate of Applied Science in Civil Engineering Technology, May 2014
B.S. Civil Engineering, SUNY Polytechnic Institute, May 2016

Certifications
ACI Concrete Field Testing Certification and Soil Testing

Experience
NYSDOT Construction Inspector - Two summers of experience as an inspector for the NYSDOT. Ensured labor safety at the construction site. Reviewed plans and material data to ensure activities were done as per specifications. Assisted the Engineer Technician with structural lifting and sounding pier walls prior to demolition. Conducted concrete testing according to organizational standards.

Course Work
AutoCAD, Microstation, Materials Testing, Structural Steel Design, Reinforced Concrete Design, Construction Inspection, Fluid Mechanics, Thermodynamics, Differential Equations, Hydraulics/Stormwater Management, Estimating & Construction Planning, Soil Mechanics, Surveying, Construction Methods & Management

Membership
American Society of Civil Engineers, Student Chapter

Software Experience
AutoCAD, STAAD, Microstation, Site Manager, Mastan2, Microsoft Office

Bianca Little
Managing Engineer

Education
B.S. Civil Engineering with a Minor in Applied Mathematics, SUNY Polytechnic Institute, May 2016

Experience
Student Assistant Researcher-Performed a literature review on environmental issues related to computer chip manufacturing. Conducted laboratory tests to develop an effective treatment method for the removal of two representative metals (copper and fluoride) from wastewater using enhanced coagulation and flocculation.
Managerial experience working as a Secretarial Assistant to the Admissions Office. Managed the front desk of the Admissions Office, facilitated communication with prospective SUNY PI students, and input information into the school's database system.

Course Work
Relevant courses include Environmental Engineering, Hydrology and Storm Water Management, Structural Steel Design, Reinforced Concrete Design, Thermodynamics, Transportation Engineering, Applied Probability, and Professionalism.

Membership
American Society of Civil Engineers, Student Chapter

Software Experience
AutoCAD, Microsoft Office, Mastan2

Judge Mastrantone
Engineer

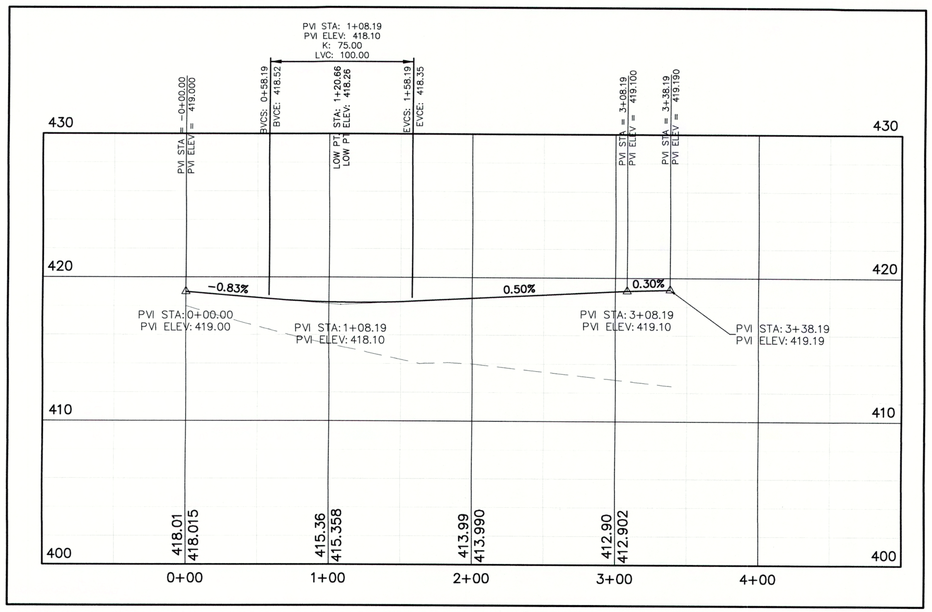
Education
B.S. Civil Engineering, SUNY Polytechnic Institute, May 2016

Experience
Assistant project manager for Garrison Stone Works in Garrison, NY. As assistant project manager: I maintained the integrity and workmanship of a given project, ensured the quality and time management of a project, interacted with management to troubleshoot any issues that arose, and interacted with and worked alongside other workers as a team.

Course Work
Relevant courses include Structural Steel Design, Reinforced Concrete Design, Fluid Mechanics, Thermodynamics, Differential Equations, Hydrology, Transportation Engineering, Environmental Engineering, Geotechnical Engineering, Structural Engineering, Surveying, and Microstation.

Membership
American Society of Civil Engineers, Student Chapter

Software Experience
Microstation, Mastan2, and Microsoft Office



1 **PROFILE-WEST-EB (STA. 0+00 THRU 3+38.19)**

SCALE: VERTICAL 1"=5', HORZONTAL 1"=50'

ALPHA ENGINEERING
SUNY POLYTECHNIC INSTITUTE
100 SEYMOUR RD, UTICA NY

TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

ROAD PROFILES

NO.	DATE	REVISION	BY

SCALE: AS NOTED
FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
DWG. NO: **PRO 6**
CHECKED BY:

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

For

DeWitt Bypass

Town of DeWitt
Onondaga County, New York

April 2016

1234.56
DeWitt Bypass

ALPHA ENGINEERING

SUNY POLYTECHNIC INSTITUTE
100 Seymour Road
Utica, New York

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Introduction

A stormwater management assessment has been conducted for the proposed project in order to protect the waters of the State of New York from the adverse impacts of stormwater runoff. The information in the following report represents an analysis of the project in accordance with the New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from construction Activity Permit No. GP-0-15-002 and the New York State Stormwater Management Design Manual. The Stormwater Pollution Prevention Plan was developed to incorporate, where appropriate, green infrastructure techniques to preserve natural resources and utilize the existing hydrology of the site. With this plan was designed to implement runoff reduction practices, water quality treatment practices, apply volume and peak control practices for channel protection, overbank flood control, and extreme flood control as appropriate.

The following sections provide a detailed evaluation of the social, economic and environmental impacts on the study area along with Alpha Engineering's proposed design plans. The environmental impact study compares information obtained from a previous study that was conducted in 1988 with the current information to understand how we may be impacting the area that we propose to place the bypass.

I. Project Information

(1) Scope of the Project

This project will address safety and traffic infrastructure problems along Route 290 and Route 5 in the Towns of DeWitt and Manlius. These sections of roads receive significant traffic volumes at peak travel times where the level of service is below acceptable. The entirety of this project will include an arterial highway, roundabout, bridge and a storm water detention pond. Pedestrian walking facilities such as sidewalks and paths are also included. In addition, unused on/off ramps for interstates 481 and 690 will be utilized.

(2) Location of Project

The project is located in the Towns of Dewitt and Manlius near the city Syracuse in Onondaga County, New York. The western starting point of the project is located at the I-481 and I-690 interchange. From there it will cross Butternut Creek Drive and Butternut Creek and continue eastward. The eastern ending point of the project is located at the North Burdick Street and Bowman Road intersection.

(3) Project Description

The type of project is an arterial bypass of Route 5 on the nearby roadway networks in the Town of Dewitt and Manlius. The construction of the highway will allow for faster travel times between East Syracuse and Manlius, Fayetteville and other surrounding towns by avoiding Route 5. This project entails a 45 mph bypass road, a bridge and a roundabout. The project area in its entirety encompasses a total of 2,170 acres of land which includes all major and minor impacted areas. Of this land 682 acres are developed residential and commercial property and 1,184 acres are undeveloped land. Within this project land 775 acres are NYSDEC protected wetlands.

(4) Cultural Resources

The environmental impact study completed for this project compares information obtained from a previous study that was conducted in 1988 with the current information to understand how we may be impacting the area that we propose to place the bypass.

Based on these studies, the cultural resources of the study area are summarized below:

<u>Prehistoric Resources</u>

There are no prehistoric sites within the project area listed with the New York State Office of Parks, Recreation and Historic Preservation. No prehistoric material was discovered and no soil anomalies indicative of prehistoric activity were encountered in shovel test pits during the 1986 cultural resources survey.

Historic Resources

The New York State Department of Parks, Recreation and Historic Preservation list no historic site within the project area. During the 1986 survey, historic artifacts were recovered from two locations associated with structures visible on historic maps depicting the project area. These are School House No. 19 (dating to about 1854) and a structure identified as the "WSRR" company, which was erected between 1874 and 1889. Both were located on the present Route 290 and neither structure is presently standing.

The Old Erie Canal in the vicinity of the project is considered eligible for listing on the National Register of Historic Places. The canal is now functioning as a linear state park.

The Syracuse and Chenango Railroad was constructed through the project area between the years 1850 and 1874. The railroad crossed the Erie Canal via an elevated trestle east of Limestone Creek, subsequently turning west across the creek and traveling west to the north of Clark Hill. This rail line, now abandoned, does not appear to have any scientific or local historical significance.

There are no structures, within the study area, listed on the National Register of Historic Places. The State Historic Preservation Officer has determined that two buildings in the Hamlet of Manlius Center are potentially eligible for listing on the National Register. These structure are the Manlius Center Community Church on North Manlius Road and an abandoned warehouse adjacent to the Old Erie Canal at the existing Route 290 crossing.

This project will not affect historical features eligible for the National Register of Historic places.

II. Existing Conditions

(1) Existing Site Conditions

The project area consists of various types land features including developed and undeveloped land. The developed land located on the west side of Butternut Creek consists of asphalt parking lots, DOT facility buildings, interstates 481 and 690 and Butternut Creek Drive. The undeveloped land on the west side of Butternut Creek consists mainly of wooded areas with some meadow areas. The east side of Butternut Creek consists of wetlands and wooded areas. During extreme rainfall events these areas experience flooding do to the close proximity to Butternut Creek. A complete floodplain analysis has been completed and is located in the Floodplain Analysis Report.

The existing subcatchments were divided into 4 areas determined by the physical features of the land. The physical features include the slope of the land, land cover and pre-existing culverts. The time of concentration and land use curve numbers were calculated for the subcatchments. Subcatchments 1, 3 and 4 experience sheet and shallow concentrated flow that drain into culverts that drain into Butternut Creek. Runoff calculations are provided in detail in APPENDIX 2. A detailed map of the subcatchment areas is located in the figures provided in this report.

(2) Table of Receiving Water bodies

Stormwater Structure	**Receiving Water Body**	**NYSDEC Regulated**
Detention pond	Butternut Creek	Yes – Class C

(3) Existing Watershed Information

The project area, which is a part of the Eastern Oswego River Basin, is drained by Butternut Creek in the western portion of the study area and is drained by Limestone Creek in the eastern portion of the study area. Both of these creeks are slow moving, somewhat meandering streams with an approximately flat gradient of 3 feet/mile. The project area is encompassed by 790 acres of wetlands. The water classification of the Old Erie Canal, Limestone Creek and Butternut Creek has a classification of "Class C". All remaining tributaries are classified as a "Class D". There are no sole source aquifers located in this area leaving nearly the entire study area to be served by the Onondaga County Water Authority (OCWA) for their source of clean drinking water. A 48in diameter water supply main runs through the middle of the project area.

The project area is located within the 100-year floodplains of Limestone and Butternut Creeks. The floodplains are located adjacent to Butternut and Limestone Creeks that flow northward

through the study area. The expanse of the 100 year floodplain is due to the flat, low lying terrain adjacent to these two streams that carry runoff northward from the Appalachian Uplands south of the study area, according to the Flood Insurance Studies prepared by FEMA for the towns of Manlius and Dewitt.

III. Project Soils

(1) NRCS Report at Project Location

See APPENDIX 6

(2) Soil Types

There are a variety of soils in the general project area. The soil types that will mainly be affected in the areas where the project construction will occur include, but are not limited to

Table 1: Soil Type	**Map Symbol**
Camillus silt loam, 2 to 6 percent slopes	CaB
Camillus silt loam, 6 to 12 percent slopes, eroded	CaC2
Canandaigua mucky silt loam	Cd
Carlisle muck	Ce
Cut and Fill Land	CFL
Fonda mucky silty clay loam	Fo
Hamlin silt loam	Hb
Hilton loam, 0 to 3 percent slopes	HIA
Lockport and Brockport silty clay loams, 0 to 6 percent slopes	LvB
Made Land	ML
Niagara silt loam, 0 to 4 percent slopes	NgA
Ontario loam, 2 to 8 percent slopes	OgB

Ontario gravelly loam, 8 to 15 percent slopes	OnC
Palms muck	Pb
Rhinebeck silt loam	Rh
Teel silt loam	Te
Urban land	Ub
Water	W
Wayland soils complex, 0 to 3 percent slopes, frequently flooded	Wn

(3) Soil Characteristics and Soil Erosion Hazard Potential

The bedrock located in the project area is mostly Devonian and Silurian age sedimentary rock. This rock dips southward at 50 feet per mile causing the rocks to outcrop in bands oriented in an east-west direction. Bedrock can be found at a 30 foot or less depth throughout the site. The bedrock situated beneath the project area is the called the "Syracuse Formation", which consists of dolomite, shale, gypsum and salt. Bedrock units from the Silurian Age Vernon Formation (shale and dolomite), the Cobleskill Limestone and the Bertie and Camillus dolomite and shale are found amongst the "Syracuse Formation".

Found within the project area are unconsolidated deposits of glacial origin. The deposits in this area include glacial till, glacial outwash laid down by melt water streams and lacustrine sediments deposited in glacial lakes.

The specific onsite soils do not typically present qualities that would be considered to have hazardous erosion potential.

IV. Proposed Conditions

The proposed site conditions were altered from the existing conditions. On the east side of Butternut Creek the land use was changed from mostly wetlands and wooded areas to paved asphalt due to the construction of the road. On the west side of Butternut Creek, majority of the wooded area was converted to curbed asphalt roadways for the roundabout and relocation of Butternut Creek. The time of concentration for all subcatchments were altered due to the change in land use and slopes. The area of disturbed land on the west side of Butternut includes a total of 4.7 acres. Over 90% of the total project area which includes many of the surrounding roadways and a significant portion of Butternut Creek will not be affected.

The on/off ramps of I-481 and I-690 are connected to the roundabout which connects with Butternut Drive and the proposed roadway. All soil below the roadways and roundabout will remain the same type. Additional soil from off-site will be imported for the roadway fill.

V. Construction Phasing

The Contractor is required by the NYSDOT to submit to the Engineer for approval, a construction/progress schedule showing the order in which the Contractor proposes to carry on the work, the date on which the work on the project will start, the major items of work (earth work, excavation, mobilization, soil erosion control measures, highway reconstruction etc.), the critical features and the completed dates for completing each task.

The Contractor's work schedule and methods shall be consistent with the SWPPP or amended SWPPP. Once approved, the progress schedule shall become a part of the SWPPP.

The following list is a suggested phasing and sequence of major construction activities for the project to meet the NYSDEC Phase II erosion control requirements:

Phase 1:

<u>Roundabout</u>

- Clear and grub construction site in preparation for grading.
- Install erosion control measures.
- Temporarily relocate utilities including waterlines and powerlines.
- Grade construction site including relocated Butternut Drive, roundabout and Exit/Entrance ramps and storm water detention pond. Exclude existing Butternut Drive to avoid traffic impact.
- Lay subbase for relocated Butternut Drive, roundabout and Exit/Entrance ramps.
- Install storm water drainage system and pipes.
- Pave roundabout and relocated Butternut Drive.
- Re-establish waterlines and power lines.
- Paint pavement markings for relocated Butternut Drive and Roundabout.
- Install roundabout lighting and signs.
- Close Existing Butternut Drive and allow traffic to flow from south Butternut Drive through the roundabout and to north Butternut Drive. Do not allow traffic to take exits/entrances or bypass road.
- Remove Existing Butternut Drive.

- Pave exit/entrance ramps.
- Complete sign installations and pavement markings for exit/entrance ramps.

Phase 2:

Bridge

- Install piles and pier caps. Complete bridge abutments and miscellaneous sub-structure concrete work and closure pours.
- Construct bridge approaches.
- Install all under drain, drainage and utility conduits as needed.
- Construct and install concrete girders.
- Pour bridge deck.
- Install sidewalk and bridge rails.
- Install lighting.

Phase 3: Stage 3 may be constructed concurrently with Stage 2.

Bypass Road

- Clear and grub construction site in preparation for grading.
- Install erosion control measures.
- Grade bypass road.
- Lay subbase.
- Install highway drainage system.
- Pave bypass road.
- Install traffic signals for intersection of bypass road and Bowman Road.
- Install guiderails.
- Complete sign installations and pavement markings for bypass road and bridge.
- Complete landscaping of entire project.
- When vegetation is established, remove silt fence and any other temporary erosion control measures that remain and clean out any sedimentation in the drainage pipes and swales. Reseed/repair any areas damaged during these activities.
- Open bypass road and exit/entrance ramps to traffic.

VI. Erosion and Sediment Control Measures

The purpose of this section is to identify the types of temporary and permanent erosion and sediment controls that will be used on the site. The controls will provide soil stabilization for disturbed areas and structural controls to divert runoff and remove sediment. This section will also address control of other potential stormwater pollutant sources such as epoxy, concrete dust, grease, fuel oil, waste disposal, and sanitary waste disposal. The design of the erosion/sediment control plan will meet the NYSDEC requirements. The Developer will obtain coverage under the NYSDEC's State Pollutant Discharge Elimination System (SPDES) General Permit (GP-0-10-001) for Stormwater Discharges from Construction Activities, and maintain stormwater treatment facilities as required by the permit.

(1) Erosion Control Measures

- Silt fencing
- Inlet and Outlet protection
- Mulching and seeding
- Construction Entrances
- Stabilized staging areas
- Sediment traps
- Sediment basin

Temporary and Permanent Erosion Control Practices

To limit soil migration the following measures, as shown on the erosion control plan, will be implemented:

- Silt fencing will be placed along the perimeter as shown on the erosion control plan before any clearing or grading takes place.
- The proposed detention pond will be utilized as a sediment basin to remove siltation from storm water prior to leaving the site. Collected silt will be periodically removed to maintain capacity.
- Bare soils shall be seeded within 14 days of exposure, unless construction will begin within 14 days. As sections are completed, or if construction is suspended, the area will be seeded immediately. The temporary seed mix shall consist of 30 pounds per acre of rye grass (annual or perennial) and 100 pounds per acre winter rye (cereal rye). Use winter rye if seeding occurs in October or November.
- Within 14 days after clearing and grading, ground agricultural limestone, 5- 10-10 fertilizer will be applied to each acre to be stabilized. The limestone should be at a pH of 6.0, and the fertilizer should be added at a rate of 600 pounds per acre.
- After fertilizer, all areas, which will not be impacted by further construction, shall be permanently seeded. The permanent seed mix shall be 8 pounds per acre of trefoil or common white clover plus, twenty pounds per acre of tall fescue plus, 2 pounds per acre of redtop, and 5 pounds per acre of ryegrass (perennial).
- After seeding, disturbed areas will be mulched with 4,000 pounds per acre of straw.

- Topsoil stockpiles will be stabilized with temporary seed and mulch no later than 7 days from the placement of the stockpile. The temporary seed shall be rye (grain) applied at the rate of 120 pounds per acre. Silt fence will be installed around the base of each stockpile.
- Areas of the site, which are to be paved, will be temporarily stabilized by applying geotextile and stone sub-base until asphalt is applied.
- A stabilized construction entrance will be placed at the entrance to the unpaved portion of the site. This will be the only entrance used during the construction of the project. A stabilized staging area will be installed near the stabilized construction entrance to be utilized for storage of construction materials and equipment.

All erosion and sediment control structures are designed in accordance with the New York Standards and Specifications for Erosion and Sediment Control.

(2) Maintenance Procedures

During construction and until such time as the site is stabilized, all erosion/sediment control measures shall be maintained as specified in the New York Standards and Specifications for Erosion and Sediment Control and as summarized below:

- Silt Fence – Remove accumulated sediment when bulges appear in the fencing or when sediment is one-foot deep.
- Sediment Trap – Remove sediment and restore trap to original dimensions when sediment has accumulated to one-half of the design depth of the trap.
- Stabilized Construction Entrance – Periodic top dressing with stone is required to help prevent tracking of sediment onto public roads.
- Proper cleanup and disposal of any fuel spills.
- Periodic sweeping of the pavement to remove accumulated sediment.
- Maintaining vegetation in the dry detention basin and vegetated swales.

(3) Inspection Procedure

Visual inspections of all cleared and graded areas of the construction site will be performed weekly as required by the SPDES General Permit for Stormwater Discharge from Construction Activities Permit No. GP-0-10-001.

The inspections will be conducted by a qualified inspector, which is defined as a P.E., registered L.A., CPESC, or a trained technician working directly for a P.E., or registered L.A. The inspections will verify that the control structures described in Section 3 of this SWPPP are in place, are in

good condition, and are minimizing erosion. The inspection will also verify that the procedures used to prevent stormwater contamination from construction materials and petroleum products are effective. The following inspection and maintenance practices will be used to maintain erosion and sediment controls:

Silt fences will be inspected for depth of sediment, for tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground. Sediment will be removed from behind silt fencing when it has reached one-third the height of the fence.

The sediment trap will be inspected for depth of sediment and built-up sediment will be removed when it reaches one-half the total depth of trap.

Temporary and permanent seeding will be inspected for bare spots, washouts, and healthy growth.

The stabilized construction entrance will be inspected for sediment tracked on the road, for clean gravel, and that all traffic uses the stabilized entrance when leaving the site.

The Inspection Report will be completed after each inspection. A copy of the report form to be completed by the SWPPP coordinator is provided in APPENDIX 1 of this SWPPP. Completed forms will be maintained on-site during the entire construction project. A copy shall also be submitted to the developer and the governing agency. The developer will be responsible for reviewing each report and making all necessary repairs to the stormwater management facilities as indicated in the report. Following construction, the completed forms will be retained at the owner's office for a minimum of one year.

If construction activities change or design modifications are made to the site plan, which could impact stormwater, this SWPPP will be amended appropriately. The amended SWPPP will have a description of the new activities that contribute to the increased pollutant loading and the planned source control activities. Additionally, the SWPPP will be amended if it proves to be ineffective in its objective to control pollutants in stormwater discharge from the site.

(4) SWPPP Implementation Responsibilities

The construction site SWPPP coordinator for the facility will be the developer. The duties of the construction site SWPPP coordinator include the following:

- Implement the SWPPP plan with the aid of the SWPPP team; Oversee maintenance practices identified in the SWPPP.
- Implement and oversee employee training.
- Conduct or provide for inspection and monitoring activities.

- Identify other potential pollutant sources and make sure they are added to the plan.
- Identify any deficiencies in the SWPPP and make sure they are corrected, and ensure that any changes in construction plans are addressed in the SWPPP.
- Ensure that all housekeeping and monitoring procedures are implemented.

VII. Green Infrastructure

(1) Reduction of Impervious Cover

The DEC Stormwater Design Manual has several techniques that are useful to reduce impervious cover. Some of these techniques are listed below.

Table 5.4 Planning Practices for Reduction of Impervious Cover

Practice	Description
Roadway Reduction	Minimize roadway widths and lengths to reduce site impervious area
Sidewalk Reduction	Minimize sidewalk lengths and widths to reduce site impervious area
Driveway Reduction	Minimize driveway lengths and widths to reduce site impervious area
Cul-de-sac Reduction	Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.
Building Footprint Reduction	Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.
Parking Reduction	Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.

(2) Runoff Reduction Techniques

In the DEC Stormwater Design Manual there are several suggested techniques to assist with reducing the amount of runoff. As seen in DEC Stormwater Design Manual there is a variety of techniques that can be used. One of the major runoff reduction techniques that will be used in the design of the bypass road is using porous pavement/pervious pavers for the design of the sidewalks around the roundabout and for the walking path along the bypass road. Using these pervious systems in this design will reduce downstream erosion, limit runoff at the source and overall improve the quality of the runoff water.

VIII. Post Construction Storm Water Control Practices

(1) Description of Post Construction Storm Water Practices

For the post construction storm water management a detention pond was implemented. In addition to the detention pond, pervious pavers and porous pavement were used for the sidewalks and walking paths. Where the roundabout is located, a detailed storm water analysis was completed. Subcatchments 1, 3 and 4 had minor alterations from the existing to the proposed area. These minor changes were due to on/off ramps being repaved and changes in grade. The storm water from the on/off ramps were collected in catch basins that drain to the detention pond. Subcatchment 2, where the roundabout is located, experienced drastic changes in runoff. The detention pond was constructed in subcatchment 2 due to the location of the roundabout and Butternut Creek. A detailed plan of the post construction subcatchments, pipe layout and catch basin locations is located in the figures. All runoff from post construction drains into the pond through a network of catch basins and pipes. All details regarding the detention pond including cross sections, plan views and an outlet structure are located in APPENDIX 8.

(2) Hydraulic Analysis of Storm Water Control Practices Including Pre-Development and Post-Development Conditions

The following table is a summary of the peak flows at the overall discharge point which is located at Butternut Creek. See the attached Hydrocad calculations in APPENDIX 3 for the complete hydraulic model which includes the proposed detention facility and all subcatchments.

Table 2 - Stormwater Management Plan Summary

Storm Event	Pre-Project Runoff	Post-Project Runoff
1 year	12.19	10.97
10 year	25.63	24.96
100 year	52.42	50.75

Area of Disturbance	4.72 Acres
Water Quality Volume Required	0.335 Acre-Feet
Water Quality Volume Provided	0.627 Acre-Feet

Table 3 below provides required volumes and provided volumes for the detention pond. The maximum capacity is 1.347 acre-feet which provides adequate storage for the 10 and 100 year storms.

Table 3 – Detention Pond Volumes

Detention Pond Summary			
	Required	Provided	
Water Quality Volume	0.335	0.737	acre-feet
Forebay Volume	0.037	0.11	acre-feet
Permanent Pool Volume	0.335	0.627	acre-feet
Channel Protection Volume	0.459	0.481	acre-feet
Overbank Flood Protection- 10 year	0.327		acre-feet
Overbank Flood Protection- 100 year	1.279	1.347	acre-feet

(3) Maintenance Table of Post-Construction Storm Water Control Practices:

Maintenance of post construction storm water practices (detention pond) are outlined in the New York State DEC storm water design manual. A copy of this maintenance procedure is outlined in APPENDIX 5.

IX. Summary

All major and minor aspects of the project area were considered and thoroughly analyzed for the existing and proposed conditions. Many factors were considered for the storm water prevention of this project. The factors considered were project size, soil type, land use and hydraulic analysis among many other factors which are detailed in this report. A detention pond will be utilized to deal with runoff from the proposed roadway and roundabout. In addition, the runoff reduction techniques utilized in this project are porous pavement and pervious pavers which will reduce impervious cover. All project maps, plans, figures, details and forms are located in this report.

Project Maps, Plans and Figures

Appendix

(1) Site Inspection Form
(2) Existing Runoff Computations
(3) Proposed Runoff Computations
(4) Water Quality Calculations
(5) Maintenance Checklist for Stormwater Management Facilities
(6) NRCS Soils Report
(7) Erosion Control Details (NYS Standards and Specifications)
(8) Detention Pond Plans & Details

EXISTING CONDITIONS

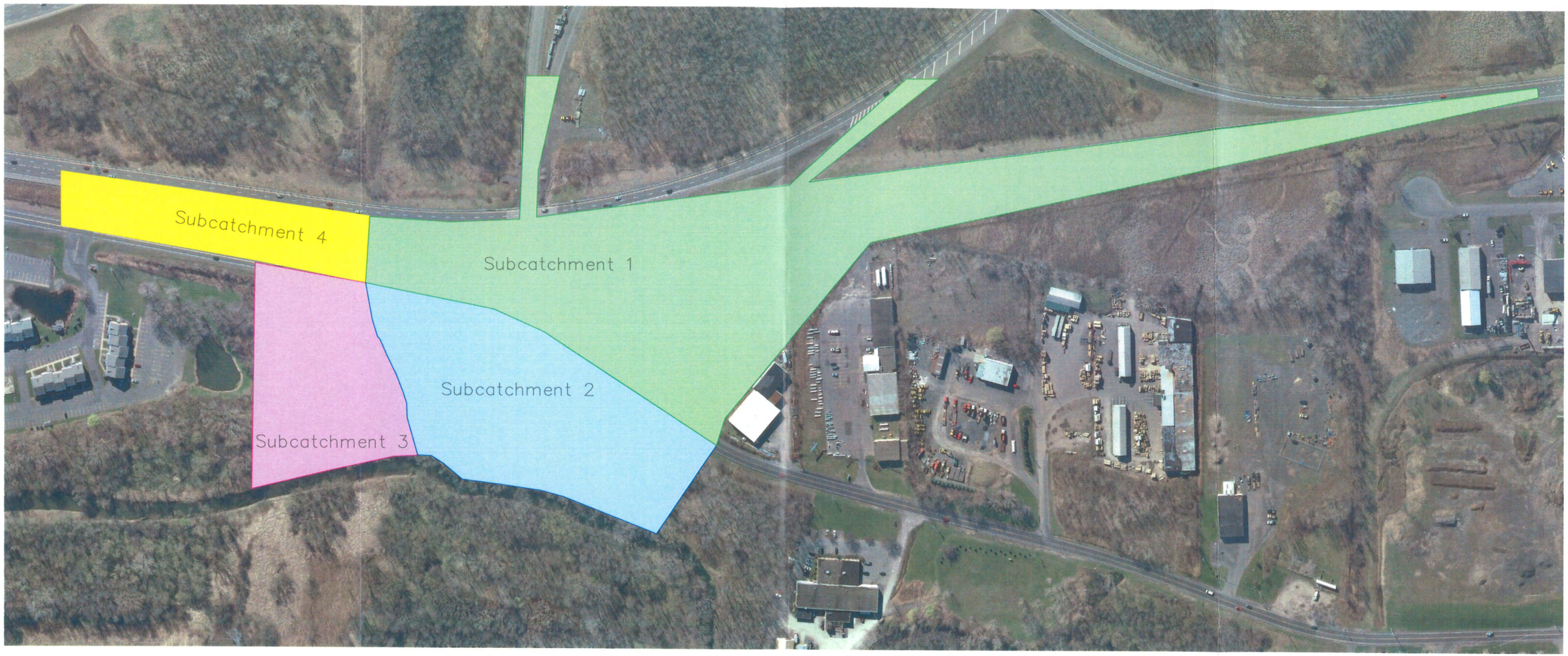


FIGURE 2

PROPOSED CONDITIONS

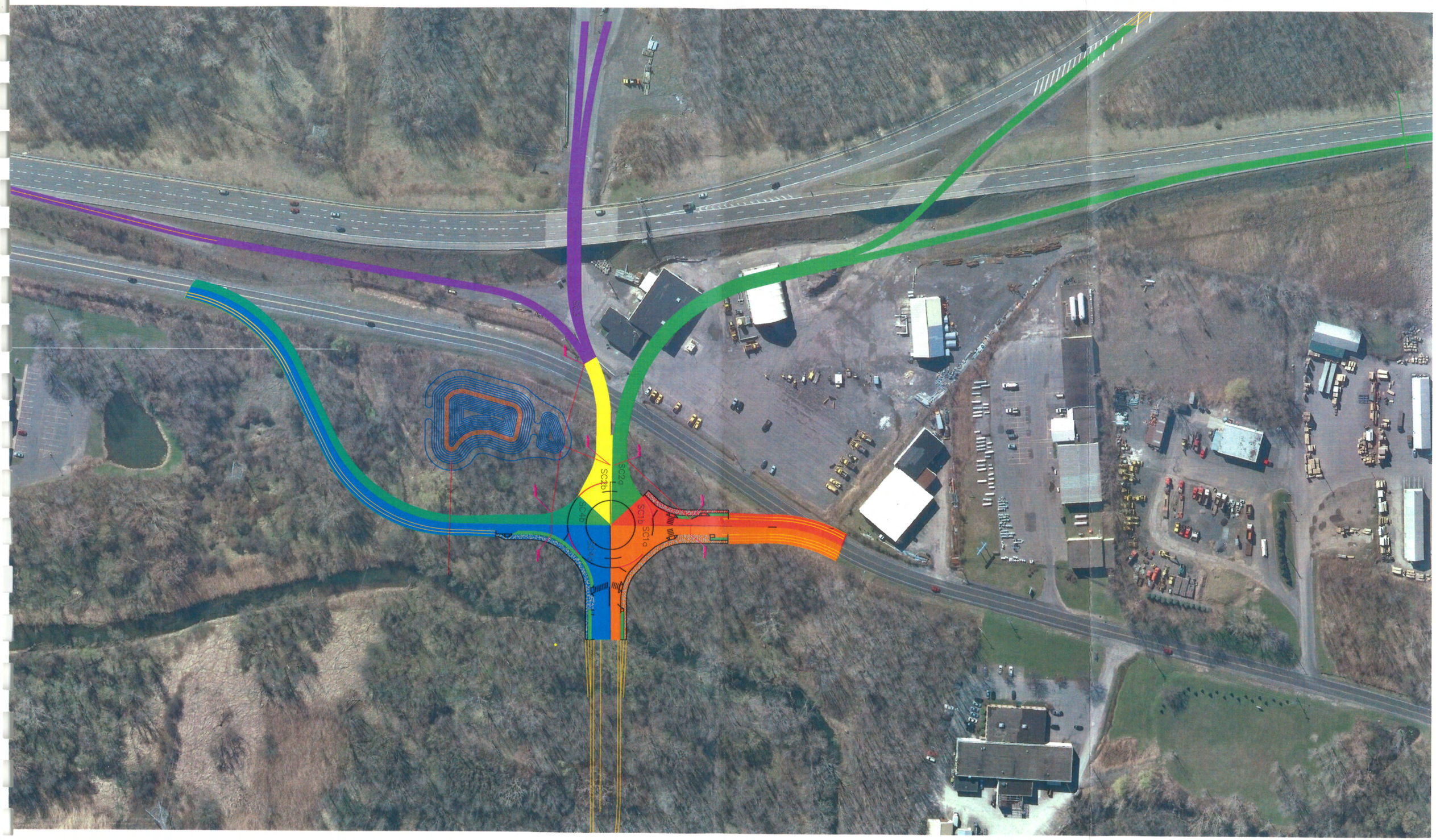


FIGURE 3

SOILS MAP

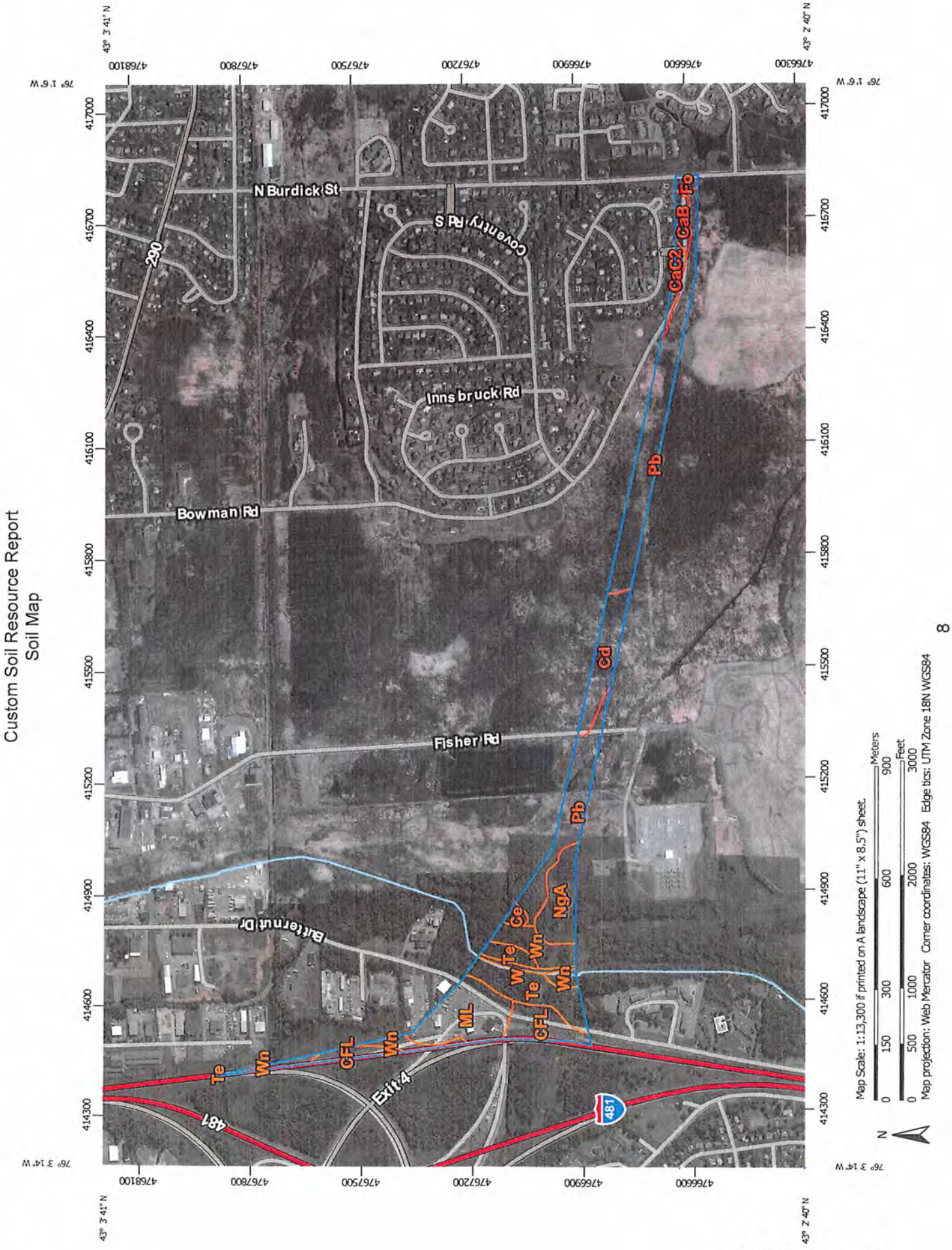


FIGURE 4

Soil Map

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

FIGURE 4

APPENDIX

1

STORMWATER POLLUTION PREVENTION PLAN SITE INSPECTION REPORT

PROJECT:	DEVELOPER:
CONTRACTOR:	WEATHER:
CONSTRUCTION STAGE:	DAYS SINCE LAST SNOWFALL: AMOUNT:

	COMPONENT	CONDITION: GOOD/FAIR/ POOR/N/A	CHANGES SINCE LAST REPORT	DEFICIENCIES AND RECOMMENDATIONS
1	SILT FENCE			
2	SEDIMENT BASINS			
3	CB INLET PROTECTION			
4	PAVEMENT/ ROADWAY			
5	CONSTRUCTION ACCESS			
6	STABILIZATION (SEED/MULCH)			
7	CHECK DAMS			
8	SWALES			
9	SEDIMENT TRAPS			
10	OTHER			

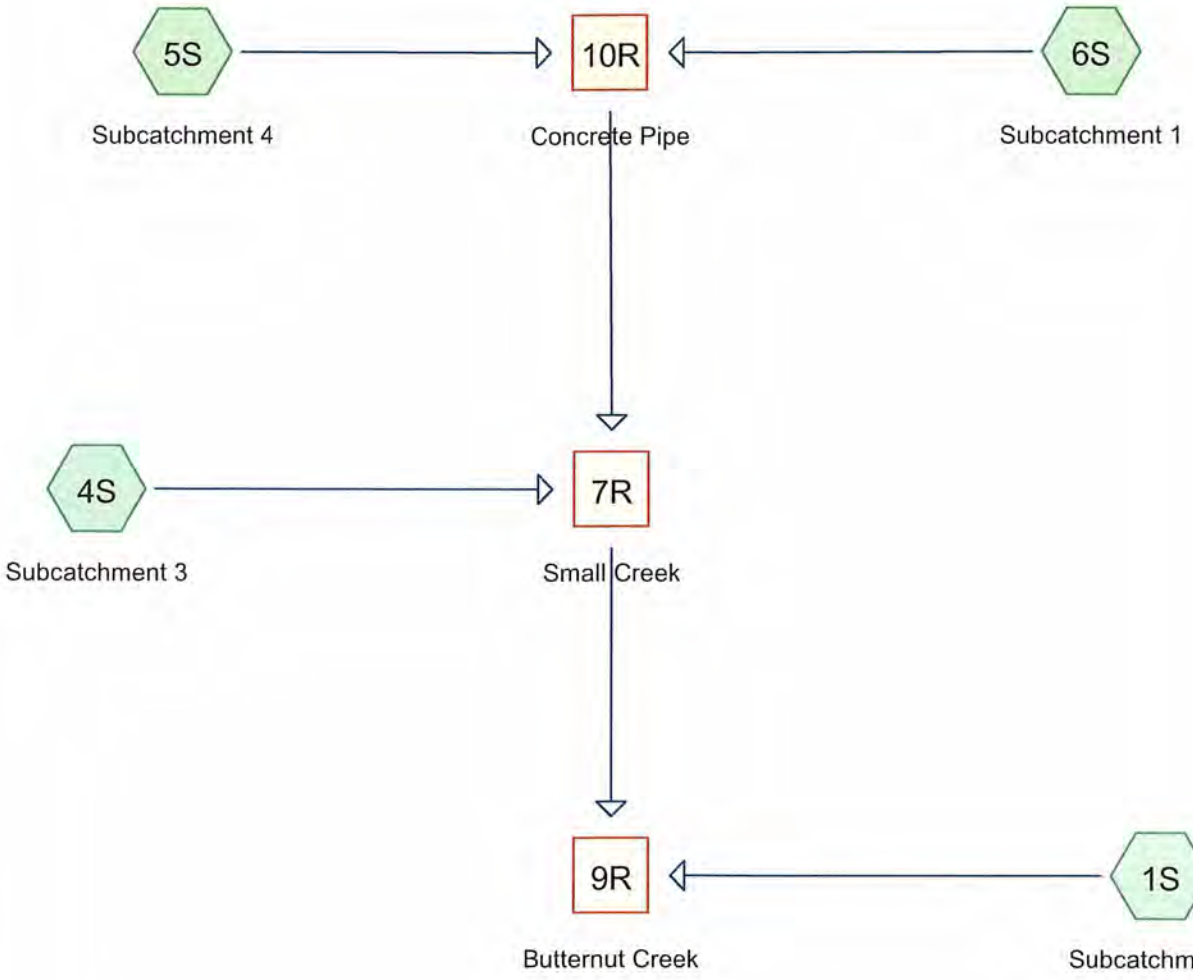
SOIL CONDITIONS: DRY/MOIST/SATURATED	MAIN DISCHARGE POINT CONDITIONS:
ADDITIONAL COMMENTS:	

INSPECTION BY: _____ TIME: _____ DATE OF INSPECTION: _____

SIGNATURE: _____ DATE: _____ DATE OF LAST INSPECTION: _____

APPENDIX

2



Subcat Reach Pond Link

Routing Diagram for DeWitt Bypass Existing-April 21
Prepared by Toshiba, Printed 4/29/2016
HydroCAD® 10.00-16 s/n 04514 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.060	49	50-75% Grass cover, Fair, HSG A (5S)
0.900	68	<50% Grass cover, Poor, HSG A (6S)
0.100	89	<50% Grass cover, Poor, HSG D (6S)
8.500	98	Paved parking, HSG A (6S)
1.000	98	Paved parking, HSG D (6S)
2.700	83	Paved roads w/open ditches, 50% imp, HSG A (6S)
0.300	93	Paved roads w/open ditches, 50% imp, HSG D (6S)
2.000	30	Woods, Good, HSG A (1S)
8.140	77	Woods, Good, HSG D (1S, 4S)
27.700	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
18.160	HSG A	1S, 5S, 6S
0.000	HSG B	
0.000	HSG C	
9.540	HSG D	1S, 4S, 6S
0.000	Other	
27.700		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchm Numbers
4.060	0.000	0.000	0.000	0.000	4.060	50-75% Grass cover, Fair	5
0.900	0.000	0.000	0.100	0.000	1.000	<50% Grass cover, Poor	S 6
8.500	0.000	0.000	1.000	0.000	9.500	Paved parking	S 6
2.700	0.000	0.000	0.300	0.000	3.000	Paved roads w/open ditches, 50% imp	S 6
2.000	0.000	0.000	8.140	0.000	10.140	Woods, Good	S 1 S , 4 S
18.160	**0.000**	**0.000**	**9.540**	**0.000**	**27.700**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	10R	416.00	414.00	150.0	0.0133	0.011	30.0	0.0	4.0

Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 2 Runoff Area=6.300 ac 0.00% Impervious Runoff Depth>0.09"
Flow Length=280' Slope=0.0070 '/' Tc=80.3 min CN=62 Runoff=0.08 cfs 0.047 af

Subcatchment 4S: Subcatchment 3 Runoff Area=3.840 ac 0.00% Impervious Runoff Depth>0.46"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=77 Runoff=0.77 cfs 0.147 af

Subcatchment 5S: Subcatchment 4 Runoff Area=4.060 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=49 Runoff=0.00 cfs 0.000 af

Subcatchment 6S: Subcatchment 1 Runoff Area=13.500 ac 81.48% Impervious Runoff Depth>1.34"
Flow Length=2,260' Tc=36.2 min CN=93 Runoff=11.83 cfs 1.507 af

Reach 7R: Small Creek Avg. Flow Depth=0.97' Max Vel=4.43 fps Inflow=12.25 cfs 1.653 af
n=0.030 L=360.0' S=0.0167 '/' Capacity=146.42 cfs Outflow=12.23 cfs 1.651 af

Reach 9R: Butternut Creek Avg. Flow Depth=0.47' Max Vel=2.81 fps Inflow=12.23 cfs 1.698 af
n=0.030 L=380.0' S=0.0097 '/' Capacity=1,479.89 cfs Outflow=12.19 cfs 1.695 af

Reach 10R: Concrete Pipe Avg. Flow Depth=0.63' Max Vel=8.80 fps Inflow=11.83 cfs 1.507 af
30.0" Round Pipe w/ 4.0" inside fill n=0.011 L=150.0' S=0.0133 '/' Capacity=49.49 cfs Outflow=11.82 cfs 1.506 af

Total Runoff Area = 27.700 ac Runoff Volume = 1.700 af Average Runoff Depth = 0.74"
60.29% Pervious = 16.700 ac 39.71% Impervious = 11.000 ac

Summary for Subcatchment 1S: Subcatchment 2

Area closest to butternut creek, between BD and BC.
sheet flow for 100 feet.
shallow channel flow for 180 feet.
380 feet flow in butternut creek.

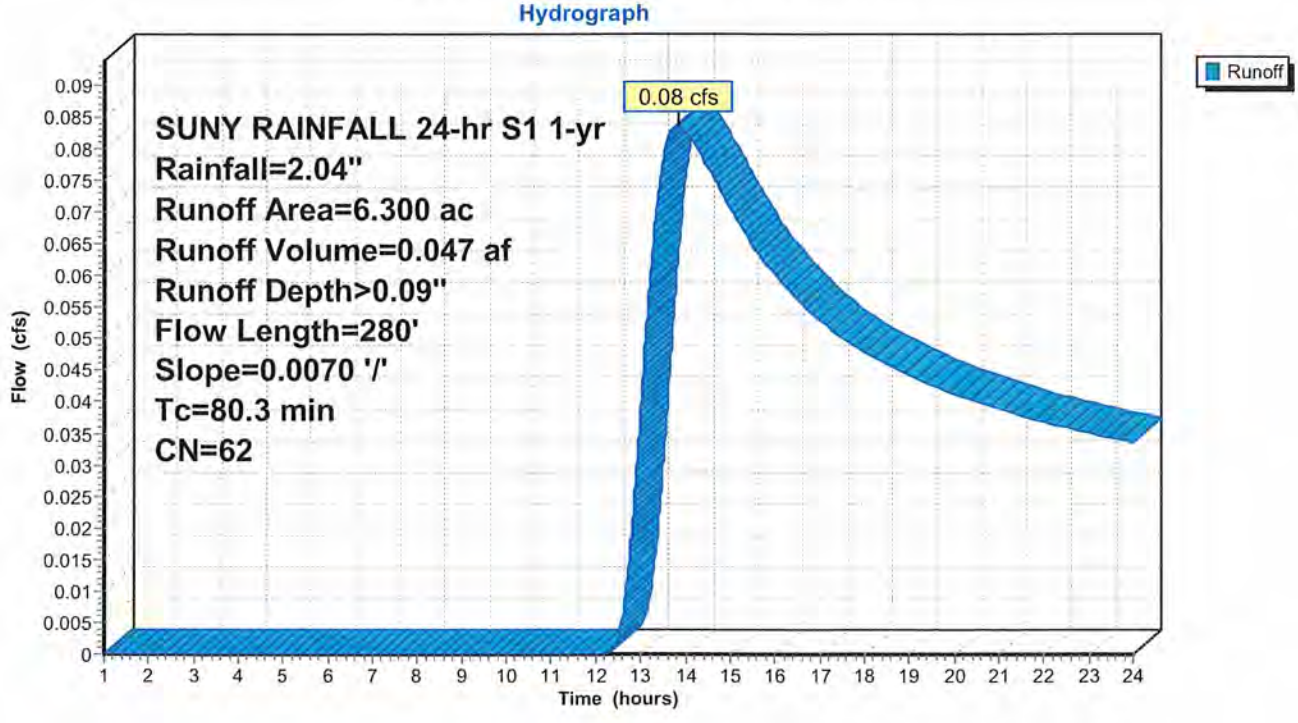
Runoff = 0.08 cfs @ 13.83 hrs, Volume= 0.047 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
4.300	77	Woods, Good, HSG D
2.000	30	Woods, Good, HSG A
6.300	62	Weighted Average
6.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0	100	0.0070	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.38"
14.3	180	0.0070	0.21		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
80.3	280	Total			

Subcatchment 1S: Subcatchment 2



Summary for Subcatchment 4S: Subcatchment 3

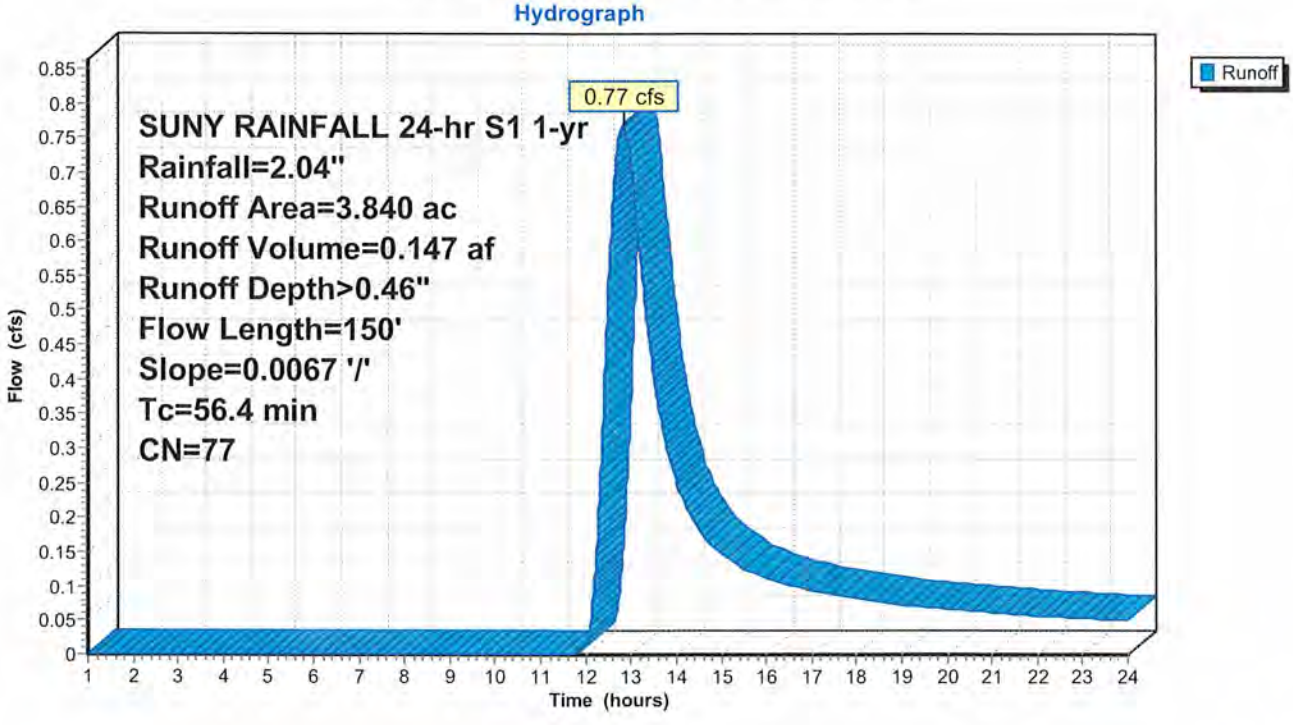
Runoff = 0.77 cfs @ 12.85 hrs, Volume= 0.147 af, Depth> 0.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
2.300	77	Woods, Good, HSG D
1.540	77	Woods, Good, HSG D
3.840	77	Weighted Average
3.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 4S: Subcatchment 3



Summary for Subcatchment 5S: Subcatchment 4

[45] Hint: Runoff=Zero

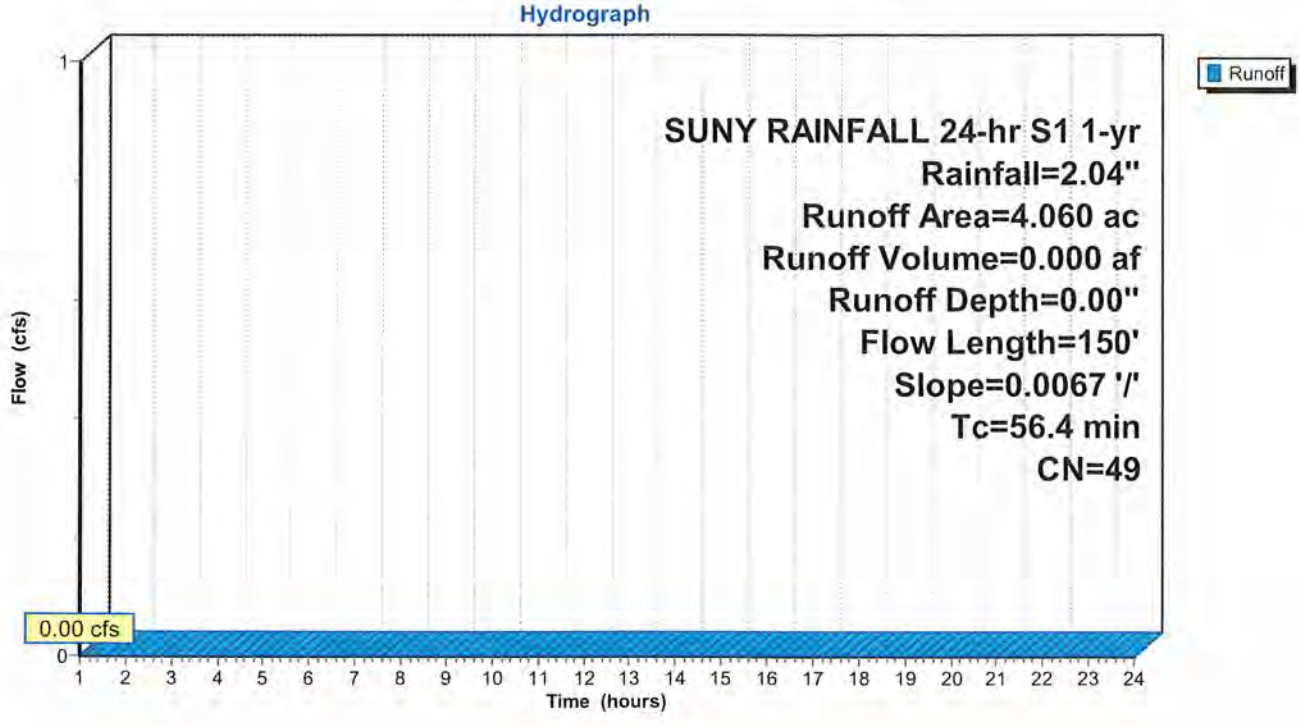
Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
4.060	49	50-75% Grass cover, Fair, HSG A
4.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 5S: Subcatchment 4



Summary for Subcatchment 6S: Subcatchment 1

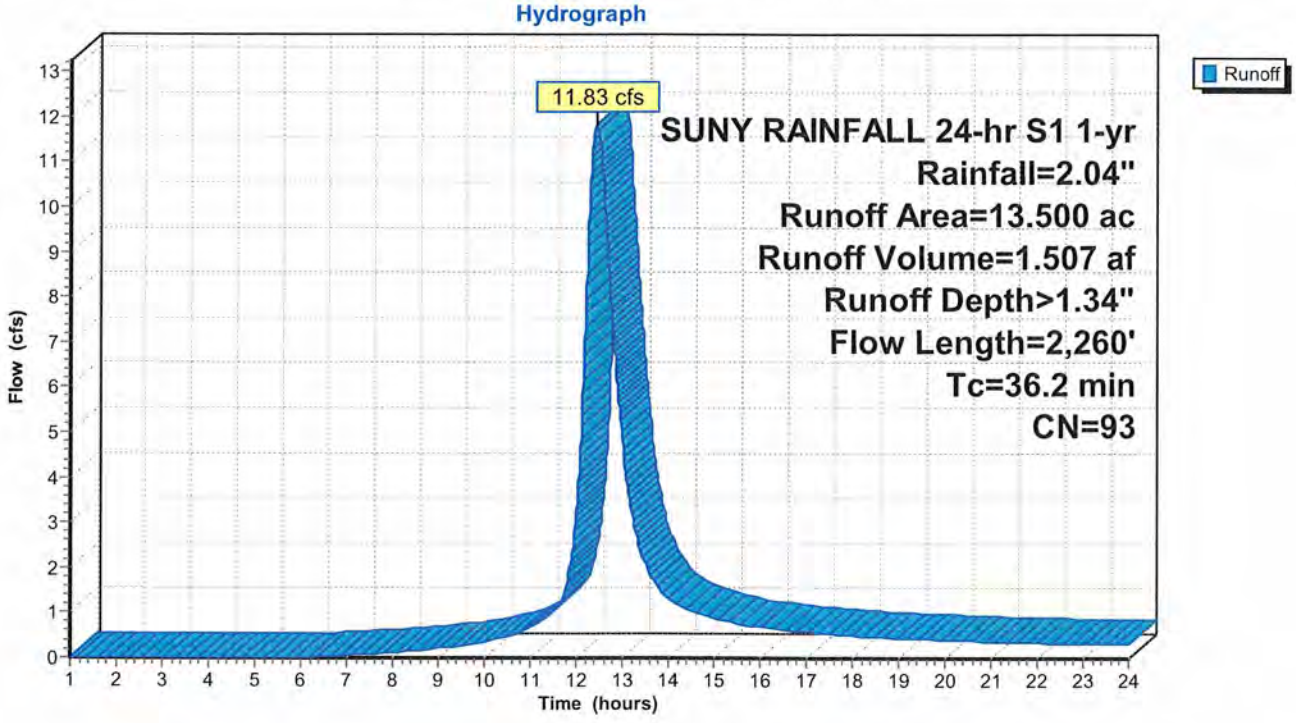
Runoff = 11.83 cfs @ 12.43 hrs, Volume= 1.507 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
8.500	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
2.700	83	Paved roads w/open ditches, 50% imp, HSG A
0.300	93	Paved roads w/open ditches, 50% imp, HSG D
0.900	68	<50% Grass cover, Poor, HSG A
0.100	89	<50% Grass cover, Poor, HSG D
13.500	93	Weighted Average
2.500		18.52% Pervious Area
11.000		81.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0105	0.08		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.38"
6.8	850	0.0105	2.08		**Shallow Concentrated Flow, Shallow Concentrated** Paved Kv= 20.3 fps
6.2	950	0.0084	2.54	13.56	**Parabolic Channel, Stream** W=4.00' D=2.00' Area=5.3 sf Perim=5.9' n= 0.050 Sluggish weedy reaches w/pools
1.8	360	0.0139	3.35	52.55	**Parabolic Channel, Sluggish Stream W. Side of BN Creek** W=7.25' D=3.25' Area=15.7 sf Perim=10.2' n= 0.070 Sluggish weedy reaches w/pools
36.2	2,260	Total			

Subcatchment 6S: Subcatchment 1



Summary for Reach 7R: Small Creek

[62] Hint: Exceeded Reach 10R OUTLET depth by 0.03' @ 12.61 hrs

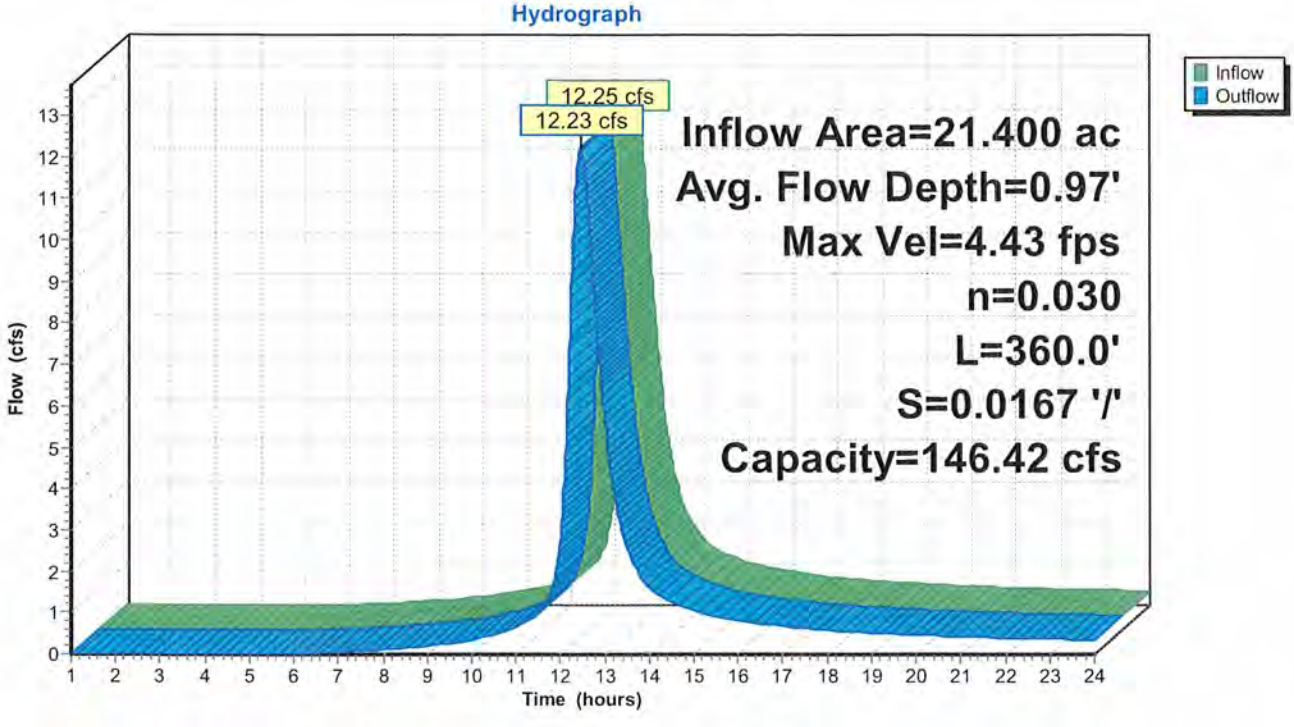
Inflow Area = 21.400 ac, 51.40% Impervious, Inflow Depth > 0.93" for 1-yr event
Inflow = 12.25 cfs @ 12.44 hrs, Volume= 1.653 af
Outflow = 12.23 cfs @ 12.47 hrs, Volume= 1.651 af, Atten= 0%, Lag= 1.8 min

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.43 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.82 fps, Avg. Travel Time= 3.3 min

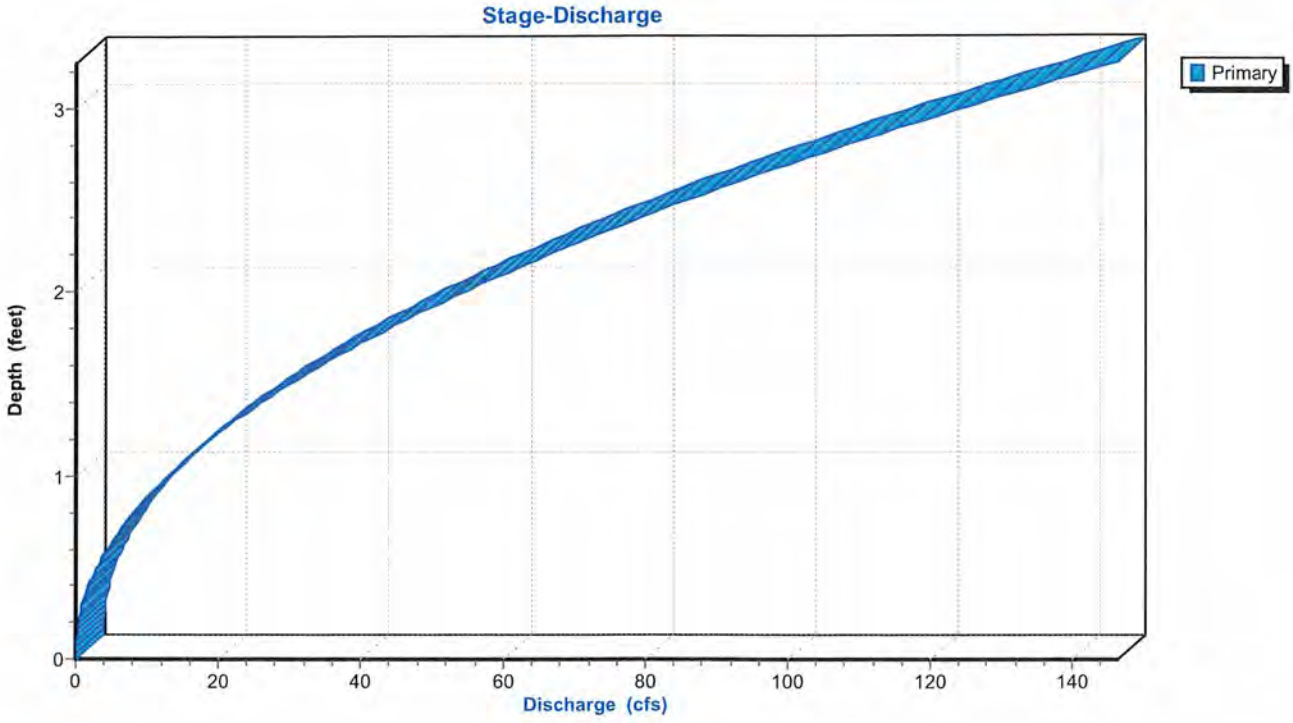
Peak Storage= 993 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.97'
Bank-Full Depth= 3.25' Flow Area= 16.8 sf, Capacity= 146.42 cfs

7.75' x 3.25' deep Parabolic Channel, n= 0.030 Earth, dense weeds
Length= 360.0' Slope= 0.0167 '/'
Inlet Invert= 414.00', Outlet Invert= 408.00'

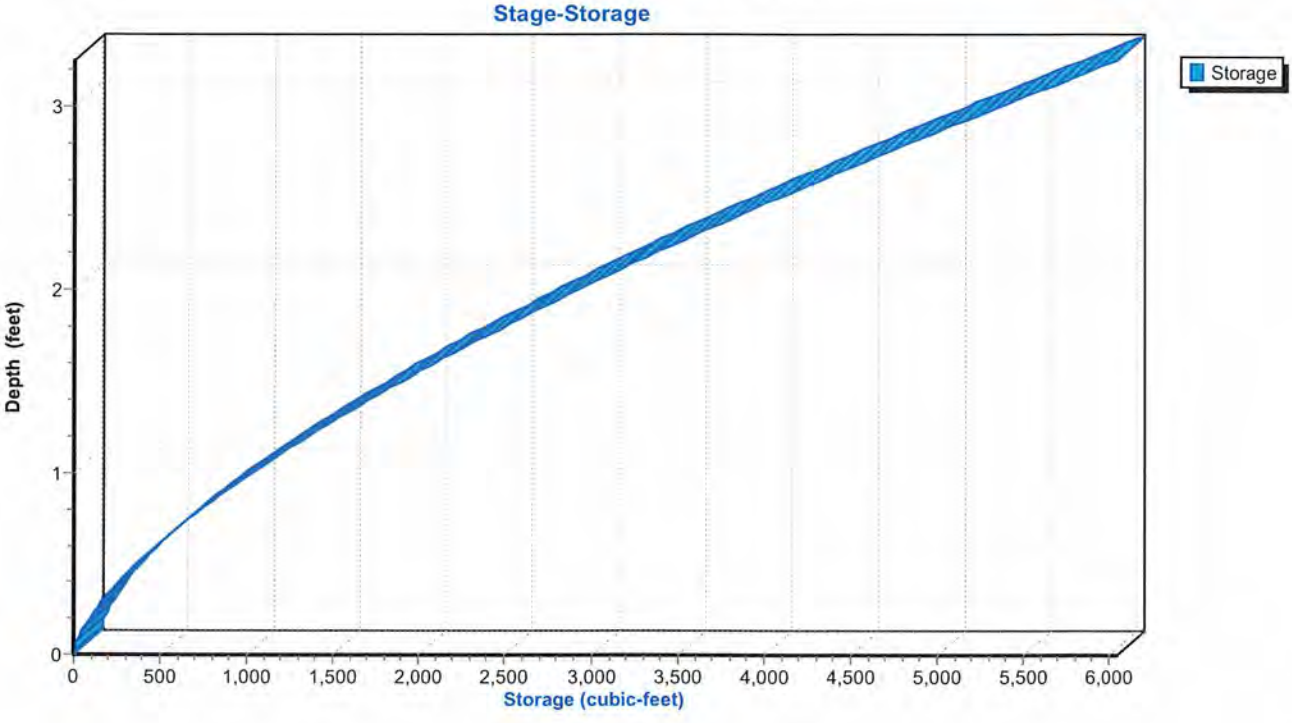




Reach 7R: Small Creek



Reach 7R: Small Creek



Summary for Reach 9R: Butternut Creek

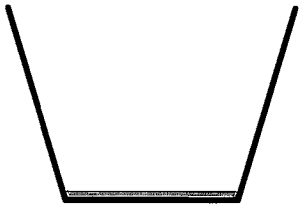
[61] Hint: Exceeded Reach 7R outlet invert by 0.47' @ 12.50 hrs

Inflow Area = 27.700 ac, 39.71% Impervious, Inflow Depth > 0.74" for 1-yr event
Inflow = 12.23 cfs @ 12.47 hrs, Volume= 1.698 af
Outflow = 12.19 cfs @ 12.50 hrs, Volume= 1.695 af, Atten= 0%, Lag= 1.7 min

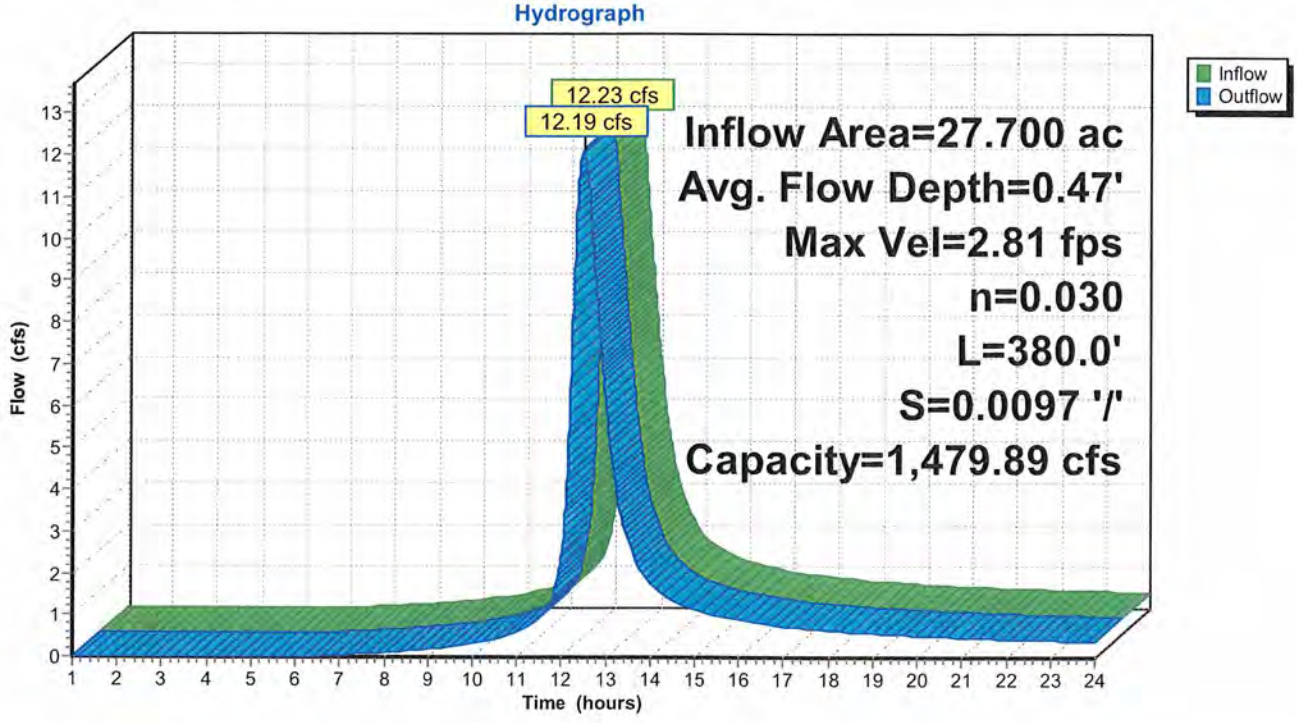
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.81 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.17 fps, Avg. Travel Time= 5.4 min

Peak Storage= 1,648 cf @ 12.50 hrs
Average Depth at Peak Storage= 0.47'
Defined Flood Depth= 417.70' Flow Area= 6,223.3 sf, Capacity= 98,716.46 cfs
Bank-Full Depth= 10.00' Flow Area= 120.0 sf, Capacity= 1,479.89 cfs

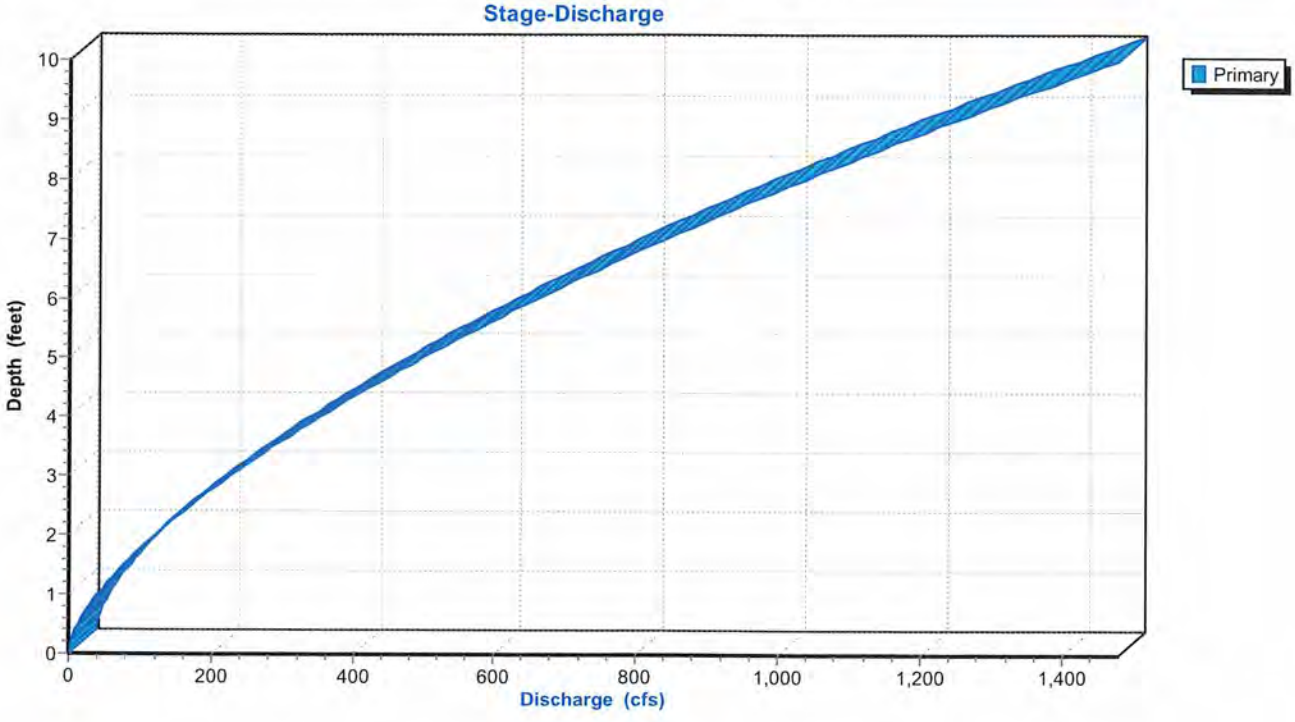
9.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 0.3 '/' Top Width= 15.00'
Length= 380.0' Slope= 0.0097 '/'
Inlet Invert= 408.00', Outlet Invert= 404.31'



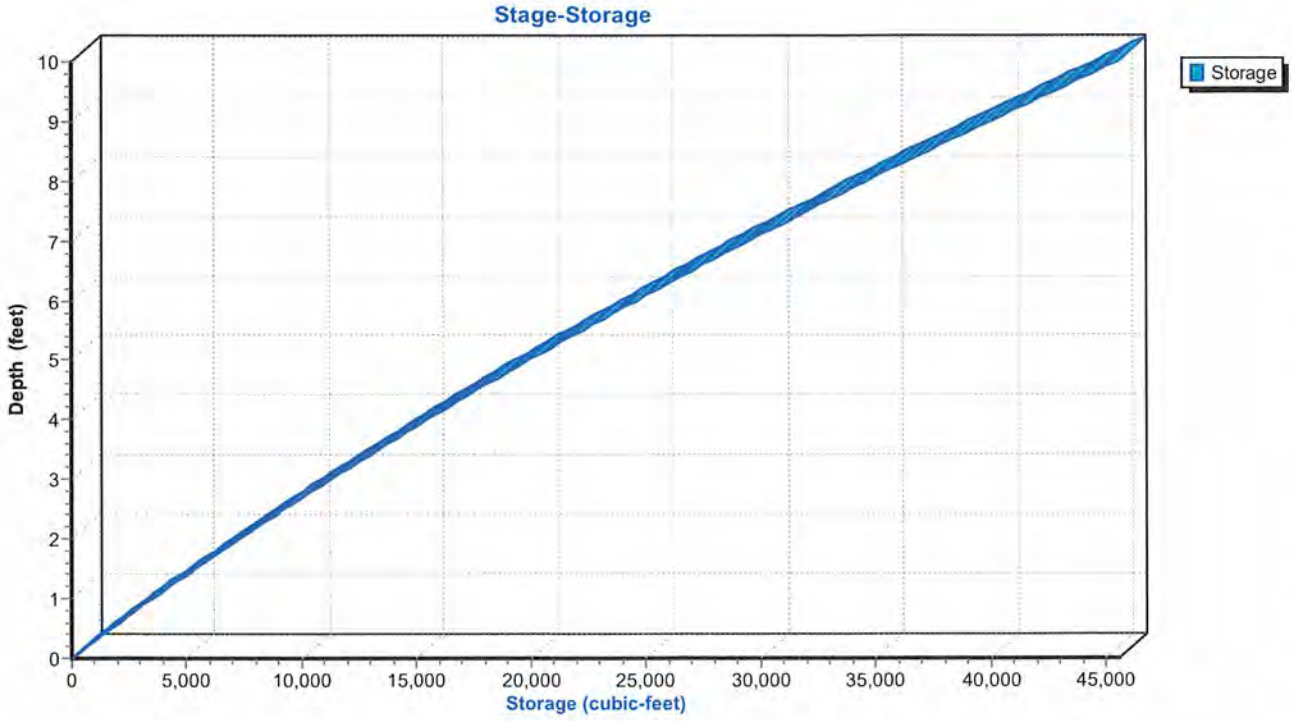
Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Summary for Reach 10R: Concrete Pipe

[52] Hint: Inlet/Outlet conditions not evaluated

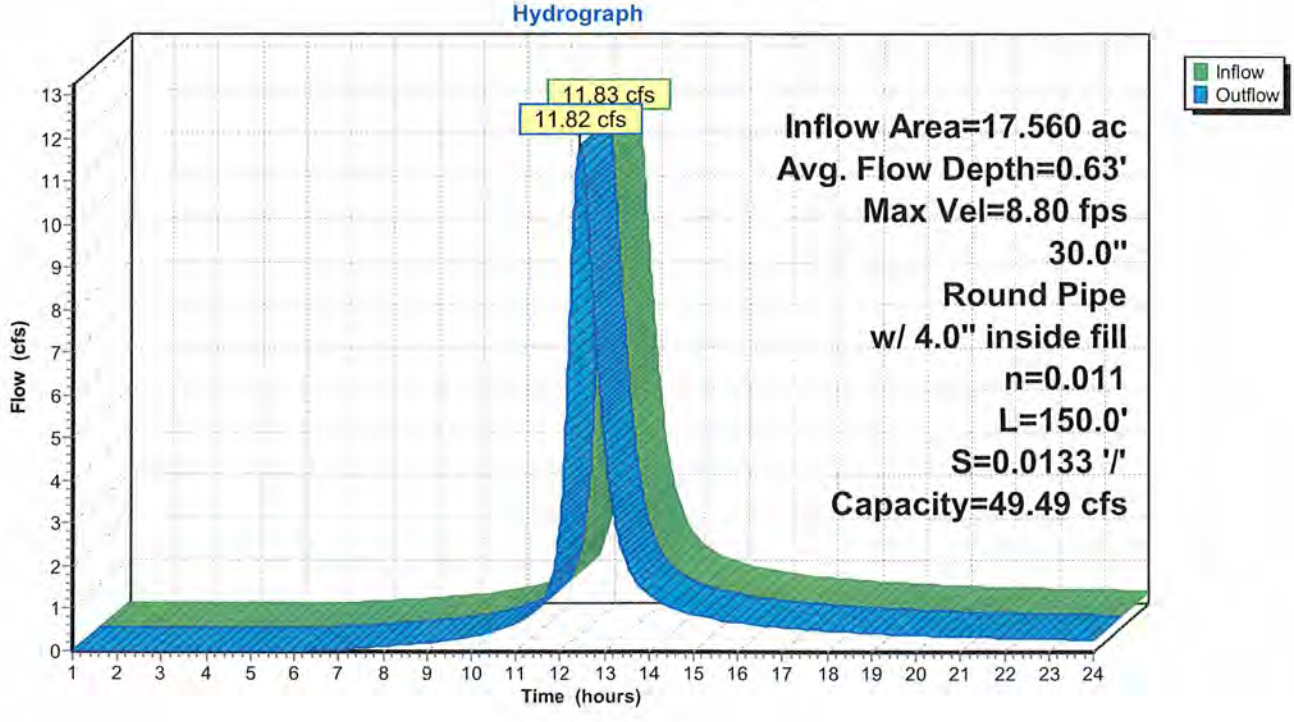
Inflow Area = 17.560 ac, 62.64% Impervious, Inflow Depth > 1.03" for 1-yr event
Inflow = 11.83 cfs @ 12.43 hrs, Volume= 1.507 af
Outflow = 11.82 cfs @ 12.44 hrs, Volume= 1.506 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.80 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.14 fps, Avg. Travel Time= 0.8 min

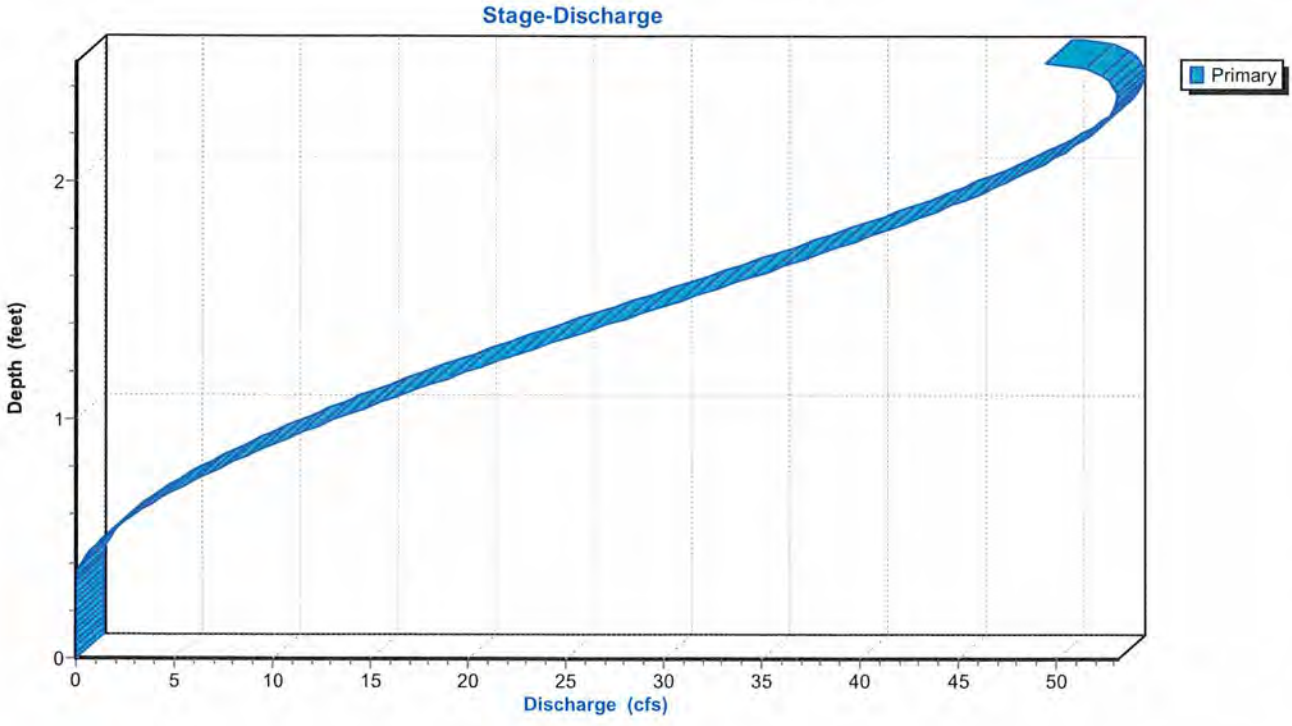
Peak Storage= 201 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.96' above invert (0.63' above fill)
Bank-Full Depth= 2.50' above invert (2.17' above fill) Flow Area= 4.5 sf, Capacity= 49.49 cfs

30.0" Round Pipe w/ 4.0" inside fill
n= 0.011 Concrete pipe, finished
Length= 150.0' Slope= 0.0133 '/' (101 Elevation Intervals)
Inlet Invert= 416.00', Outlet Invert= 414.00'

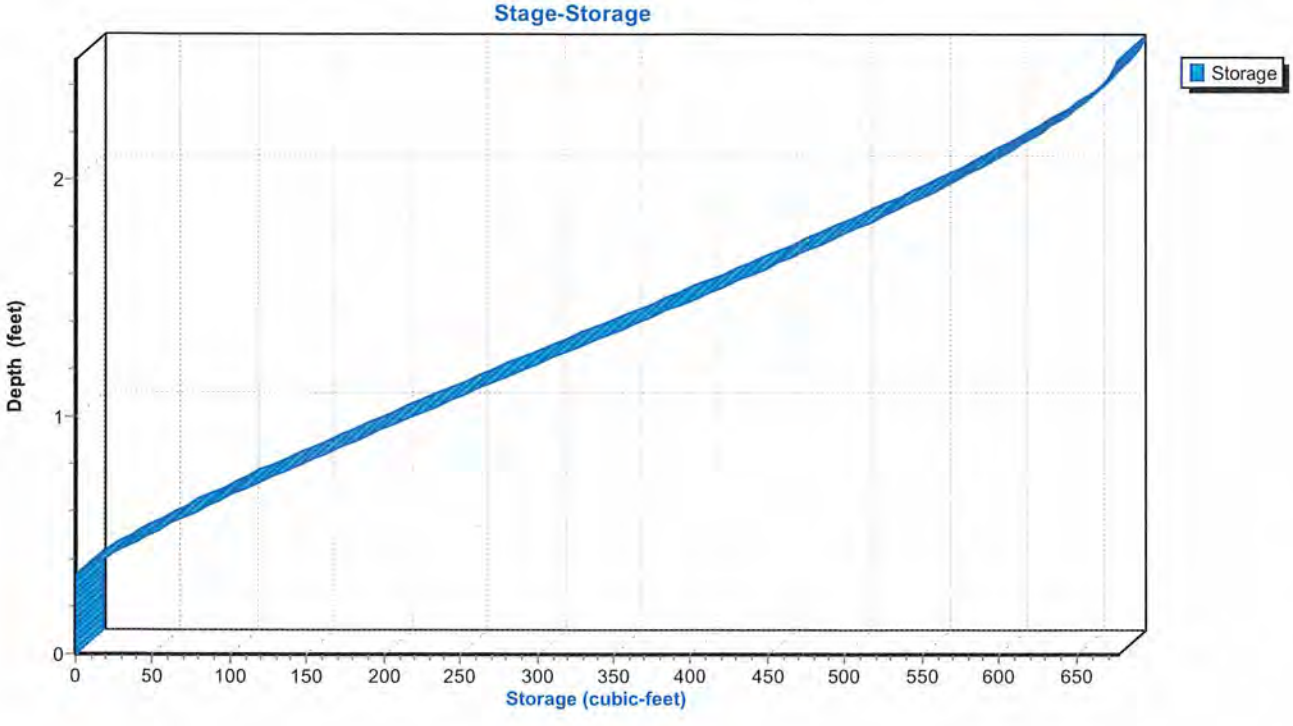




Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 2 Runoff Area=6.300 ac 0.00% Impervious Runoff Depth>0.17"
Flow Length=280' Slope=0.0070 '/' Tc=80.3 min CN=62 Runoff=0.24 cfs 0.091 af

Subcatchment 4S: Subcatchment 3 Runoff Area=3.840 ac 0.00% Impervious Runoff Depth>0.65"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=77 Runoff=1.18 cfs 0.209 af

Subcatchment 5S: Subcatchment 4 Runoff Area=4.060 ac 0.00% Impervious Runoff Depth>0.01"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=49 Runoff=0.01 cfs 0.002 af

Subcatchment 6S: Subcatchment 1 Runoff Area=13.500 ac 81.48% Impervious Runoff Depth>1.65"
Flow Length=2,260' Tc=36.2 min CN=93 Runoff=14.81 cfs 1.860 af

Reach 7R: Small Creek Avg. Flow Depth=1.09' Max Vel=4.74 fps Inflow=15.51 cfs 2.070 af
n=0.030 L=360.0' S=0.0167 '/' Capacity=146.42 cfs Outflow=15.49 cfs 2.068 af

Reach 9R: Butternut Creek Avg. Flow Depth=0.55' Max Vel=3.07 fps Inflow=15.52 cfs 2.159 af
n=0.030 L=380.0' S=0.0097 '/' Capacity=1,479.89 cfs Outflow=15.48 cfs 2.155 af

Reach 10R: Concrete Pipe Avg. Flow Depth=0.72' Max Vel=9.41 fps Inflow=14.81 cfs 1.862 af
30.0" Round Pipe w/ 4.0" inside fill n=0.011 L=150.0' S=0.0133 '/' Capacity=49.49 cfs Outflow=14.80 cfs 1.862 af

Total Runoff Area = 27.700 ac Runoff Volume = 2.162 af Average Runoff Depth = 0.94"
60.29% Pervious = 16.700 ac 39.71% Impervious = 11.000 ac

Summary for Subcatchment 1S: Subcatchment 2

Area closest to butternut creek, between BD and BC.
sheet flow for 100 feet.
shallow channel flow for 180 feet.
380 feet flow in butternut creek.

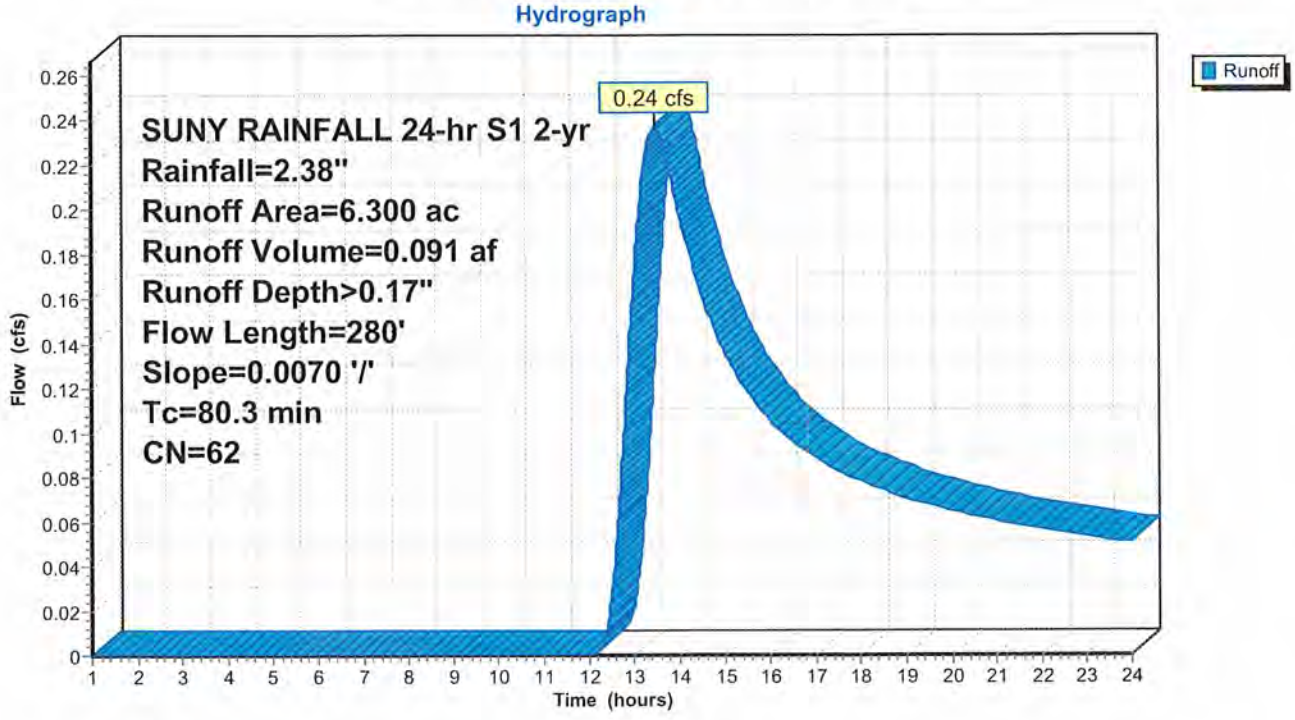
Runoff = 0.24 cfs @ 13.47 hrs, Volume= 0.091 af, Depth> 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
4.300	77	Woods, Good, HSG D
2.000	30	Woods, Good, HSG A
6.300	62	Weighted Average
6.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0	100	0.0070	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.38"
14.3	180	0.0070	0.21		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
80.3	280	Total			

Subcatchment 1S: Subcatchment 2



Summary for Subcatchment 4S: Subcatchment 3

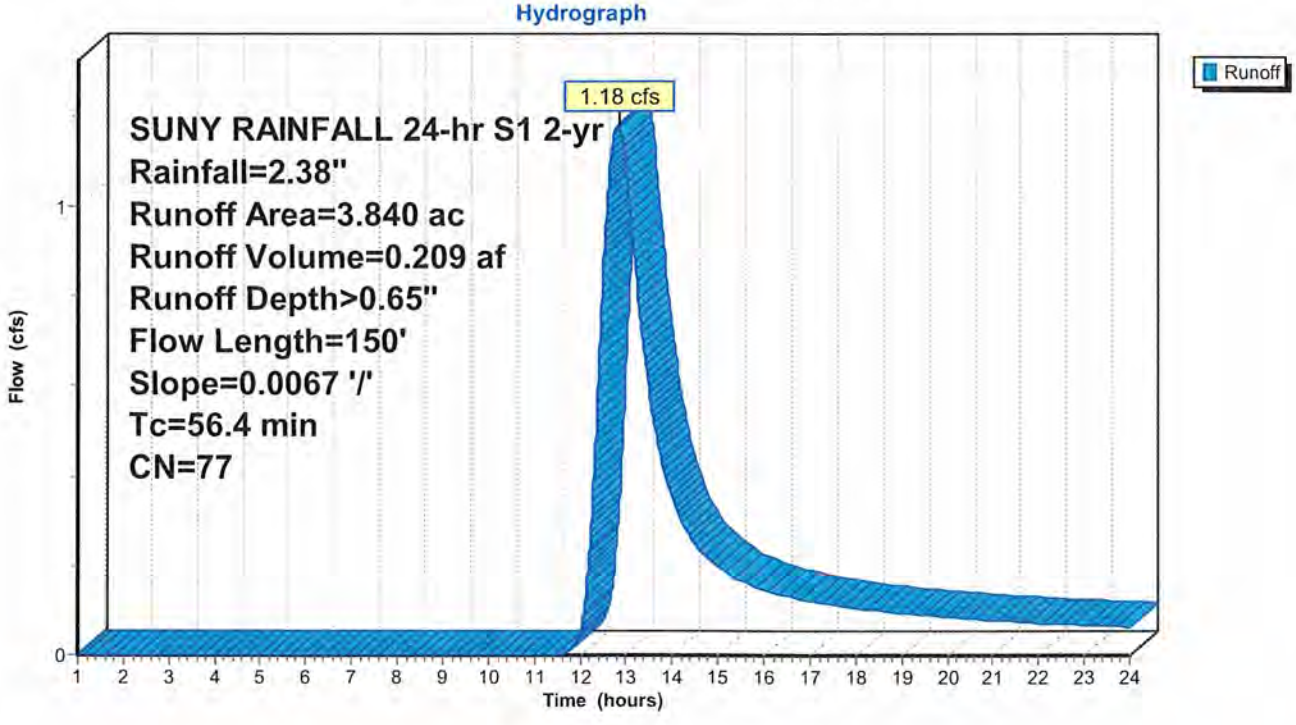
Runoff = 1.18 cfs @ 12.84 hrs, Volume= 0.209 af, Depth> 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
2.300	77	Woods, Good, HSG D
1.540	77	Woods, Good, HSG D
3.840	77	Weighted Average
3.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 4S: Subcatchment 3



Summary for Subcatchment 5S: Subcatchment 4

[73] Warning: Peak may fall outside time span

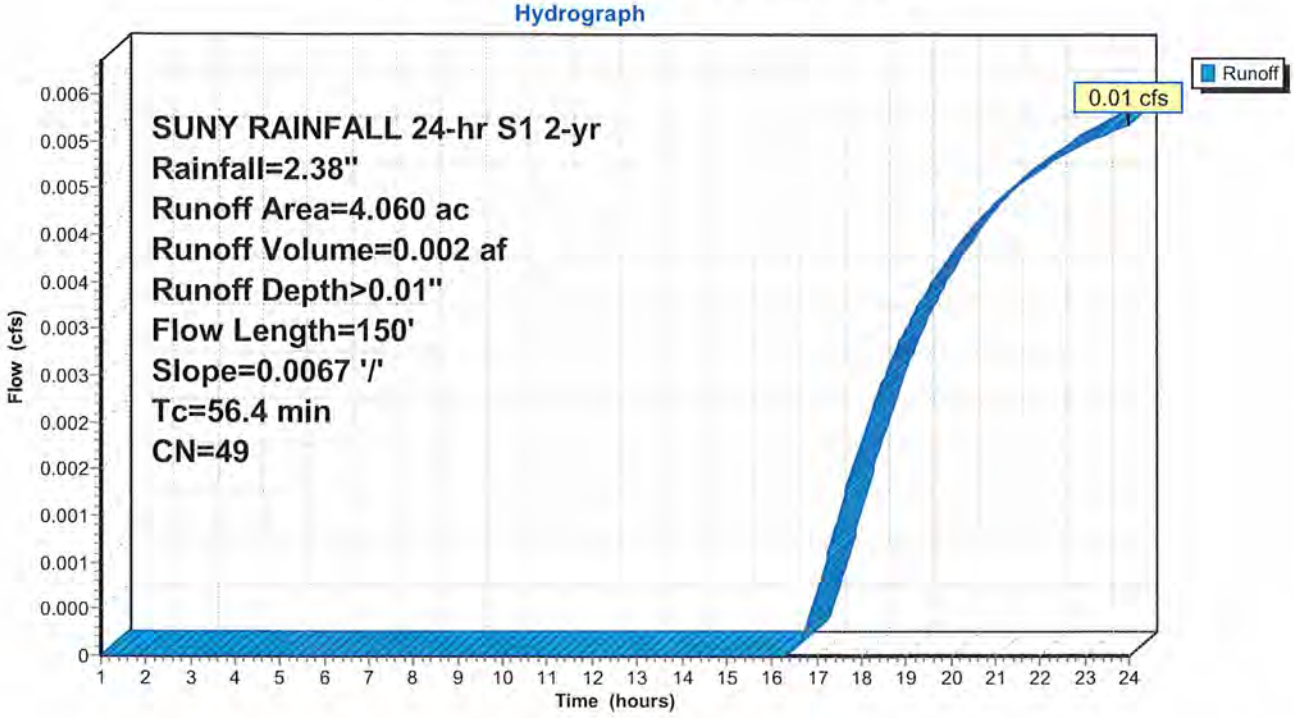
Runoff = 0.01 cfs @ 24.00 hrs, Volume= 0.002 af, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
4.060	49	50-75% Grass cover, Fair, HSG A
4.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 5S: Subcatchment 4



Summary for Subcatchment 6S: Subcatchment 1

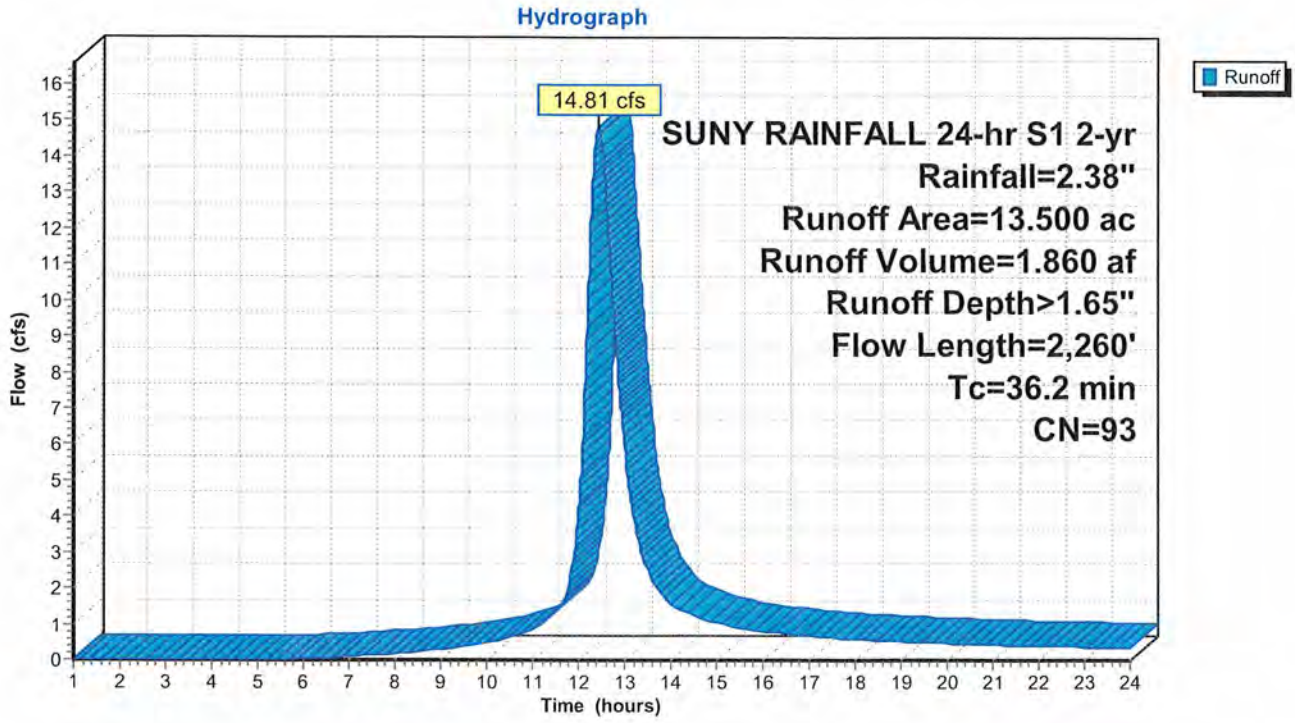
Runoff = 14.81 cfs @ 12.43 hrs, Volume= 1.860 af, Depth> 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
8.500	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
2.700	83	Paved roads w/open ditches, 50% imp, HSG A
0.300	93	Paved roads w/open ditches, 50% imp, HSG D
0.900	68	<50% Grass cover, Poor, HSG A
0.100	89	<50% Grass cover, Poor, HSG D
13.500	93	Weighted Average
2.500		18.52% Pervious Area
11.000		81.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0105	0.08		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.38"
6.8	850	0.0105	2.08		**Shallow Concentrated Flow, Shallow Concentrated** Paved Kv= 20.3 fps
6.2	950	0.0084	2.54	13.56	**Parabolic Channel, Stream** W=4.00' D=2.00' Area=5.3 sf Perim=5.9' n= 0.050 Sluggish weedy reaches w/pools
1.8	360	0.0139	3.35	52.55	**Parabolic Channel, Sluggish Stream W. Side of BN Creek** W=7.25' D=3.25' Area=15.7 sf Perim=10.2' n= 0.070 Sluggish weedy reaches w/pools
36.2	2,260	Total			

Subcatchment 6S: Subcatchment 1



Summary for Reach 7R: Small Creek

[62] Hint: Exceeded Reach 10R OUTLET depth by 0.05' @ 12.63 hrs

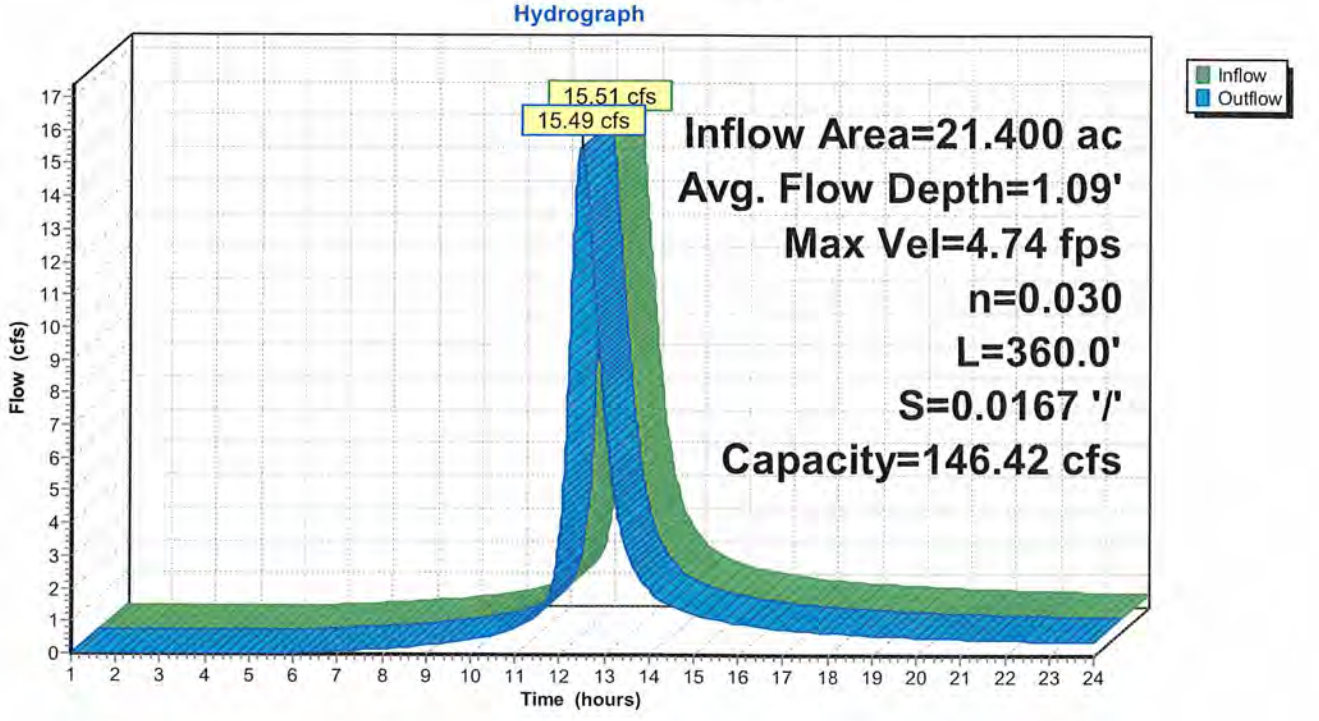
Inflow Area = 21.400 ac, 51.40% Impervious, Inflow Depth > 1.16" for 2-yr event
Inflow = 15.51 cfs @ 12.44 hrs, Volume= 2.070 af
Outflow = 15.49 cfs @ 12.47 hrs, Volume= 2.068 af, Atten= 0%, Lag= 2.0 min

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.74 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.91 fps, Avg. Travel Time= 3.1 min

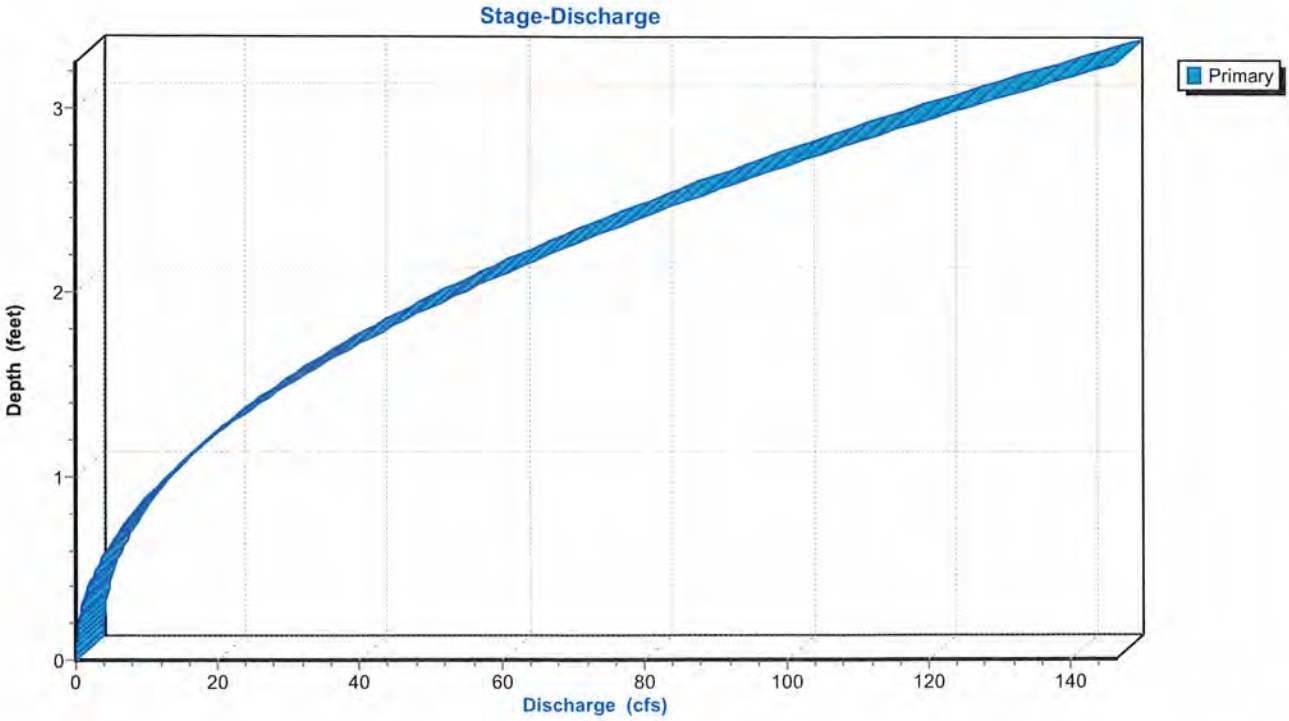
Peak Storage= 1,177 cf @ 12.47 hrs
Average Depth at Peak Storage= 1.09'
Bank-Full Depth= 3.25' Flow Area= 16.8 sf, Capacity= 146.42 cfs

7.75' x 3.25' deep Parabolic Channel, n= 0.030 Earth, dense weeds
Length= 360.0' Slope= 0.0167 '/'
Inlet Invert= 414.00', Outlet Invert= 408.00'

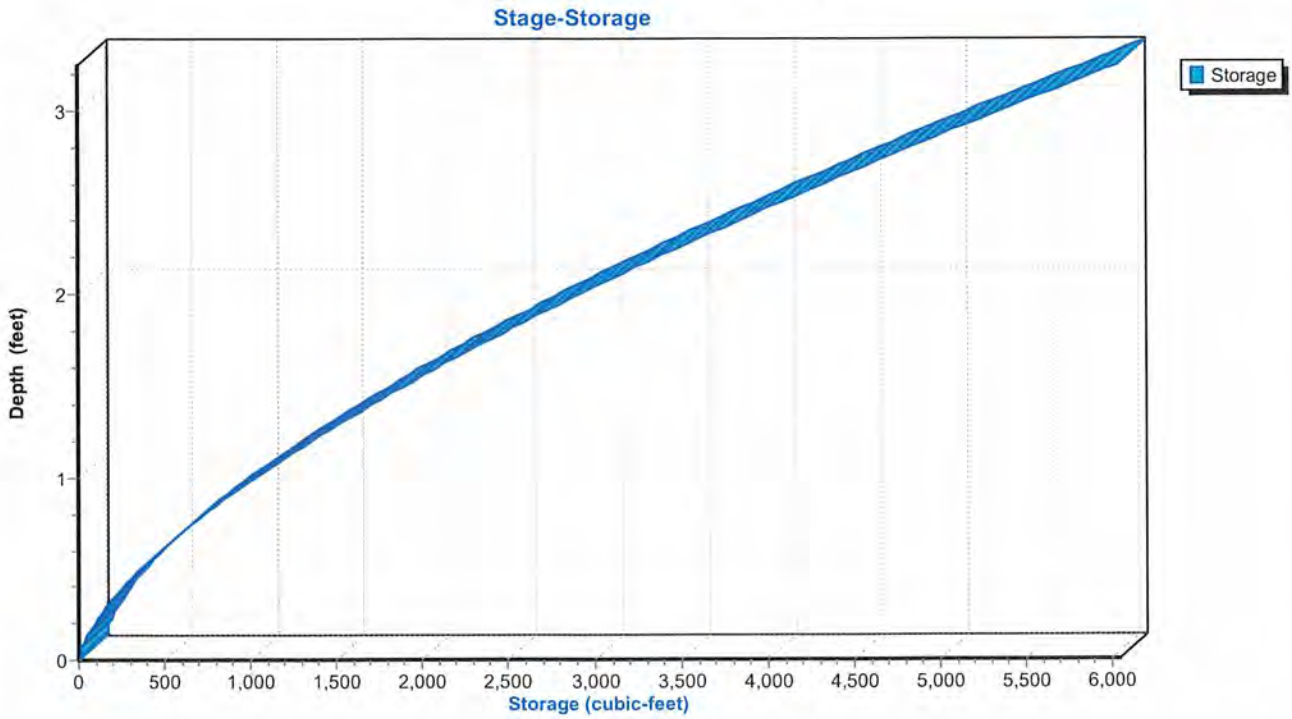




Reach 7R: Small Creek



Reach 7R: Small Creek



Summary for Reach 9R: Butternut Creek

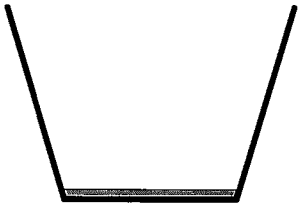
[61] Hint: Exceeded Reach 7R outlet invert by 0.55' @ 12.50 hrs

Inflow Area = 27.700 ac, 39.71% Impervious, Inflow Depth > 0.94" for 2-yr event
Inflow = 15.52 cfs @ 12.47 hrs, Volume= 2.159 af
Outflow = 15.48 cfs @ 12.50 hrs, Volume= 2.155 af, Atten= 0%, Lag= 1.5 min

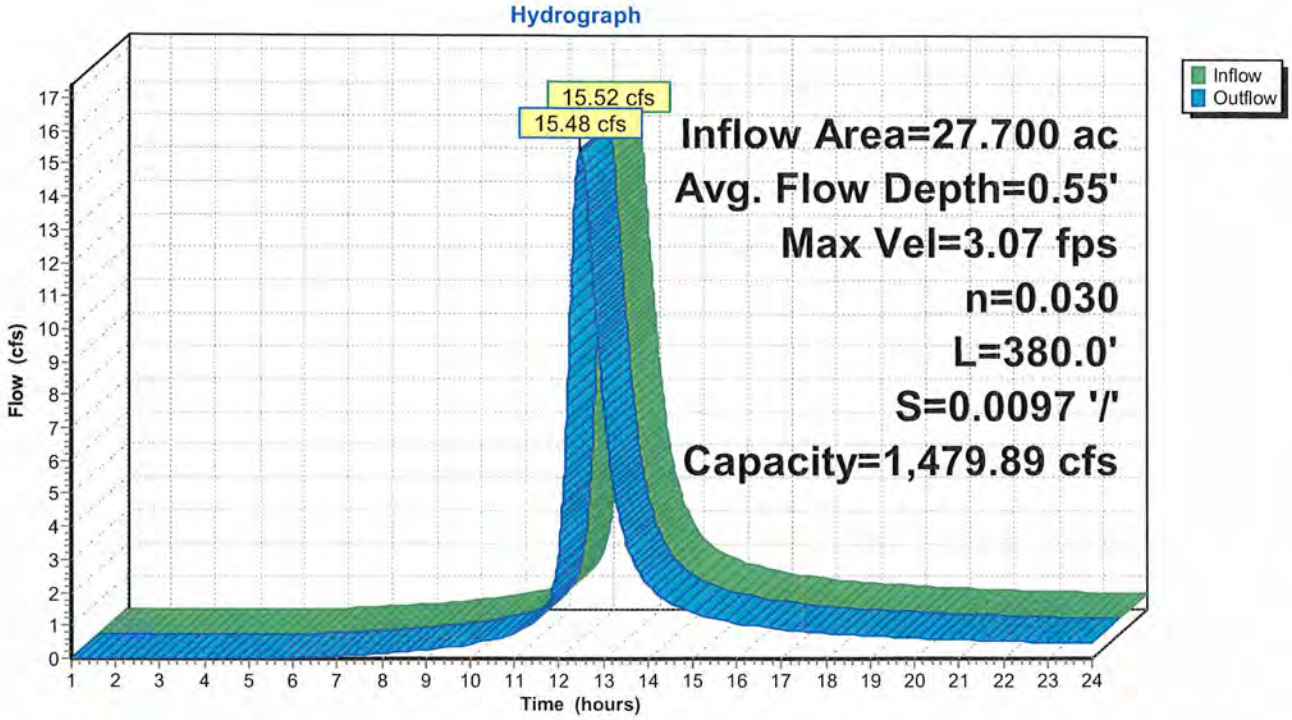
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.07 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 5.3 min

Peak Storage= 1,914 cf @ 12.50 hrs
Average Depth at Peak Storage= 0.55'
Defined Flood Depth= 417.70' Flow Area= 6,223.3 sf, Capacity= 98,716.46 cfs
Bank-Full Depth= 10.00' Flow Area= 120.0 sf, Capacity= 1,479.89 cfs

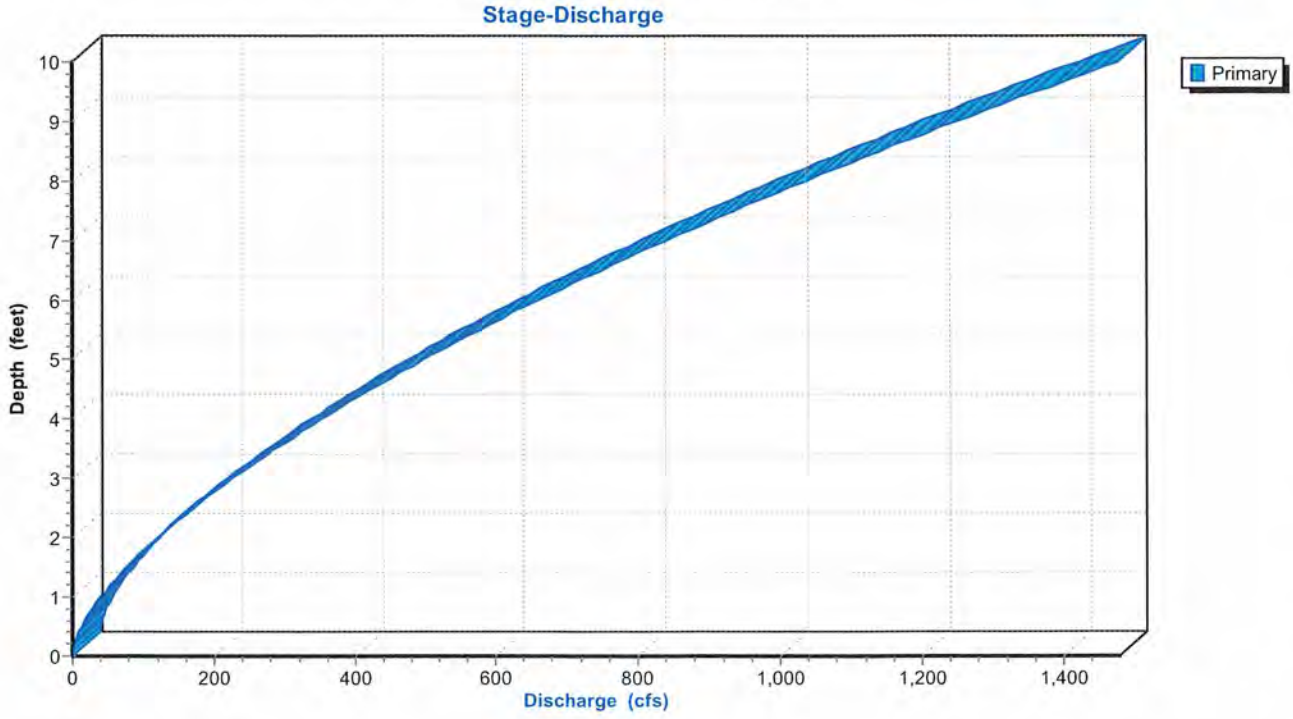
9.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 0.3 '/' Top Width= 15.00'
Length= 380.0' Slope= 0.0097 '/'
Inlet Invert= 408.00', Outlet Invert= 404.31'



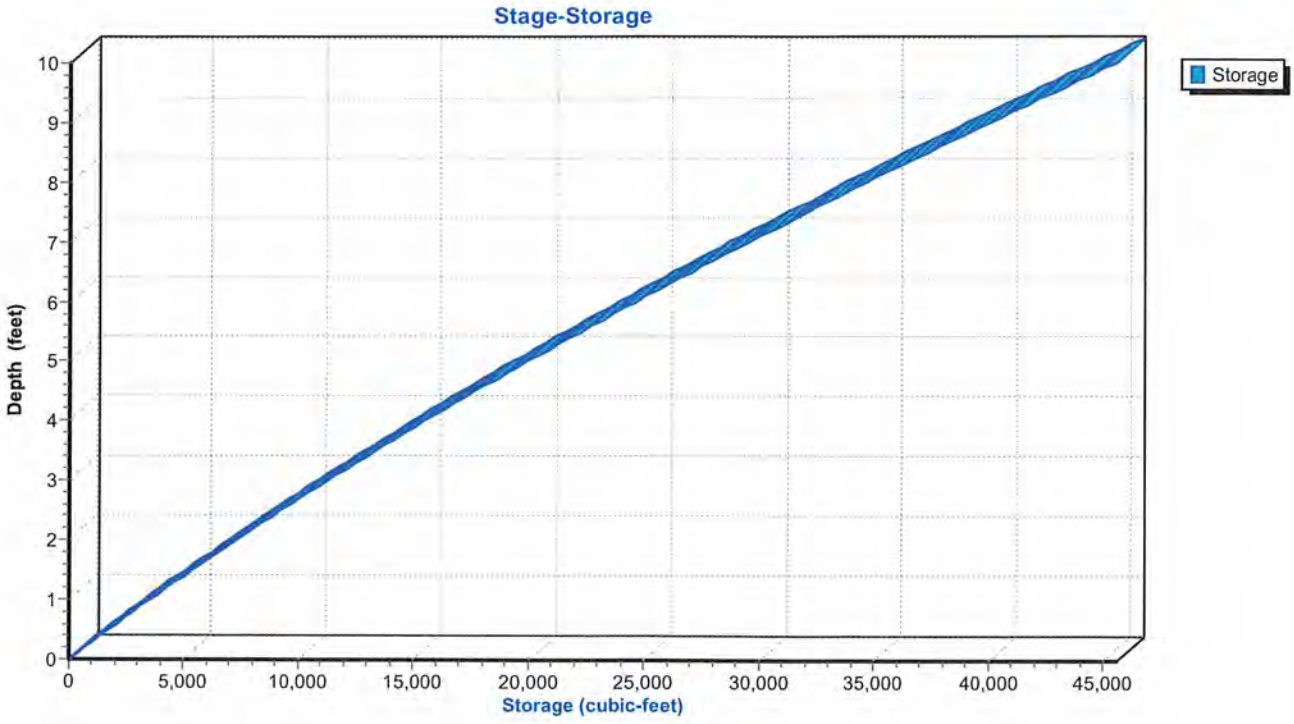
Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Summary for Reach 10R: Concrete Pipe

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 17.560 ac, 62.64% Impervious, Inflow Depth > 1.27" for 2-yr event
Inflow = 14.81 cfs @ 12.43 hrs, Volume= 1.862 af
Outflow = 14.80 cfs @ 12.44 hrs, Volume= 1.862 af, Atten= 0%, Lag= 0.3 min

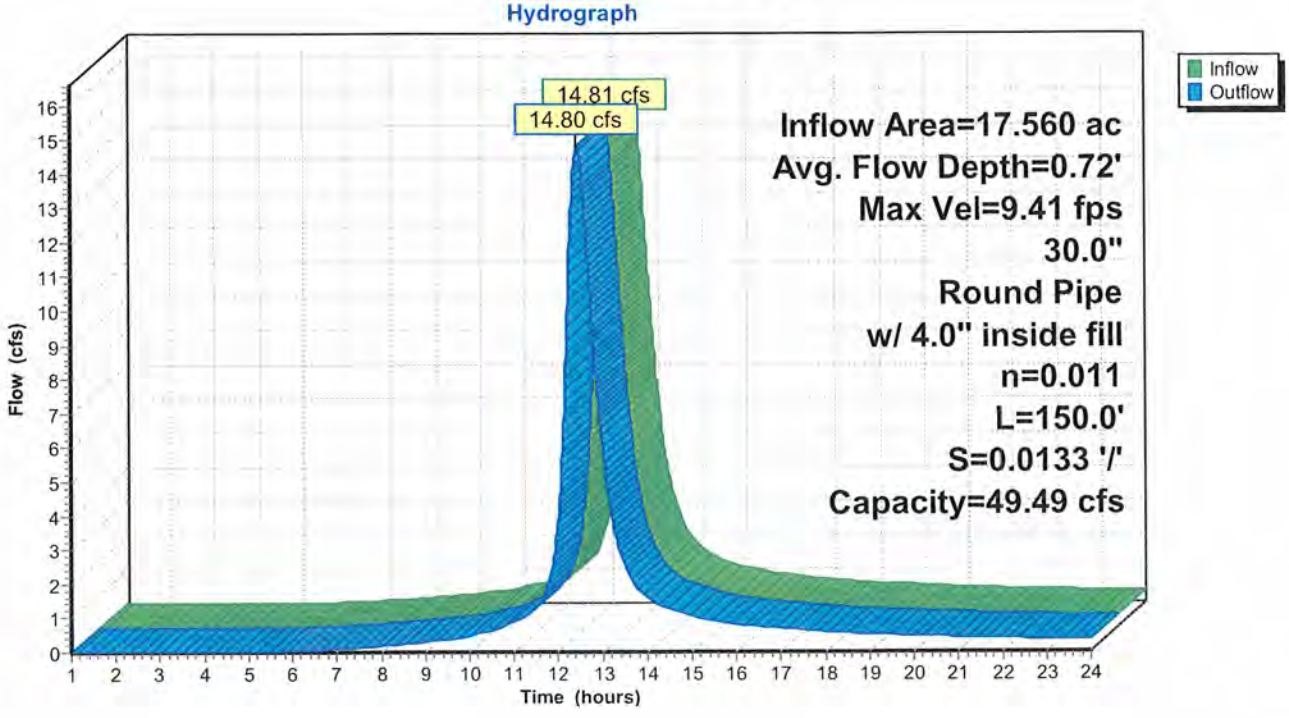
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.41 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.33 fps, Avg. Travel Time= 0.8 min

Peak Storage= 236 cf @ 12.44 hrs
Average Depth at Peak Storage= 1.05' above invert (0.72' above fill)
Bank-Full Depth= 2.50' above invert (2.17' above fill) Flow Area= 4.5 sf, Capacity= 49.49 cfs

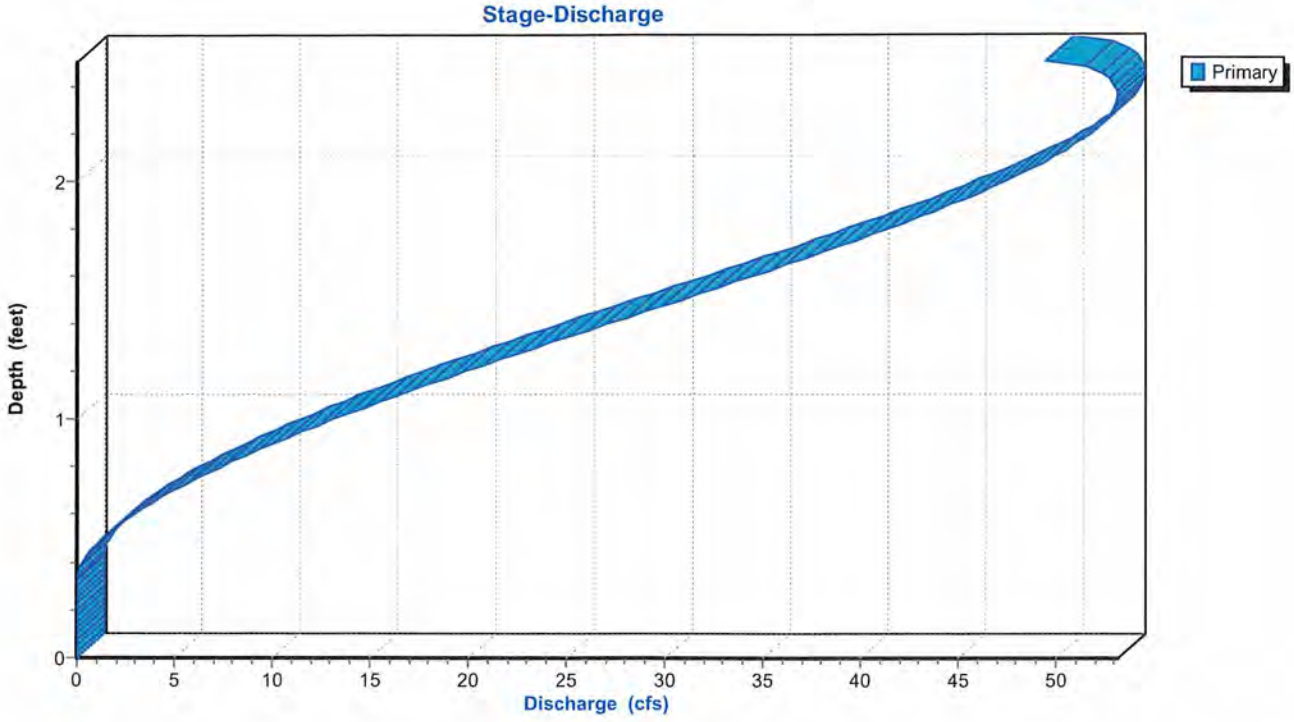
30.0" Round Pipe w/ 4.0" inside fill
n= 0.011 Concrete pipe, finished
Length= 150.0' Slope= 0.0133 '/' (101 Elevation Intervals)
Inlet Invert= 416.00', Outlet Invert= 414.00'



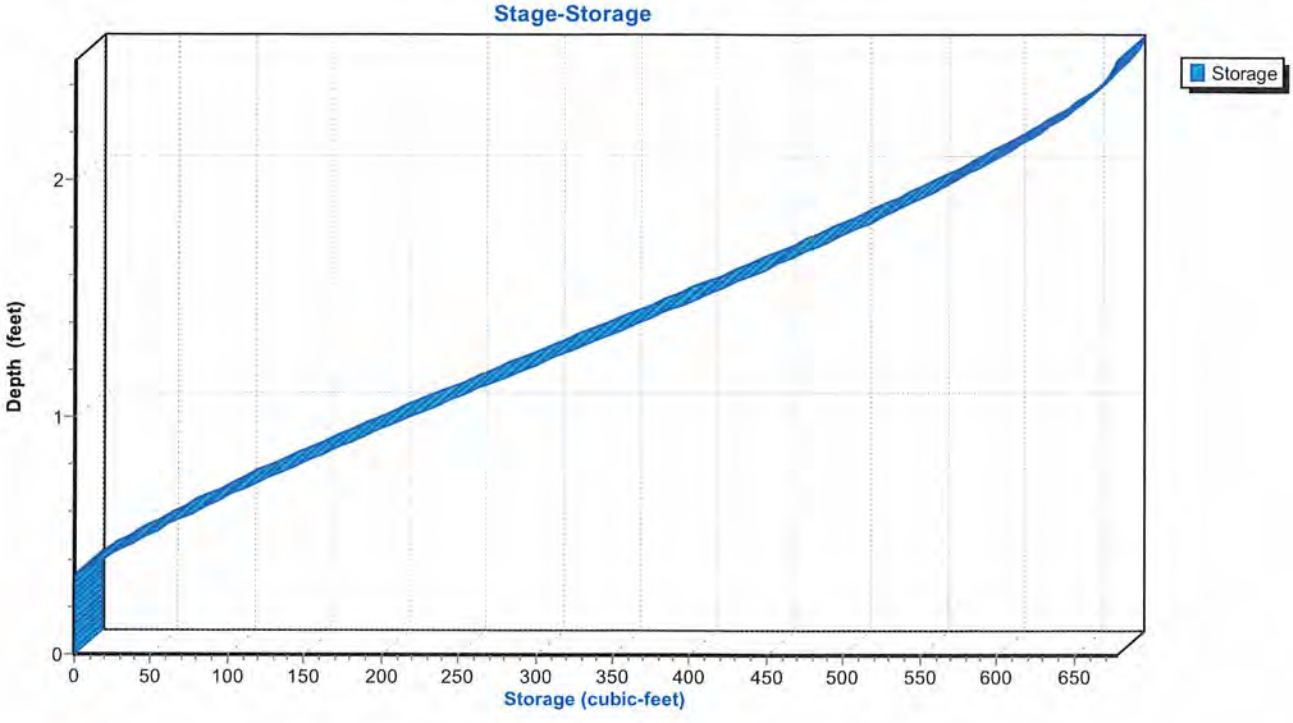
Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 2 Runoff Area=6.300 ac 0.00% Impervious Runoff Depth>0.56"
Flow Length=280' Slope=0.0070 '/' Tc=80.3 min CN=62 Runoff=1.18 cfs 0.293 af

Subcatchment 4S: Subcatchment 3 Runoff Area=3.840 ac 0.00% Impervious Runoff Depth>1.35"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=77 Runoff=2.70 cfs 0.431 af

Subcatchment 5S: Subcatchment 4 Runoff Area=4.060 ac 0.00% Impervious Runoff Depth>0.15"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=49 Runoff=0.11 cfs 0.049 af

Subcatchment 6S: Subcatchment 1 Runoff Area=13.500 ac 81.48% Impervious Runoff Depth>2.64"
Flow Length=2,260' Tc=36.2 min CN=93 Runoff=23.61 cfs 2.968 af

Reach 7R: Small Creek Avg. Flow Depth=1.38' Max Vel=5.45 fps Inflow=25.42 cfs 3.448 af
n=0.030 L=360.0' S=0.0167 '/' Capacity=146.42 cfs Outflow=25.40 cfs 3.446 af

Reach 9R: Butternut Creek Avg. Flow Depth=0.75' Max Vel=3.69 fps Inflow=25.67 cfs 3.738 af
n=0.030 L=380.0' S=0.0097 '/' Capacity=1,479.89 cfs Outflow=25.63 cfs 3.732 af

Reach 10R: Concrete Pipe Avg. Flow Depth=0.97' Max Vel=10.72 fps Inflow=23.61 cfs 3.018 af
30.0" Round Pipe w/ 4.0" inside fill n=0.011 L=150.0' S=0.0133 '/' Capacity=49.49 cfs Outflow=23.60 cfs 3.017 af

Total Runoff Area = 27.700 ac Runoff Volume = 3.742 af Average Runoff Depth = 1.62"
60.29% Pervious = 16.700 ac 39.71% Impervious = 11.000 ac

Summary for Subcatchment 1S: Subcatchment 2

Area closest to butternut creek, between BD and BC.
sheet flow for 100 feet.
shallow channel flow for 180 feet.
380 feet flow in butternut creek.

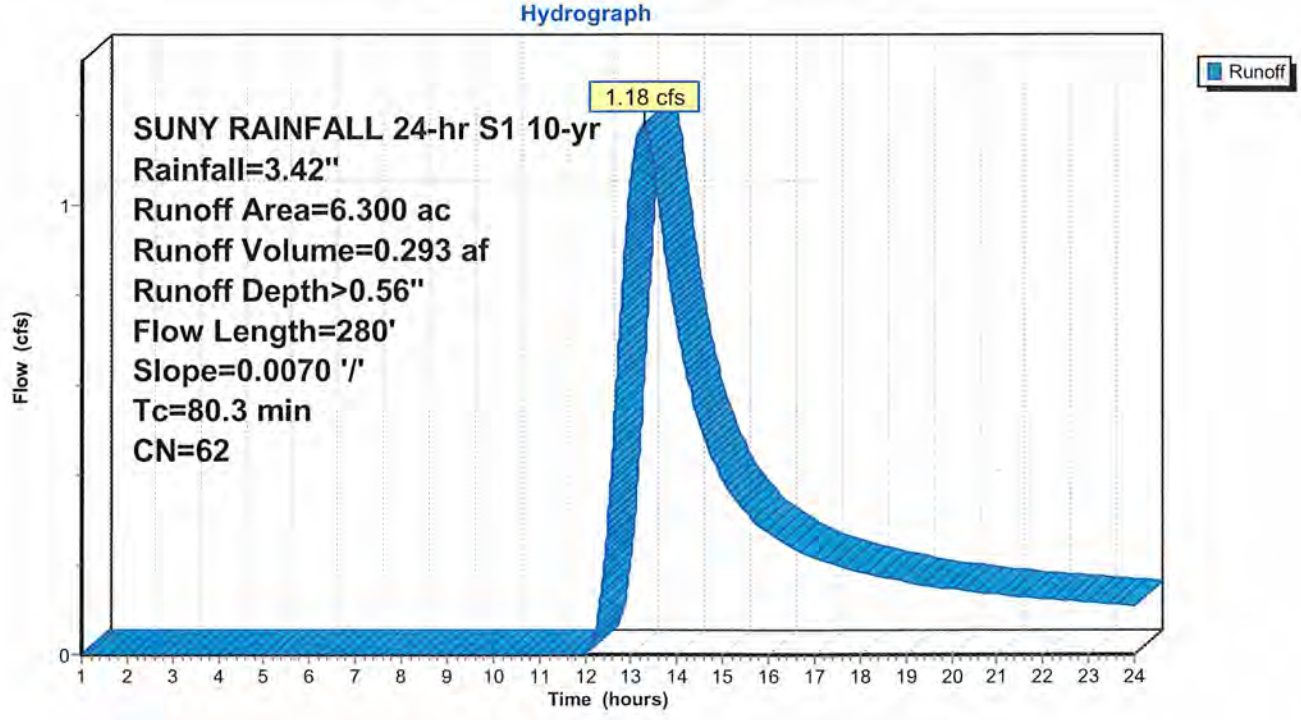
Runoff = 1.18 cfs @ 13.29 hrs, Volume= 0.293 af, Depth> 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
4.300	77	Woods, Good, HSG D
2.000	30	Woods, Good, HSG A
6.300	62	Weighted Average
6.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0	100	0.0070	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.38"
14.3	180	0.0070	0.21		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
80.3	280	Total			

Subcatchment 1S: Subcatchment 2



Summary for Subcatchment 4S: Subcatchment 3

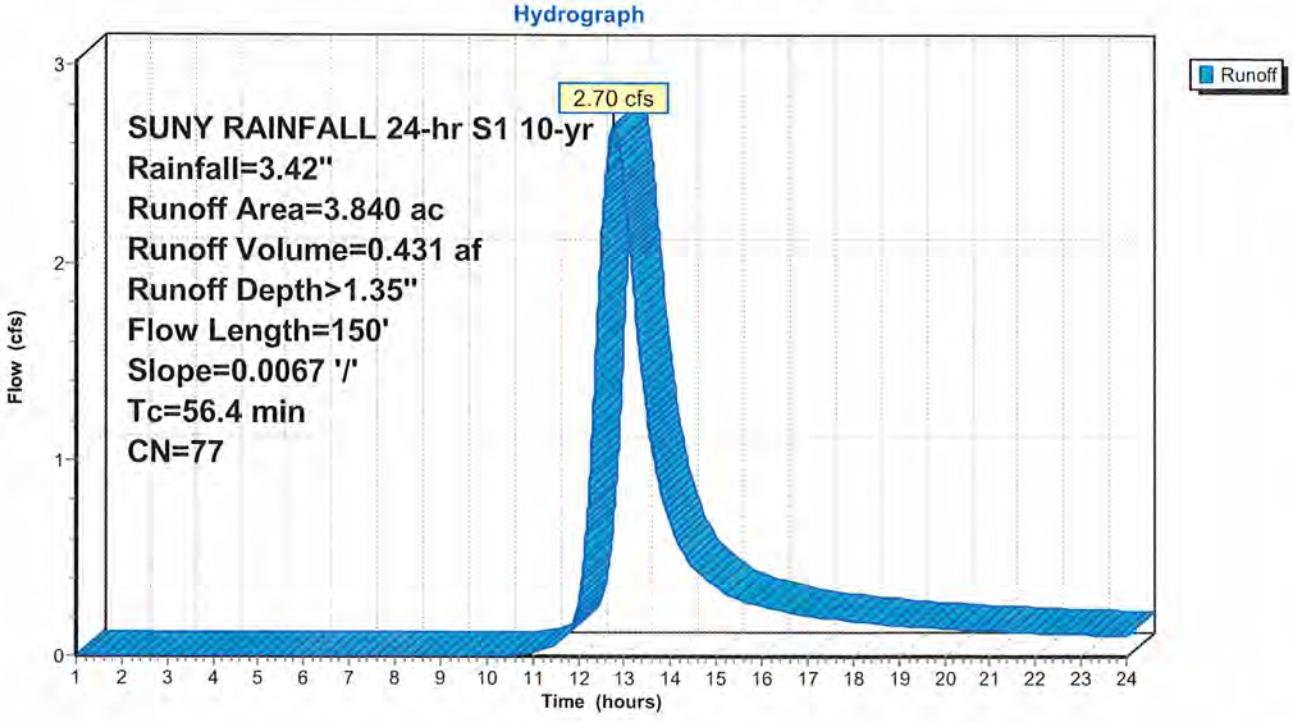
Runoff = 2.70 cfs @ 12.78 hrs, Volume= 0.431 af, Depth> 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
2.300	77	Woods, Good, HSG D
1.540	77	Woods, Good, HSG D
3.840	77	Weighted Average
3.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 4S: Subcatchment 3



Summary for Subcatchment 5S: Subcatchment 4

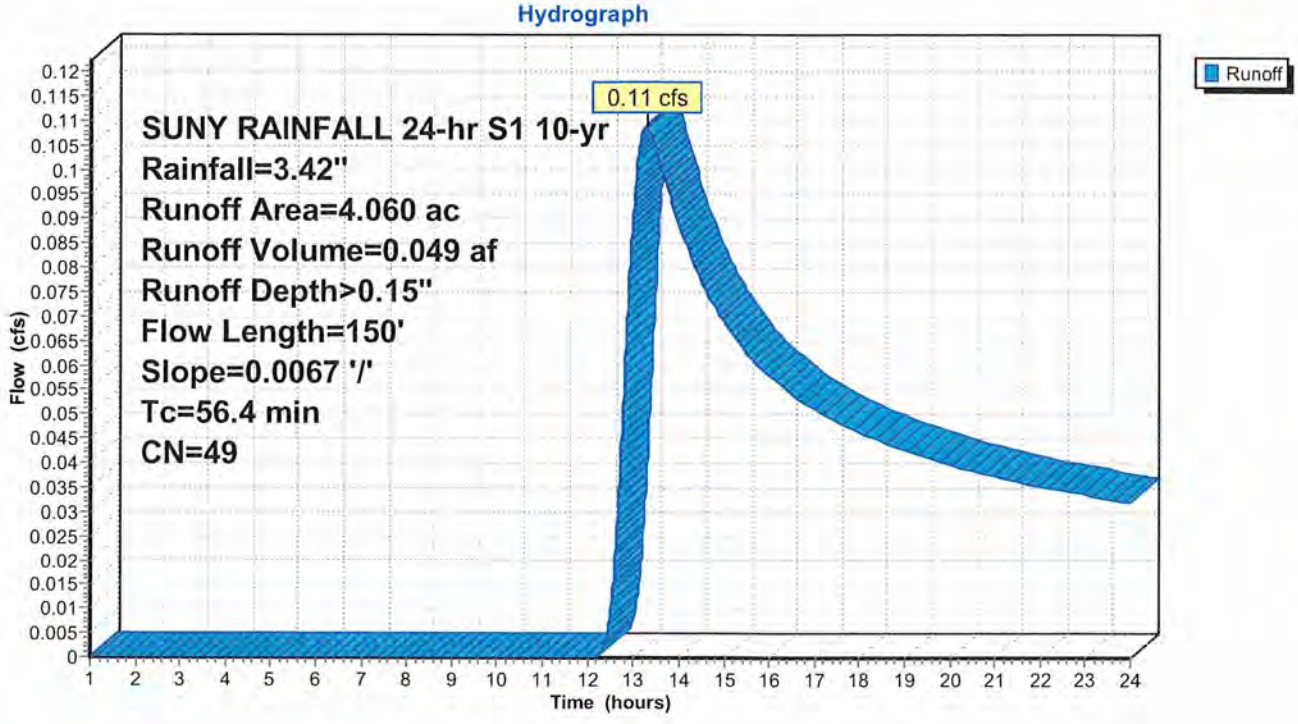
Runoff = 0.11 cfs @ 13.28 hrs, Volume= 0.049 af, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
4.060	49	50-75% Grass cover, Fair, HSG A
4.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 5S: Subcatchment 4



Summary for Subcatchment 6S: Subcatchment 1

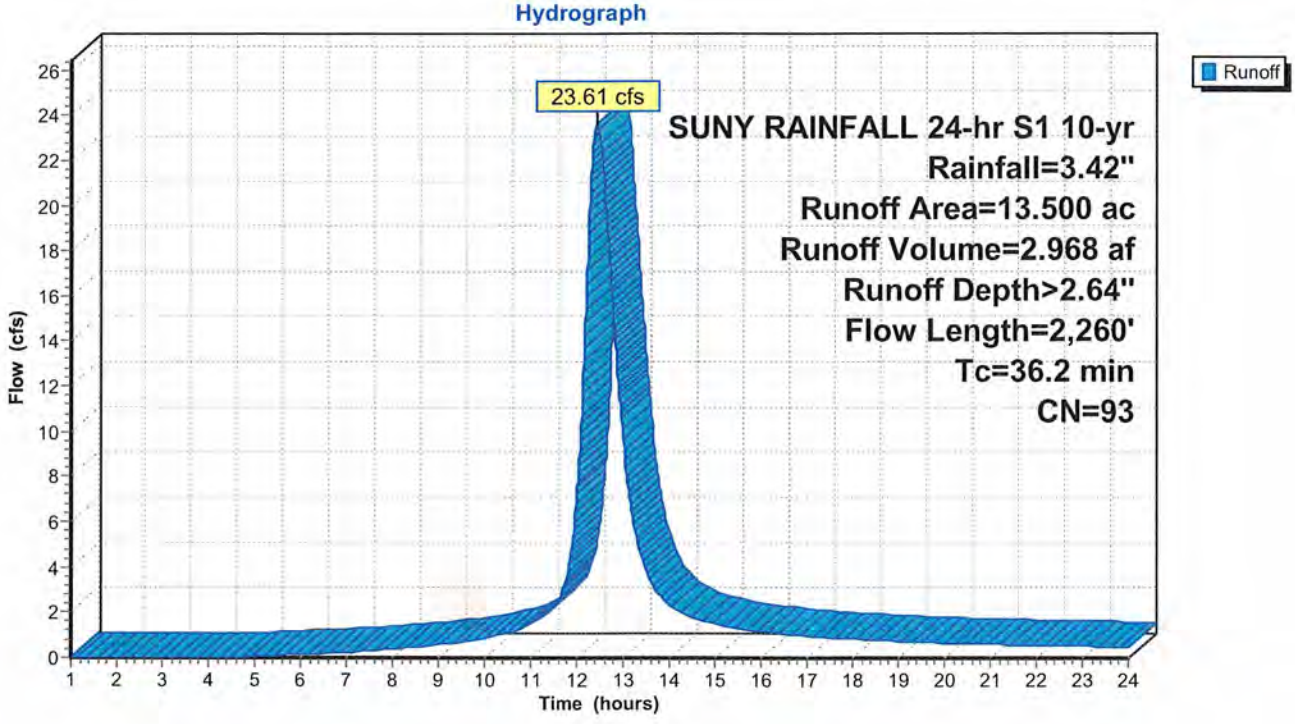
Runoff = 23.61 cfs @ 12.43 hrs, Volume= 2.968 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
8.500	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
2.700	83	Paved roads w/open ditches, 50% imp, HSG A
0.300	93	Paved roads w/open ditches, 50% imp, HSG D
0.900	68	<50% Grass cover, Poor, HSG A
0.100	89	<50% Grass cover, Poor, HSG D
13.500	93	Weighted Average
2.500		18.52% Pervious Area
11.000		81.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0105	0.08		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.38"
6.8	850	0.0105	2.08		**Shallow Concentrated Flow, Shallow Concentrated** Paved Kv= 20.3 fps
6.2	950	0.0084	2.54	13.56	**Parabolic Channel, Stream** W=4.00' D=2.00' Area=5.3 sf Perim=5.9' n= 0.050 Sluggish weedy reaches w/pools
1.8	360	0.0139	3.35	52.55	**Parabolic Channel, Sluggish Stream W. Side of BN Creek** W=7.25' D=3.25' Area=15.7 sf Perim=10.2' n= 0.070 Sluggish weedy reaches w/pools
36.2	2,260	Total			

Subcatchment 6S: Subcatchment 1



Summary for Reach 7R: Small Creek

[62] Hint: Exceeded Reach 10R OUTLET depth by 0.12' @ 12.77 hrs

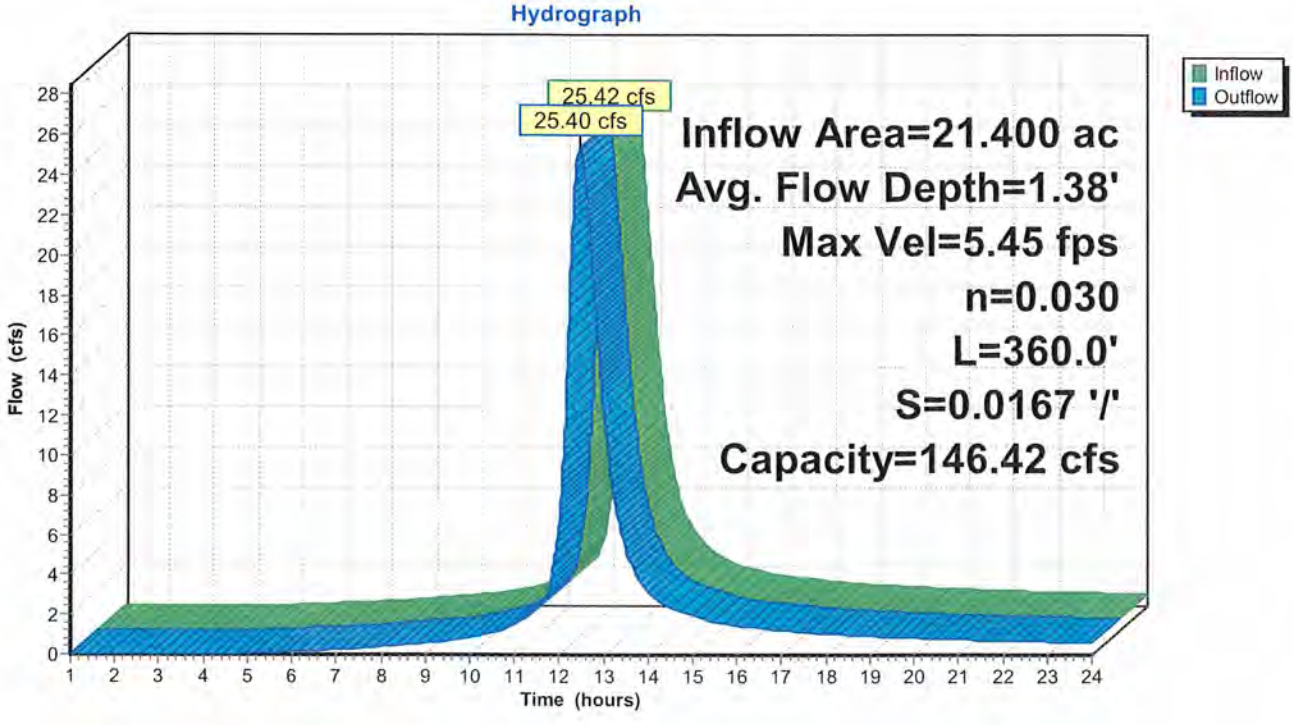
Inflow Area = 21.400 ac, 51.40% Impervious, Inflow Depth > 1.93" for 10-yr event
Inflow = 25.42 cfs @ 12.47 hrs, Volume= 3.448 af
Outflow = 25.40 cfs @ 12.48 hrs, Volume= 3.446 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.45 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 2.16 fps, Avg. Travel Time= 2.8 min

Peak Storage= 1,679 cf @ 12.48 hrs
Average Depth at Peak Storage= 1.38'
Bank-Full Depth= 3.25' Flow Area= 16.8 sf, Capacity= 146.42 cfs

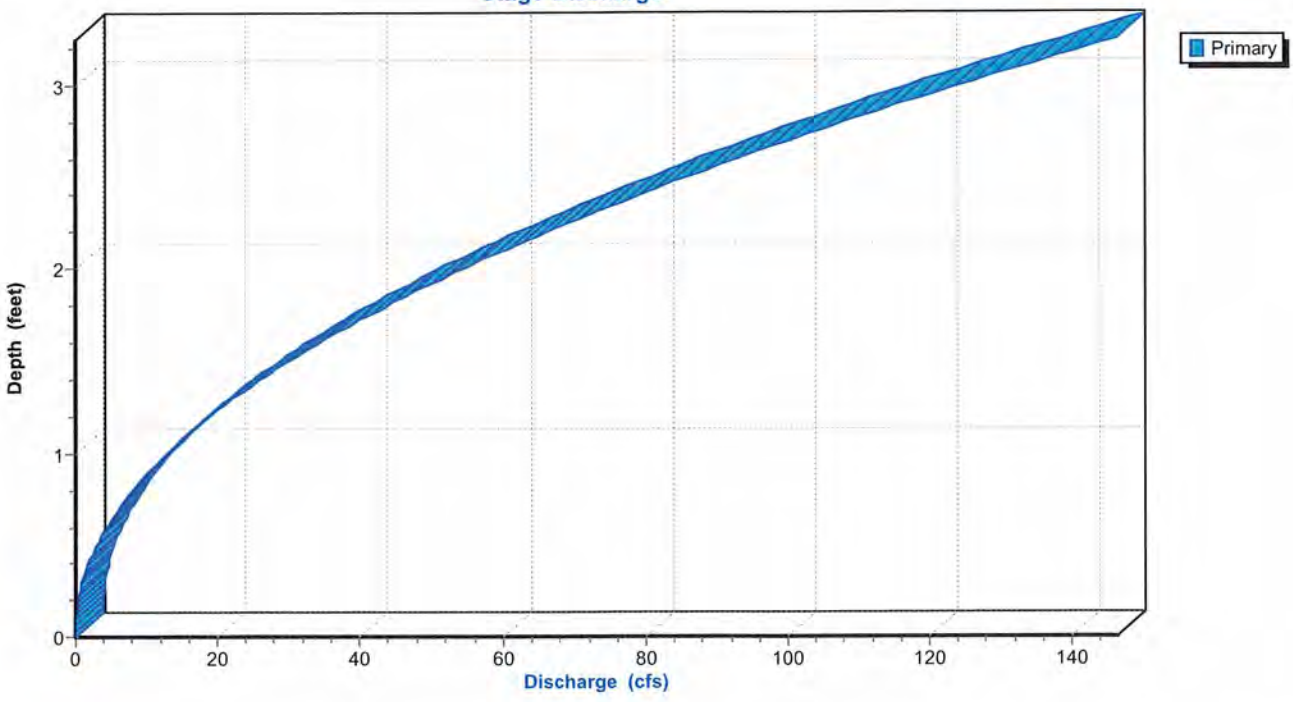
7.75' x 3.25' deep Parabolic Channel, n= 0.030 Earth, dense weeds
Length= 360.0' Slope= 0.0167 '/'
Inlet Invert= 414.00', Outlet Invert= 408.00'





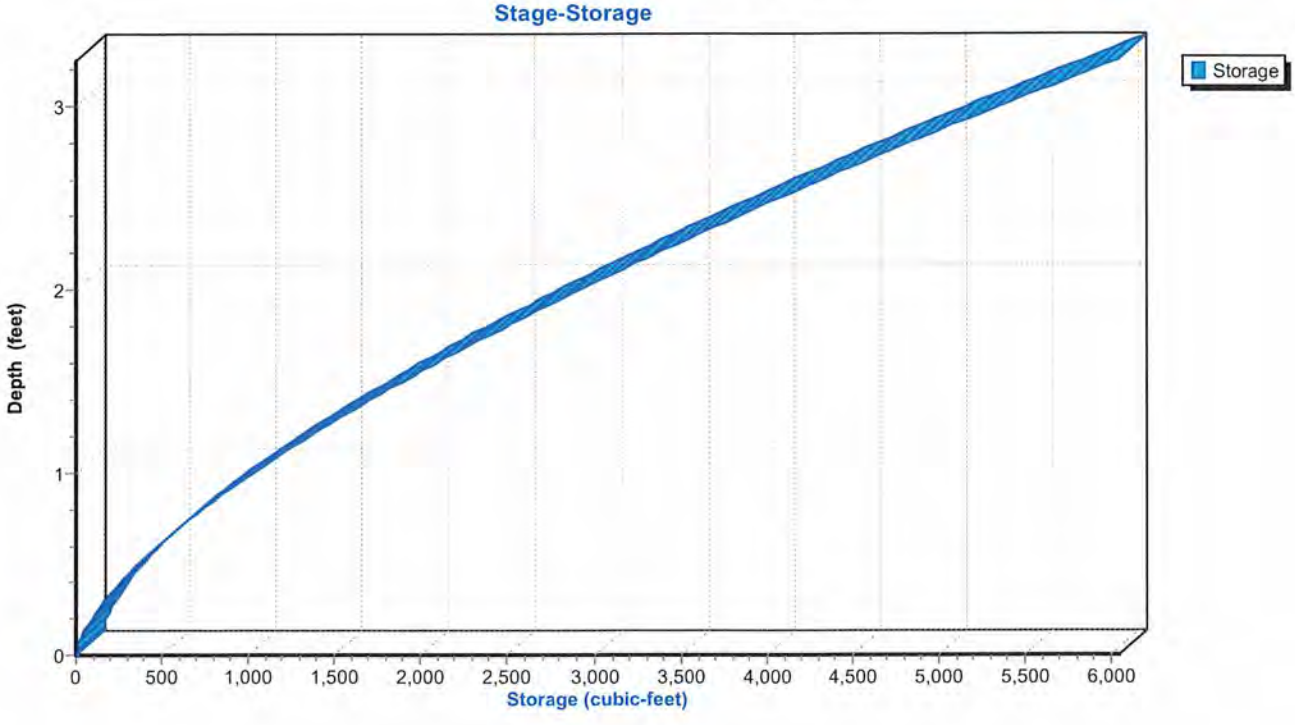
Reach 7R: Small Creek

Stage-Discharge



Reach 7R: Small Creek

Stage-Storage



Summary for Reach 9R: Butternut Creek

[61] Hint: Exceeded Reach 7R outlet invert by 0.75' @ 12.50 hrs

Inflow Area = 27.700 ac, 39.71% Impervious, Inflow Depth > 1.62" for 10-yr event
Inflow = 25.67 cfs @ 12.48 hrs, Volume= 3.738 af
Outflow = 25.63 cfs @ 12.50 hrs, Volume= 3.732 af, Atten= 0%, Lag= 1.3 min

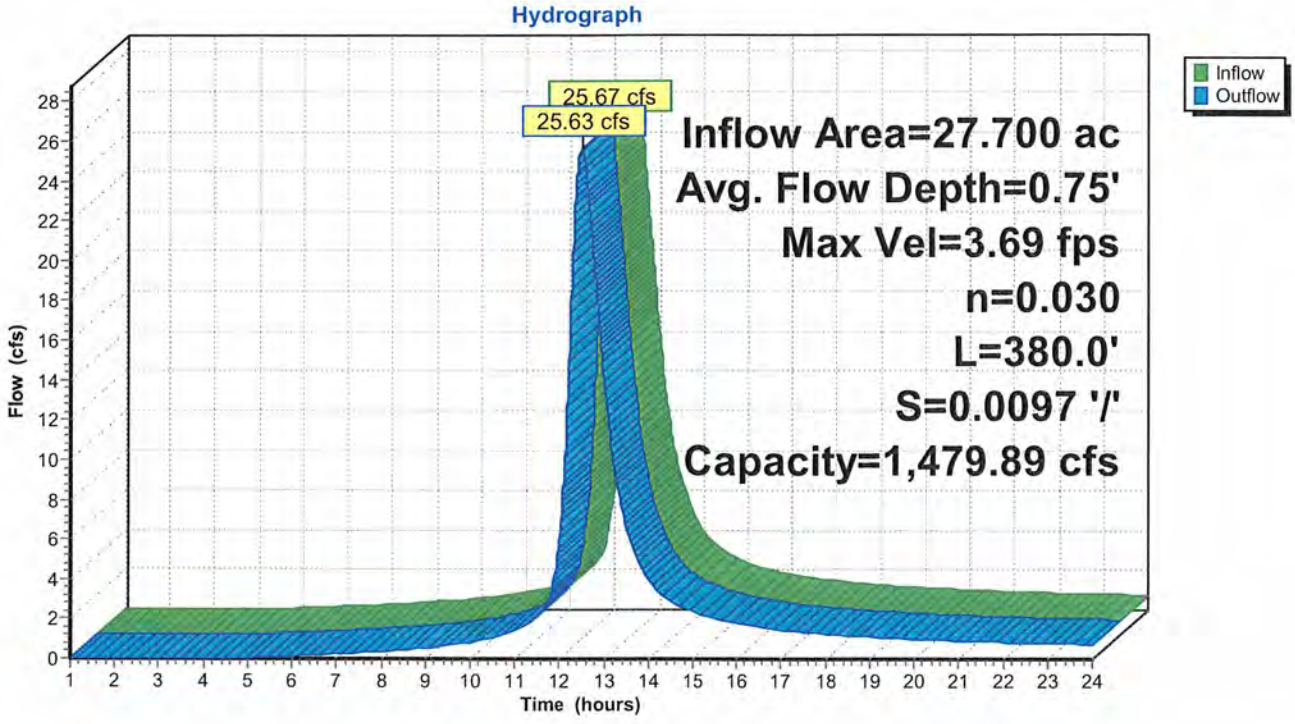
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.69 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 4.8 min

Peak Storage= 2,637 cf @ 12.50 hrs
Average Depth at Peak Storage= 0.75'
Defined Flood Depth= 417.70' Flow Area= 6,223.3 sf, Capacity= 98,716.46 cfs
Bank-Full Depth= 10.00' Flow Area= 120.0 sf, Capacity= 1,479.89 cfs

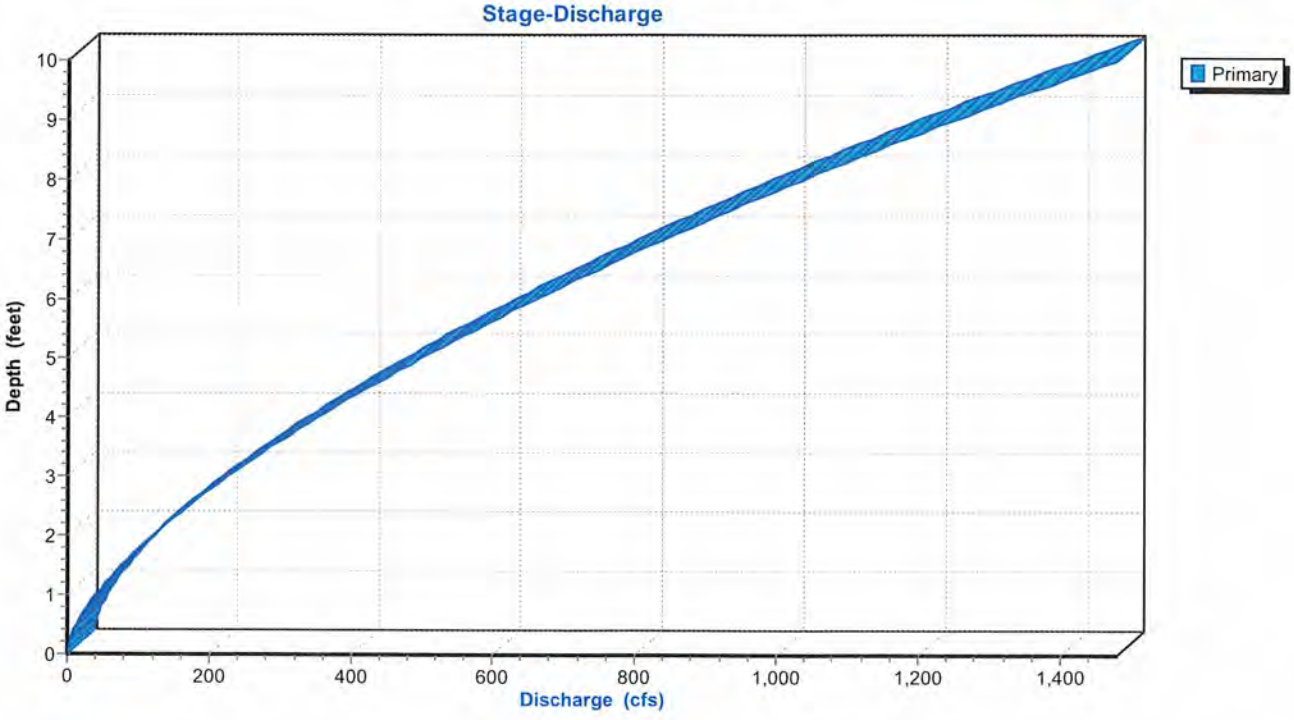
9.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 0.3 '/' Top Width= 15.00'
Length= 380.0' Slope= 0.0097 '/'
Inlet Invert= 408.00', Outlet Invert= 404.31'



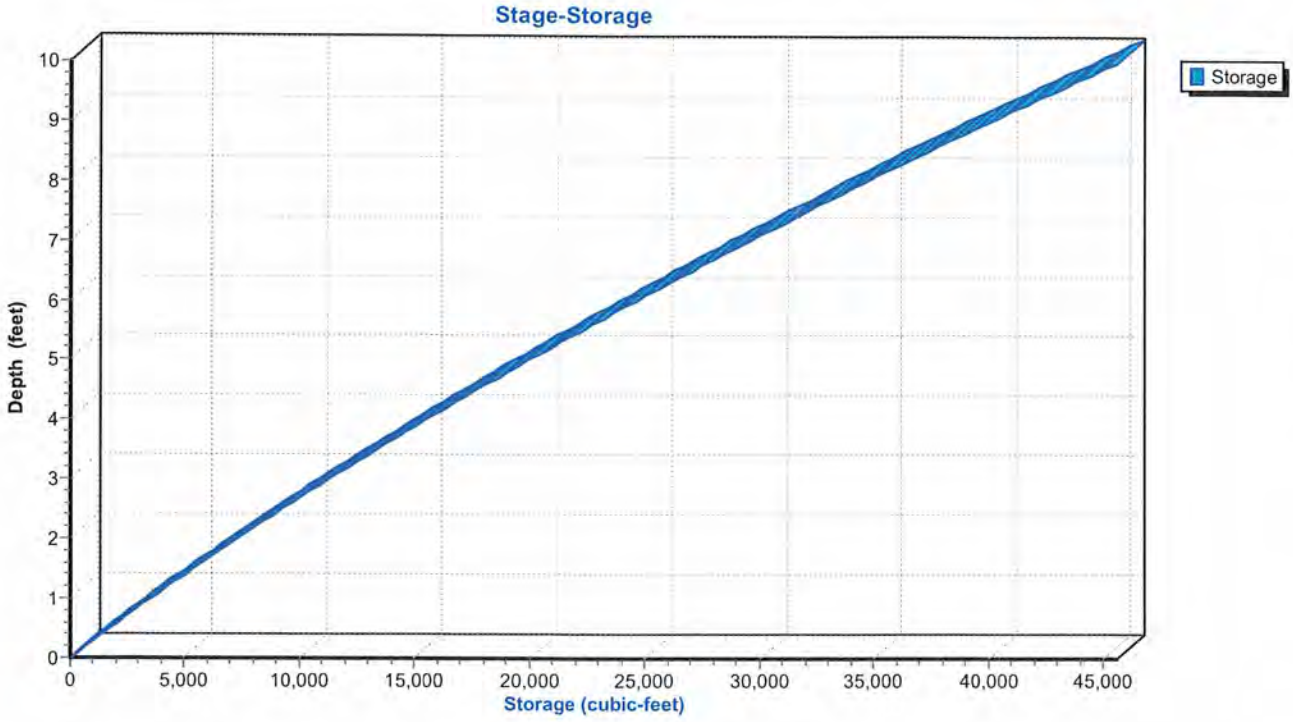
Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Summary for Reach 10R: Concrete Pipe

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 17.560 ac, 62.64% Impervious, Inflow Depth > 2.06" for 10-yr event
Inflow = 23.61 cfs @ 12.43 hrs, Volume= 3.018 af
Outflow = 23.60 cfs @ 12.44 hrs, Volume= 3.017 af, Atten= 0%, Lag= 0.3 min

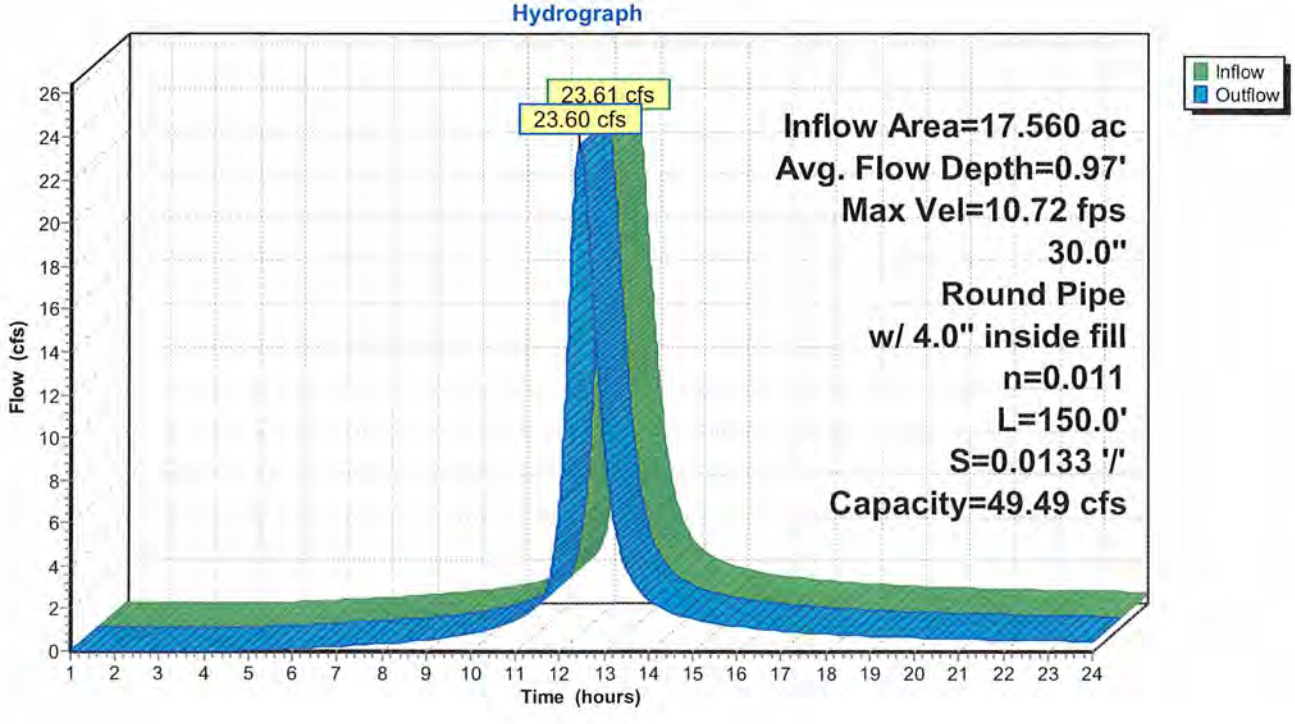
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.72 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.82 fps, Avg. Travel Time= 0.7 min

Peak Storage= 330 cf @ 12.44 hrs
Average Depth at Peak Storage= 1.30' above invert (0.97' above fill)
Bank-Full Depth= 2.50' above invert (2.17' above fill) Flow Area= 4.5 sf, Capacity= 49.49 cfs

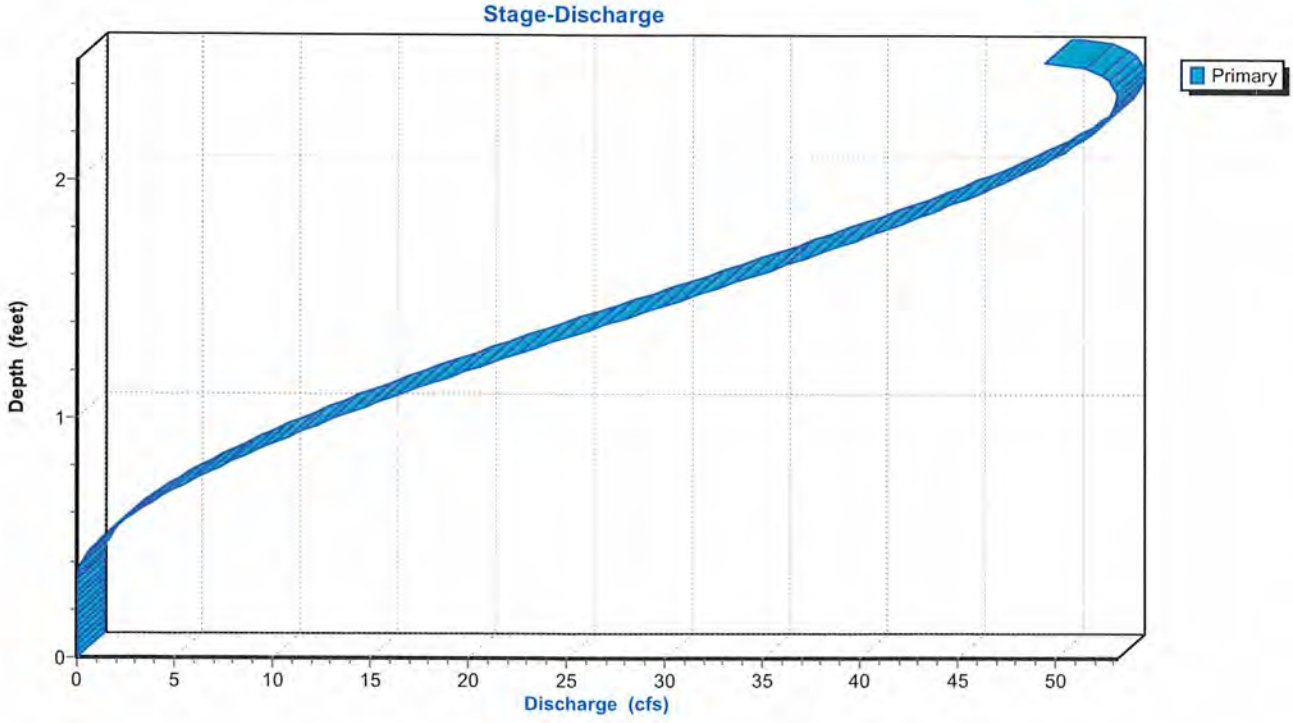
30.0" Round Pipe w/ 4.0" inside fill
n= 0.011 Concrete pipe, finished
Length= 150.0' Slope= 0.0133 '/' (101 Elevation Intervals)
Inlet Invert= 416.00', Outlet Invert= 414.00'



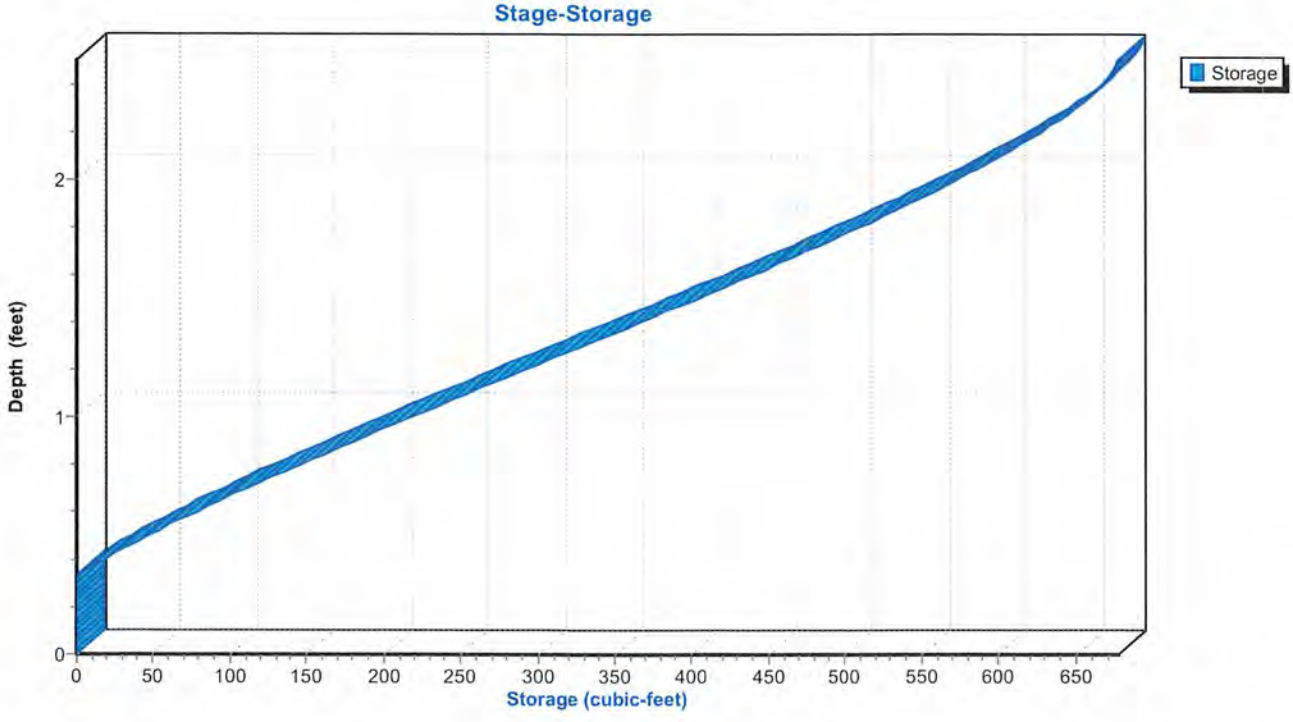
Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 2 Runoff Area=6.300 ac 0.00% Impervious Runoff Depth>1.88"
Flow Length=280' Slope=0.0070 '/' Tc=80.3 min CN=62 Runoff=5.09 cfs 0.988 af

Subcatchment 4S: Subcatchment 3 Runoff Area=3.840 ac 0.00% Impervious Runoff Depth>3.23"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=77 Runoff=6.96 cfs 1.033 af

Subcatchment 5S: Subcatchment 4 Runoff Area=4.060 ac 0.00% Impervious Runoff Depth>0.94"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=49 Runoff=1.70 cfs 0.318 af

Subcatchment 6S: Subcatchment 1 Runoff Area=13.500 ac 81.48% Impervious Runoff Depth>4.92"
Flow Length=2,260' Tc=36.2 min CN=93 Runoff=44.63 cfs 5.530 af

Reach 7R: Small Creek Avg. Flow Depth=1.93' Max Vel=6.58 fps Inflow=50.48 cfs 6.880 af
n=0.030 L=360.0' S=0.0167 '/' Capacity=146.42 cfs Outflow=50.45 cfs 6.876 af

Reach 9R: Butternut Creek Avg. Flow Depth=1.18' Max Vel=4.76 fps Inflow=52.46 cfs 7.863 af
n=0.030 L=380.0' S=0.0097 '/' Capacity=1,479.89 cfs Outflow=52.42 cfs 7.854 af

Reach 10R: Concrete Pipe Avg. Flow Depth=1.59' Max Vel=12.38 fps Inflow=45.29 cfs 5.848 af
30.0" Round Pipe w/ 4.0" inside fill n=0.011 L=150.0' S=0.0133 '/' Capacity=49.49 cfs Outflow=45.27 cfs 5.847 af

Total Runoff Area = 27.700 ac Runoff Volume = 7.868 af Average Runoff Depth = 3.41"
60.29% Pervious = 16.700 ac 39.71% Impervious = 11.000 ac

Summary for Subcatchment 1S: Subcatchment 2

Area closest to butternut creek, between BD and BC.
sheet flow for 100 feet.
shallow channel flow for 180 feet.
380 feet flow in butternut creek.

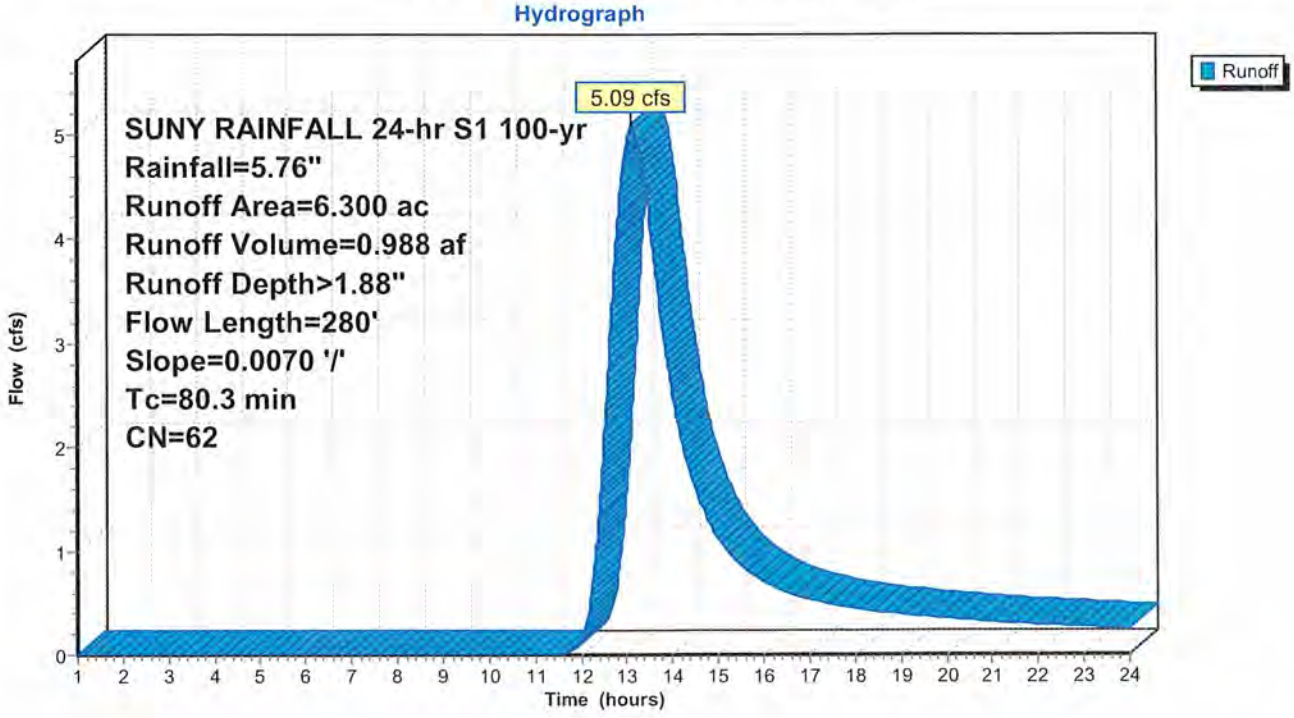
Runoff = 5.09 cfs @ 13.12 hrs, Volume= 0.988 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
4.300	77	Woods, Good, HSG D
2.000	30	Woods, Good, HSG A
6.300	62	Weighted Average
6.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0	100	0.0070	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.38"
14.3	180	0.0070	0.21		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
80.3	280	Total			

Subcatchment 1S: Subcatchment 2



Summary for Subcatchment 4S: Subcatchment 3

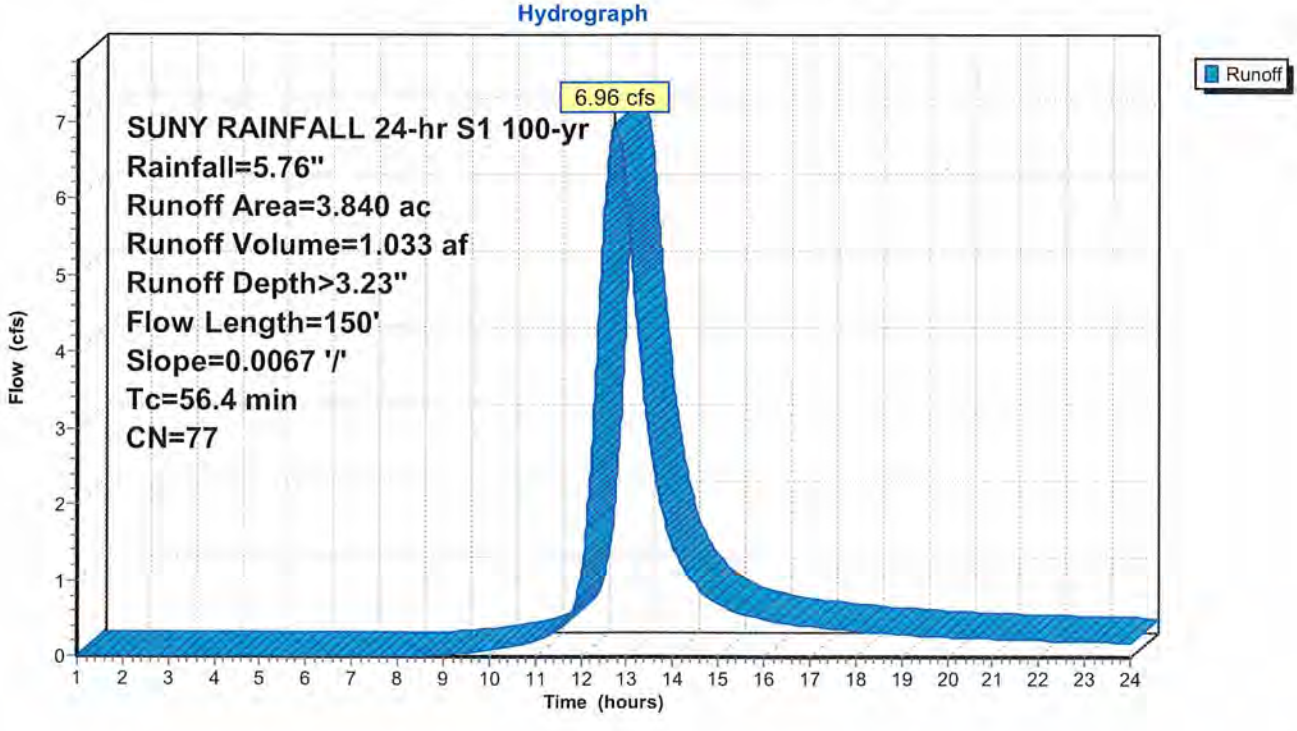
Runoff = 6.96 cfs @ 12.73 hrs, Volume= 1.033 af, Depth> 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
2.300	77	Woods, Good, HSG D
1.540	77	Woods, Good, HSG D
3.840	77	Weighted Average
3.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 4S: Subcatchment 3



Summary for Subcatchment 5S: Subcatchment 4

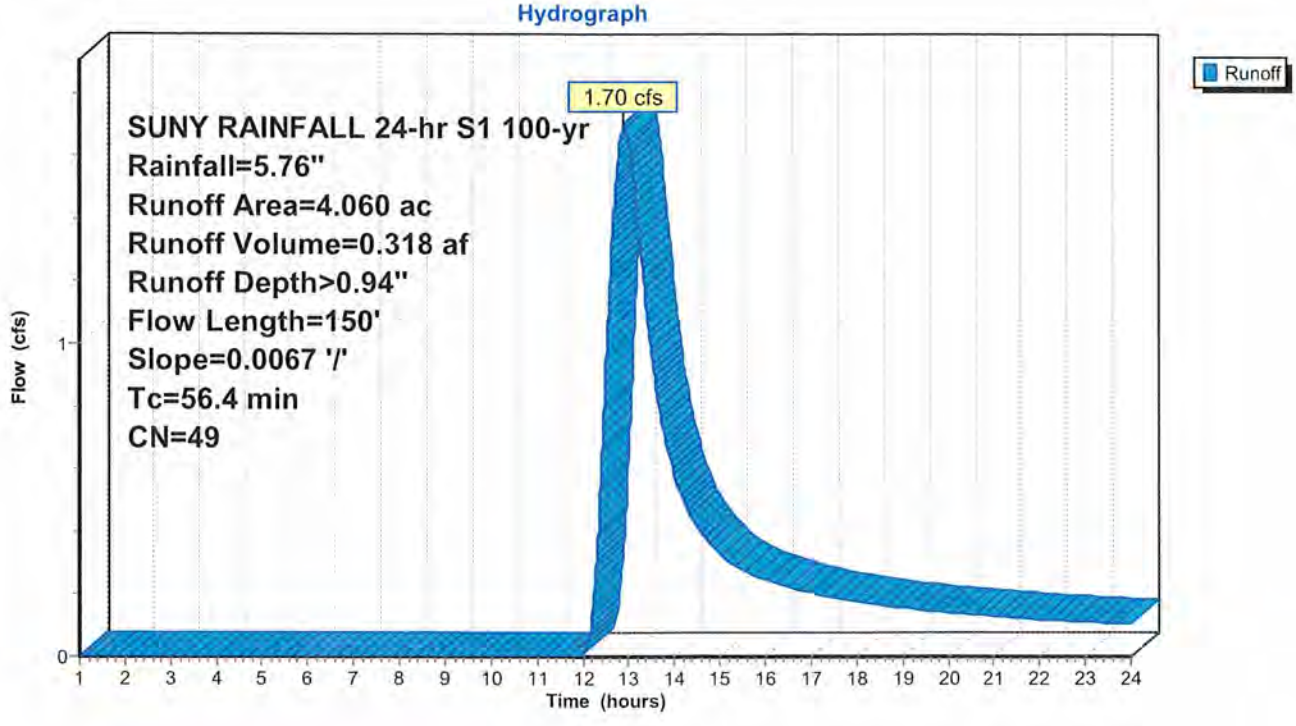
Runoff = 1.70 cfs @ 12.91 hrs, Volume= 0.318 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
4.060	49	50-75% Grass cover, Fair, HSG A
4.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 5S: Subcatchment 4



Summary for Subcatchment 6S: Subcatchment 1

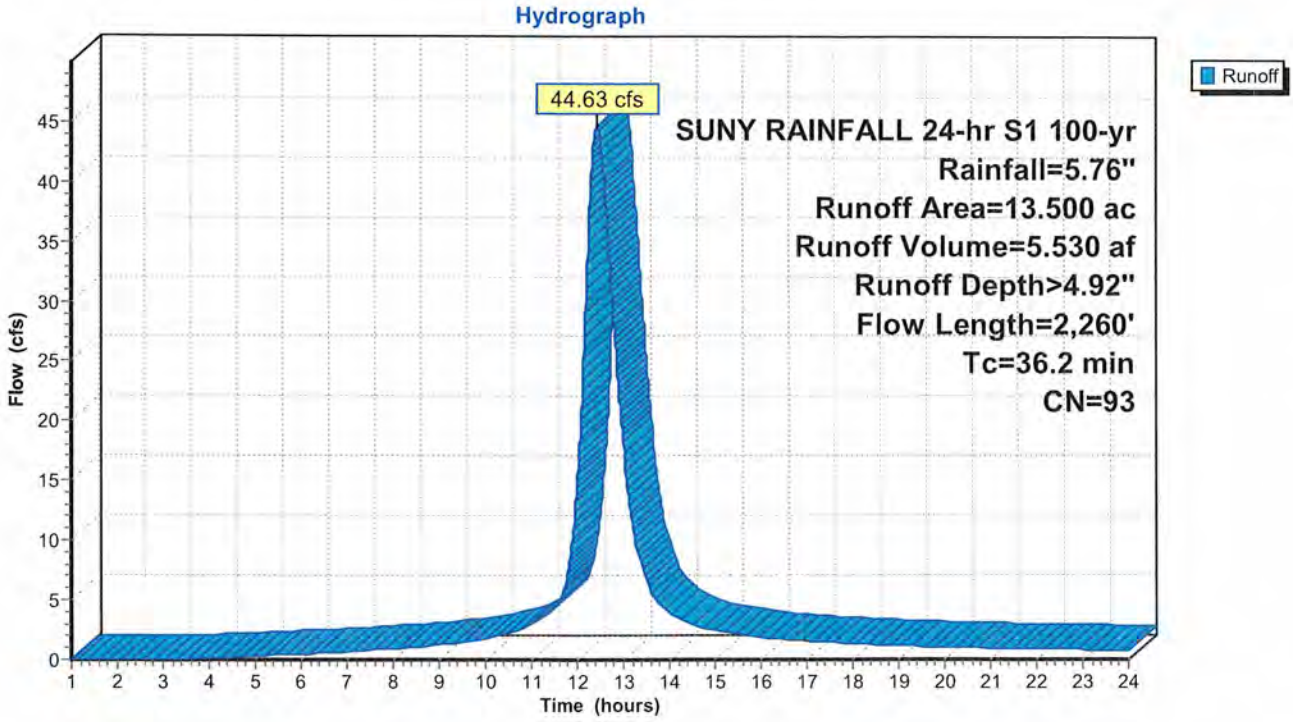
Runoff = 44.63 cfs @ 12.43 hrs, Volume= 5.530 af, Depth> 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
8.500	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
2.700	83	Paved roads w/open ditches, 50% imp, HSG A
0.300	93	Paved roads w/open ditches, 50% imp, HSG D
0.900	68	<50% Grass cover, Poor, HSG A
0.100	89	<50% Grass cover, Poor, HSG D
13.500	93	Weighted Average
2.500		18.52% Pervious Area
11.000		81.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0105	0.08		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.38"
6.8	850	0.0105	2.08		**Shallow Concentrated Flow, Shallow Concentrated** Paved Kv= 20.3 fps
6.2	950	0.0084	2.54	13.56	**Parabolic Channel, Stream** W=4.00' D=2.00' Area=5.3 sf Perim=5.9' n= 0.050 Sluggish weedy reaches w/pools
1.8	360	0.0139	3.35	52.55	**Parabolic Channel, Sluggish Stream W. Side of BN Creek** W=7.25' D=3.25' Area=15.7 sf Perim=10.2' n= 0.070 Sluggish weedy reaches w/pools
36.2	2,260	Total			

Subcatchment 6S: Subcatchment 1



Summary for Reach 7R: Small Creek

[62] Hint: Exceeded Reach 10R OUTLET depth by 0.21' @ 12.95 hrs

Inflow Area = 21.400 ac, 51.40% Impervious, Inflow Depth > 3.86" for 100-yr event
Inflow = 50.48 cfs @ 12.47 hrs, Volume= 6.880 af
Outflow = 50.45 cfs @ 12.49 hrs, Volume= 6.876 af, Atten= 0%, Lag= 0.7 min

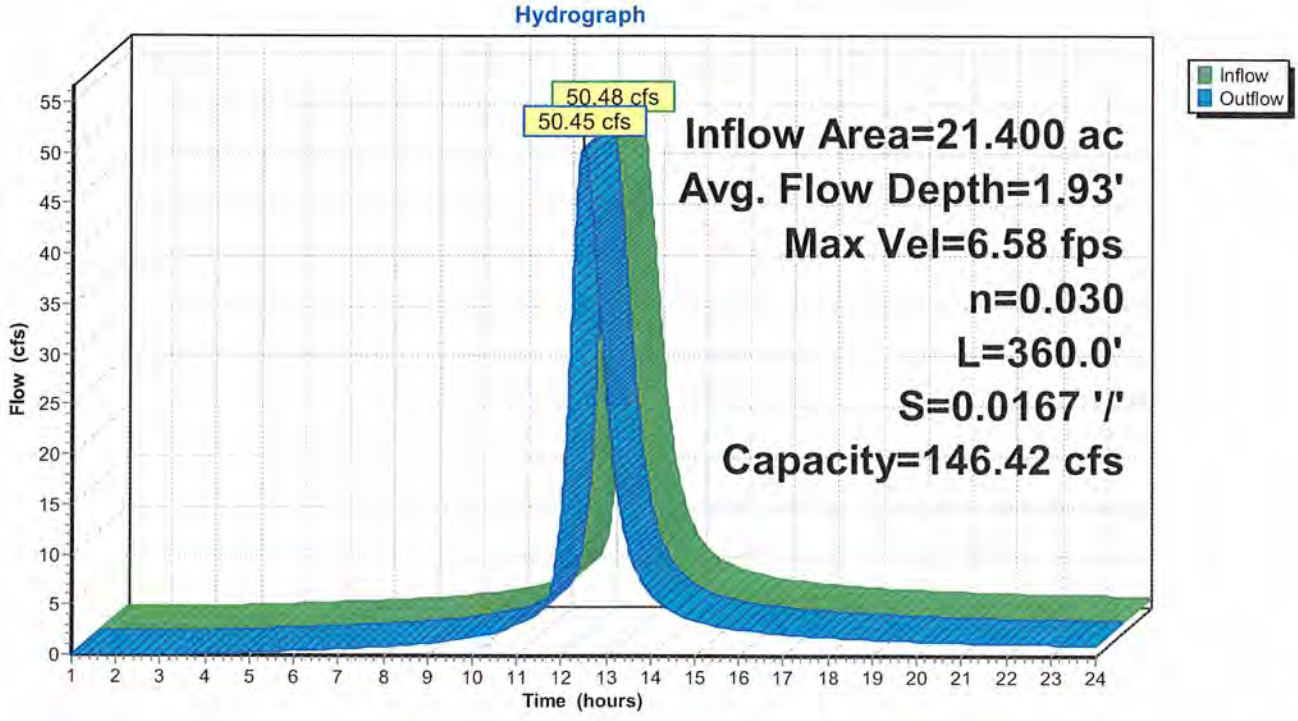
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.58 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 2.57 fps, Avg. Travel Time= 2.3 min

Peak Storage= 2,762 cf @ 12.49 hrs
Average Depth at Peak Storage= 1.93'
Bank-Full Depth= 3.25' Flow Area= 16.8 sf, Capacity= 146.42 cfs

7.75' x 3.25' deep Parabolic Channel, n= 0.030 Earth, dense weeds
Length= 360.0' Slope= 0.0167 '/'
Inlet Invert= 414.00', Outlet Invert= 408.00'

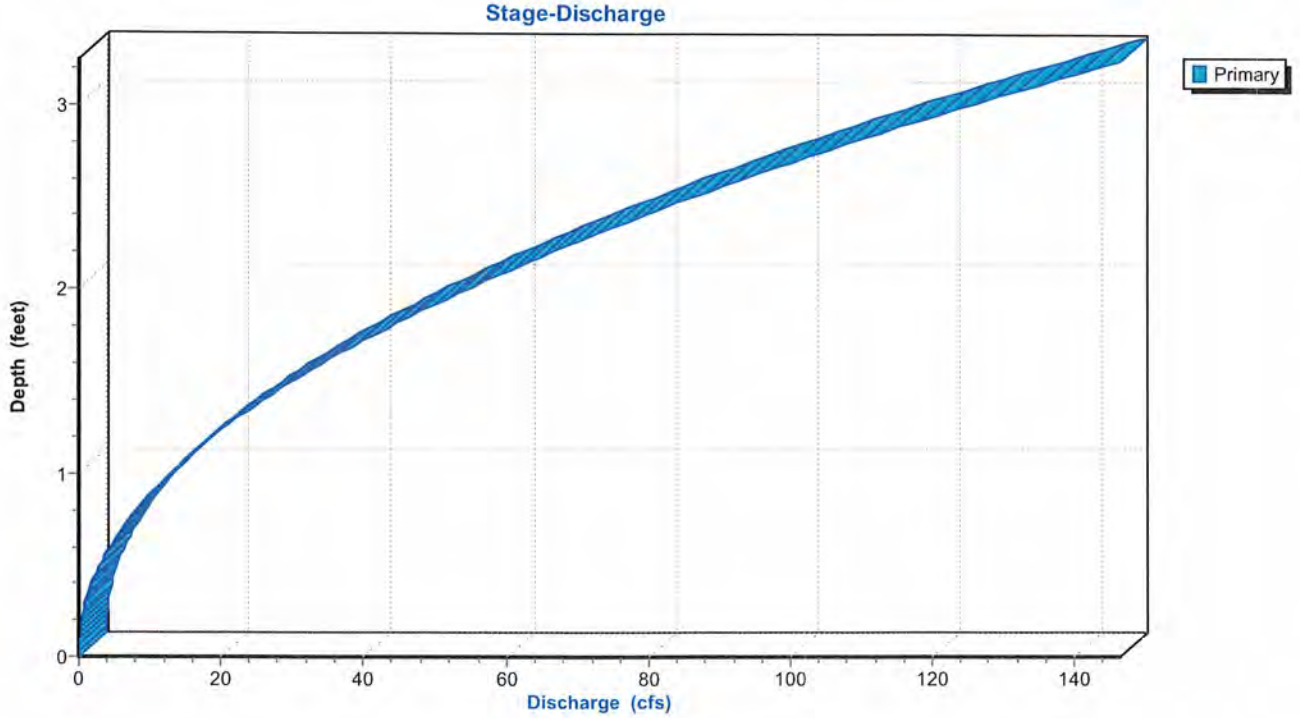


Reach 7R: Small Creek



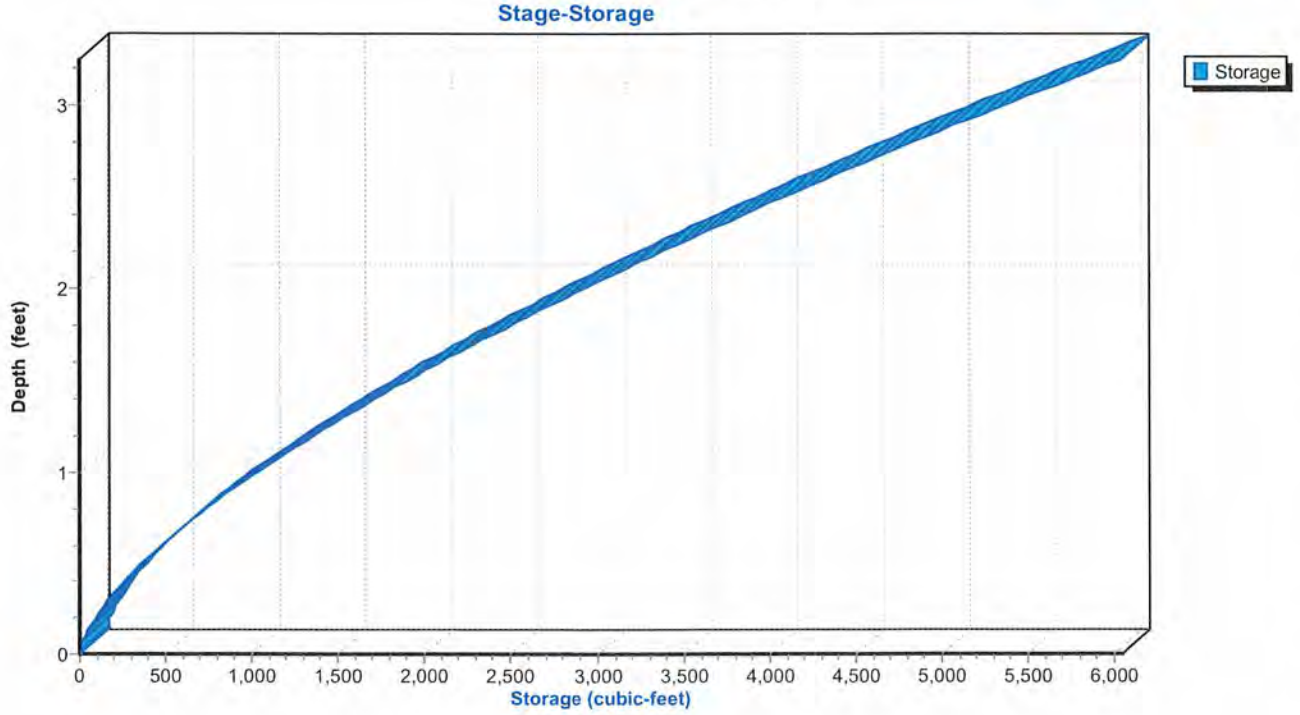
Reach 7R: Small Creek

Stage-Discharge



Reach 7R: Small Creek

Stage-Storage



Summary for Reach 9R: Butternut Creek

[61] Hint: Exceeded Reach 7R outlet invert by 1.18' @ 12.52 hrs

Inflow Area = 27.700 ac, 39.71% Impervious, Inflow Depth > 3.41" for 100-yr event
Inflow = 52.46 cfs @ 12.51 hrs, Volume= 7.863 af
Outflow = 52.42 cfs @ 12.52 hrs, Volume= 7.854 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.76 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.61 fps, Avg. Travel Time= 3.9 min

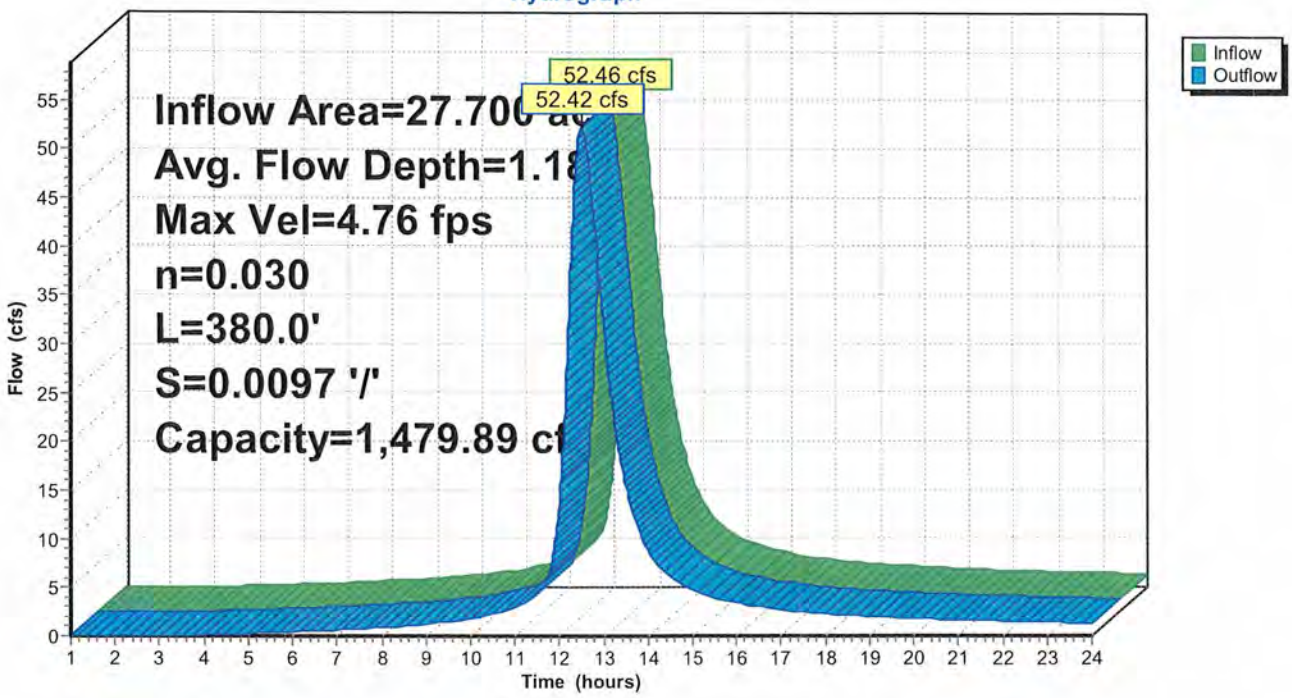
Peak Storage= 4,187 cf @ 12.52 hrs
Average Depth at Peak Storage= 1.18'
Defined Flood Depth= 417.70' Flow Area= 6,223.3 sf, Capacity= 98,716.46 cfs
Bank-Full Depth= 10.00' Flow Area= 120.0 sf, Capacity= 1,479.89 cfs

9.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 0.3 '/' Top Width= 15.00'
Length= 380.0' Slope= 0.0097 '/'
Inlet Invert= 408.00', Outlet Invert= 404.31'



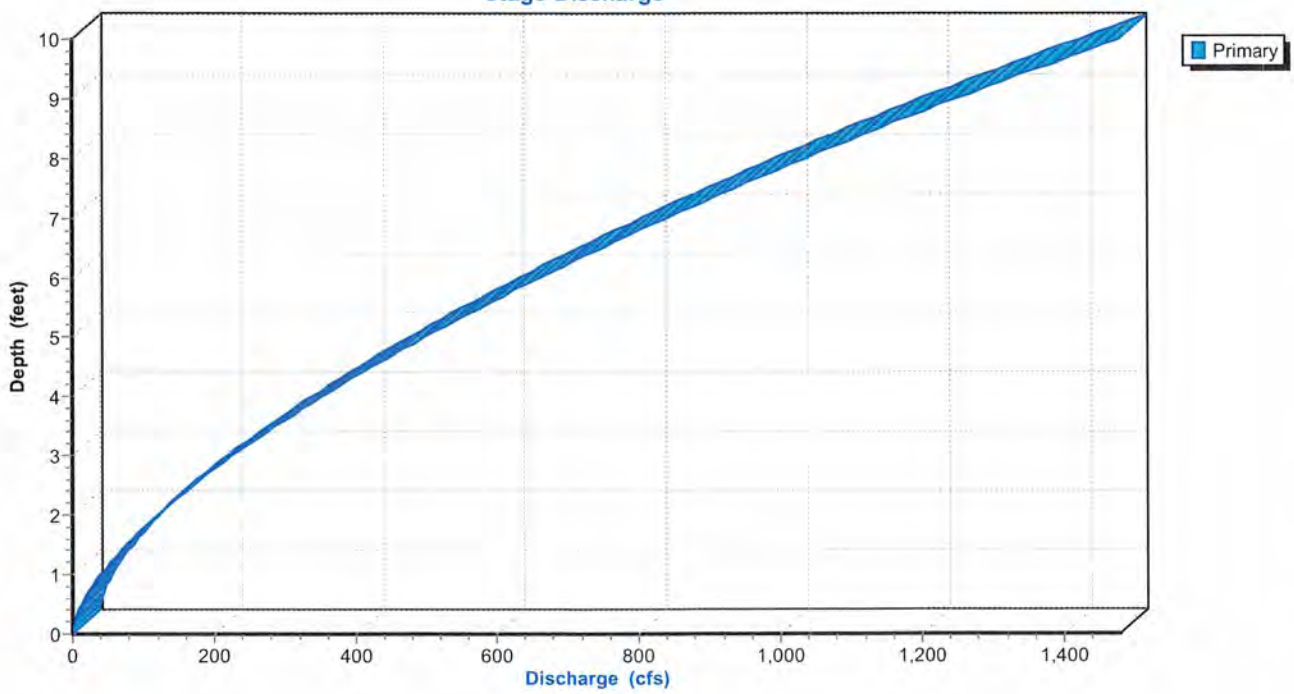
Reach 9R: Butternut Creek

Hydrograph

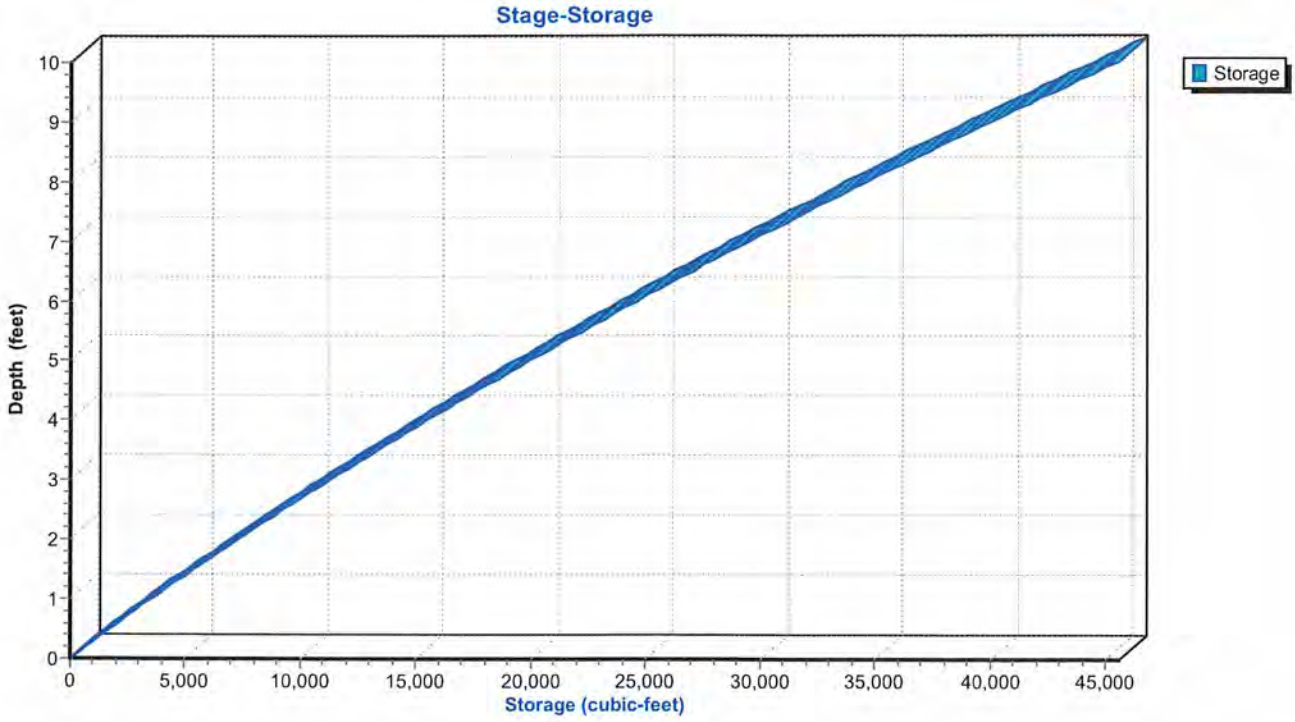


Reach 9R: Butternut Creek

Stage-Discharge



Reach 9R: Butternut Creek



Summary for Reach 10R: Concrete Pipe

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 17.560 ac, 62.64% Impervious, Inflow Depth > 4.00" for 100-yr event
Inflow = 45.29 cfs @ 12.43 hrs, Volume= 5.848 af
Outflow = 45.27 cfs @ 12.44 hrs, Volume= 5.847 af, Atten= 0%, Lag= 0.3 min

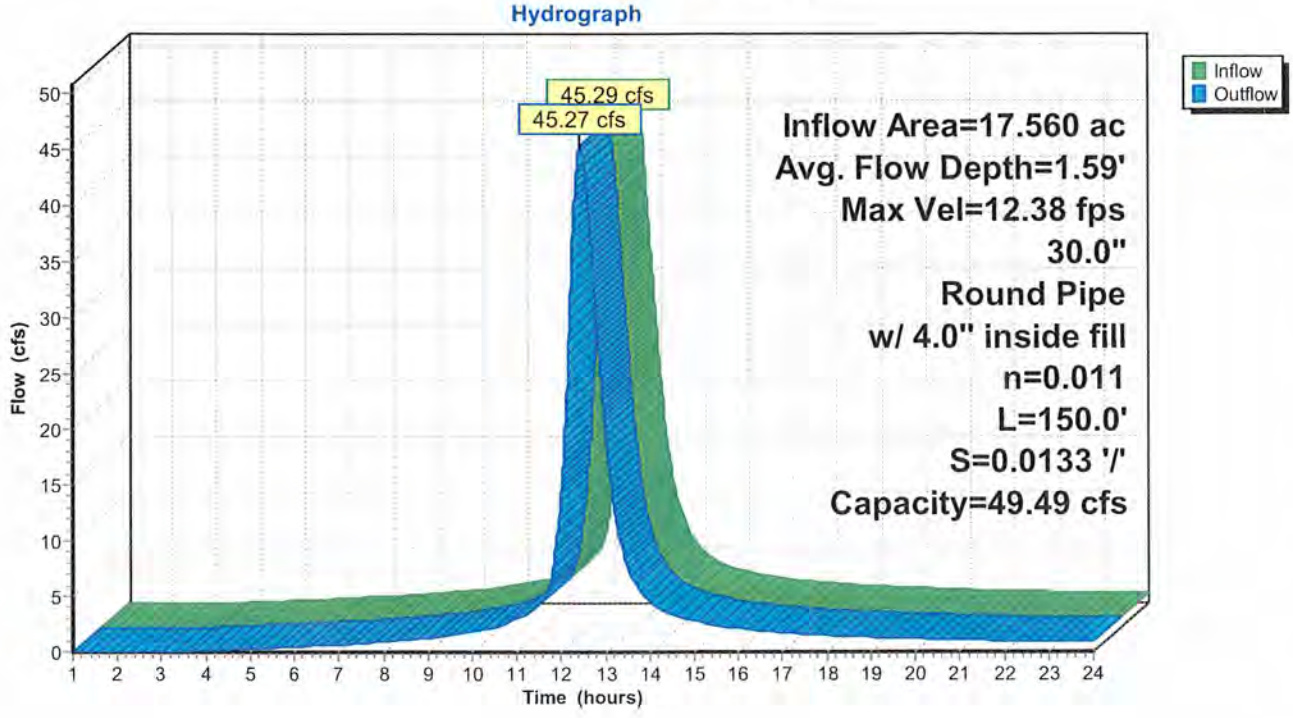
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 12.38 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.61 fps, Avg. Travel Time= 0.5 min

Peak Storage= 549 cf @ 12.44 hrs
Average Depth at Peak Storage= 1.92' above invert (1.59' above fill)
Bank-Full Depth= 2.50' above invert (2.17' above fill) Flow Area= 4.5 sf, Capacity= 49.49 cfs

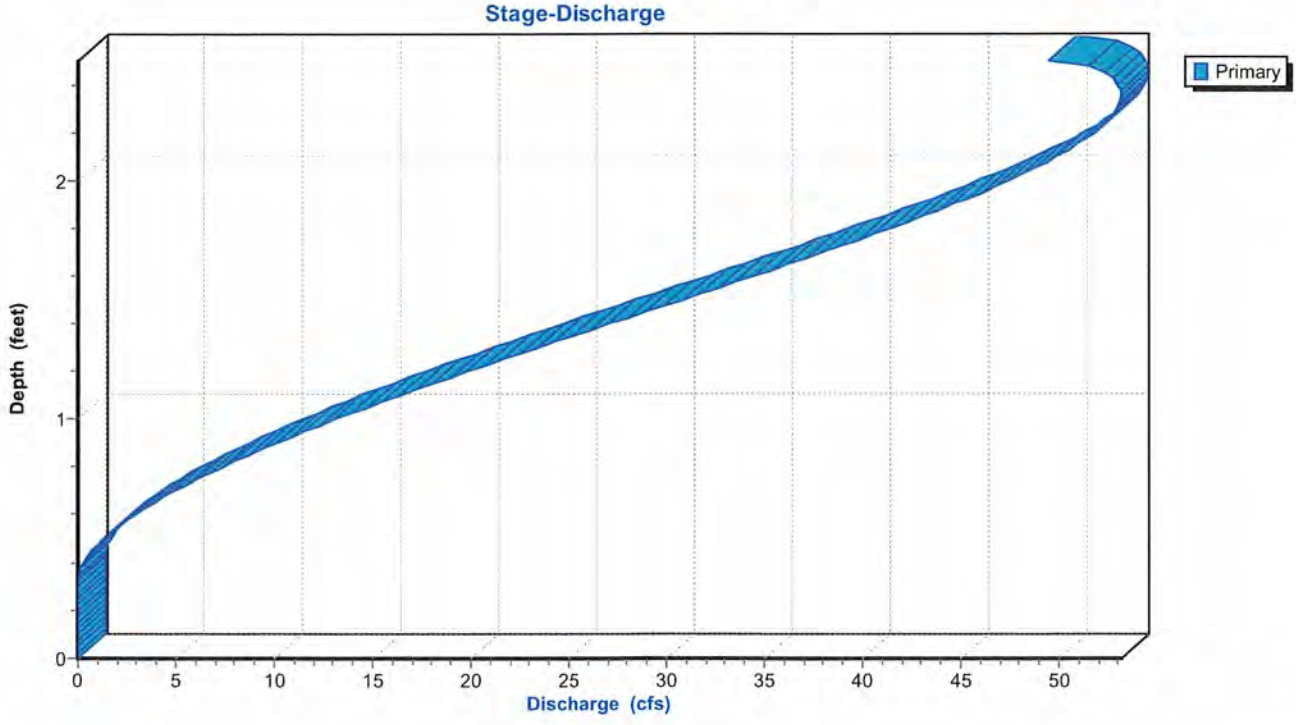
30.0" Round Pipe w/ 4.0" inside fill
n= 0.011 Concrete pipe, finished
Length= 150.0' Slope= 0.0133 '/' (101 Elevation Intervals)
Inlet Invert= 416.00', Outlet Invert= 414.00'



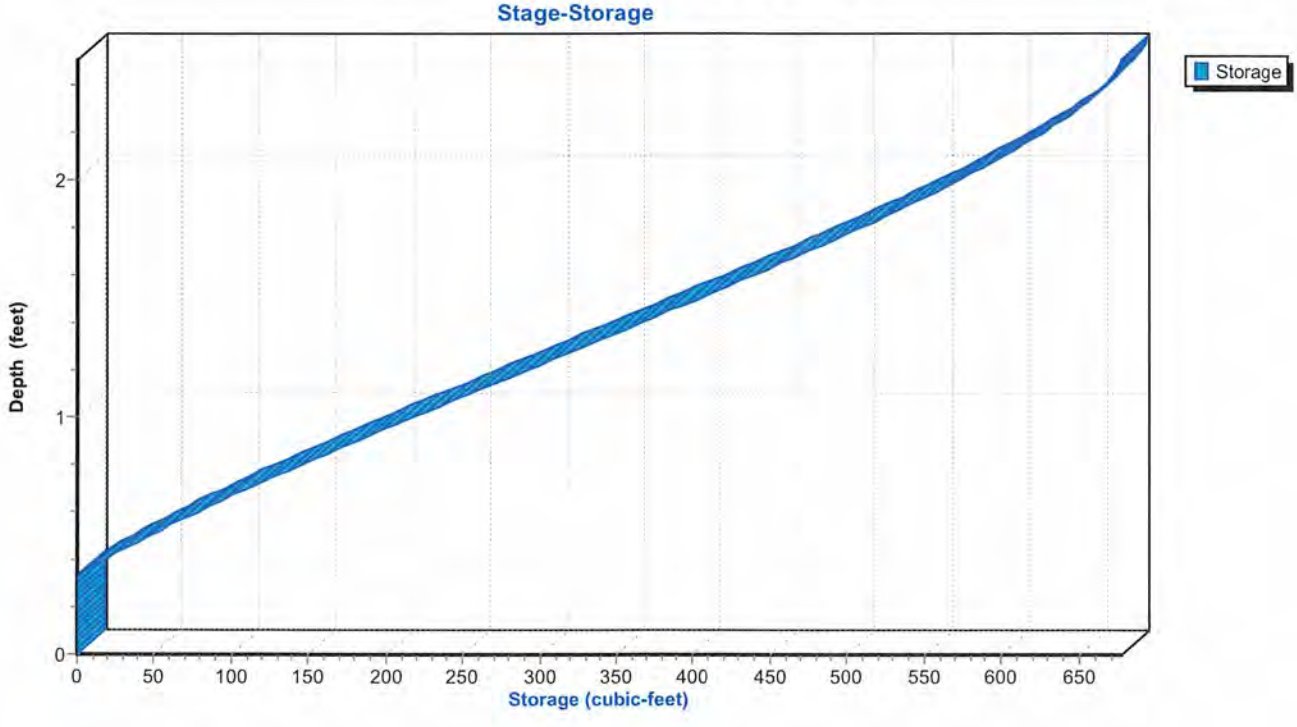
Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe

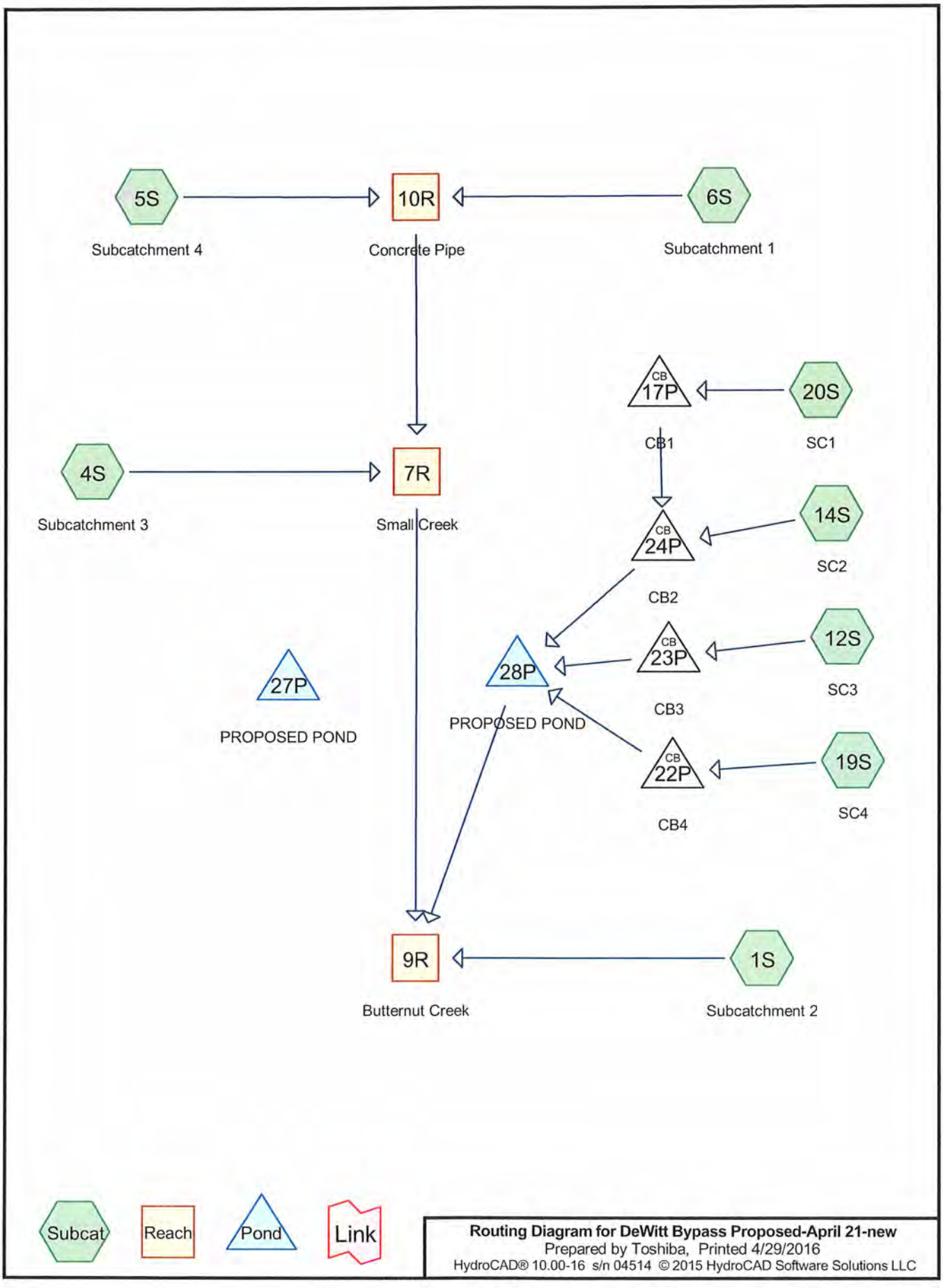


Reach 10R: Concrete Pipe



APPENDIX

3



Routing Diagram for DeWitt Bypass Proposed-April 21-new
Prepared by Toshiba, Printed 4/29/2016
HydroCAD® 10.00-16 s/n 04514 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.060	49	50-75% Grass cover, Fair, HSG A (5S)
0.900	68	<50% Grass cover, Poor, HSG A (6S)
0.100	89	<50% Grass cover, Poor, HSG D (6S)
7.650	98	Paved parking, HSG A (6S)
0.900	98	Paved parking, HSG D (6S)
4.721	98	Paved roads w/curbs & sewers, HSG D (12S, 14S, 19S, 20S)
2.700	83	Paved roads w/open ditches, 50% imp, HSG A (6S)
0.300	93	Paved roads w/open ditches, 50% imp, HSG D (6S)
0.910	30	Woods, Good, HSG A (1S)
5.460	77	Woods, Good, HSG D (1S, 4S)
27.701	**82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
16.220	HSG A	1S, 5S, 6S
0.000	HSG B	
0.000	HSG C	
11.481	HSG D	1S, 4S, 6S, 12S, 14S, 19S, 20S
0.000	Other	
27.701		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchm Numbers
4.060	0.000	0.000	0.000	0.000	4.060	50-75% Grass cover, Fair	5S
0.900	0.000	0.000	0.100	0.000	1.000	<50% Grass cover, Poor	6S
7.650	0.000	0.000	0.900	0.000	8.550	Paved parking	6S
0.000	0.000	0.000	4.721	0.000	4.721	Paved roads w/curbs & sewers	12S, 14S, 19S, 20S
2.700	0.000	0.000	0.300	0.000	3.000	Paved roads w/open ditches, 50% imp	6S
0.910	0.000	0.000	5.460	0.000	6.370	Woods, Good	1S, 4S
16.220	**0.000**	**0.000**	**11.481**	**0.000**	**27.701**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	10R	416.00	414.00	150.0	0.0133	0.011	30.0	0.0	4.0
2	17P	419.81	419.05	150.0	0.0051	0.011	12.0	0.0	0.0
3	22P	419.63	418.94	138.0	0.0050	0.011	12.0	0.0	0.0
4	23P	418.45	416.00	129.0	0.0190	0.015	12.0	0.0	0.0
5	24P	419.05	418.31	87.0	0.0085	0.011	24.0	0.0	0.0
6	27P	411.00	410.00	200.0	0.0050	0.011	12.0	0.0	0.0
7	28P	411.00	410.00	200.0	0.0050	0.011	12.0	0.0	0.0

Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 2 Runoff Area=3.000 ac 0.00% Impervious Runoff Depth>0.10"
Flow Length=280' Slope=0.0070 '/' Tc=80.3 min CN=63 Runoff=0.05 cfs 0.026 af

Subcatchment 4S: Subcatchment 3 Runoff Area=3.370 ac 0.00% Impervious Runoff Depth>0.46"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=77 Runoff=0.68 cfs 0.129 af

Subcatchment 5S: Subcatchment 4 Runoff Area=4.060 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=49 Runoff=0.00 cfs 0.000 af

Subcatchment 6S: Subcatchment 1 Runoff Area=12.550 ac 80.08% Impervious Runoff Depth>1.26"
Flow Length=2,260' Tc=36.2 min CN=92 Runoff=10.38 cfs 1.319 af

Subcatchment 12S: SC3 Runoff Area=1.288 ac 100.00% Impervious Runoff Depth>1.81"
Flow Length=1,245' Tc=10.3 min CN=98 Runoff=2.69 cfs 0.194 af

Subcatchment 14S: SC2 Runoff Area=1.736 ac 100.00% Impervious Runoff Depth>1.81"
Flow Length=1,196' Slope=0.0033 '/' Tc=18.6 min CN=98 Runoff=2.72 cfs 0.261 af

Subcatchment 19S: SC4 Runoff Area=1.044 ac 100.00% Impervious Runoff Depth>1.81"
Flow Length=804' Slope=0.0018 '/' Tc=17.3 min CN=98 Runoff=1.70 cfs 0.157 af

Subcatchment 20S: SC1 Runoff Area=0.653 ac 100.00% Impervious Runoff Depth>1.81"
Flow Length=255' Slope=0.0073 '/' Tc=3.6 min CN=98 Runoff=1.88 cfs 0.099 af

Reach 7R: Small Creek Avg. Flow Depth=0.92' Max Vel=4.27 fps Inflow=10.75 cfs 1.448 af
n=0.030 L=360.0' S=0.0167 '/' Capacity=146.42 cfs Outflow=10.73 cfs 1.446 af

Reach 9R: Butternut Creek Avg. Flow Depth=0.44' Max Vel=2.70 fps Inflow=11.00 cfs 1.788 af
n=0.030 L=380.0' S=0.0097 '/' Capacity=1,479.89 cfs Outflow=10.97 cfs 1.783 af

Reach 10R: Concrete Pipe Avg. Flow Depth=0.58' Max Vel=8.46 fps Inflow=10.38 cfs 1.319 af
30.0" Round Pipe w/ 4.0" inside fill n=0.011 L=150.0' S=0.0133 '/' Capacity=49.49 cfs Outflow=10.37 cfs 1.319 af

Pond 17P: CB1 Peak Elev=420.62' Inflow=1.88 cfs 0.099 af
12.0" Round Culvert n=0.011 L=150.0' S=0.0051 '/' Outflow=1.88 cfs 0.099 af

Pond 22P: CB4 Peak Elev=420.39' Inflow=1.70 cfs 0.157 af
12.0" Round Culvert n=0.011 L=138.0' S=0.0050 '/' Outflow=1.70 cfs 0.157 af

Pond 23P: CB3 Peak Elev=419.45' Inflow=2.69 cfs 0.194 af
12.0" Round Culvert n=0.015 L=129.0' S=0.0190 '/' Outflow=2.69 cfs 0.194 af

Pond 24P: CB2 Peak Elev=419.80' Inflow=3.20 cfs 0.360 af
24.0" Round Culvert n=0.011 L=87.0' S=0.0085 '/' Outflow=3.20 cfs 0.360 af

Pond 27P: PROPOSED POND Peak Elev=0.00' Storage=0.000 af
Primary=0.00 cfs 0.000 af

Pond 28P: PROPOSED POND Peak Elev=412.69' Storage=1.108 af Inflow=7.17 cfs 0.712 af
Outflow=0.30 cfs 0.316 af

Total Runoff Area = 27.701 ac Runoff Volume = 2.186 af Average Runoff Depth = 0.95"
46.68% Pervious = 12.930 ac 53.32% Impervious = 14.771 ac

Summary for Subcatchment 1S: Subcatchment 2

Area closest to butternut creek, between BD and BC.
sheet flow for 100 feet.
shallow channel flow for 180 feet.
380 feet flow in butternut creek.

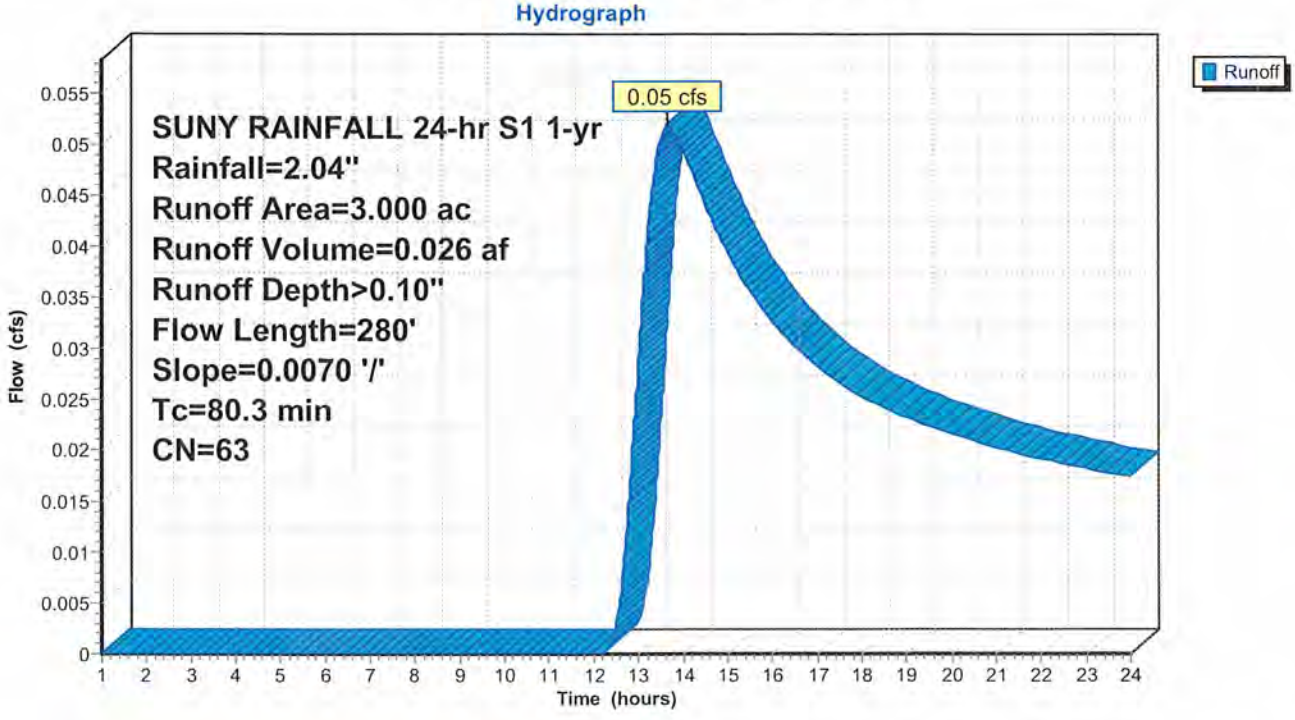
Runoff = 0.05 cfs @ 13.65 hrs, Volume= 0.026 af, Depth> 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
2.090	77	Woods, Good, HSG D
0.910	30	Woods, Good, HSG A
3.000	63	Weighted Average
3.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0	100	0.0070	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.38"
14.3	180	0.0070	0.21		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
80.3	280	Total			

Subcatchment 1S: Subcatchment 2



Summary for Subcatchment 4S: Subcatchment 3

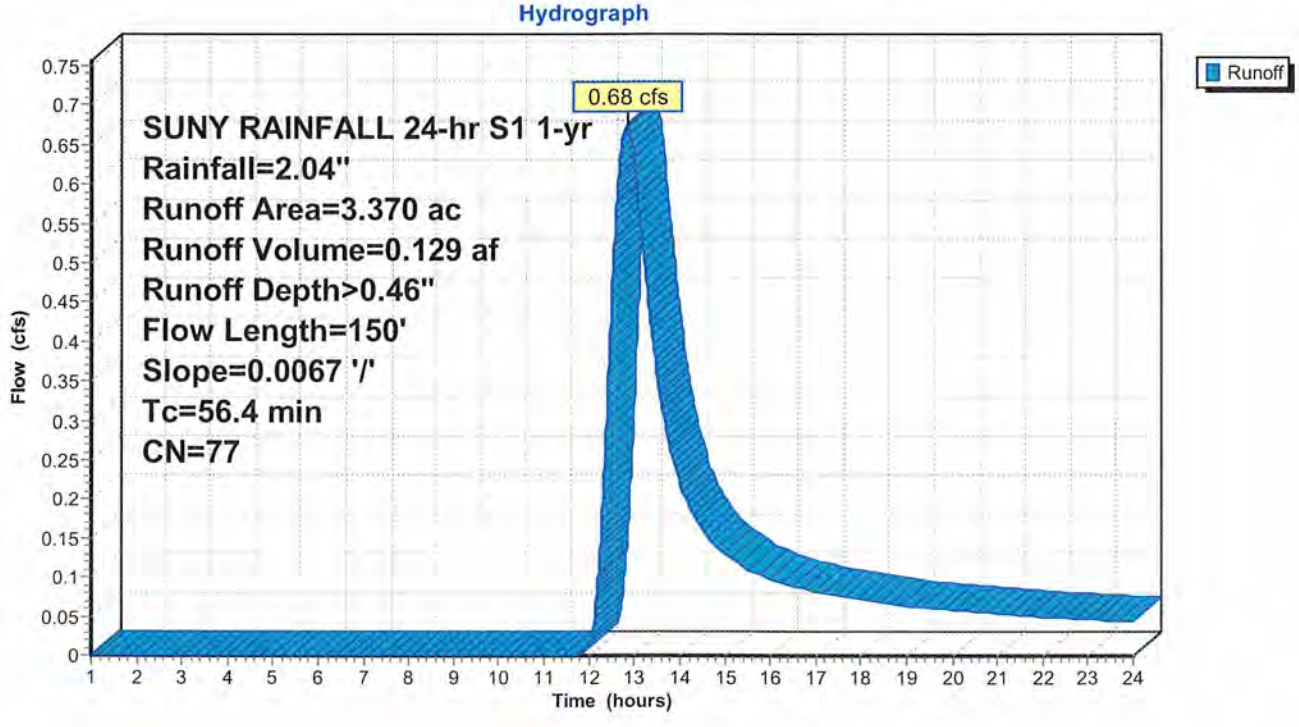
Runoff = 0.68 cfs @ 12.85 hrs, Volume= 0.129 af, Depth> 0.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
2.000	77	Woods, Good, HSG D
1.370	77	Woods, Good, HSG D
3.370	77	Weighted Average
3.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 4S: Subcatchment 3



Summary for Subcatchment 5S: Subcatchment 4

[45] Hint: Runoff=Zero

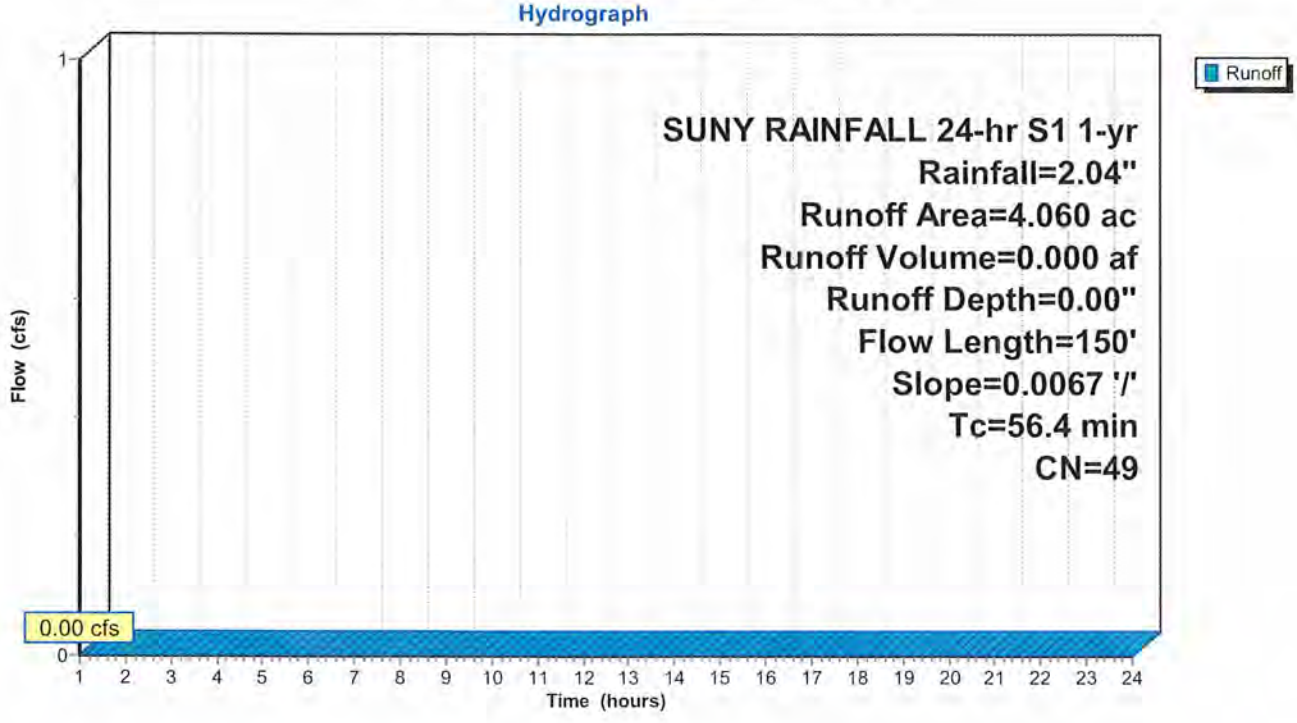
Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
4.060	49	50-75% Grass cover, Fair, HSG A
4.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 5S: Subcatchment 4



Summary for Subcatchment 6S: Subcatchment 1

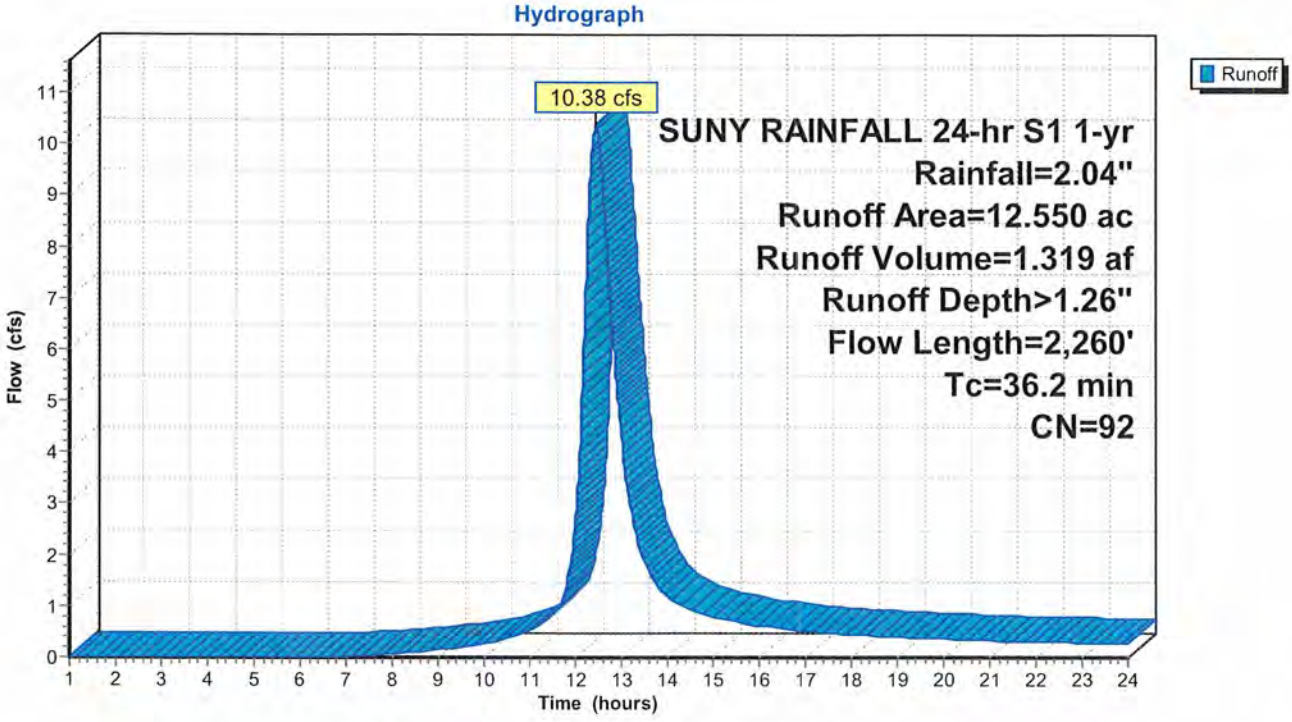
Runoff = 10.38 cfs @ 12.43 hrs, Volume= 1.319 af, Depth> 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
7.650	98	Paved parking, HSG A
0.900	98	Paved parking, HSG D
2.700	83	Paved roads w/open ditches, 50% imp, HSG A
0.300	93	Paved roads w/open ditches, 50% imp, HSG D
0.900	68	<50% Grass cover, Poor, HSG A
0.100	89	<50% Grass cover, Poor, HSG D
12.550	92	Weighted Average
2.500		19.92% Pervious Area
10.050		80.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0105	0.08		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.38"
6.8	850	0.0105	2.08		**Shallow Concentrated Flow, Shallow Concentrated** Paved Kv= 20.3 fps
6.2	950	0.0084	2.54	13.56	**Parabolic Channel, Stream** W=4.00' D=2.00' Area=5.3 sf Perim=5.9' n= 0.050 Sluggish weedy reaches w/pools
1.8	360	0.0139	3.35	52.55	**Parabolic Channel, Sluggish Stream W. Side of BN Creek** W=7.25' D=3.25' Area=15.7 sf Perim=10.2' n= 0.070 Sluggish weedy reaches w/pools
36.2	2,260	Total			

Subcatchment 6S: Subcatchment 1



Summary for Subcatchment 12S: SC3

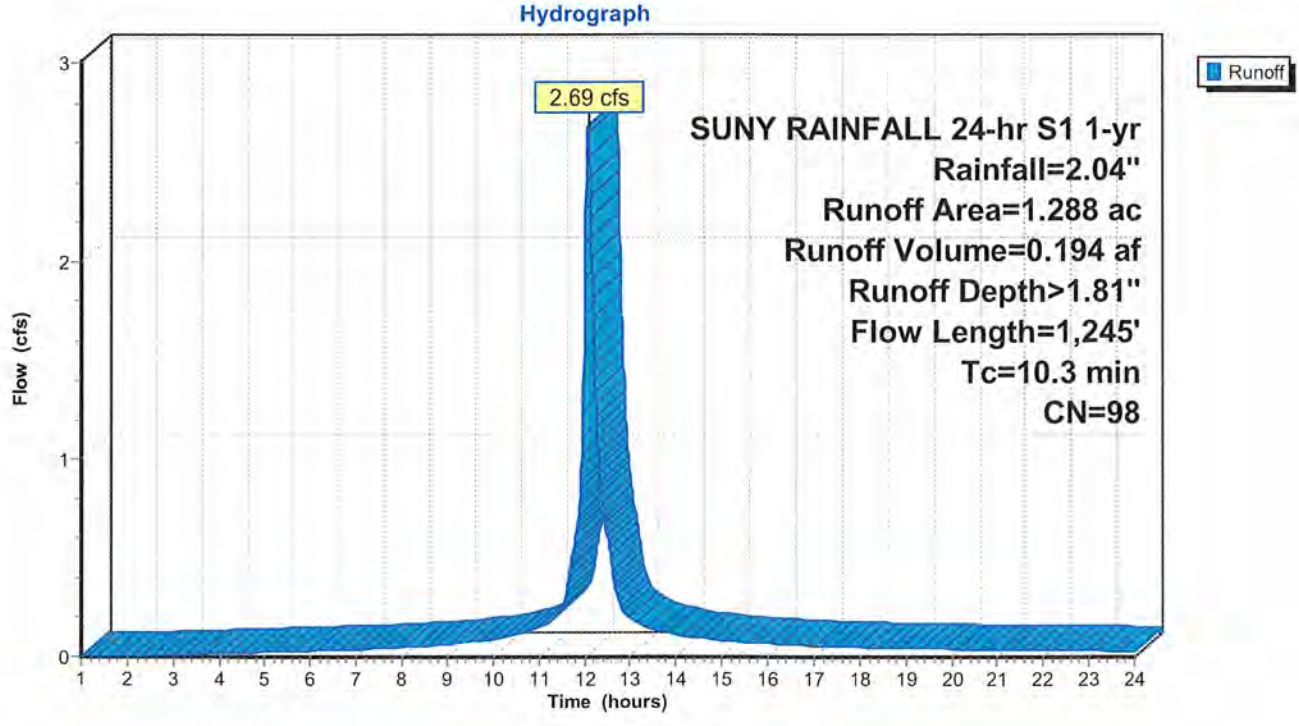
Runoff = 2.69 cfs @ 12.09 hrs, Volume= 0.194 af, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
1.288	98	Paved roads w/curbs & sewers, HSG D
1.288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	100	0.0070	0.78		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
8.2	1,145	0.0133	2.34		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.3	1,245	Total			

Subcatchment 12S: SC3



Summary for Subcatchment 14S: SC2

Combined nodes 9,10,5 &4

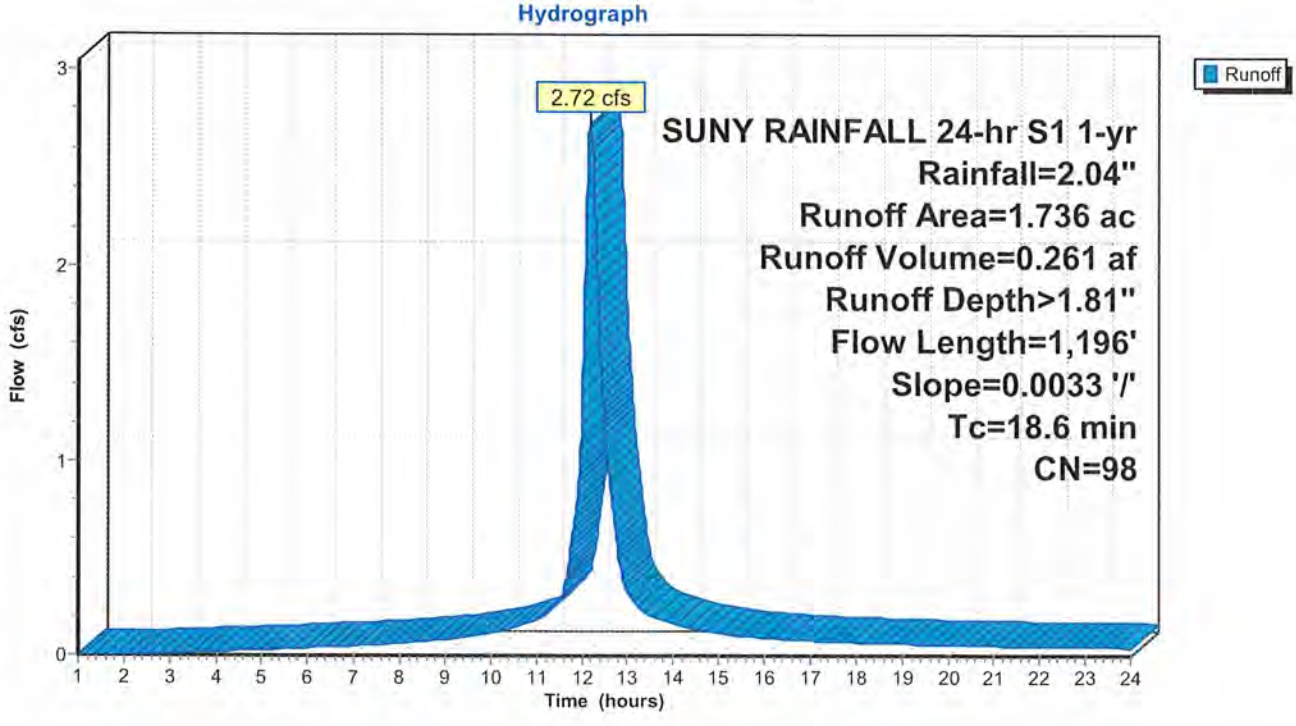
Runoff = 2.72 cfs @ 12.20 hrs, Volume= 0.261 af, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
1.736	98	Paved roads w/curbs & sewers, HSG D
1.736		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	100	0.0033	0.58		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
15.7	1,096	0.0033	1.17		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.6	1,196	Total			

Subcatchment 14S: SC2



Summary for Subcatchment 19S: SC4

Combined nodes 2&3

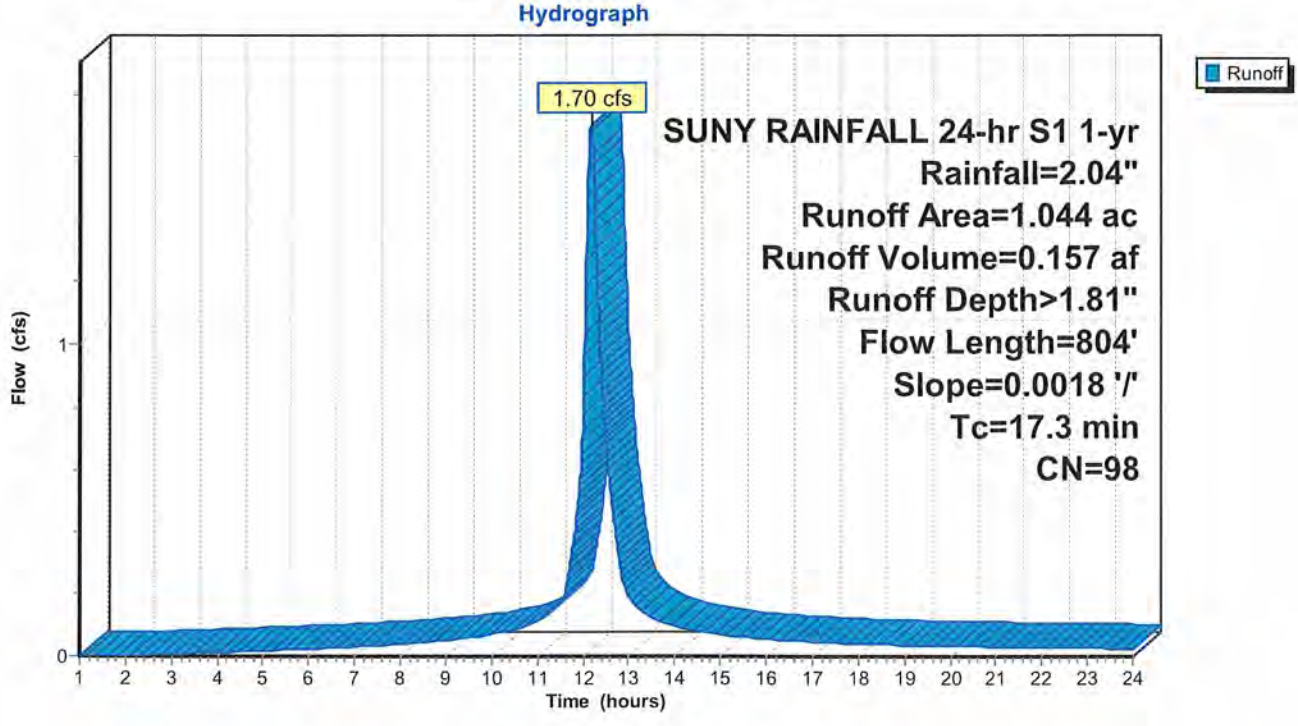
Runoff = 1.70 cfs @ 12.18 hrs, Volume= 0.157 af, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
1.044	98	Paved roads w/curbs & sewers, HSG D
1.044		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	100	0.0018	0.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
13.6	704	0.0018	0.86		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
17.3	804	Total			

Subcatchment 19S: SC4



Summary for Subcatchment 20S: SC1

Combined nodes 1&6

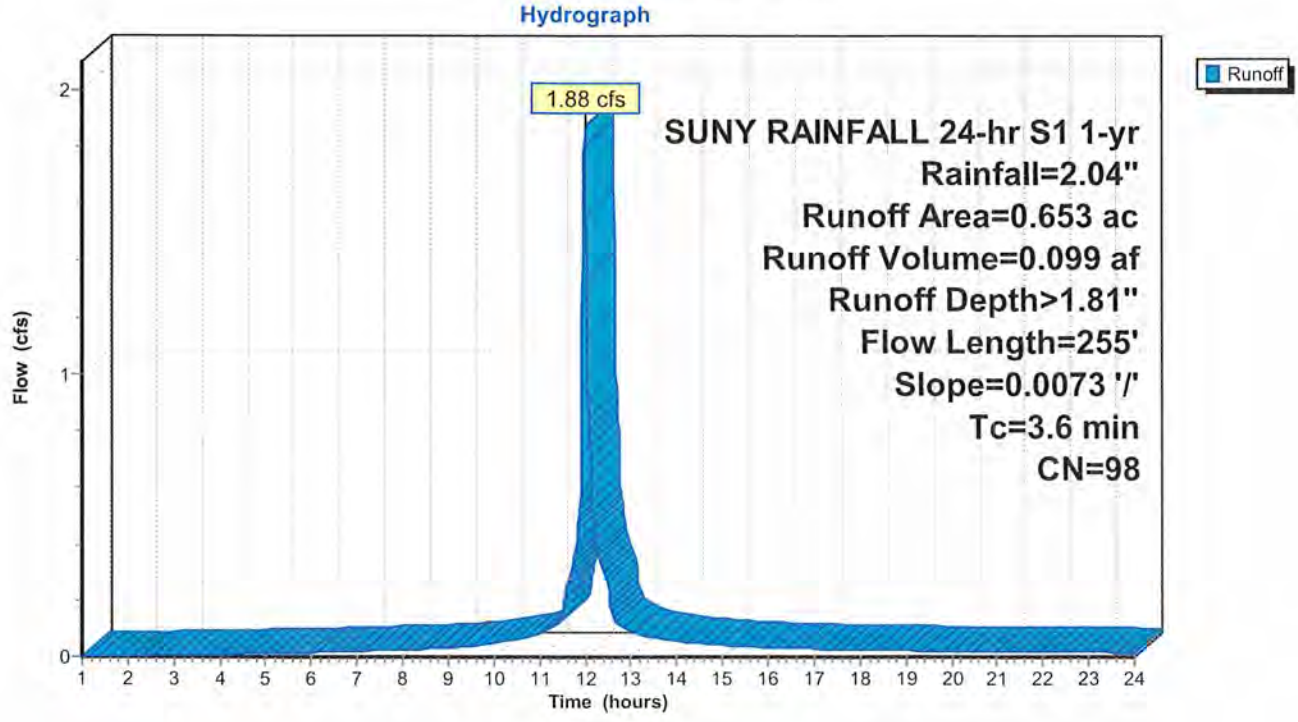
Runoff = 1.88 cfs @ 12.01 hrs, Volume= 0.099 af, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 1-yr Rainfall=2.04"

Area (ac)	CN	Description
0.653	98	Paved roads w/curbs & sewers, HSG D
0.653		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	100	0.0073	0.79		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
1.5	155	0.0073	1.73		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.6	255	Total			

Subcatchment 20S: SC1



Summary for Reach 7R: Small Creek

[62] Hint: Exceeded Reach 10R OUTLET depth by 0.02' @ 12.62 hrs

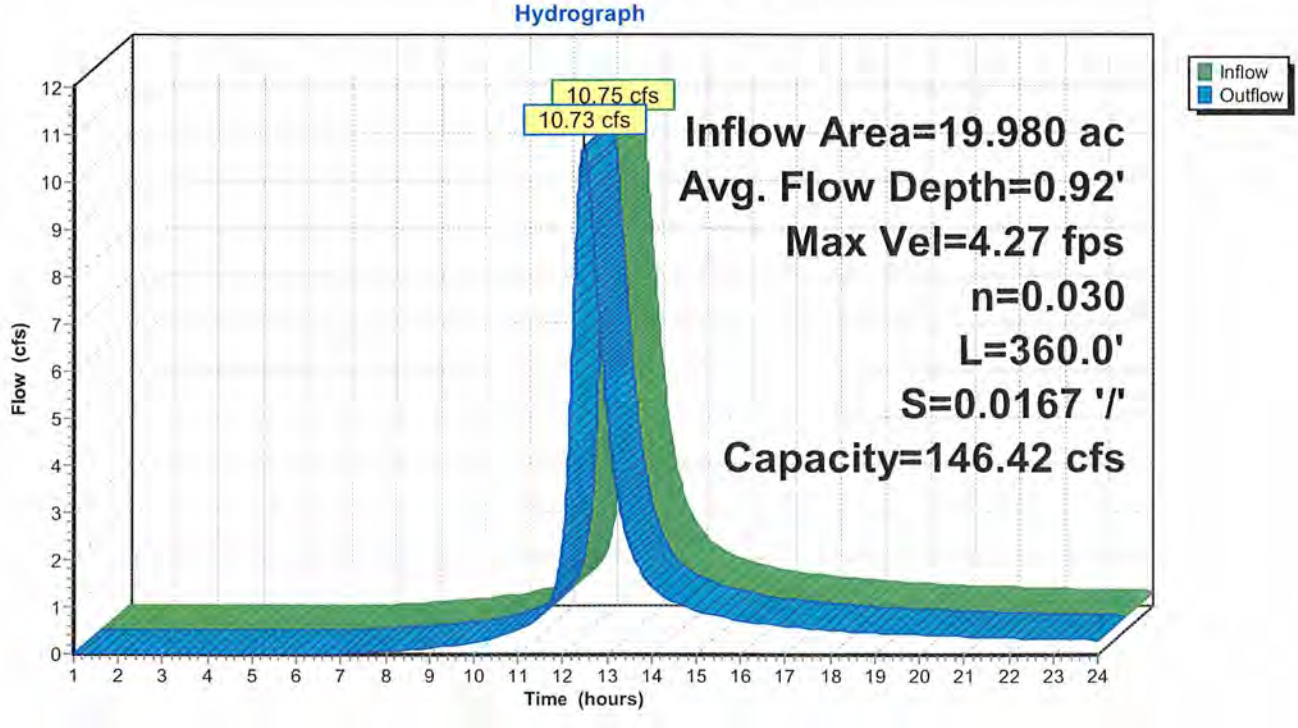
Inflow Area = 19.980 ac, 50.30% Impervious, Inflow Depth > 0.87" for 1-yr event
Inflow = 10.75 cfs @ 12.46 hrs, Volume= 1.448 af
Outflow = 10.73 cfs @ 12.48 hrs, Volume= 1.446 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.27 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.77 fps, Avg. Travel Time= 3.4 min

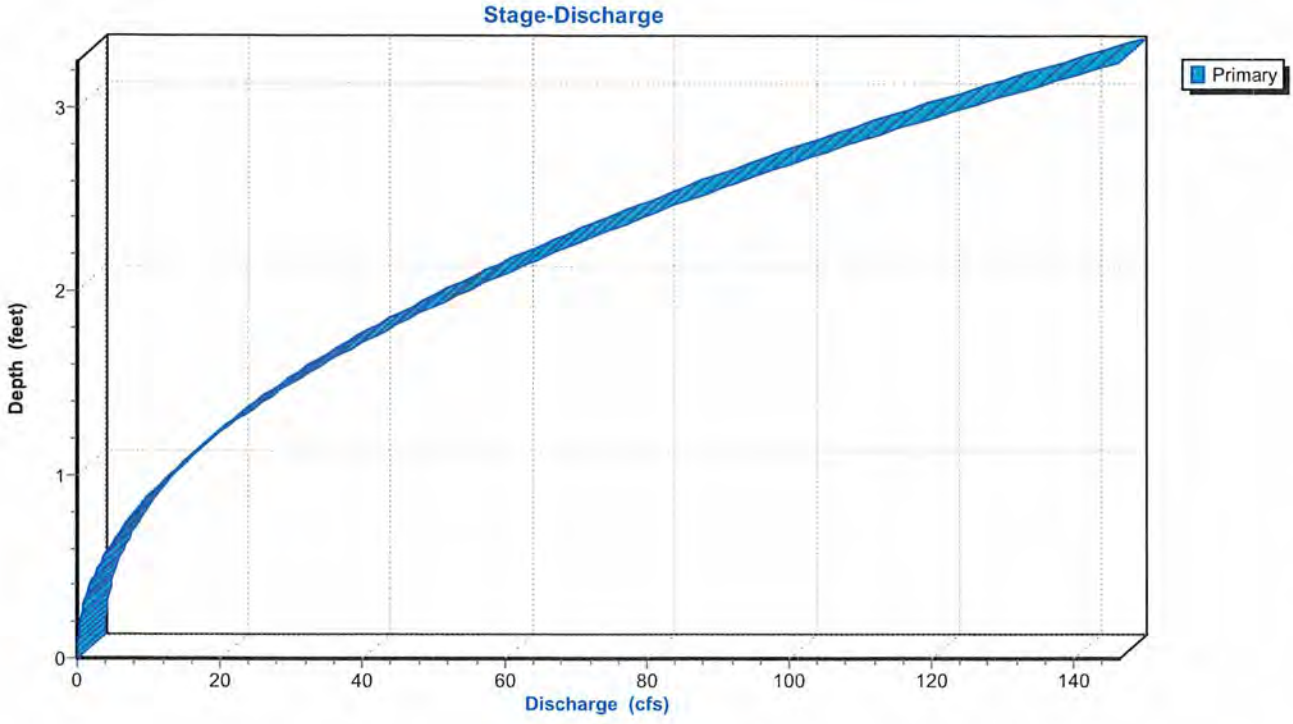
Peak Storage= 905 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.92'
Bank-Full Depth= 3.25' Flow Area= 16.8 sf, Capacity= 146.42 cfs

7.75' x 3.25' deep Parabolic Channel, n= 0.030 Earth, dense weeds
Length= 360.0' Slope= 0.0167 '/'
Inlet Invert= 414.00', Outlet Invert= 408.00'

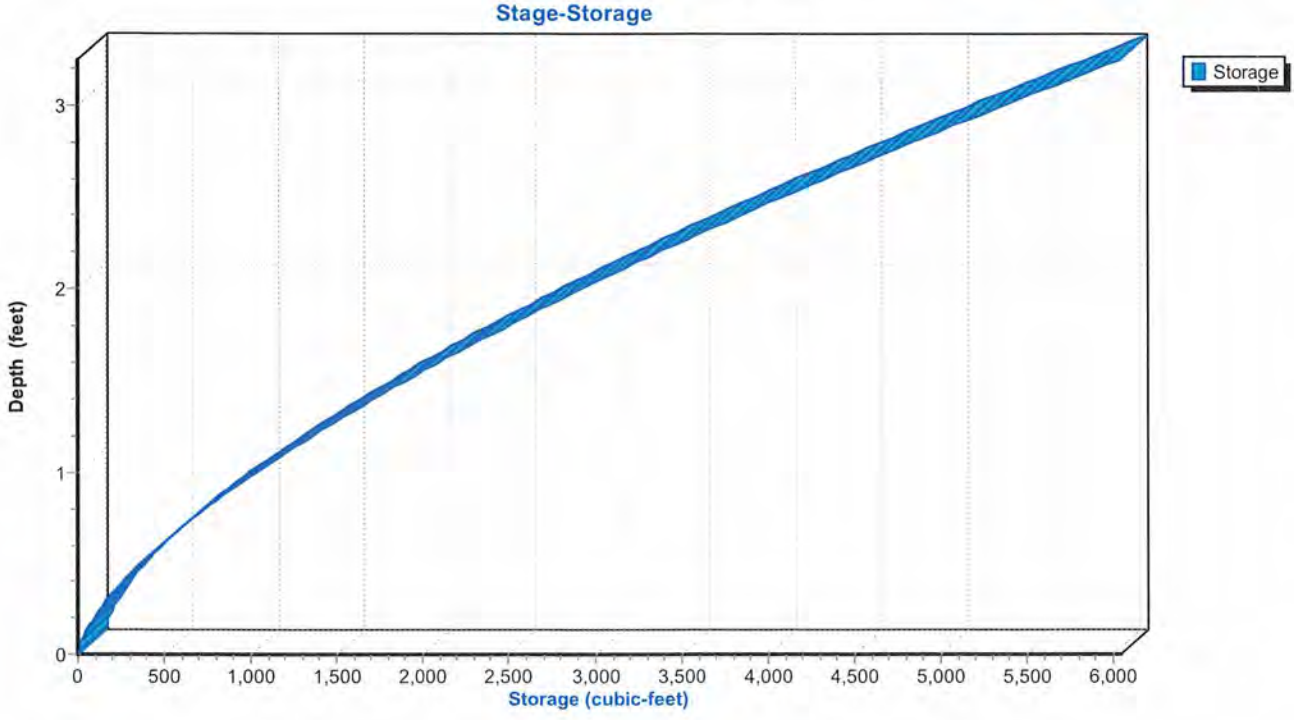




Reach 7R: Small Creek



Reach 7R: Small Creek



Summary for Reach 9R: Butternut Creek

[61] Hint: Exceeded Reach 7R outlet invert by 0.44' @ 12.51 hrs

Inflow Area = 27.701 ac, 53.32% Impervious, Inflow Depth > 0.77" for 1-yr event
Inflow = 11.00 cfs @ 12.48 hrs, Volume= 1.788 af
Outflow = 10.97 cfs @ 12.51 hrs, Volume= 1.783 af, Atten= 0%, Lag= 1.7 min

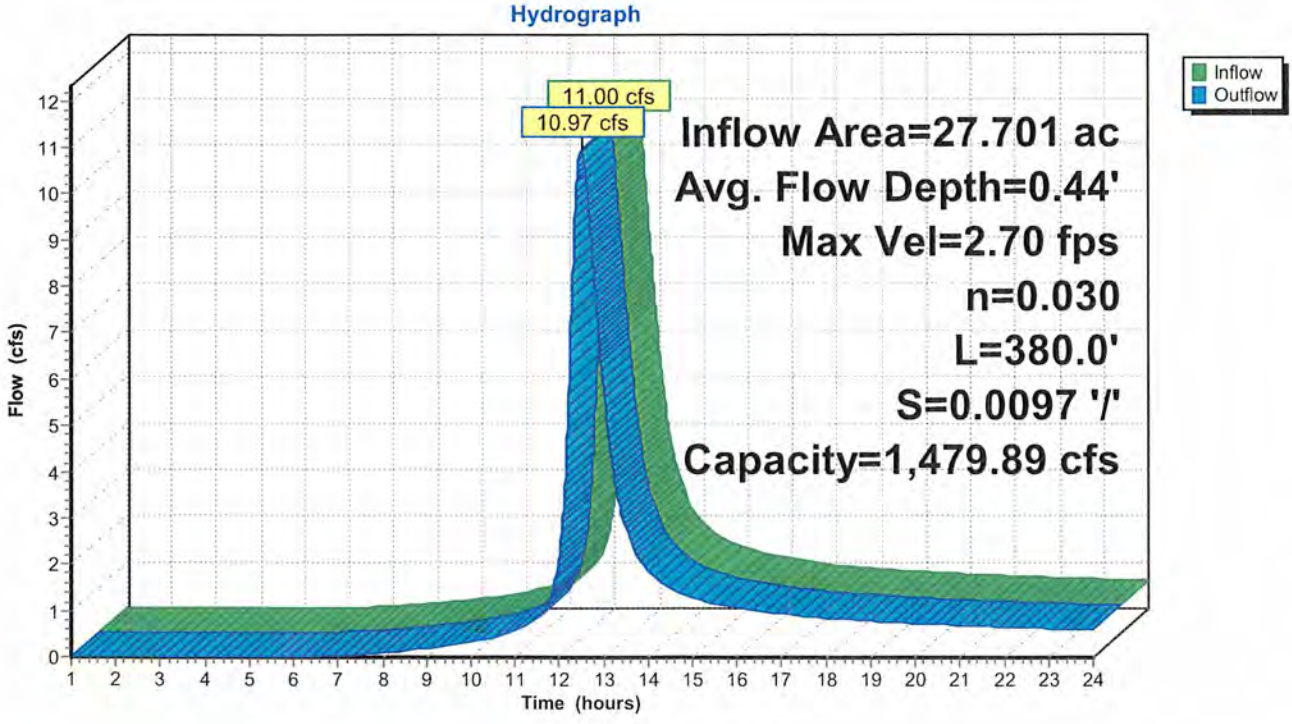
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.70 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.15 fps, Avg. Travel Time= 5.5 min

Peak Storage= 1,542 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.44'
Defined Flood Depth= 417.70' Flow Area= 6,223.3 sf, Capacity= 98,716.46 cfs
Bank-Full Depth= 10.00' Flow Area= 120.0 sf, Capacity= 1,479.89 cfs

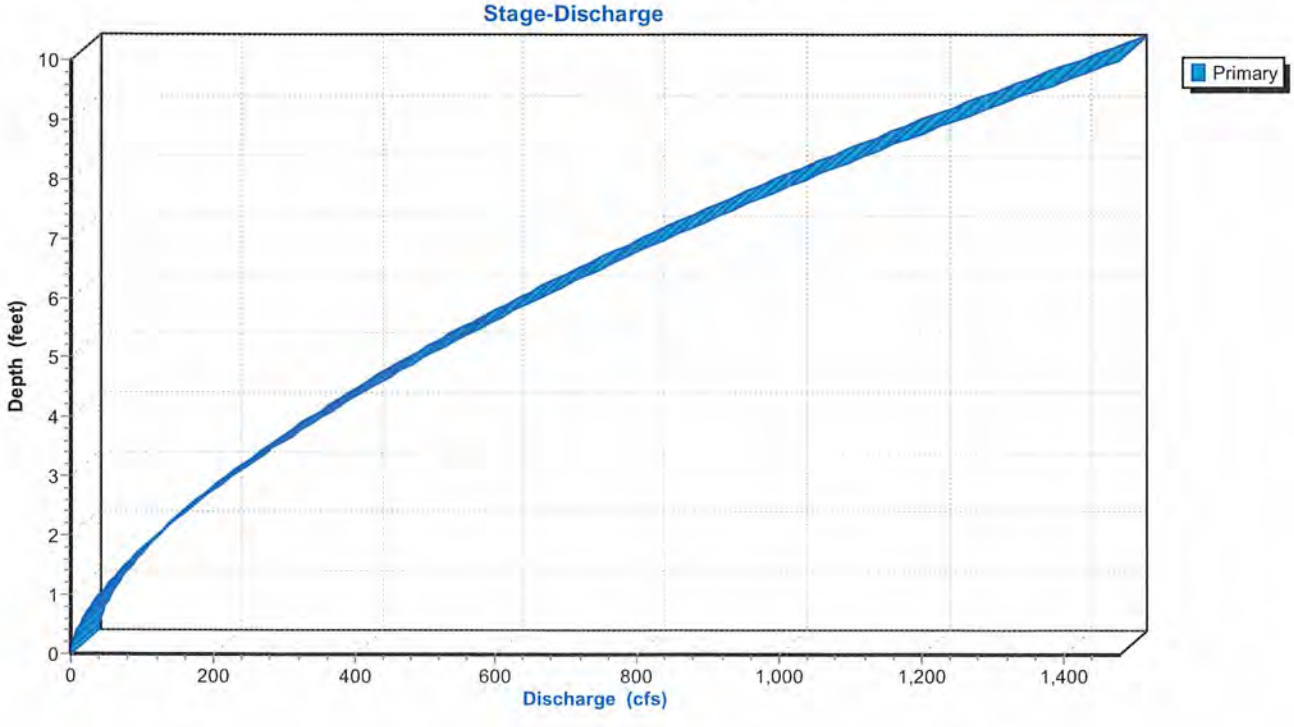
9.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 0.3 '/' Top Width= 15.00'
Length= 380.0' Slope= 0.0097 '/'
Inlet Invert= 408.00', Outlet Invert= 404.31'



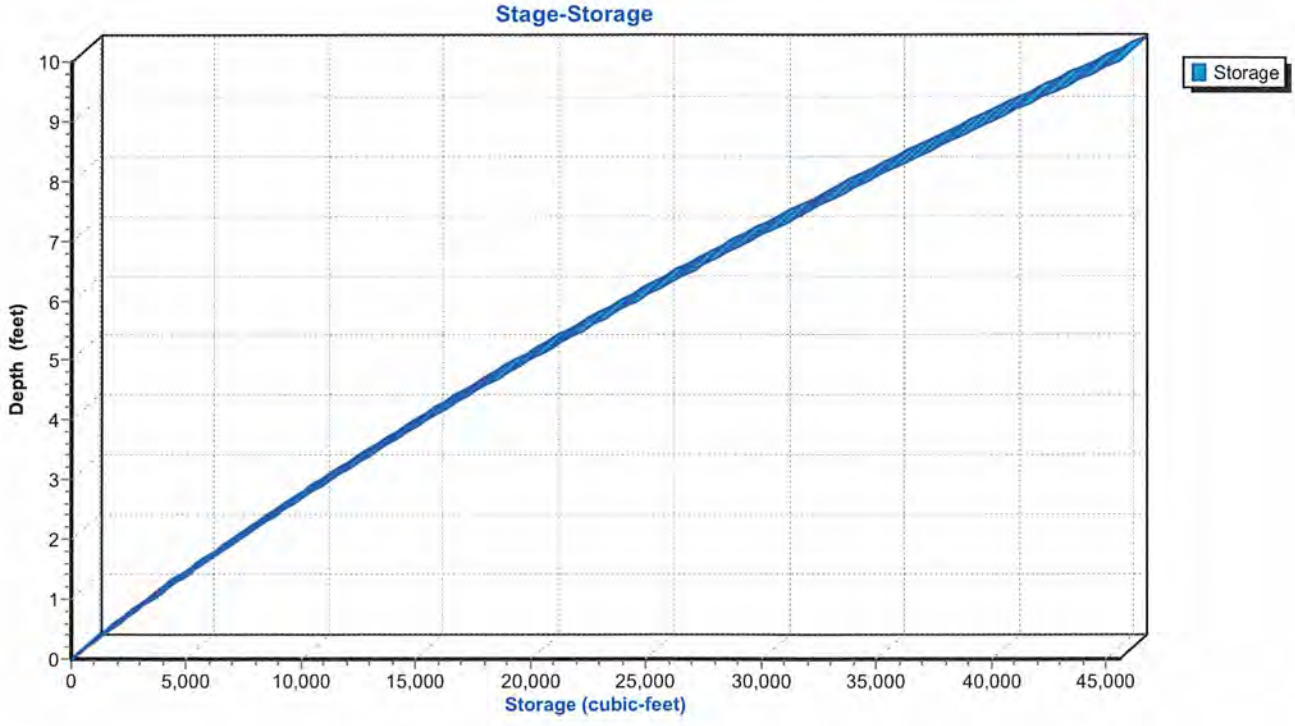
Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Summary for Reach 10R: Concrete Pipe

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 16.610 ac, 60.51% Impervious, Inflow Depth > 0.95" for 1-yr event
Inflow = 10.38 cfs @ 12.43 hrs, Volume= 1.319 af
Outflow = 10.37 cfs @ 12.44 hrs, Volume= 1.319 af, Atten= 0%, Lag= 0.4 min

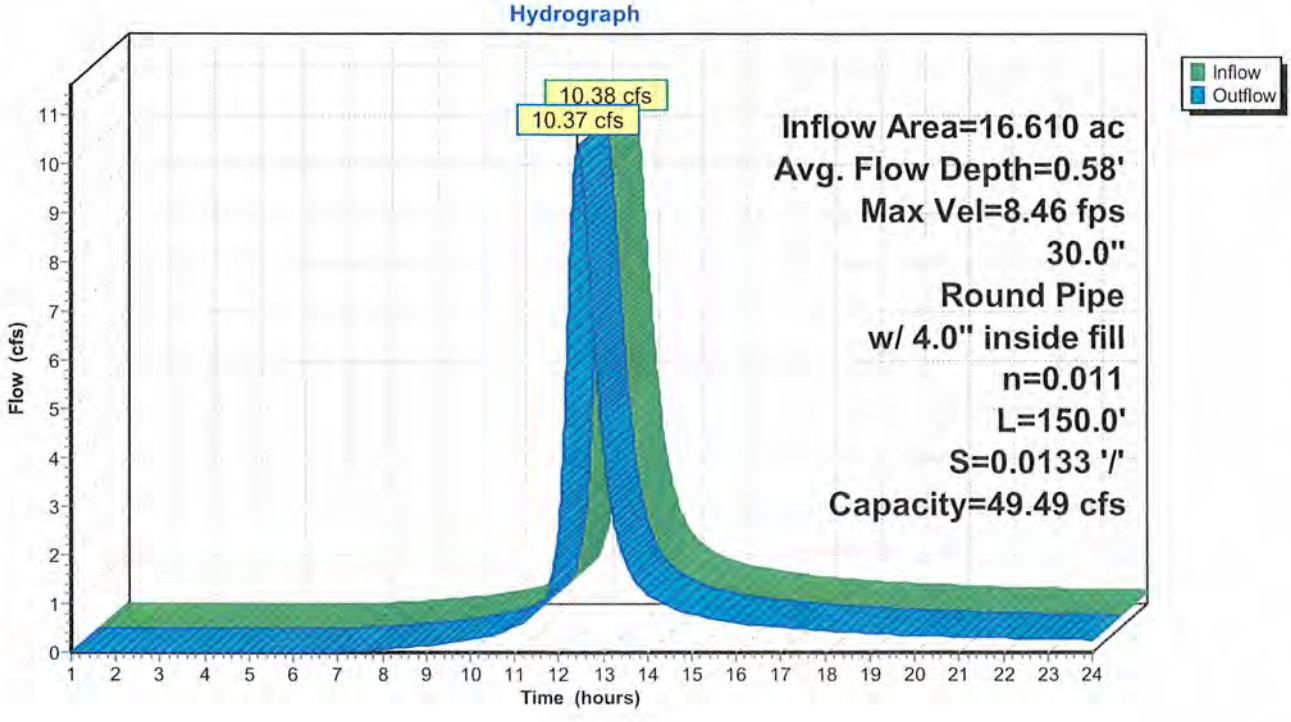
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.46 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.05 fps, Avg. Travel Time= 0.8 min

Peak Storage= 184 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.91' above invert (0.58' above fill)
Bank-Full Depth= 2.50' above invert (2.17' above fill) Flow Area= 4.5 sf, Capacity= 49.49 cfs

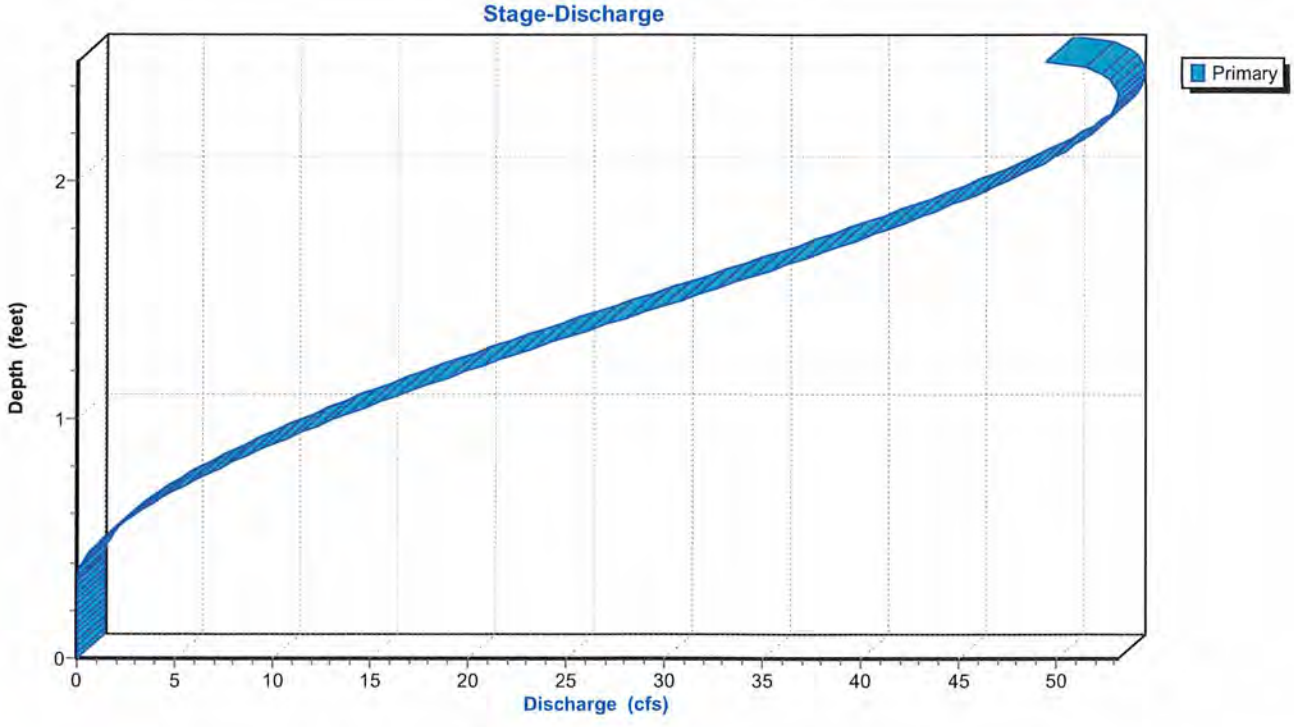
30.0" Round Pipe w/ 4.0" inside fill
n= 0.011 Concrete pipe, finished
Length= 150.0' Slope= 0.0133 '/' (101 Elevation Intervals)
Inlet Invert= 416.00', Outlet Invert= 414.00'



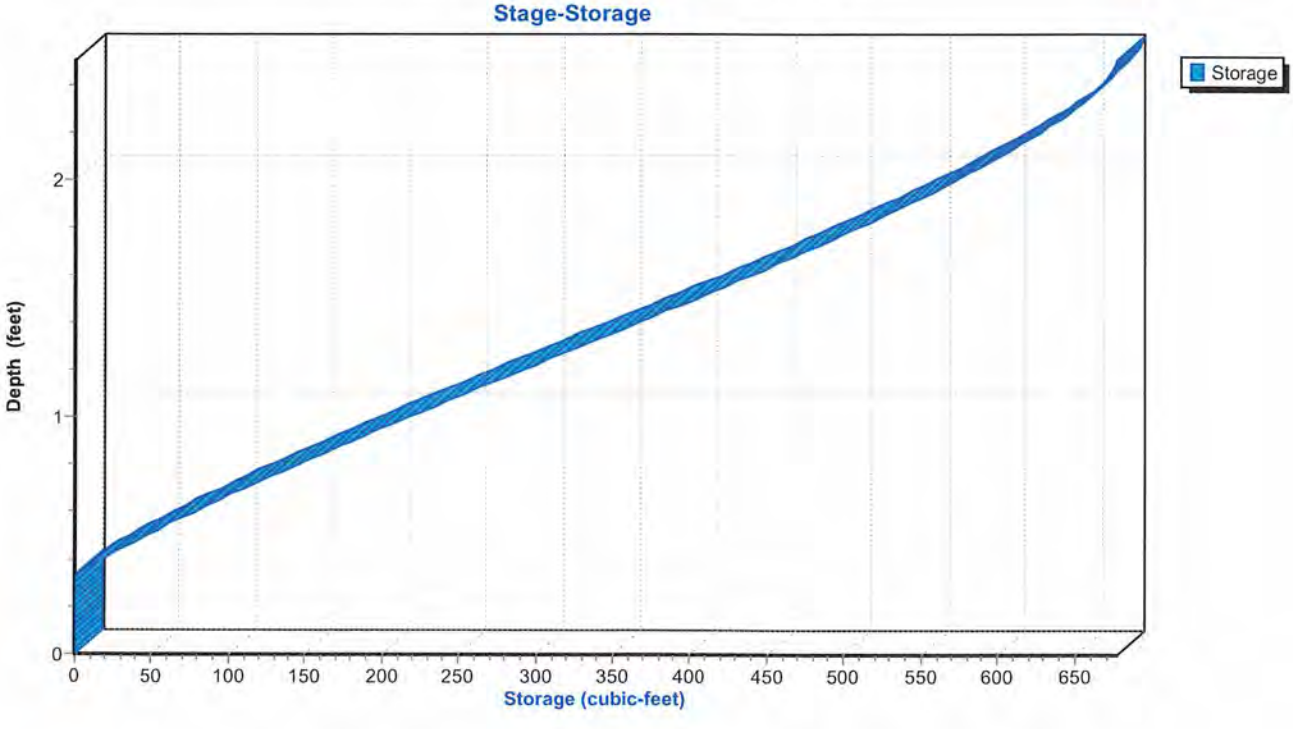
Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Summary for Pond 17P: CB1

[57] Hint: Peaked at 420.62' (Flood elevation advised)

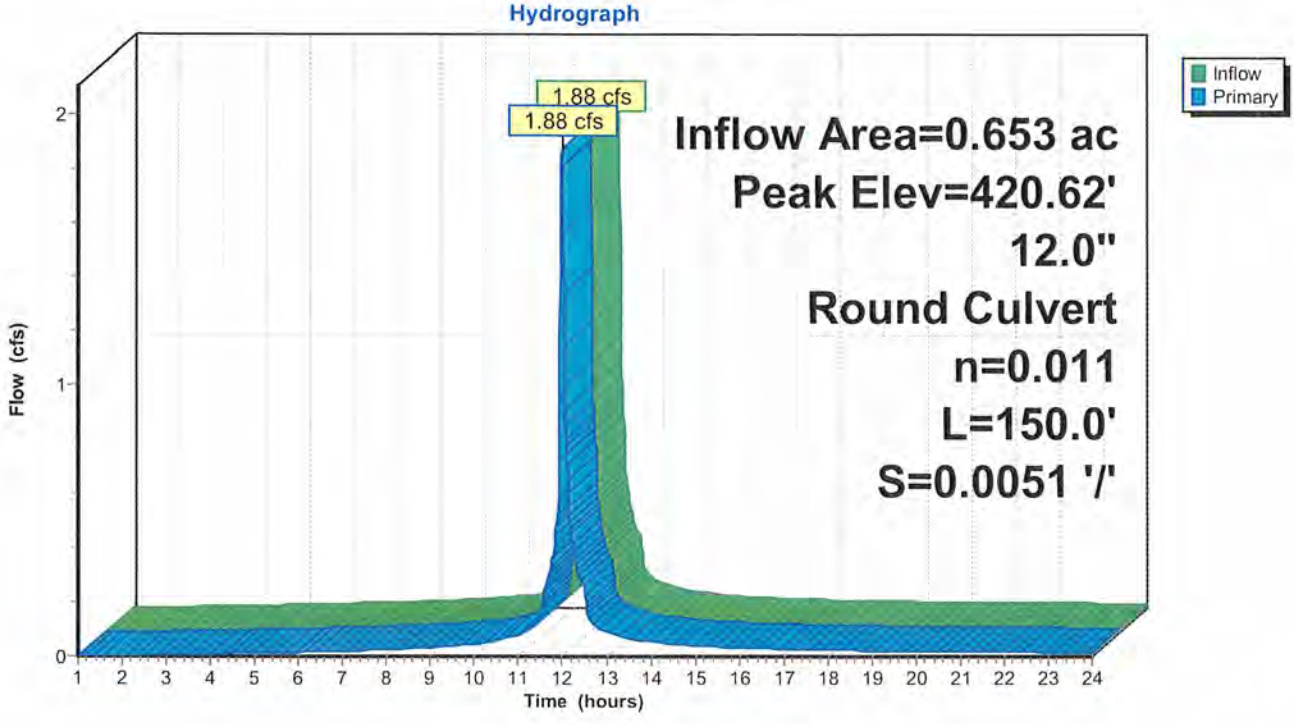
Inflow Area =	0.653 ac,100.00% Impervious,	Inflow Depth >	1.81"	for 1-yr event	
Inflow =	1.88 cfs @	12.01 hrs, Volume=	0.099 af		
Outflow =	1.88 cfs @	12.01 hrs, Volume=	0.099 af,	Atten= 0%,	Lag= 0.0 min
Primary =	1.88 cfs @	12.01 hrs, Volume=	0.099 af		

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 420.62' @ 12.01 hrs

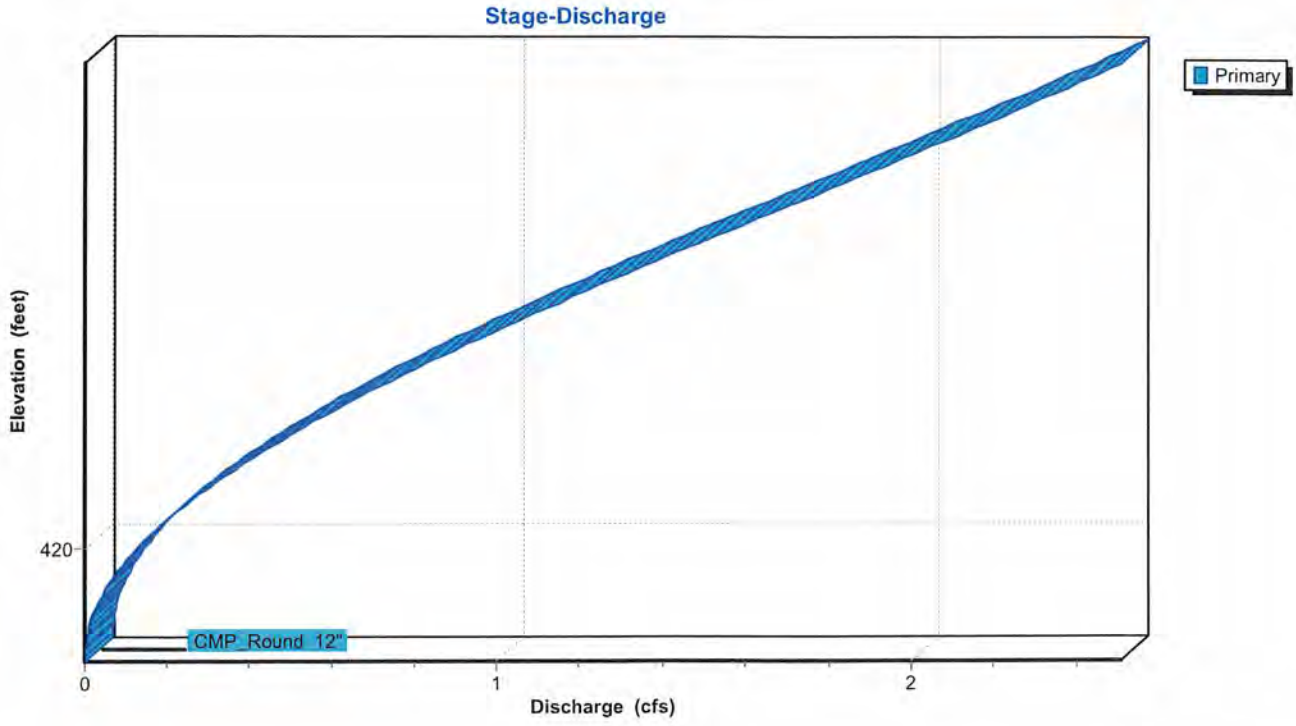
Device	Routing	Invert	Outlet Devices
#1	Primary	419.81'	**12.0" Round CMP_Round 12"** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.81' / 419.05' S= 0.0051 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.87 cfs @ 12.01 hrs HW=420.62' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 1.87 cfs @ 3.75 fps)

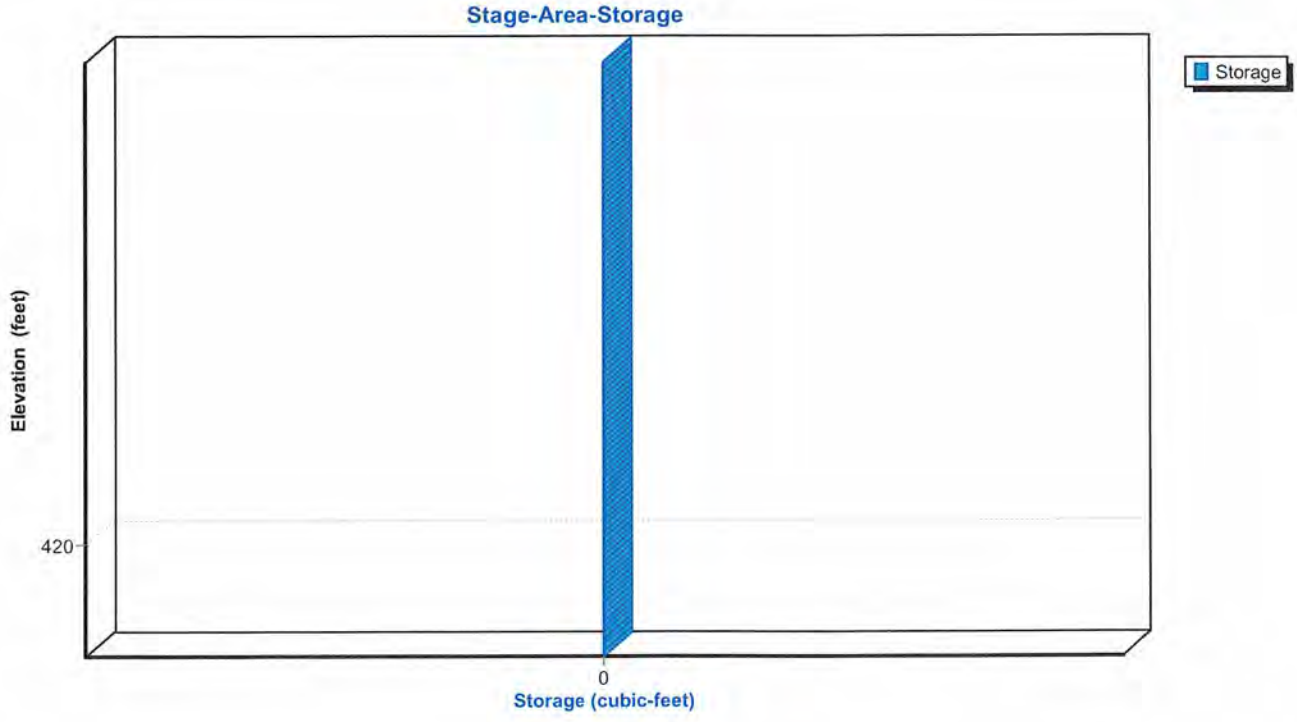
Pond 17P: CB1



Pond 17P: CB1



Pond 17P: CB1



Summary for Pond 22P: CB4

[57] Hint: Peaked at 420.39' (Flood elevation advised)

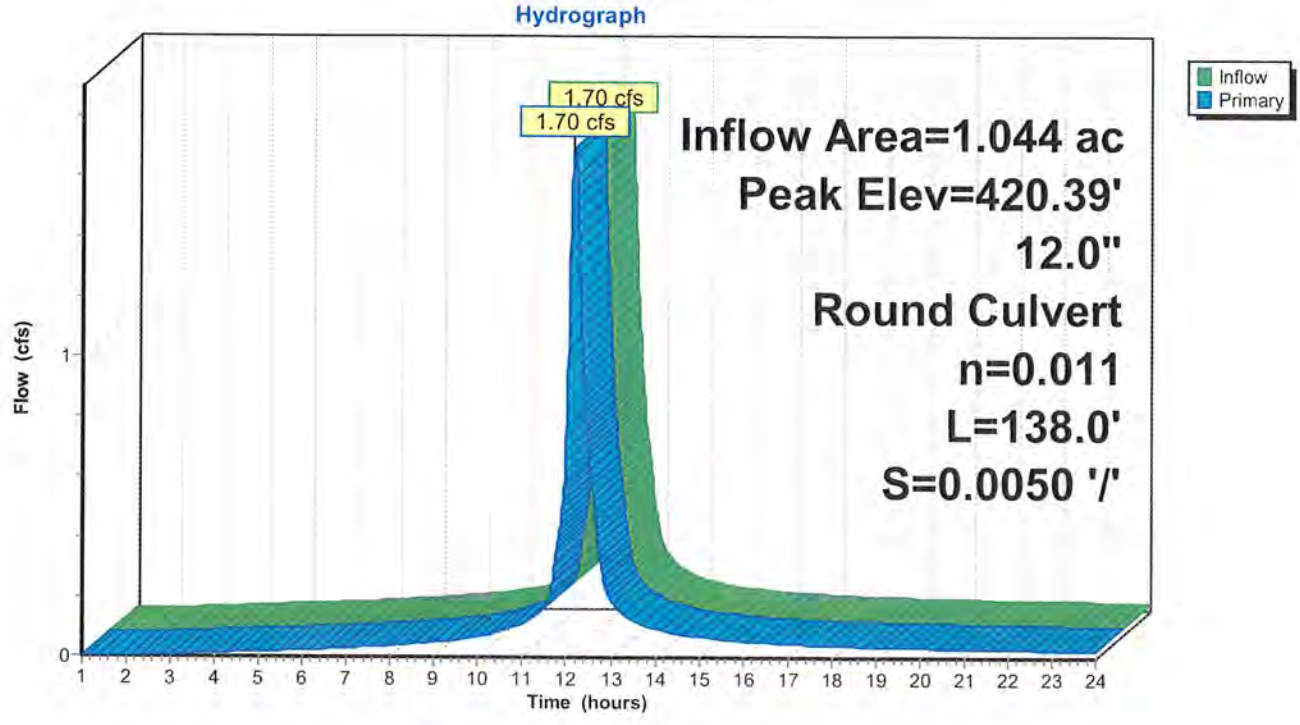
Inflow Area = 1.044 ac,100.00% Impervious, Inflow Depth > 1.81" for 1-yr event
Inflow = 1.70 cfs @ 12.18 hrs, Volume= 0.157 af
Outflow = 1.70 cfs @ 12.18 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
Primary = 1.70 cfs @ 12.18 hrs, Volume= 0.157 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 420.39' @ 12.18 hrs

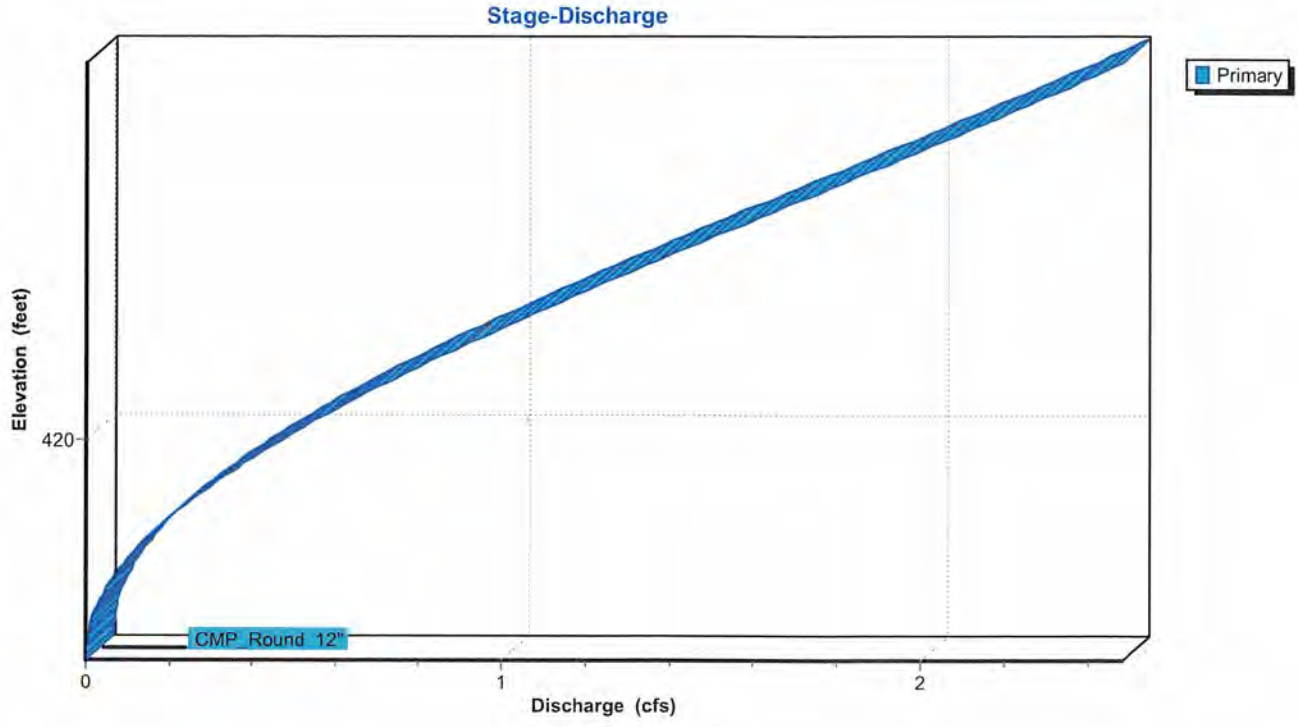
Device	Routing	Invert	Outlet Devices
#1	Primary	419.63'	**12.0" Round CMP_Round 12"** L= 138.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.63' / 418.94' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.70 cfs @ 12.18 hrs HW=420.39' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 1.70 cfs @ 3.64 fps)

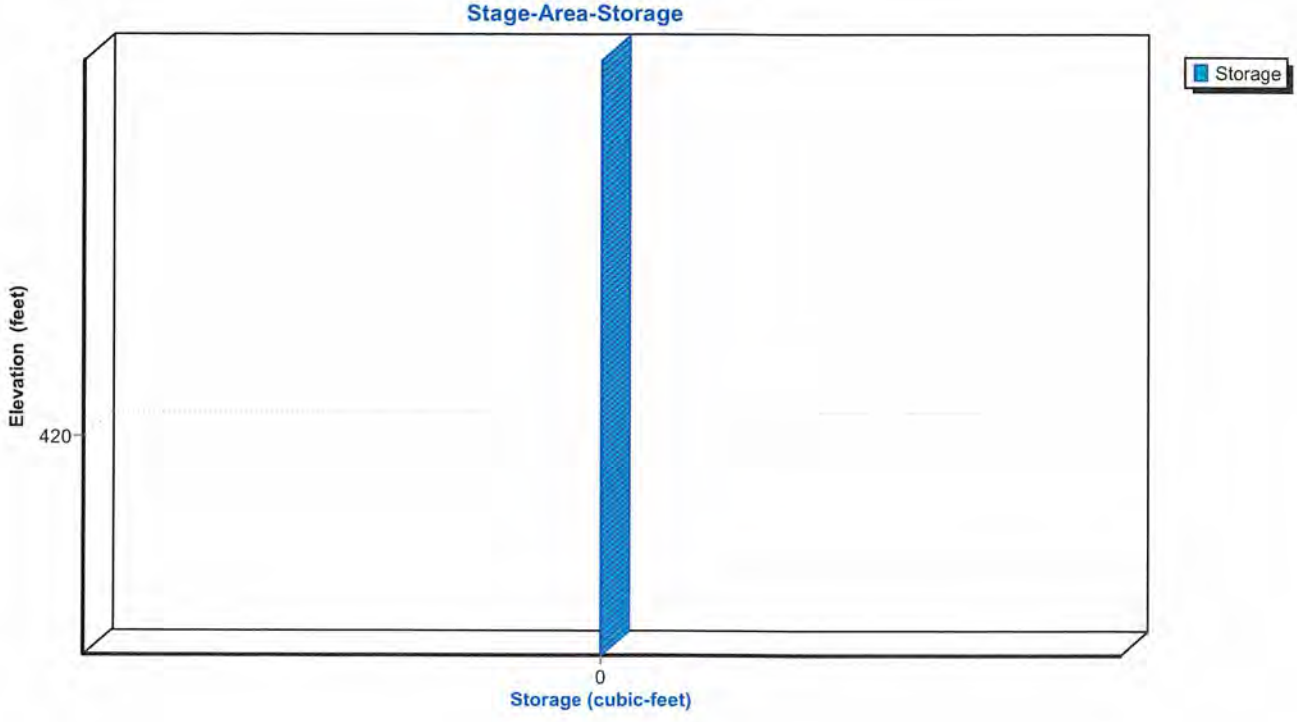
Pond 22P: CB4



Pond 22P: CB4



Pond 22P: CB4



Summary for Pond 23P: CB3

[57] Hint: Peaked at 419.45' (Flood elevation advised)

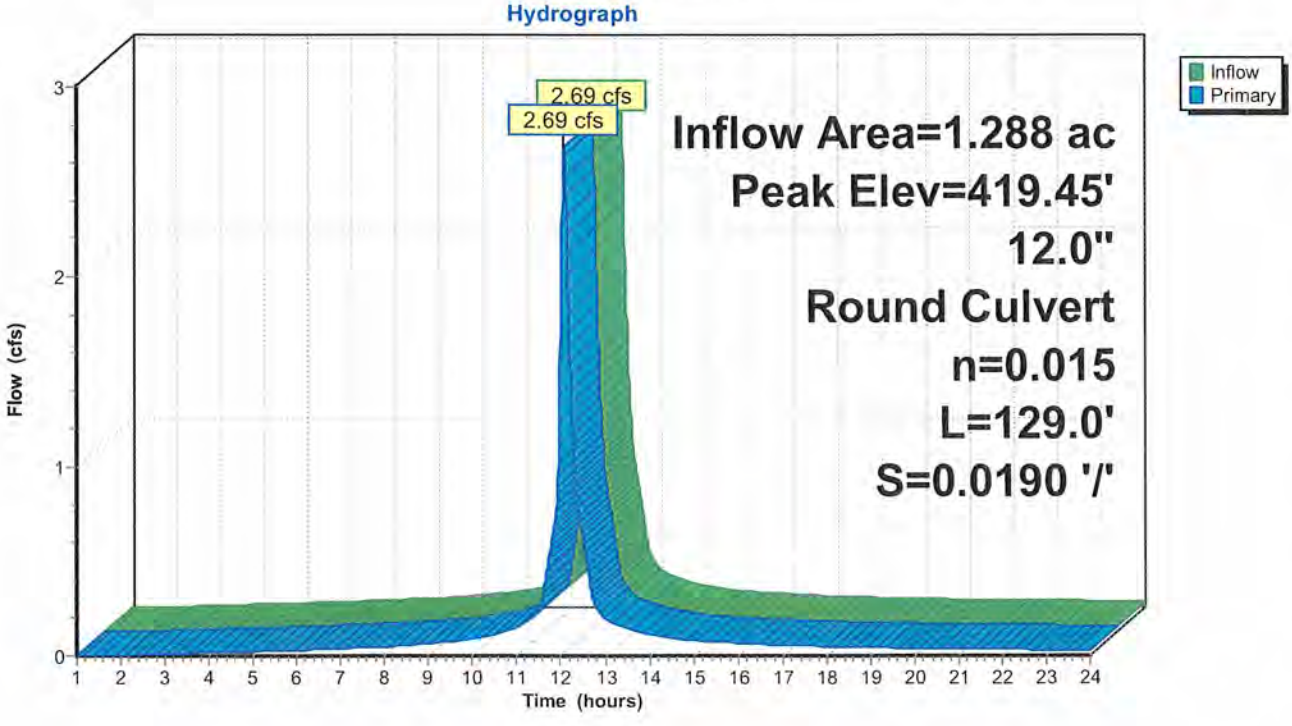
Inflow Area =	1.288 ac,100.00% Impervious,	Inflow Depth >	1.81"	for	1-yr event
Inflow =	2.69 cfs @	12.09 hrs, Volume=	0.194 af		
Outflow =	2.69 cfs @	12.09 hrs, Volume=	0.194 af,	Atten= 0%,	Lag= 0.0 min
Primary =	2.69 cfs @	12.09 hrs, Volume=	0.194 af		

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 419.45' @ 12.09 hrs

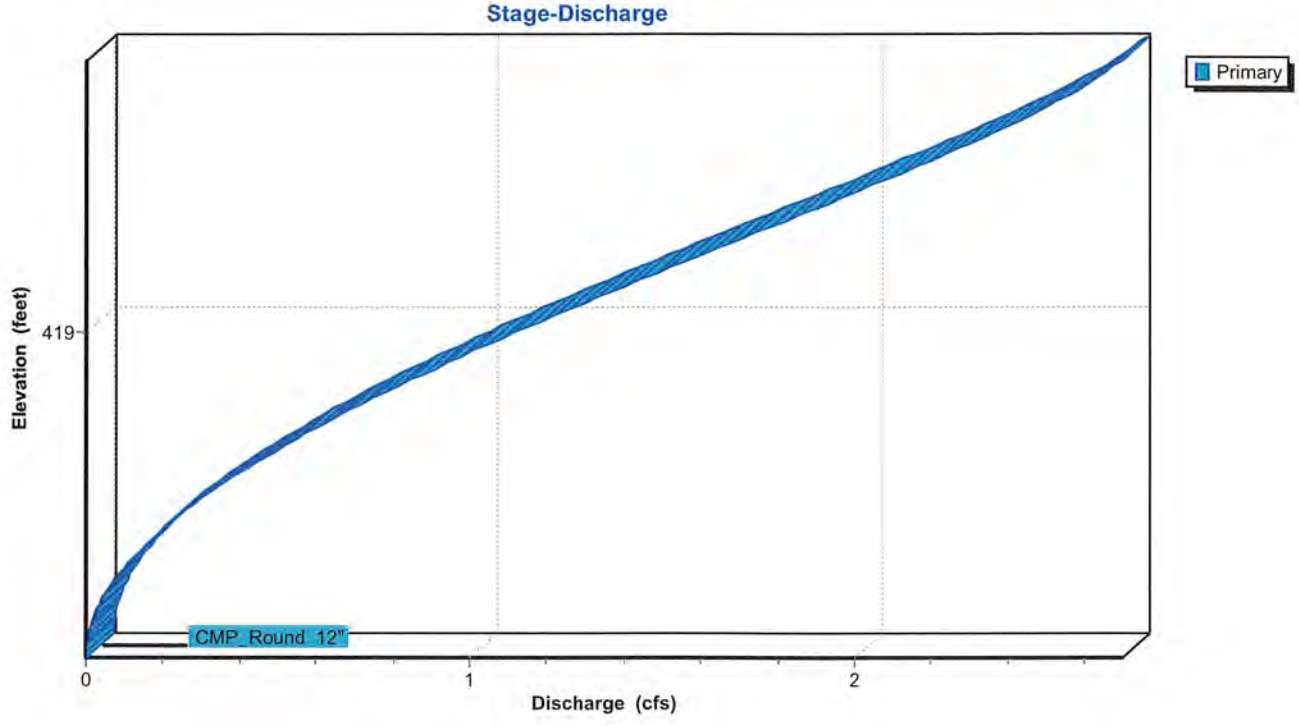
Device	Routing	Invert	Outlet Devices
#1	Primary	418.45'	**12.0" Round CMP_Round 12"** L= 129.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 418.45' / 416.00' S= 0.0190 '/' Cc= 0.900 n= 0.015 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.68 cfs @ 12.09 hrs HW=419.45' (Free Discharge)
1=CMP_Round 12" (Inlet Controls 2.68 cfs @ 3.42 fps)

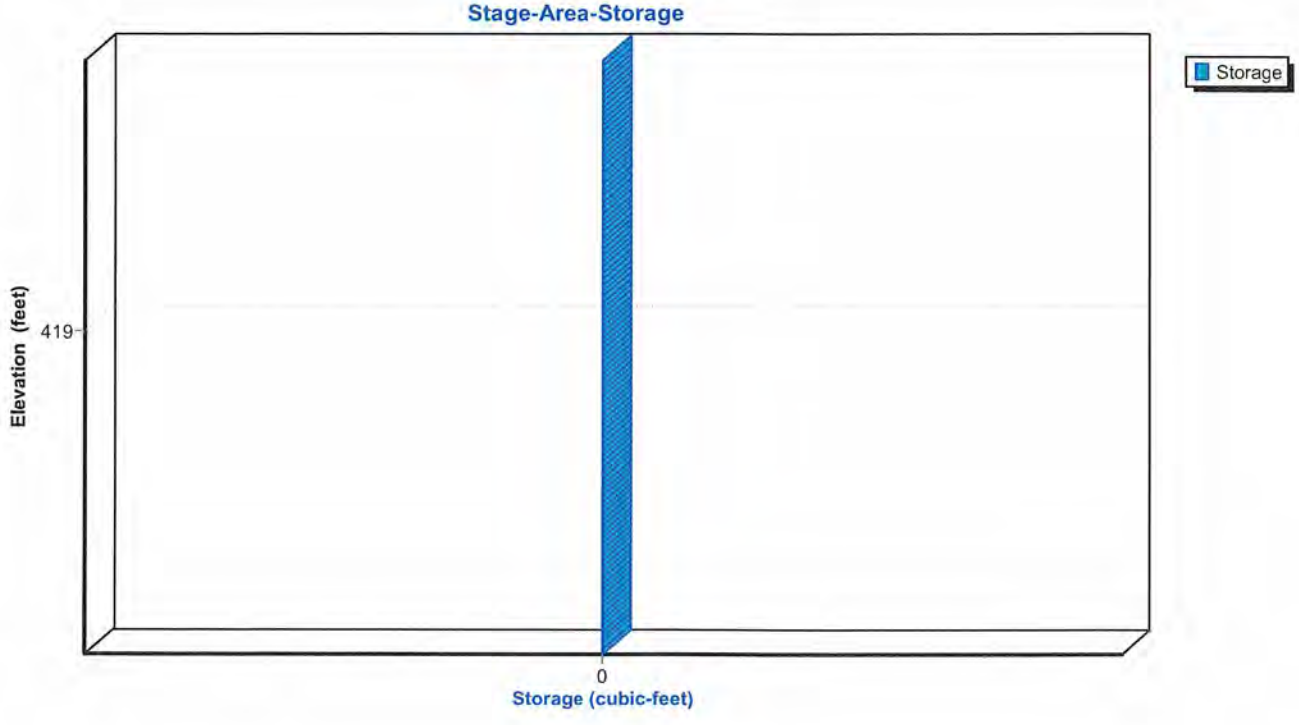
Pond 23P: CB3



Pond 23P: CB3



Pond 23P: CB3



Summary for Pond 24P: CB2

[57] Hint: Peaked at 419.80' (Flood elevation advised)
[79] Warning: Submerged Pond 17P Primary device # 1 OUTLET by 0.75'

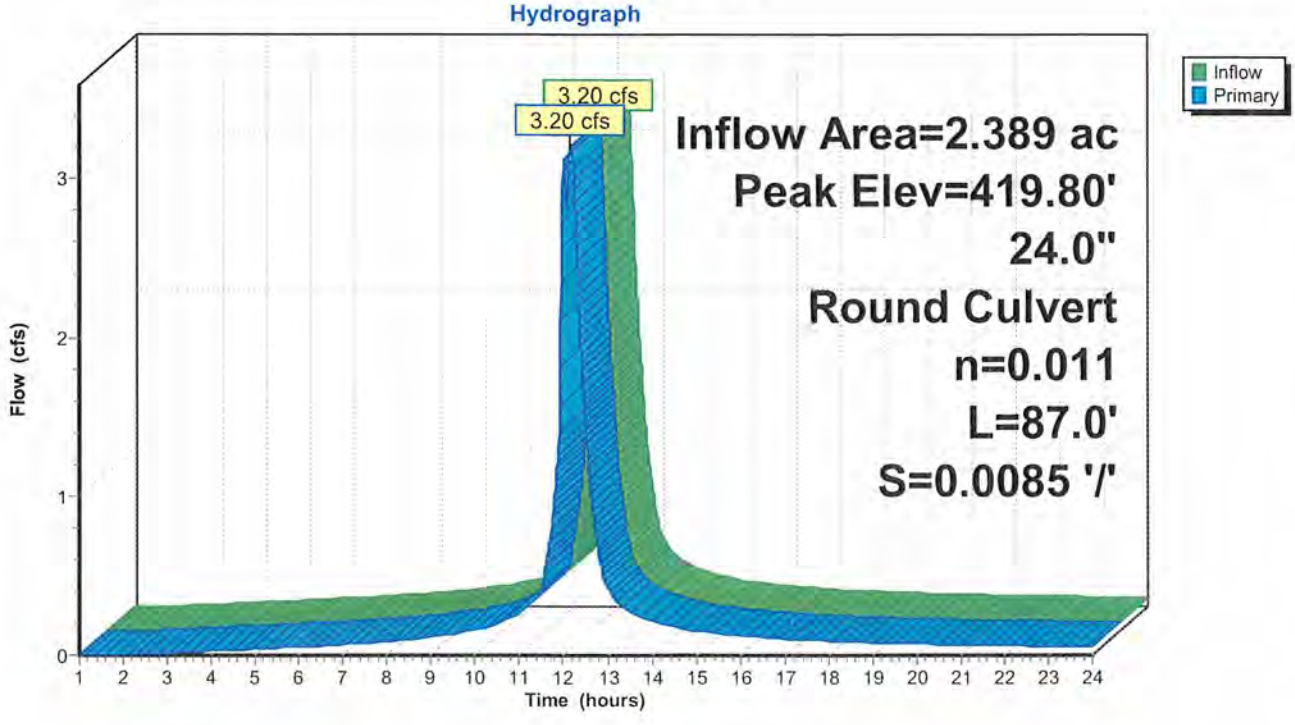
Inflow Area = 2.389 ac,100.00% Impervious, Inflow Depth > 1.81" for 1-yr event
Inflow = 3.20 cfs @ 12.18 hrs, Volume= 0.360 af
Outflow = 3.20 cfs @ 12.18 hrs, Volume= 0.360 af, Atten= 0%, Lag= 0.0 min
Primary = 3.20 cfs @ 12.18 hrs, Volume= 0.360 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 419.80' @ 12.18 hrs

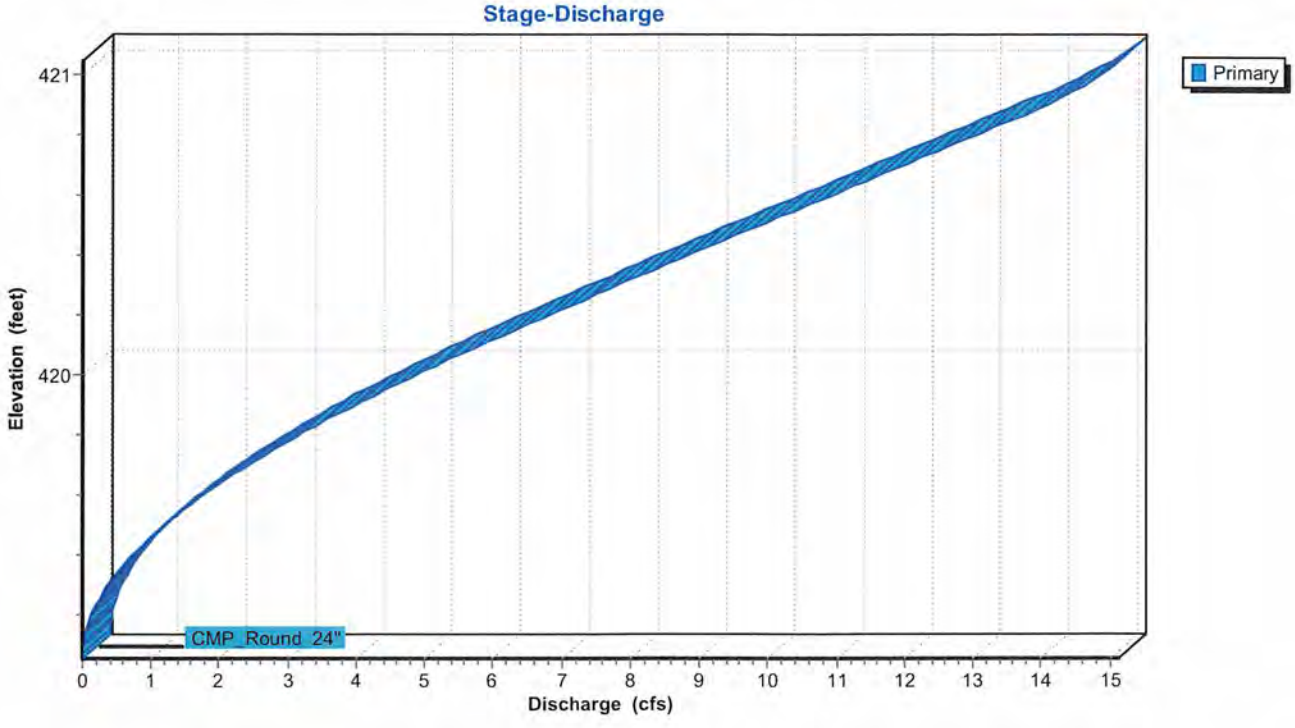
Device	Routing	Invert	Outlet Devices
#1	Primary	419.05'	**24.0" Round CMP_Round 24"** L= 87.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.05' / 418.31' S= 0.0085 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=3.20 cfs @ 12.18 hrs HW=419.80' (Free Discharge)
↑**1=CMP_Round 24"** (Inlet Controls 3.20 cfs @ 2.96 fps)

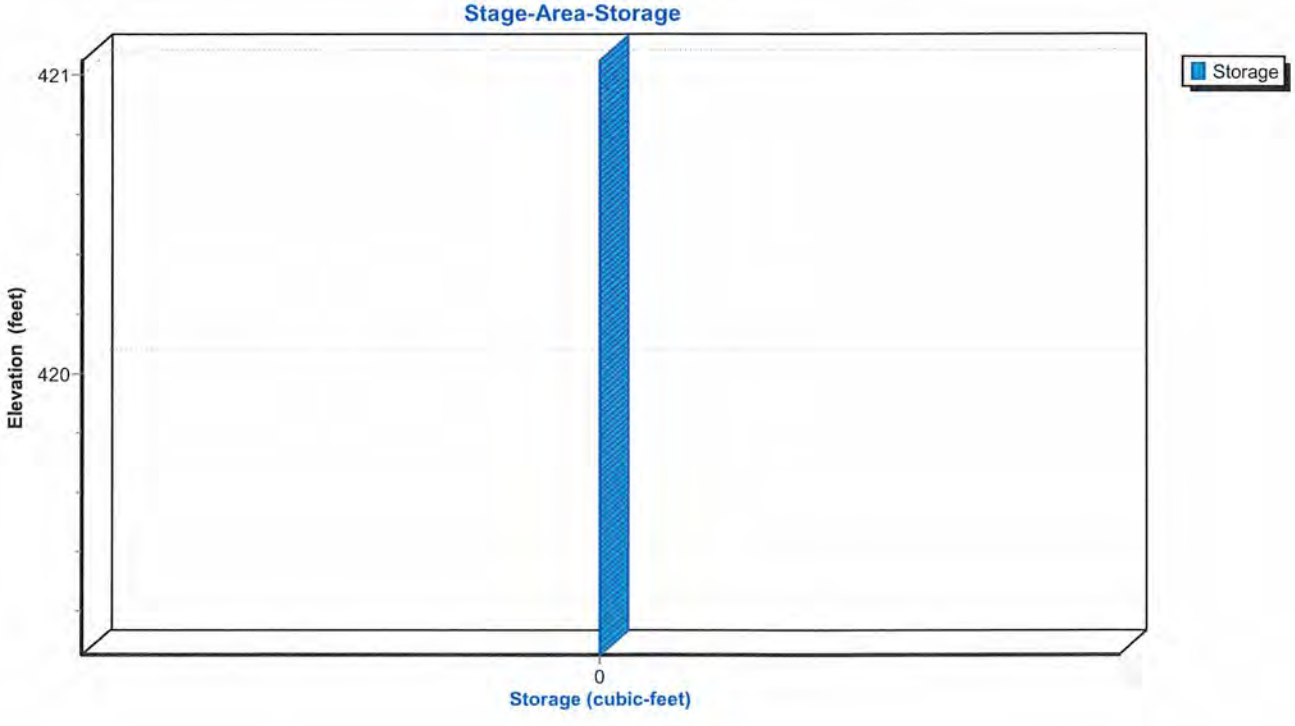
Pond 24P: CB2



Pond 24P: CB2



Pond 24P: CB2



Summary for Pond 27P: PROPOSED POND

[43] Hint: Has no inflow (Outflow=Zero)

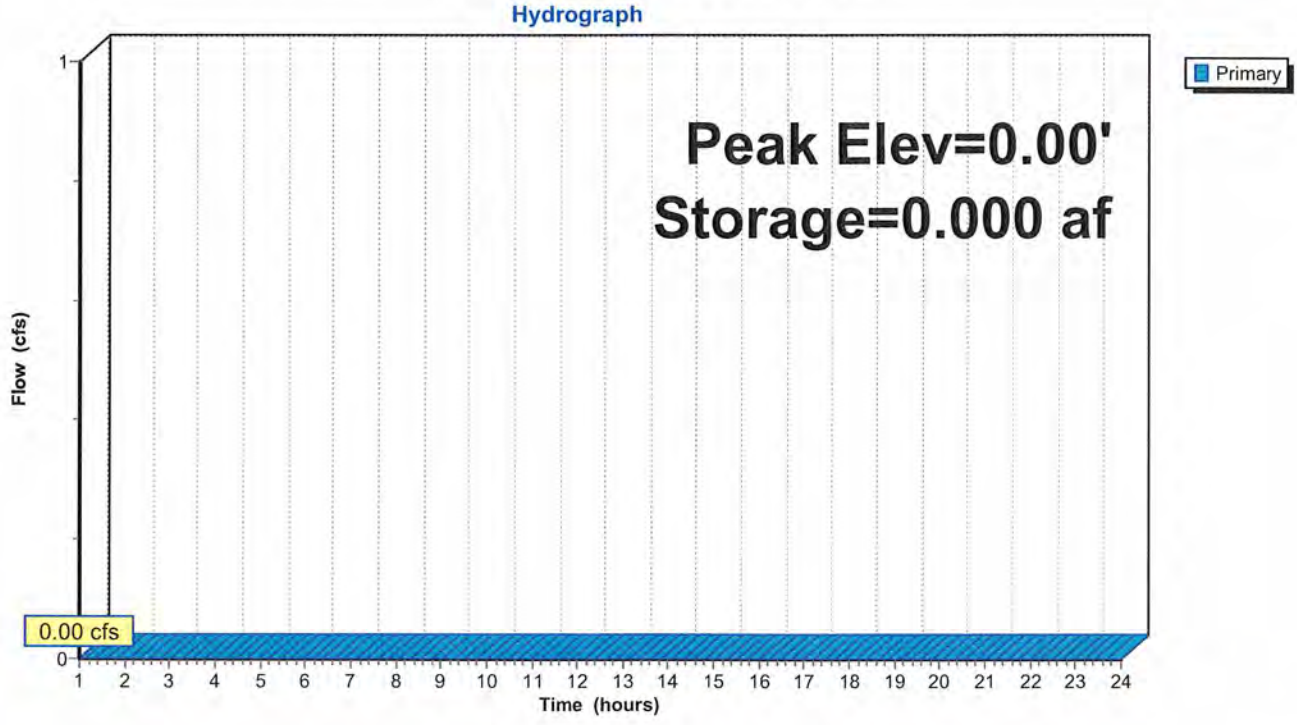
Volume	Invert	Avail.Storage	Storage Description
#1	403.00'	1.801 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
403.00	0.008	0.0	0.000	0.000
404.00	0.020	0.0	0.000	0.000
405.00	0.034	0.0	0.000	0.000
406.00	0.050	0.0	0.000	0.000
407.00	0.067	0.0	0.000	0.000
408.00	0.087	0.0	0.000	0.000
409.00	0.108	0.0	0.000	0.000
410.00	0.132	0.0	0.000	0.000
411.00	0.250	0.0	0.000	0.000
412.00	0.291	100.0	0.270	0.270
413.00	0.335	100.0	0.313	0.583
414.00	0.381	100.0	0.358	0.941
415.00	0.429	100.0	0.405	1.346
416.00	0.480	100.0	0.454	1.801

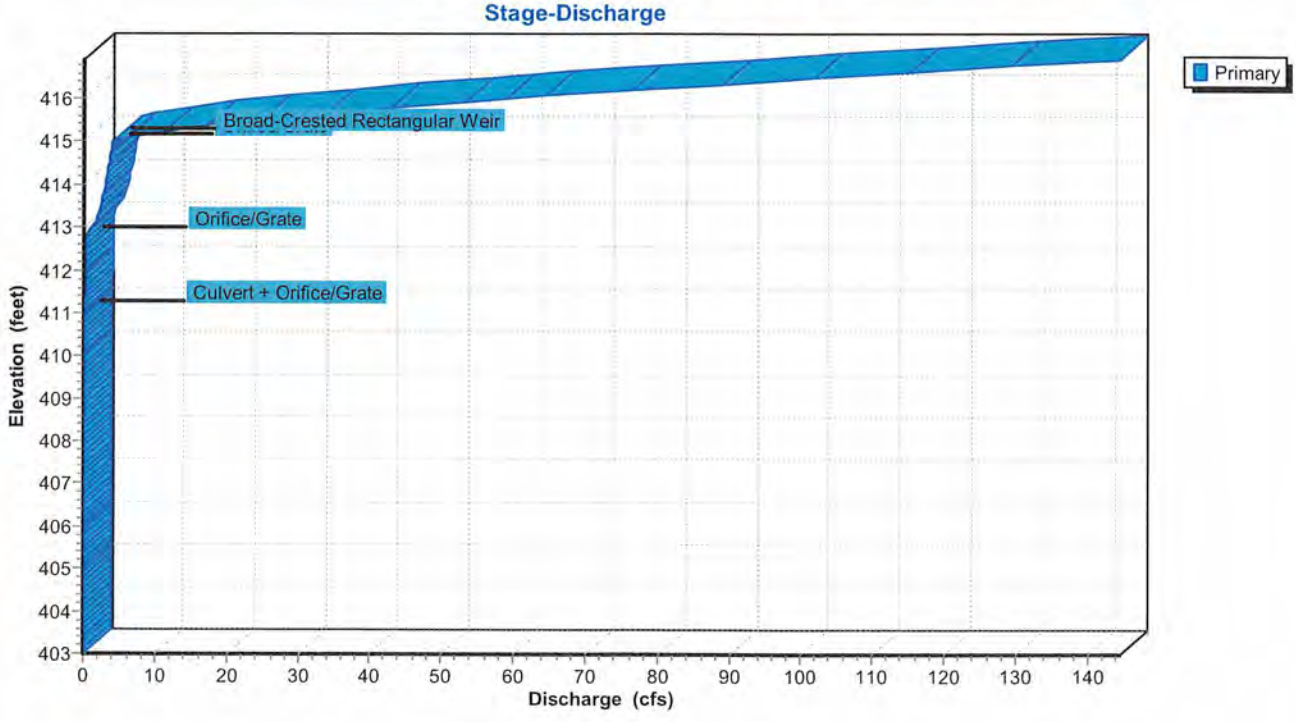
Device	Routing	Invert	Outlet Devices
#1	Primary	411.00'	**12.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 411.00' / 410.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Device 1	411.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	412.70'	**18.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	414.90'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	415.00'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=0.00' (Free Discharge)
- **1=Culvert** (Controls 0.00 cfs)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

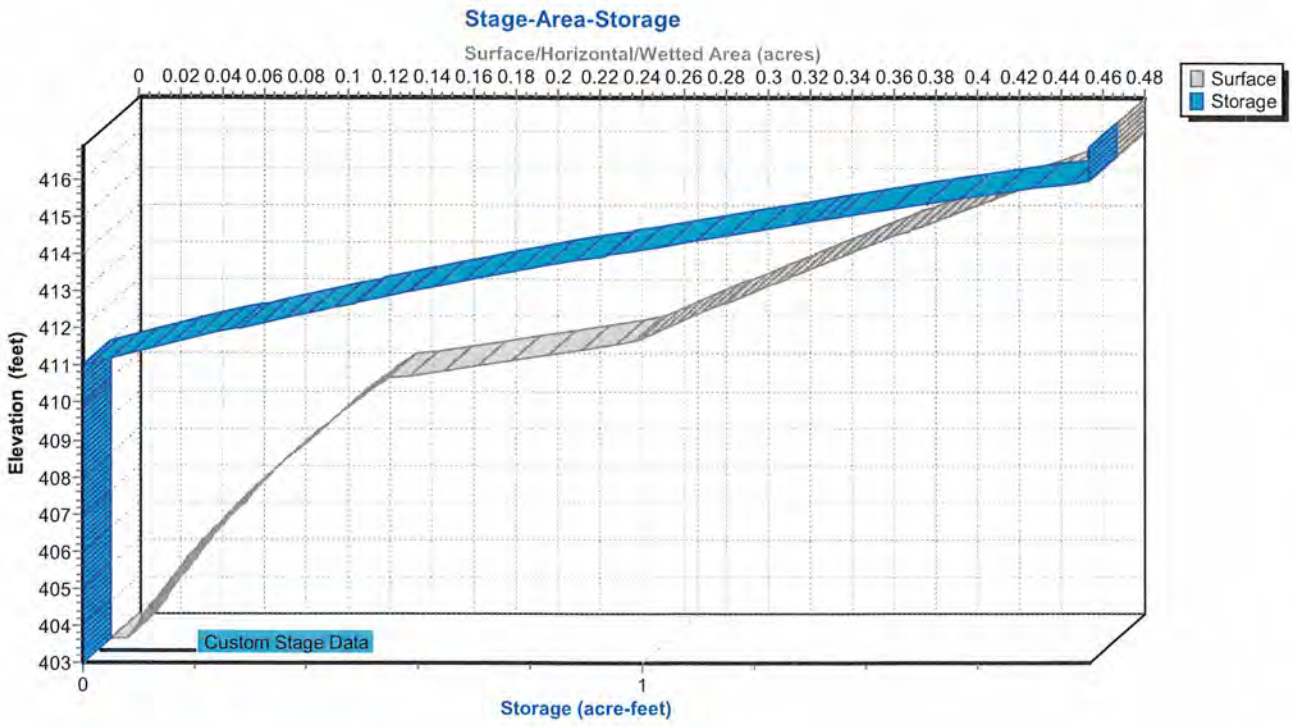
Pond 27P: PROPOSED POND



Pond 27P: PROPOSED POND



Pond 27P: PROPOSED POND



Summary for Pond 28P: PROPOSED POND

Inflow Area = 4.721 ac,100.00% Impervious, Inflow Depth > 1.81" for 1-yr event
Inflow = 7.17 cfs @ 12.13 hrs, Volume= 0.712 af
Outflow = 0.30 cfs @ 15.20 hrs, Volume= 0.316 af, Atten= 96%, Lag= 184.5 min
Primary = 0.30 cfs @ 15.20 hrs, Volume= 0.316 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Starting Elev= 411.00' Surf.Area= 0.250 ac Storage= 0.627 af
Peak Elev= 412.69' @ 15.20 hrs Surf.Area= 0.321 ac Storage= 1.108 af (0.481 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 251.4 min (1,025.2 - 773.8)

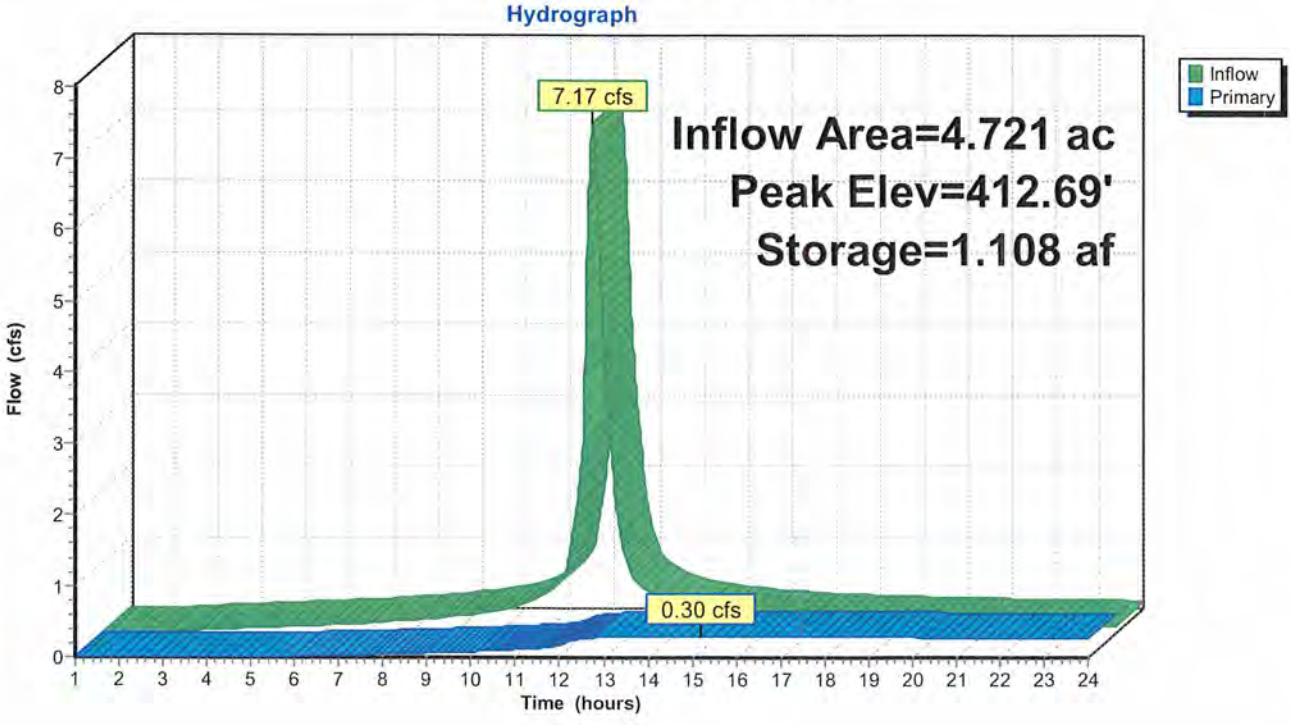
Volume	Invert	Avail.Storage	Storage Description
#1	403.00'	2.428 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
403.00	0.008	0.0	0.000	0.000
404.00	0.020	100.0	0.014	0.014
405.00	0.034	100.0	0.027	0.041
406.00	0.050	100.0	0.042	0.083
407.00	0.067	100.0	0.059	0.141
408.00	0.087	100.0	0.077	0.219
409.00	0.108	100.0	0.097	0.316
410.00	0.132	100.0	0.120	0.436
411.00	0.250	100.0	0.191	0.627
412.00	0.291	100.0	0.270	0.897
413.00	0.335	100.0	0.313	1.210
414.00	0.381	100.0	0.358	1.568
415.00	0.429	100.0	0.405	1.974
416.00	0.480	100.0	0.454	2.428

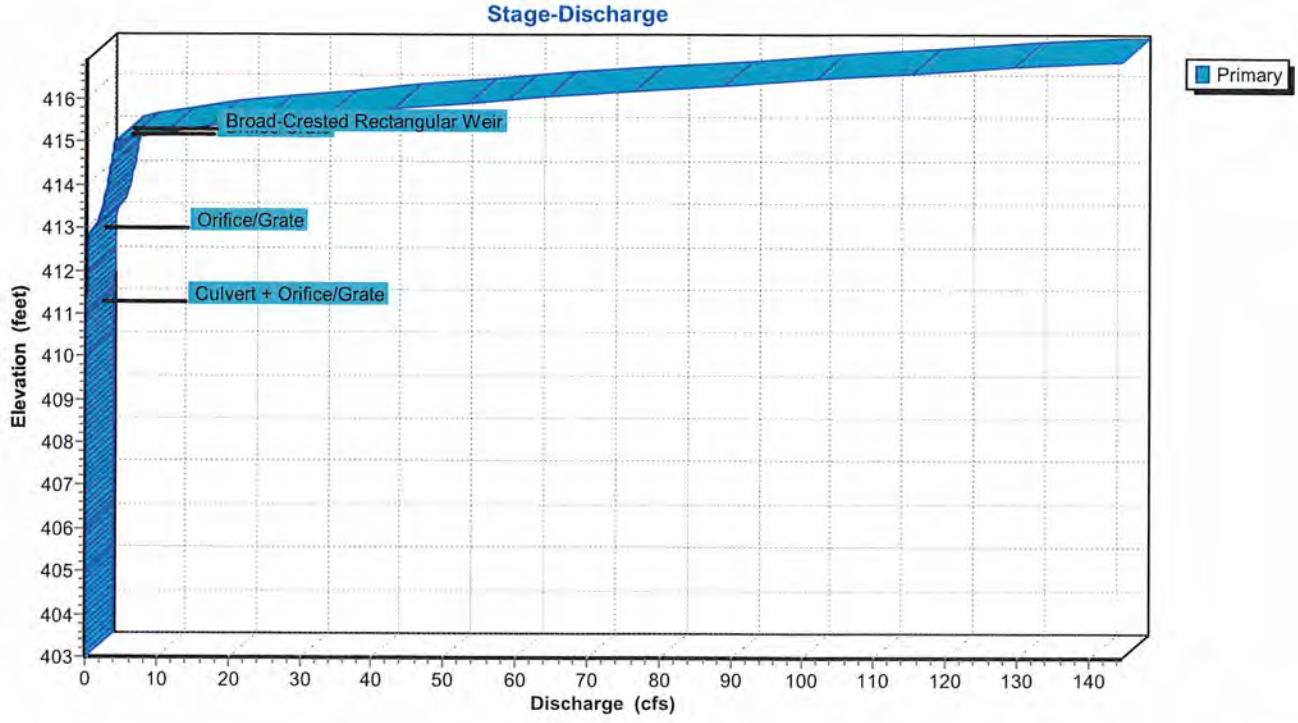
Device	Routing	Invert	Outlet Devices
#1	Primary	411.00'	**12.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 411.00' / 410.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Device 1	411.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	412.70'	**18.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	414.90'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	415.00'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.30 cfs @ 15.20 hrs HW=412.69' (Free Discharge)
- **1=Culvert** (Passes 0.30 cfs of 3.34 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.30 cfs @ 6.02 fps)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

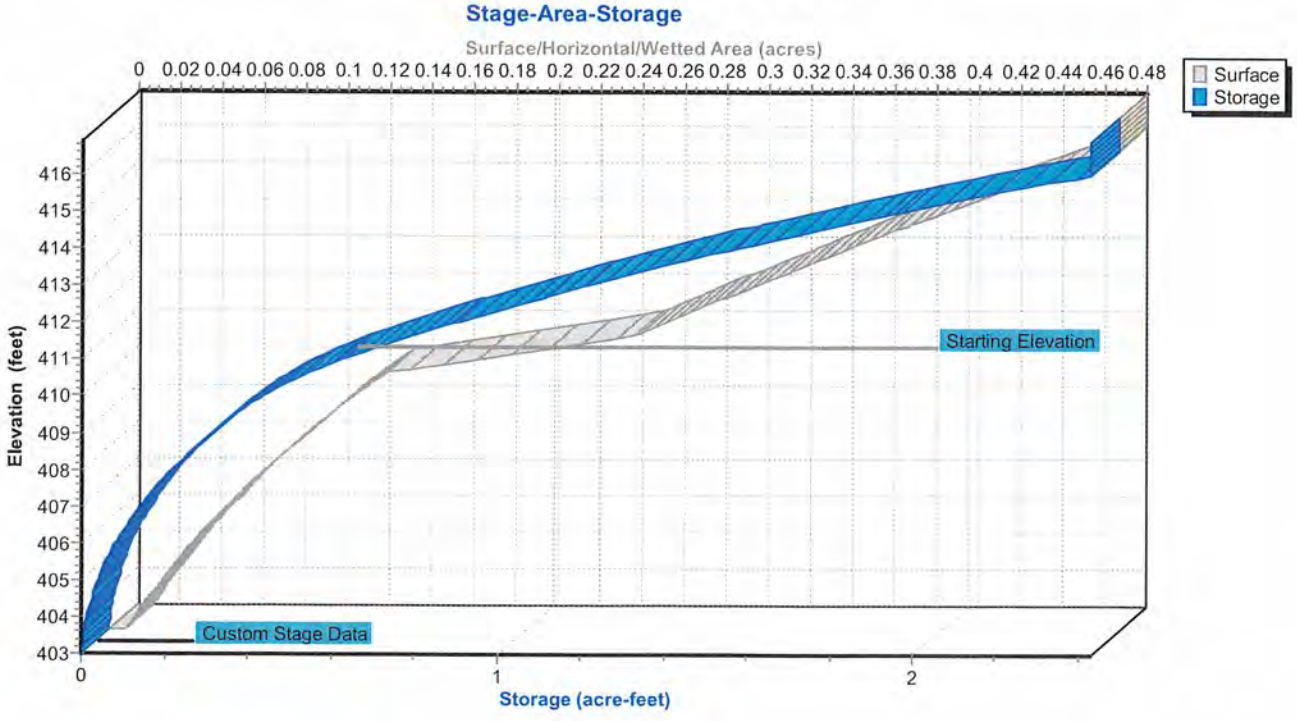
Pond 28P: PROPOSED POND



Pond 28P: PROPOSED POND



Pond 28P: PROPOSED POND



Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 2 Runoff Area=3.000 ac 0.00% Impervious Runoff Depth>0.19"
Flow Length=280' Slope=0.0070 '/' Tc=80.3 min CN=63 Runoff=0.14 cfs 0.049 af

Subcatchment 4S: Subcatchment 3 Runoff Area=3.370 ac 0.00% Impervious Runoff Depth>0.65"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=77 Runoff=1.04 cfs 0.183 af

Subcatchment 5S: Subcatchment 4 Runoff Area=4.060 ac 0.00% Impervious Runoff Depth>0.01"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=49 Runoff=0.01 cfs 0.002 af

Subcatchment 6S: Subcatchment 1 Runoff Area=12.550 ac 80.08% Impervious Runoff Depth>1.57"
Flow Length=2,260' Tc=36.2 min CN=92 Runoff=13.12 cfs 1.641 af

Subcatchment 12S: SC3 Runoff Area=1.288 ac 100.00% Impervious Runoff Depth>2.15"
Flow Length=1,245' Tc=10.3 min CN=98 Runoff=3.20 cfs 0.230 af

Subcatchment 14S: SC2 Runoff Area=1.736 ac 100.00% Impervious Runoff Depth>2.14"
Flow Length=1,196' Slope=0.0033 '/' Tc=18.6 min CN=98 Runoff=3.26 cfs 0.310 af

Subcatchment 19S: SC4 Runoff Area=1.044 ac 100.00% Impervious Runoff Depth>2.14"
Flow Length=804' Slope=0.0018 '/' Tc=17.3 min CN=98 Runoff=2.03 cfs 0.187 af

Subcatchment 20S: SC1 Runoff Area=0.653 ac 100.00% Impervious Runoff Depth>2.15"
Flow Length=255' Slope=0.0073 '/' Tc=3.6 min CN=98 Runoff=2.23 cfs 0.117 af

Reach 7R: Small Creek Avg. Flow Depth=1.03' Max Vel=4.58 fps Inflow=13.74 cfs 1.826 af
n=0.030 L=360.0' S=0.0167 '/' Capacity=146.42 cfs Outflow=13.73 cfs 1.824 af

Reach 9R: Butternut Creek Avg. Flow Depth=0.52' Max Vel=2.96 fps Inflow=14.04 cfs 2.292 af
n=0.030 L=380.0' S=0.0097 '/' Capacity=1,479.89 cfs Outflow=14.00 cfs 2.286 af

Reach 10R: Concrete Pipe Avg. Flow Depth=0.67' Max Vel=9.08 fps Inflow=13.12 cfs 1.643 af
30.0" Round Pipe w/ 4.0" inside fill n=0.011 L=150.0' S=0.0133 '/' Capacity=49.49 cfs Outflow=13.11 cfs 1.643 af

Pond 17P: CB1 Peak Elev=420.72' Inflow=2.23 cfs 0.117 af
12.0" Round Culvert n=0.011 L=150.0' S=0.0051 '/' Outflow=2.23 cfs 0.117 af

Pond 22P: CB4 Peak Elev=420.49' Inflow=2.03 cfs 0.187 af
12.0" Round Culvert n=0.011 L=138.0' S=0.0050 '/' Outflow=2.03 cfs 0.187 af

Pond 23P: CB3 Peak Elev=419.67' Inflow=3.20 cfs 0.230 af
12.0" Round Culvert n=0.015 L=129.0' S=0.0190 '/' Outflow=3.20 cfs 0.230 af

Pond 24P: CB2 Peak Elev=419.88' Inflow=3.84 cfs 0.427 af
24.0" Round Culvert n=0.011 L=87.0' S=0.0085 '/' Outflow=3.84 cfs 0.427 af

Pond 27P: PROPOSED POND Peak Elev=0.00' Storage=0.000 af
Primary=0.00 cfs 0.000 af

Pond 28P: PROPOSED POND Peak Elev=412.87' Storage=1.169 af Inflow=8.59 cfs 0.844 af
Outflow=0.67 cfs 0.419 af

Total Runoff Area = 27.701 ac Runoff Volume = 2.719 af Average Runoff Depth = 1.18"
46.68% Pervious = 12.930 ac 53.32% Impervious = 14.771 ac

Summary for Subcatchment 1S: Subcatchment 2

Area closest to butternut creek, between BD and BC.
sheet flow for 100 feet.
shallow channel flow for 180 feet.
380 feet flow in butternut creek.

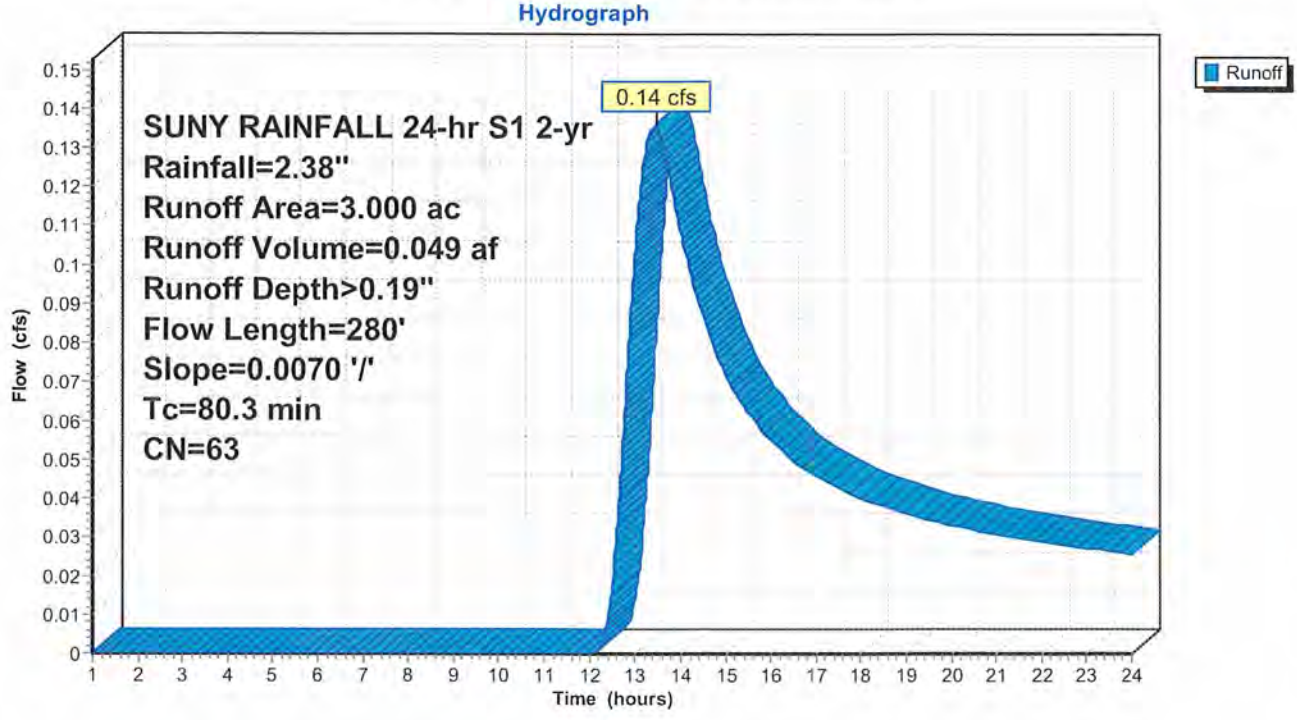
Runoff = 0.14 cfs @ 13.47 hrs, Volume= 0.049 af, Depth> 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
2.090	77	Woods, Good, HSG D
0.910	30	Woods, Good, HSG A
3.000	63	Weighted Average
3.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0	100	0.0070	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.38"
14.3	180	0.0070	0.21		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
80.3	280	Total			

Subcatchment 1S: Subcatchment 2



Summary for Subcatchment 4S: Subcatchment 3

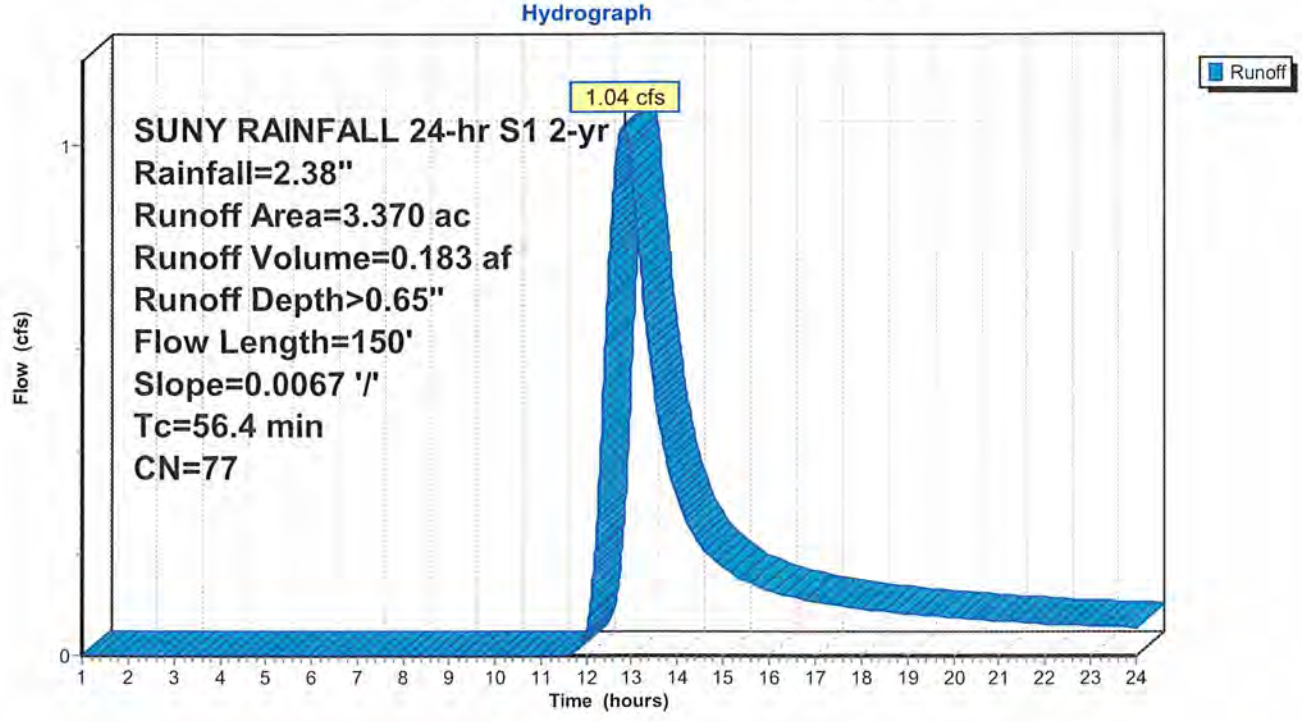
Runoff = 1.04 cfs @ 12.84 hrs, Volume= 0.183 af, Depth> 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
2.000	77	Woods, Good, HSG D
1.370	77	Woods, Good, HSG D
3.370	77	Weighted Average
3.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 4S: Subcatchment 3



Summary for Subcatchment 5S: Subcatchment 4

[73] Warning: Peak may fall outside time span

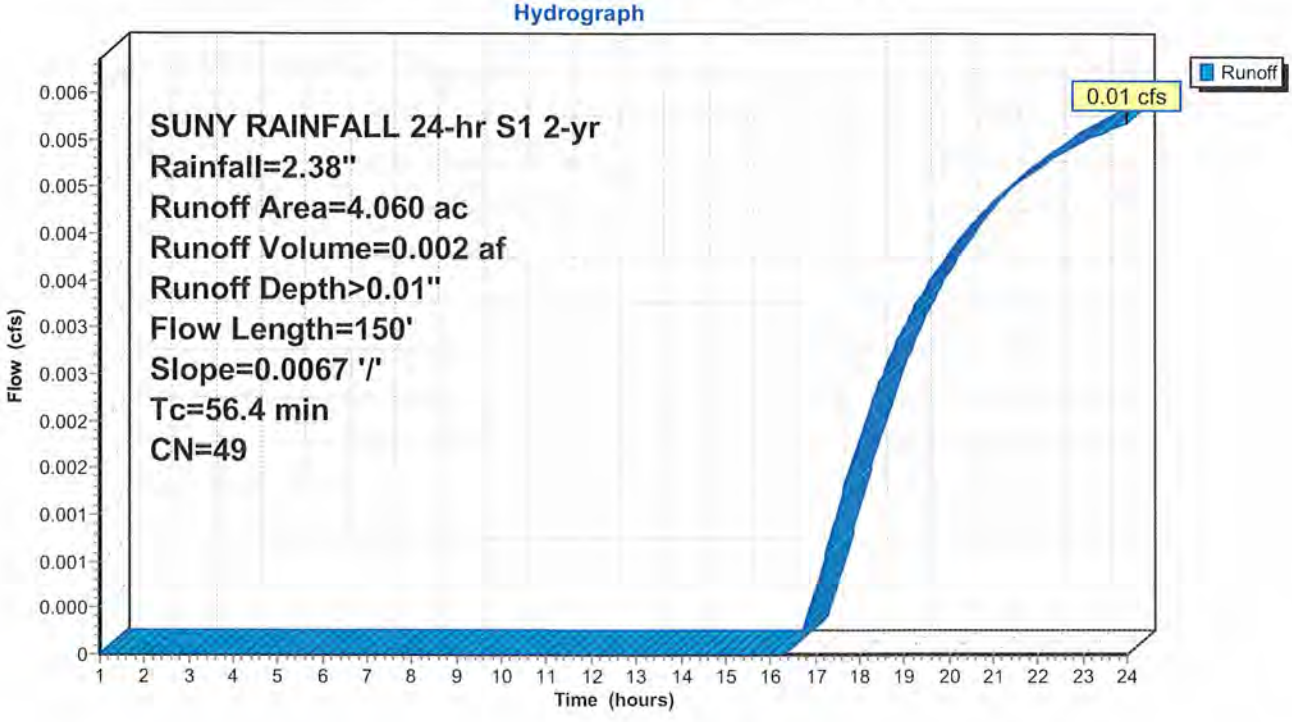
Runoff = 0.01 cfs @ 24.00 hrs, Volume= 0.002 af, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
4.060	49	50-75% Grass cover, Fair, HSG A
4.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 5S: Subcatchment 4



Summary for Subcatchment 6S: Subcatchment 1

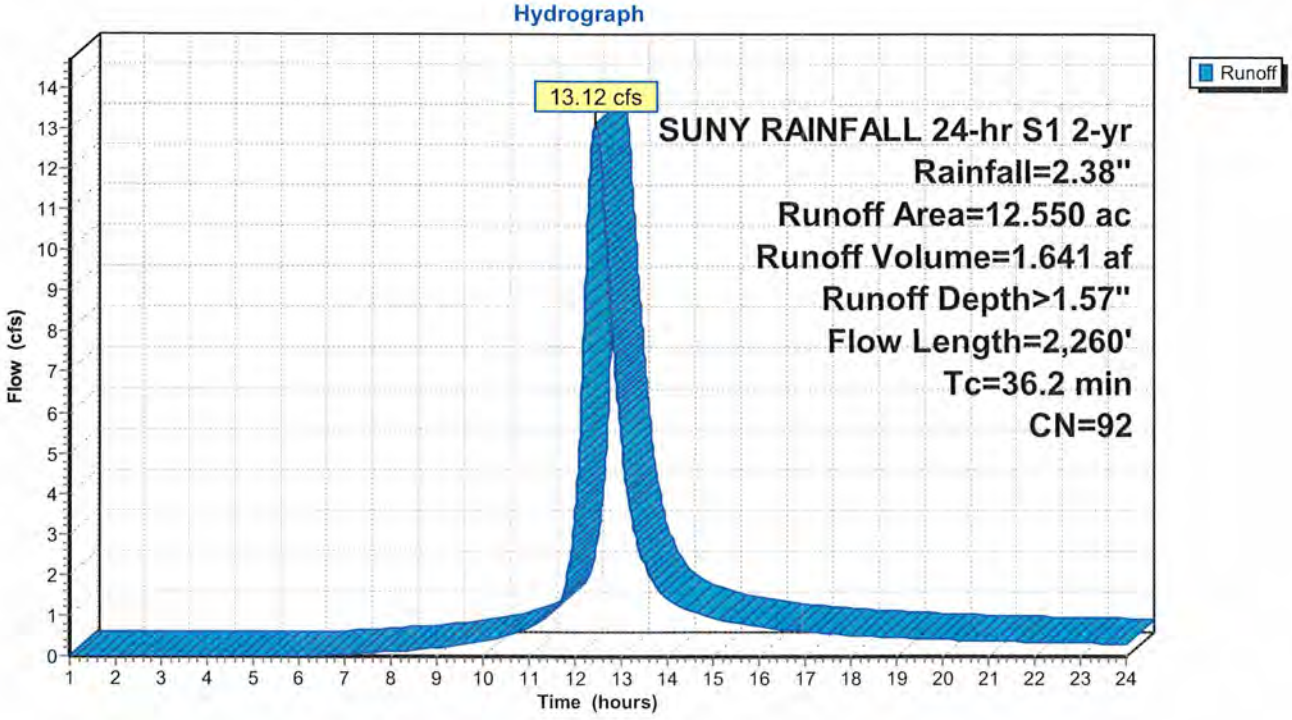
Runoff = 13.12 cfs @ 12.43 hrs, Volume= 1.641 af, Depth> 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
7.650	98	Paved parking, HSG A
0.900	98	Paved parking, HSG D
2.700	83	Paved roads w/open ditches, 50% imp, HSG A
0.300	93	Paved roads w/open ditches, 50% imp, HSG D
0.900	68	<50% Grass cover, Poor, HSG A
0.100	89	<50% Grass cover, Poor, HSG D
12.550	92	Weighted Average
2.500		19.92% Pervious Area
10.050		80.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0105	0.08		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.38"
6.8	850	0.0105	2.08		**Shallow Concentrated Flow, Shallow Concentrated** Paved Kv= 20.3 fps
6.2	950	0.0084	2.54	13.56	**Parabolic Channel, Stream** W=4.00' D=2.00' Area=5.3 sf Perim=5.9' n= 0.050 Sluggish weedy reaches w/pools
1.8	360	0.0139	3.35	52.55	**Parabolic Channel, Sluggish Stream W. Side of BN Creek** W=7.25' D=3.25' Area=15.7 sf Perim=10.2' n= 0.070 Sluggish weedy reaches w/pools
36.2	2,260	Total			

Subcatchment 6S: Subcatchment 1



Summary for Subcatchment 12S: SC3

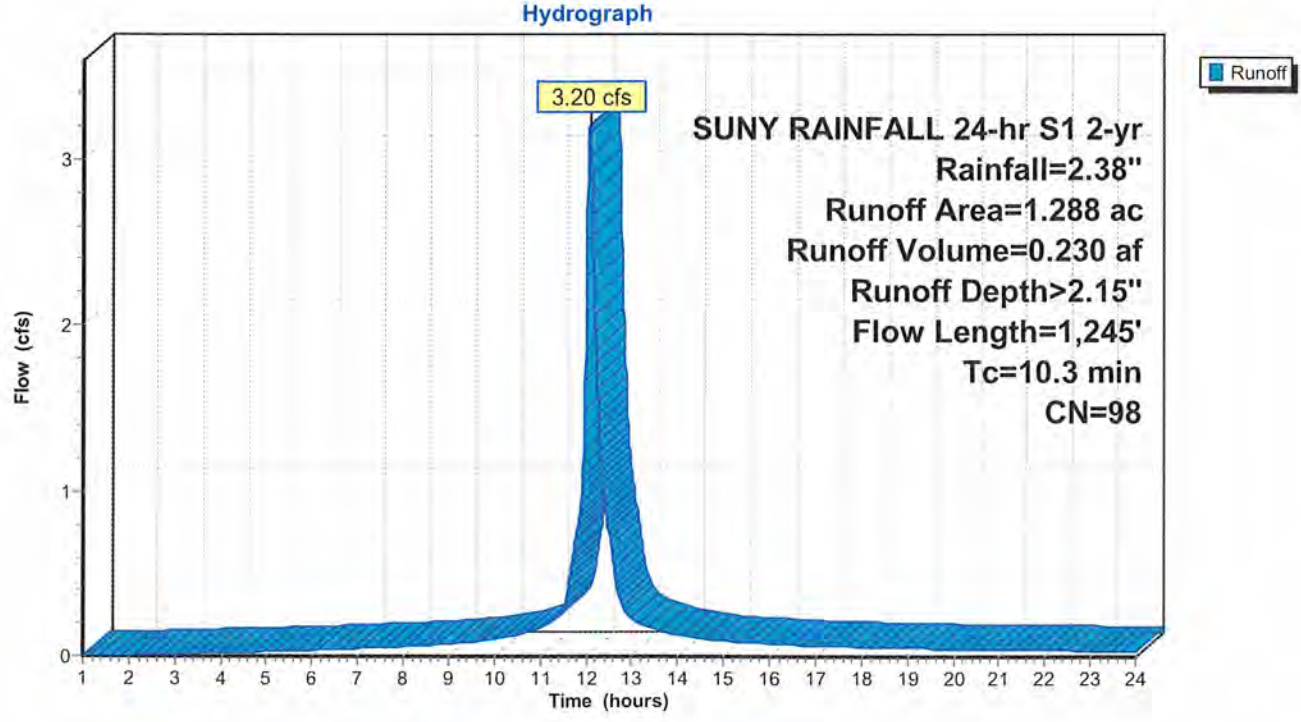
Runoff = 3.20 cfs @ 12.09 hrs, Volume= 0.230 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
1.288	98	Paved roads w/curbs & sewers, HSG D
1.288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	100	0.0070	0.78		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
8.2	1,145	0.0133	2.34		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.3	1,245	Total			

Subcatchment 12S: SC3



Summary for Subcatchment 14S: SC2

Combined nodes 9,10,5 &4

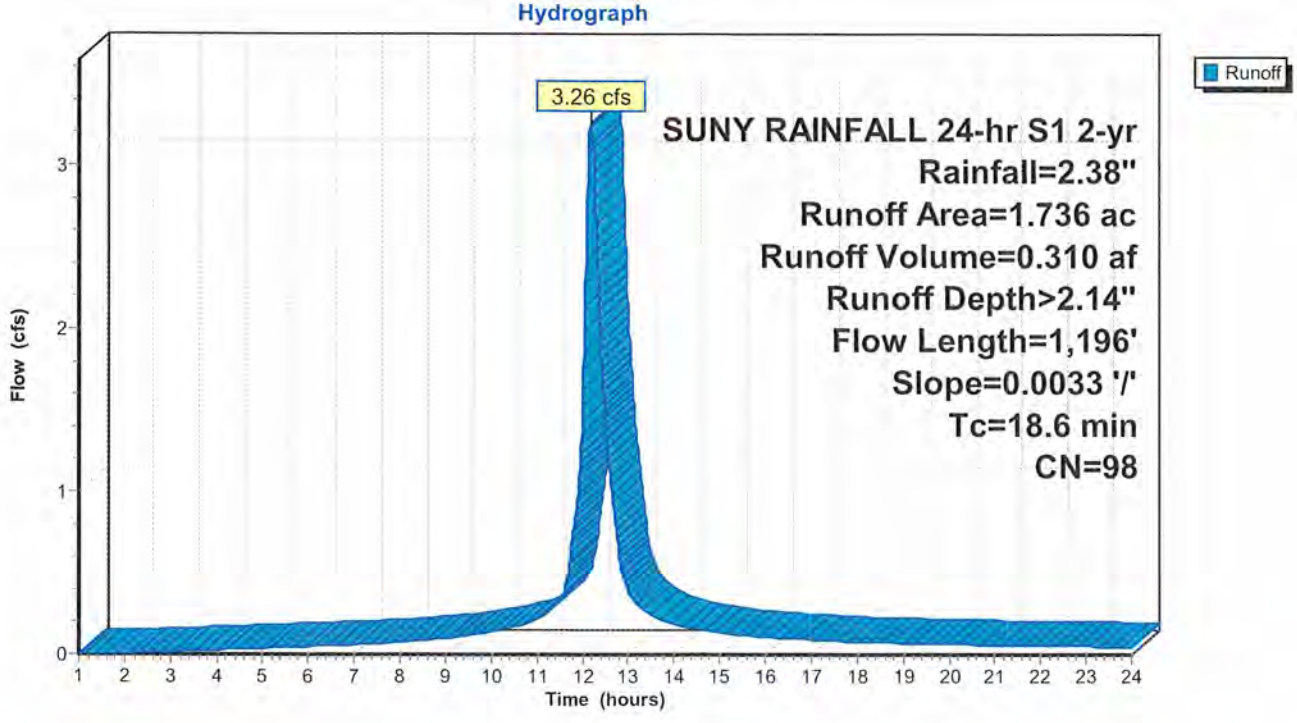
Runoff = 3.26 cfs @ 12.20 hrs, Volume= 0.310 af, Depth> 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
1.736	98	Paved roads w/curbs & sewers, HSG D
1.736		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	100	0.0033	0.58		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
15.7	1,096	0.0033	1.17		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.6	1,196	Total			

Subcatchment 14S: SC2



Summary for Subcatchment 19S: SC4

Combined nodes 2&3

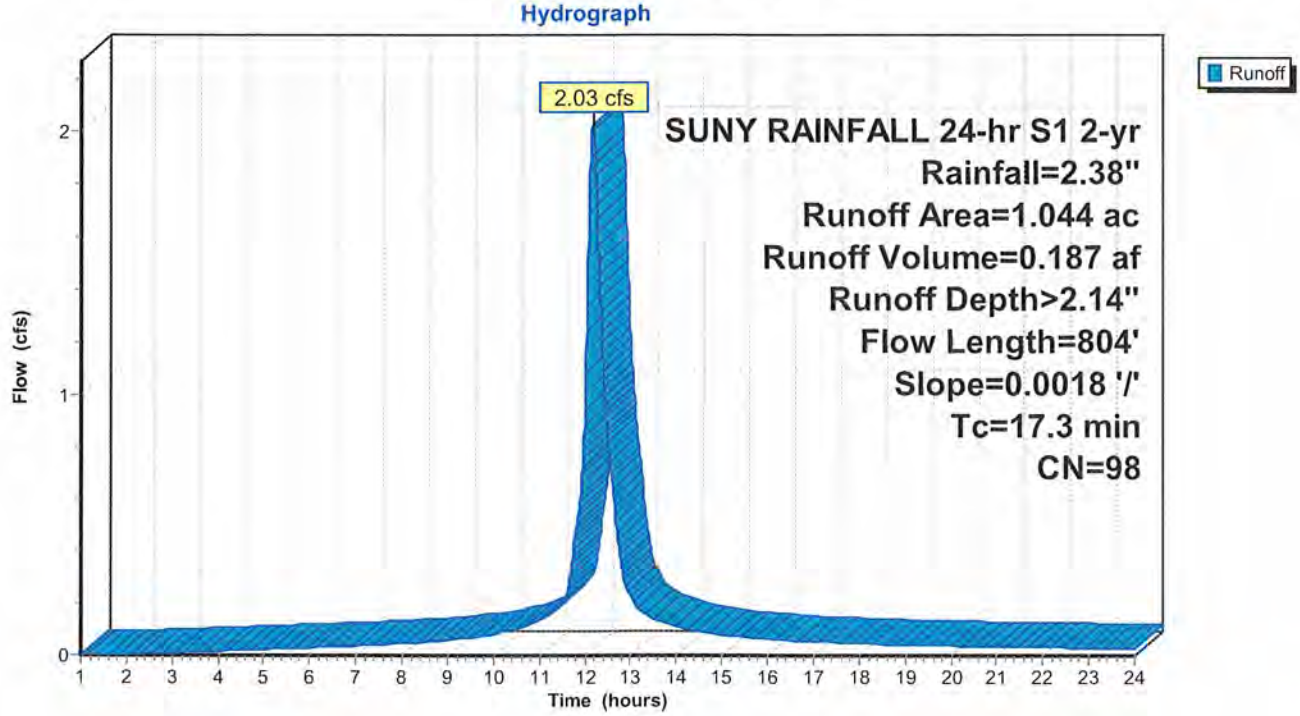
Runoff = 2.03 cfs @ 12.18 hrs, Volume= 0.187 af, Depth> 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
1.044	98	Paved roads w/curbs & sewers, HSG D
1.044		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	100	0.0018	0.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
13.6	704	0.0018	0.86		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
17.3	804	Total			

Subcatchment 19S: SC4



Summary for Subcatchment 20S: SC1

Combined nodes 1&6

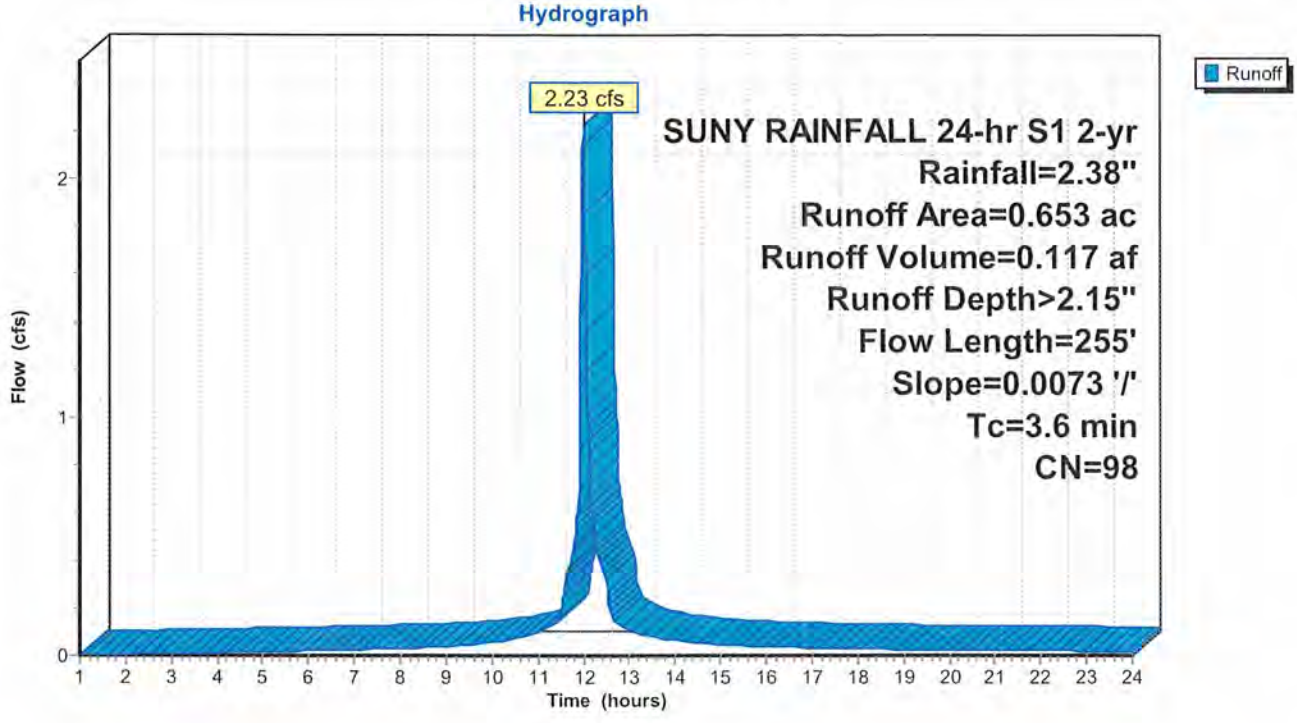
Runoff = 2.23 cfs @ 12.01 hrs, Volume= 0.117 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 2-yr Rainfall=2.38"

Area (ac)	CN	Description
0.653	98	Paved roads w/curbs & sewers, HSG D
0.653		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	100	0.0073	0.79		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
1.5	155	0.0073	1.73		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.6	255	Total			

Subcatchment 20S: SC1



Summary for Reach 7R: Small Creek

[62] Hint: Exceeded Reach 10R OUTLET depth by 0.04' @ 12.62 hrs

Inflow Area = 19.980 ac, 50.30% Impervious, Inflow Depth > 1.10" for 2-yr event
Inflow = 13.74 cfs @ 12.46 hrs, Volume= 1.826 af
Outflow = 13.73 cfs @ 12.48 hrs, Volume= 1.824 af, Atten= 0%, Lag= 0.8 min

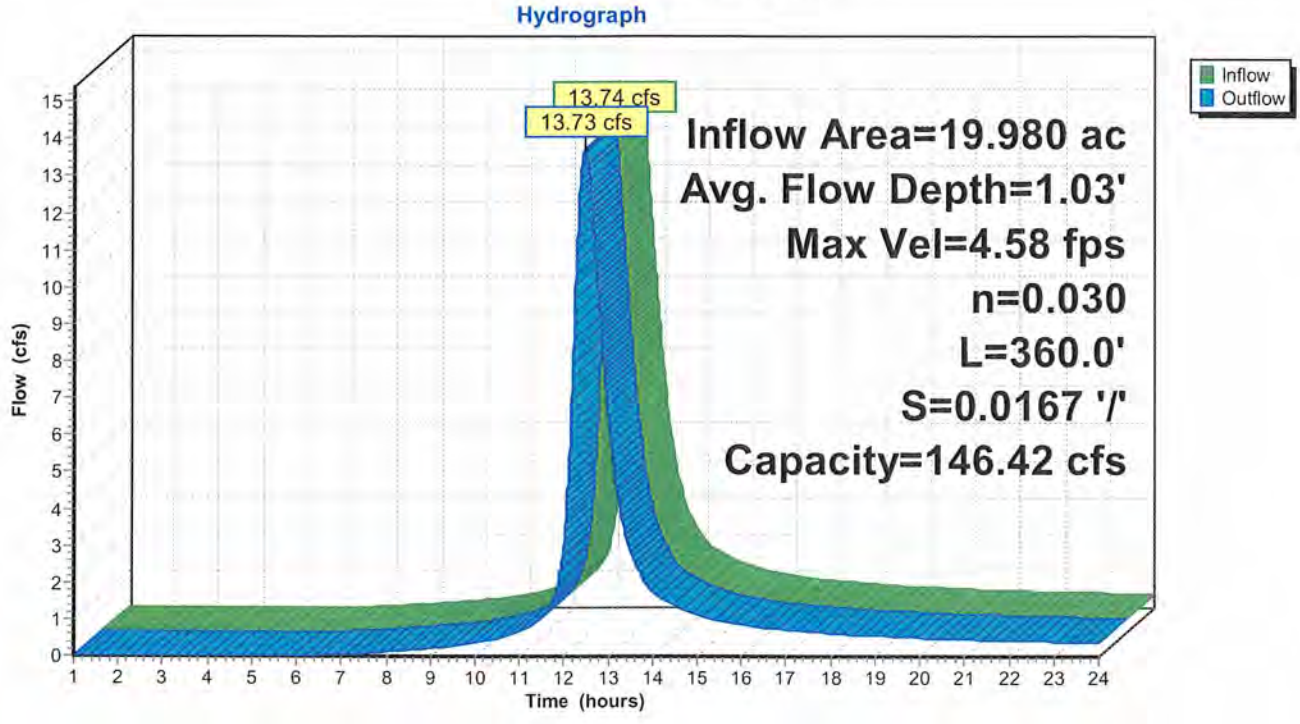
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.58 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.87 fps, Avg. Travel Time= 3.2 min

Peak Storage= 1,079 cf @ 12.48 hrs
Average Depth at Peak Storage= 1.03'
Bank-Full Depth= 3.25' Flow Area= 16.8 sf, Capacity= 146.42 cfs

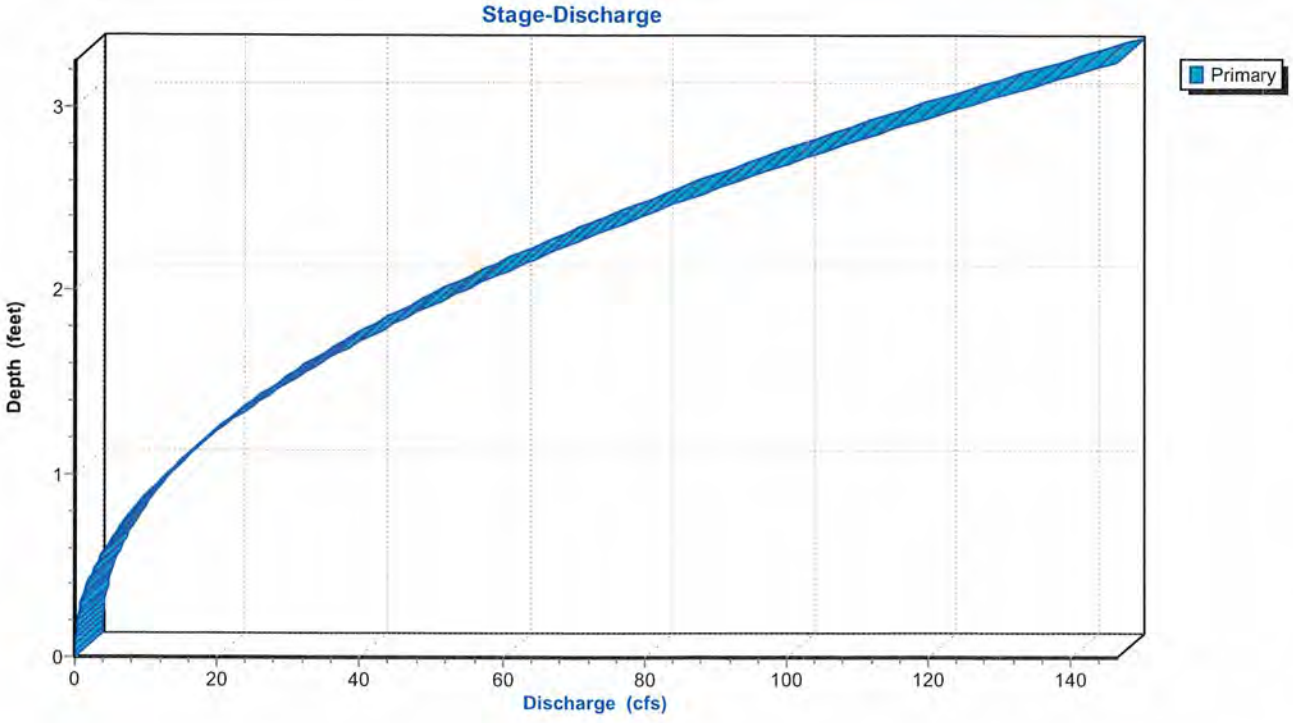
7.75' x 3.25' deep Parabolic Channel, n= 0.030 Earth, dense weeds
Length= 360.0' Slope= 0.0167 '/'
Inlet Invert= 414.00', Outlet Invert= 408.00'



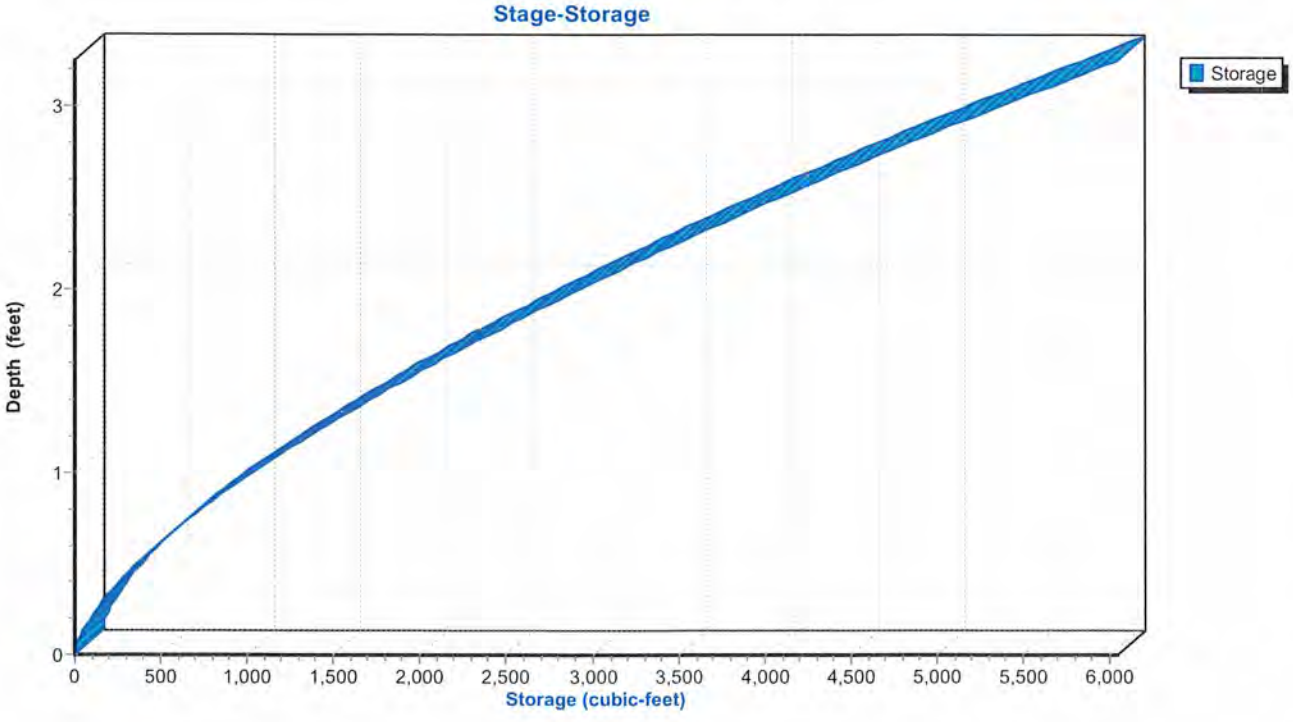
Reach 7R: Small Creek



Reach 7R: Small Creek



Reach 7R: Small Creek



Summary for Reach 9R: Butternut Creek

[61] Hint: Exceeded Reach 7R outlet invert by 0.52' @ 12.50 hrs

Inflow Area = 27.701 ac, 53.32% Impervious, Inflow Depth > 0.99" for 2-yr event
Inflow = 14.04 cfs @ 12.48 hrs, Volume= 2.292 af
Outflow = 14.00 cfs @ 12.50 hrs, Volume= 2.286 af, Atten= 0%, Lag= 1.5 min

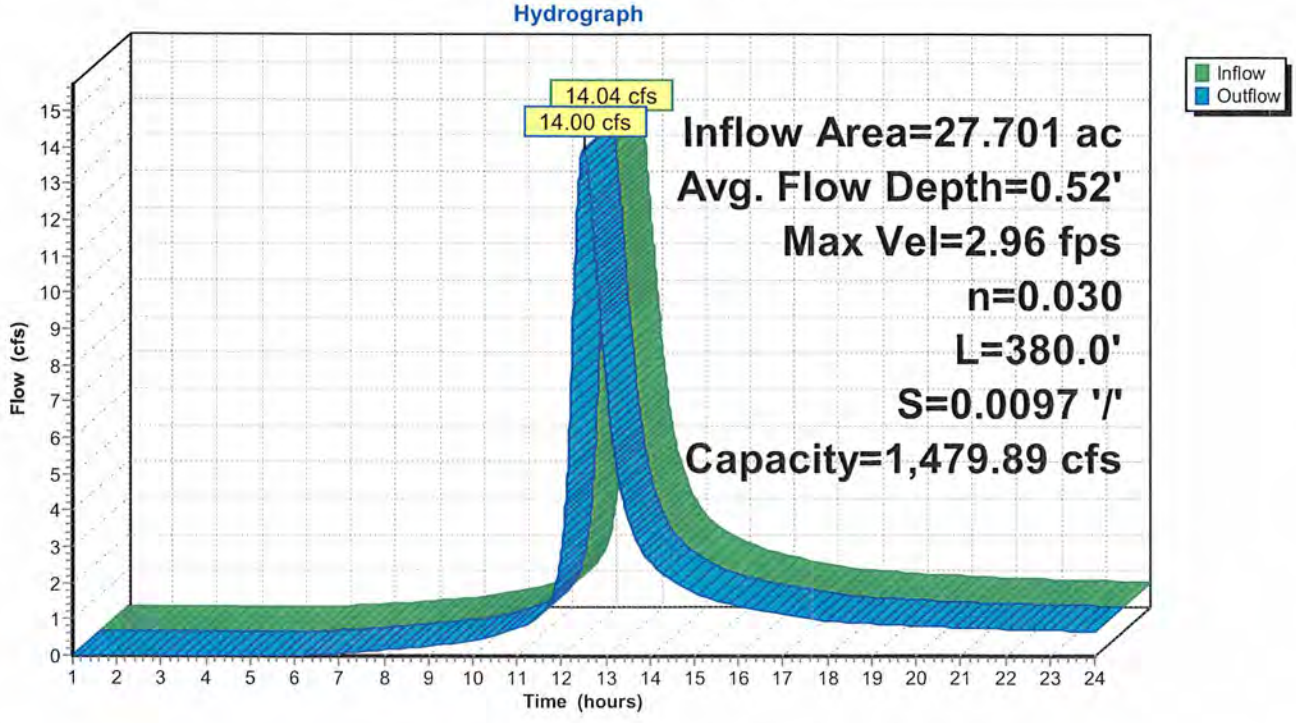
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.96 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 5.3 min

Peak Storage= 1,799 cf @ 12.50 hrs
Average Depth at Peak Storage= 0.52'
Defined Flood Depth= 417.70' Flow Area= 6,223.3 sf, Capacity= 98,716.46 cfs
Bank-Full Depth= 10.00' Flow Area= 120.0 sf, Capacity= 1,479.89 cfs

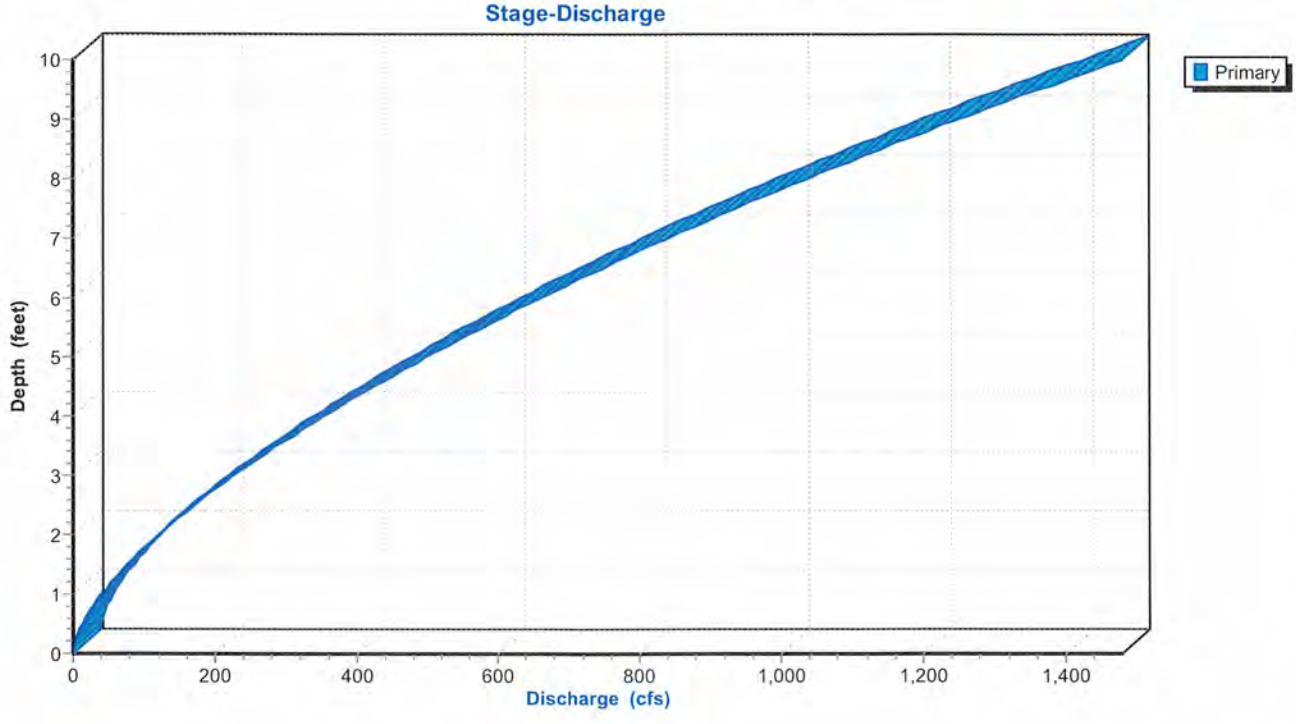
9.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 0.3 '/' Top Width= 15.00'
Length= 380.0' Slope= 0.0097 '/'
Inlet Invert= 408.00', Outlet Invert= 404.31'



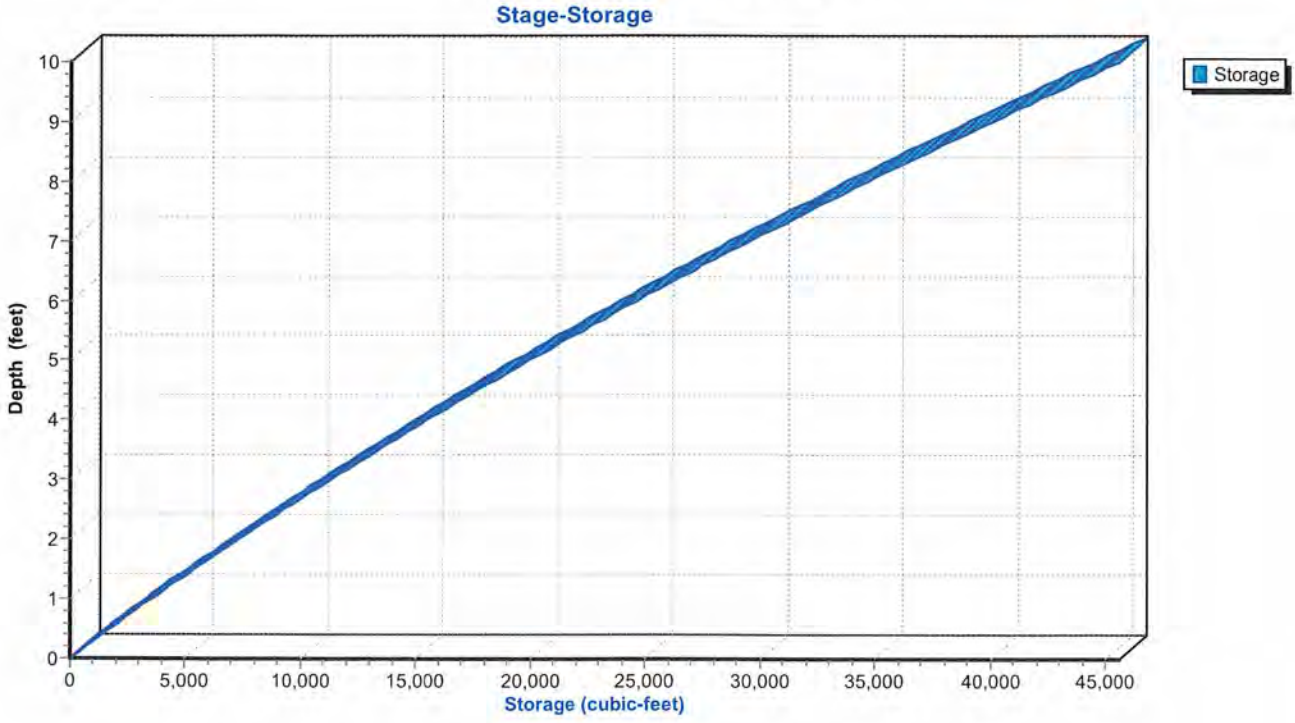
Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Summary for Reach 10R: Concrete Pipe

[52] Hint: Inlet/Outlet conditions not evaluated

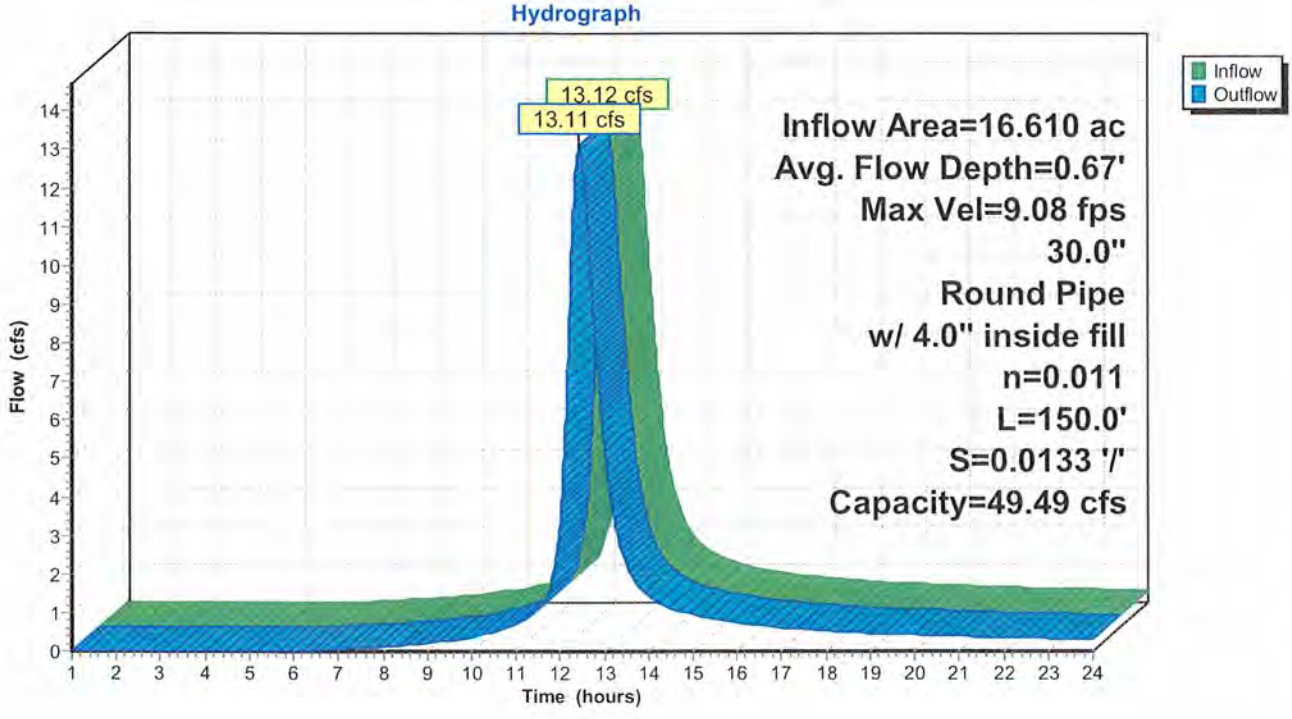
Inflow Area = 16.610 ac, 60.51% Impervious, Inflow Depth > 1.19" for 2-yr event
Inflow = 13.12 cfs @ 12.43 hrs, Volume= 1.643 af
Outflow = 13.11 cfs @ 12.44 hrs, Volume= 1.643 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.08 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.23 fps, Avg. Travel Time= 0.8 min

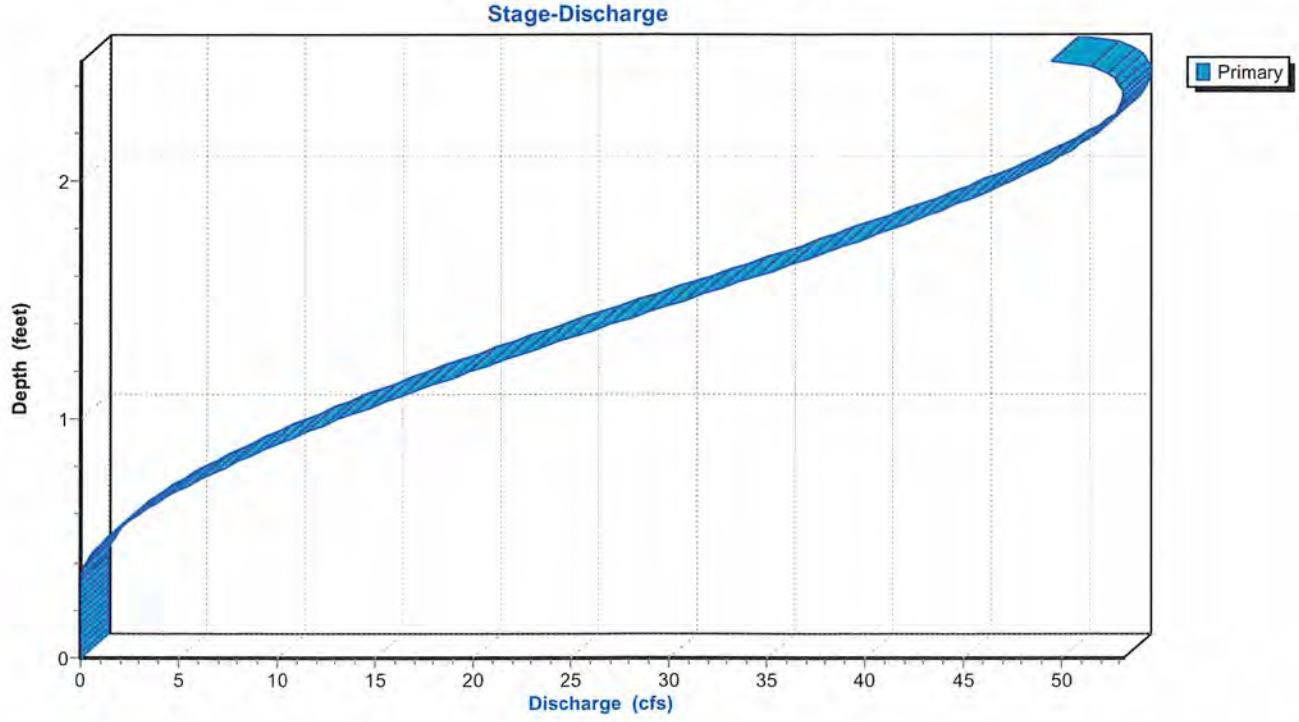
Peak Storage= 217 cf @ 12.44 hrs
Average Depth at Peak Storage= 1.00' above invert (0.67' above fill)
Bank-Full Depth= 2.50' above invert (2.17' above fill) Flow Area= 4.5 sf, Capacity= 49.49 cfs

30.0" Round Pipe w/ 4.0" inside fill
n= 0.011 Concrete pipe, finished
Length= 150.0' Slope= 0.0133 '/' (101 Elevation Intervals)
Inlet Invert= 416.00', Outlet Invert= 414.00'

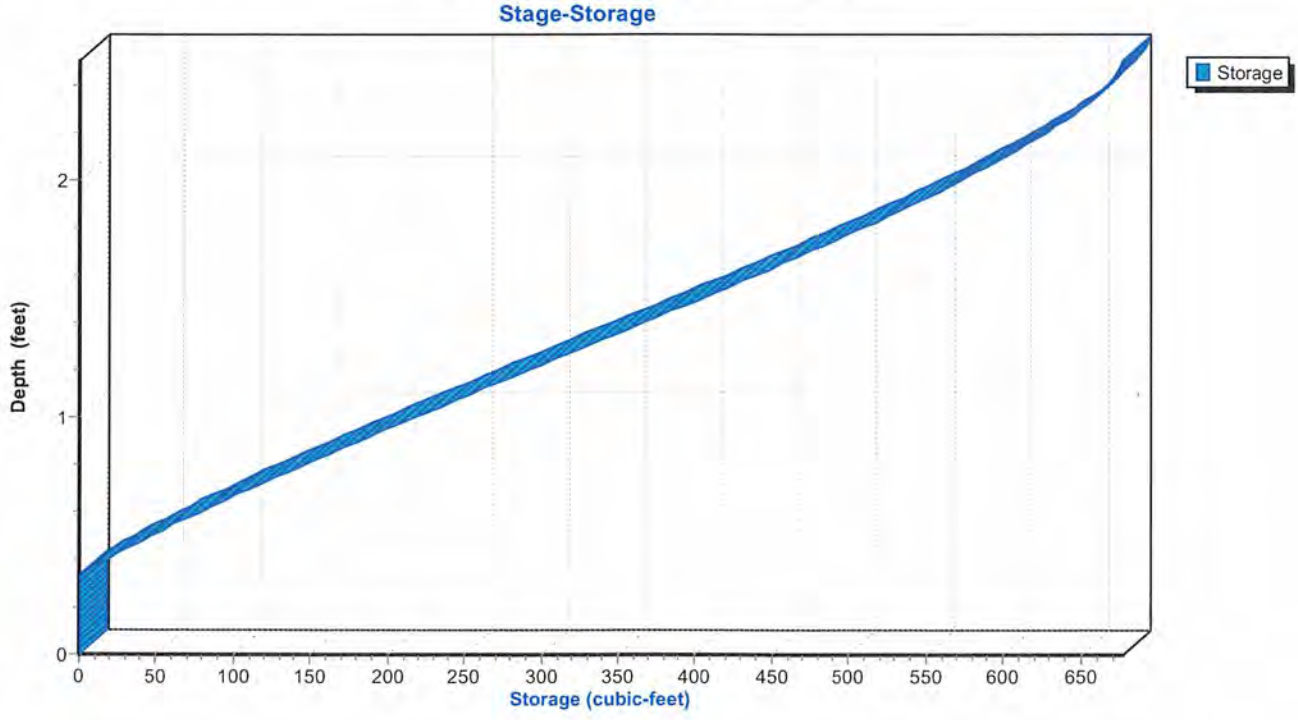




Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Summary for Pond 17P: CB1

[57] Hint: Peaked at 420.72' (Flood elevation advised)

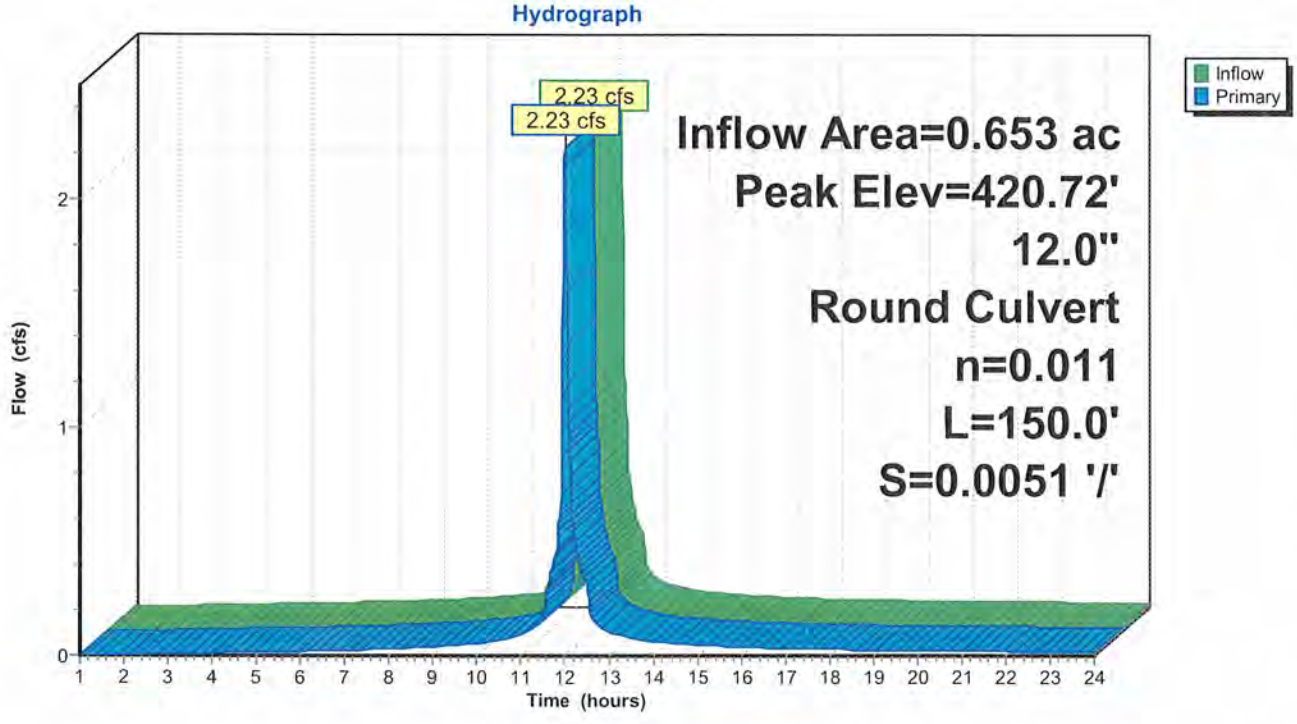
Inflow Area = 0.653 ac,100.00% Impervious, Inflow Depth > 2.15" for 2-yr event
Inflow = 2.23 cfs @ 12.01 hrs, Volume= 0.117 af
Outflow = 2.23 cfs @ 12.01 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.0 min
Primary = 2.23 cfs @ 12.01 hrs, Volume= 0.117 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 420.72' @ 12.01 hrs

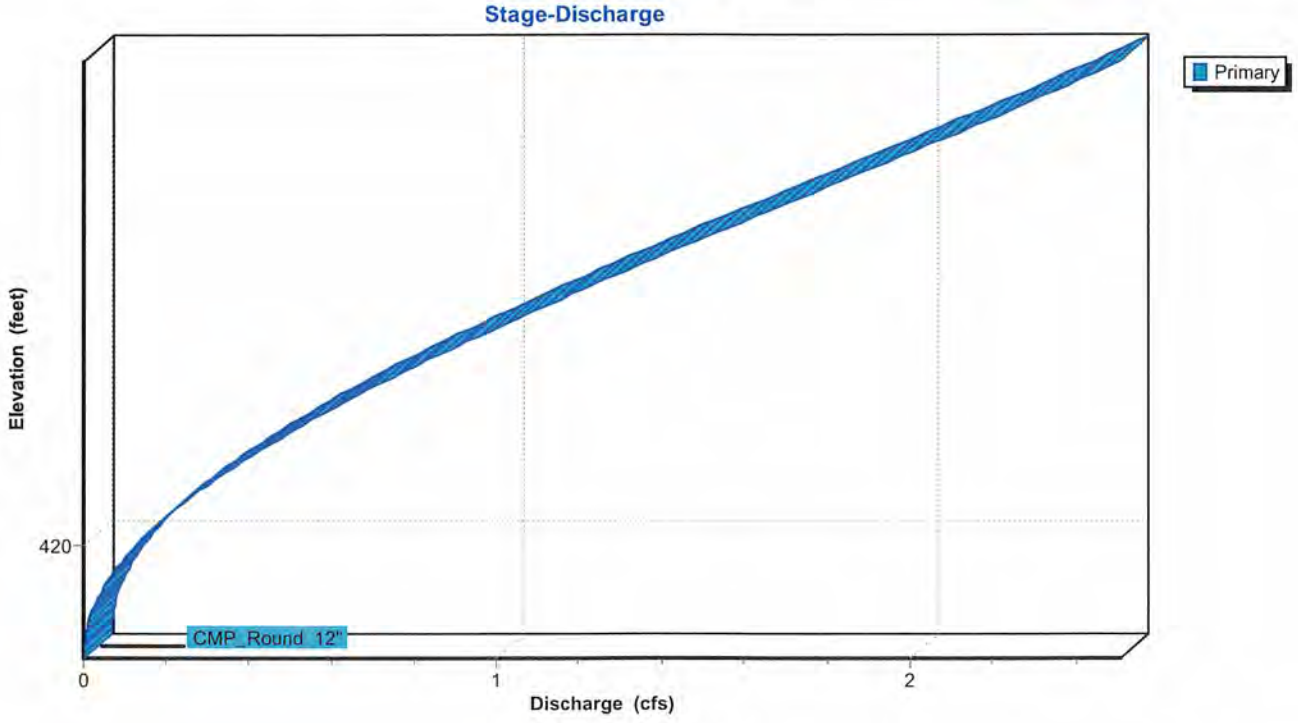
Device	Routing	Invert	Outlet Devices
#1	Primary	419.81'	**12.0" Round CMP_Round 12"** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.81' / 419.05' S= 0.0051 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.23 cfs @ 12.01 hrs HW=420.72' (Free Discharge)
↑—1=CMP_Round 12" (Barrel Controls 2.23 cfs @ 3.88 fps)

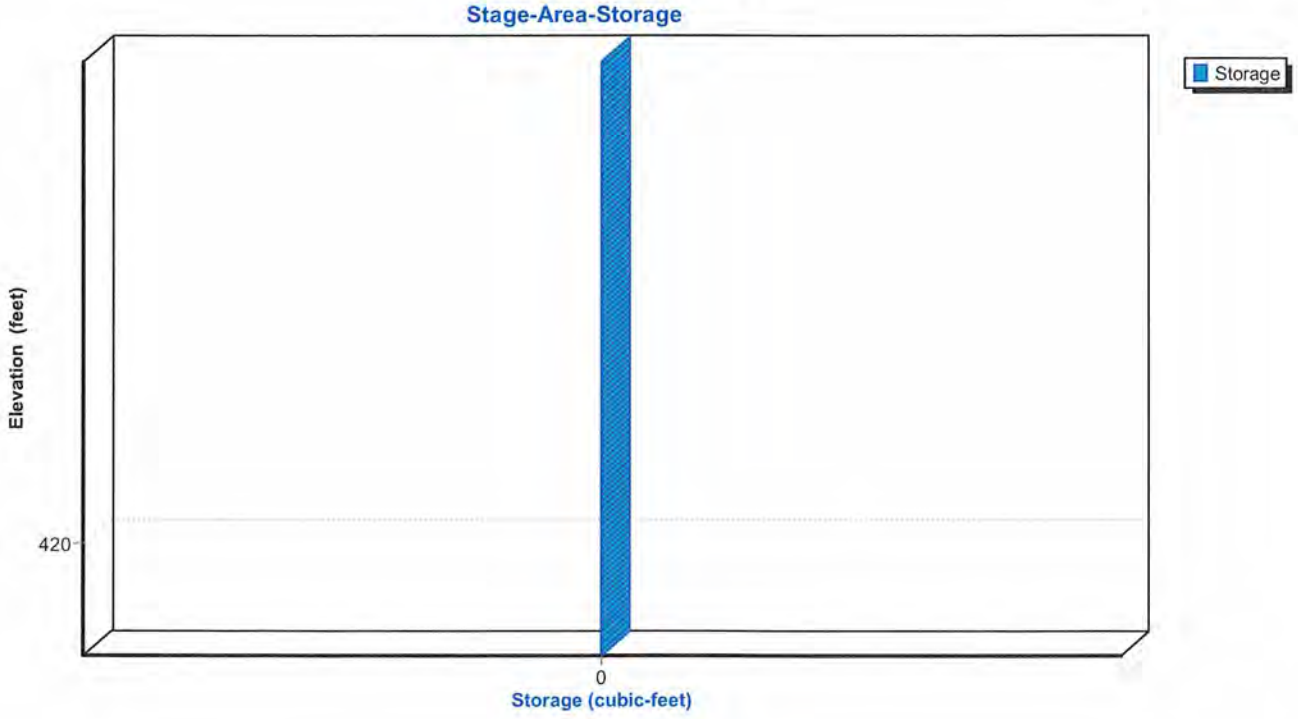
Pond 17P: CB1



Pond 17P: CB1



Pond 17P: CB1



Summary for Pond 22P: CB4

[57] Hint: Peaked at 420.49' (Flood elevation advised)

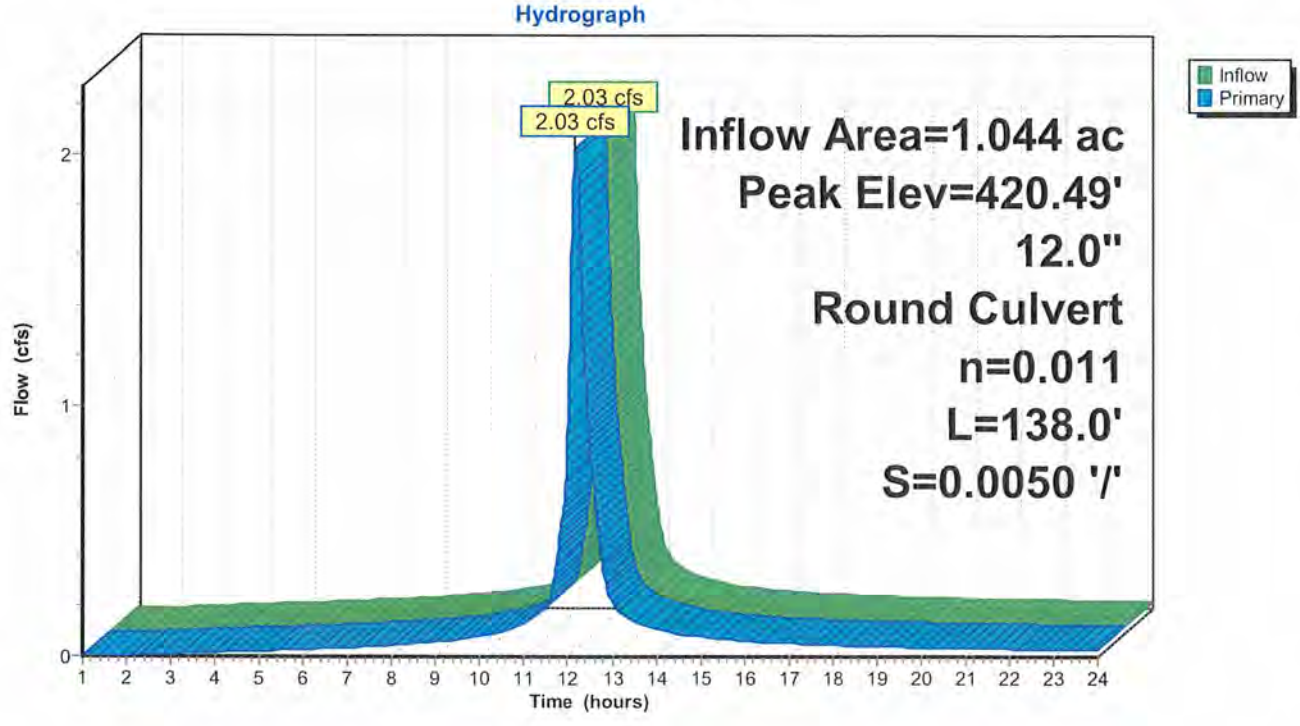
Inflow Area = 1.044 ac,100.00% Impervious, Inflow Depth > 2.14" for 2-yr event
Inflow = 2.03 cfs @ 12.18 hrs, Volume= 0.187 af
Outflow = 2.03 cfs @ 12.18 hrs, Volume= 0.187 af, Atten= 0%, Lag= 0.0 min
Primary = 2.03 cfs @ 12.18 hrs, Volume= 0.187 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 420.49' @ 12.18 hrs

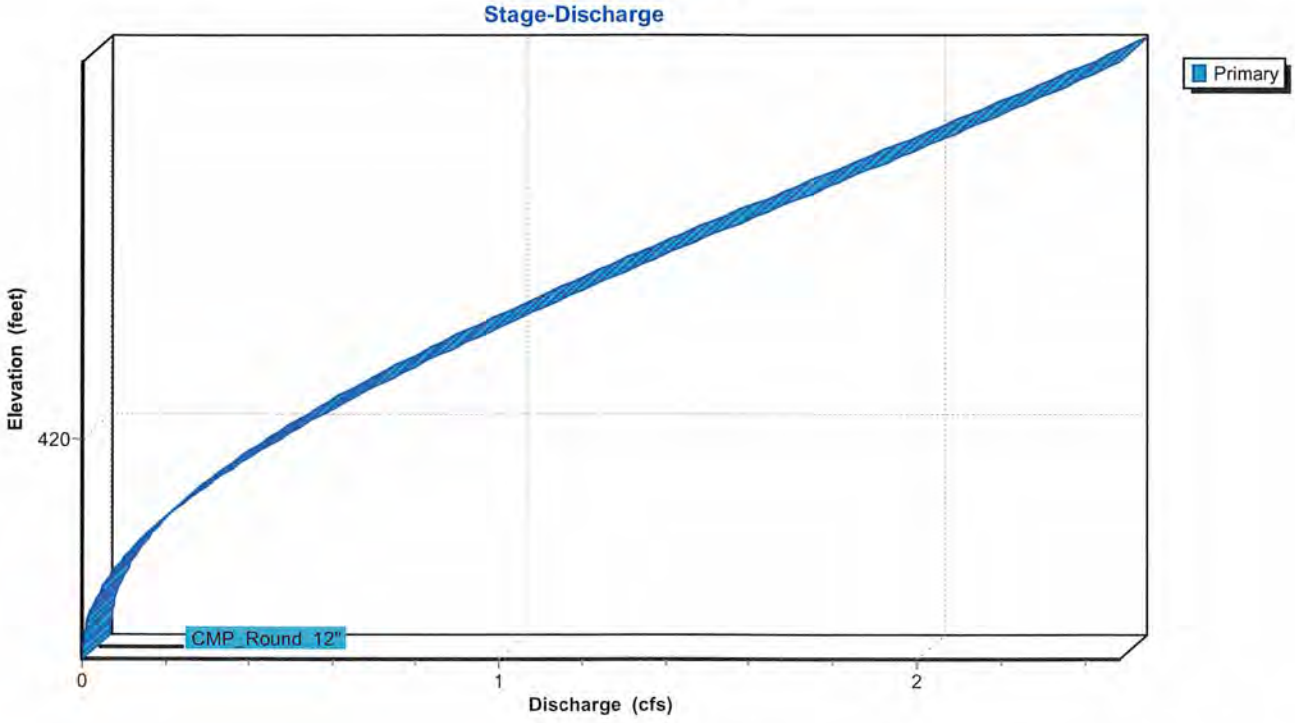
Device	Routing	Invert	Outlet Devices
#1	Primary	419.63'	**12.0" Round CMP_Round 12"** L= 138.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.63' / 418.94' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.03 cfs @ 12.18 hrs HW=420.49' (Free Discharge)
↑**1=CMP_Round 12"** (Barrel Controls 2.03 cfs @ 3.78 fps)

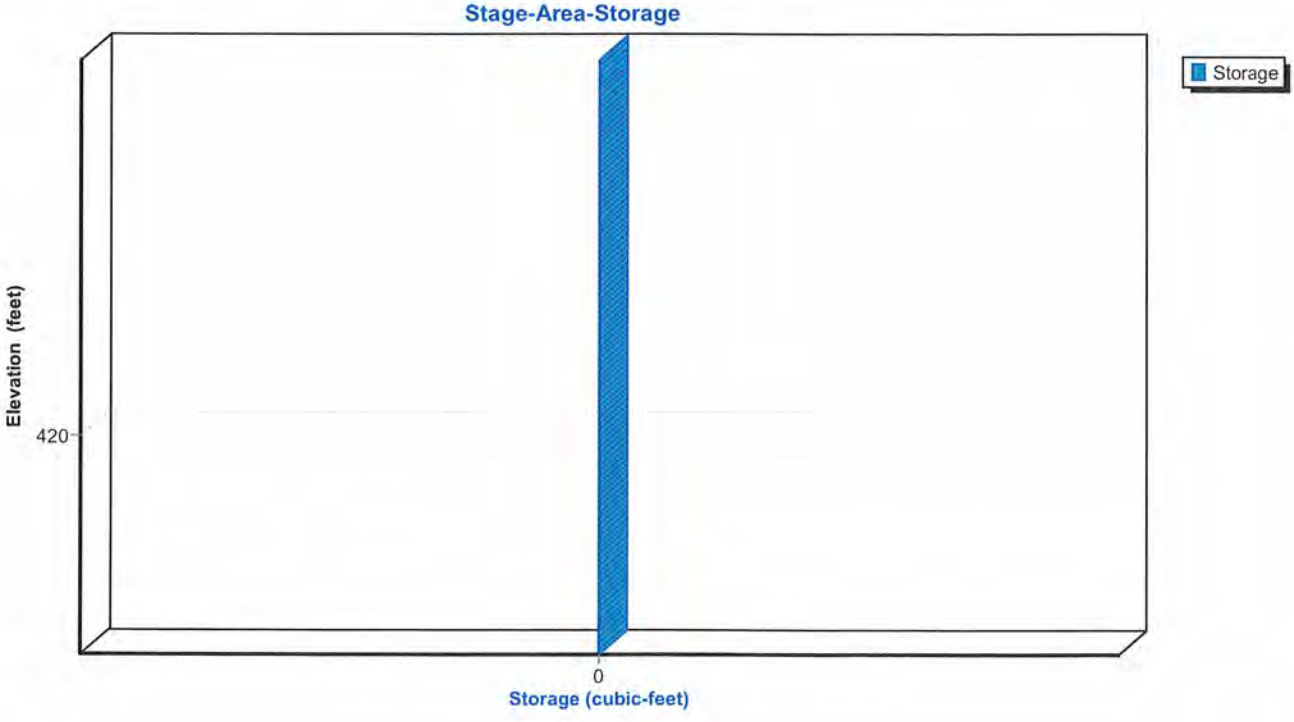
Pond 22P: CB4



Pond 22P: CB4



Pond 22P: CB4



Summary for Pond 23P: CB3

[57] Hint: Peaked at 419.67' (Flood elevation advised)

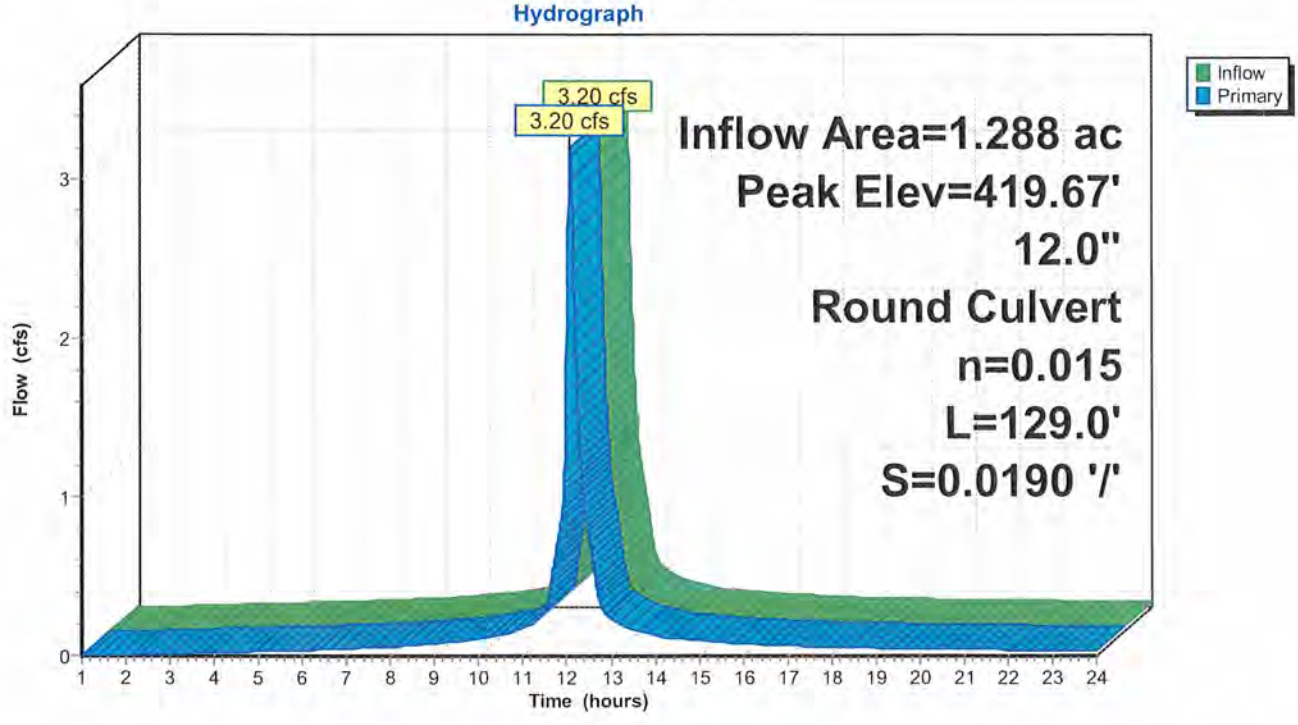
Inflow Area = 1.288 ac,100.00% Impervious, Inflow Depth > 2.15" for 2-yr event
Inflow = 3.20 cfs @ 12.09 hrs, Volume= 0.230 af
Outflow = 3.20 cfs @ 12.09 hrs, Volume= 0.230 af, Atten= 0%, Lag= 0.0 min
Primary = 3.20 cfs @ 12.09 hrs, Volume= 0.230 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 419.67' @ 12.09 hrs

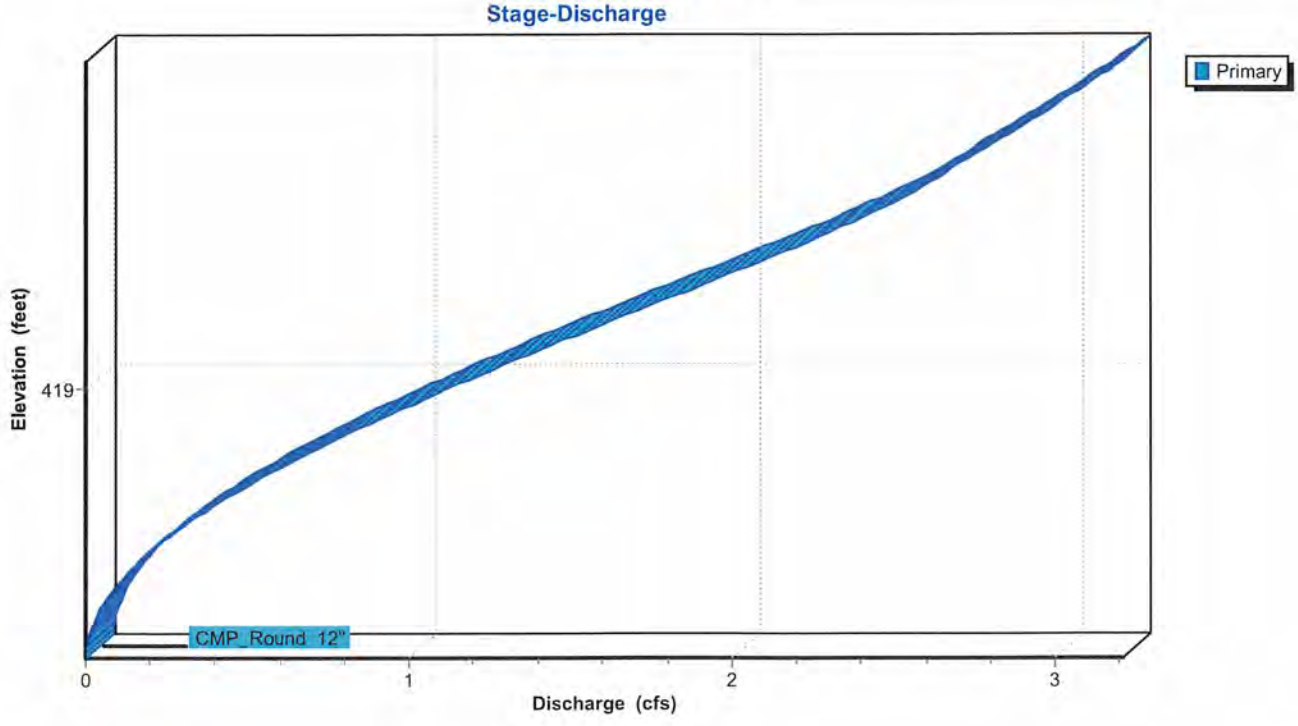
Device	Routing	Invert	Outlet Devices
#1	Primary	418.45'	**12.0" Round CMP_Round 12"** L= 129.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 418.45' / 416.00' S= 0.0190 '/' Cc= 0.900 n= 0.015 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.20 cfs @ 12.09 hrs HW=419.67' (Free Discharge)
↑—1=CMP_Round 12" (Inlet Controls 3.20 cfs @ 4.08 fps)

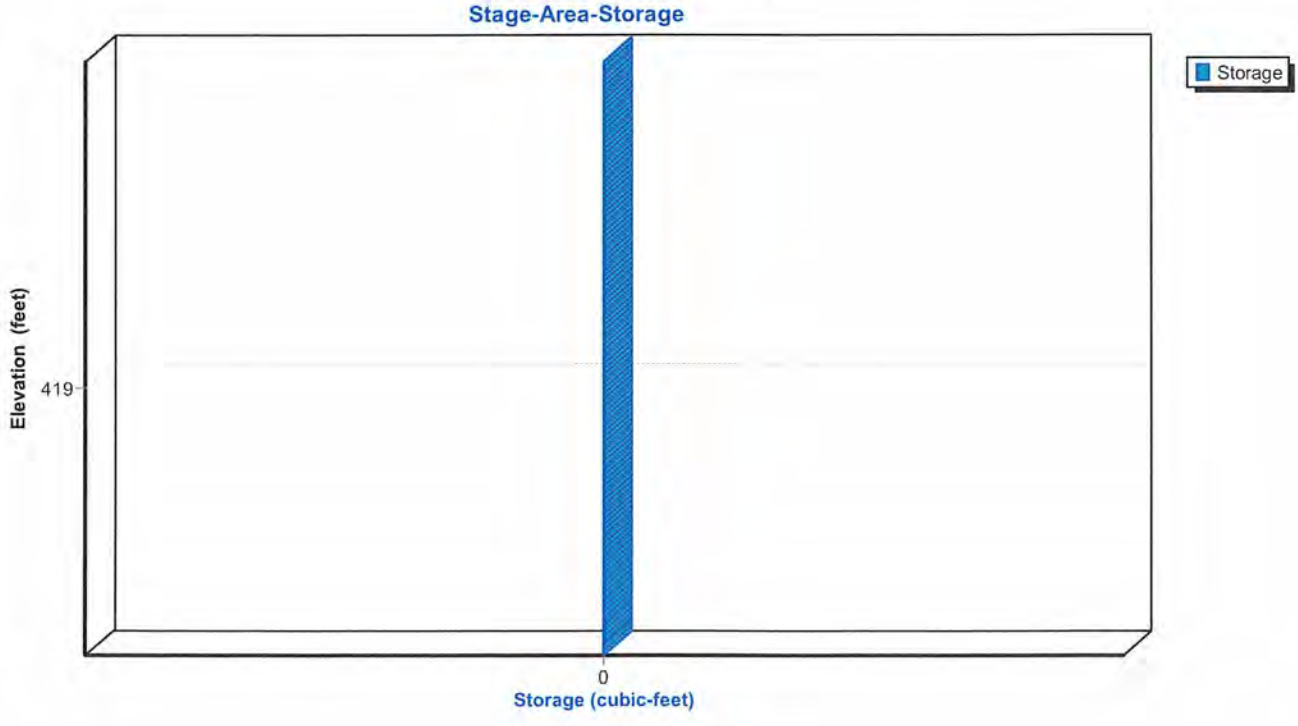
Pond 23P: CB3



Pond 23P: CB3



Pond 23P: CB3



Summary for Pond 24P: CB2

[57] Hint: Peaked at 419.88' (Flood elevation advised)
[79] Warning: Submerged Pond 17P Primary device # 1 INLET by 0.07'

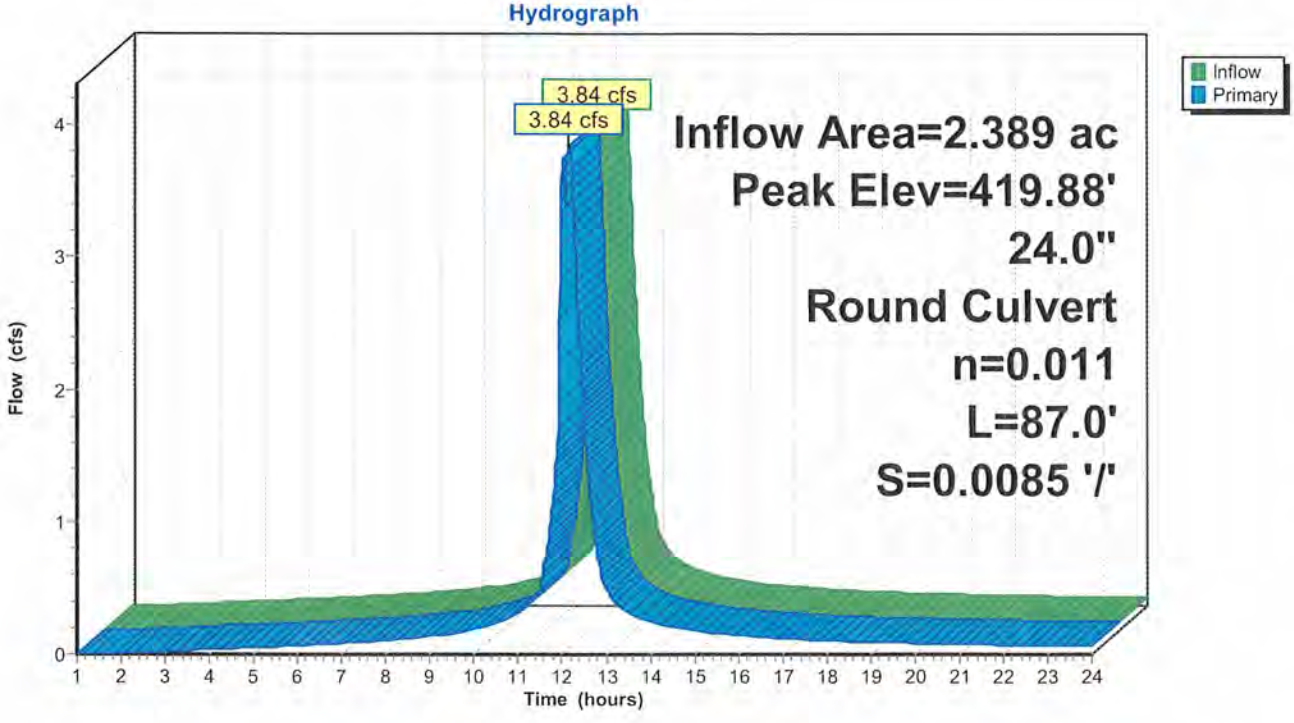
Inflow Area = 2.389 ac,100.00% Impervious, Inflow Depth > 2.15" for 2-yr event
Inflow = 3.84 cfs @ 12.18 hrs, Volume= 0.427 af
Outflow = 3.84 cfs @ 12.18 hrs, Volume= 0.427 af, Atten= 0%, Lag= 0.0 min
Primary = 3.84 cfs @ 12.18 hrs, Volume= 0.427 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 419.88' @ 12.18 hrs

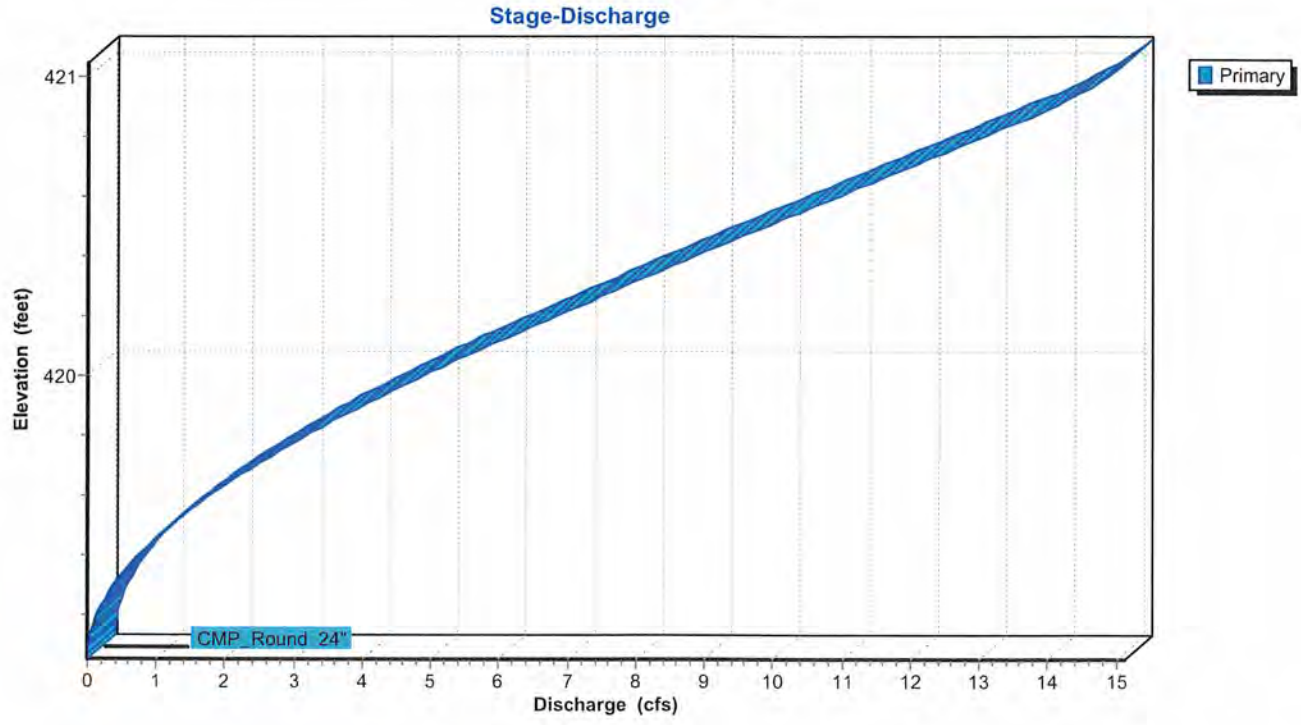
Device	Routing	Invert	Outlet Devices
#1	Primary	419.05'	**24.0" Round CMP_Round 24"** L= 87.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.05' / 418.31' S= 0.0085 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=3.84 cfs @ 12.18 hrs HW=419.88' (Free Discharge)
↑—1=CMP_Round 24" (Inlet Controls 3.84 cfs @ 3.10 fps)

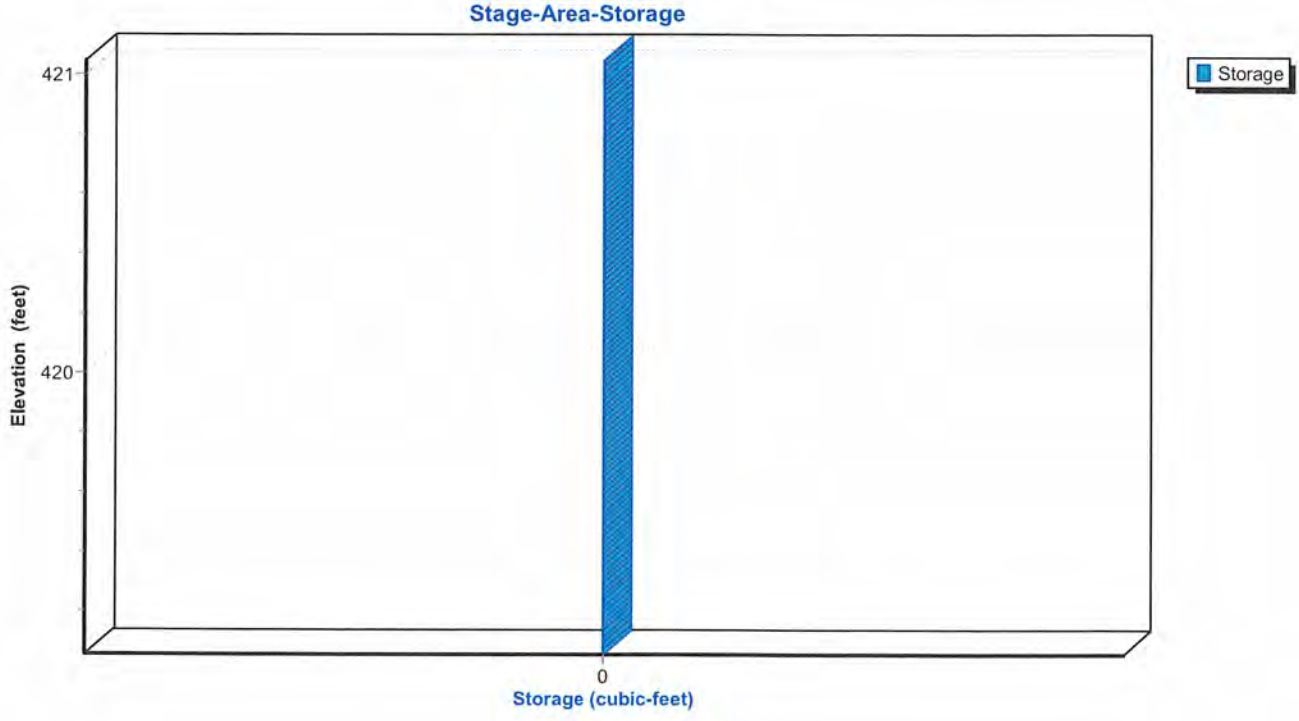
Pond 24P: CB2



Pond 24P: CB2



Pond 24P: CB2



Summary for Pond 27P: PROPOSED POND

[43] Hint: Has no inflow (Outflow=Zero)

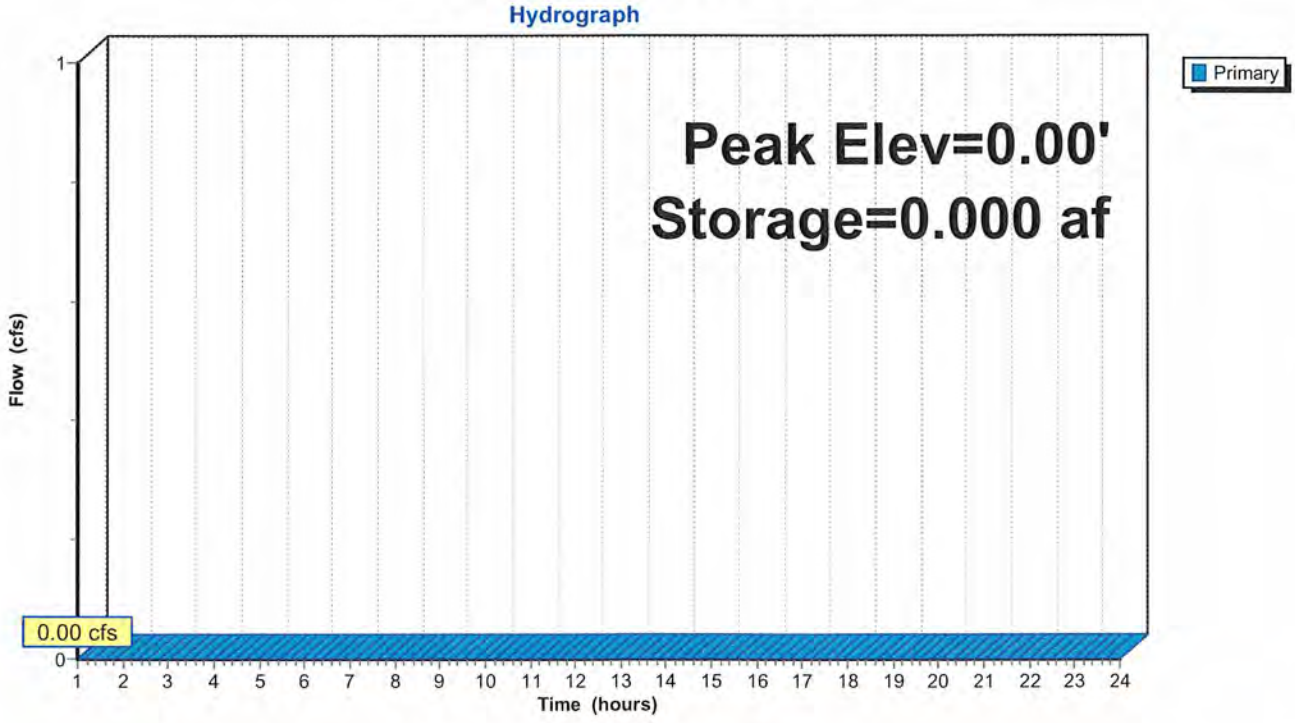
Volume	Invert	Avail.Storage	Storage Description
#1	403.00'	1.801 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
403.00	0.008	0.0	0.000	0.000
404.00	0.020	0.0	0.000	0.000
405.00	0.034	0.0	0.000	0.000
406.00	0.050	0.0	0.000	0.000
407.00	0.067	0.0	0.000	0.000
408.00	0.087	0.0	0.000	0.000
409.00	0.108	0.0	0.000	0.000
410.00	0.132	0.0	0.000	0.000
411.00	0.250	0.0	0.000	0.000
412.00	0.291	100.0	0.270	0.270
413.00	0.335	100.0	0.313	0.583
414.00	0.381	100.0	0.358	0.941
415.00	0.429	100.0	0.405	1.346
416.00	0.480	100.0	0.454	1.801

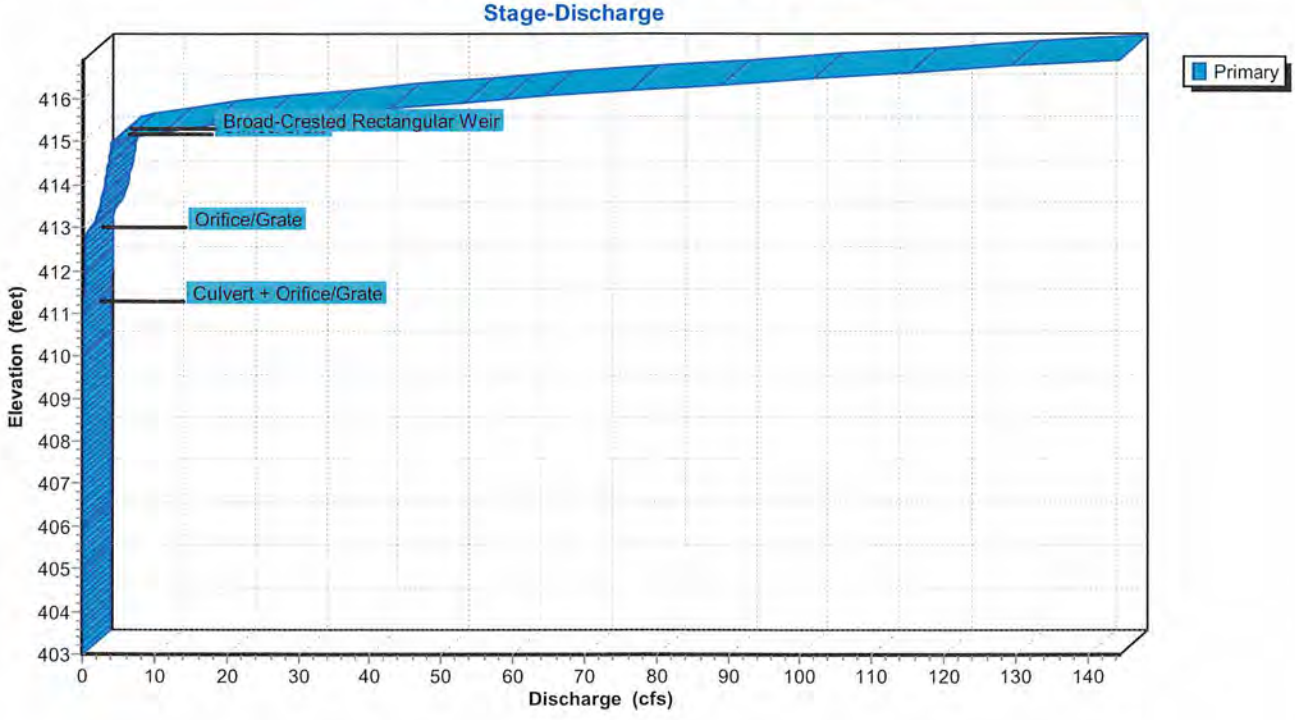
Device	Routing	Invert	Outlet Devices
#1	Primary	411.00'	**12.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 411.00' / 410.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Device 1	411.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	412.70'	**18.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	414.90'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	415.00'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=0.00' (Free Discharge)
- **1=Culvert** (Controls 0.00 cfs)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

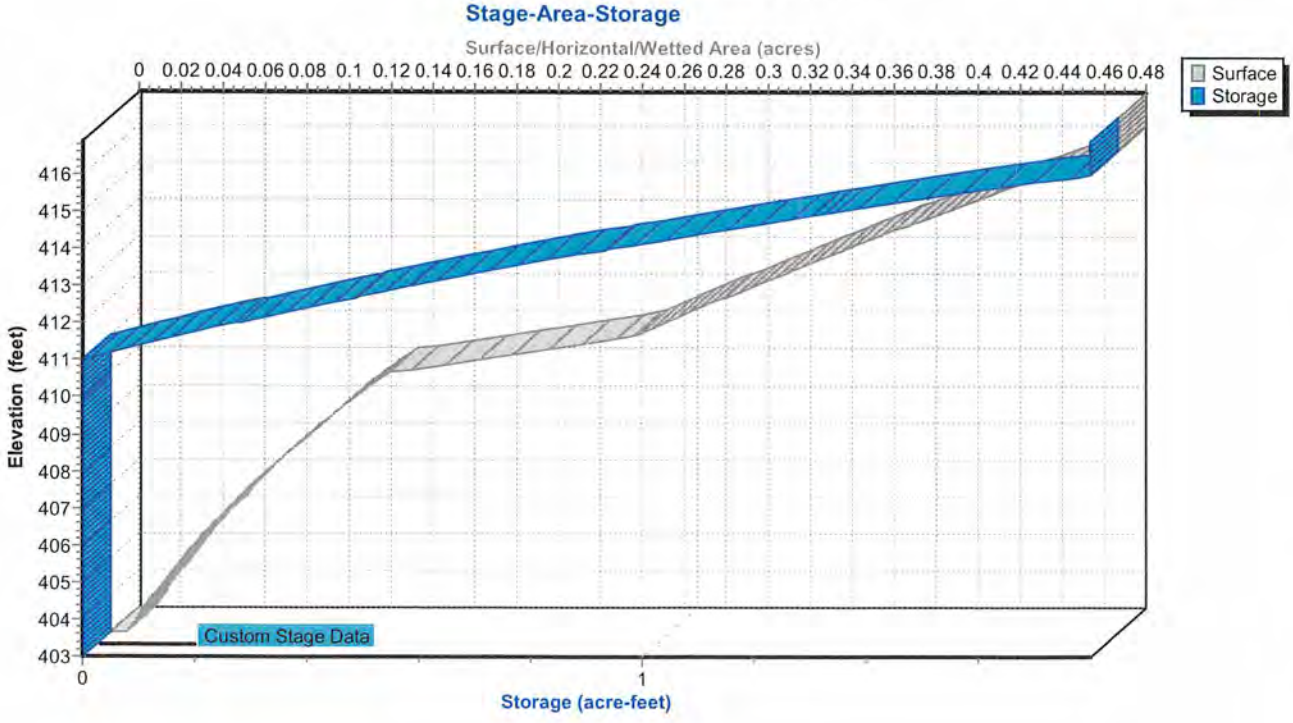
Pond 27P: PROPOSED POND



Pond 27P: PROPOSED POND



Pond 27P: PROPOSED POND



Summary for Pond 28P: PROPOSED POND

Inflow Area = 4.721 ac,100.00% Impervious, Inflow Depth > 2.15" for 2-yr event
Inflow = 8.59 cfs @ 12.13 hrs, Volume= 0.844 af
Outflow = 0.67 cfs @ 13.42 hrs, Volume= 0.419 af, Atten= 92%, Lag= 77.3 min
Primary = 0.67 cfs @ 13.42 hrs, Volume= 0.419 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Starting Elev= 411.00' Surf.Area= 0.250 ac Storage= 0.627 af
Peak Elev= 412.87' @ 13.42 hrs Surf.Area= 0.329 ac Storage= 1.169 af (0.542 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 215.0 min (984.3 - 769.3)

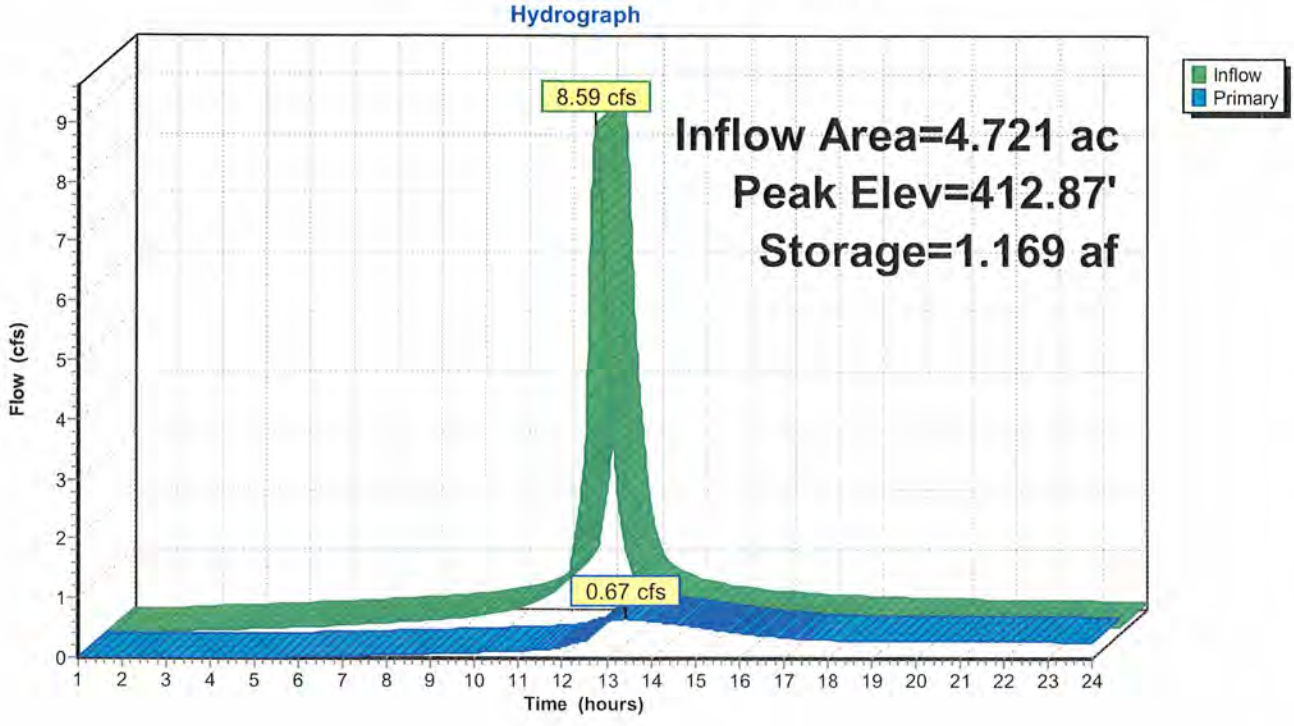
Volume	Invert	Avail.Storage	Storage Description
#1	403.00'	2.428 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
403.00	0.008	0.0	0.000	0.000
404.00	0.020	100.0	0.014	0.014
405.00	0.034	100.0	0.027	0.041
406.00	0.050	100.0	0.042	0.083
407.00	0.067	100.0	0.059	0.141
408.00	0.087	100.0	0.077	0.219
409.00	0.108	100.0	0.097	0.316
410.00	0.132	100.0	0.120	0.436
411.00	0.250	100.0	0.191	0.627
412.00	0.291	100.0	0.270	0.897
413.00	0.335	100.0	0.313	1.210
414.00	0.381	100.0	0.358	1.568
415.00	0.429	100.0	0.405	1.974
416.00	0.480	100.0	0.454	2.428

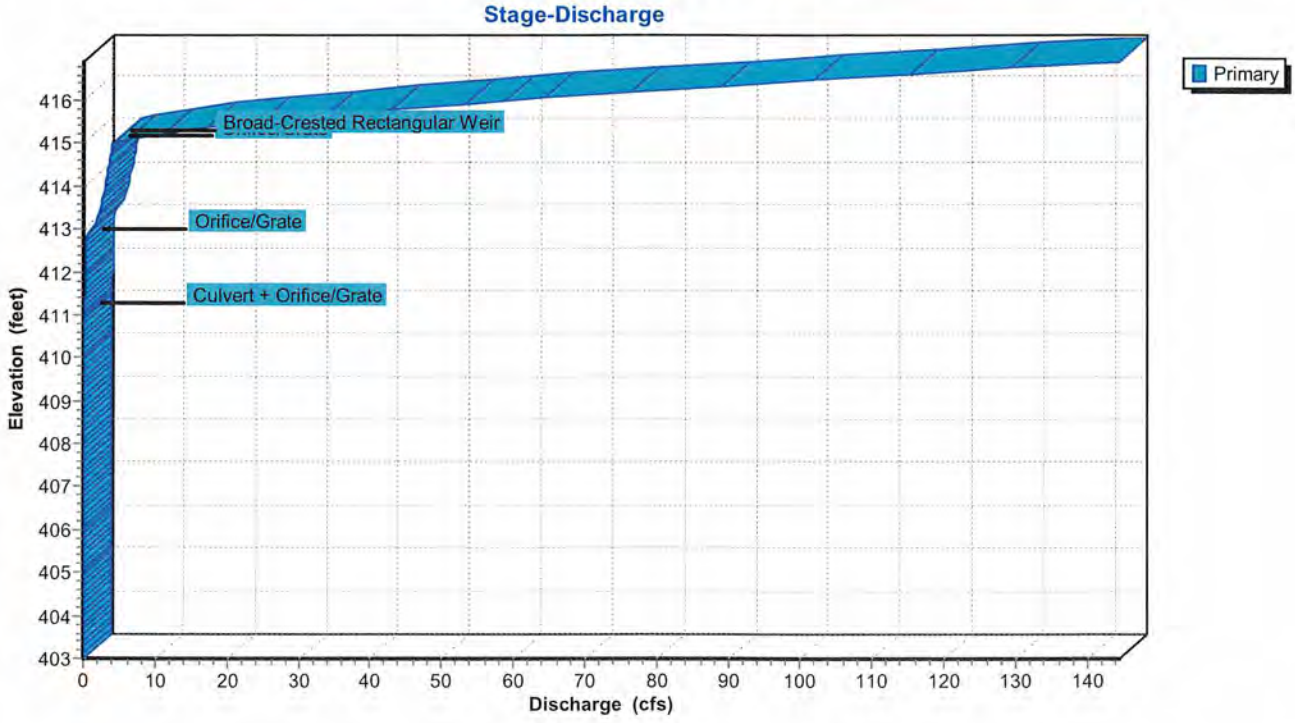
Device	Routing	Invert	Outlet Devices
#1	Primary	411.00'	**12.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 411.00' / 410.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Device 1	411.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	412.70'	**18.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	414.90'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	415.00'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.66 cfs @ 13.42 hrs HW=412.87' (Free Discharge)
- **1=Culvert** (Passes 0.66 cfs of 3.52 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.31 cfs @ 6.37 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.35 cfs @ 1.34 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

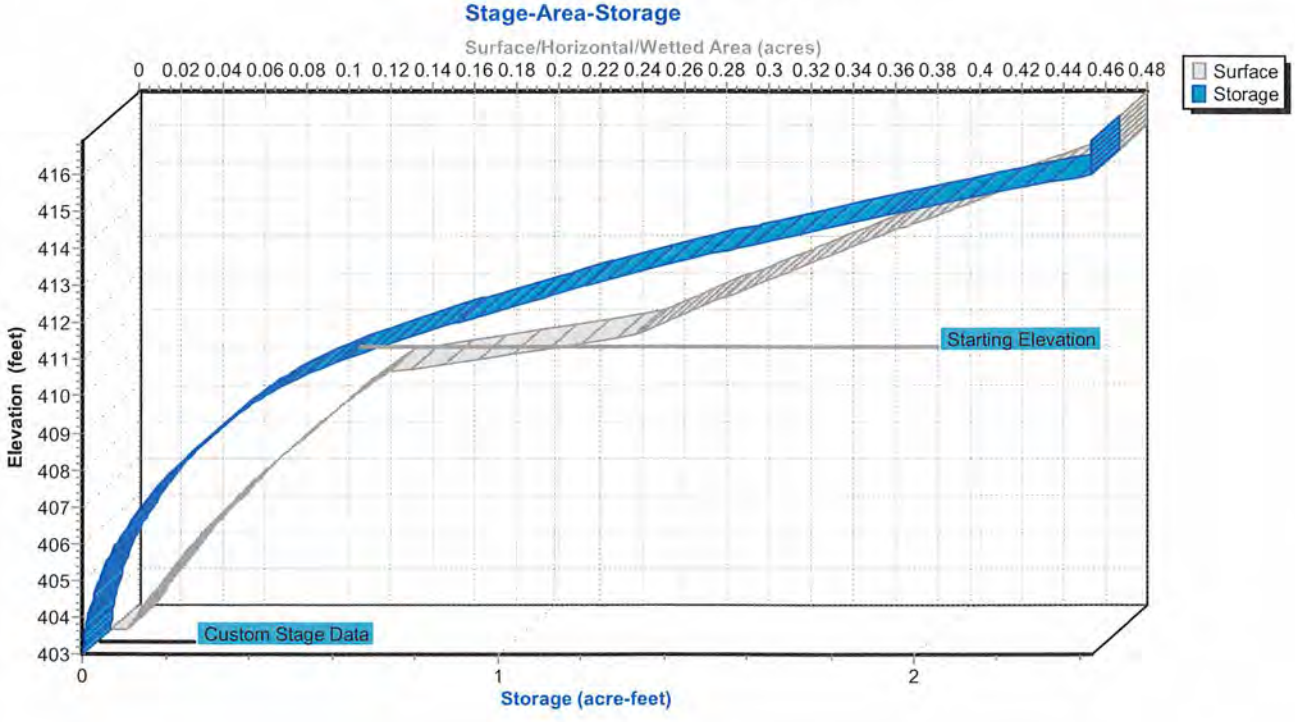
Pond 28P: PROPOSED POND



Pond 28P: PROPOSED POND



Pond 28P: PROPOSED POND



Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 2 Runoff Area=3.000 ac 0.00% Impervious Runoff Depth>0.60"
Flow Length=280' Slope=0.0070 '/' Tc=80.3 min CN=63 Runoff=0.62 cfs 0.150 af

Subcatchment 4S: Subcatchment 3 Runoff Area=3.370 ac 0.00% Impervious Runoff Depth>1.35"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=77 Runoff=2.37 cfs 0.379 af

Subcatchment 5S: Subcatchment 4 Runoff Area=4.060 ac 0.00% Impervious Runoff Depth>0.15"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=49 Runoff=0.11 cfs 0.049 af

Subcatchment 6S: Subcatchment 1 Runoff Area=12.550 ac 80.08% Impervious Runoff Depth>2.54"
Flow Length=2,260' Tc=36.2 min CN=92 Runoff=21.28 cfs 2.658 af

Subcatchment 12S: SC3 Runoff Area=1.288 ac 100.00% Impervious Runoff Depth>3.18"
Flow Length=1,245' Tc=10.3 min CN=98 Runoff=4.55 cfs 0.341 af

Subcatchment 14S: SC2 Runoff Area=1.736 ac 100.00% Impervious Runoff Depth>3.18"
Flow Length=1,196' Slope=0.0033 '/' Tc=18.6 min CN=98 Runoff=4.72 cfs 0.460 af

Subcatchment 19S: SC4 Runoff Area=1.044 ac 100.00% Impervious Runoff Depth>3.18"
Flow Length=804' Slope=0.0018 '/' Tc=17.3 min CN=98 Runoff=2.93 cfs 0.276 af

Subcatchment 20S: SC1 Runoff Area=0.653 ac 100.00% Impervious Runoff Depth>3.18"
Flow Length=255' Slope=0.0073 '/' Tc=3.6 min CN=98 Runoff=3.10 cfs 0.173 af

Reach 7R: Small Creek Avg. Flow Depth=1.32' Max Vel=5.29 fps Inflow=22.89 cfs 3.085 af
n=0.030 L=360.0' S=0.0167 '/' Capacity=146.42 cfs Outflow=22.87 cfs 3.082 af

Reach 9R: Butternut Creek Avg. Flow Depth=0.74' Max Vel=3.66 fps Inflow=24.99 cfs 4.024 af
n=0.030 L=380.0' S=0.0097 '/' Capacity=1,479.89 cfs Outflow=24.96 cfs 4.016 af

Reach 10R: Concrete Pipe Avg. Flow Depth=0.91' Max Vel=10.42 fps Inflow=21.28 cfs 2.707 af
30.0" Round Pipe w/ 4.0" inside fill n=0.011 L=150.0' S=0.0133 '/' Capacity=49.49 cfs Outflow=21.27 cfs 2.706 af

Pond 17P: CB1 Peak Elev=421.23' Inflow=3.10 cfs 0.173 af
12.0" Round Culvert n=0.011 L=150.0' S=0.0051 '/' Outflow=3.10 cfs 0.173 af

Pond 22P: CB4 Peak Elev=420.80' Inflow=2.93 cfs 0.276 af
12.0" Round Culvert n=0.011 L=138.0' S=0.0050 '/' Outflow=2.93 cfs 0.276 af

Pond 23P: CB3 Peak Elev=420.59' Inflow=4.55 cfs 0.341 af
12.0" Round Culvert n=0.015 L=129.0' S=0.0190 '/' Outflow=4.55 cfs 0.341 af

Pond 24P: CB2 Peak Elev=420.08' Inflow=5.62 cfs 0.633 af
24.0" Round Culvert n=0.011 L=87.0' S=0.0085 '/' Outflow=5.62 cfs 0.633 af

Pond 27P: PROPOSED POND Peak Elev=0.00' Storage=0.000 af
Primary=0.00 cfs 0.000 af

Pond 28P: PROPOSED POND Peak Elev=413.45' Storage=1.364 af Inflow=12.47 cfs 1.251 af
Outflow=2.18 cfs 0.792 af

Total Runoff Area = 27.701 ac Runoff Volume = 4.486 af Average Runoff Depth = 1.94"
46.68% Pervious = 12.930 ac 53.32% Impervious = 14.771 ac

Summary for Subcatchment 1S: Subcatchment 2

Area closest to butternut creek, between BD and BC.
sheet flow for 100 feet.
shallow channel flow for 180 feet.
380 feet flow in butternut creek.

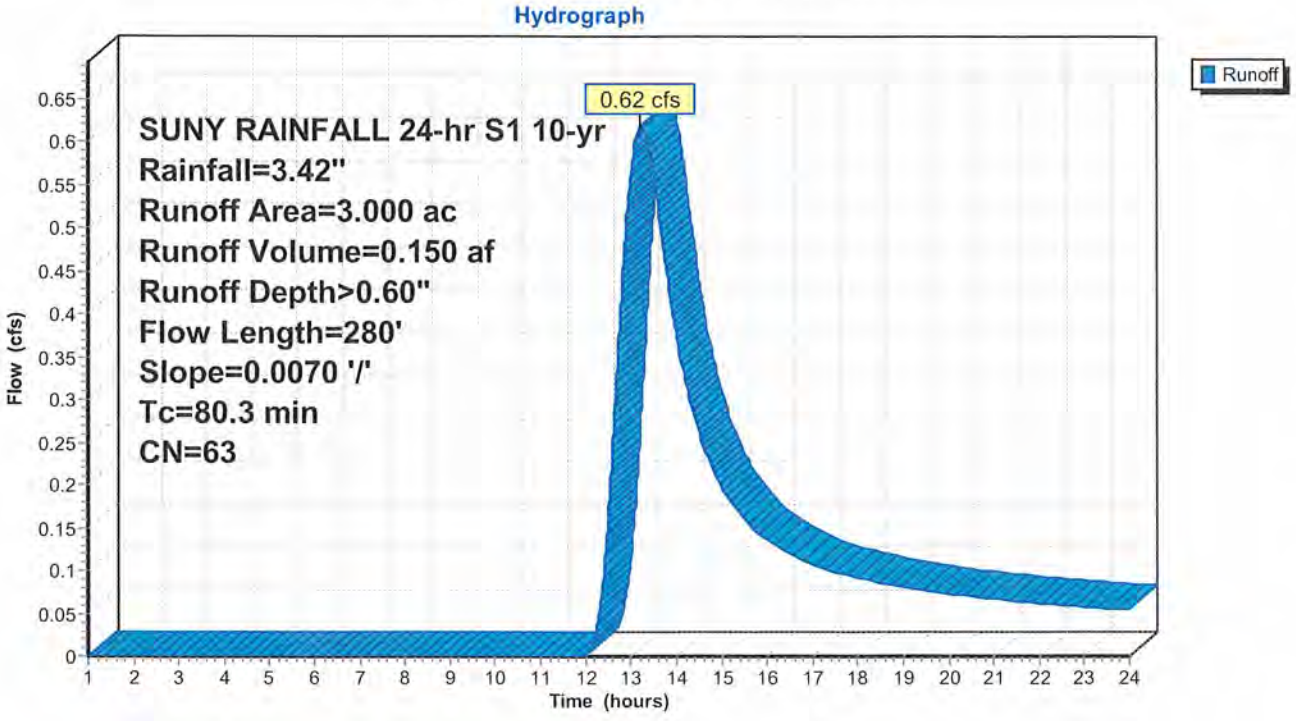
Runoff = 0.62 cfs @ 13.21 hrs, Volume= 0.150 af, Depth> 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
2.090	77	Woods, Good, HSG D
0.910	30	Woods, Good, HSG A
3.000	63	Weighted Average
3.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0	100	0.0070	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.38"
14.3	180	0.0070	0.21		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
80.3	280	Total			

Subcatchment 1S: Subcatchment 2



Summary for Subcatchment 4S: Subcatchment 3

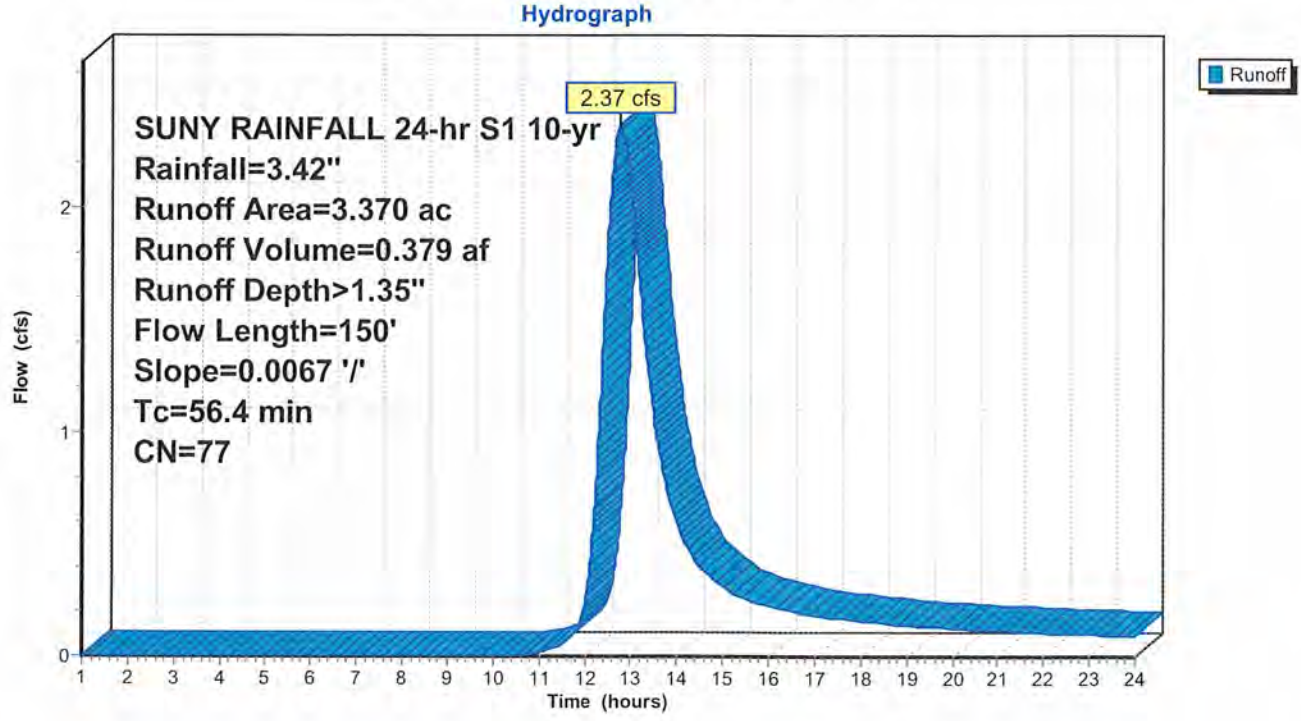
Runoff = 2.37 cfs @ 12.78 hrs, Volume= 0.379 af, Depth> 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
2.000	77	Woods, Good, HSG D
1.370	77	Woods, Good, HSG D
3.370	77	Weighted Average
3.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 4S: Subcatchment 3



Summary for Subcatchment 5S: Subcatchment 4

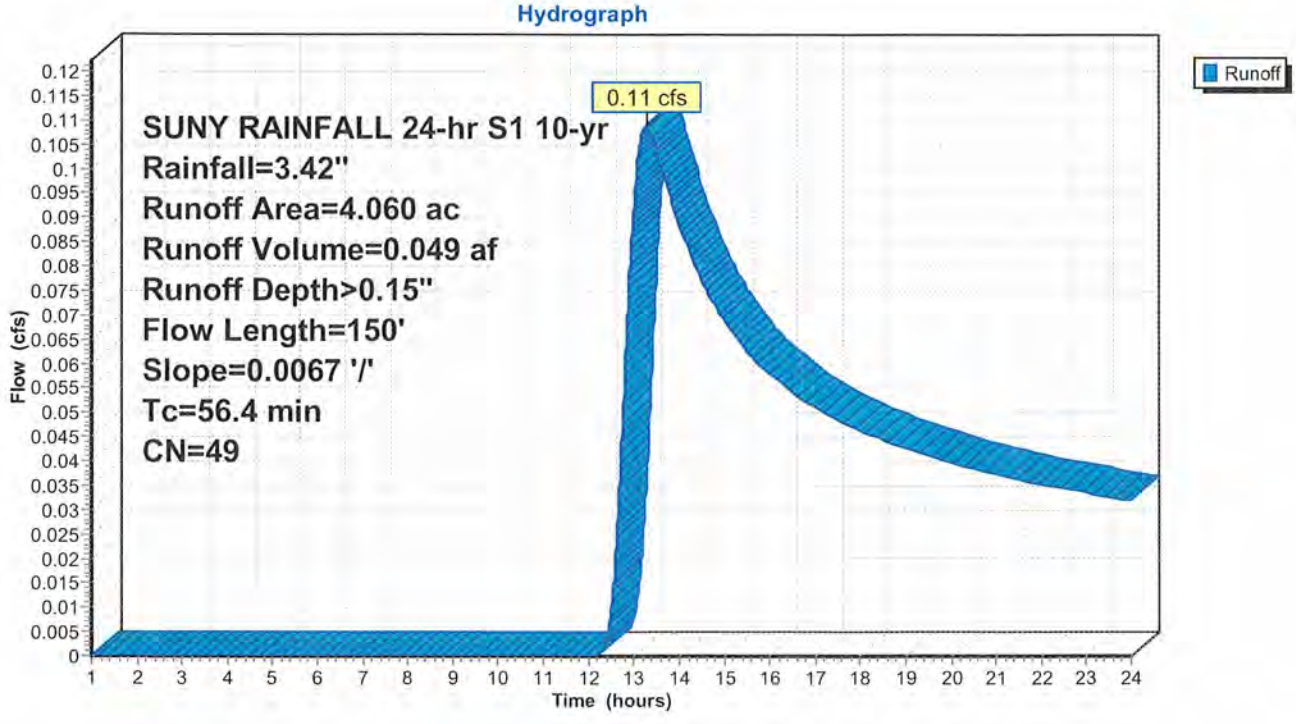
Runoff = 0.11 cfs @ 13.28 hrs, Volume= 0.049 af, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
4.060	49	50-75% Grass cover, Fair, HSG A
4.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 5S: Subcatchment 4



Summary for Subcatchment 6S: Subcatchment 1

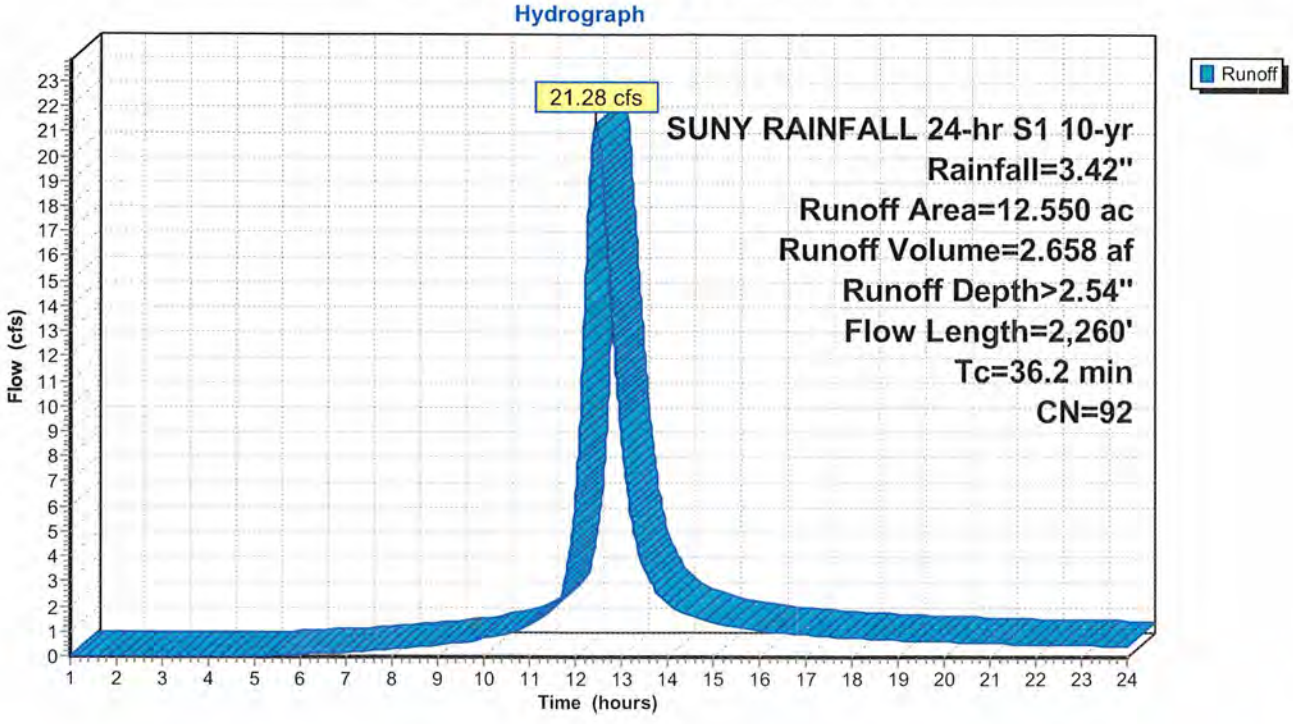
Runoff = 21.28 cfs @ 12.43 hrs, Volume= 2.658 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
7.650	98	Paved parking, HSG A
0.900	98	Paved parking, HSG D
2.700	83	Paved roads w/open ditches, 50% imp, HSG A
0.300	93	Paved roads w/open ditches, 50% imp, HSG D
0.900	68	<50% Grass cover, Poor, HSG A
0.100	89	<50% Grass cover, Poor, HSG D
12.550	92	Weighted Average
2.500		19.92% Pervious Area
10.050		80.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0105	0.08		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.38"
6.8	850	0.0105	2.08		**Shallow Concentrated Flow, Shallow Concentrated** Paved Kv= 20.3 fps
6.2	950	0.0084	2.54	13.56	**Parabolic Channel, Stream** W=4.00' D=2.00' Area=5.3 sf Perim=5.9' n= 0.050 Sluggish weedy reaches w/pools
1.8	360	0.0139	3.35	52.55	**Parabolic Channel, Sluggish Stream W. Side of BN Creek** W=7.25' D=3.25' Area=15.7 sf Perim=10.2' n= 0.070 Sluggish weedy reaches w/pools
36.2	2,260	Total			

Subcatchment 6S: Subcatchment 1



Summary for Subcatchment 12S: SC3

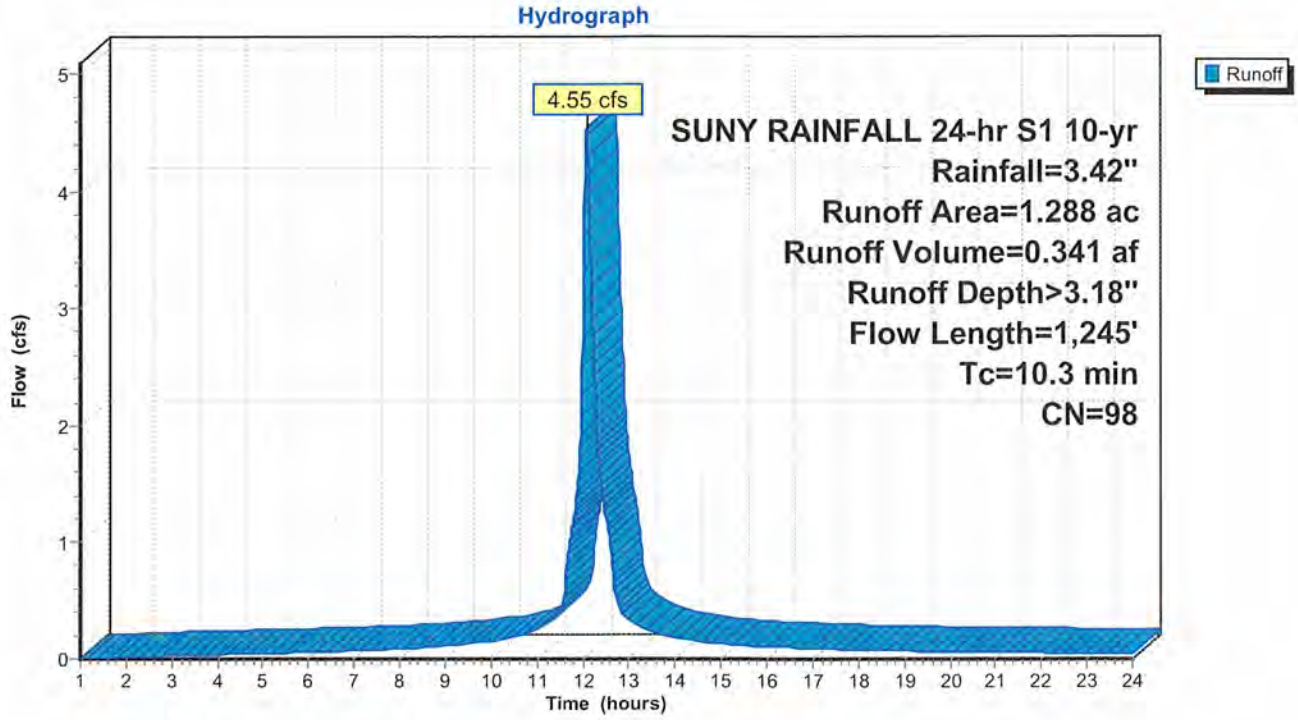
Runoff = 4.55 cfs @ 12.09 hrs, Volume= 0.341 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
1.288	98	Paved roads w/curbs & sewers, HSG D
1.288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	100	0.0070	0.78		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
8.2	1,145	0.0133	2.34		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.3	1,245	Total			

Subcatchment 12S: SC3



Summary for Subcatchment 14S: SC2

Combined nodes 9,10,5 &4

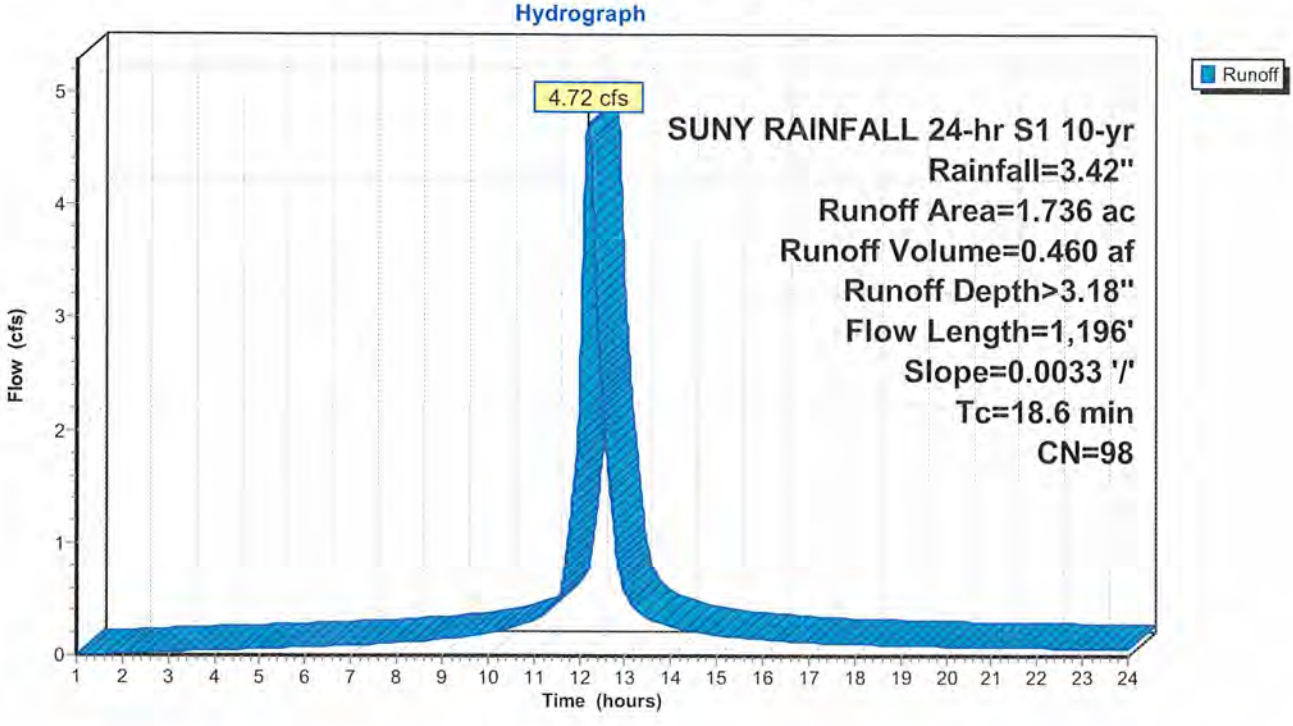
Runoff = 4.72 cfs @ 12.21 hrs, Volume= 0.460 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
1.736	98	Paved roads w/curbs & sewers, HSG D
1.736		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	100	0.0033	0.58		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
15.7	1,096	0.0033	1.17		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.6	1,196	Total			

Subcatchment 14S: SC2



Summary for Subcatchment 19S: SC4

Combined nodes 2&3

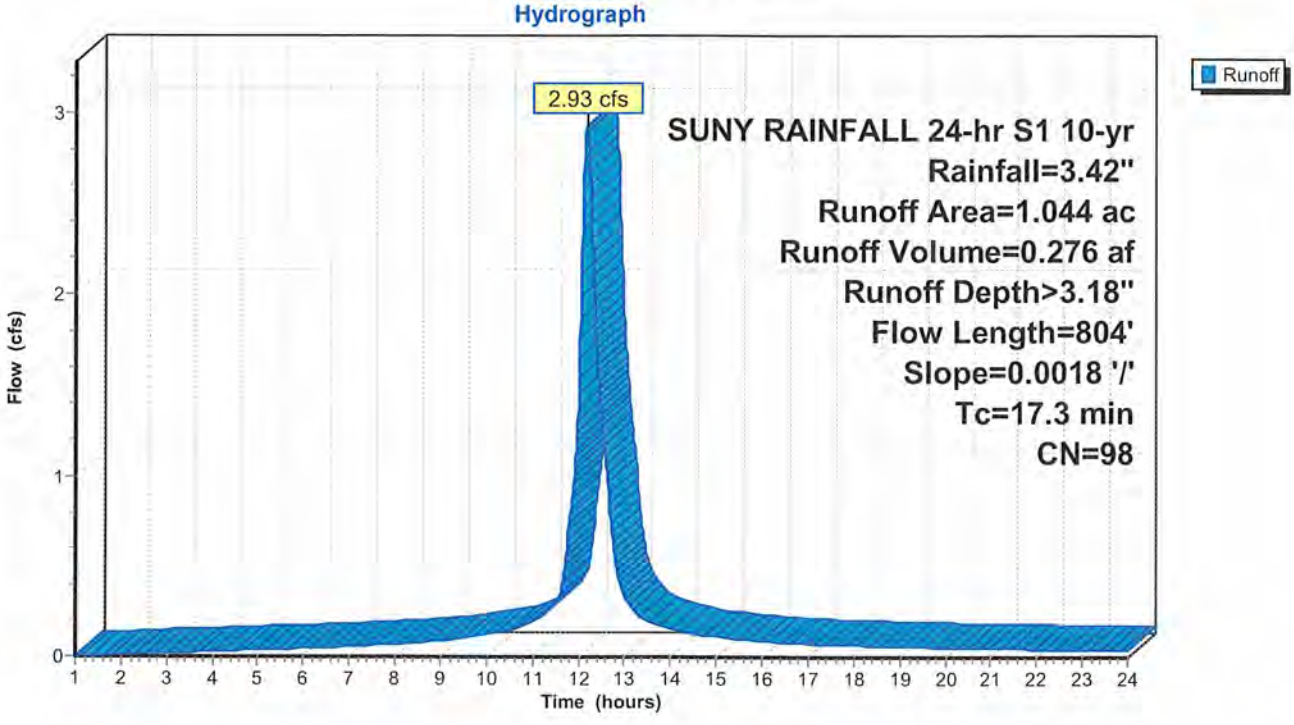
Runoff = 2.93 cfs @ 12.18 hrs, Volume= 0.276 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
1.044	98	Paved roads w/curbs & sewers, HSG D
1.044		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	100	0.0018	0.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
13.6	704	0.0018	0.86		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
17.3	804	Total			

Subcatchment 19S: SC4



Summary for Subcatchment 20S: SC1

Combined nodes 1&6

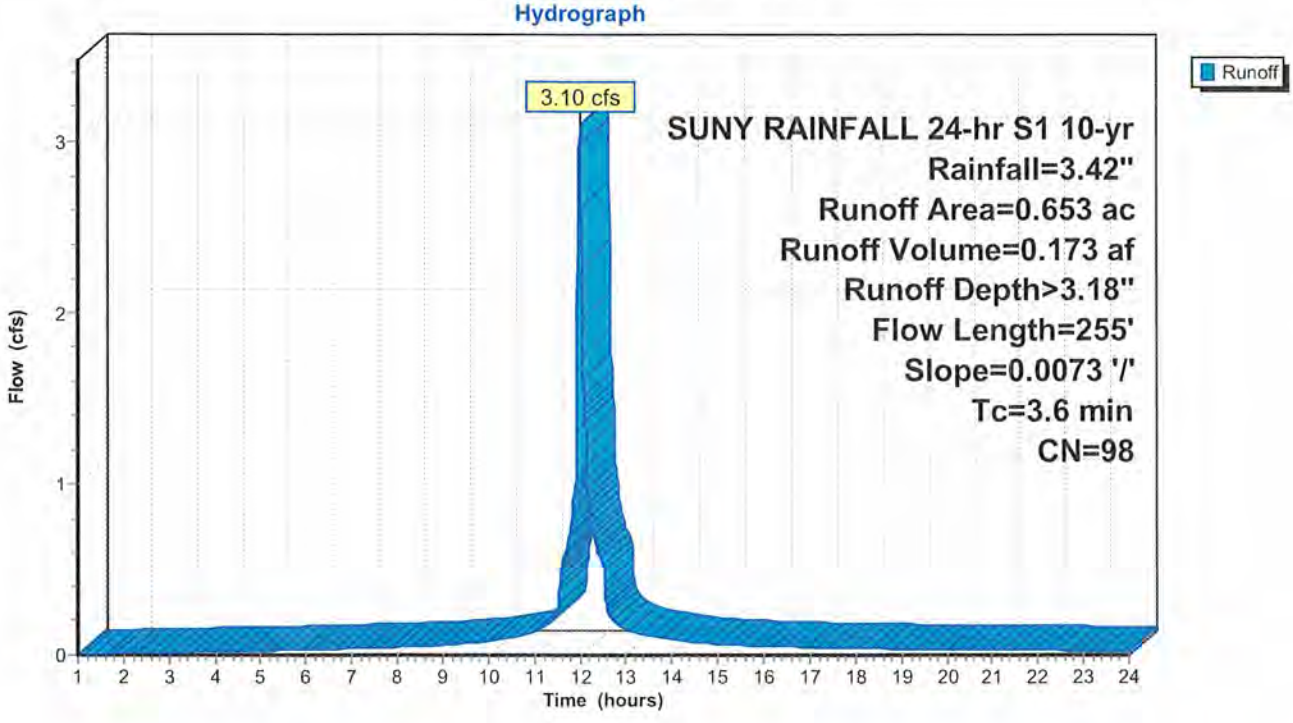
Runoff = 3.10 cfs @ 12.01 hrs, Volume= 0.173 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 10-yr Rainfall=3.42"

Area (ac)	CN	Description
0.653	98	Paved roads w/curbs & sewers, HSG D
0.653		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	100	0.0073	0.79		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
1.5	155	0.0073	1.73		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.6	255	Total			

Subcatchment 20S: SC1



Summary for Reach 7R: Small Creek

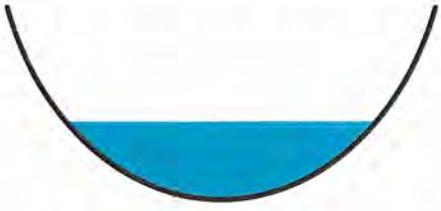
[62] Hint: Exceeded Reach 10R OUTLET depth by 0.11' @ 12.72 hrs

Inflow Area = 19.980 ac, 50.30% Impervious, Inflow Depth > 1.85" for 10-yr event
Inflow = 22.89 cfs @ 12.47 hrs, Volume= 3.085 af
Outflow = 22.87 cfs @ 12.48 hrs, Volume= 3.082 af, Atten= 0%, Lag= 0.7 min

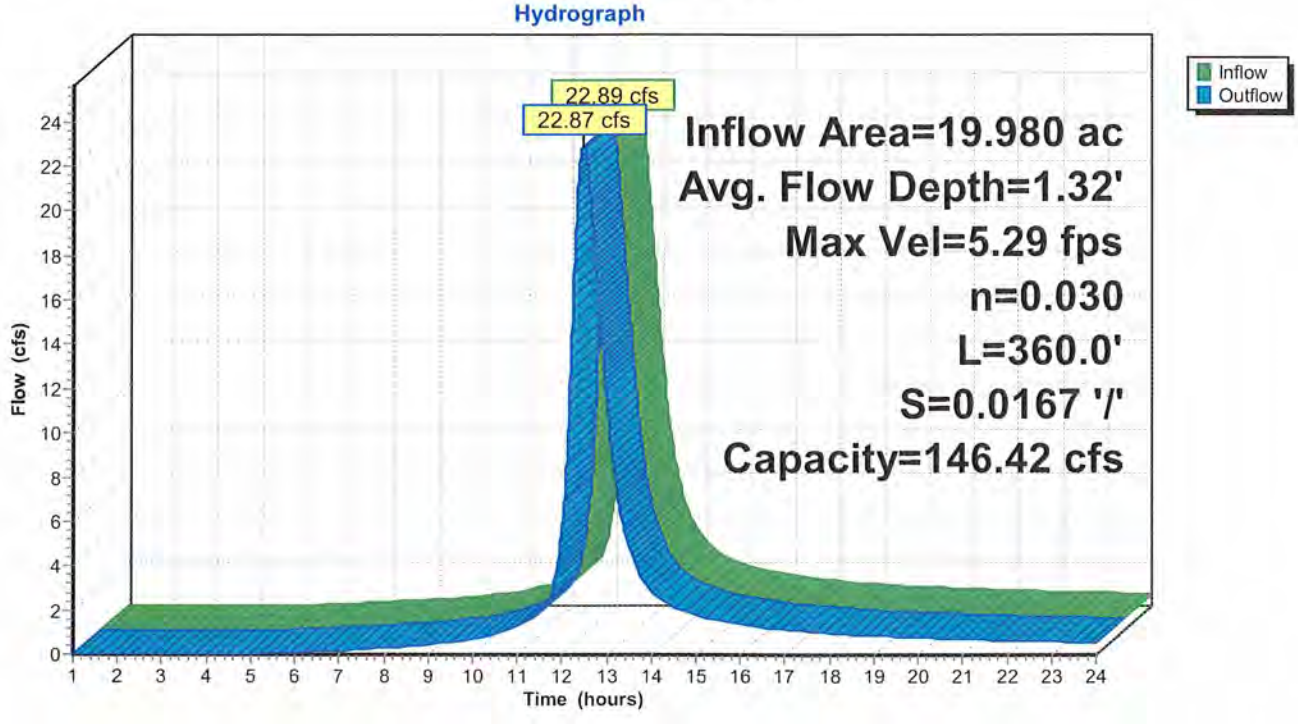
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.29 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 2.11 fps, Avg. Travel Time= 2.8 min

Peak Storage= 1,557 cf @ 12.48 hrs
Average Depth at Peak Storage= 1.32'
Bank-Full Depth= 3.25' Flow Area= 16.8 sf, Capacity= 146.42 cfs

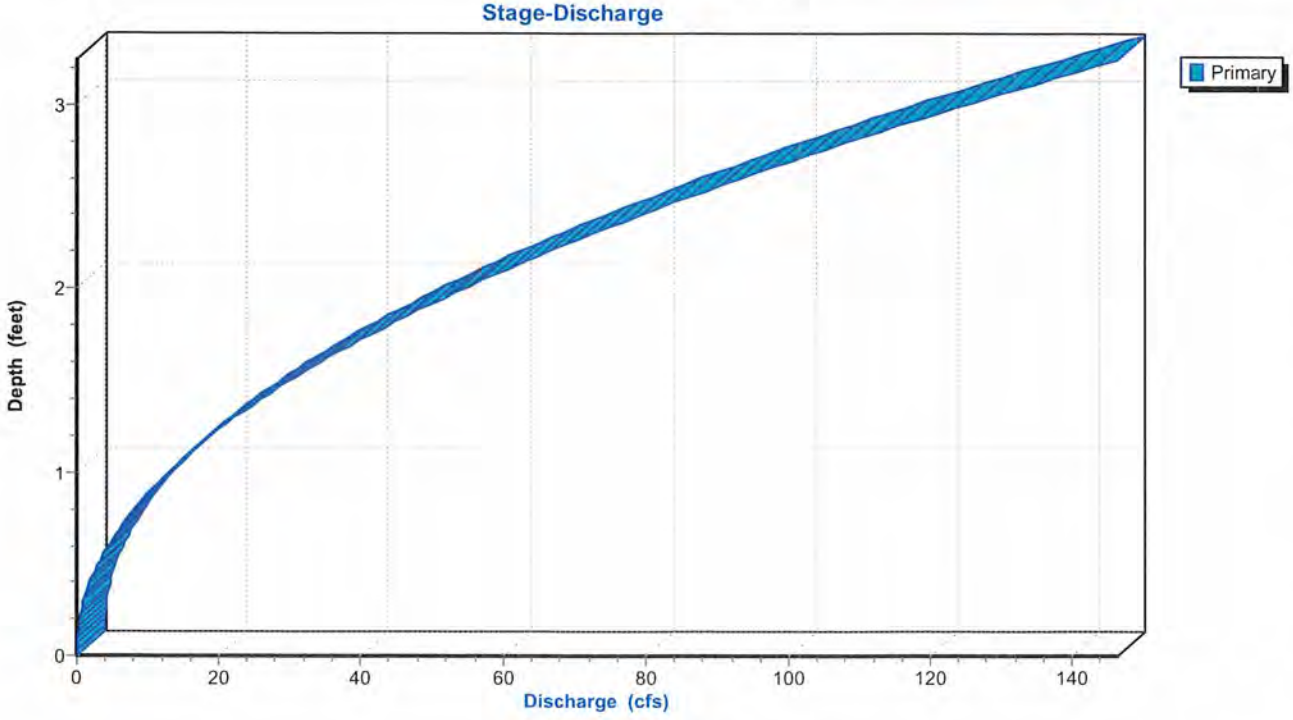
7.75' x 3.25' deep Parabolic Channel, n= 0.030 Earth, dense weeds
Length= 360.0' Slope= 0.0167 '/'
Inlet Invert= 414.00', Outlet Invert= 408.00'



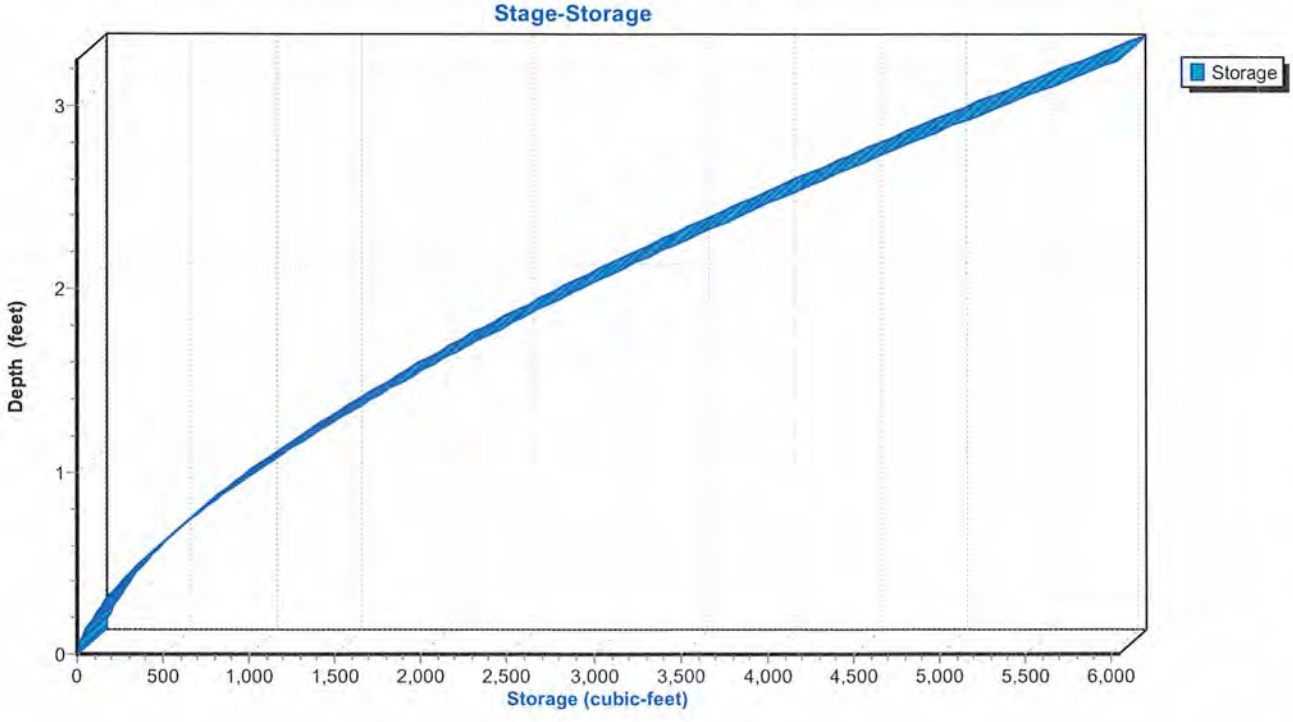
Reach 7R: Small Creek



Reach 7R: Small Creek



Reach 7R: Small Creek



Summary for Reach 9R: Butternut Creek

[61] Hint: Exceeded Reach 7R outlet invert by 0.74' @ 12.51 hrs

Inflow Area = 27.701 ac, 53.32% Impervious, Inflow Depth > 1.74" for 10-yr event
Inflow = 24.99 cfs @ 12.49 hrs, Volume= 4.024 af
Outflow = 24.96 cfs @ 12.51 hrs, Volume= 4.016 af, Atten= 0%, Lag= 1.3 min

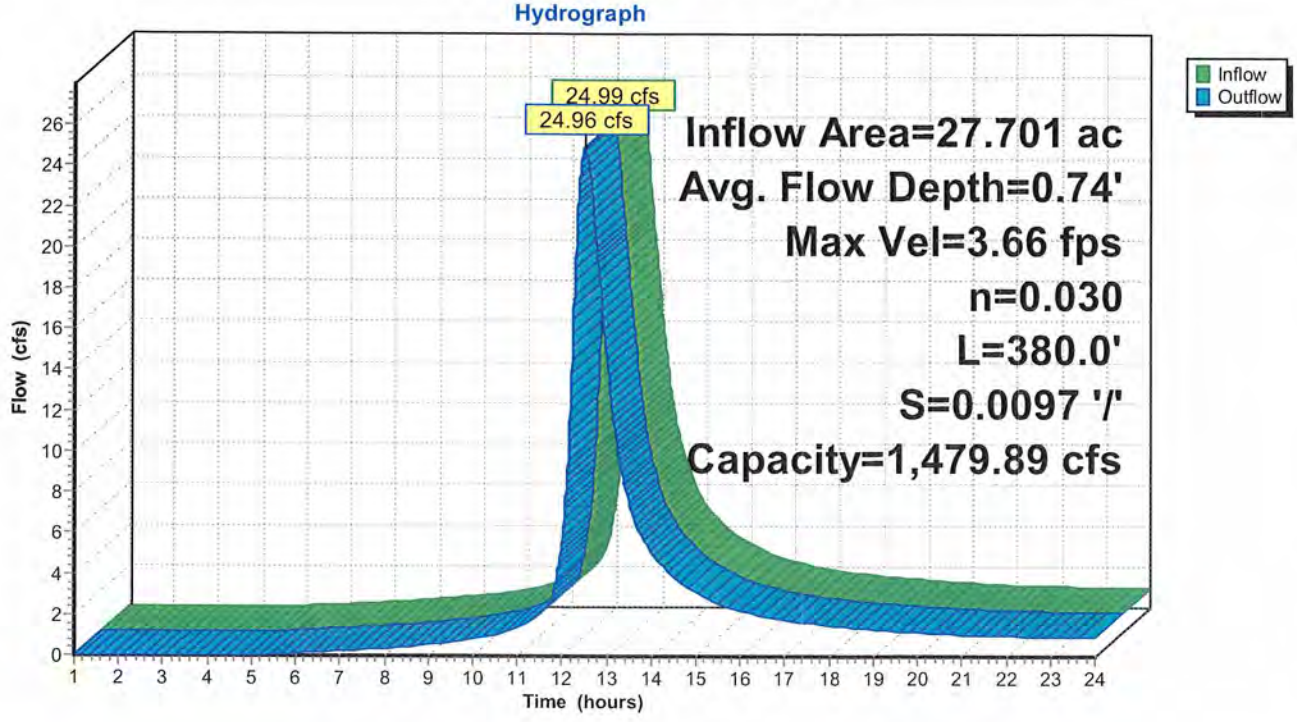
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.66 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.34 fps, Avg. Travel Time= 4.7 min

Peak Storage= 2,593 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.74'
Defined Flood Depth= 417.70' Flow Area= 6,223.3 sf, Capacity= 98,716.46 cfs
Bank-Full Depth= 10.00' Flow Area= 120.0 sf, Capacity= 1,479.89 cfs

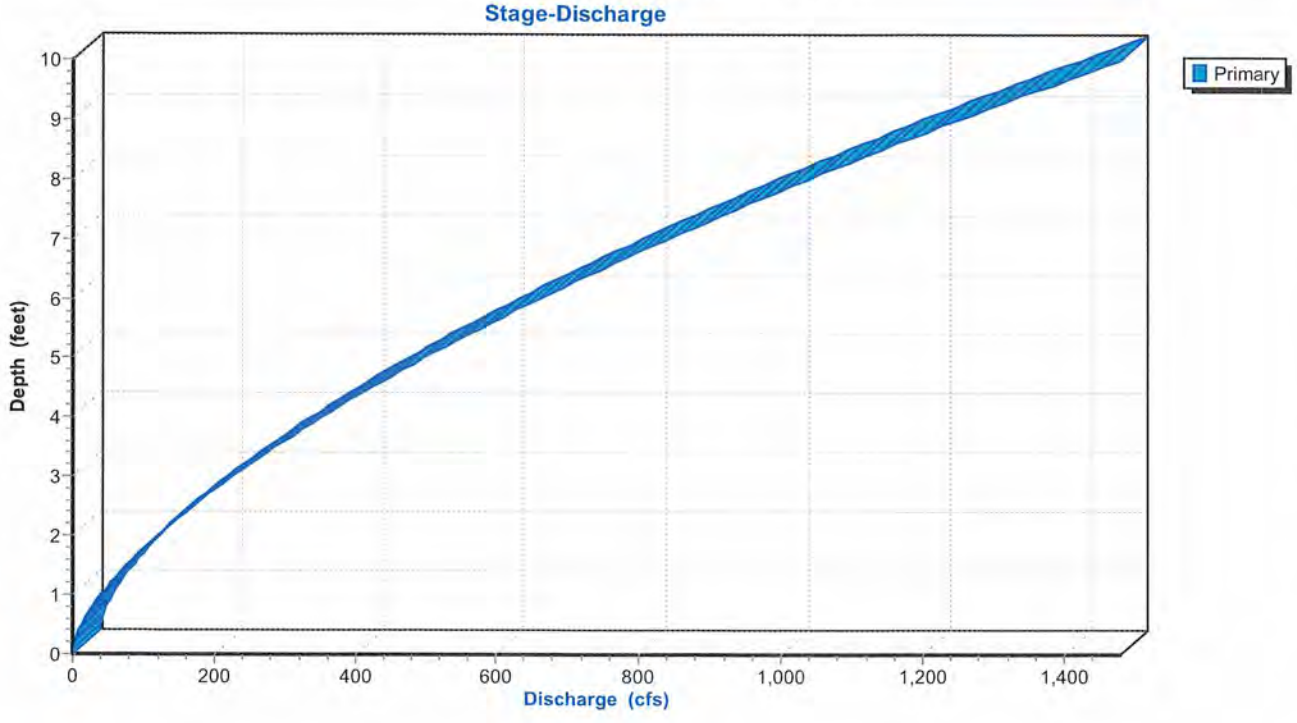
9.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 0.3 '/' Top Width= 15.00'
Length= 380.0' Slope= 0.0097 '/'
Inlet Invert= 408.00', Outlet Invert= 404.31'



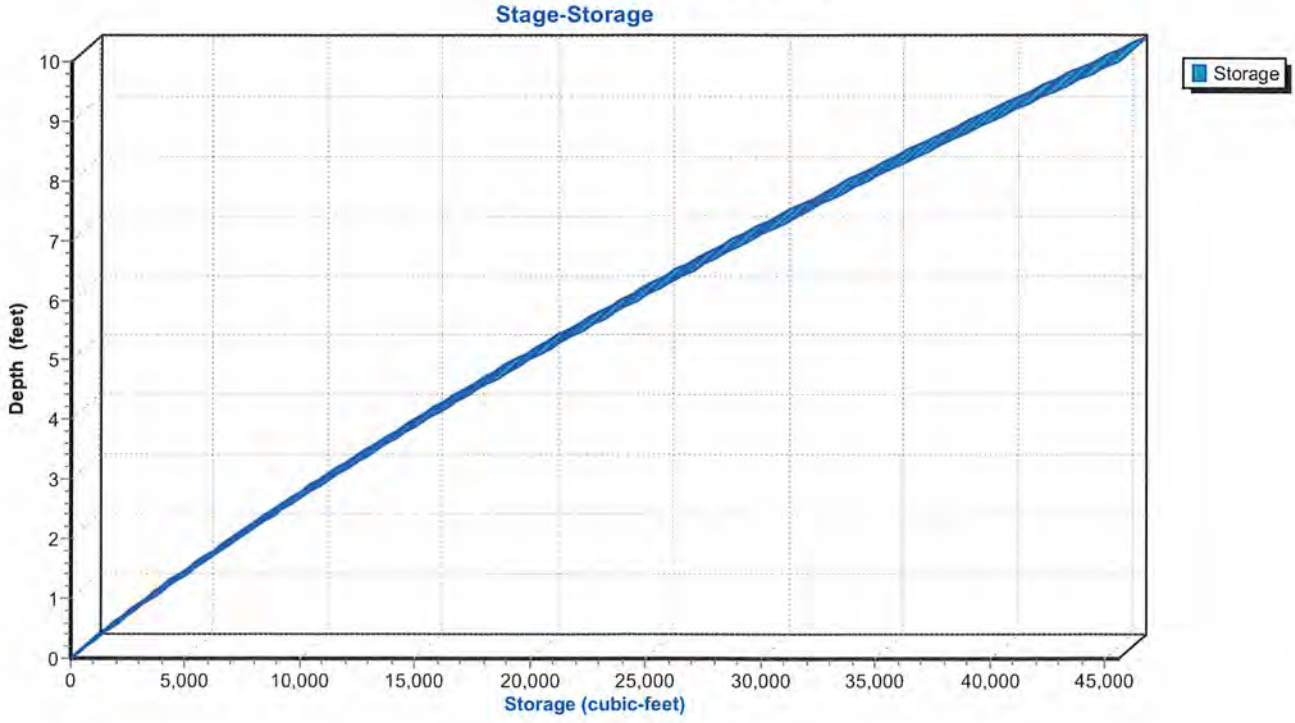
Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Summary for Reach 10R: Concrete Pipe

[52] Hint: Inlet/Outlet conditions not evaluated

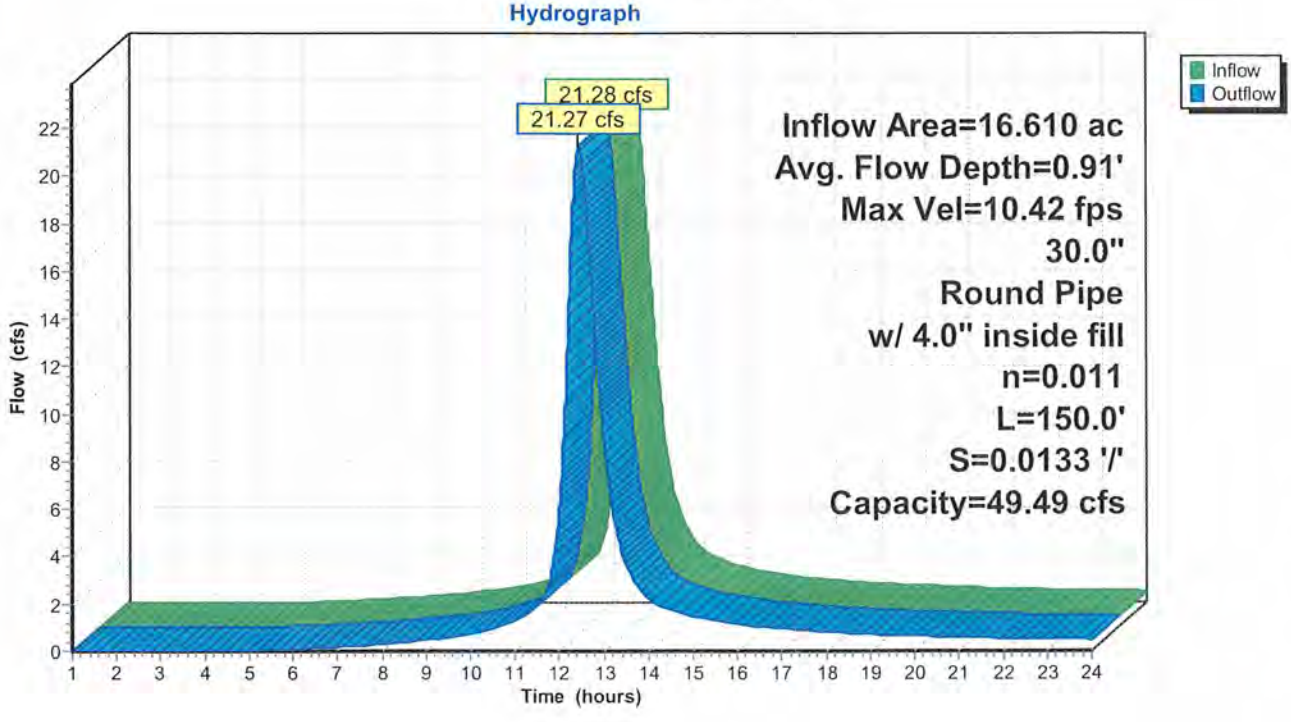
Inflow Area = 16.610 ac, 60.51% Impervious, Inflow Depth > 1.96" for 10-yr event
Inflow = 21.28 cfs @ 12.43 hrs, Volume= 2.707 af
Outflow = 21.27 cfs @ 12.44 hrs, Volume= 2.706 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.42 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.71 fps, Avg. Travel Time= 0.7 min

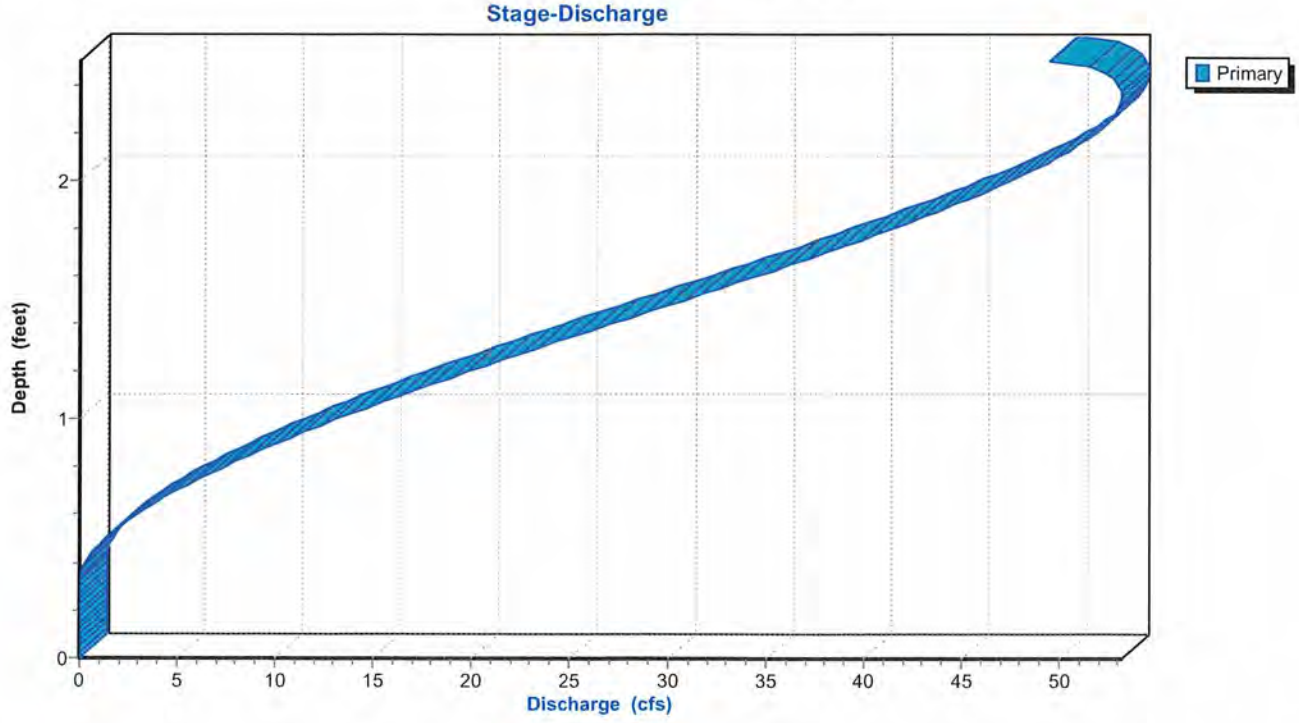
Peak Storage= 306 cf @ 12.44 hrs
Average Depth at Peak Storage= 1.24' above invert (0.91' above fill)
Bank-Full Depth= 2.50' above invert (2.17' above fill) Flow Area= 4.5 sf, Capacity= 49.49 cfs

30.0" Round Pipe w/ 4.0" inside fill
n= 0.011 Concrete pipe, finished
Length= 150.0' Slope= 0.0133 '/' (101 Elevation Intervals)
Inlet Invert= 416.00', Outlet Invert= 414.00'

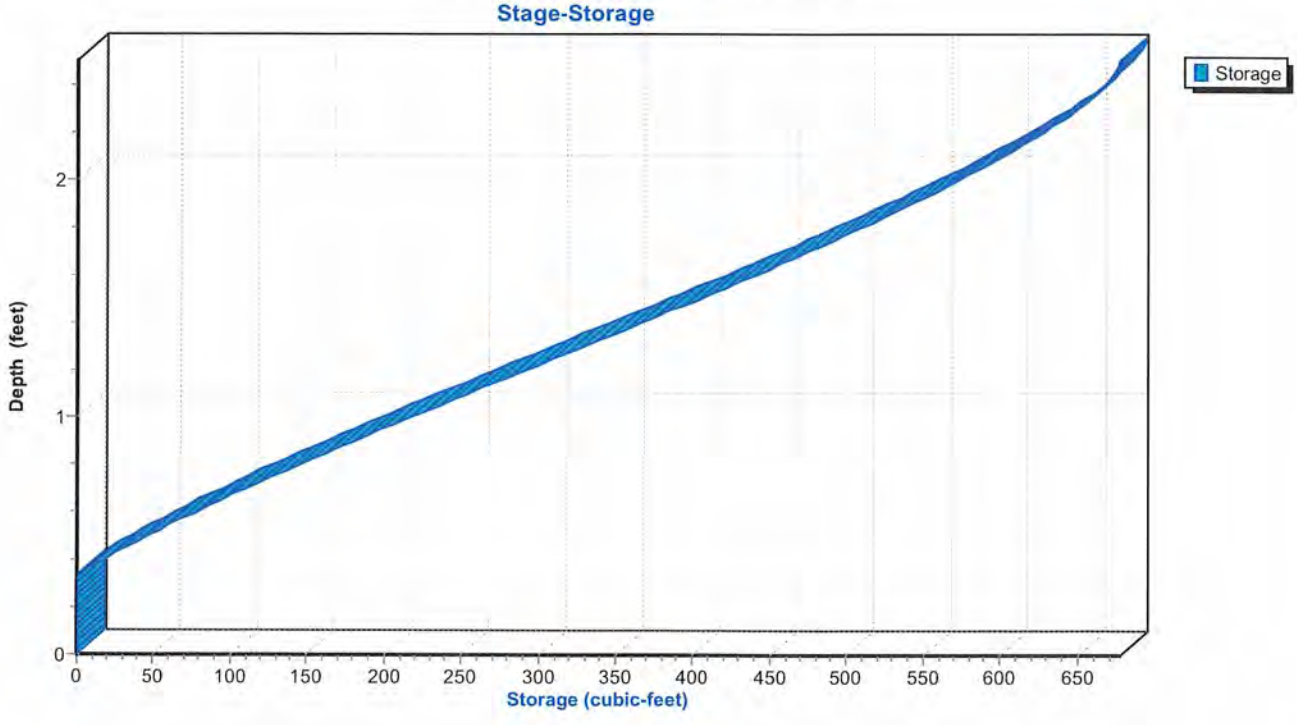




Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Summary for Pond 17P: CB1

[57] Hint: Peaked at 421.23' (Flood elevation advised)

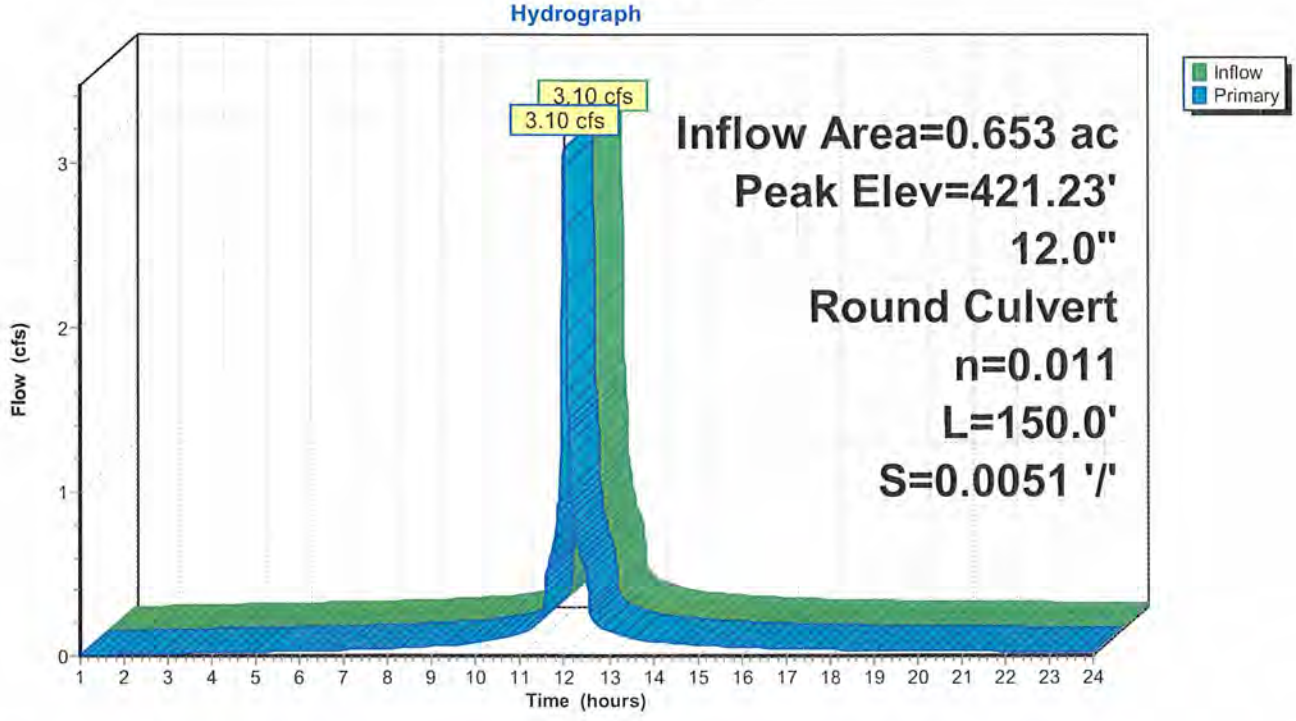
Inflow Area = 0.653 ac,100.00% Impervious, Inflow Depth > 3.18" for 10-yr event
Inflow = 3.10 cfs @ 12.01 hrs, Volume= 0.173 af
Outflow = 3.10 cfs @ 12.01 hrs, Volume= 0.173 af, Atten= 0%, Lag= 0.0 min
Primary = 3.10 cfs @ 12.01 hrs, Volume= 0.173 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 421.23' @ 12.01 hrs

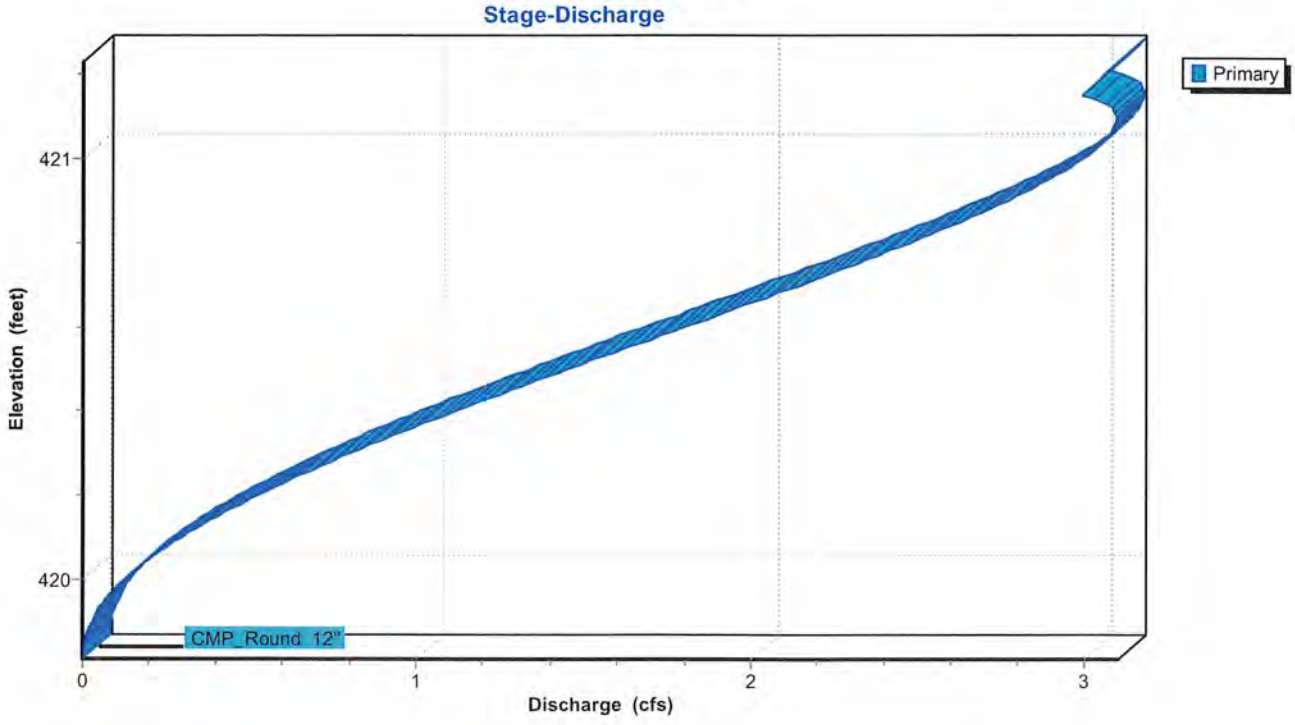
Device	Routing	Invert	Outlet Devices
#1	Primary	419.81'	**12.0" Round CMP_Round 12"** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.81' / 419.05' S= 0.0051 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.07 cfs @ 12.01 hrs HW=421.21' (Free Discharge)
1=CMP_Round 12" (Barrel Controls 3.07 cfs @ 3.91 fps)

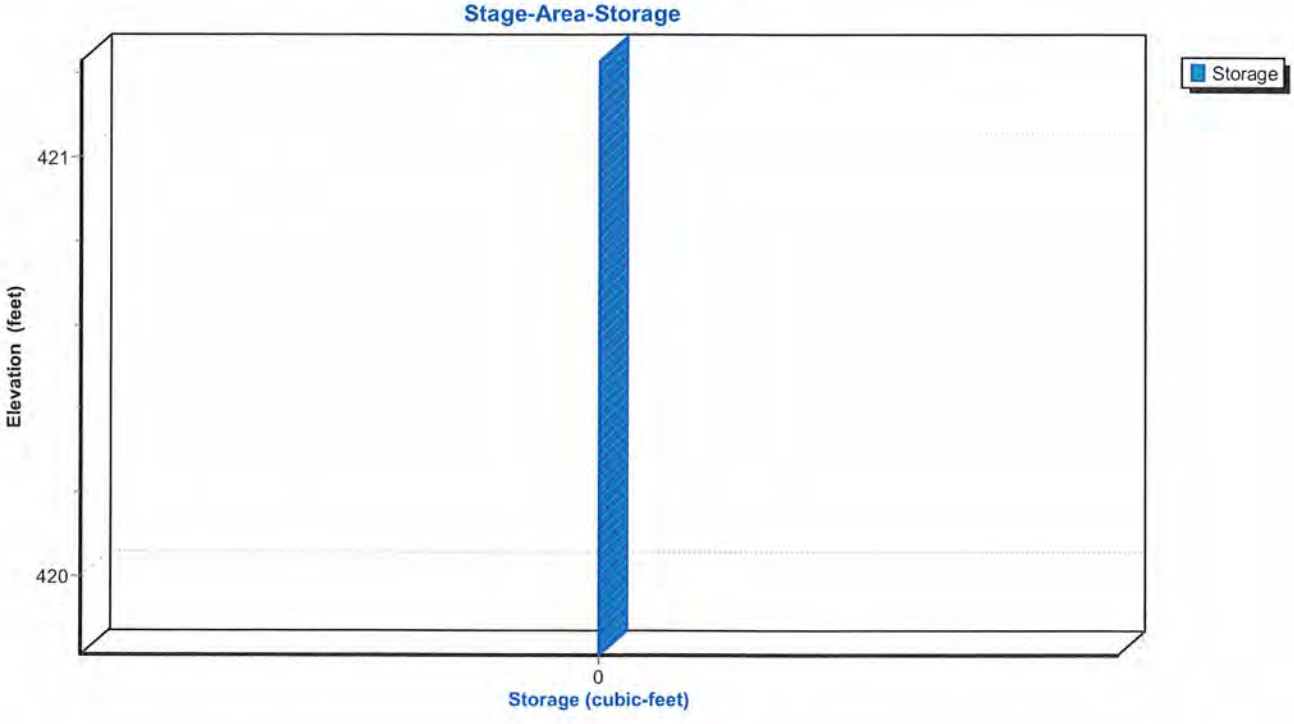
Pond 17P: CB1



Pond 17P: CB1



Pond 17P: CB1



Summary for Pond 22P: CB4

[57] Hint: Peaked at 420.80' (Flood elevation advised)

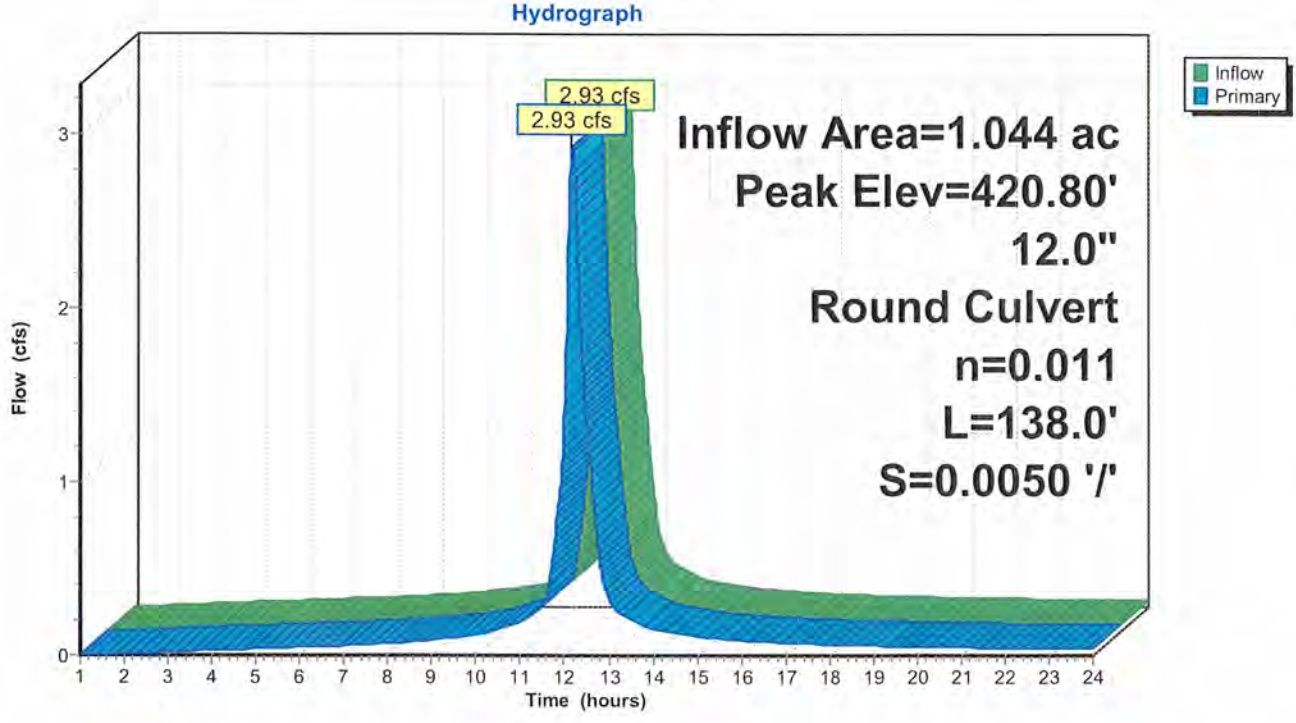
Inflow Area = 1.044 ac,100.00% Impervious, Inflow Depth > 3.18" for 10-yr event
Inflow = 2.93 cfs @ 12.18 hrs, Volume= 0.276 af
Outflow = 2.93 cfs @ 12.18 hrs, Volume= 0.276 af, Atten= 0%, Lag= 0.0 min
Primary = 2.93 cfs @ 12.18 hrs, Volume= 0.276 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 420.80' @ 12.18 hrs

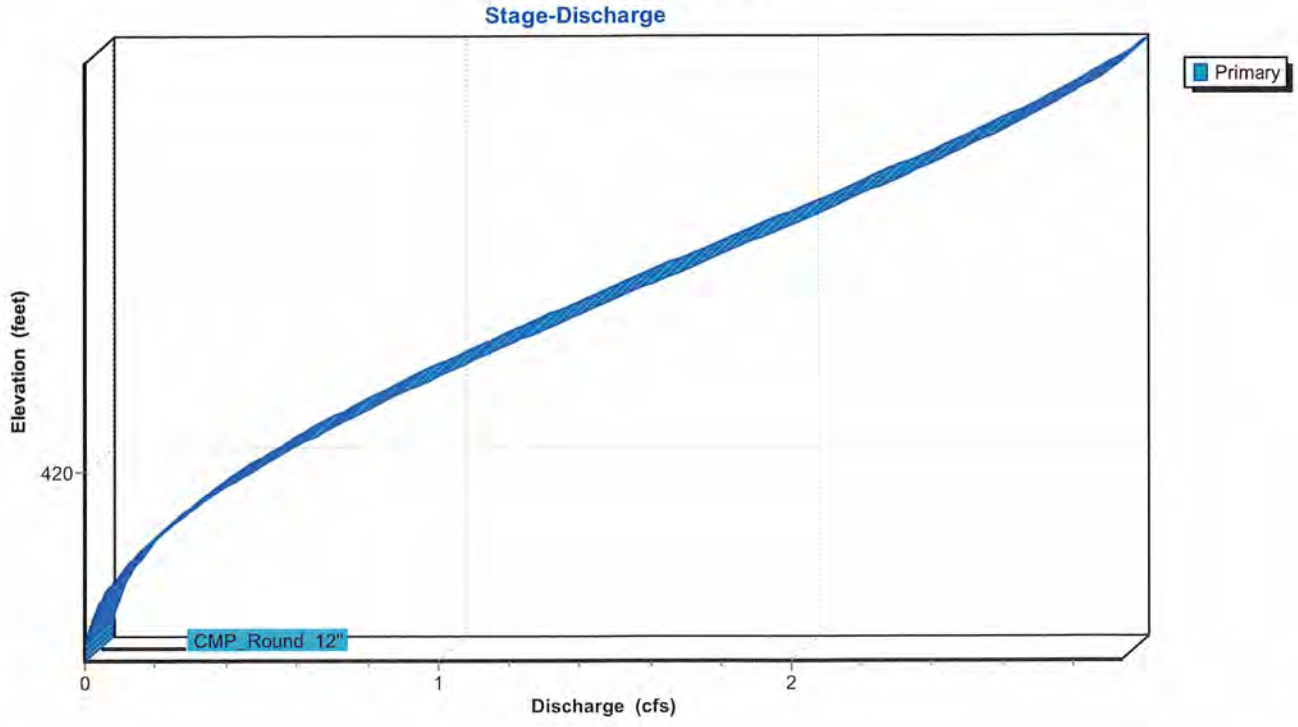
Device	Routing	Invert	Outlet Devices
#1	Primary	419.63'	**12.0" Round CMP_Round 12"** L= 138.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.63' / 418.94' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.93 cfs @ 12.18 hrs HW=420.80' (Free Discharge)
↑—1=CMP_Round 12" (Barrel Controls 2.93 cfs @ 4.02 fps)

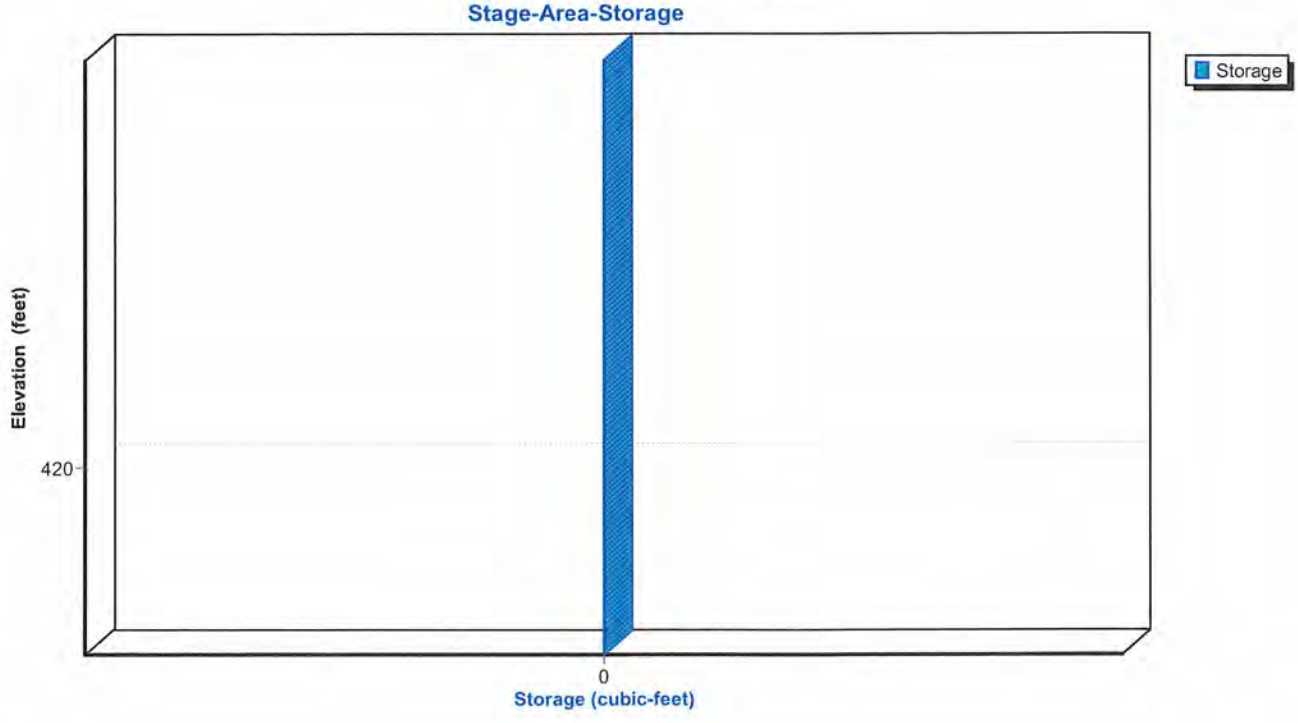
Pond 22P: CB4



Pond 22P: CB4



Pond 22P: CB4



Summary for Pond 23P: CB3

[57] Hint: Peaked at 420.59' (Flood elevation advised)

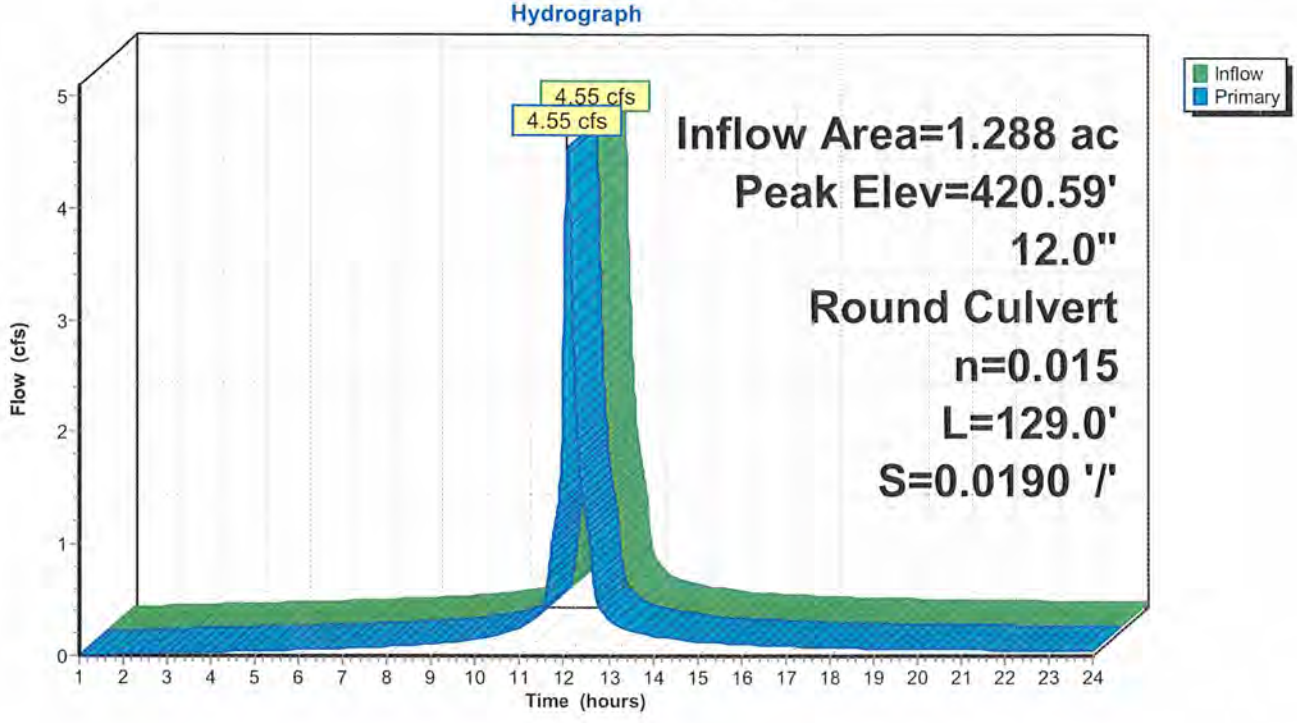
Inflow Area = 1.288 ac,100.00% Impervious, Inflow Depth > 3.18" for 10-yr event
Inflow = 4.55 cfs @ 12.09 hrs, Volume= 0.341 af
Outflow = 4.55 cfs @ 12.09 hrs, Volume= 0.341 af, Atten= 0%, Lag= 0.0 min
Primary = 4.55 cfs @ 12.09 hrs, Volume= 0.341 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 420.59' @ 12.09 hrs

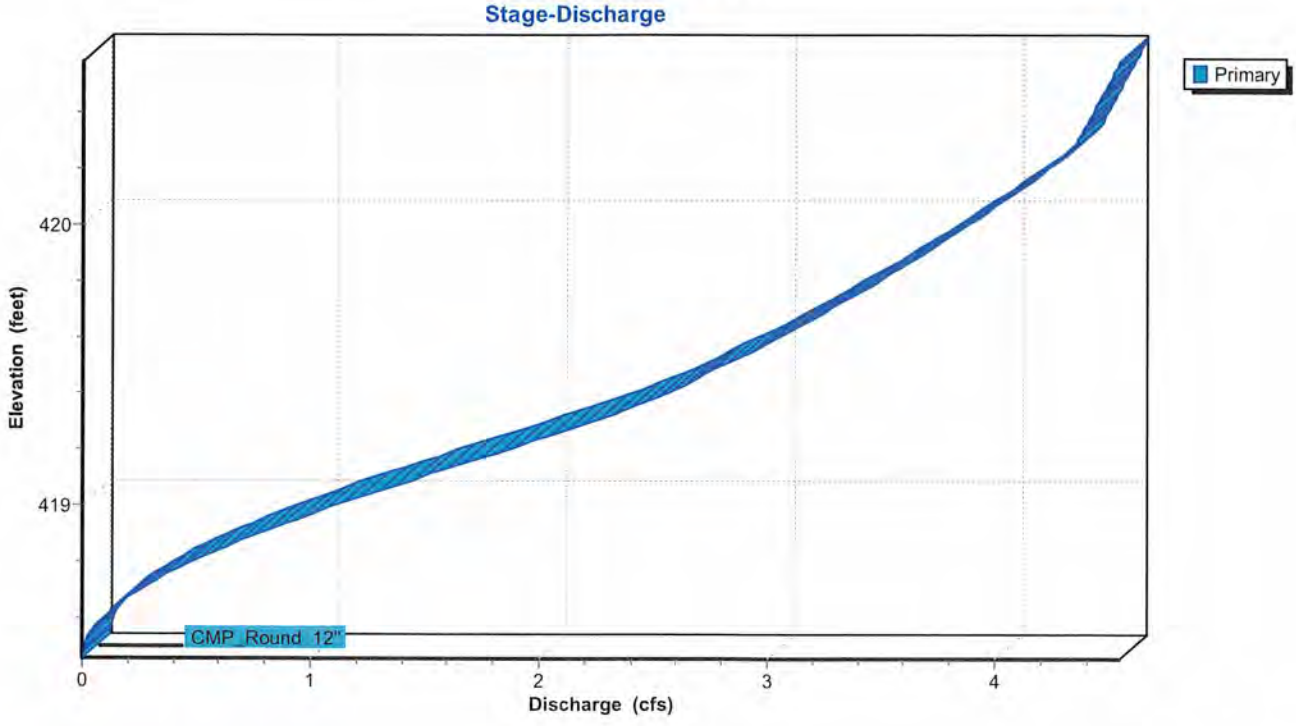
Device	Routing	Invert	Outlet Devices
#1	Primary	418.45'	**12.0" Round CMP_Round 12"** L= 129.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 418.45' / 416.00' S= 0.0190 '/' Cc= 0.900 n= 0.015 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.54 cfs @ 12.09 hrs HW=420.58' (Free Discharge)
1=CMP_Round 12" (Barrel Controls 4.54 cfs @ 5.78 fps)

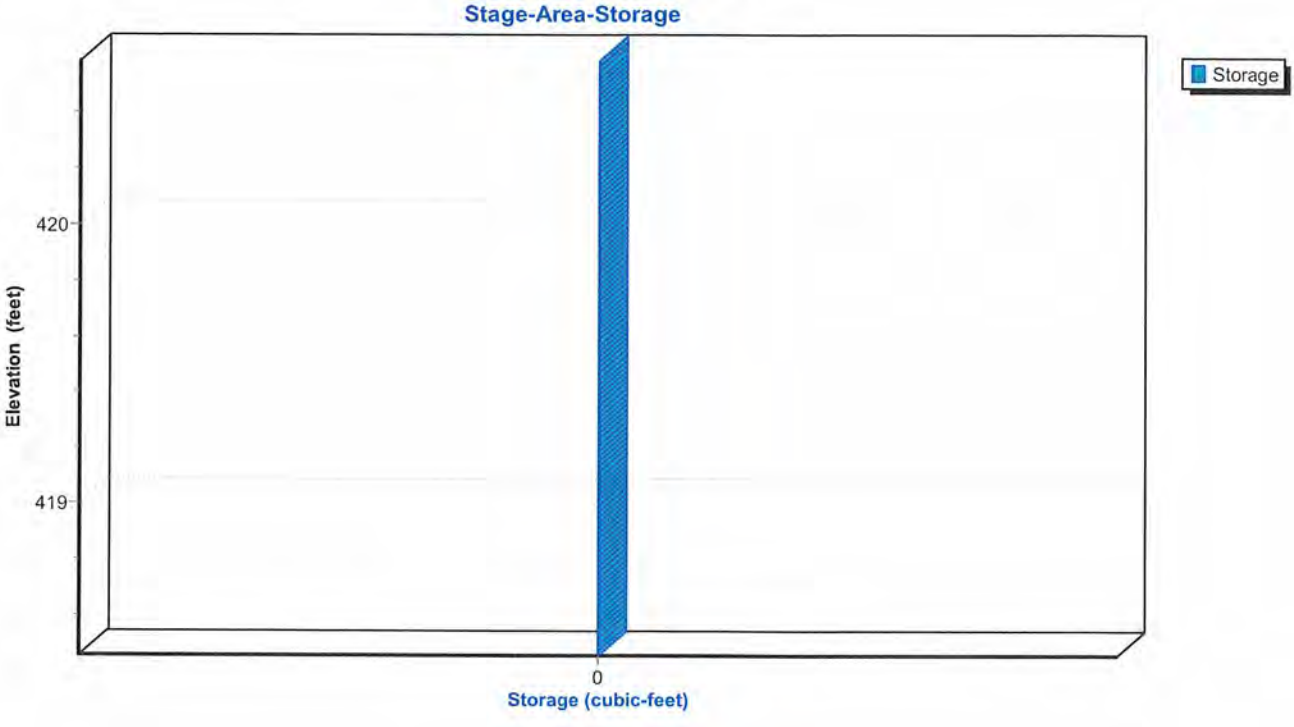
Pond 23P: CB3



Pond 23P: CB3



Pond 23P: CB3



Summary for Pond 24P: CB2

[57] Hint: Peaked at 420.08' (Flood elevation advised)
[79] Warning: Submerged Pond 17P Primary device # 1 INLET by 0.27'

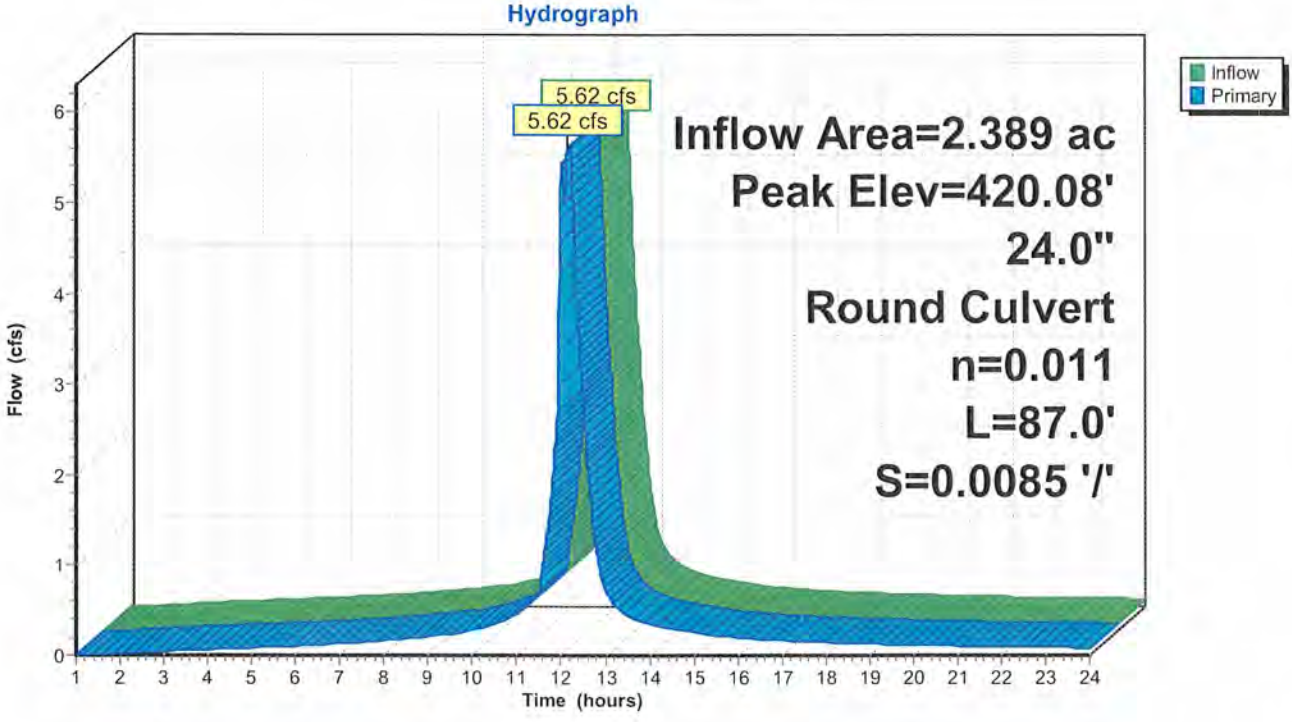
Inflow Area = 2.389 ac,100.00% Impervious, Inflow Depth > 3.18" for 10-yr event
Inflow = 5.62 cfs @ 12.17 hrs, Volume= 0.633 af
Outflow = 5.62 cfs @ 12.17 hrs, Volume= 0.633 af, Atten= 0%, Lag= 0.0 min
Primary = 5.62 cfs @ 12.17 hrs, Volume= 0.633 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 420.08' @ 12.17 hrs

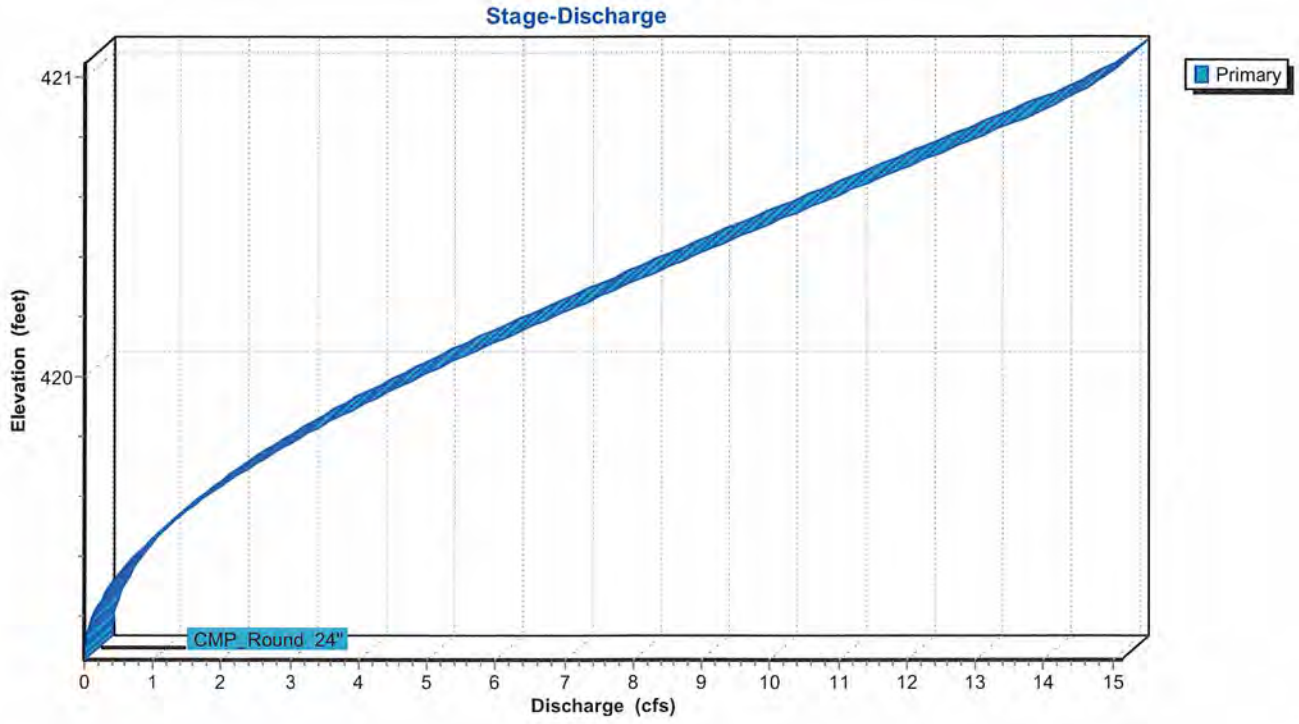
Device	Routing	Invert	Outlet Devices
#1	Primary	419.05'	**24.0" Round CMP_Round 24"** L= 87.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.05' / 418.31' S= 0.0085 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=5.62 cfs @ 12.17 hrs HW=420.08' (Free Discharge)
1=CMP_Round 24" (Inlet Controls 5.62 cfs @ 3.45 fps)

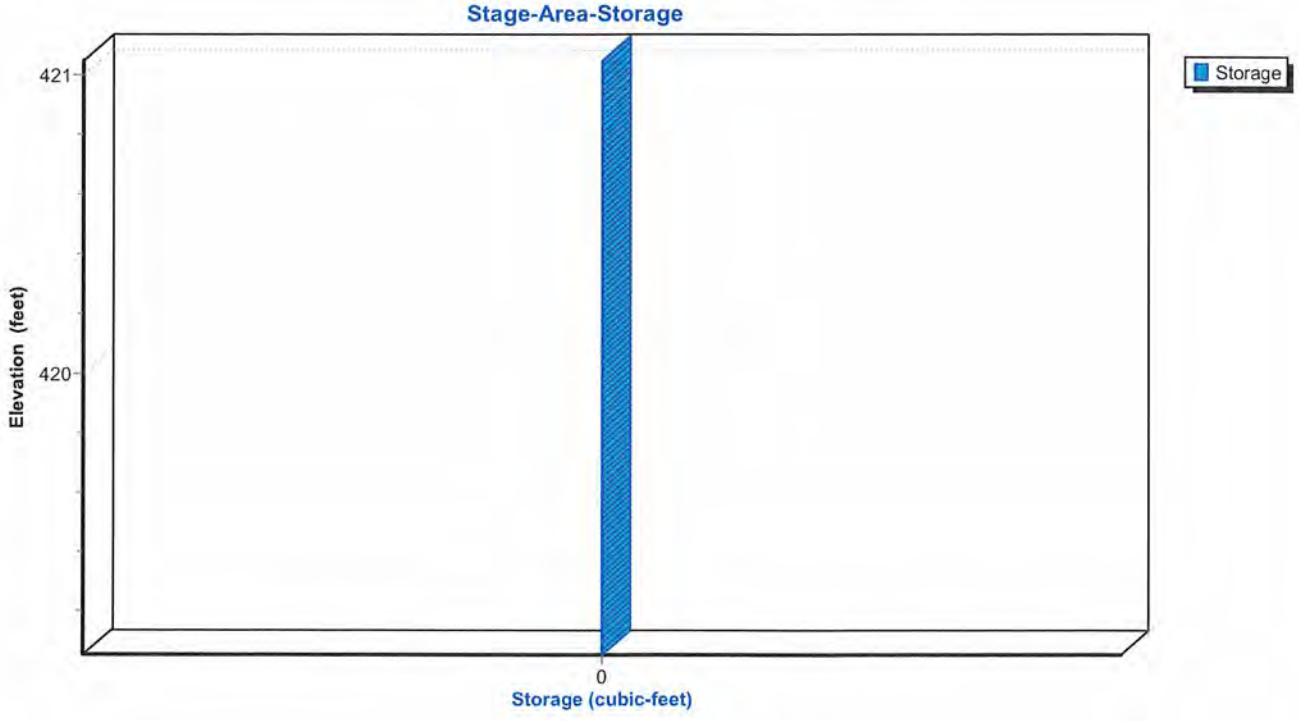
Pond 24P: CB2



Pond 24P: CB2



Pond 24P: CB2



Summary for Pond 27P: PROPOSED POND

[43] Hint: Has no inflow (Outflow=Zero)

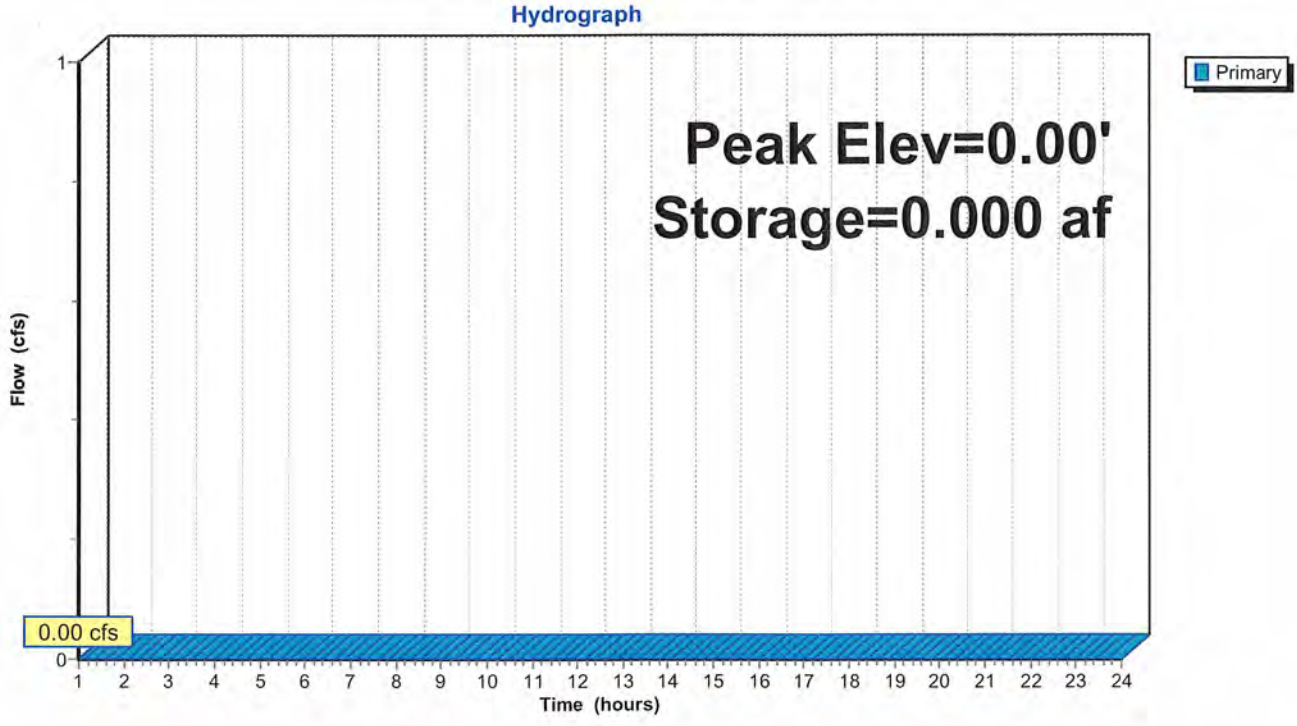
Volume	Invert	Avail.Storage	Storage Description
#1	403.00'	1.801 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
403.00	0.008	0.0	0.000	0.000
404.00	0.020	0.0	0.000	0.000
405.00	0.034	0.0	0.000	0.000
406.00	0.050	0.0	0.000	0.000
407.00	0.067	0.0	0.000	0.000
408.00	0.087	0.0	0.000	0.000
409.00	0.108	0.0	0.000	0.000
410.00	0.132	0.0	0.000	0.000
411.00	0.250	0.0	0.000	0.000
412.00	0.291	100.0	0.270	0.270
413.00	0.335	100.0	0.313	0.583
414.00	0.381	100.0	0.358	0.941
415.00	0.429	100.0	0.405	1.346
416.00	0.480	100.0	0.454	1.801

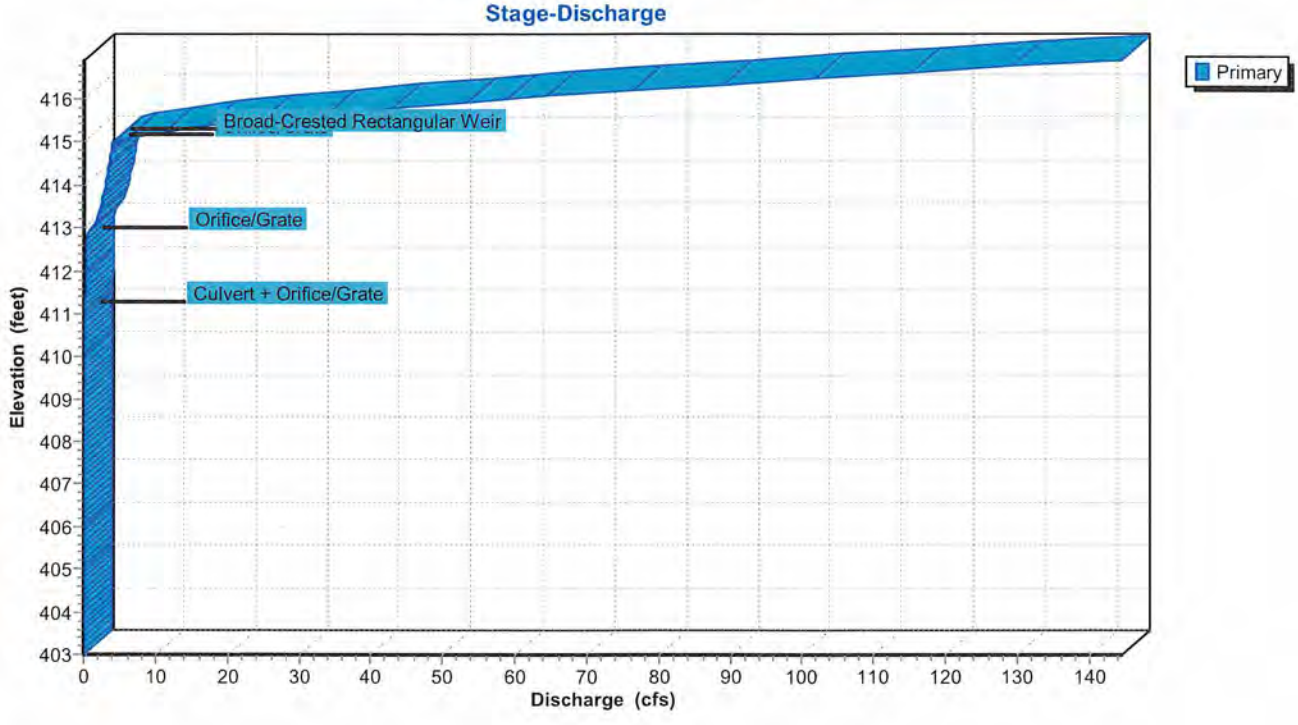
Device	Routing	Invert	Outlet Devices
#1	Primary	411.00'	**12.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 411.00' / 410.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Device 1	411.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	412.70'	**18.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	414.90'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	415.00'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=0.00' (Free Discharge)
- **1=Culvert** (Controls 0.00 cfs)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

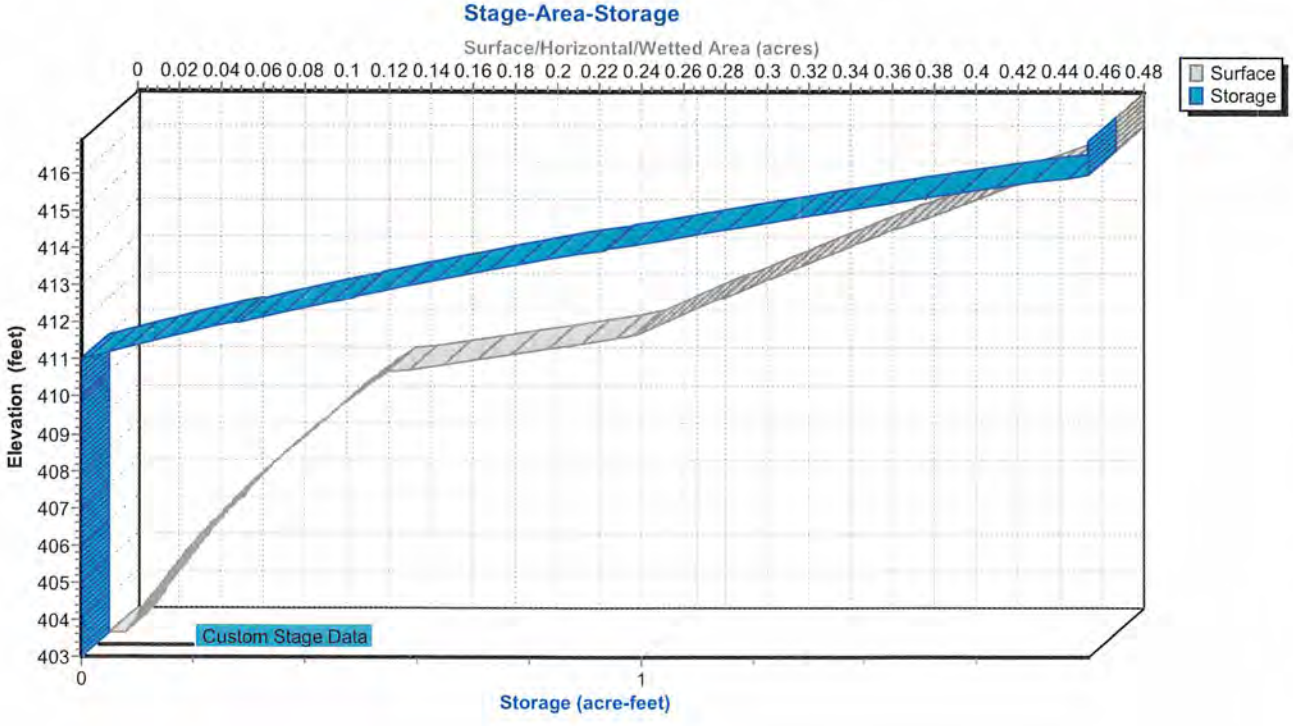
Pond 27P: PROPOSED POND



Pond 27P: PROPOSED POND



Pond 27P: PROPOSED POND



Summary for Pond 28P: PROPOSED POND

Inflow Area = 4.721 ac,100.00% Impervious, Inflow Depth > 3.18" for 10-yr event
Inflow = 12.47 cfs @ 12.13 hrs, Volume= 1.251 af
Outflow = 2.18 cfs @ 12.79 hrs, Volume= 0.792 af, Atten= 82%, Lag= 40.0 min
Primary = 2.18 cfs @ 12.79 hrs, Volume= 0.792 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Starting Elev= 411.00' Surf.Area= 0.250 ac Storage= 0.627 af
Peak Elev= 413.45' @ 12.79 hrs Surf.Area= 0.356 ac Storage= 1.364 af (0.737 af above start)

Plug-Flow detention time= 801.6 min calculated for 0.165 af (13% of inflow)
Center-of-Mass det. time= 151.1 min (911.5 - 760.4)

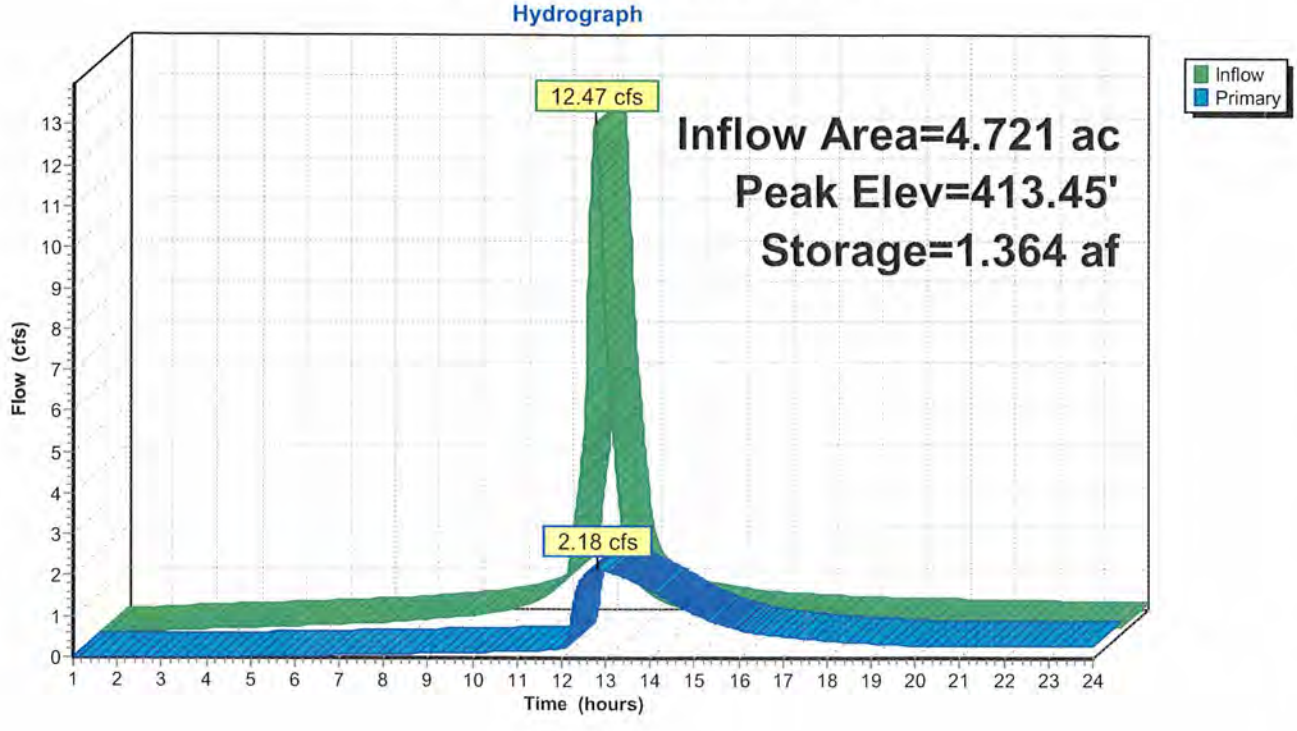
Volume	Invert	Avail.Storage	Storage Description
#1	403.00'	2.428 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
403.00	0.008	0.0	0.000	0.000
404.00	0.020	100.0	0.014	0.014
405.00	0.034	100.0	0.027	0.041
406.00	0.050	100.0	0.042	0.083
407.00	0.067	100.0	0.059	0.141
408.00	0.087	100.0	0.077	0.219
409.00	0.108	100.0	0.097	0.316
410.00	0.132	100.0	0.120	0.436
411.00	0.250	100.0	0.191	0.627
412.00	0.291	100.0	0.270	0.897
413.00	0.335	100.0	0.313	1.210
414.00	0.381	100.0	0.358	1.568
415.00	0.429	100.0	0.405	1.974
416.00	0.480	100.0	0.454	2.428

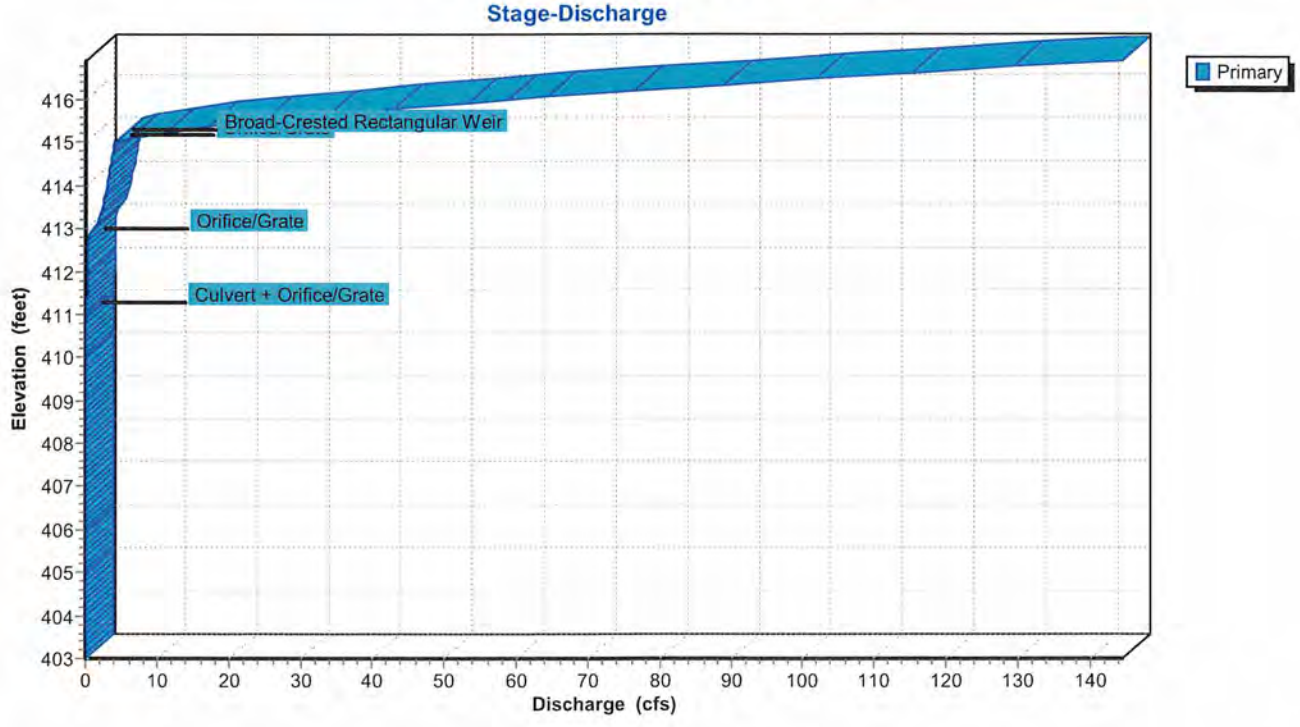
Device	Routing	Invert	Outlet Devices
#1	Primary	411.00'	**12.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 411.00' / 410.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Device 1	411.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	412.70'	**18.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	414.90'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	415.00'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.19 cfs @ 12.79 hrs HW=413.45' (Free Discharge)
- **1=Culvert** (Passes 2.19 cfs of 4.03 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.36 cfs @ 7.34 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.83 cfs @ 3.65 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

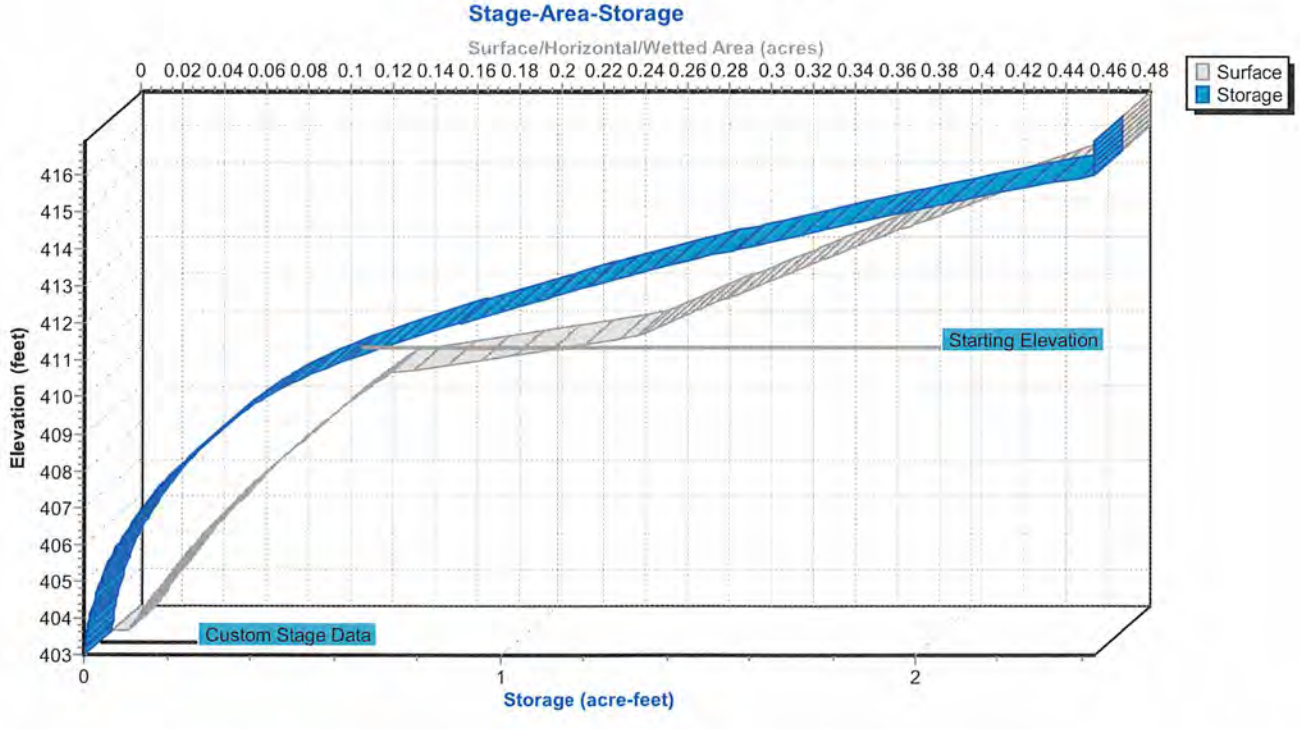
Pond 28P: PROPOSED POND



Pond 28P: PROPOSED POND



Pond 28P: PROPOSED POND



Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 2 Runoff Area=3.000 ac 0.00% Impervious Runoff Depth>1.96"
Flow Length=280' Slope=0.0070 '/' Tc=80.3 min CN=63 Runoff=2.55 cfs 0.491 af

Subcatchment 4S: Subcatchment 3 Runoff Area=3.370 ac 0.00% Impervious Runoff Depth>3.23"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=77 Runoff=6.11 cfs 0.907 af

Subcatchment 5S: Subcatchment 4 Runoff Area=4.060 ac 0.00% Impervious Runoff Depth>0.94"
Flow Length=150' Slope=0.0067 '/' Tc=56.4 min CN=49 Runoff=1.70 cfs 0.318 af

Subcatchment 6S: Subcatchment 1 Runoff Area=12.550 ac 80.08% Impervious Runoff Depth>4.80"
Flow Length=2,260' Tc=36.2 min CN=92 Runoff=40.86 cfs 5.024 af

Subcatchment 12S: SC3 Runoff Area=1.288 ac 100.00% Impervious Runoff Depth>5.51"
Flow Length=1,245' Tc=10.3 min CN=98 Runoff=7.82 cfs 0.592 af

Subcatchment 14S: SC2 Runoff Area=1.736 ac 100.00% Impervious Runoff Depth>5.51"
Flow Length=1,196' Slope=0.0033 '/' Tc=18.6 min CN=98 Runoff=8.24 cfs 0.797 af

Subcatchment 19S: SC4 Runoff Area=1.044 ac 100.00% Impervious Runoff Depth>5.51"
Flow Length=804' Slope=0.0018 '/' Tc=17.3 min CN=98 Runoff=5.10 cfs 0.479 af

Subcatchment 20S: SC1 Runoff Area=0.653 ac 100.00% Impervious Runoff Depth>5.52"
Flow Length=255' Slope=0.0073 '/' Tc=3.6 min CN=98 Runoff=5.25 cfs 0.300 af

Reach 7R: Small Creek Avg. Flow Depth=1.84' Max Vel=6.42 fps Inflow=46.11 cfs 6.247 af
n=0.030 L=360.0' S=0.0167 '/' Capacity=146.42 cfs Outflow=46.08 cfs 6.243 af

Reach 9R: Butternut Creek Avg. Flow Depth=1.15' Max Vel=4.71 fps Inflow=50.78 cfs 8.409 af
n=0.030 L=380.0' S=0.0097 '/' Capacity=1,479.89 cfs Outflow=50.75 cfs 8.399 af

Reach 10R: Concrete Pipe Avg. Flow Depth=1.47' Max Vel=12.22 fps Inflow=41.53 cfs 5.341 af
30.0" Round Pipe w/ 4.0" inside fill n=0.011 L=150.0' S=0.0133 '/' Capacity=49.49 cfs Outflow=41.51 cfs 5.340 af

Pond 17P: CB1 Peak Elev=423.43' Inflow=5.25 cfs 0.300 af
12.0" Round Culvert n=0.011 L=150.0' S=0.0051 '/' Outflow=5.25 cfs 0.300 af

Pond 22P: CB4 Peak Elev=422.96' Inflow=5.10 cfs 0.479 af
12.0" Round Culvert n=0.011 L=138.0' S=0.0050 '/' Outflow=5.10 cfs 0.479 af

Pond 23P: CB3 Peak Elev=427.60' Inflow=7.82 cfs 0.592 af
12.0" Round Culvert n=0.015 L=129.0' S=0.0190 '/' Outflow=7.82 cfs 0.592 af

Pond 24P: CB2 Peak Elev=420.51' Inflow=9.92 cfs 1.097 af
24.0" Round Culvert n=0.011 L=87.0' S=0.0085 '/' Outflow=9.92 cfs 1.097 af

Pond 27P: PROPOSED POND Peak Elev=0.00' Storage=0.000 af
Primary=0.00 cfs 0.000 af

Pond 28P: PROPOSED POND Peak Elev=414.84' Storage=1.906 af Inflow=21.84 cfs 2.168 af
Outflow=3.84 cfs 1.675 af

Total Runoff Area = 27.701 ac Runoff Volume = 8.906 af Average Runoff Depth = 3.86"
46.68% Pervious = 12.930 ac 53.32% Impervious = 14.771 ac

Summary for Subcatchment 1S: Subcatchment 2

Area closest to butternut creek, between BD and BC.
sheet flow for 100 feet.
shallow channel flow for 180 feet.
380 feet flow in butternut creek.

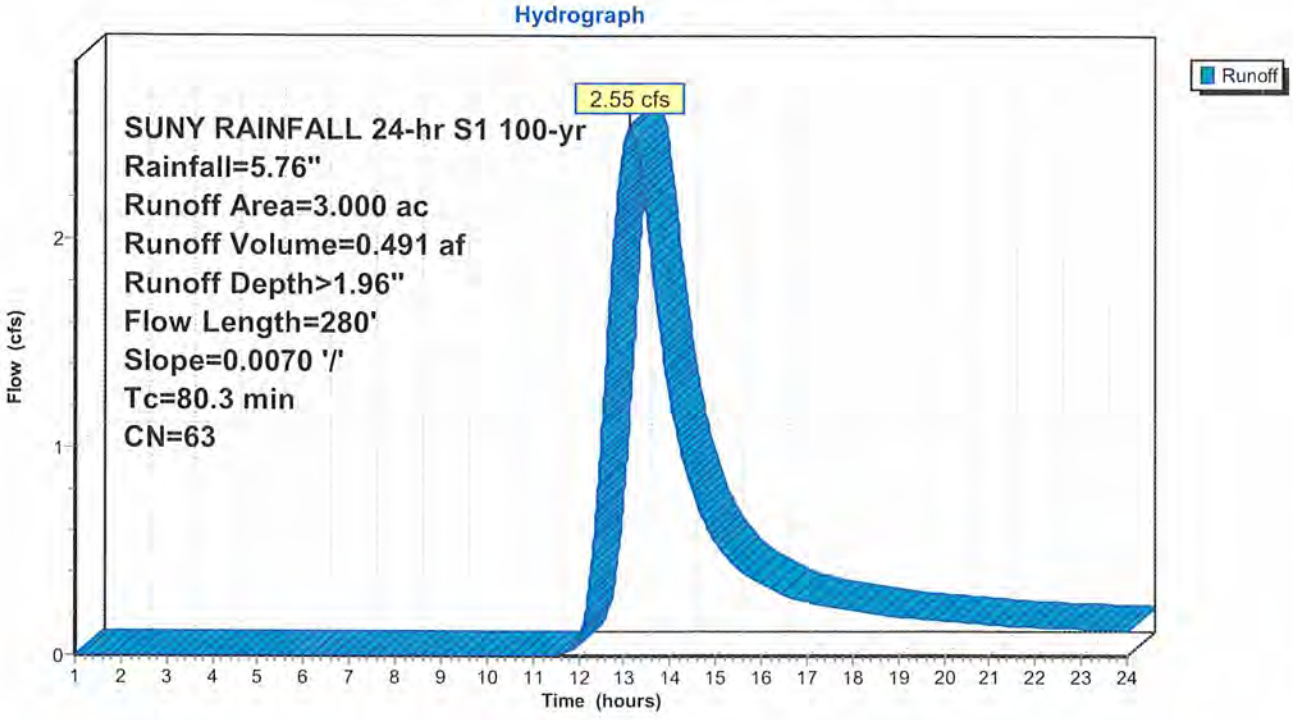
Runoff = 2.55 cfs @ 13.12 hrs, Volume= 0.491 af, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
2.090	77	Woods, Good, HSG D
0.910	30	Woods, Good, HSG A
3.000	63	Weighted Average
3.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0	100	0.0070	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.38"
14.3	180	0.0070	0.21		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
80.3	280	Total			

Subcatchment 1S: Subcatchment 2



Summary for Subcatchment 4S: Subcatchment 3

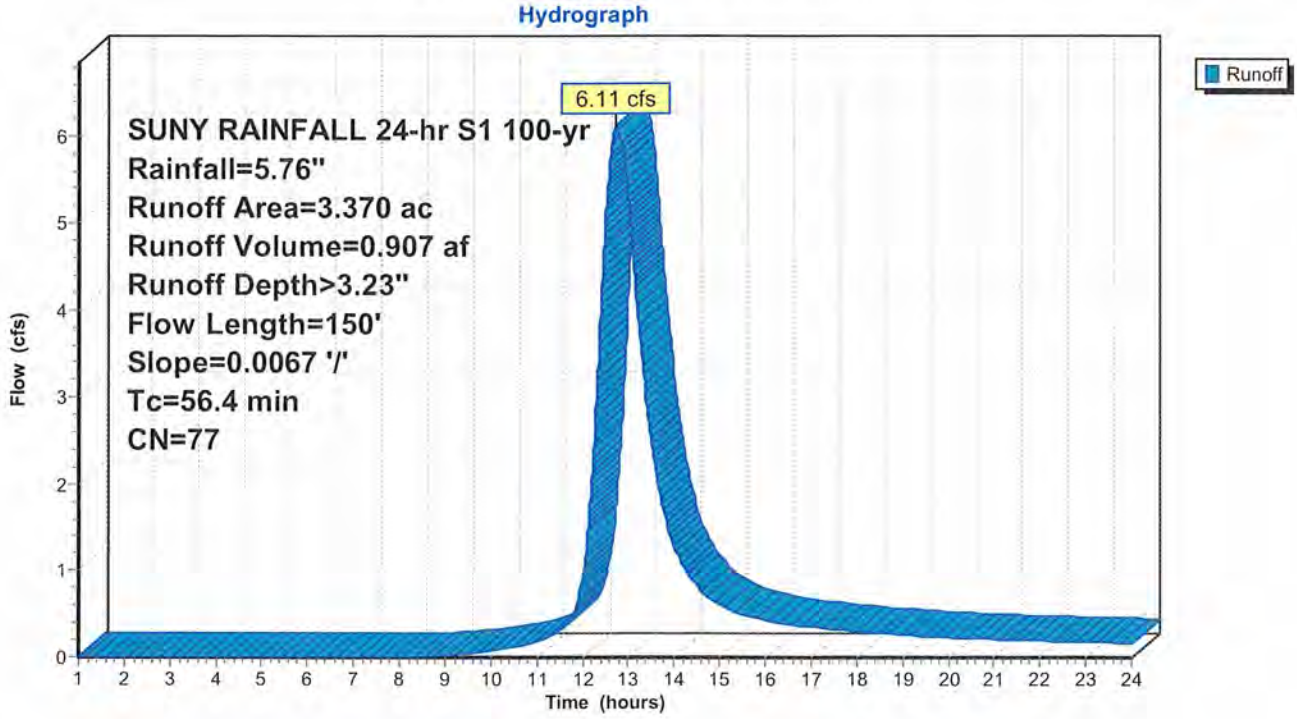
Runoff = 6.11 cfs @ 12.73 hrs, Volume= 0.907 af, Depth> 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
2.000	77	Woods, Good, HSG D
1.370	77	Woods, Good, HSG D
3.370	77	Weighted Average
3.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 4S: Subcatchment 3



Summary for Subcatchment 5S: Subcatchment 4

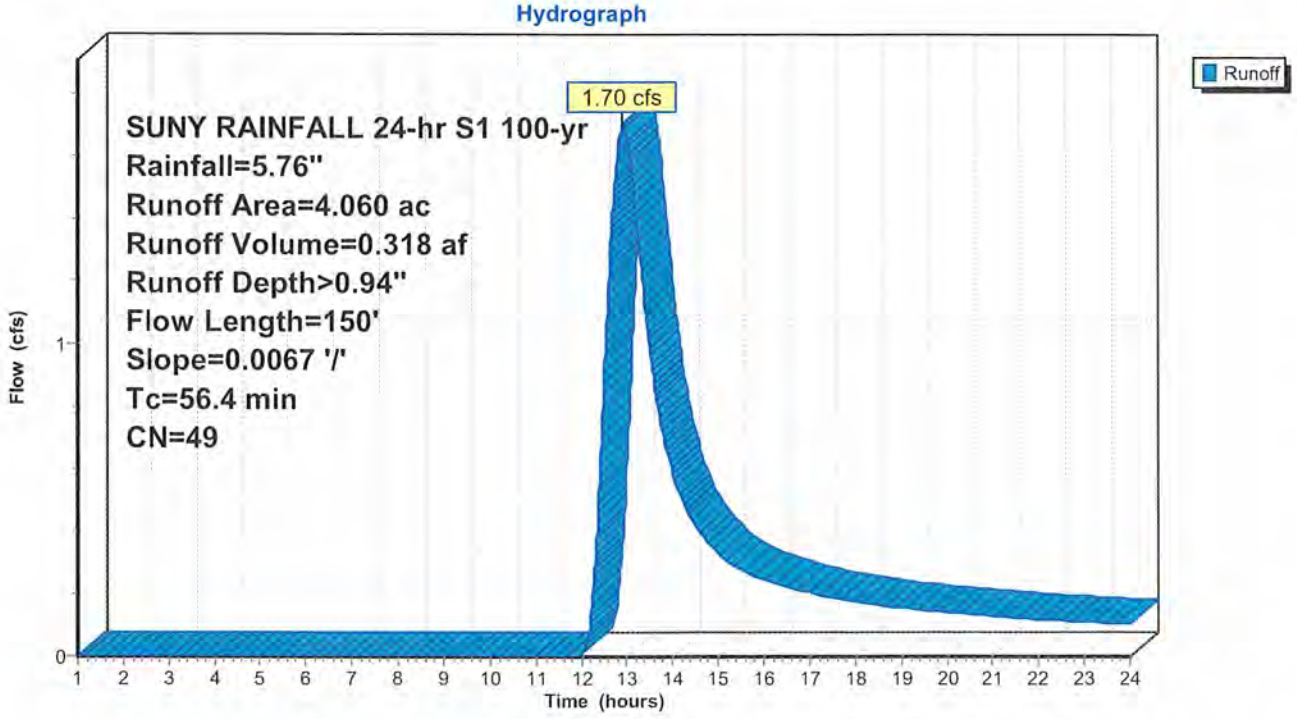
Runoff = 1.70 cfs @ 12.91 hrs, Volume= 0.318 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
4.060	49	50-75% Grass cover, Fair, HSG A
4.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.3	75	0.0067	0.02		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.38"
3.1	75	0.0067	0.41		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
56.4	150	Total			

Subcatchment 5S: Subcatchment 4



Summary for Subcatchment 6S: Subcatchment 1

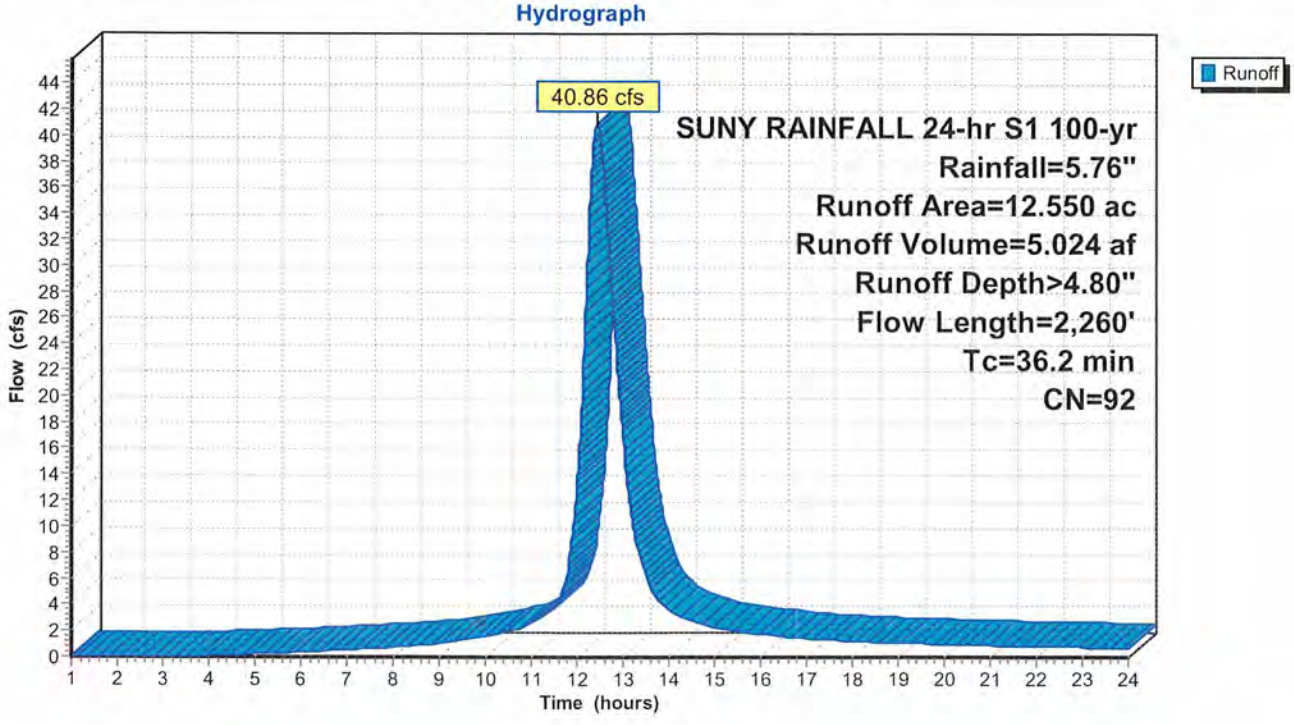
Runoff = 40.86 cfs @ 12.43 hrs, Volume= 5.024 af, Depth> 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
7.650	98	Paved parking, HSG A
0.900	98	Paved parking, HSG D
2.700	83	Paved roads w/open ditches, 50% imp, HSG A
0.300	93	Paved roads w/open ditches, 50% imp, HSG D
0.900	68	<50% Grass cover, Poor, HSG A
0.100	89	<50% Grass cover, Poor, HSG D
12.550	92	Weighted Average
2.500		19.92% Pervious Area
10.050		80.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0105	0.08		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.38"
6.8	850	0.0105	2.08		**Shallow Concentrated Flow, Shallow Concentrated** Paved Kv= 20.3 fps
6.2	950	0.0084	2.54	13.56	**Parabolic Channel, Stream** W=4.00' D=2.00' Area=5.3 sf Perim=5.9' n= 0.050 Sluggish weedy reaches w/pools
1.8	360	0.0139	3.35	52.55	**Parabolic Channel, Sluggish Stream W. Side of BN Creek** W=7.25' D=3.25' Area=15.7 sf Perim=10.2' n= 0.070 Sluggish weedy reaches w/pools
36.2	2,260	Total			

Subcatchment 6S: Subcatchment 1



Summary for Subcatchment 12S: SC3

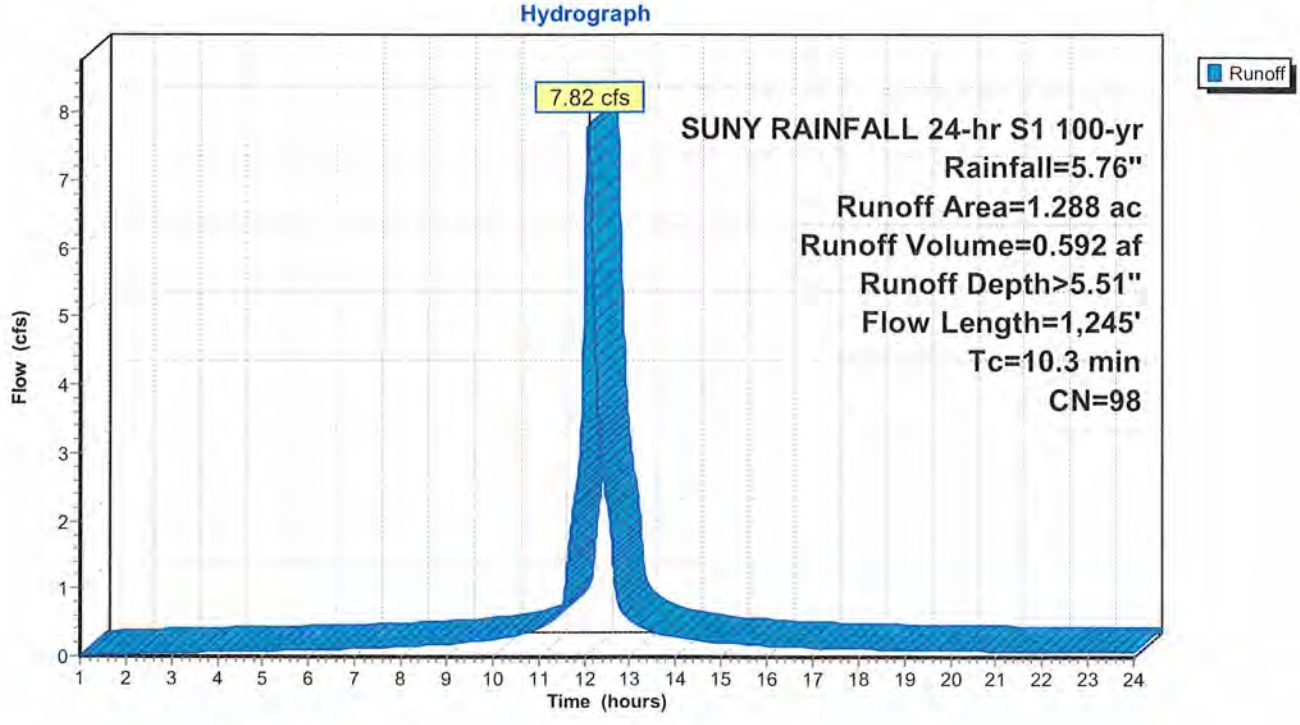
Runoff = 7.82 cfs @ 12.09 hrs, Volume= 0.592 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
1.288	98	Paved roads w/curbs & sewers, HSG D
1.288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	100	0.0070	0.78		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
8.2	1,145	0.0133	2.34		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.3	1,245	Total			

Subcatchment 12S: SC3



Summary for Subcatchment 14S: SC2

Combined nodes 9,10,5 &4

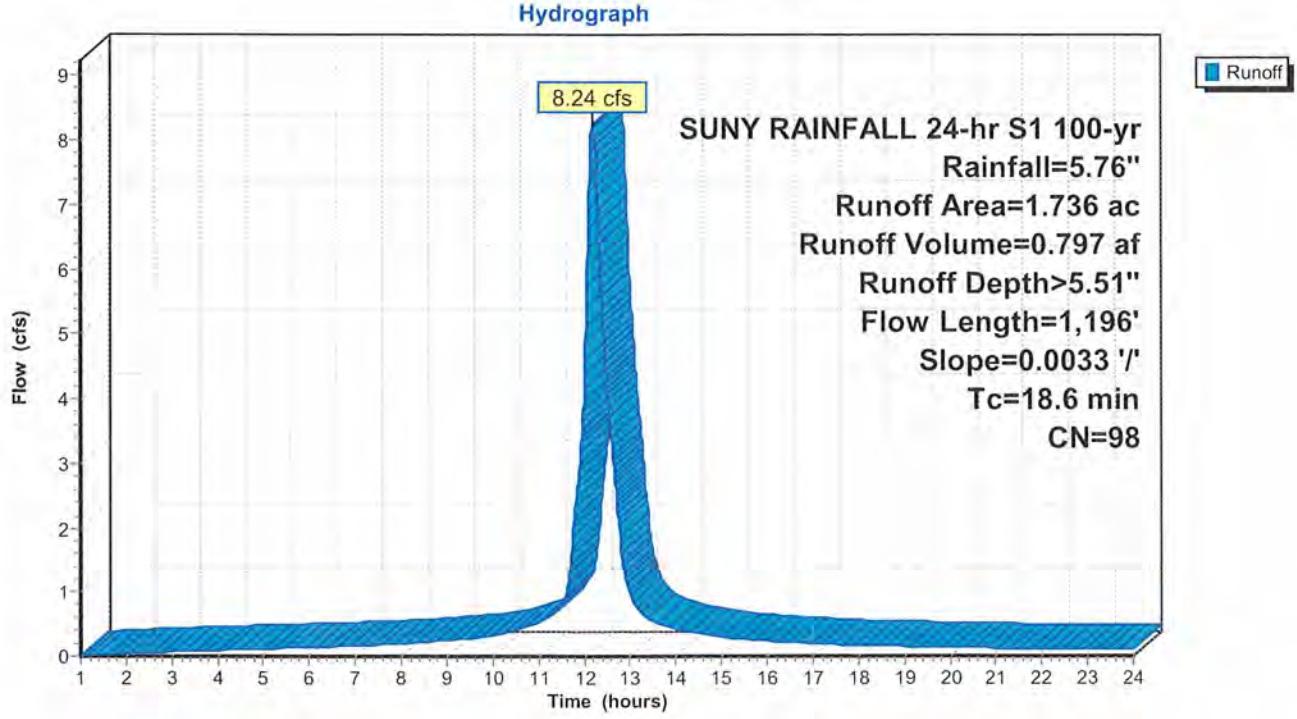
Runoff = 8.24 cfs @ 12.21 hrs, Volume= 0.797 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
1.736	98	Paved roads w/curbs & sewers, HSG D
1.736		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	100	0.0033	0.58		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
15.7	1,096	0.0033	1.17		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.6	1,196	Total			

Subcatchment 14S: SC2



Summary for Subcatchment 19S: SC4

Combined nodes 2&3

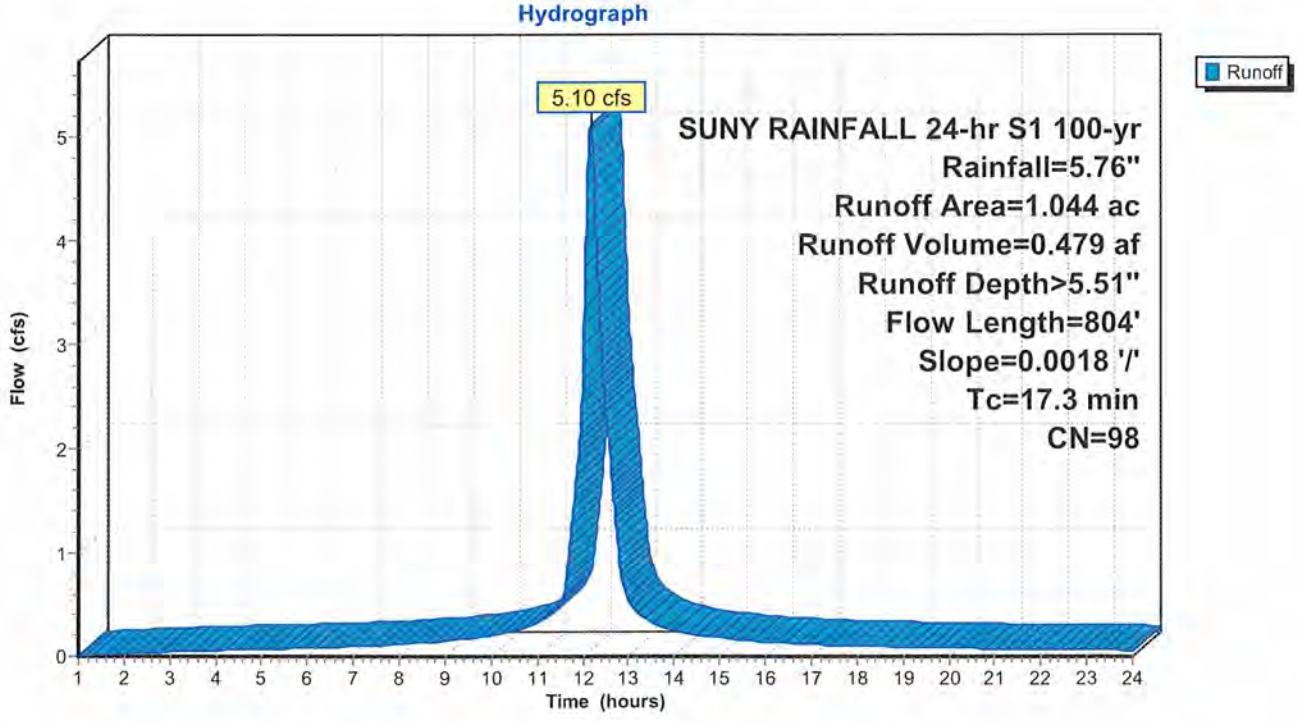
Runoff = 5.10 cfs @ 12.18 hrs, Volume= 0.479 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
1.044	98	Paved roads w/curbs & sewers, HSG D
1.044		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	100	0.0018	0.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
13.6	704	0.0018	0.86		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
17.3	804	Total			

Subcatchment 19S: SC4



Summary for Subcatchment 20S: SC1

Combined nodes 1&6

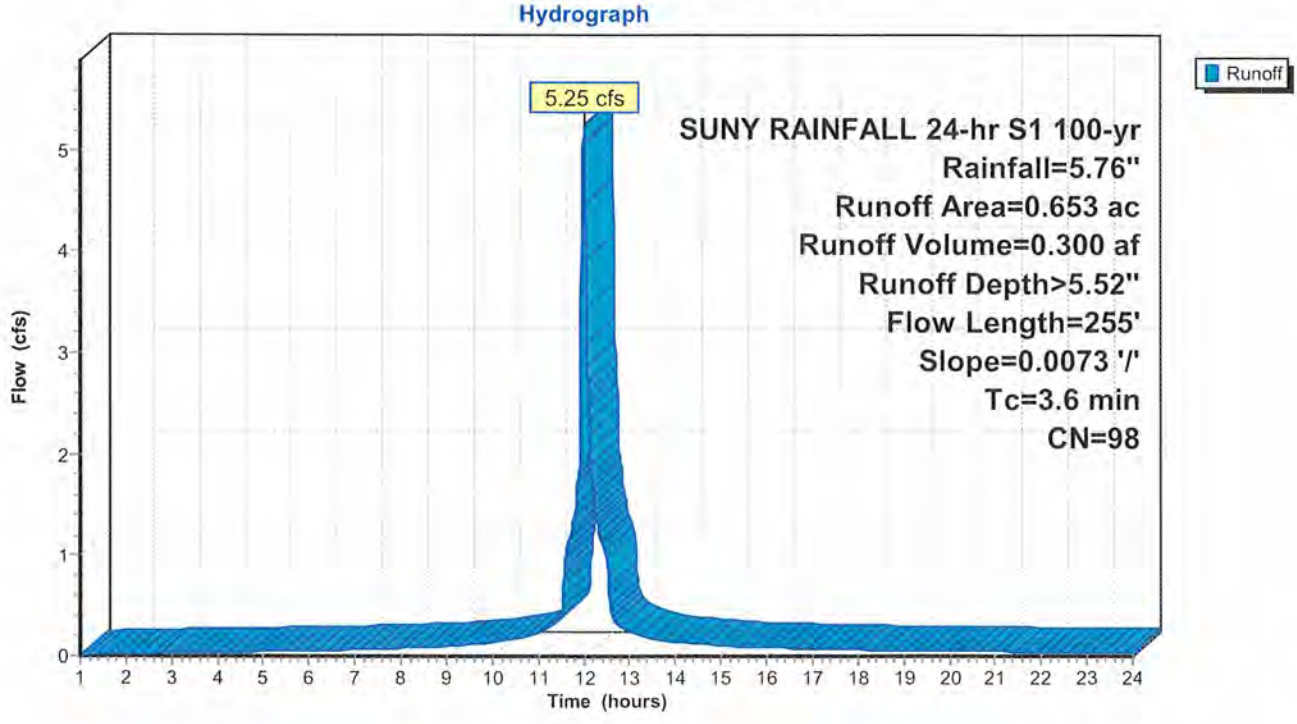
Runoff = 5.25 cfs @ 12.01 hrs, Volume= 0.300 af, Depth> 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
SUNY RAINFALL 24-hr S1 100-yr Rainfall=5.76"

Area (ac)	CN	Description
0.653	98	Paved roads w/curbs & sewers, HSG D
0.653		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	100	0.0073	0.79		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.38"
1.5	155	0.0073	1.73		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.6	255	Total			

Subcatchment 20S: SC1



Summary for Reach 7R: Small Creek

[62] Hint: Exceeded Reach 10R OUTLET depth by 0.20' @ 12.95 hrs

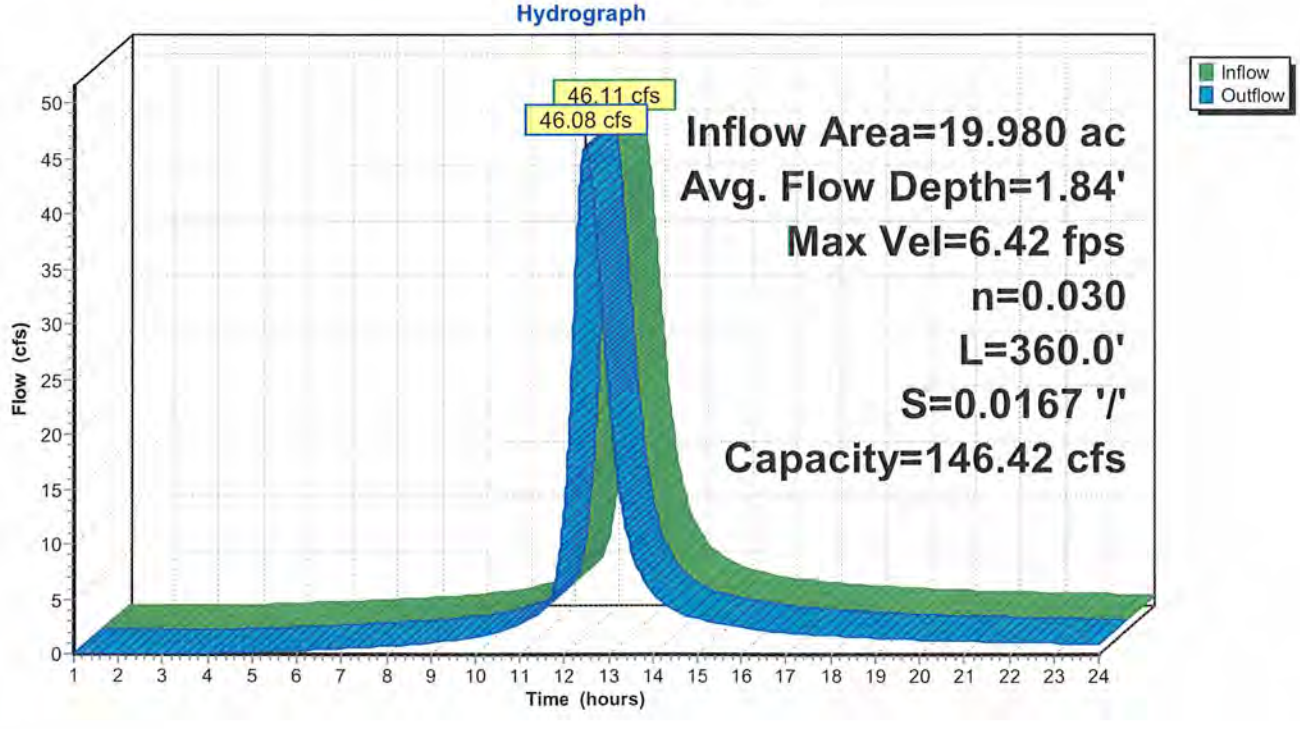
Inflow Area = 19.980 ac, 50.30% Impervious, Inflow Depth > 3.75" for 100-yr event
Inflow = 46.11 cfs @ 12.47 hrs, Volume= 6.247 af
Outflow = 46.08 cfs @ 12.49 hrs, Volume= 6.243 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.42 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 2.50 fps, Avg. Travel Time= 2.4 min

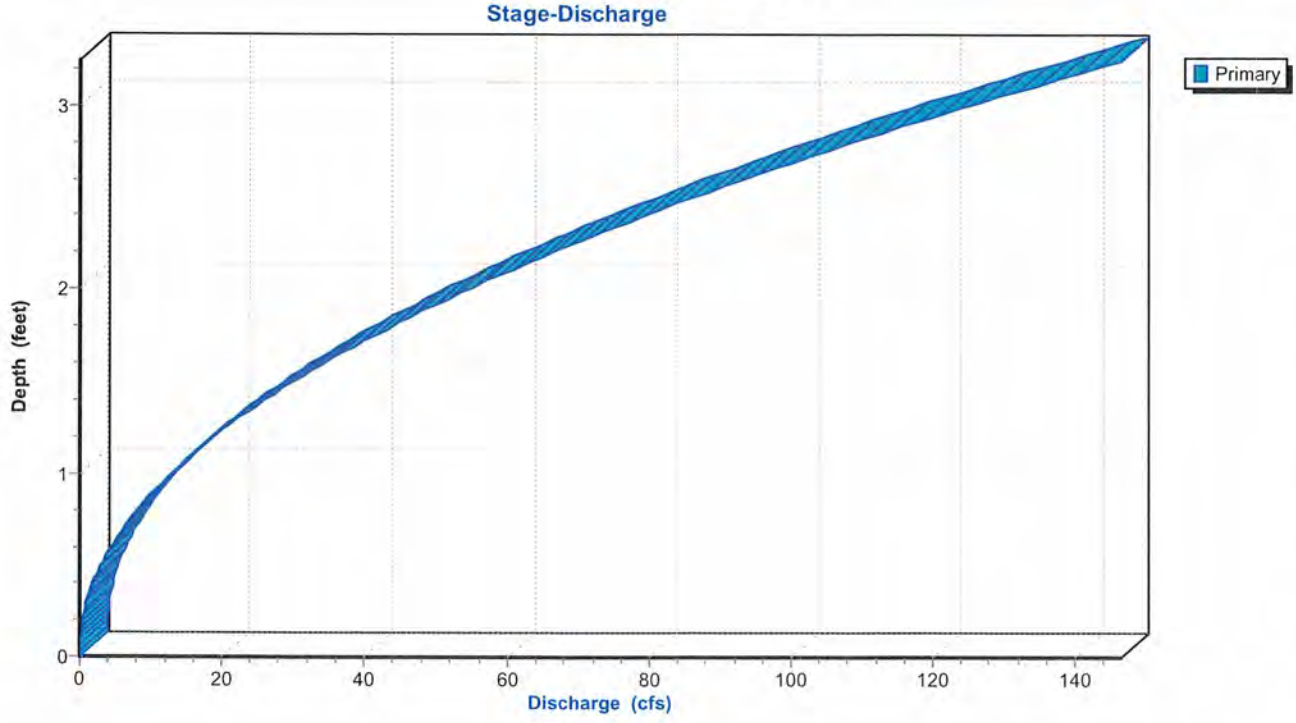
Peak Storage= 2,585 cf @ 12.49 hrs
Average Depth at Peak Storage= 1.84'
Bank-Full Depth= 3.25' Flow Area= 16.8 sf, Capacity= 146.42 cfs

7.75' x 3.25' deep Parabolic Channel, n= 0.030 Earth, dense weeds
Length= 360.0' Slope= 0.0167 '/'
Inlet Invert= 414.00', Outlet Invert= 408.00'

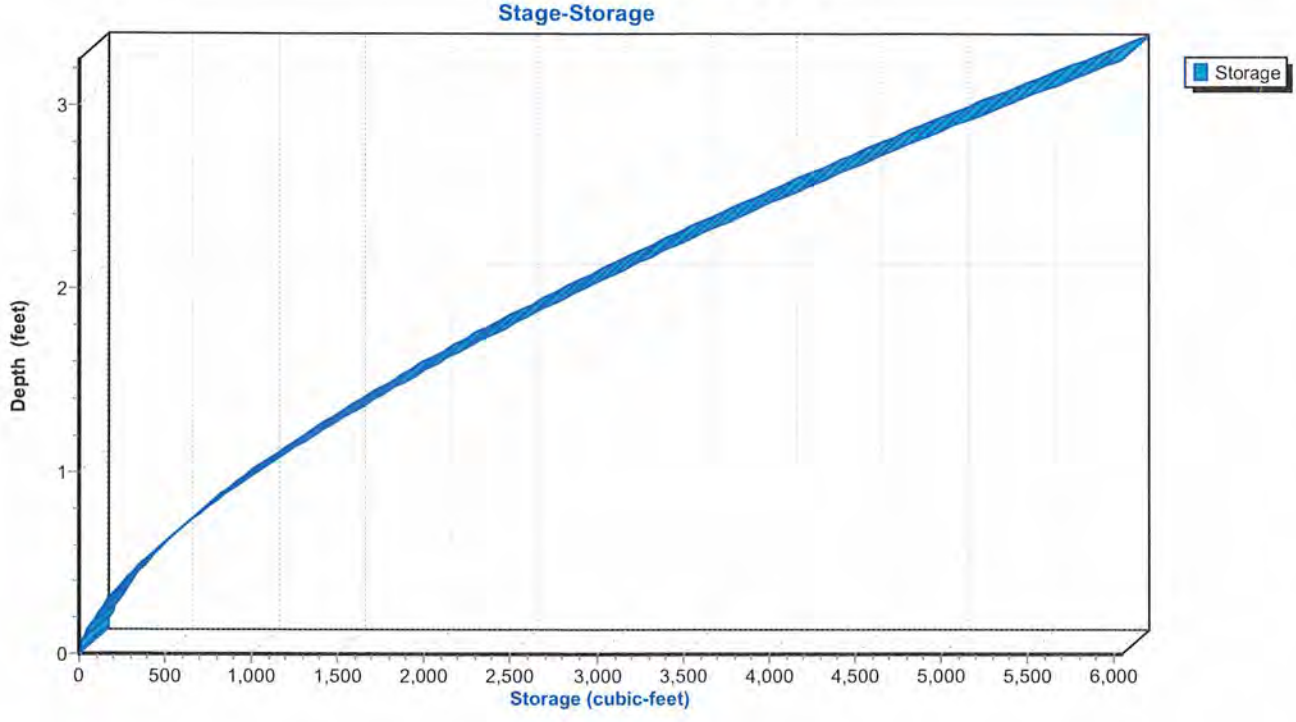




Reach 7R: Small Creek



Reach 7R: Small Creek



Summary for Reach 9R: Butternut Creek

[61] Hint: Exceeded Reach 7R outlet invert by 1.15' @ 12.52 hrs

Inflow Area = 27.701 ac, 53.32% Impervious, Inflow Depth > 3.64" for 100-yr event
Inflow = 50.78 cfs @ 12.51 hrs, Volume= 8.409 af
Outflow = 50.75 cfs @ 12.52 hrs, Volume= 8.399 af, Atten= 0%, Lag= 0.7 min

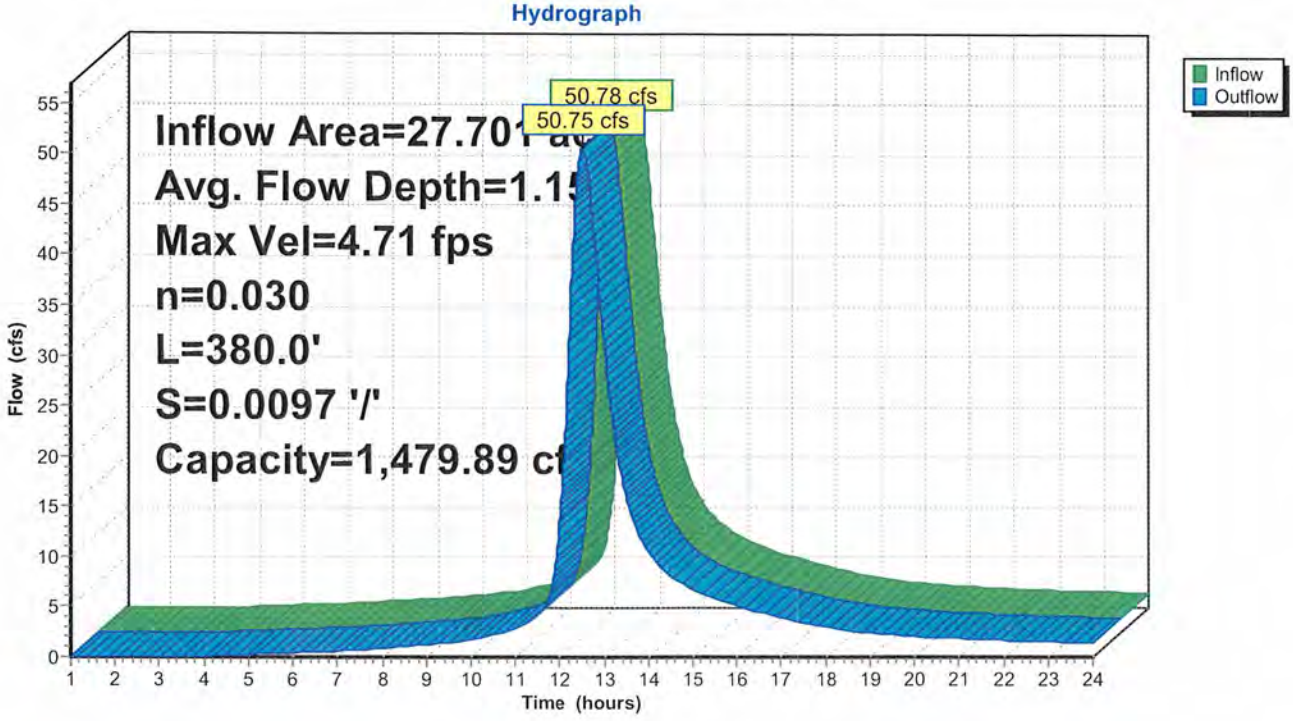
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.71 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.63 fps, Avg. Travel Time= 3.9 min

Peak Storage= 4,099 cf @ 12.52 hrs
Average Depth at Peak Storage= 1.15'
Defined Flood Depth= 417.70' Flow Area= 6,223.3 sf, Capacity= 98,716.46 cfs
Bank-Full Depth= 10.00' Flow Area= 120.0 sf, Capacity= 1,479.89 cfs

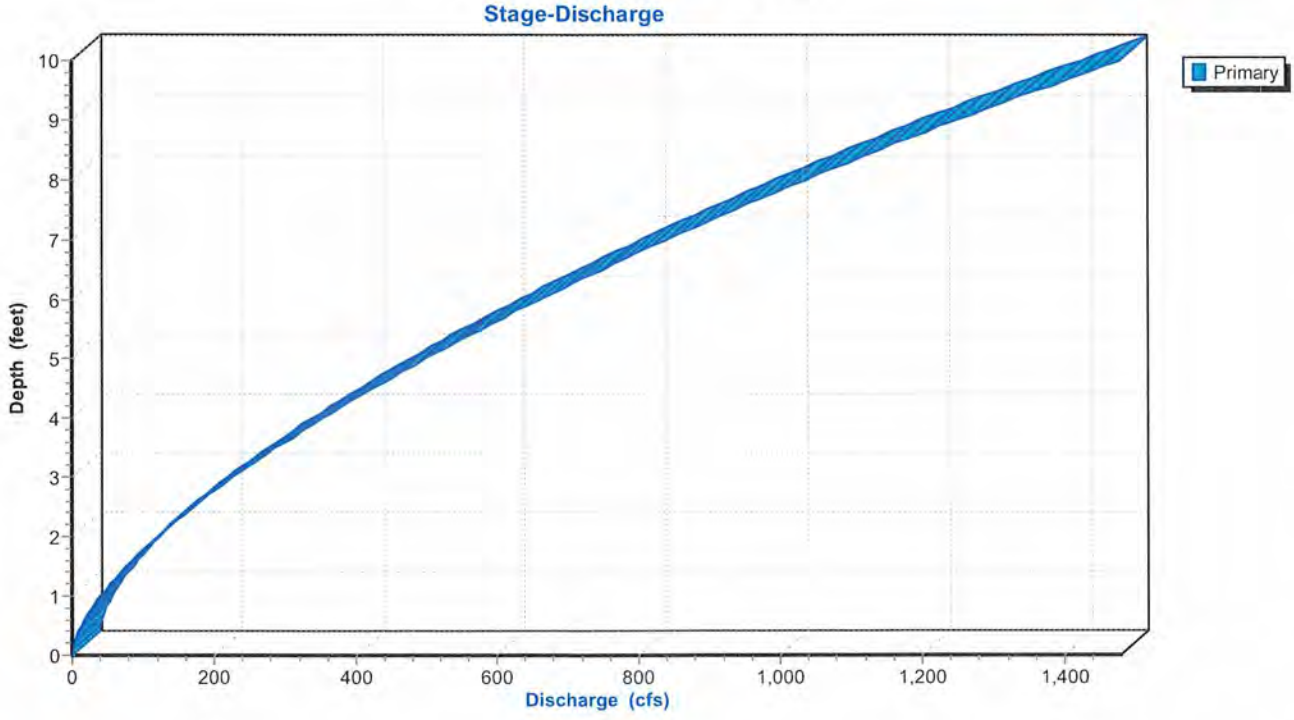
9.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 0.3 '/' Top Width= 15.00'
Length= 380.0' Slope= 0.0097 '/'
Inlet Invert= 408.00', Outlet Invert= 404.31'



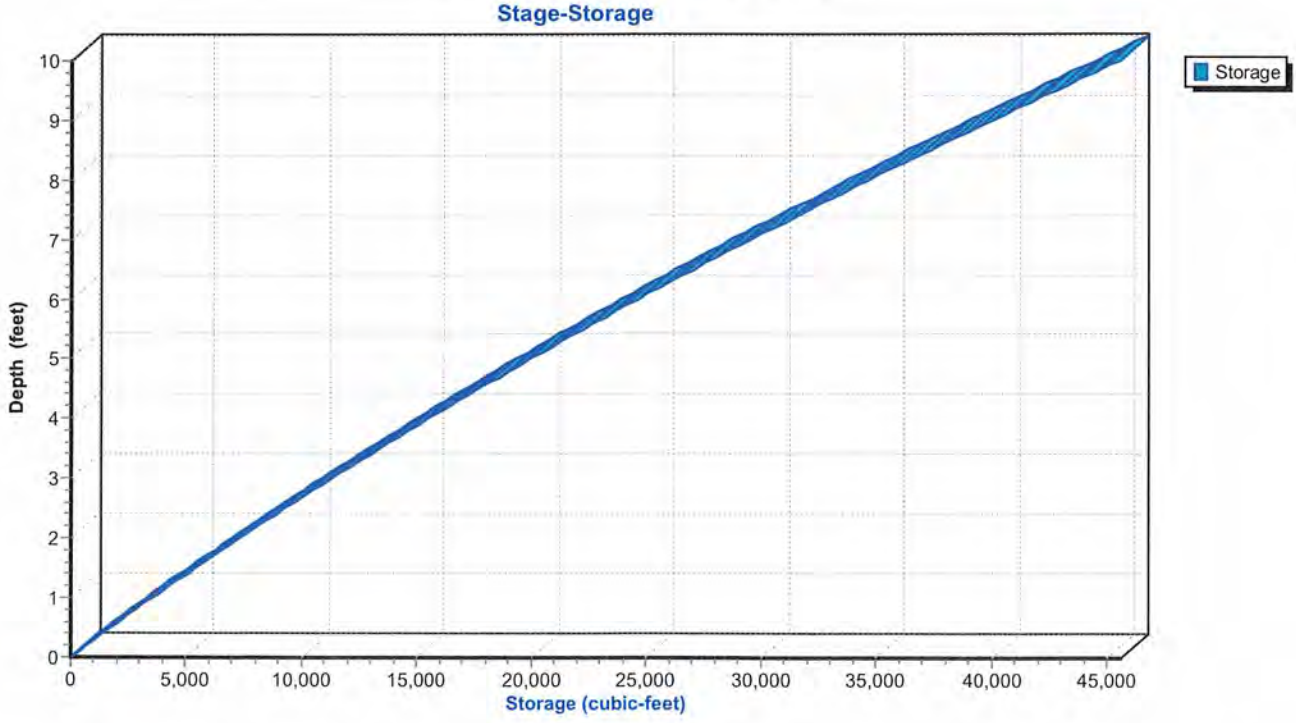
Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Reach 9R: Butternut Creek



Summary for Reach 10R: Concrete Pipe

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 16.610 ac, 60.51% Impervious, Inflow Depth > 3.86" for 100-yr event
Inflow = 41.53 cfs @ 12.43 hrs, Volume= 5.341 af
Outflow = 41.51 cfs @ 12.44 hrs, Volume= 5.340 af, Atten= 0%, Lag= 0.4 min

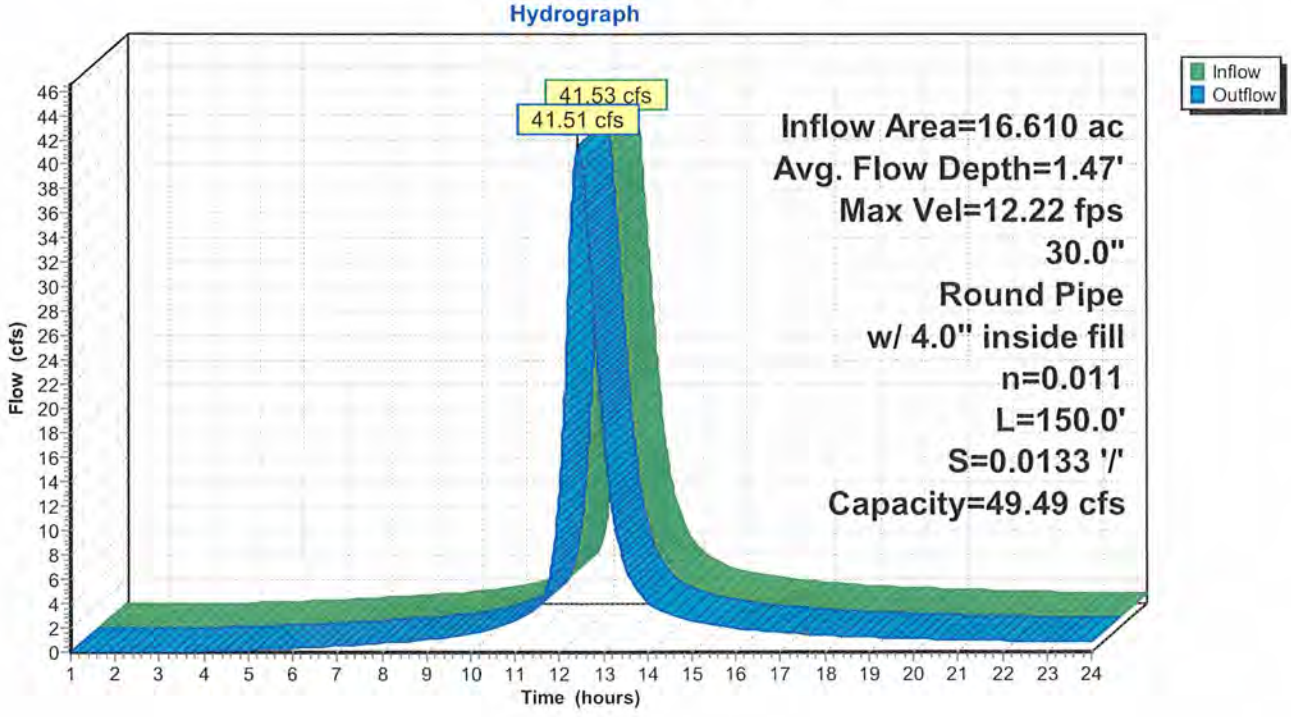
Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 12.22 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.49 fps, Avg. Travel Time= 0.6 min

Peak Storage= 510 cf @ 12.44 hrs
Average Depth at Peak Storage= 1.80' above invert (1.47' above fill)
Bank-Full Depth= 2.50' above invert (2.17' above fill) Flow Area= 4.5 sf, Capacity= 49.49 cfs

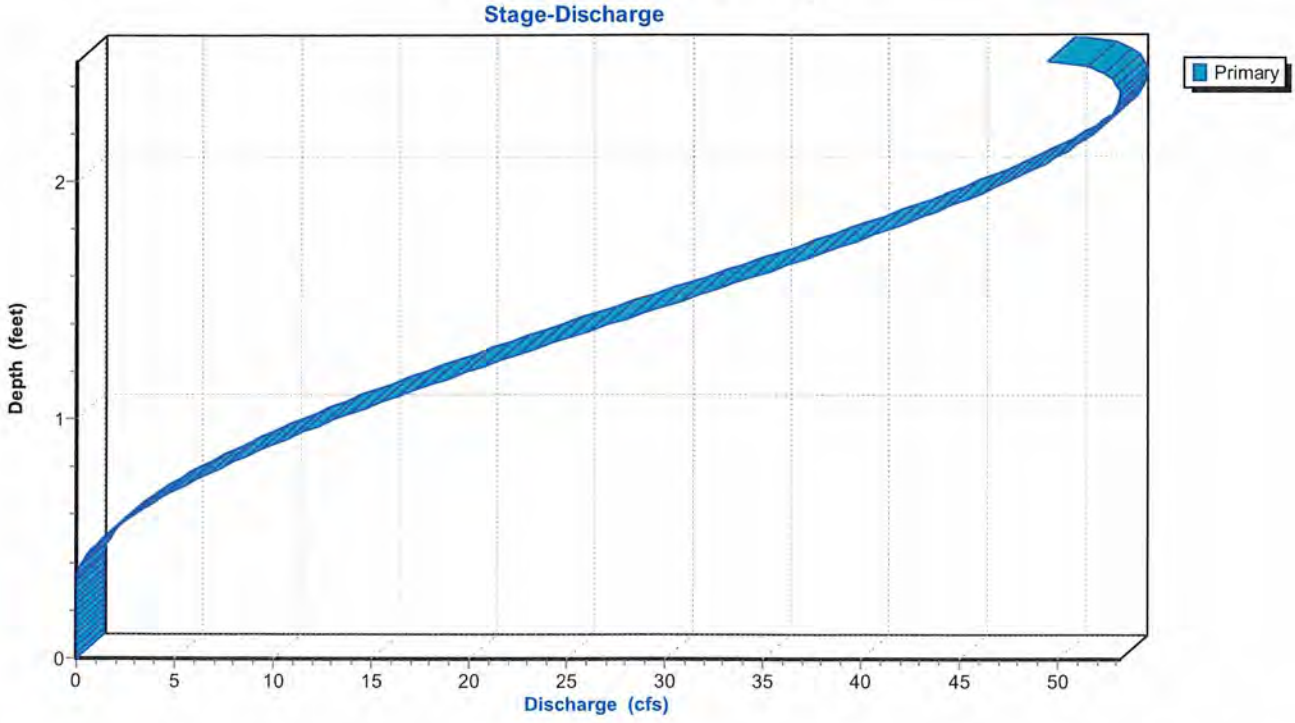
30.0" Round Pipe w/ 4.0" inside fill
n= 0.011 Concrete pipe, finished
Length= 150.0' Slope= 0.0133 '/' (101 Elevation Intervals)
Inlet Invert= 416.00', Outlet Invert= 414.00'



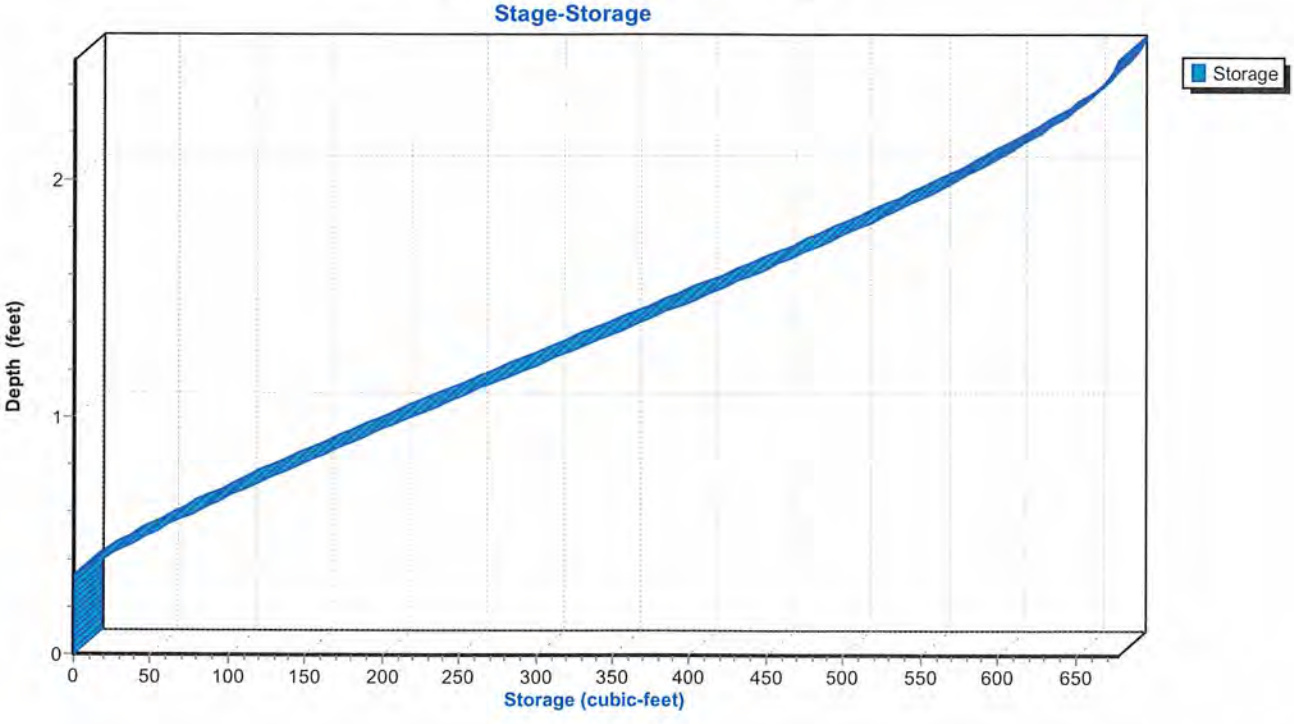
Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Reach 10R: Concrete Pipe



Summary for Pond 17P: CB1

[57] Hint: Peaked at 423.43' (Flood elevation advised)

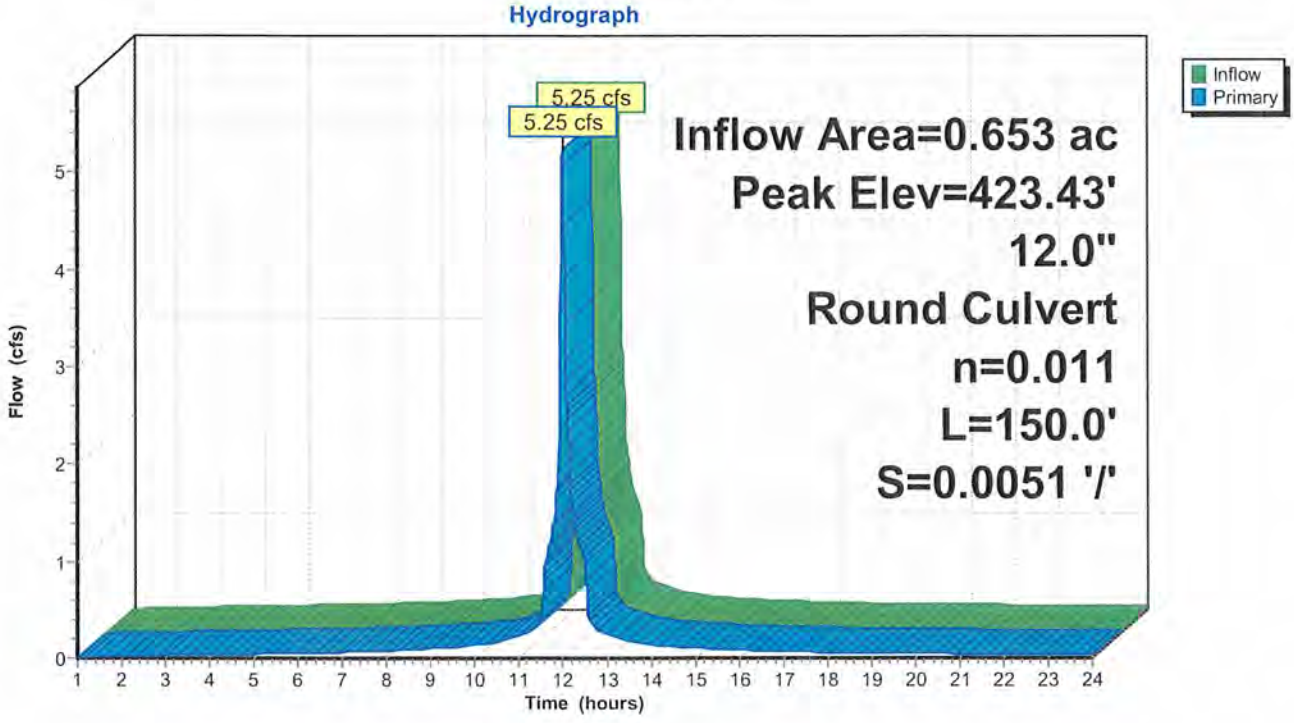
Inflow Area = 0.653 ac,100.00% Impervious, Inflow Depth > 5.52" for 100-yr event
Inflow = 5.25 cfs @ 12.01 hrs, Volume= 0.300 af
Outflow = 5.25 cfs @ 12.01 hrs, Volume= 0.300 af, Atten= 0%, Lag= 0.0 min
Primary = 5.25 cfs @ 12.01 hrs, Volume= 0.300 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 423.43' @ 12.01 hrs

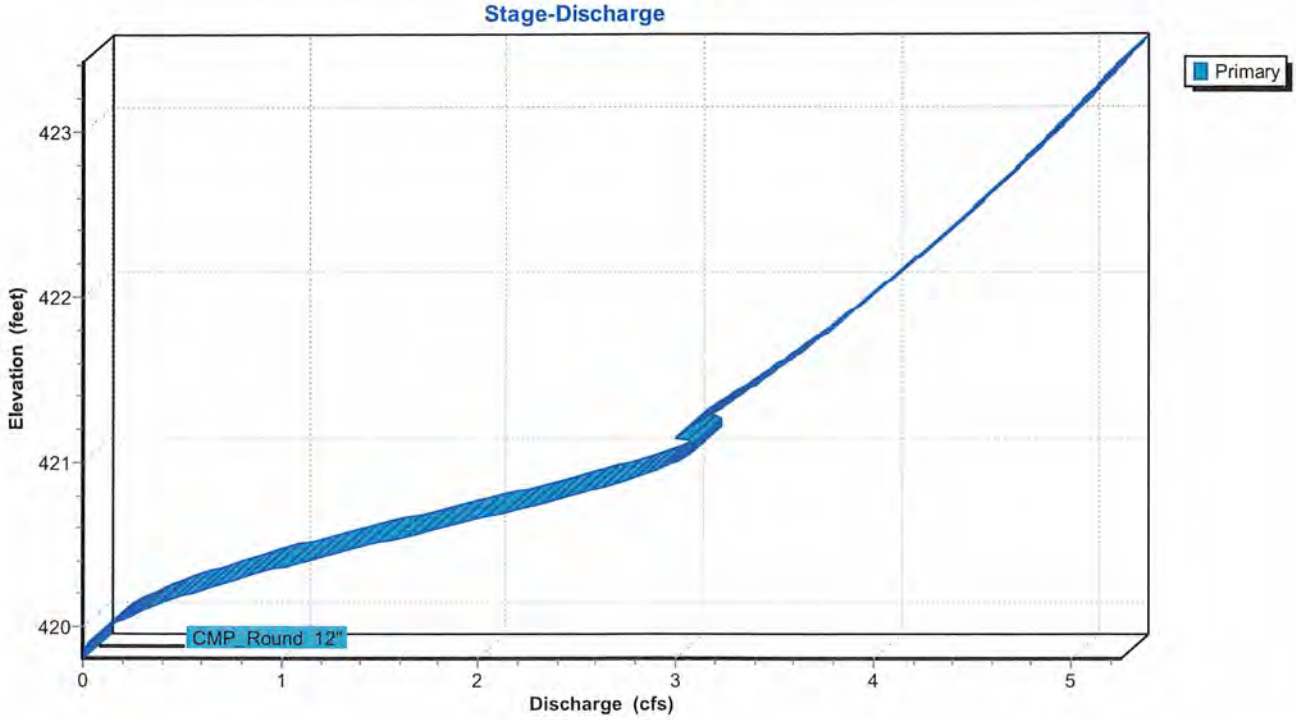
Device	Routing	Invert	Outlet Devices
#1	Primary	419.81'	**12.0" Round CMP_Round 12"** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.81' / 419.05' S= 0.0051 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=5.24 cfs @ 12.01 hrs HW=423.42' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 5.24 cfs @ 6.67 fps)

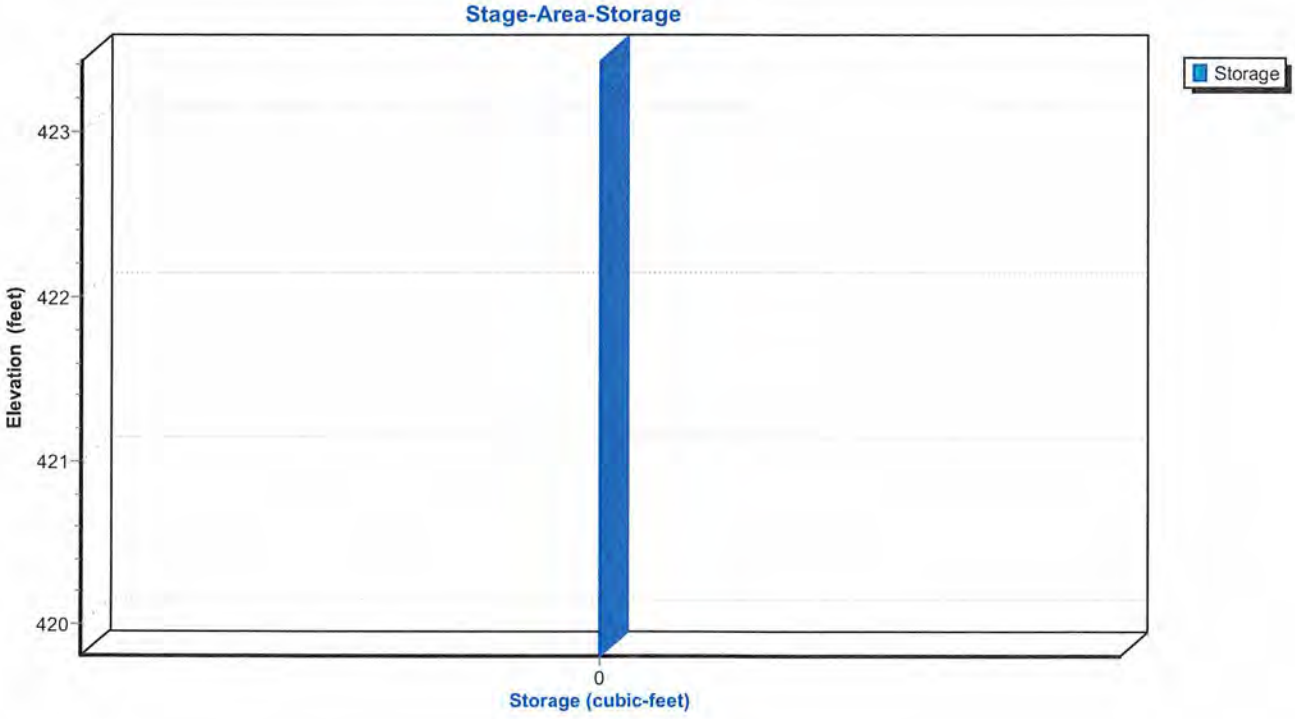
Pond 17P: CB1



Pond 17P: CB1



Pond 17P: CB1



Summary for Pond 22P: CB4

[57] Hint: Peaked at 422.96' (Flood elevation advised)

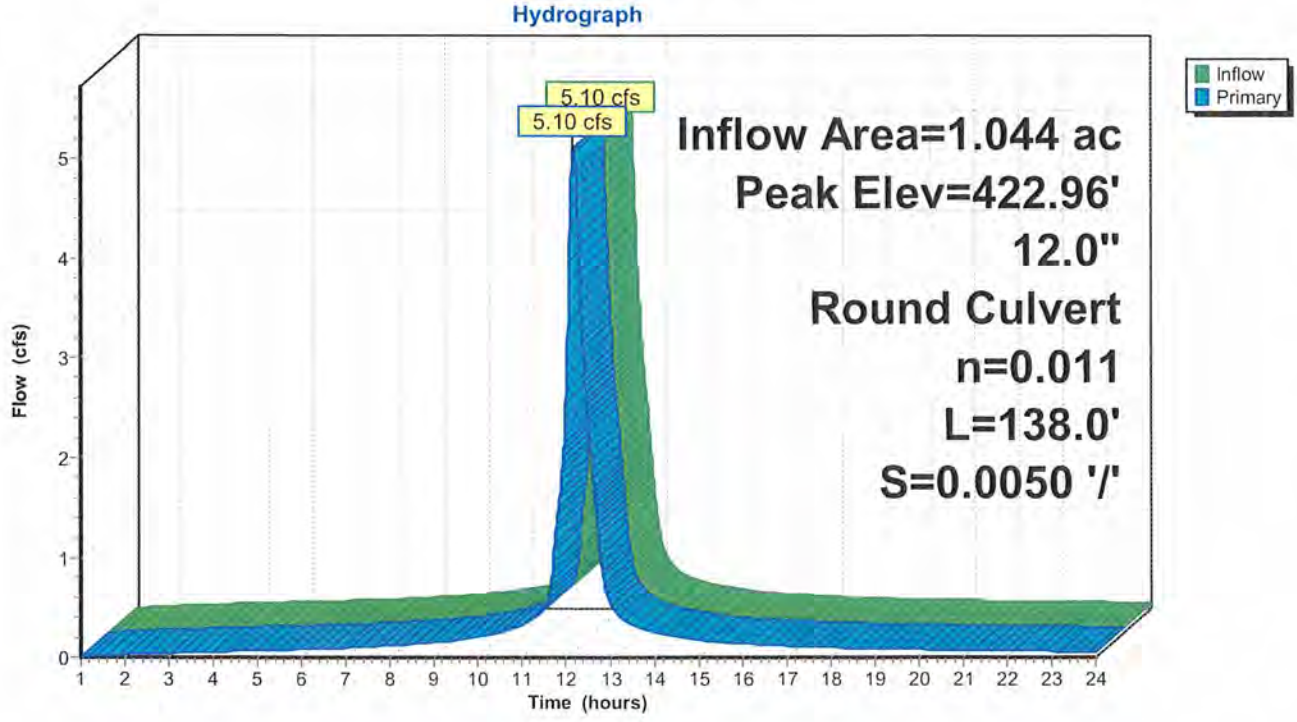
Inflow Area = 1.044 ac,100.00% Impervious, Inflow Depth > 5.51" for 100-yr event
Inflow = 5.10 cfs @ 12.18 hrs, Volume= 0.479 af
Outflow = 5.10 cfs @ 12.18 hrs, Volume= 0.479 af, Atten= 0%, Lag= 0.0 min
Primary = 5.10 cfs @ 12.18 hrs, Volume= 0.479 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 422.96' @ 12.18 hrs

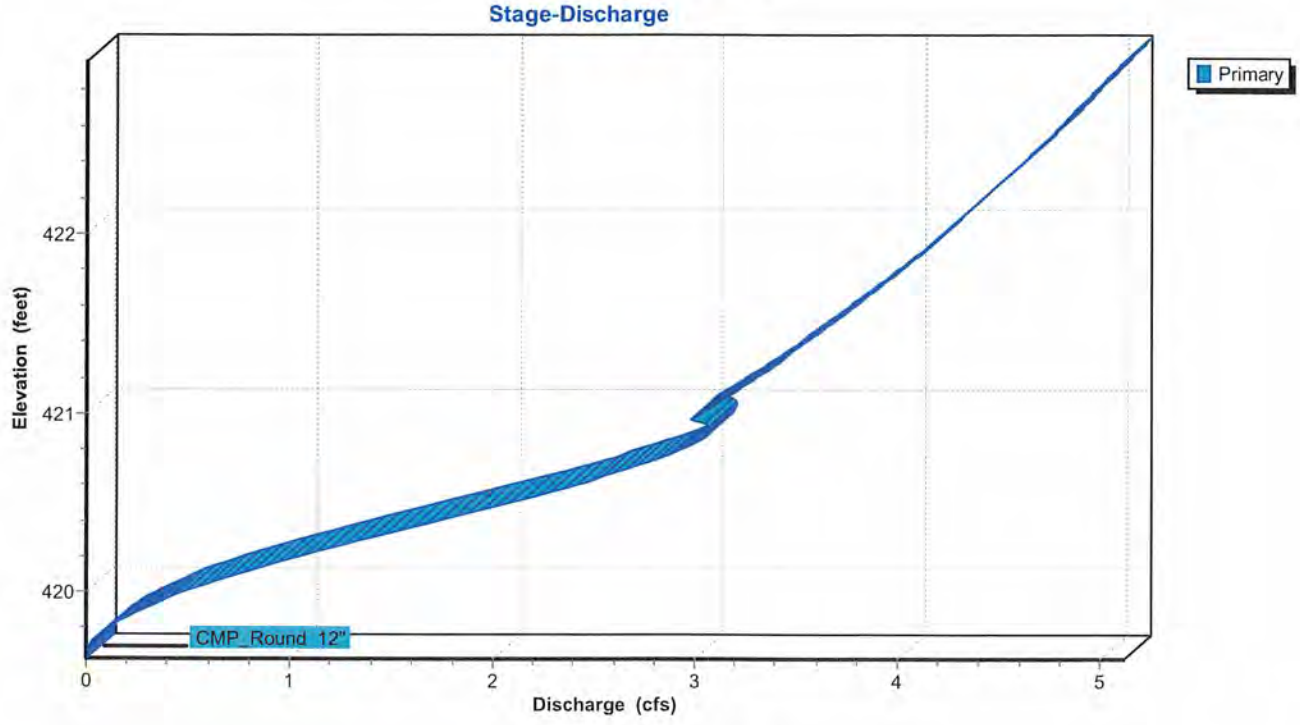
Device	Routing	Invert	Outlet Devices
#1	Primary	419.63'	**12.0" Round CMP_Round 12"** L= 138.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.63' / 418.94' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=5.10 cfs @ 12.18 hrs HW=422.96' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 5.10 cfs @ 6.50 fps)

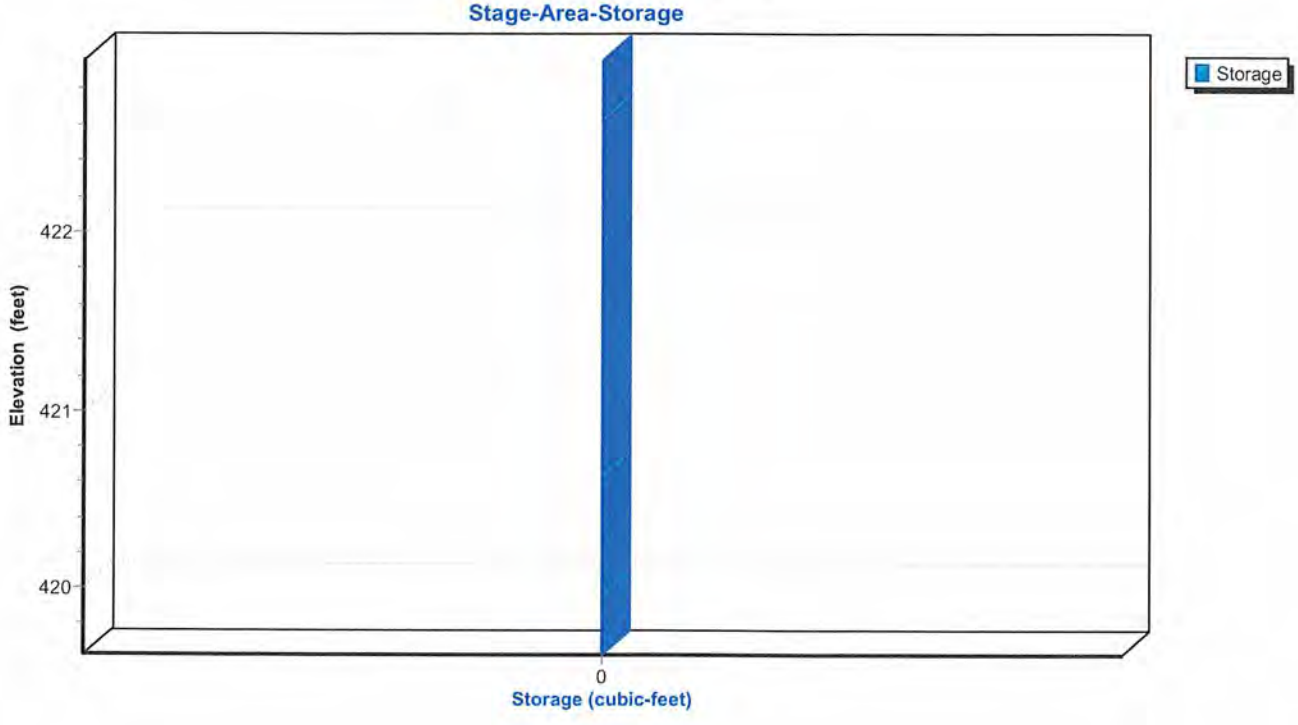
Pond 22P: CB4



Pond 22P: CB4



Pond 22P: CB4



Summary for Pond 23P: CB3

[57] Hint: Peaked at 427.60' (Flood elevation advised)

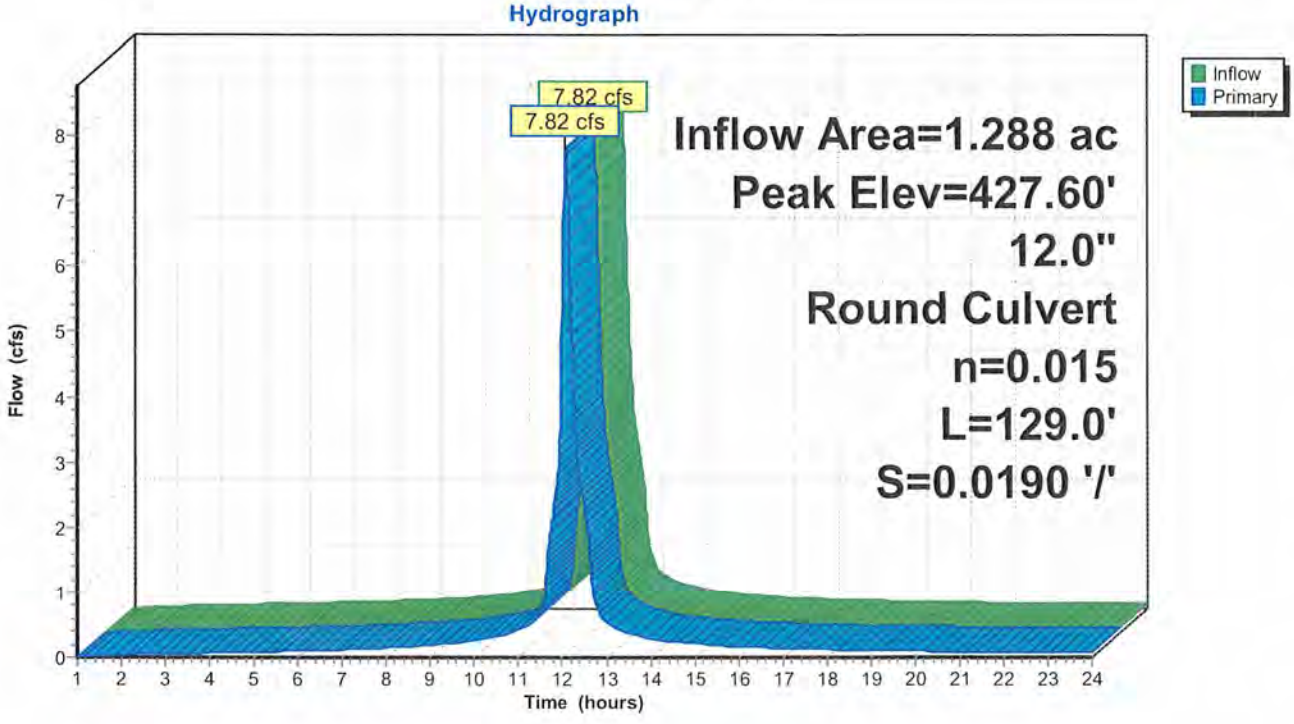
Inflow Area = 1.288 ac,100.00% Impervious, Inflow Depth > 5.51" for 100-yr event
Inflow = 7.82 cfs @ 12.09 hrs, Volume= 0.592 af
Outflow = 7.82 cfs @ 12.09 hrs, Volume= 0.592 af, Atten= 0%, Lag= 0.0 min
Primary = 7.82 cfs @ 12.09 hrs, Volume= 0.592 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 427.60' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	418.45'	**12.0" Round CMP_Round 12"** L= 129.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 418.45' / 416.00' S= 0.0190 '/' Cc= 0.900 n= 0.015 Corrugated PE, smooth interior, Flow Area= 0.79 sf

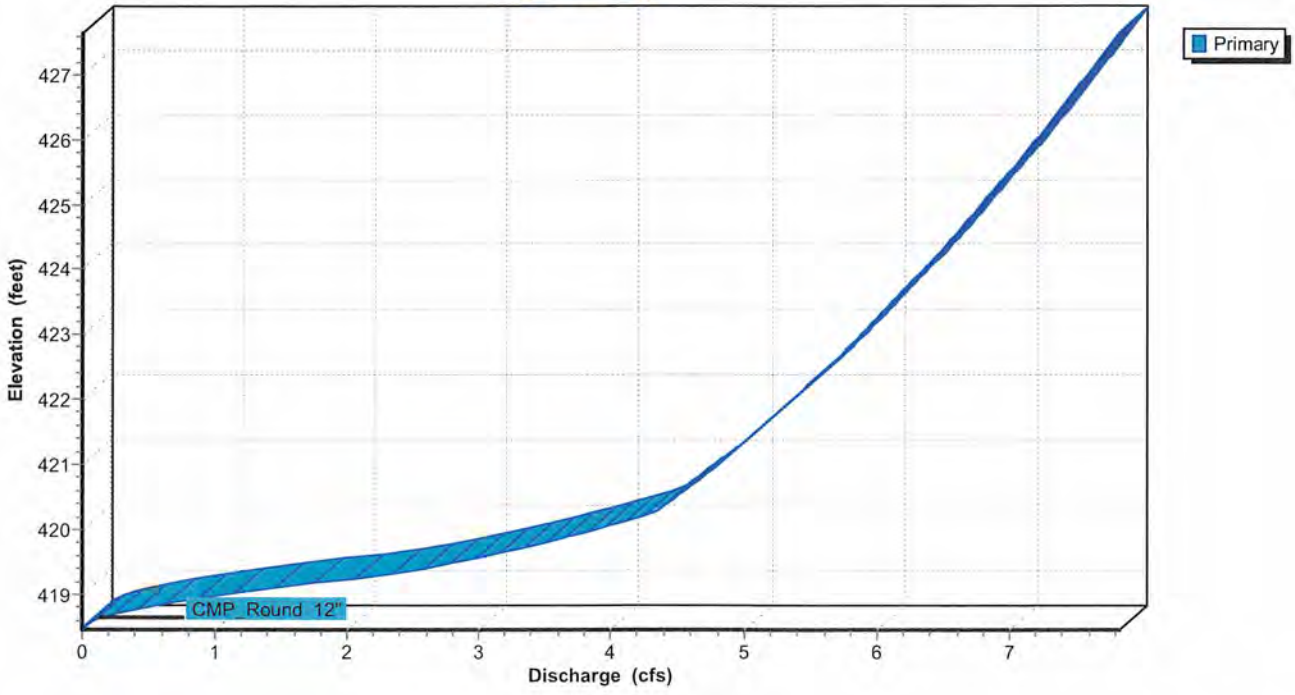
Primary OutFlow Max=7.81 cfs @ 12.09 hrs HW=427.59' (Free Discharge)
↑—1=CMP_Round 12" (Barrel Controls 7.81 cfs @ 9.95 fps)

Pond 23P: CB3



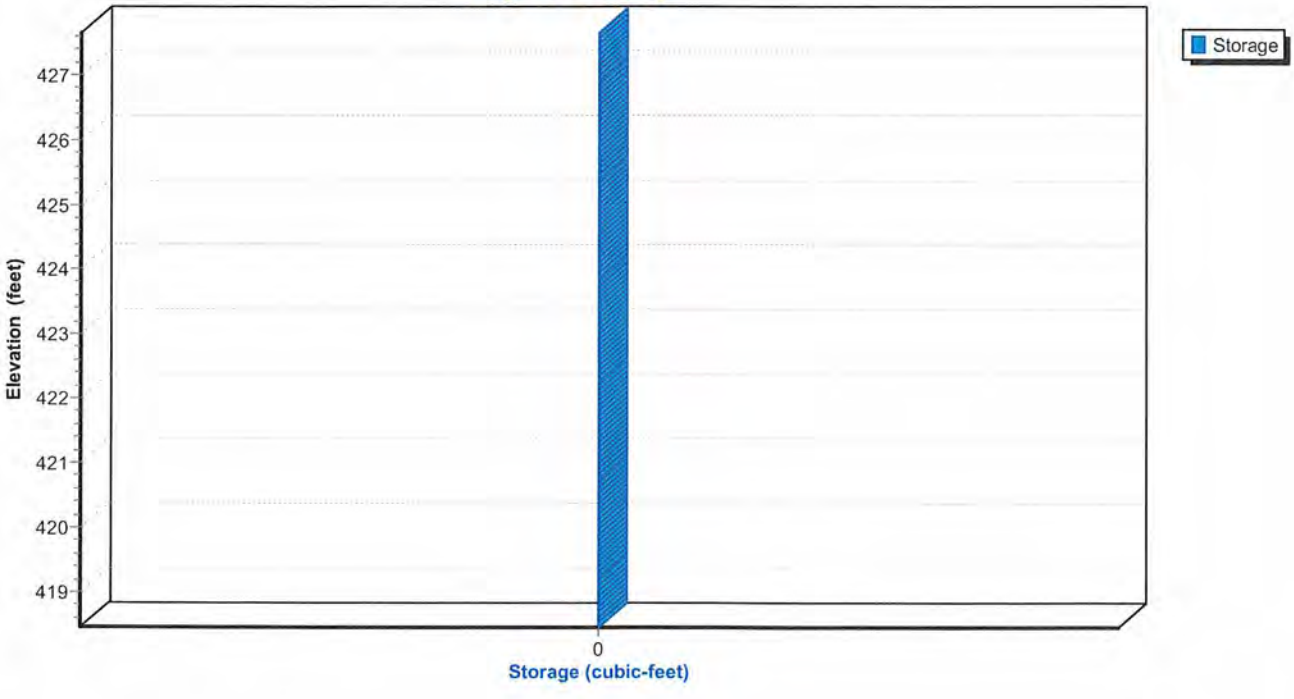
Pond 23P: CB3

Stage-Discharge



Pond 23P: CB3

Stage-Area-Storage



Summary for Pond 24P: CB2

[57] Hint: Peaked at 420.51' (Flood elevation advised)
[79] Warning: Submerged Pond 17P Primary device # 1 INLET by 0.70'

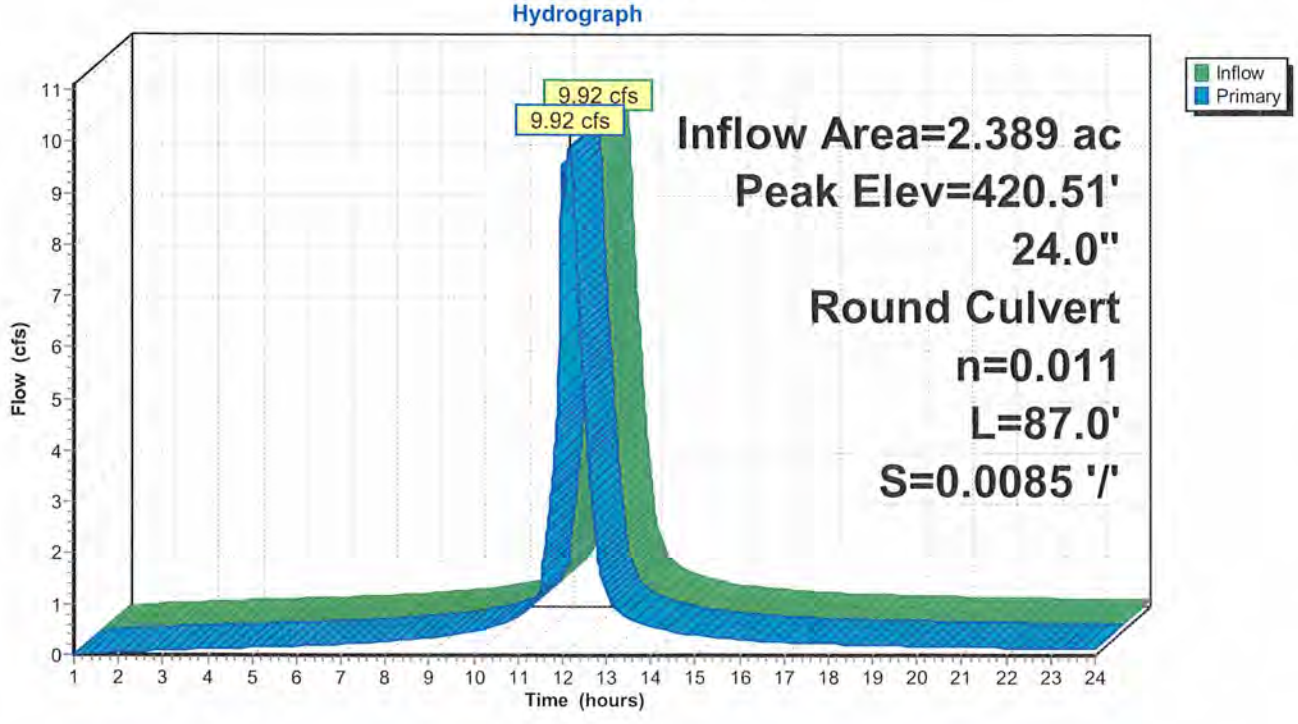
Inflow Area = 2.389 ac,100.00% Impervious, Inflow Depth > 5.51" for 100-yr event
Inflow = 9.92 cfs @ 12.17 hrs, Volume= 1.097 af
Outflow = 9.92 cfs @ 12.17 hrs, Volume= 1.097 af, Atten= 0%, Lag= 0.0 min
Primary = 9.92 cfs @ 12.17 hrs, Volume= 1.097 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 420.51' @ 12.17 hrs

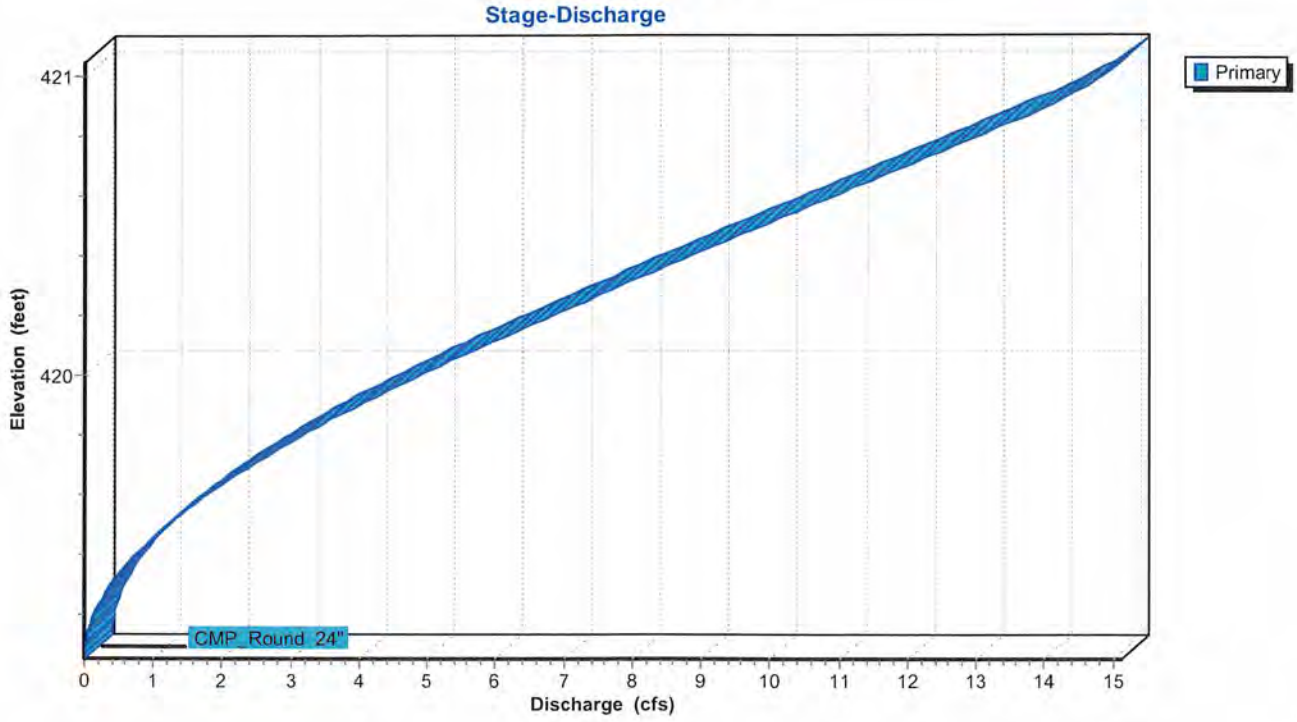
Device	Routing	Invert	Outlet Devices
#1	Primary	419.05'	**24.0" Round CMP_Round 24"** L= 87.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 419.05' / 418.31' S= 0.0085 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=9.92 cfs @ 12.17 hrs HW=420.51' (Free Discharge)
↑**1=CMP_Round 24"** (Barrel Controls 9.92 cfs @ 5.65 fps)

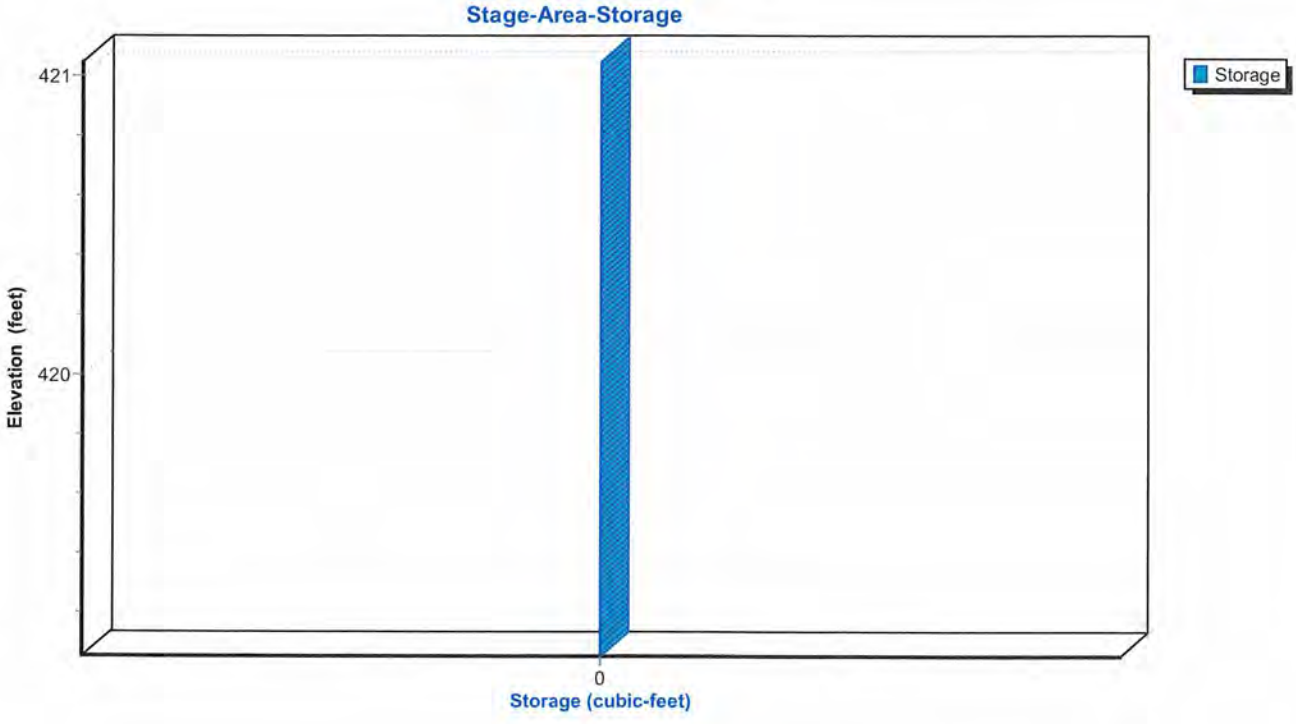
Pond 24P: CB2



Pond 24P: CB2



Pond 24P: CB2



Summary for Pond 27P: PROPOSED POND

[43] Hint: Has no inflow (Outflow=Zero)

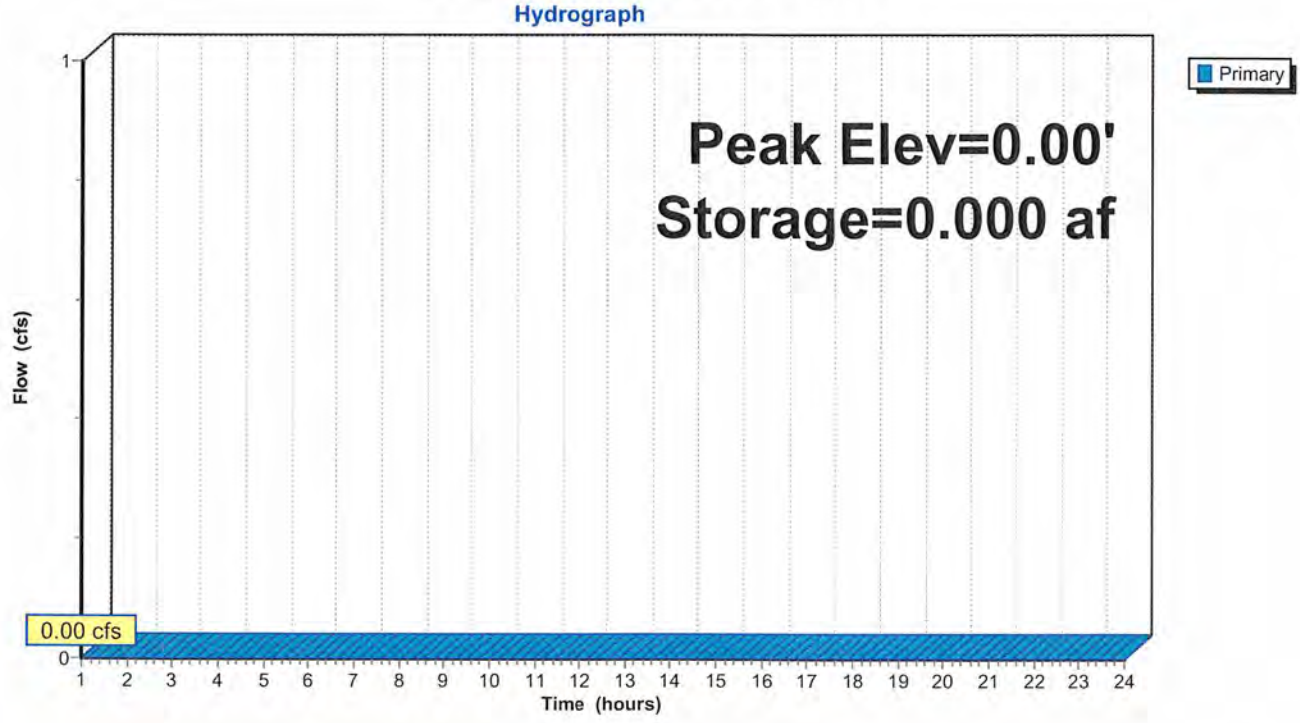
Volume	Invert	Avail.Storage	Storage Description
#1	403.00'	1.801 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
403.00	0.008	0.0	0.000	0.000
404.00	0.020	0.0	0.000	0.000
405.00	0.034	0.0	0.000	0.000
406.00	0.050	0.0	0.000	0.000
407.00	0.067	0.0	0.000	0.000
408.00	0.087	0.0	0.000	0.000
409.00	0.108	0.0	0.000	0.000
410.00	0.132	0.0	0.000	0.000
411.00	0.250	0.0	0.000	0.000
412.00	0.291	100.0	0.270	0.270
413.00	0.335	100.0	0.313	0.583
414.00	0.381	100.0	0.358	0.941
415.00	0.429	100.0	0.405	1.346
416.00	0.480	100.0	0.454	1.801

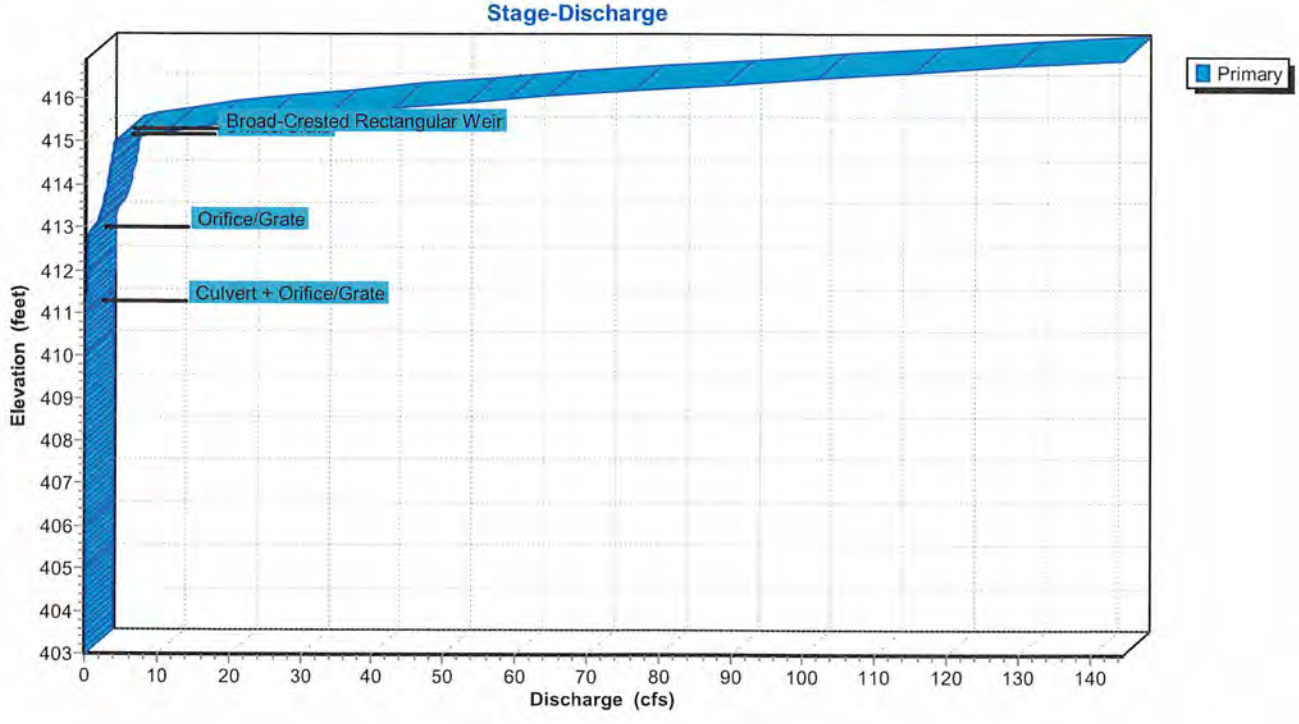
Device	Routing	Invert	Outlet Devices
#1	Primary	411.00'	**12.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 411.00' / 410.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Device 1	411.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	412.70'	**18.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	414.90'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	415.00'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=0.00' (Free Discharge)
- **1=Culvert** (Controls 0.00 cfs)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

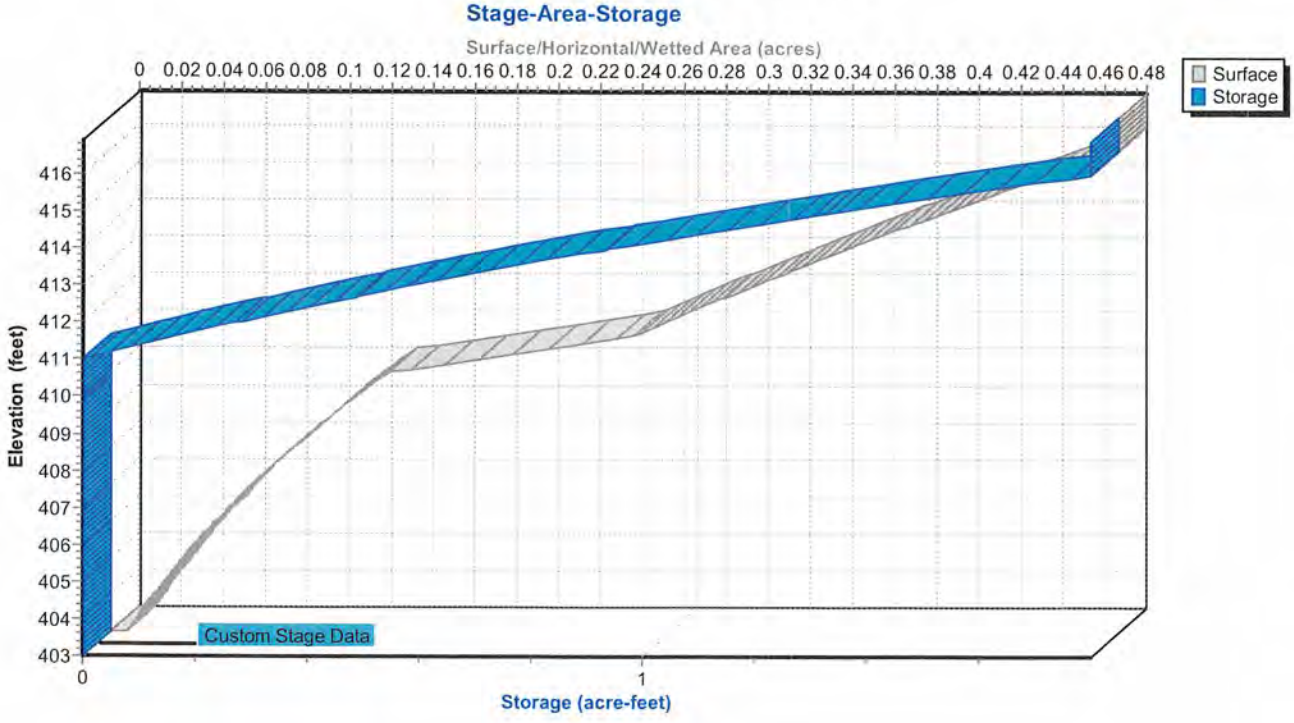
Pond 27P: PROPOSED POND



Pond 27P: PROPOSED POND



Pond 27P: PROPOSED POND



Summary for Pond 28P: PROPOSED POND

Inflow Area = 4.721 ac,100.00% Impervious, Inflow Depth > 5.51" for 100-yr event
Inflow = 21.84 cfs @ 12.13 hrs, Volume= 2.168 af
Outflow = 3.84 cfs @ 12.80 hrs, Volume= 1.675 af, Atten= 82%, Lag= 40.0 min
Primary = 3.84 cfs @ 12.80 hrs, Volume= 1.675 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Starting Elev= 411.00' Surf.Area= 0.250 ac Storage= 0.627 af
Peak Elev= 414.84' @ 12.80 hrs Surf.Area= 0.421 ac Storage= 1.906 af (1.279 af above start)

Plug-Flow detention time= 373.9 min calculated for 1.048 af (48% of inflow)
Center-of-Mass det. time= 150.9 min (901.6 - 750.7)

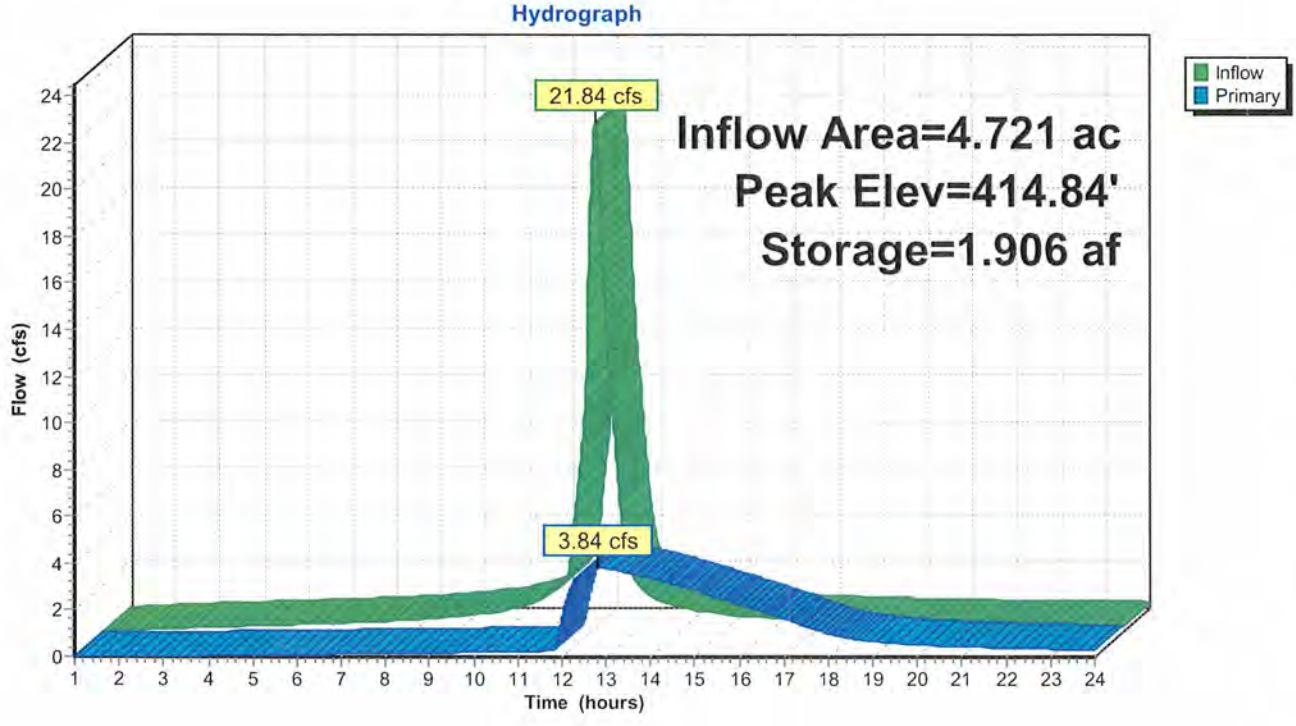
Volume	Invert	Avail.Storage	Storage Description
#1	403.00'	2.428 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
403.00	0.008	0.0	0.000	0.000
404.00	0.020	100.0	0.014	0.014
405.00	0.034	100.0	0.027	0.041
406.00	0.050	100.0	0.042	0.083
407.00	0.067	100.0	0.059	0.141
408.00	0.087	100.0	0.077	0.219
409.00	0.108	100.0	0.097	0.316
410.00	0.132	100.0	0.120	0.436
411.00	0.250	100.0	0.191	0.627
412.00	0.291	100.0	0.270	0.897
413.00	0.335	100.0	0.313	1.210
414.00	0.381	100.0	0.358	1.568
415.00	0.429	100.0	0.405	1.974
416.00	0.480	100.0	0.454	2.428

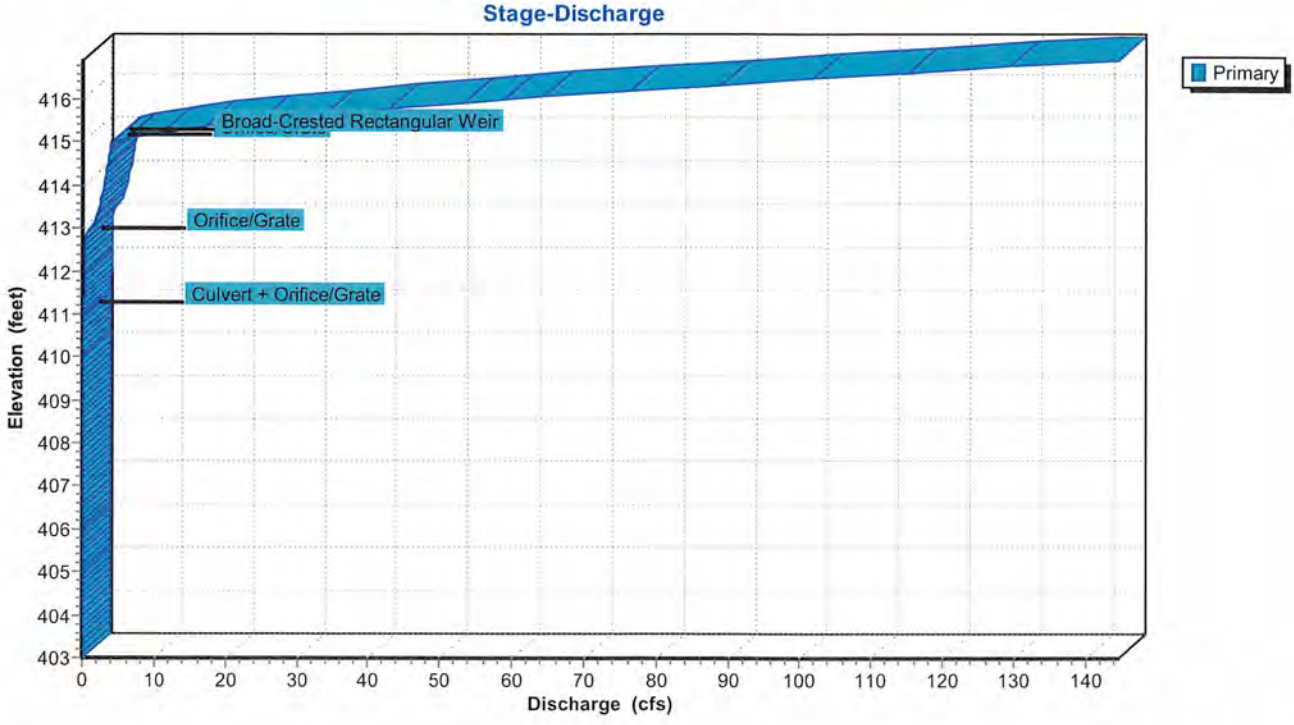
Device	Routing	Invert	Outlet Devices
#1	Primary	411.00'	**12.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 411.00' / 410.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Device 1	411.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	412.70'	**18.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	414.90'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	415.00'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=3.84 cfs @ 12.80 hrs HW=414.84' (Free Discharge)
- **1=Culvert** (Passes 3.84 cfs of 5.04 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 9.28 fps)
  - **3=Orifice/Grate** (Orifice Controls 3.38 cfs @ 6.76 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

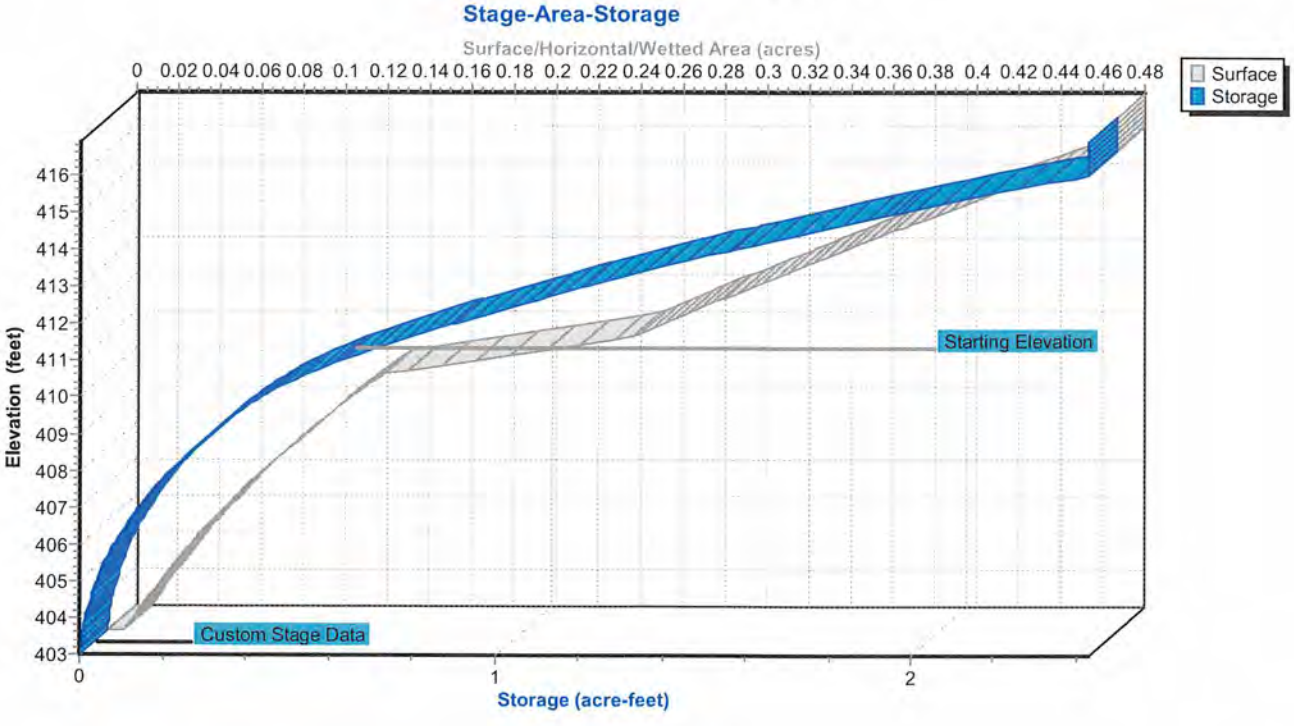
Pond 28P: PROPOSED POND



Pond 28P: PROPOSED POND



Pond 28P: PROPOSED POND



APPENDIX

4

DeWitt Bypass

Step 1: Site Description

Name	Area (acres)
On-site area	4.72
Off-site area	0
Total area	4.72
Post CN	98

Step 2: Storm Identification

Storm Frequency (24hr storm)	Total Rainfall (in)
1 year	2.04
2 year	2.38
10 year	3.42
100 year	5.78

Step 3: Time of Concentration

Tc (hr) =	1.338	hours
Tc (hr) =	0.29	hours

Step 4: Calculation of Peak Flow

**Use hydrocad

Storm Frequency	Pre-dev Peak Flow	Post-dev Peak Flow
1-year 24hr	12.23	13.98
2-year 24hr	15.52	17.65
10-year 24hr	25.67	29.01
100-year 24hr	52.46	57.85

Step 5: Water Quality Volume WQv

P, 90% Rainfall Event (in), Figure 4.1	1
A, total area (acres)	4.7
Impervious cover (area)	4.7
I, Percent impervious cover	100
Rv, 0.05+0.009*I	0.95
WQv, Water Quality Volume (acre-ft)	0.372
Average discharge(cfs)	0.192951786

Step 6: Channel Protection Volume CPv (TR-55 protocol)

CN, post-developed curve number	98
Ia, Ia=(200/CN-2)	0.041
P, 1 yr 24-hr storm rainfall (in)	2.04
Ia/P	0.020
Tc, post-development time of concentration (hr)	0.290
Qu (Exhibit 4-II TR-55)	680
q0/qi (Figure B.1)	0.028
Vs/Vr=0.683-1.43*q0/qi+1.64*(q0/qi)^2-0.804*(q0/qi)^3	0.644
Q, 1-year 24hr storm post-development runoff	1.81
Vs=Cpv=((Vs/Vr)*Q*A)/12	0.459

Step 7:Overbank Flood Protection Qp10

Qi, pre-development 10 year 24 hr peak flow =	25.63
Q0, post-development 10 year 24 hr peak flow=	47.06
q0/q1i	0.54
CN, curve number post development	98
Vs/Vr, 0.682-1.43*q0/q1i+1.64*q0/q1i-0.804*q0/q1i^3=	0.259755591
Qd, 10yr 24hr totalrunoff [in]=	3.2
Total runoff (acre-ft)=	0.33

Step 8: Overbank Flood Protection Qf100

Qi, pre-developed 100 yr 24hr peak flow=	52.42
Q0, post-developed 100 yr 24 hr peak flow=	57.79
Q0/Qi=	0.91
CN, curve number post development=	98
Vs/Vr, Figure B.2 (max)=	0.134201695
Qpv, post developed 100ur 24hr total runoff (ft^3)=	5.522
Total runoff (acre-ft)=	0.29

Step 9: Sizing: WQv Requirements

Forebay volume, set to 10% of WQv=	0.0372
Permanent pool volume, 90% WQv=	0.335

Detention Pond Summary

Water Quality Volume	0.335	acre-feet
Forebay Volume	0.037	acre-feet
Permanent Pool Volume	0.335	acre-feet
Channel Protection Volume	0.459	acre-feet
Overbank Flood Protection- 10 year	0.33	acre-feet
Overbank Flood Protection- 100 year	0.29	acre-feet

APPENDIX

5

Stormwater/Wetland Pond Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Pre-Construction/Materials and Equipment		
Pre-construction meeting		
Pipe and appurtenances on-site prior to construction and dimensions checked		
1. Material (including protective coating, if specified)		
2. Diameter		
3. Dimensions of metal riser or pre-cast concrete outlet structure		
4. Required dimensions between water control structures (orifices, weirs, etc.) are in accordance with approved plans		
5. Barrel stub for prefabricated pipe structures at proper angle for design barrel slope		
6. Number and dimensions of prefabricated anti-seep collars		
7. Watertight connectors and gaskets		
8. Outlet drain valve		
Project benchmark near pond site		
Equipment for temporary de-watering		

Stormwater/Wetland Pond Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Pre-Construction/Materials and Equipment		
Pre-construction meeting		
Pipe and appurtenances on-site prior to construction and dimensions checked		
1. Material (including protective coating, if specified)		
2. Diameter		
3. Dimensions of metal riser or pre-cast concrete outlet structure		
4. Required dimensions between water control structures (orifices, weirs, etc.) are in accordance with approved plans		
5. Barrel stub for prefabricated pipe structures at proper angle for design barrel slope		
6. Number and dimensions of prefabricated anti-seep collars		
7. Watertight connectors and gaskets		
8. Outlet drain valve		
Project benchmark near pond site		
Equipment for temporary de-watering		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
2. Subgrade Preparation		
Area beneath embankment stripped of all vegetation, topsoil, and organic matter		
3. Pipe Spillway Installation		
Method of installation detailed on plans		
A. Bed preparation		
Installation trench excavated with specified side slopes		
Stable, uniform, dry subgrade of relatively impervious material (If subgrade is wet, contractor shall have defined steps before proceeding with installation)		
Invert at proper elevation and grade		
B. Pipe placement		
Metal / plastic pipe		
1. Watertight connectors and gaskets properly installed		
2. Anti-seep collars properly spaced and having watertight connections to pipe		
3. Backfill placed and tamped by hand under "haunches" of pipe		
4. Remaining backfill placed in max. 8 inch lifts using small power tamping equipment until 2 feet cover over pipe is reached		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
3. Pipe Spillway Installation		
Concrete pipe		
1. Pipe set on blocks or concrete slab for pouring of low cradle		
2. Pipe installed with rubber gasket joints with no spalling in gasket interface area		
3. Excavation for lower half of anti-seep collar(s) with reinforcing steel set		
4. Entire area where anti-seep collar(s) will come in contact with pipe coated with mastic or other approved waterproof sealant		
5. Low cradle and bottom half of anti-seep collar installed as monolithic pour and of an approved mix		
6. Upper half of anti-seep collar(s) formed with reinforcing steel set		
7. Concrete for collar of an approved mix and vibrated into place (protected from freezing while curing, if necessary)		
8. Forms stripped and collar inspected for honeycomb prior to backfilling. Parge if necessary.		
C. Backfilling		
Fill placed in maximum 8 inch lifts		
Backfill taken minimum 2 feet above top of anti-seep collar elevation before traversing with heavy equipment		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
4. Riser / Outlet Structure Installation		
Riser located within embankment		
A. Metal riser		
Riser base excavated or formed on stable subgrade to design dimensions		
Set on blocks to design elevations and plumbed		
Reinforcing bars placed at right angles and projecting into sides of riser		
Concrete poured so as to fill inside of riser to invert of barrel		
B. Pre-cast concrete structure		
Dry and stable subgrade		
Riser base set to design elevation		
If more than one section, no spalling in gasket interface area; gasket or approved caulking material placed securely		
Watertight and structurally sound collar or gasket joint where structure connects to pipe spillway		
C. Poured concrete structure		
Footing excavated or formed on stable subgrade, to design dimensions with reinforcing steel set		
Structure formed to design dimensions, with reinforcing steel set as per plan		
Concrete of an approved mix and vibrated into place (protected from freezing while curing, if necessary)		
Forms stripped & inspected for "honeycomb" prior to backfilling; parge if necessary		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
5. Embankment Construction		
Fill material		
Compaction		
Embankment		
1. Fill placed in specified lifts and compacted with appropriate equipment		
2. Constructed to design cross-section, side slopes and top width		
3. Constructed to design elevation plus allowance for settlement		
6. Impounded Area Construction		
Excavated / graded to design contours and side slopes		
Inlet pipes have adequate outfall protection		
Forebay(s)		
Pond benches		
7. Earth Emergency Spillway Construction		
Spillway located in cut or structurally stabilized with riprap, gabions, concrete, etc.		
Excavated to proper cross-section, side slopes and bottom width		
Entrance channel, crest, and exit channel constructed to design grades and elevations		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
8. Outlet Protection		
A. End section		
Securely in place and properly backfilled		
B. Endwall		
Footing excavated or formed on stable subgrade, to design dimensions and reinforcing steel set, if specified		
Endwall formed to design dimensions with reinforcing steel set as per plan		
Concrete of an approved mix and vibrated into place (protected from freezing, if necessary)		
Forms stripped and structure inspected for "honeycomb" prior to backfilling; parge if necessary		
C. Riprap apron / channel		
Apron / channel excavated to design cross-section with proper transition to existing ground		
Filter fabric in place		
Stone sized as per plan and uniformly place at the thickness specified		
9. Vegetative Stabilization		
Approved seed mixture or sod		
Proper surface preparation and required soil amendments		
Excelsior mat or other stabilization, as per plan		

Actions to be Taken:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
10. Miscellaneous		
Drain for ponds having a permanent pool		
Trash rack / anti-vortex device secured to outlet structure		
Trash protection for low flow pipes, orifices, etc.		
Fencing (when required)		
Access road		
Set aside for clean-out maintenance		
11. Stormwater Wetlands		
Adequate water balance		
Variety of depth zones present		
Approved pondscaping plan in place Reinforcement budget for additional plantings		
Plants and materials ordered 6 months prior to construction		
Construction planned to allow for adequate planting and establishment of plant community (April-June planting window)		
Wetland buffer area preserved to maximum extent possible		

Comments:

APPENDIX

6

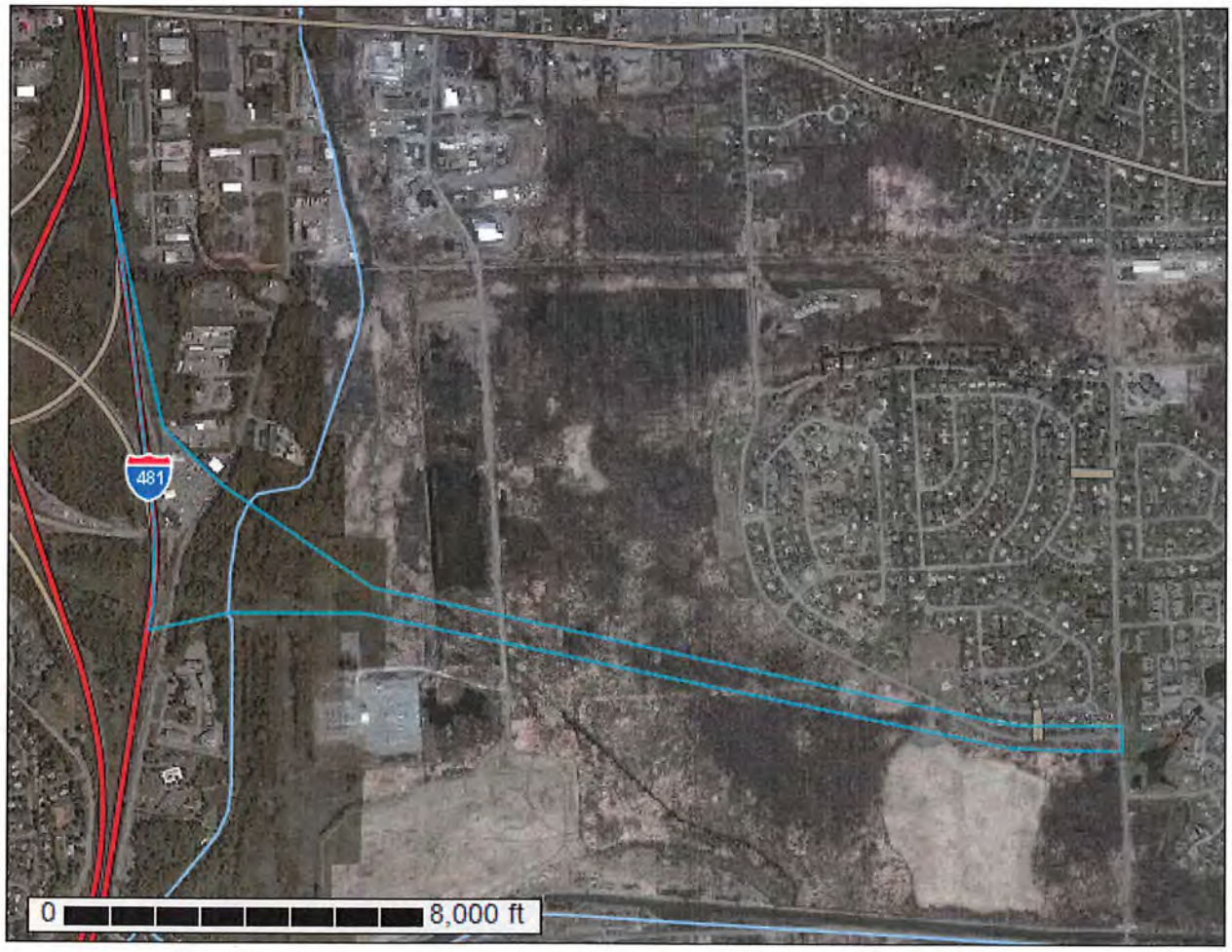
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Onondaga County, New York



April 29, 2016

Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:13,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

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 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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: Onondaga County, New York
Survey Area Data: Version 9, Sep 24, 2015

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

Date(s) aerial images were photographed: Apr 15, 2011—Aug 24, 2013

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

Onondaga County, New York (NY067)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CaB	Camillus silt loam, 2 to 6 percent slopes	1.3	2.0%
CaC2	Camillus silt loam, 6 to 12 percent slopes, eroded	1.2	1.8%
Cd	Canandaigua mucky silt loam	5.2	8.2%
Ce	Carlisle muck	0.6	1.0%
CFL	Cut and fill land	5.6	8.8%
Fo	Fonda mucky silty clay loam	0.7	1.1%
ML	Made land	8.2	12.8%
NgA	Niagara silt loam, 0 to 4 percent slopes	5.3	8.2%
Pb	Palms muck	20.8	32.5%
Te	Teel silt loam	7.8	12.2%
W	Water	0.8	1.2%
Wn	Wayland soils complex, 0 to 3 percent slopes, frequently flooded	6.5	10.2%
Totals for Area of Interest		**64.2**	**100.0%**

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different

management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

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

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

Onondaga County, New York

CaB—Camillus silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 9vfz
Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Camillus

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum derived from the underlying shale and loamy till

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 22 inches: silt loam
H3 - 22 to 38 inches: very channery silt loam
H4 - 38 to 42 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 16 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C

Minor Components

Ontario

Percent of map unit: 5 percent

Lairdsville

Percent of map unit: 5 percent

Unnamed soils

Percent of map unit: 5 percent

Benson

Percent of map unit: 5 percent

CaC2—Camillus silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 9vg1
Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Camillus, Eroded

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum derived from the underlying shale and loamy till

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 22 inches: silt loam
H3 - 22 to 38 inches: very channery silt loam
H4 - 38 to 42 inches: unweathered bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 16 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: C

Minor Components

Ontario
Percent of map unit: 5 percent

Lairdsville
Percent of map unit: 5 percent

Unnamed soils
Percent of map unit: 5 percent

Benson
Percent of map unit: 5 percent

Cd—Canandaigua mucky silt loam

Map Unit Setting
National map unit symbol: 9vg3
Elevation: 100 to 1,000 feet
Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Farmland of statewide importance

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

Description of Canandaigua

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

Typical profile
H1 - 0 to 8 inches: mucky silt loam
H2 - 8 to 31 inches: very fine sandy loam
H3 - 31 to 60 inches: stratified silt loam to very fine sand to fine sand

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water storage in profile: Very high (about 13.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D

Minor Components

Niagara

Percent of map unit: 5 percent

Lakemont

Percent of map unit: 5 percent
Landform: Depressions

Fonda

Percent of map unit: 5 percent
Landform: Depressions

Palms

Percent of map unit: 5 percent
Landform: Marshes, swamps

Ce—Carlisle muck

Map Unit Setting

National map unit symbol: 9vg4
Elevation: 600 to 1,200 feet
Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Carlisle

Setting

Landform: Marshes, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Deep organic material

Typical profile

H1 - 0 to 99 inches: muck

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water storage in profile: Very high (about 23.9 inches)

Interpretive groups

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

Minor Components

Palms

Percent of map unit: 5 percent
Landform: Marshes, swamps

Edwards

Percent of map unit: 5 percent
Landform: Marshes, swamps

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions

Fonda

Percent of map unit: 5 percent
Landform: Depressions

Lamson

Percent of map unit: 5 percent
Landform: Depressions

CFL—Cut and fill land

Map Unit Setting

National map unit symbol: 9vfy
Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 70 percent

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

Description of Udorthents

Typical profile
H1 - 0 to 4 inches: gravelly sandy loam
H2 - 4 to 70 inches: very gravelly sandy loam

Properties and qualities
Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Minor Components

Collamer
Percent of map unit: 5 percent

Galen
Percent of map unit: 5 percent

Appleton
Percent of map unit: 5 percent

Volusia
Percent of map unit: 5 percent

Lamson
Percent of map unit: 5 percent
Landform: Depressions

Lyons
Percent of map unit: 5 percent
Landform: Depressions

Fo—Fonda mucky silty clay loam

Map Unit Setting
National map unit symbol: 9vgp
Elevation: 50 to 650 feet

Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Fonda

Setting

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

Typical profile

H1 - 0 to 9 inches: mucky silty clay loam
H2 - 9 to 33 inches: silty clay
H3 - 33 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D

Minor Components

Lakemont

Percent of map unit: 5 percent
Landform: Depressions

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions

Palms

Percent of map unit: 5 percent
Landform: Marshes, swamps

Odessa

Percent of map unit: 5 percent

Rhinebeck
Percent of map unit: 5 percent

ML—Made land

Map Unit Setting
National map unit symbol: 9vjb
Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Not prime farmland

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

Description of Udorthents

Typical profile
H1 - 0 to 4 inches: channery loam
H2 - 4 to 70 inches: very channery loam

Properties and qualities
Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Minor Components

Mardin
Percent of map unit: 5 percent

Conesus
Percent of map unit: 5 percent

Lockport
Percent of map unit: 5 percent

Niagara
Percent of map unit: 5 percent

Fonda
Percent of map unit: 5 percent
Landform: Depressions

Lamson
Percent of map unit: 5 percent
Landform: Depressions

NgA—Niagara silt loam, 0 to 4 percent slopes

Map Unit Setting
National map unit symbol: 9vjv
Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Prime farmland if drained

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

Description of Niagara

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

Typical profile
H1 - 0 to 11 inches: silt loam
H2 - 11 to 39 inches: silt loam
H3 - 39 to 60 inches: stratified silt loam to loamy very fine sand

Properties and qualities
Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D

Minor Components

Canandaigua

Percent of map unit: 7 percent
Landform: Depressions

Collamer

Percent of map unit: 5 percent

Williamson

Percent of map unit: 5 percent

Unnamed soils

Percent of map unit: 3 percent

Pb—Palms muck

Map Unit Setting

National map unit symbol: 9vkf
Elevation: 250 to 1,500 feet
Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Palms

Setting

Landform: Marshes, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over loamy glacial drift

Typical profile

H1 - 0 to 24 inches: muck
H2 - 24 to 60 inches: clay loam

Properties and qualities

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

Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 20 percent
Available water storage in profile: Very high (about 16.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D

Minor Components

Carlisle
Percent of map unit: 5 percent
Landform: Marshes, swamps

Edwards
Percent of map unit: 5 percent
Landform: Marshes, swamps

Canandaigua
Percent of map unit: 5 percent
Landform: Depressions

Lamson
Percent of map unit: 5 percent
Landform: Depressions

Te—Teel silt loam

Map Unit Setting
National map unit symbol: 9vkv
Elevation: 600 to 1,800 feet
Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: All areas are prime farmland

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

Description of Teel

Setting
Landform: Flood plains
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Silty alluvium

Typical profile
H1 - 0 to 10 inches: silt loam
H2 - 10 to 28 inches: silt loam
H3 - 28 to 60 inches: silt loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: High (about 9.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D

Minor Components

Hamlin
Percent of map unit: 5 percent

Herkimer
Percent of map unit: 5 percent

Howard
Percent of map unit: 5 percent

Wayland
Percent of map unit: 5 percent
Landform: Flood plains

W—Water

Map Unit Setting
National map unit symbol: 9vl1
Mean annual precipitation: 38 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Wn—Wayland soils complex, 0 to 3 percent slopes, frequently flooded

Map Unit Setting
National map unit symbol: 2srgv
Elevation: 160 to 1,970 feet
Mean annual precipitation: 31 to 68 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition
Wayland and similar soils: 60 percent
Wayland, very poorly drained, and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wayland

Setting
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty and clayey alluvium derived from interbedded sedimentary rock

Typical profile
A - 0 to 6 inches: silt loam
Bg1 - 6 to 12 inches: silt loam
Bg2 - 12 to 18 inches: silt loam
C1 - 18 to 46 inches: silt loam
C2 - 46 to 72 inches: silty clay loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D

Description of Wayland, Very Poorly Drained

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey alluvium derived from interbedded sedimentary rock

Typical profile

A - 0 to 6 inches: mucky silt loam
Bg1 - 6 to 12 inches: silt loam
Bg2 - 12 to 18 inches: silt loam
C1 - 18 to 46 inches: silt loam
C2 - 46 to 72 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.8 inches)

Interpretive groups

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

Minor Components

Wakeville

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear

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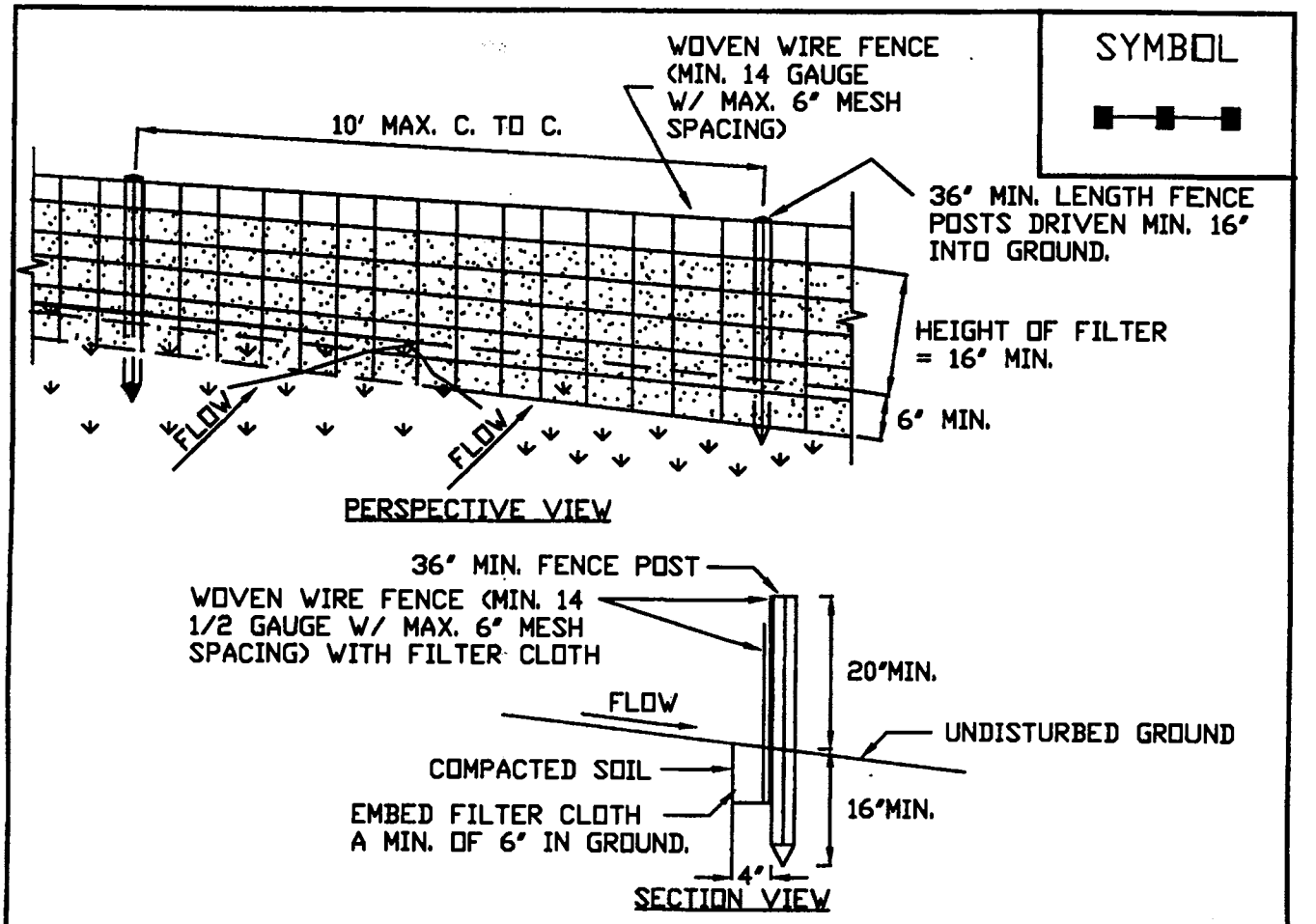
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APPENDIX

7

Figure 5A.8
Silt Fence



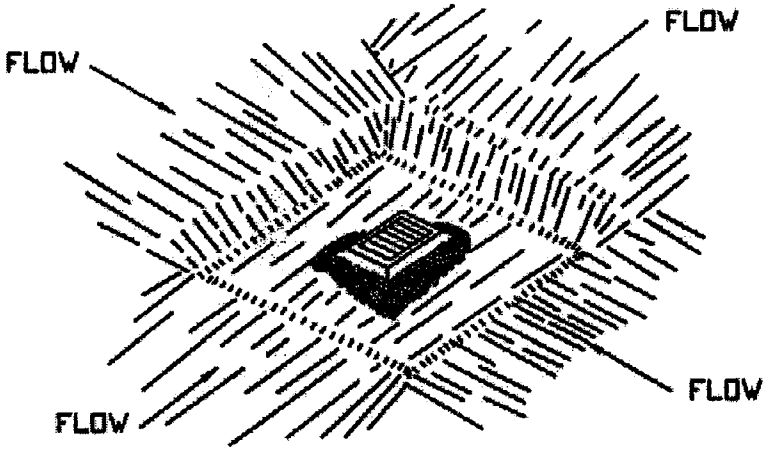
CONSTRUCTION SPECIFICATIONS

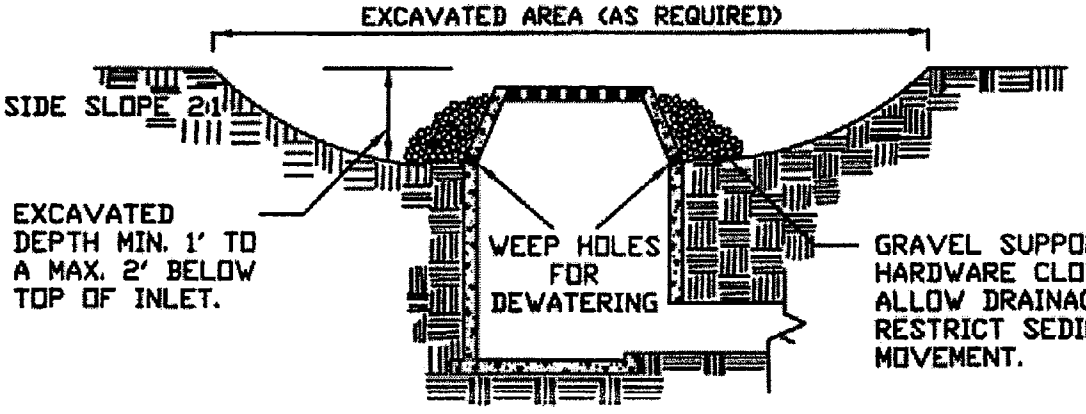
1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER 'T' OR 'U' TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN 'BULGES' DEVELOP IN THE SILT FENCE.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	SILT FENCE

Figure 5A.11
Excavated Drop Inlet Protection

SYMBOL





CONSTRUCTION SPECIFICATIONS

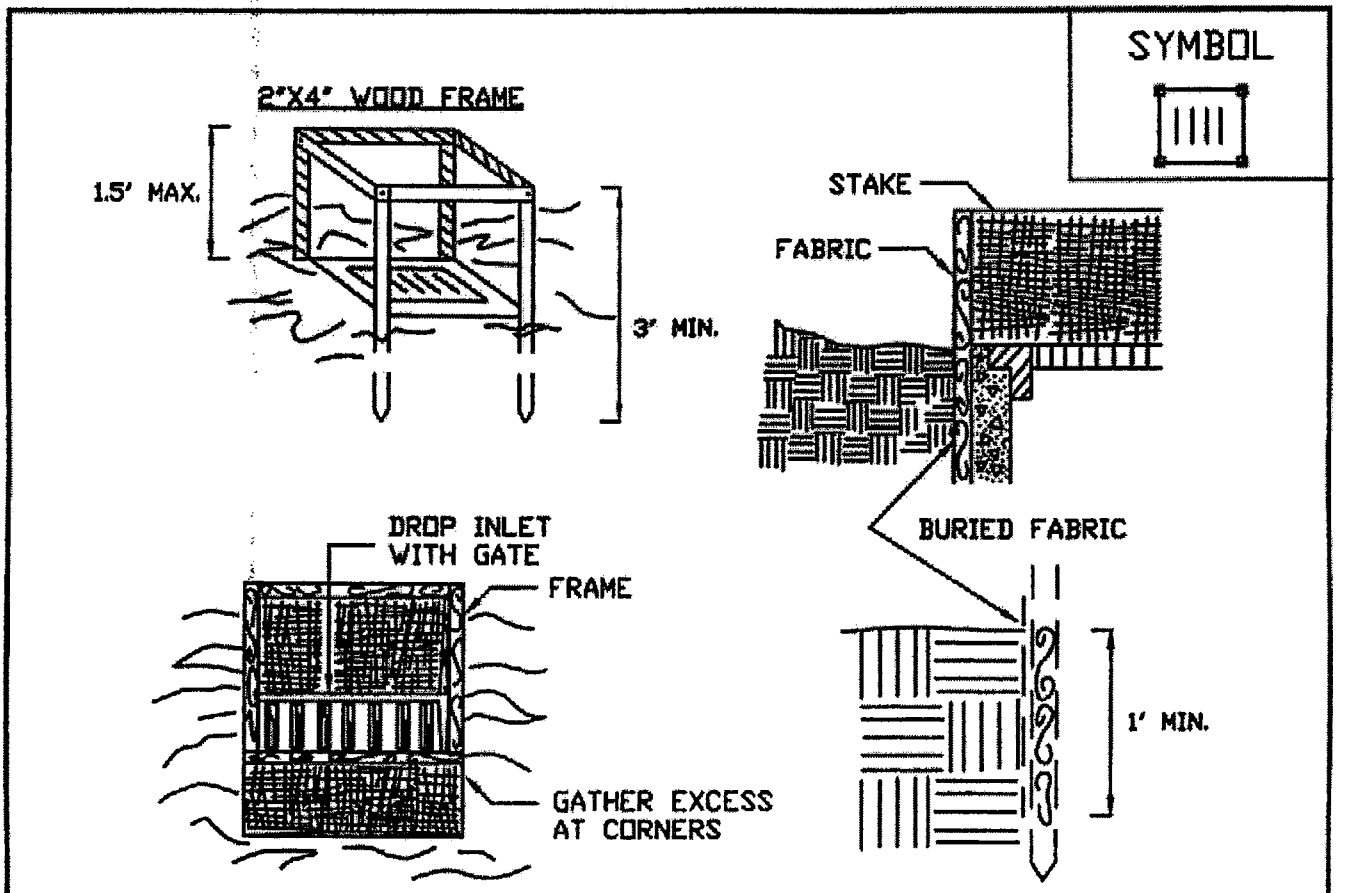
1. CLEAR THE AREA OF ALL DEBRIS THAT WILL HINDER EXCAVATION.
2. GRADE APPROACH TO THE INLET UNIFORMLY AROUND THE BASIN.
3. WEEP HOLES SHALL BE PROTECTED BY GRAVEL.
4. UPON STABILIZATION OF CONTRIBUTING DRAINAGE AREA, SEAL WEEP HOLES, FILL EXCAVATION WITH STABLE SOIL TO FINAL GRADE, COMPACT IT PROPERLY AND STABILIZE WITH PERMANENT SEEDING.

MAXIMUM DRAINAGE AREA 1 ACRE

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

EXCAVATED DROP INLET PROTECTION

Figure 5A.12
Filter Fabric Drop Inlet Protection



CONSTRUCTION SPECIFICATIONS

1. FILTER FABRIC SHALL HAVE AN EOS OF 40-85. BURLAP MAY BE USED FOR SHORT TERM APPLICATIONS.
2. CUT FABRIC FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS. IF JOINTS ARE NEEDED THEY WILL BE OVERLAPPED TO THE NEXT STAKE.
3. STAKE MATERIALS WILL BE STANDARD 2" x 4" WOOD OR EQUIVALENT, METAL WITH A MINIMUM LENGTH OF 3 FEET.
4. SPACE STAKES EVENLY AROUND INLET 3 FEET APART AND DRIVE A MINIMUM 18 INCHES DEEP. SPANS GREATER THAN 3 FEET MAY BE BRIDGED WITH THE USE OF WIRE MESH BEHIND THE FILTER FABRIC FOR SUPPORT.
5. FABRIC SHALL BE EMBEDDED 1 FOOT MINIMUM BELOW GROUND AND BACKFILLED. IT SHALL BE SECURELY FASTENED TO THE STAKES AND FRAME.
6. A 2" x 4" WOOD FRAME SHALL BE COMPLETED AROUND THE CREST OF THE FABRIC FOR OVER FLOW STABILITY.

MAXIMUN DRAINAGE AREA 1 ACRE

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	FILTER FABRIC DROP INLET PROTECTION

Figure 5A.16(1)
Pipe Outlet Sediment Trap: ST-I

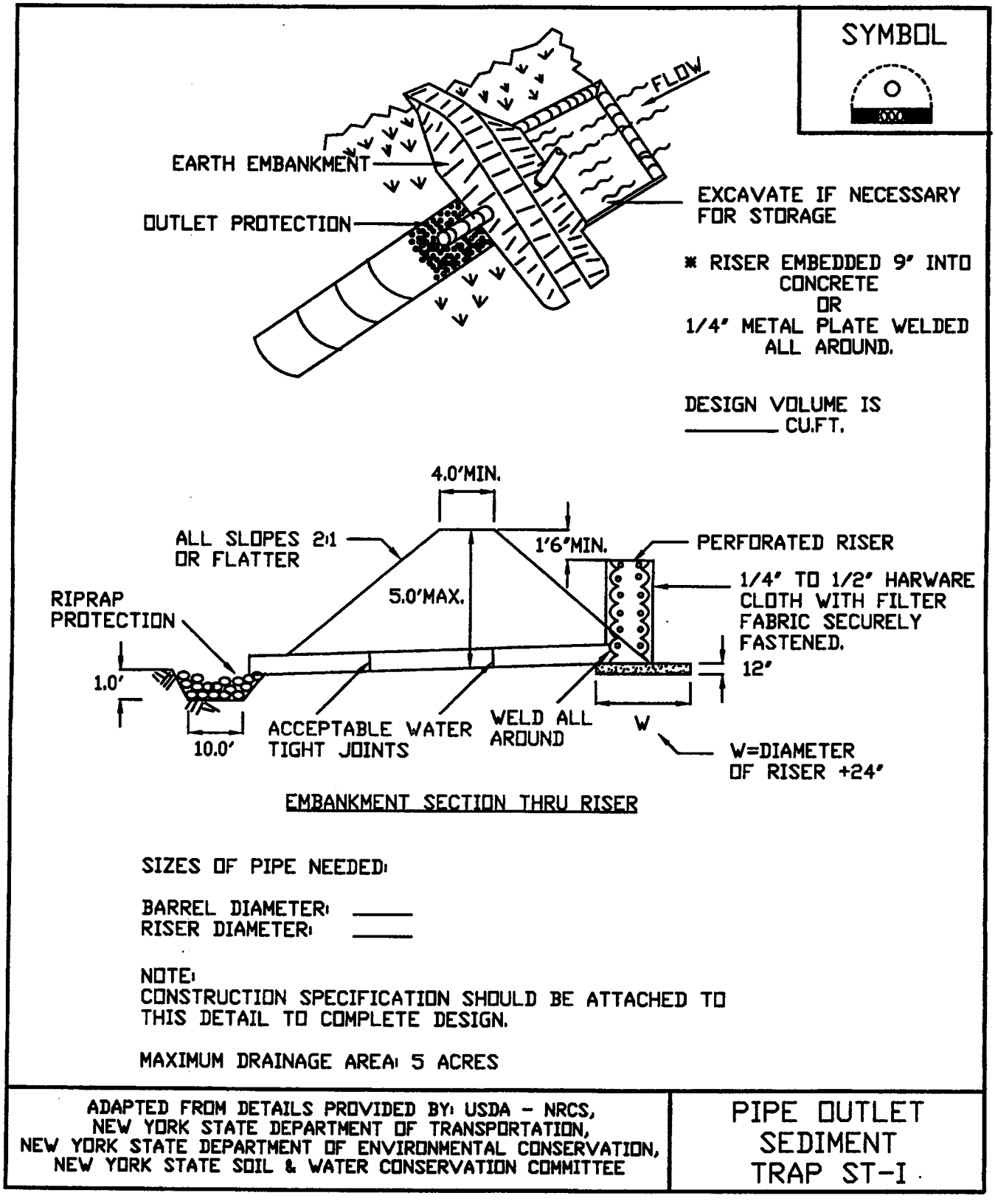


Figure 5A.16(2)
Pipe Outlet Sediment Trap: ST-I—Construction Specifications

SYMBOL



CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL, OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. VOLUME OF SEDIMENT STORAGE SHALL BE 3600 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE.
4. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND STABILIZED.
5. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
6. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
7. THE STRUCTURE SHALL BE REMOVED AND AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
8. ALL FILL SLOPES SHALL BE 2:1 OR FLATTER; CUT SLOPES 1:1 OR FLATTER.
9. ALL PIPE CONNECTIONS SHALL BE WATERTIGHT.
10. THE TOP 2/3 OF THE RISER SHALL BE PERFORATED WITH ONE (1) INCH DIAMETER HOLES OR SLITS SPACED SIX (6) INCHES VERTICALLY AND HORIZONTALLY AND PLACED IN THE CONCAVE PORTION OF PIPE. NO HOLES WILL BE ALLOWED WITHIN SIX (6) INCHES OF THE HORIZONTAL BARREL.
11. THE RISER SHALL BE WRAPPED WITH 1/4 TO 1/2 INCH HARDWARE CLOTH WIRE THEN WRAPPED WITH FILTER CLOTH (HAVING AN EQUIVALENT SIEVE SIZE OF 40-80). THE FILTER CLOTH SHALL EXTEND SIX (6) INCHES ABOVE THE HIGHEST HOLE AND SIX (6) INCHES BELOW THE LOWEST HOLE. WHERE ENDS OF THE FILTER CLOTH COME TOGETHER, THEY SHALL BE OVER-LAPPED, FOLDED AND STAPLED TO PREVENT BYPASS.
12. STRAPS OR CONNECTING BANDS SHALL BE USED TO HOLD THE FILTER CLOTH AND WIRE FABRIC IN PLACE. THEY SHALL BE PLACED AT THE TOP AND BOTTOM OF THE CLOTH.
13. FILL MATERIAL AROUND THE PIPE SPILLWAY SHALL BE HAND COMPACTED IN FOUR (4) INCH LAYERS. A MINIMUM OF TWO (2) FEET OF HAND COMPACTED BACKFILL SHALL BE PLACED OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.
14. THE RISER SHALL BE ANCHORED WITH EITHER A CONCRETE BASE OR STEEL PLATE BASE TO PREVENT FLOTATION. FOR CONCRETE BASED THE DEPTH SHALL BE TWELVE (12) INCHES WITH THE RISER EMBEDDED NINE (9) INCHES. A 1/4 INCH MINIMUM THICKNESS STEEL PLATE SHALL BE ATTACHED TO THE RISER BY A CONTINUOUS WELD AROUND THE BOTTOM TO FORM A WATERTIGHT CONNECTION AND THEN PLACE TWO (2) FEET OF STONE, GRAVEL, OR TAMPED EARTH ON THE PLATE.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	PIPE OUTLET SEDIMENT TRAP ST-I

STANDARD AND SPECIFICATIONS FOR STABILIZED CONSTRUCTION ENTRANCE



Definition

A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area.

Purpose

The purpose of stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets.

Conditions Where Practice Applies

A stabilized construction entrance shall be used at all points of construction ingress and egress.

Design Criteria

See Figure 5A.35 on page 5A.76 for details.

Aggregate Size: Use a matrix of 1-4 inch stone, or reclaimed or recycled concrete equivalent.

Thickness: Not less than six (6) inches.

Width: 12-foot minimum but not less than the full width of points where ingress or egress occurs. 24-foot minimum if there is only one access to the site.

Length: As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum would apply).

Geotextile: To be placed over the entire area to be covered with aggregate. Filter cloth will not be required on a single-family residence lot. Piping of surface water under entrance shall be provided as required. If piping is impossible, a mountable berm with 5:1 slopes will be permitted.

Criteria for Geotextile

The geotextile shall be woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the fabric properties as shown:

Fabric Properties[3]	Light Duty[1] Roads Grade Subgrade	Heavy Duty[2] Haul Roads Rough Graded	Test Method
Grab Tensile Strength (lbs)	200	220	ASTM D1682
Elongation at Failure (%)	50	60	ASTM D1682
Mullen Brust Strength (lbs)	190	430	ASTM D3786
Puncture Strength (lbs)	40	125	ASTM D751 modified
Equivalent Opening Size	40-80	40-80	US Std Sieve CW-02215
Aggregate Depth	6	10	--

[1]Light Duty Road: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Acceptable materials are Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.

[2]Heavy Duty Road: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Acceptable materials are Trevira Spunbond 1135, Mirafi 600X, or equivalent.

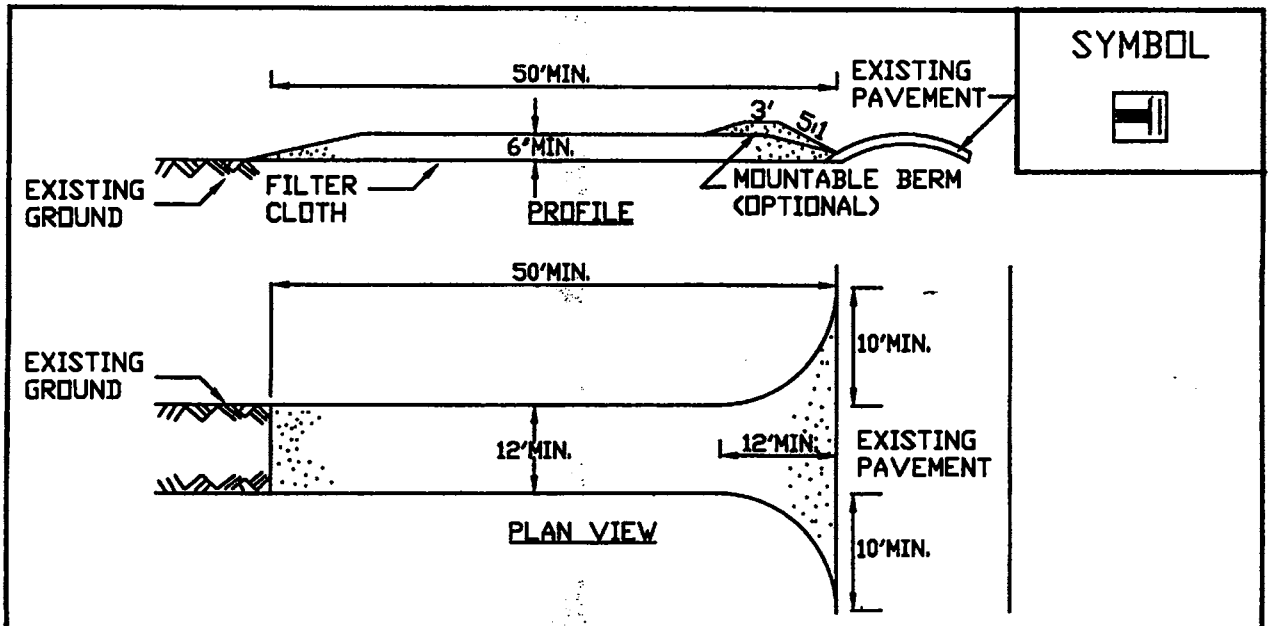
[3]Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

Maintenance

The entrance shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately.

When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

Figure 5A.35
Stabilized Construction Entrance



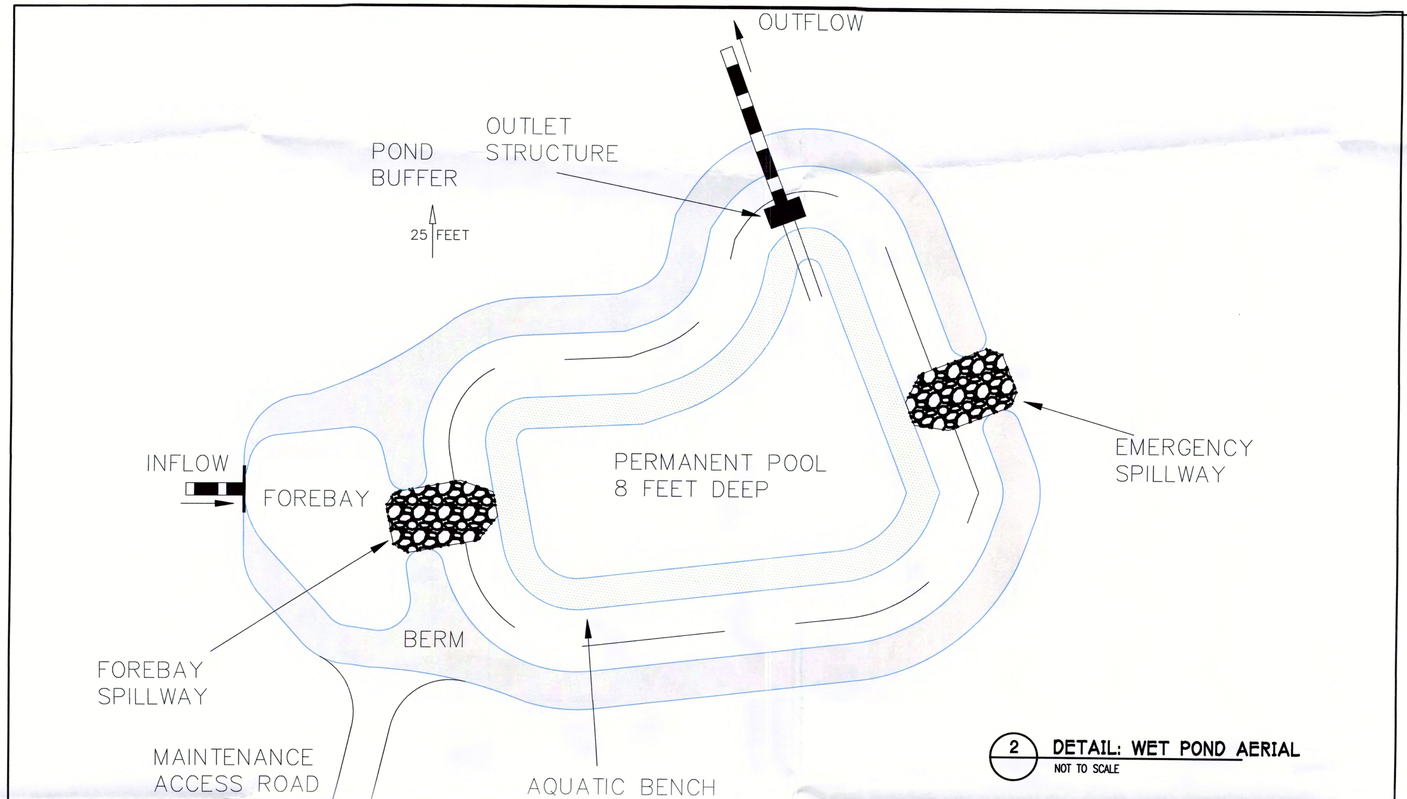
CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 1-4 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

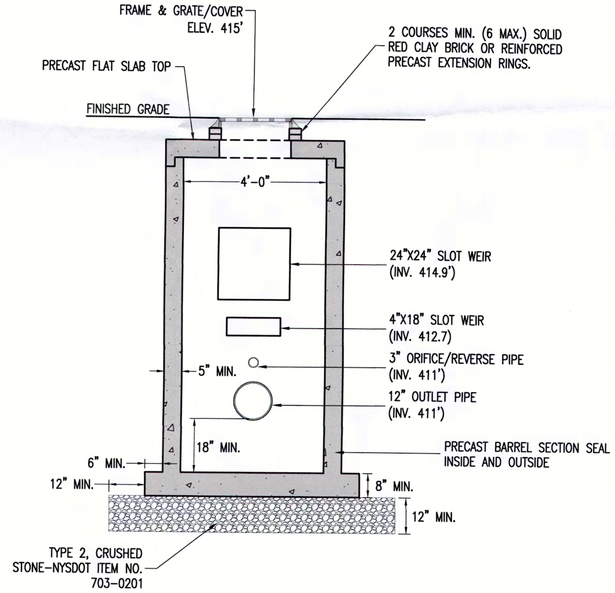
ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STABILIZED CONSTRUCTION ENTRANCE

APPENDIX

8



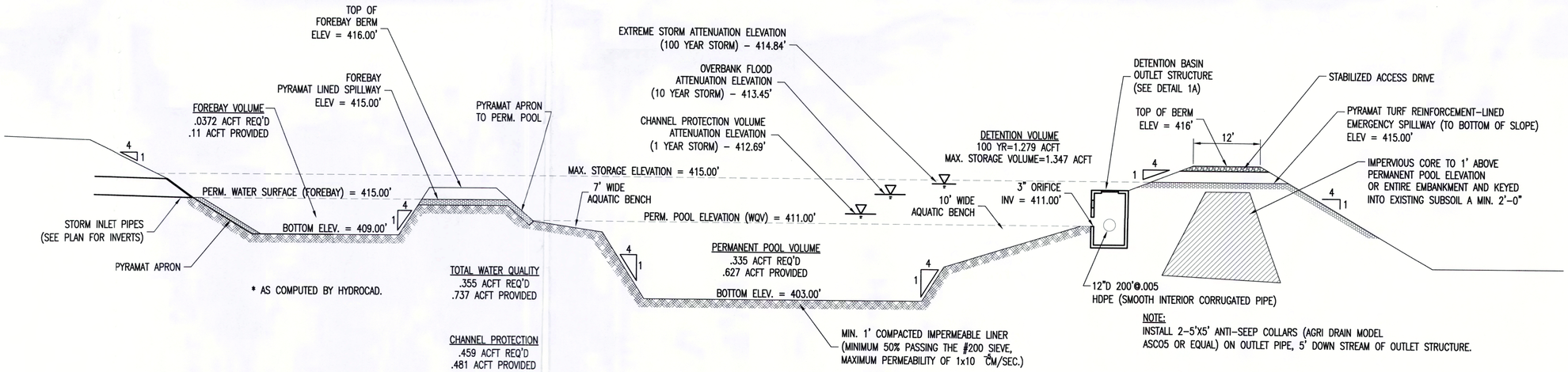
2 **DETAIL: WET POND AERIAL**
NOT TO SCALE



NOTES:

1. DESIGNED IN ACCORDANCE TO ASTM C478 WITH AASHTO HS-20 LOADING.
2. JOINTS SEALED IN ACCORDANCE WITH ASTM C990.
3. MANHOLE STEPS: ASTM C478 (IF REQUIRED).
4. REINFORCEMENT TO ASTM A615, A497, GRADE 60.
5. CONCRETE TO BE A MINIMUM 5000 PSI AT 28 DAYS, AIR ENTRAINED 5%-8%.
6. INSTALL STEPS IN STRUCTURES WITH A DEPTH GREATER THAN 4', AND IN ACCORDANCE WITH 604-3.06 OF THE NYSDOT STANDARD SPECIFICATIONS.

1A **DETAIL: PRECAST CONCRETE OUTLET STRUCTURE**
NOT TO SCALE



NOTE:
INSTALL 2-5'X5' ANTI-SEEP COLLARS (AGRI DRAIN MODEL ASC05 OR EQUAL) ON OUTLET PIPE, 5' DOWN STREAM OF OUTLET STRUCTURE.

1 **DETAIL: WET POND**
NOT TO SCALE

ALPHA ENGINEERING
SUNY POLYTECHNIC INSTITUTE
100 SEYMOUR RD, UTICA NY

TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

POND DETAILS

NO.	DATE	REVISION	BY

SCALE: NOT TO SCALE
FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
DWG. NO: **DET1**
CHECKED BY:

Traffic Impact Study
&
Roundabout Design Report

For

DeWitt Bypass

Town of DeWitt
Onondaga County, New York

April 2016

1234.56
DeWitt Bypass

ALPHA ENGINEERING

SUNY POLYTECHNIC INSTITUTE
100 Seymour Road
Utica, New York

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Traffic Impact Study

A-1 Traffic Data

The general purpose of a traffic impact study is to assess the effects of a particular development's traffic to the transportation network of the project. These studies can be used to help evaluate the existing traffic and as a planning tool to develop the type of transportation improvements that may be necessary.

Traffic impacts will be analyzed at all the intersections within the project site. The following intersections (signalized and unsignalized) that were analyzed are:

1. Butternut Creek Drive-Route 290
2. Bowman Road-North Route 290
3. Fremont Road- Route 290
4. North Burdick Street-Route 290
5. Route 257-Route 290
6. East Genesee Street-Route 257
7. Route 257-Salt Spring Road
8. Highbridge Road-East Genesee Street East Genesee Street-North Burdick Street
9. Cedar Bay Road-North Burdick Street
10. Bowman Road-North Burdick Street
11. Cedar Bay Road-Kinne Road Butternut Creek Drive-Kinne Road
12. 5 way interchange (Route 5-Lyndon Rd- E. Genesee- Highbridge Rd-Bridgepath Road)
13. Route 5-Wegmans entry point

Locations and traffic counts at these intersections are represented in **Appendix A.**

The study considers the weekday (5 days) evening (PM) peak hours, to accurately reflect peak traffic directly related to the use of the project site. This report analyzes traffic impacts at the intersections mentioned above.

Pedestrian travel was observed to be very light at the times of the study and therefore not considered to be an impact for intersection analysis.

The operational conditions within a traffic stream, in terms of: speed, travel time, maneuverability, traffic interruptions, and comfort of the study areas, will be designated with Level of Service (LOS) quality grading of A through F. "LOS A" representing the best conditions and "LOS F" representing the worst. Synchro traffic simulator will be used to assess the existing and alternative LOS for each of the following intersections. Google Earth Pro was also utilized to gather storage length measurements and as a template guide during the Synchro model construction.

Analysis Report for existing and design alternative conditions are included in **APPENDIX B.**

A-2 Alternatives Considered and Dismissed

Roundabout vs Signalized Intersection

A traffic circle and a signalized intersection are two controller types that were considered for the RT 481- RT 690 interchange. It was decided that the roundabout was the most feasible alternative design for the project for a number of reasons:

- Roundabout presents lower cost and maintenance
- Roundabouts promote a continuous flow of traffic
- Achieves higher safety for vehicles approaching the RT 481 off ramp

Appropriate exit route of the bypass road

There were two possible exit routes for the bypass road: 1.) Bowman intersection 2.) RT-290 before the RT 290- Minoa Rd. intersection. It was decided that the exit route for the bypass road will be placed at Bowman Road for a number of reasons:

- Construction cost would be less with a shorter bypass route intersecting with Bowman Road.
- Avoid property issues for the construction of the bypass road by intersecting with Bowman Road.
- Placing the exit route at Bowman road would be a viable option for commuters heading to either Fayetteville or Chittenango.

Steel Bridge vs Concrete Bridge

Since the bypass route will occupy a body of water, a one-hundred foot bridge must be utilized to avoid the100-year FEMA flood plain. It was decided that the bridge to be utilized will be a concrete bridge for a number of reasons:

- Overall costs of a concrete bridge is less than that of a steel bridge.
- A shorter construction time is required to the steel bridge.
- Concrete bridges are more economical in terms of shorter bridge spans.

A-3 Fulfillment of Objectives

Based on the model simulation of the proposed alternative route, improvements in terms of Level of Service (LOS) at the following intersections were achieved:

Intersection	Existing LOS	Proposed LOS
RT 290- Butternut Dr.	C	B
RT 290-Fremont Rd.	D	C
RT 290-Brudick St.	D	B
RT 5- N. Burdick	D	C
RT 5- Wegmans Dr.	D	C

An improved traffic flow will be anticipated from the RT5/ E. Genesee road stretch due to the improved LOS at multiple intersections. In addition, safety will increase due to the improved traffic flow at the RT5-Wegmans Dr. intersection. An improved traffic flow will prevent traffic from stagnating at the RT 481 off ramp.

Roundabout Design Report

B-1 Roundabout Design Process

The following section provides detailed information about the roundabout design for the Dewitt Bypass Project. When designing this roundabout Alpha Engineering took many different design criteria into consideration to provide a balance between safety and capacity. The roundabout was designed for an urban area where the bicycle and pedestrian use is moderate.

The roundabout is designed to be an urban double lane roundabout with a maximum speed of 15 mph within the circle. This speed was chosen based on approach sight distance, sight distance on circulatory roadway, and intersection sight distance. This speed also is beneficial because in multiple lane roundabouts having a larger path of curvature, there is greater side friction between adjacent traffic streams which causes more vehicles to cut across the lanes and this increases a risk for more sideswipe crashes. By choosing 15 mph, the risk for sideswipe crashes is reduced by forcing cars to slow down and remain in their lanes. To avoid crashes due to loss of control the roundabout was designed with a radial alignment of entries resulting in four 90 degree legs entering the roundabout.

The entry width is a large factor that affects the roundabout's capacity; the entry width for the roundabout associated with the Dewitt Bypass was designed to be 15.0 feet at the Southbound entrance, Northbound entrance and bypass road entrance leading to Butternut Road and the largest entry width is 32.0 feet at the On and Off ramps. This entry width was chosen to eliminate path overlap. In the case of the Dewitt Bypass roundabout the circulatory width is 32 feet. This was determined from the table below (Exhibit 6-22) of minimum circulatory lane widths based on the inscribed circle diameter taken from the U.S. Federal Highway Administration.

The exit width was based on the capacity of cars flowing through the exit during peak hours and the design vehicles requirements. The exit width was chosen to be 15.5 feet at the northbound and southbound exits of Butternut Road and 29 feet at the On ramp, Off ramp and the bypass road.

The inscribed circle diameter was designed based on site category and using Exhibit 6-19 found in the US DOT Roundabout manual. The inscribed circle design for the Dewitt Bypass

roundabout was determined to be 150.0 feet because the site category is an urban double lane roundabout.

Exhibit 6-19. Recommended inscribed circle diameter ranges.

Site Category	Typical Design Vehicle	Inscribed Circle Diameter Range*
Mini-Roundabout	Single-Unit Truck	13–25m (45–80 ft)
Urban Compact	Single-Unit Truck/Bus	25–30m (80–100 ft)
Urban Single Lane	WB-15 (WB-50)	30–40m (100–130 ft)
Urban Double Lane	WB-15 (WB-50)	45–55m (150–180 ft)
Rural Single Lane	WB-20 (WB-67)	35–40m (115–130 ft)
Rural Double Lane	WB-20 (WB-67)	55–60m (180–200 ft)

* Assumes 90-degree angles between entries and no more than four legs.

The next aspect of the roundabout that was designed was the central island. Central islands are raised, non-traversable areas encompassed by the circulatory roadway. The most effective type of Central Island is circular in shape because it promotes constant speed. The central island is designed based on the fastest vehicle path and this cannot be determined until the inscribed circle diameter and required circulatory roadway width are designed. Being that these two aspects of the roundabout are already established the roundabout was able to be designed. Using Exhibit 6-22 in the US DOT Roundabout Manual the central island diameter was chosen to be 86 ft. in diameter. This roundabout was designed with no apron because the central island diameter is large enough to support trucks and passenger vehicles driving through.

Exhibit 6-22. Minimum circulatory lane widths for two-lane roundabouts.

Inscribed Circle Diameter	Minimum Circulatory Lane Width*	Central Island Diameter
45 m (150 ft)	9.8 m (32 ft)	25.4 m (86 ft)
50 m (165 ft)	9.3 m (31 ft)	31.4 m (103 ft)
55 m (180 ft)	9.1 m (30 ft)	36.8 m (120 ft)
60 m (200 ft)	9.1 m (30 ft)	41.8 m (140 ft)
65 m (215 ft)	8.7 m (29 ft)	47.6 m (157 ft)
70 m (230 ft)	8.7 m (29 ft)	52.6 m (172 ft)

* Based on 1994 AASHTO Table III-20, Case III(A) (4). Assumes infrequent semi-trailer use (typically less than 5 percent of the total traffic). Refer to AASHTO for cases with higher truck percentages.

In double lane roundabouts the entry radius is designed to control entry speed and minimize path overlap. This was accomplished using a small radius generally somewhere between 50-100 feet. For the design of this roundabout the entry radius is 95 feet. The exit radius should be larger than entry radius to minimize the congestion at the exits and being that this roundabout is in a location where there are few pedestrians the exit radius was designed to be larger than the entry radius. Therefore, the exit radius of the roundabout at the Dewitt Bypass is designed to be 105 feet.

Based on the US DOT standards the approach width of the northbound and southbound directions of Butternut Road are 12 feet in width each. The bypass road is also 12 feet based on standard approach width in roundabouts. The On and Off ramps' approach width is 24 feet based on standards because these ramps are double lane entrances to the roundabout. The departure width of the roads are based on the US DOT standards: Butternut Road northbound and southbound is 12 feet in width whereas, the On and Off ramps and the bypass road departure widths are all 24 feet in width because these roads departing from the roundabout are all double lane.

Splitter island length should be at least 50 feet to provide protection for crossing pedestrians and alert approaching drivers about the roundabout. The roundabout at the Dewitt Bypass splitter island length at all entrances and exits is much larger than the minimum and meets the standard AASHTO guidelines.

Stopping sight distances at all approaches were designed to allow enough distance for a driver to perceive and react to an object and brake appropriately before reaching the object. The stopping sight distance at the northbound and southbound approaches is 146 feet. At the on ramp the distance is 80 feet and at the off ramp is 94 feet. The stopping sight distance at the bypass road is 97 feet. This was based on Exhibit 6-28 and the formula in Figure 1 found in the US DOT Roundabout manual where the computed distance needs to be greater than 77.0 feet if the speed is 15 mph.

Exhibit 6-28 gives recommended stopping sight distances for design, as computed from the above equations.

Speed (km/h)	Computed Distance* (m)	Speed (mph)	Computed Distance* (ft)
10	8.1	10	46.4
20	18.5	15	77.0
30	31.2	20	112.4
40	46.2	25	152.7
50	63.4	30	197.8
60	83.0	35	247.8
70	104.9	40	302.7
80	129.0	45	362.
90	155.5	50	427.2
100	184.2 *	55	496.7

Assumes 2.5 s perception-braking time, 3.4 m/s² (11.2 ft/s²) driver deceleration

Exhibit 6-28. Design values for stopping sight distances.

Figure 1: Formula for Stopping Sight Distance

$$d = (1.468)(t)(V) + 1.087\frac{V^2}{a}$$

where:
- d = stopping sight distance, ft;
- t = perception-brake reaction time, assumed to be 2.5 s;
- V = initial speed, mph; and
- a = driver deceleration, assumed to be 11.2 ft/s^2.

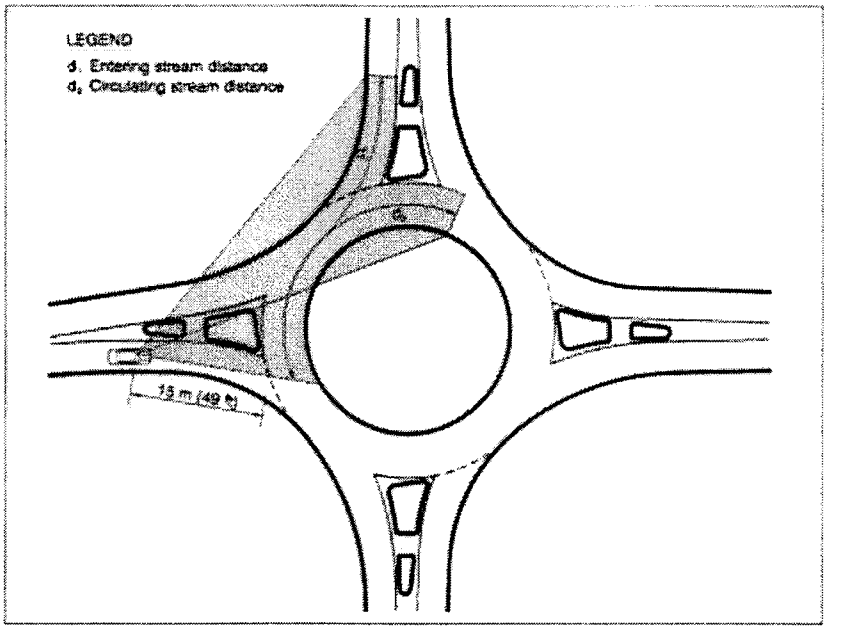
The next aspect of the roundabout that was designed was the intersection sight distance. This distance is the required distance for a driver without the right of way to perceive and react to the presence of vehicles. Typically the only locations in a roundabout that need to be evaluated for intersection sight distance are at the entries. This is traditionally measured by what is called a "sight triangle". The sight triangle is bounded by a length of roadway defining a limit away from the intersection on each side of the two conflicting approaches and a line connecting the limits. Each approach must be measured independently to ensure safety. This is measured using an assumed height of driver's eye of 3.54 ft as defined by AASHTO and the formula in Figure 2. Based on the calculation and our design criteria our computed intersection sight distance is a minimum of 143.0 ft. At each entry two traffic streams should be checked: the entering stream and the circulating stream. The entering stream consists of vehicles from the immediate upstream entry and was measured using Autocad. For Butternut Southbound and Butternut Northbound the intersection sight distance is 164.0 ft and 159.0 ft respectively. For the on and off ramps the distance is 162.0 ft. and for the bypass road the intersection sight distance is 172.0 ft. The next traffic stream that was measured was the circulating stream which is comprised of vehicles that enter the roundabout before the immediate upstream entry. The intersection sight distance for the circulating stream at Butternut Southbound and Northbound are 144.0 ft and 145.0 ft respectively. At the on and off ramps the intersection sight distance is 145.0 ft and 158.0 ft. at the Bypass Road. The placements of these two distances can be viewed in Exhibit 6-32 from the US DOT Roundabout Manual. The main purpose of calculating the intersection sight distance is to place restrictions on the height of the central island, landscaping and other objects such as signage placed within these zones.

Figure 2: Formula for Intersection Sight Distance

$b = 1.468(V_{major})(t_c)$ (6-3b, U.S. customary)

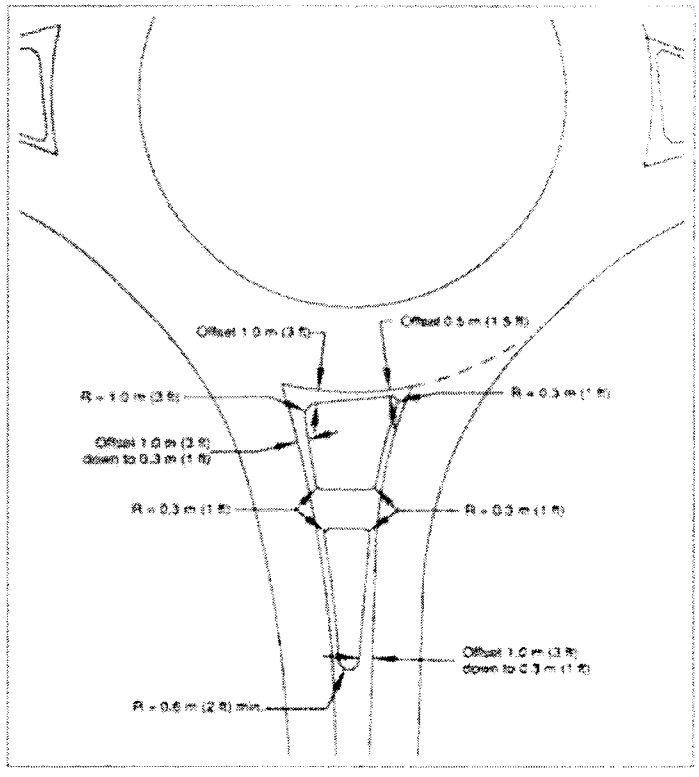
where:
- b = length of conflicting leg of sight triangle, ft
- V_{major} = design speed of conflicting movement, mph, discussed below
- t_c = critical gap for entering the major road, s, equal to 6.5 s

Exhibit 6-32. Intersection sight distance



The offset for the Dewitt Bypass were based off of Exhibit 6.27 from the US DOT Roundabout Manual. Following this standard criteria provided by the NYSDOT the Offset and nose radii were designed to be similar to the values provided in Figure 6-27.

Exhibit 6-27 Minimum splitter island nose radii and offsets



The yield lines are positioned outside of the swept path of the largest expected vehicle and in our design the yield lines meets standards and is used when designing the crosswalk on the exit. The crosswalk is setback from the yield line by 20 feet and crosses through Butternut Northbound. This is determined by the stopping sight distance from the yield line to the crosswalk. For Butternut Northbound the stopping sight distance was determined to be 101.0 ft which is adequate because the stopping sight distance for a speed of 15mph throughout the roundabout should be 95.4 ft. at a minimum. This is the same criteria that needs to be met on the Bypass Road. The stopping sight distance on the Bypass Road is 104.0 ft, thus meeting standards.

When designing this roundabout Alpha Engineering took many different design criteria into consideration and standards for safety provided by the U.S. DOT Roundabout manual to provide a balance between safety and capacity. The roundabout was designed for an urban area where the bicycle and pedestrian use is minimum and maximum speed in the circle is 15 mph.

B-2 Roundabout Analysis

Based on these design parameters, Alpha engineers conducted a traffic analysis using RODEL traffic software in order to determine the Level of Service on each leg. The traffic counts applied in the analysis are designed for 20 years with a forecast value of two percent per year from the proposed traffic counts found in **APPENDIX A.** See **APPENDIX C** of the report for the detailed analysis of the roundabout.

Appendix

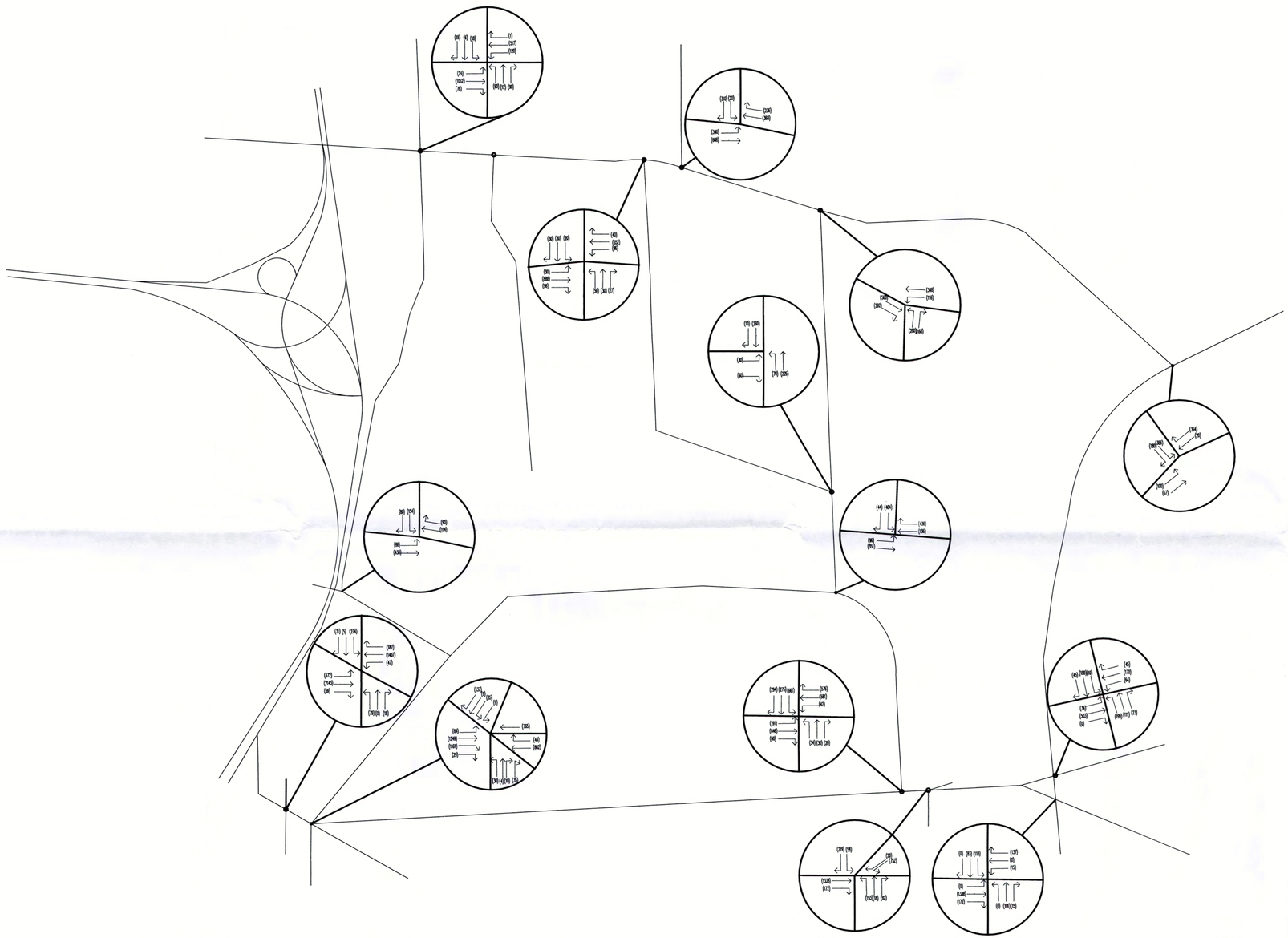
A. Traffic Counts

B. Traffic Analysis

C. Roundabout Traffic Analysis

APPENDIX

A



1 **EXISITING TRAFFIC**
NOT TO SCALE

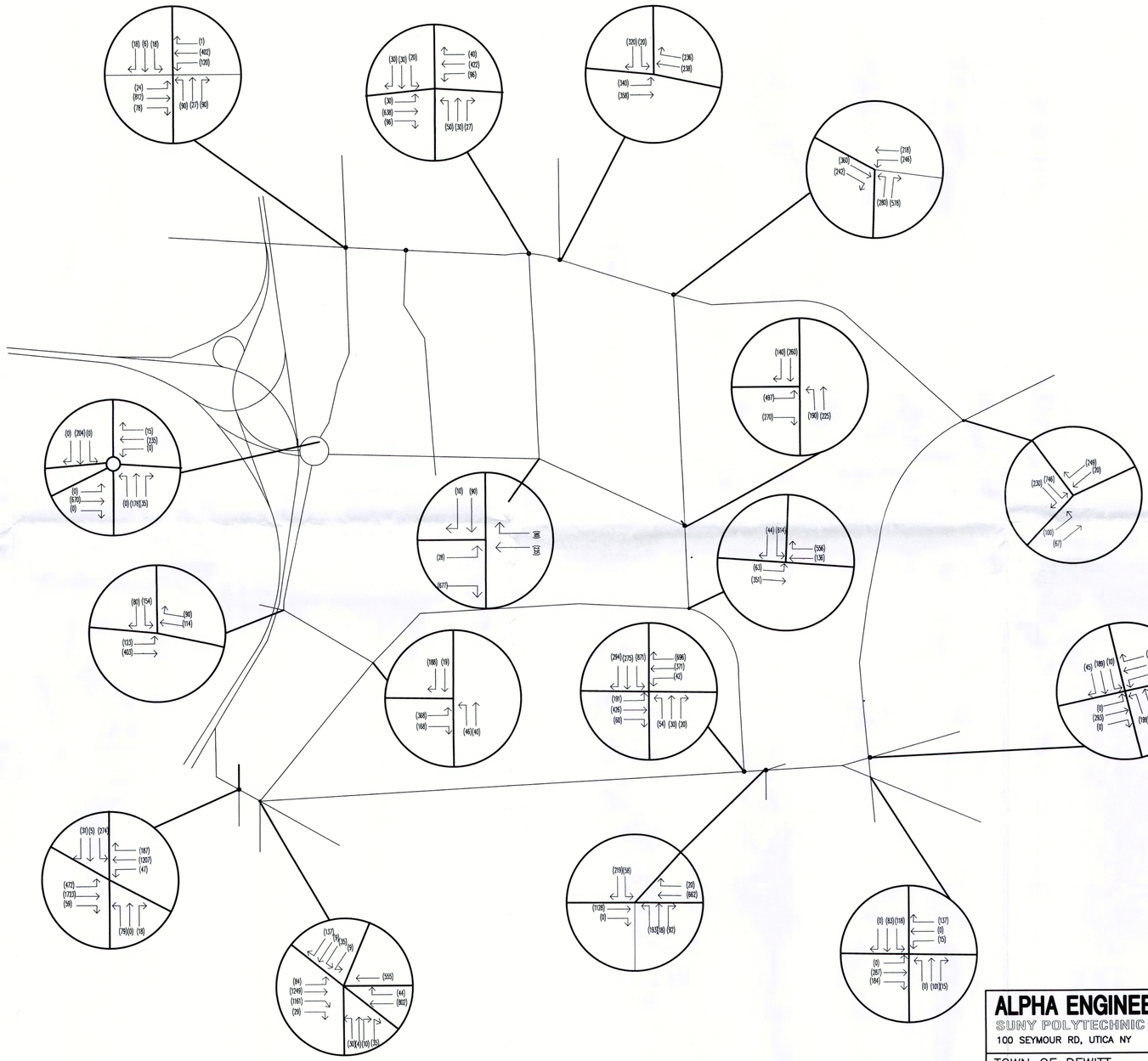
ALPHA ENGINEERING
SUNY POLYTECHNIC INSTITUTE
100 SEYMOUR RD, UTICA NY

TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

EXISITING PROFILE

NO.	DATE	REVISION	BY

SCALE: NOT TO SCALE
FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
DWG. NO: **TRF 1**
CHECKED BY:



1 **PROPOSED TRAFFIC**
NOT TO SCALE

ALPHA ENGINEERING
SUNY POLYTECHNIC INSTITUTE
100 SEYMOUR RD, UTICA NY

TOWN OF DEWITT
ONONDAGA COUNTY, NEW YORK
DEWITT BYPASS PROJECT

PROPOSED PROFILE

NO.	DATE	REVISION	BY

SCALE: NOT TO SCALE
FILE NO.: XXX.XX
DESIGNED BY:
DATE: 04.20.2016
DRAWN BY:
CHECKED BY:
DWG. NO: **TRF 2**

APPENDIX

B

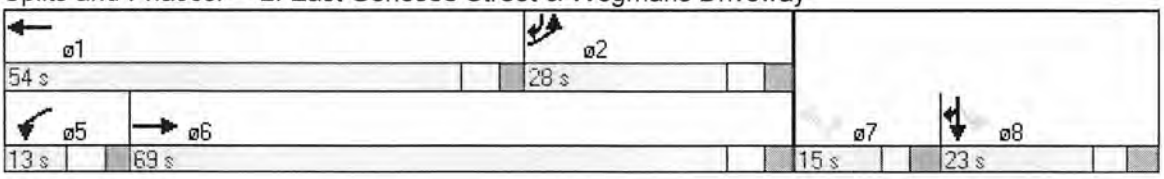
EXISTING TRAFFIC

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	410		0	230		0	0		0	0		0
Storage Lanes	2		0	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	60	286		60	286		20		20	60	60	60
Trailing Detector (ft)	-10	10		-10	10		0		0	-10	-10	-10
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.996			0.982				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950	0.954	
Satd. Flow (prot)	3433	5065	0	1770	4994	0	1770	0	1583	1681	1688	1583
Flt Permitted	0.950			0.950			0.364			0.950	0.954	
Satd. Flow (perm)	3433	5065	0	1770	4994	0	678	0	1583	1681	1688	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			24				20			34
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2577			1394			1472			1777	
Travel Time (s)		58.6			31.7			33.5			40.4	
Volume (vph)	472	2143	59	47	1407	187	79	0	18	274	5	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	513	2329	64	51	1529	203	86	0	20	298	5	34
Lane Group Flow (vph)	513	2393	0	51	1732	0	86	0	20	149	154	34
Turn Type	Prot			Prot			custom		custom	Perm		pt+ov
Protected Phases	2	6		5	1						8	2 8
Permitted Phases							7		7	8		
Detector Phases	2	6		5	1		7		7	8	8	2 8
Minimum Initial (s)	6.0	15.0		4.0	15.0		4.0		4.0	4.0	4.0	
Minimum Split (s)	13.0	22.0		10.5	21.5		10.0		10.0	11.0	11.0	
Total Split (s)	28.0	69.0	0.0	13.0	54.0	0.0	15.0	0.0	15.0	23.0	23.0	51.0
Total Split (%)	23.3%	57.5%	0.0%	10.8%	45.0%	0.0%	12.5%	0.0%	12.5%	19.2%	19.2%	42.5%
Maximum Green (s)	21.0	62.0		6.5	47.5		9.0		9.0	16.0	16.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0		3.0	3.5	3.5	
All-Red Time (s)	3.0	3.0		2.5	2.5		3.0		3.0	3.5	3.5	
Lead/Lag	Lag	Lag		Lead	Lead		Lead		Lead	Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0		3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None		None	None	None	
Act Effct Green (s)	24.0	69.0		9.1	51.6		11.0		11.0	17.4	17.4	41.4
Actuated g/C Ratio	0.20	0.58		0.08	0.43		0.09		0.09	0.14	0.14	0.34
v/c Ratio	0.75	0.82		0.38	0.80		1.39		0.12	0.61	0.63	0.06
Control Delay	52.8	24.7		72.7	36.3		288.1		21.5	56.4	57.1	5.4
Queue Delay	0.0	0.0		0.0	0.0		0.0		0.0	0.0	0.0	0.0
Total Delay	52.8	24.7		72.7	36.3		288.1		21.5	56.4	57.1	5.4
LOS	D	C		E	D		F		C	E	E	A
Approach Delay		29.7			37.4						51.6	
Approach LOS		C			D						D	

Intersection Summary

Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 69 (58%), Referenced to phase 1:WBT and 6:EBT, Start of Yellow	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.39	
Intersection Signal Delay: 38.1	Intersection LOS: D
Intersection Capacity Utilization 70.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: East Genesee Street & Wegmans Driveway

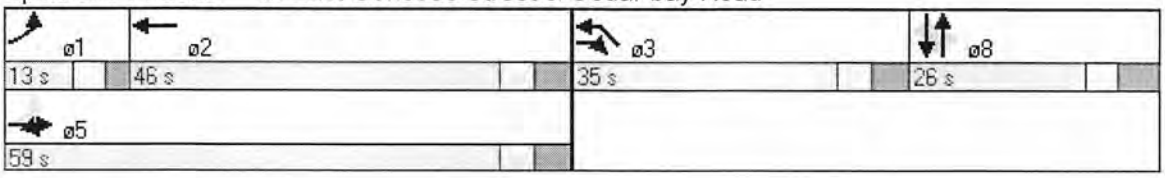


Lane Group	EBL	EBT	EBR	EBR2	WBT	NBL	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0			0		0			0	
Storage Lanes	1		1			0		0			0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50	50			50	50	50
Trailing Detector (ft)	0	0	0		0	0	0			0	0	0
Turning Speed (mph)	15		9	9		15		9	9	15	15	
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850				0.923					0.903
Flt Protected	0.950						0.981					0.989
Satd. Flow (prot)	1770	3539	1583	0	3539	0	1687	0	0	0	0	1664
Flt Permitted	0.154						0.706					0.905
Satd. Flow (perm)	287	3539	1583	0	3539	0	1214	0	0	0	0	1522
Right Turn on Red				Yes					Yes			
Satd. Flow (RTOR)			3				29					94
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30		30					30
Link Distance (ft)		1394			7517		1744					4285
Travel Time (s)		31.7			170.8		39.6					97.4
Volume (vph)	84	1249	1161	29	765	30	4	10	35	9	35	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	1358	1262	32	832	33	4	11	38	10	38	10
Lane Group Flow (vph)	91	1358	1294	0	832	0	86	0	0	0	0	207
Turn Type	pm+pt		pt+ov			Perm				Perm	Perm	
Protected Phases	1	5	3 5		2		8					8
Permitted Phases	5					8				8	8	
Detector Phases	1	5	3 5		2	8	8			8	8	8
Minimum Initial (s)	4.0	10.0			10.0	4.0	4.0			4.0	4.0	4.0
Minimum Split (s)	10.0	17.5			17.5	12.0	12.0			12.0	12.0	12.0
Total Split (s)	13.0	59.0	94.0	0.0	46.0	26.0	26.0	0.0	0.0	26.0	26.0	26.0
Total Split (%)	10.8%	49.2%	78.3%	0.0%	38.3%	21.7%	21.7%	0.0%	0.0%	21.7%	21.7%	21.7%
Maximum Green (s)	7.0	51.5			38.5	18.0	18.0			18.0	18.0	18.0
Yellow Time (s)	3.5	3.5			3.5	3.5	3.5			3.5	3.5	3.5
All-Red Time (s)	2.5	4.0			4.0	4.5	4.5			4.5	4.5	4.5
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0			3.0	3.0	3.0
Recall Mode	None	C-Max			C-Max	None	None			None	None	None
Act Effct Green (s)	59.4	59.4	94.4		45.8		17.6					17.6
Actuated g/C Ratio	0.50	0.50	0.79		0.38		0.15					0.15
v/c Ratio	0.35	0.78	1.04		0.62		0.42					0.68
Control Delay	16.7	30.6	60.9		33.3		34.2					32.2
Queue Delay	0.0	0.0	0.0		0.0		0.0					0.0
Total Delay	16.7	30.6	60.9		33.3		34.2					32.2
LOS	B	C	E		C		C					C
Approach Delay		44.4			33.3		34.2					32.2
Approach LOS		D			C		C					C

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:WBT and 5:EBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.04			
Intersection Signal Delay: 49.5		Intersection LOS: D	
Intersection Capacity Utilization 93.2%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 5: East Genesee Street & Cedar bay Road



Lane Group	SBR	NWL	NWR
Lane Configurations			
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)	0	0	0
Storage Lanes	0	2	0
Total Lost Time (s)	4.0	4.0	4.0
Leading Detector (ft)		50	
Trailing Detector (ft)		0	
Turning Speed (mph)	9	15	9
Lane Util. Factor	1.00	0.97	0.95
Frt		0.992	
Flt Protected		0.955	
Satd. Flow (prot)	0	3423	0
Flt Permitted		0.955	
Satd. Flow (perm)	0	3423	0
Right Turn on Red	Yes		
Satd. Flow (RTOR)			
Headway Factor	1.00	1.00	1.00
Link Speed (mph)		30	
Link Distance (ft)		1779	
Travel Time (s)		40.4	
Volume (vph)	137	802	44
Peak Hour Factor	0.92	0.92	0.92
Adj. Flow (vph)	149	872	48
Lane Group Flow (vph)	0	920	0
Turn Type			
Protected Phases		3	
Permitted Phases			
Detector Phases		3	
Minimum Initial (s)		10.0	
Minimum Split (s)		18.5	
Total Split (s)	0.0	35.0	0.0
Total Split (%)	0.0%	29.2%	0.0%
Maximum Green (s)		27.5	
Yellow Time (s)		3.5	
All-Red Time (s)		4.0	
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)		3.0	
Recall Mode		None	
Act Effct Green (s)		31.0	
Actuated g/C Ratio		0.26	
v/c Ratio		1.04	
Control Delay		84.8	
Queue Delay		0.0	
Total Delay		84.8	
LOS		F	
Approach Delay		84.8	
Approach LOS		F	

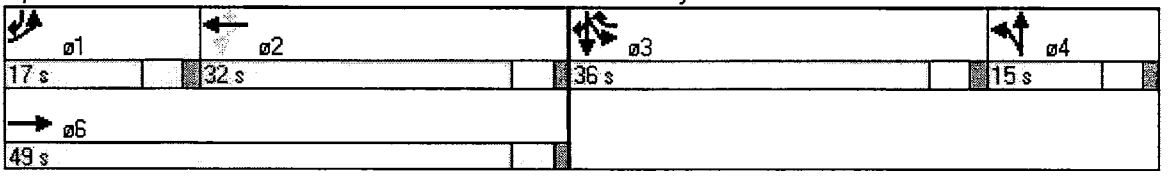
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		150	0		0	0		0
Storage Lanes	1		0	0		1	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	50
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.990				0.850		0.974				0.850
Flt Protected	0.950				0.997			0.975		0.950	0.979	
Satd. Flow (prot)	1770	3504	0	0	3529	1583	0	1769	0	1681	1732	1583
Flt Permitted	0.950				0.813			0.975		0.950	0.979	
Satd. Flow (perm)	1770	3504	0	0	2877	1583	0	1769	0	1681	1732	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				411		10				187
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		7517			553			1082			5007	
Travel Time (s)		170.8			12.6			24.6			113.8	
Volume (vph)	191	846	60	42	581	576	54	30	20	661	275	294
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	920	65	46	632	626	59	33	22	718	299	320
Lane Group Flow (vph)	208	985	0	0	678	626	0	114	0	496	521	320
Turn Type	Prot			Perm		pm+ov	Split			Split		pt+ov
Protected Phases	1	6			2	3	4	4		3	3	3 1
Permitted Phases				2		2						
Detector Phases	1	6		2	2	3	4	4		3	3	3 1
Minimum Initial (s)	6.0	20.0		20.0	20.0	6.0	4.0	4.0		6.0	6.0	
Minimum Split (s)	11.0	25.0		25.0	25.0	11.0	9.0	9.0		11.0	11.0	
Total Split (s)	17.0	49.0	0.0	32.0	32.0	36.0	15.0	15.0	0.0	36.0	36.0	53.0
Total Split (%)	17.0%	49.0%	0.0%	32.0%	32.0%	36.0%	15.0%	15.0%	0.0%	36.0%	36.0%	53.0%
Maximum Green (s)	12.0	44.0		27.0	27.0	31.0	10.0	10.0		31.0	31.0	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.5		1.5	1.5	
Lead/Lag	Lead			Lag	Lag	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max	None	None	None		None	None	
Act Effct Green (s)	13.4	45.8			28.4	64.4		10.2		32.0	32.0	45.4
Actuated g/C Ratio	0.13	0.46			0.28	0.64		0.10		0.32	0.32	0.45
v/c Ratio	0.88	0.61			0.83	0.54		0.60		0.92	0.94	0.39
Control Delay	77.8	22.4			39.9	8.9		50.1		57.8	60.5	5.4
Queue Delay	0.0	0.0			0.0	0.5		0.0		0.0	0.0	0.0
Total Delay	77.8	22.4			39.9	9.4		50.1		57.8	60.5	5.4
LOS	E	C			D	A		D		E	E	A
Approach Delay		32.1			25.3			50.1			46.3	
Approach LOS		C			C			D			D	

Intersection Summary

Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 35.2	Intersection LOS: D
Intersection Capacity Utilization 87.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 8: East Genesee Street & Cedar bay Road



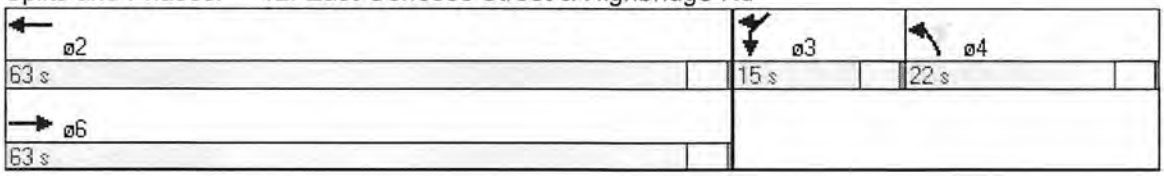
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	330		0	0	0		0	0
Storage Lanes	0		0	1		0	1	0		0	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50		50	50		50	50
Trailing Detector (ft)		0			0		0	0		0	0
Turning Speed (mph)	15		9	15		9	15	9	9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95
Frt		0.983			0.996			0.850		0.925	0.850
Flt Protected							0.950			0.976	
Satd. Flow (prot)	0	3479	0	0	3525	0	1770	1583	0	1682	1504
Flt Permitted							0.950			0.976	
Satd. Flow (perm)	0	3479	0	0	3525	0	1770	1583	0	1682	1504
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		24			5			100		40	175
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30		30			30	
Link Distance (ft)		553			2710		1209			1393	
Travel Time (s)		12.6			61.6		27.5			31.7	
Volume (vph)	0	1338	172	0	752	20	193	18	92	58	219
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1454	187	0	817	22	210	20	100	63	238
Lane Group Flow (vph)	0	1641	0	0	839	0	210	120	0	126	175
Turn Type							Prot				Prot
Protected Phases		6			2		4			3	3
Permitted Phases								4			
Detector Phases		6			2		4	4		3	3
Minimum Initial (s)		4.0			4.0		4.0	4.0		4.0	4.0
Minimum Split (s)		20.0			20.0		20.0	20.0		8.0	8.0
Total Split (s)	0.0	63.0	0.0	0.0	63.0	0.0	22.0	22.0	0.0	15.0	15.0
Total Split (%)	0.0%	63.0%	0.0%	0.0%	63.0%	0.0%	22.0%	22.0%	0.0%	15.0%	15.0%
Maximum Green (s)		59.0			59.0		18.0	18.0		11.0	11.0
Yellow Time (s)		3.5			3.5		3.5	3.5		3.5	3.5
All-Red Time (s)		0.5			0.5		0.5	0.5		0.5	0.5
Lead/Lag							Lag	Lag		Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0
Recall Mode		C-Max			C-Max		Max	Max		None	None
Walk Time (s)		5.0			5.0		5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0			
Act Effct Green (s)		59.0			59.0		19.7	19.7		9.3	9.3
Actuated g/C Ratio		0.59			0.59		0.20	0.20		0.09	0.09
v/c Ratio		0.80			0.40		0.60	0.31		0.66	0.59
Control Delay		14.8			11.7		45.5	12.6		39.8	13.5
Queue Delay		0.2			0.0		0.0	0.0		0.0	0.0
Total Delay		15.0			11.7		45.5	12.6		39.8	13.5
LOS		B			B		D	B		D	B

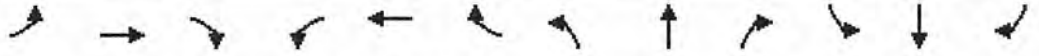
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR
Approach Delay		15.0			11.7		33.5			24.5	
Approach LOS		B			B		C			C	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow, Master Intersection
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 17.0 Intersection LOS: B
Intersection Capacity Utilization 70.9% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 12: East Genesee Street & Highbridge Rd



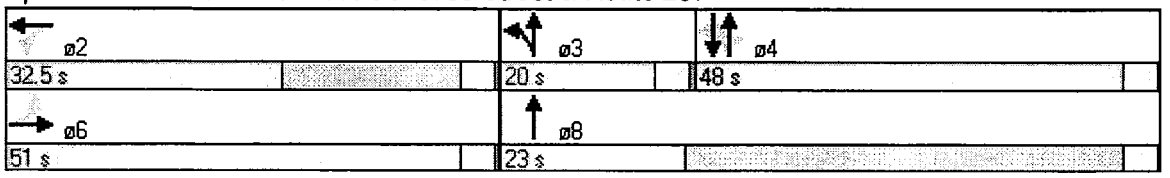


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	130		0	0		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.969			0.974			0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	0	1770	1805	0	1770	1814	0	1770	1809	0
Flt Permitted	0.525			0.191			0.488			0.664		
Satd. Flow (perm)	978	1863	0	356	1805	0	909	1814	0	1237	1809	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					13			14			11	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2710			1216			270			8133	
Travel Time (s)		61.6			27.6			6.1			184.8	
Volume (vph)	34	503	0	64	170	45	199	111	23	10	189	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	547	0	70	185	49	216	121	25	11	205	49
Lane Group Flow (vph)	37	547	0	70	234	0	216	146	0	11	254	0
Turn Type	Perm			Perm			D.P+P			Perm		
Protected Phases		6			2		3	3 4 8			4	
Permitted Phases	6			2			4			4		
Detector Phases	6	6		2	2		3	3 4 8		4	4	
Minimum Initial (s)	6.0	6.0		6.0	6.0		1.0			4.0	4.0	
Minimum Split (s)	22.0	22.0		20.0	20.0		20.0			20.0	20.0	
Total Split (s)	51.0	51.0	0.0	32.5	32.5	0.0	20.0	91.0	0.0	48.0	48.0	0.0
Total Split (%)	42.9%	42.9%	0.0%	27.3%	27.3%	0.0%	16.8%	76.5%	0.0%	40.3%	40.3%	0.0%
Maximum Green (s)	47.0	47.0		28.5	28.5		16.0			44.0	44.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5			3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5			0.5	0.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0	
Recall Mode	Min	Min		None	None		None			None	None	
Act Effct Green (s)	30.4	30.4		30.4	30.4		21.6	37.1		13.4	13.4	
Actuated g/C Ratio	0.52	0.52		0.52	0.52		0.36	0.51		0.22	0.22	
v/c Ratio	0.07	0.57		0.38	0.25		0.46	0.16		0.04	0.62	
Control Delay	13.9	17.6		21.7	13.5		13.6	9.9		23.3	23.4	
Queue Delay	0.0	0.0		0.2	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.9	17.6		21.9	13.5		13.6	9.9		23.3	23.4	
LOS	B	B		C	B		B	A		C	C	
Approach Delay		17.4			15.5			12.1			23.4	
Approach LOS		B			B			B			C	

Intersection Summary

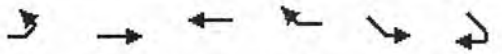
Area Type:	Other
Cycle Length: 119	
Actuated Cycle Length: 58.8	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 16.8	Intersection LOS: B
Intersection Capacity Utilization 68.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 15: East Genesee Street & Route 257



Lane Group	ø8
Lane Configurations	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Total Lost Time (s)	
Leading Detector (ft)	
Trailing Detector (ft)	
Turning Speed (mph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Headway Factor	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Volume (vph)	
Peak Hour Factor	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phases	
Minimum Initial (s)	1.0
Minimum Split (s)	20.0
Total Split (s)	23.0
Total Split (%)	19%
Maximum Green (s)	19.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary



Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.872		0.955	
Flt Protected		0.971			0.968	
Satd. Flow (prot)	0	1809	1624	0	1722	0
Flt Permitted		0.971			0.968	
Satd. Flow (perm)	0	1809	1624	0	1722	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		8133	2410		5404	
Travel Time (s)		184.8	54.8		122.8	
Volume (vph)	100	67	20	364	366	180
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	73	22	396	398	196
Lane Group Flow (vph)	0	182	418	0	594	0
Sign Control		Stop	Stop		Stop	

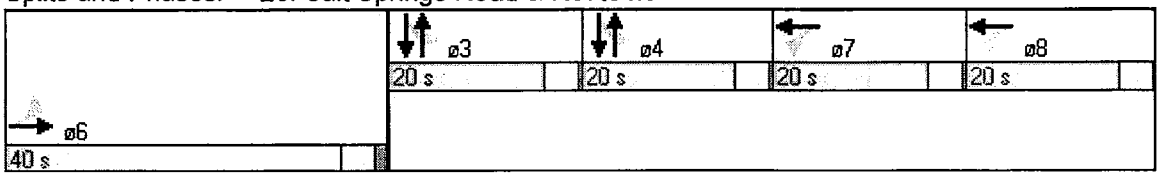
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50			50		50	50	
Trailing Detector (ft)	0	0		0	0			0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.941			0.878			0.983				
Flt Protected					0.995						0.971	
Satd. Flow (prot)	1863	1753	0	0	1627	0	0	1831	0	0	1809	0
Flt Permitted					0.937						0.707	
Satd. Flow (perm)	1863	1753	0	0	1532	0	0	1831	0	0	1317	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			149			6				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1002			1727			2053			270	
Travel Time (s)		22.8			39.3			46.7			6.1	
Volume (vph)	0	287	184	15	0	137	0	101	15	118	83	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	312	200	16	0	149	0	110	16	128	90	0
Lane Group Flow (vph)	0	512	0	0	165	0	0	126	0	0	218	0
Turn Type	Perm			Perm						Perm		
Protected Phases		6			7 8			3 4			3 4	
Permitted Phases	6			7 8						3 4		
Detector Phases	6	6		7 8	7 8			3 4		3 4	3 4	
Minimum Initial (s)	6.0	6.0										
Minimum Split (s)	22.0	22.0										
Total Split (s)	40.0	40.0	0.0	40.0	40.0	0.0	0.0	40.0	0.0	40.0	40.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	0.0%	0.0%	33.3%	0.0%	33.3%	33.3%	0.0%
Maximum Green (s)	35.0	35.0										
Yellow Time (s)	3.5	3.5										
All-Red Time (s)	1.5	1.5										
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0										
Recall Mode	Max	Max										
Act Effct Green (s)		36.3			15.2			24.8			24.8	
Actuated g/C Ratio		0.41			0.17			0.28			0.28	
v/c Ratio		0.70			0.43			0.24			0.59	
Control Delay		28.3			9.0			24.1			31.2	
Queue Delay		0.0			0.0			0.0			1.0	
Total Delay		28.3			9.0			24.1			32.1	
LOS		C			A			C			C	
Approach Delay		28.3			9.0			24.1			32.1	
Approach LOS		C			A			C			C	

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 88.4			
Natural Cycle: 115			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 25.5		Intersection LOS: C	
Intersection Capacity Utilization 50.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 20: Salt Springs Road & Route 257



Lane Group	ø3	ø4	ø7	ø8
Lane Configurations				
Ideal Flow (vphpl)				
Storage Length (ft)				
Storage Lanes				
Total Lost Time (s)				
Leading Detector (ft)				
Trailing Detector (ft)				
Turning Speed (mph)				
Lane Util. Factor				
Frt				
Flt Protected				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Right Turn on Red				
Satd. Flow (RTOR)				
Headway Factor				
Link Speed (mph)				
Link Distance (ft)				
Travel Time (s)				
Volume (vph)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type				
Protected Phases	3	4	7	8
Permitted Phases				
Detector Phases				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0
Total Split (%)	17%	17%	17%	17%
Maximum Green (s)	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None
Act Effct Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				

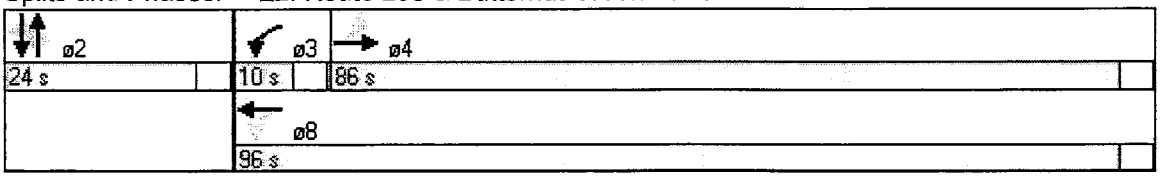
Intersection Summary

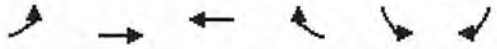
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	0		170	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990							0.850		0.943	
Flt Protected	0.950			0.950				0.958			0.979	
Satd. Flow (prot)	1770	1844	0	1770	1863	0	0	1785	1583	0	1720	0
Flt Permitted	0.453			0.047				0.751			0.870	
Satd. Flow (perm)	844	1844	0	88	1863	0	0	1399	1583	0	1528	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7							98		20	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		3472			2950			5997			2598	
Travel Time (s)		78.9			67.0			136.3			59.0	
Volume (vph)	24	1062	78	120	517	1	90	12	90	18	6	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	1154	85	130	562	1	98	13	98	20	7	20
Lane Group Flow (vph)	26	1239	0	130	563	0	0	111	98	0	47	0
Turn Type	Perm			pm+pt			Perm		Perm	Perm		
Protected Phases		4		3	8			2			2	
Permitted Phases	4			8			2		2	2		
Minimum Split (s)	20.0	20.0		8.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	86.0	86.0	0.0	10.0	96.0	0.0	24.0	24.0	24.0	24.0	24.0	0.0
Total Split (%)	71.7%	71.7%	0.0%	8.3%	80.0%	0.0%	20.0%	20.0%	20.0%	20.0%	20.0%	0.0%
Maximum Green (s)	82.0	82.0		6.0	92.0		20.0	20.0	20.0	20.0	20.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Walk Time (s)	5.0	5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	82.0	82.0		92.0	92.0			20.0	20.0		20.0	
Actuated g/C Ratio	0.68	0.68		0.77	0.77			0.17	0.17		0.17	
v/c Ratio	0.05	0.98		0.86	0.39			0.48	0.28		0.17	
Control Delay	6.5	40.5		63.2	4.8			53.0	10.7		30.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	6.5	40.5		63.2	4.8			53.0	10.7		30.0	
LOS	A	D		E	A			D	B		C	
Approach Delay		39.8			15.7			33.1			30.0	
Approach LOS		D			B			C			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	

Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 31.4 Intersection LOS: C
Intersection Capacity Utilization 87.7% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 22: Route 290 & Butternut Creek Drive





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.940		0.954	
Flt Protected		0.992			0.968	
Satd. Flow (prot)	0	1848	1751	0	1720	0
Flt Permitted		0.992			0.968	
Satd. Flow (perm)	0	1848	1751	0	1720	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1577	1657		5997	
Travel Time (s)		35.8	37.7		136.3	
Volume (vph)	88	438	114	90	154	80
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	476	124	98	167	87
Lane Group Flow (vph)	0	572	222	0	254	0
Sign Control		Stop	Stop		Stop	

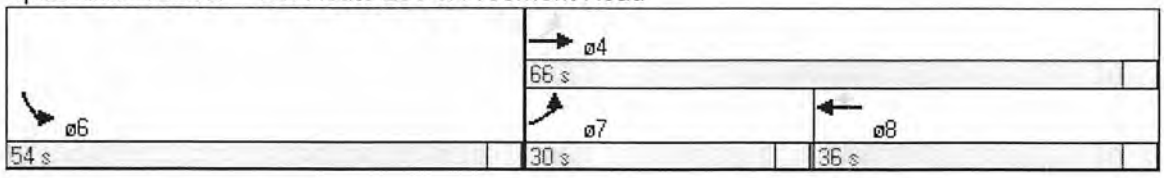
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.8%		ICU Level of Service B	
Analysis Period (min) 15			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400			180	0	0
Storage Lanes	1			1	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.921	
Flt Protected	0.950				0.980	
Satd. Flow (prot)	1770	1863	1863	1583	1681	0
Flt Permitted	0.159				0.980	
Satd. Flow (perm)	296	1863	1863	1583	1681	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				216	74	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		541	1873		2674	
Travel Time (s)		12.3	42.6		60.8	
Volume (vph)	340	608	368	236	224	320
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	370	661	400	257	243	348
Lane Group Flow (vph)	370	661	400	257	591	0
Turn Type	pm+pt			Perm		
Protected Phases	7	4	8		6	
Permitted Phases	4			8		
Detector Phases	7	4	8	8	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0	
Total Split (s)	30.0	66.0	36.0	36.0	54.0	0.0
Total Split (%)	25.0%	55.0%	30.0%	30.0%	45.0%	0.0%
Maximum Green (s)	26.0	62.0	32.0	32.0	50.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	Max	
Walk Time (s)		5.0	5.0	5.0	5.0	
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)		0	0	0	0	
Act Effct Green (s)	55.2	55.2	27.8	27.8	50.4	
Actuated g/C Ratio	0.49	0.49	0.24	0.24	0.44	
v/c Ratio	0.83	0.73	0.88	0.47	0.75	
Control Delay	37.9	27.2	53.5	10.2	31.7	
Queue Delay	0.0	7.6	0.0	0.0	0.1	
Total Delay	37.9	34.8	53.5	10.2	31.8	
LOS	D	C	D	B	C	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach Delay		35.9	36.6		31.8	
Approach LOS		D	D		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 113.6			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 35.0		Intersection LOS: D	
Intersection Capacity Utilization 80.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 25: Route 290 & Freemont Road

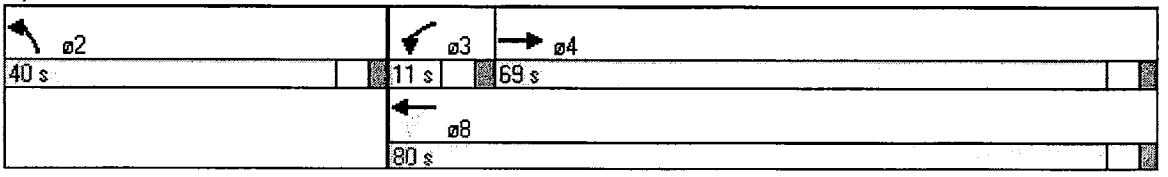


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	100		0	0
Storage Lanes		0	1		1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50		50	50	50	
Trailing Detector (ft)	0		0	0	0	
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.954				0.949	
Flt Protected			0.950		0.970	
Satd. Flow (prot)	1777	0	1770	1863	1715	0
Flt Permitted			0.058		0.970	
Satd. Flow (perm)	1777	0	108	1863	1715	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	34				26	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	1873			5404	3530	
Travel Time (s)	42.6			122.8	80.2	
Volume (vph)	560	292	116	348	280	168
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	609	317	126	378	304	183
Lane Group Flow (vph)	926	0	126	378	487	0
Turn Type			pm+pt			
Protected Phases	4		3	8	2	
Permitted Phases			8			
Detector Phases	4		3	8	2	
Minimum Initial (s)	4.0		4.0	4.0	4.0	
Minimum Split (s)	21.5		9.5	21.5	21.5	
Total Split (s)	69.0	0.0	11.0	80.0	40.0	0.0
Total Split (%)	57.5%	0.0%	9.2%	66.7%	33.3%	0.0%
Maximum Green (s)	63.5		5.5	74.5	34.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	None	
Act Effct Green (s)	65.0		76.0	76.0	34.7	
Actuated g/C Ratio	0.55		0.64	0.64	0.29	
v/c Ratio	0.94		0.75	0.32	0.94	
Control Delay	42.2		48.1	10.7	61.9	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	42.2		48.1	10.7	61.9	
LOS	D		D	B	E	
Approach Delay	42.2			20.1	61.9	
Approach LOS	D			C	E	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	118.7
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.94
Intersection Signal Delay:	41.4
Intersection LOS:	D
Intersection Capacity Utilization	89.5%
ICU Level of Service	E
Analysis Period (min)	15

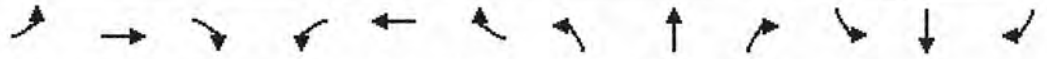
Splits and Phases: 27: Route 290 & Burdick Street





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.910				0.995	
Flt Protected	0.983			0.988		
Satd. Flow (prot)	1666	0	0	1840	1853	0
Flt Permitted	0.983			0.988		
Satd. Flow (perm)	1666	0	0	1840	1853	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	6650			1284	3530	
Travel Time (s)	151.1			29.2	80.2	
Volume (vph)	30	60	70	225	260	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	65	76	245	283	11
Lane Group Flow (vph)	98	0	0	321	294	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.4%		ICU Level of Service A	
Analysis Period (min) 15			

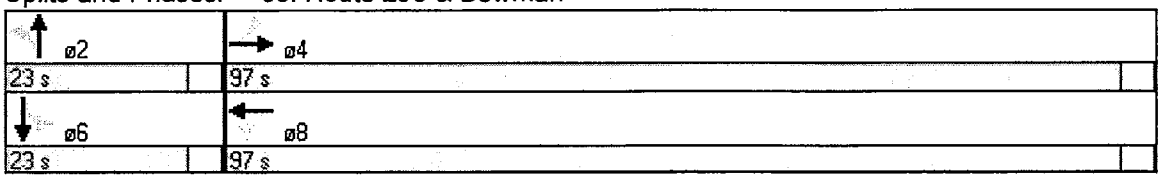


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	80		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.985			0.990			0.968			0.949	
Flt Protected	0.950			0.950				0.976			0.988	
Satd. Flow (prot)	1770	1835	0	1770	1844	0	0	1760	0	0	1747	0
Flt Permitted	0.371			0.175				0.789			0.922	
Satd. Flow (perm)	691	1835	0	326	1844	0	0	1423	0	0	1630	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			10			11			21	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2950			541			6650			648	
Travel Time (s)		67.0			12.3			151.1			14.7	
Volume (vph)	30	888	96	96	552	40	55	30	27	20	30	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	965	104	104	600	43	60	33	29	22	33	33
Lane Group Flow (vph)	33	1069	0	104	643	0	0	122	0	0	88	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	97.0	97.0	0.0	97.0	97.0	0.0	23.0	23.0	0.0	23.0	23.0	0.0
Total Split (%)	80.8%	80.8%	0.0%	80.8%	80.8%	0.0%	19.2%	19.2%	0.0%	19.2%	19.2%	0.0%
Maximum Green (s)	93.0	93.0		93.0	93.0		19.0	19.0		19.0	19.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	93.0	93.0		93.0	93.0			19.0			19.0	
Actuated g/C Ratio	0.78	0.78		0.78	0.78			0.16			0.16	
v/c Ratio	0.06	0.75		0.41	0.45			0.52			0.32	
Control Delay	4.8	18.9		10.1	5.7			50.8			37.5	
Queue Delay	0.0	0.5		0.0	1.3			0.4			0.1	
Total Delay	4.8	19.4		10.1	7.1			51.2			37.6	
LOS	A	B		B	A			D			D	
Approach Delay		19.0			7.5			51.2			37.6	
Approach LOS		B			A			D			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 75	

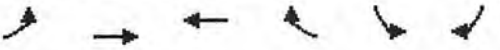
Control Type: Pretimed
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 17.5 Intersection LOS: B
Intersection Capacity Utilization 79.5% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 30: Route 290 & Bowman





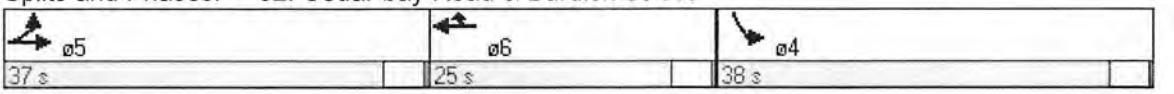
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			300	0	0
Storage Lanes	0			1	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.987	
Flt Protected		0.989			0.957	
Satd. Flow (prot)	0	1842	1863	1583	1759	0
Flt Permitted		0.989			0.957	
Satd. Flow (perm)	0	1842	1863	1583	1759	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				474	6	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		6114	5007		1284	
Travel Time (s)		139.0	113.8		29.2	
Volume (vph)	98	351	136	436	404	44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	382	148	474	439	48
Lane Group Flow (vph)	0	489	148	474	487	0
Turn Type	custom			Prot		
Protected Phases	5	5	6	6	4	
Permitted Phases	5					
Detector Phases	5	5	6	6	4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.0	8.0	20.0	20.0	20.0	
Total Split (s)	37.0	37.0	25.0	25.0	38.0	0.0
Total Split (%)	37.0%	37.0%	25.0%	25.0%	38.0%	0.0%
Maximum Green (s)	33.0	33.0	21.0	21.0	34.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lead	Lead	Lag	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	Max	Max	None	
Walk Time (s)			5.0	5.0	5.0	
Flash Dont Walk (s)			11.0	11.0	11.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effct Green (s)		26.7	21.6	21.6	27.4	
Actuated g/C Ratio		0.30	0.25	0.25	0.31	
v/c Ratio		0.88	0.32	0.64	0.88	
Control Delay		38.2	33.8	7.7	37.8	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		38.2	33.8	7.7	37.8	
LOS		D	C	A	D	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach Delay		38.2	13.9		37.8	
Approach LOS		D	B		D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 88.1			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 28.6		Intersection LOS: C	
Intersection Capacity Utilization 66.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 32: Cedar bay Road & Burdick Street





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.878	
Flt Protected	0.950			0.974		
Satd. Flow (prot)	1770	1583	0	1814	1635	0
Flt Permitted	0.950			0.974		
Satd. Flow (perm)	1770	1583	0	1814	1635	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	1657			4285	6114	
Travel Time (s)	37.7			97.4	139.0	
Volume (vph)	424	168	46	40	19	188
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	461	183	50	43	21	204
Lane Group Flow (vph)	461	183	0	93	225	0
Sign Control	Stop			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 50.8%		ICU Level of Service A	
Analysis Period (min) 15			

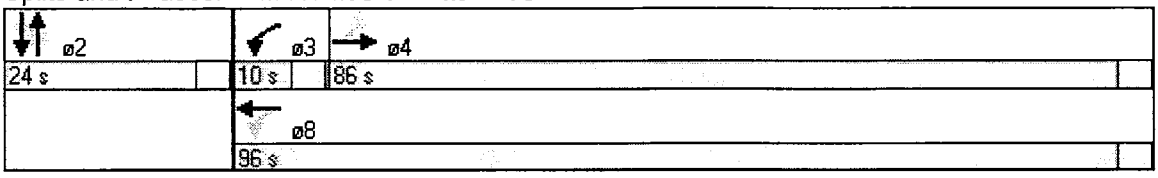
PROPOSED TRAFFIC

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	0		170	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987							0.850		0.943	
Flt Protected	0.950			0.950				0.963			0.979	
Satd. Flow (prot)	1770	1839	0	1770	1863	0	0	1794	1583	0	1720	0
Flt Permitted	0.508			0.151				0.774			0.865	
Satd. Flow (perm)	946	1839	0	281	1863	0	0	1442	1583	0	1519	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9							98		20	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2434			3735			3790			1791	
Travel Time (s)		55.3			84.9			86.1			40.7	
Volume (vph)	24	812	78	120	402	1	90	27	90	18	6	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	883	85	130	437	1	98	29	98	20	7	20
Lane Group Flow (vph)	26	968	0	130	438	0	0	127	98	0	47	0
Turn Type	Perm			pm+pt			Perm		Perm	Perm		
Protected Phases		4		3	8			2			2	
Permitted Phases	4			8			2		2	2		
Minimum Split (s)	20.0	20.0		8.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	86.0	86.0	0.0	10.0	96.0	0.0	24.0	24.0	24.0	24.0	24.0	0.0
Total Split (%)	71.7%	71.7%	0.0%	8.3%	80.0%	0.0%	20.0%	20.0%	20.0%	20.0%	20.0%	0.0%
Maximum Green (s)	82.0	82.0		6.0	92.0		20.0	20.0	20.0	20.0	20.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Walk Time (s)	5.0	5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	82.0	82.0		92.0	92.0			20.0	20.0		20.0	
Actuated g/C Ratio	0.68	0.68		0.77	0.77			0.17	0.17		0.17	
v/c Ratio	0.04	0.77		0.45	0.31			0.53	0.28		0.17	
Control Delay	6.5	17.8		11.0	5.6			54.7	10.7		30.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	6.5	17.8		11.0	5.6			54.7	10.7		30.0	
LOS	A	B		B	A			D	B		C	
Approach Delay		17.5			6.8			35.5			30.0	
Approach LOS		B			A			D			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	

Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:, Start of Green
Natural Cycle: 80
Control Type: Pretimed
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 16.7 Intersection LOS: B
Intersection Capacity Utilization 75.1% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: RT 290 & Butternut Dr

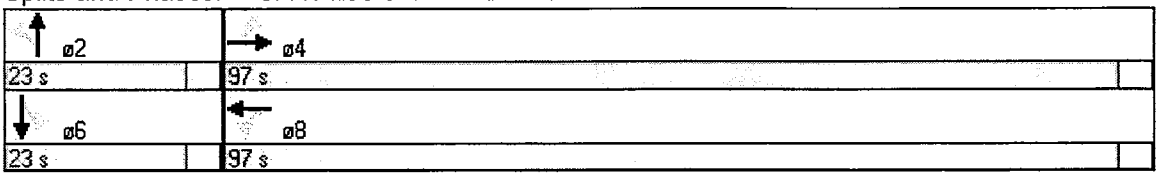


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	80		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.987			0.968			0.949	
Flt Protected	0.950			0.950				0.976			0.988	
Satd. Flow (prot)	1770	1825	0	1770	1839	0	0	1760	0	0	1747	0
Flt Permitted	0.446			0.296				0.789			0.922	
Satd. Flow (perm)	831	1825	0	551	1839	0	0	1423	0	0	1630	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			12			11			21	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		3735			623			4405			1426	
Travel Time (s)		84.9			14.2			100.1			32.4	
Volume (vph)	30	638	96	96	422	40	55	30	27	20	30	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	693	104	104	459	43	60	33	29	22	33	33
Lane Group Flow (vph)	33	797	0	104	502	0	0	122	0	0	88	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	97.0	97.0	0.0	97.0	97.0	0.0	23.0	23.0	0.0	23.0	23.0	0.0
Total Split (%)	80.8%	80.8%	0.0%	80.8%	80.8%	0.0%	19.2%	19.2%	0.0%	19.2%	19.2%	0.0%
Maximum Green (s)	93.0	93.0		93.0	93.0		19.0	19.0		19.0	19.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	93.0	93.0		93.0	93.0			19.0			19.0	
Actuated g/C Ratio	0.78	0.78		0.78	0.78			0.16			0.16	
v/c Ratio	0.05	0.56		0.24	0.35			0.52			0.32	
Control Delay	4.5	14.5		5.3	4.8			56.4			37.5	
Queue Delay	0.0	0.0		0.0	0.6			0.0			0.0	
Total Delay	4.5	14.5		5.3	5.5			56.4			37.5	
LOS	A	B		A	A			E			D	
Approach Delay		14.1			5.4			56.4			37.5	
Approach LOS		B			A			E			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	

Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 15.3 Intersection LOS: B
Intersection Capacity Utilization 66.3% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: RT 290 & Bowman Rd



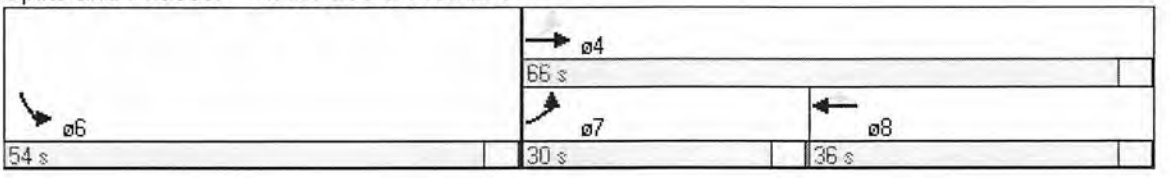


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400			180	0	0
Storage Lanes	1			1	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.921	
Flt Protected	0.950				0.980	
Satd. Flow (prot)	1770	1863	1863	1583	1681	0
Flt Permitted	0.353				0.980	
Satd. Flow (perm)	658	1863	1863	1583	1681	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				257	74	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		623	2296		1411	
Travel Time (s)		14.2	52.2		32.1	
Volume (vph)	340	358	238	236	224	320
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	370	389	259	257	243	348
Lane Group Flow (vph)	370	389	259	257	591	0
Turn Type	pm+pt			Perm		
Protected Phases	7	4	8		6	
Permitted Phases	4			8		
Detector Phases	7	4	8	8	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0	
Total Split (s)	30.0	66.0	36.0	36.0	54.0	0.0
Total Split (%)	25.0%	55.0%	30.0%	30.0%	45.0%	0.0%
Maximum Green (s)	26.0	62.0	32.0	32.0	50.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	Max	
Walk Time (s)		5.0	5.0	5.0	5.0	
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)		0	0	0	0	
Act Effct Green (s)	47.1	47.1	19.9	19.9	50.4	
Actuated g/C Ratio	0.45	0.45	0.19	0.19	0.48	
v/c Ratio	0.69	0.47	0.74	0.51	0.70	
Control Delay	26.3	21.3	44.3	6.7	26.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	26.3	21.3	44.3	6.7	26.2	
LOS	C	C	D	A	C	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach Delay		23.8	25.5		26.2	
Approach LOS		C	C		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 105.6			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 25.0		Intersection LOS: C	
Intersection Capacity Utilization 73.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 4: RT 290 & Fremont Dr

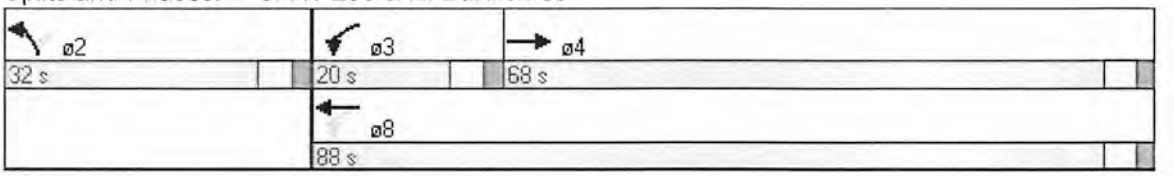


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	100		0	0
Storage Lanes		0	1		1	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50		50	50	50	50
Trailing Detector (ft)	0		0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.946					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1762	0	1770	1863	1770	1583
Flt Permitted			0.221		0.950	
Satd. Flow (perm)	1762	0	412	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	43					550
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	2296			6719	4313	
Travel Time (s)	52.2			152.7	98.0	
Volume (vph)	360	242	246	218	280	578
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	391	263	267	237	304	628
Lane Group Flow (vph)	654	0	267	237	304	628
Turn Type			pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phases	4		3	8	2	2
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	21.5		9.5	21.5	21.5	21.5
Total Split (s)	68.0	0.0	20.0	88.0	32.0	32.0
Total Split (%)	56.7%	0.0%	16.7%	73.3%	26.7%	26.7%
Maximum Green (s)	62.5		14.5	82.5	26.5	26.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	None	Max	Max
Walk Time (s)	5.0			5.0	5.0	5.0
Flash Dont Walk (s)	11.0			11.0	11.0	11.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	39.1		56.3	56.3	28.8	28.8
Actuated g/C Ratio	0.42		0.60	0.60	0.31	0.31
v/c Ratio	0.86		0.61	0.21	0.56	0.72
Control Delay	25.9		12.9	8.1	35.6	11.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	25.9		12.9	8.1	35.6	11.1
LOS	C		B	A	D	B

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach Delay	25.9			10.6	19.1	
Approach LOS	C			B	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 93.3			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 19.2		Intersection LOS: B	
Intersection Capacity Utilization 76.2%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 5: RT 290 & N. Burdick St

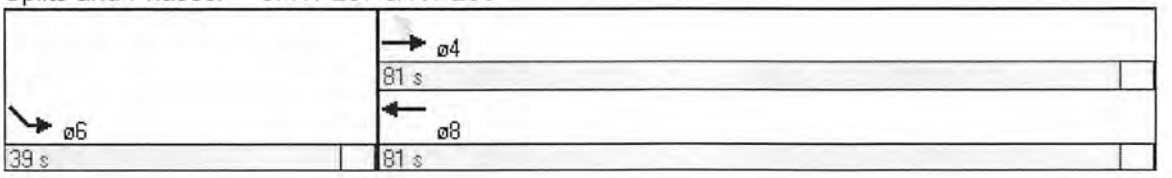


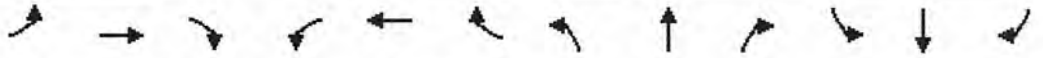
Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	
Trailing Detector (ft)	0	0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.875		0.968	
Flt Protected		0.971			0.963	
Satd. Flow (prot)	0	1809	1630	0	1736	0
Flt Permitted		0.689			0.963	
Satd. Flow (perm)	0	1283	1630	0	1736	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			271		13	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		10214	4049		6719	
Travel Time (s)		232.1	92.0		152.7	
Volume (vph)	100	67	20	249	746	230
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	73	22	271	811	250
Lane Group Flow (vph)	0	182	293	0	1061	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Detector Phases	4	4	8		6	
Minimum Initial (s)	4.0	4.0	4.0		4.0	
Minimum Split (s)	20.0	20.0	20.0		20.0	
Total Split (s)	81.0	81.0	81.0	0.0	39.0	0.0
Total Split (%)	67.5%	67.5%	67.5%	0.0%	32.5%	0.0%
Maximum Green (s)	77.0	77.0	77.0		35.0	
Yellow Time (s)	3.5	3.5	3.5		3.5	
All-Red Time (s)	0.5	0.5	0.5		0.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Recall Mode	None	None	None		Min	
Walk Time (s)	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0	0	0		0	
Act Effct Green (s)		13.1	13.1		36.6	
Actuated g/C Ratio		0.23	0.23		0.63	
v/c Ratio		0.63	0.51		0.96	
Control Delay		19.9	4.1		33.8	
Queue Delay		0.0	0.0		0.0	
Total Delay		19.9	4.1		33.8	
LOS		B	A		C	
Approach Delay		19.9	4.1		33.8	
Approach LOS		B	A		C	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 57.8
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 26.5 Intersection LOS: C
Intersection Capacity Utilization 90.9% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 6: RT 257 & RT 290





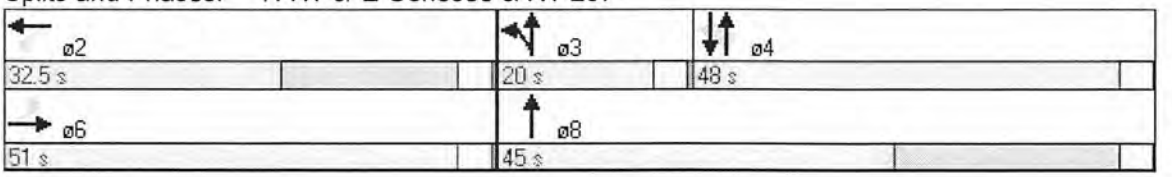
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	130		0	0		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.946			0.974			0.972	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1863	1863	0	1770	1762	0	1770	1814	0	1770	1811	0
Flt Permitted				0.429			0.476			0.664		
Satd. Flow (perm)	1863	1863	0	799	1762	0	887	1814	0	1237	1811	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					28			14			11	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		3334			2482			369			10214	
Travel Time (s)		75.8			56.4			8.4			232.1	
Volume (vph)	0	293	0	64	80	45	199	111	23	10	198	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	318	0	70	87	49	216	121	25	11	215	49
Lane Group Flow (vph)	0	318	0	70	136	0	216	146	0	11	264	0
Turn Type	Perm			Perm			D.P+P			Perm		
Protected Phases		6			2		3	3 4 8			4	
Permitted Phases	6			2			4			4		
Detector Phases	6	6		2	2		3	3 4 8		4	4	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0			4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		8.0			20.0	20.0	
Total Split (s)	51.0	51.0	0.0	32.5	32.5	0.0	20.0	113.0	0.0	48.0	48.0	0.0
Total Split (%)	42.9%	42.9%	0.0%	27.3%	27.3%	0.0%	16.8%	95.0%	0.0%	40.3%	40.3%	0.0%
Maximum Green (s)	47.0	47.0		28.5	28.5		16.0			44.0	44.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5			3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5			0.5	0.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0	
Recall Mode	None	None		Max	Max		None			None	None	
Walk Time (s)	5.0	5.0		5.0	5.0					5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0					11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0					0	0	
Act Effct Green (s)		28.9		28.9	28.9		24.7	28.7		14.3	14.3	
Actuated g/C Ratio		0.44		0.44	0.44		0.38	0.44		0.22	0.22	
v/c Ratio		0.39		0.20	0.17		0.46	0.18		0.04	0.66	
Control Delay		15.5		15.6	11.6		13.6	9.7		20.2	23.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		15.5		15.6	11.6		13.6	9.7		20.2	23.7	
LOS		B		B	B		B	A		C	C	

Lane Group	ø8
Lane Configurations	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Total Lost Time (s)	
Leading Detector (ft)	
Trailing Detector (ft)	
Turning Speed (mph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Headway Factor	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Volume (vph)	
Peak Hour Factor	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phases	
Minimum Initial (s)	4.0
Minimum Split (s)	20.0
Total Split (s)	45.0
Total Split (%)	38%
Maximum Green (s)	41.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		15.5			13.0			12.0			23.5	
Approach LOS		B			B			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 119			
Actuated Cycle Length: 65.7			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 15.9		Intersection LOS: B	
Intersection Capacity Utilization 56.5%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 7: RT 5/ E Genesee & RT 257



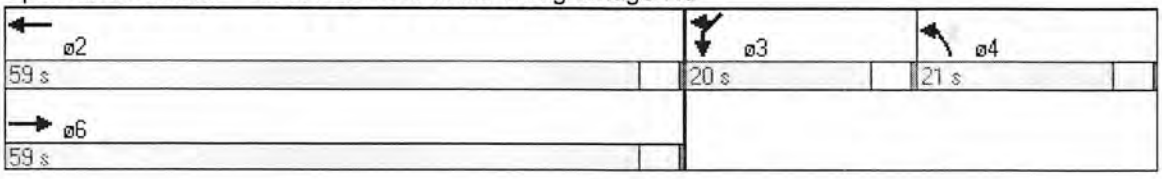
Lane Group	ø8
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50		50	50		50	50
Trailing Detector (ft)		0			0		0	0		0	0
Turning Speed (mph)	15		9	15		9	15	9	9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00
Frt					0.996			0.850			0.850
Flt Protected							0.950			0.950	
Satd. Flow (prot)	0	3539	0	0	3525	0	1770	1583	0	1770	1583
Flt Permitted							0.950			0.950	
Satd. Flow (perm)	0	3539	0	0	3525	0	1770	1583	0	1770	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)					5			100			201
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30		30			30	
Link Distance (ft)		767			3334		3116			1864	
Travel Time (s)		17.4			75.8		70.8			42.4	
Volume (vph)	0	1128	0	0	662	20	193	18	92	58	219
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1226	0	0	720	22	210	20	100	63	238
Lane Group Flow (vph)	0	1226	0	0	742	0	210	120	0	63	238
Turn Type							Prot				Prot
Protected Phases		6			2		4			3	3
Permitted Phases								4			
Detector Phases		6			2		4	4		3	3
Minimum Initial (s)		4.0			4.0		4.0	4.0		4.0	4.0
Minimum Split (s)		20.0			20.0		20.0	20.0		20.0	20.0
Total Split (s)	0.0	59.0	0.0	0.0	59.0	0.0	21.0	21.0	0.0	20.0	20.0
Total Split (%)	0.0%	59.0%	0.0%	0.0%	59.0%	0.0%	21.0%	21.0%	0.0%	20.0%	20.0%
Maximum Green (s)		55.0			55.0		17.0	17.0		16.0	16.0
Yellow Time (s)		3.5			3.5		3.5	3.5		3.5	3.5
All-Red Time (s)		0.5			0.5		0.5	0.5		0.5	0.5
Lead/Lag							Lag	Lag		Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0
Recall Mode		C-Max			C-Max		Max	Max		Max	Max
Walk Time (s)		5.0			5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0
Act Effct Green (s)		55.0			55.0		17.0	17.0		16.0	16.0
Actuated g/C Ratio		0.55			0.55		0.17	0.17		0.16	0.16
v/c Ratio		0.63			0.38		0.70	0.34		0.22	0.56
Control Delay		17.3			13.4		52.7	13.5		39.0	14.4
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0
Total Delay		17.3			13.4		52.7	13.5		39.0	14.4
LOS		B			B		D	B		D	B
Approach Delay		17.3			13.4		38.4			19.6	
Approach LOS		B			B		D			B	

Intersection Summary		
Area Type:	Other	
Cycle Length: 100		
Actuated Cycle Length: 100		
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow, Master Intersection		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.70		
Intersection Signal Delay: 19.2		Intersection LOS: B
Intersection Capacity Utilization 55.2%		ICU Level of Service B
Analysis Period (min) 15		

Splits and Phases: 9: RT 5/ E Genesee & Highbridge Rd





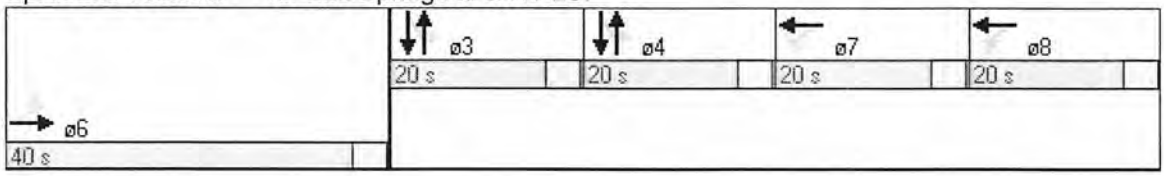
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50			50		50	50	
Trailing Detector (ft)	0	0		0	0			0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.941			0.878			0.983				
Flt Protected					0.995						0.971	
Satd. Flow (prot)	1863	1753	0	0	1627	0	0	1831	0	0	1809	0
Flt Permitted					0.937						0.707	
Satd. Flow (perm)	1863	1753	0	0	1532	0	0	1831	0	0	1317	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			149			6				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1596			1262			1315			369	
Travel Time (s)		36.3			28.7			29.9			8.4	
Volume (vph)	0	287	184	15	0	137	0	101	15	118	83	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	312	200	16	0	149	0	110	16	128	90	0
Lane Group Flow (vph)	0	512	0	0	165	0	0	126	0	0	218	0
Turn Type	Perm			Perm						Perm		
Protected Phases		6			7 8			3 4			3 4	
Permitted Phases	6			7 8						3 4		
Detector Phases	6	6		7 8	7 8			3 4		3 4	3 4	
Minimum Initial (s)	4.0	4.0										
Minimum Split (s)	20.0	20.0										
Total Split (s)	40.0	40.0	0.0	40.0	40.0	0.0	0.0	40.0	0.0	40.0	40.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	0.0%	0.0%	33.3%	0.0%	33.3%	33.3%	0.0%
Maximum Green (s)	36.0	36.0										
Yellow Time (s)	3.5	3.5										
All-Red Time (s)	0.5	0.5										
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0										
Recall Mode	Max	Max										
Walk Time (s)	5.0	5.0										
Flash Dont Walk (s)	11.0	11.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		36.1			17.2			28.1			28.1	
Actuated g/C Ratio		0.39			0.18			0.30			0.30	
v/c Ratio		0.74			0.41			0.23			0.55	
Control Delay		32.2			8.9			24.6			31.8	
Queue Delay		0.0			0.0			0.0			0.1	
Total Delay		32.2			8.9			24.6			31.9	
LOS		C			A			C			C	

Lane Group	ø3	ø4	ø7	ø8
Lane Configurations				
Ideal Flow (vphpl)				
Storage Length (ft)				
Storage Lanes				
Total Lost Time (s)				
Leading Detector (ft)				
Trailing Detector (ft)				
Turning Speed (mph)				
Lane Util. Factor				
Frt				
Flt Protected				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Right Turn on Red				
Satd. Flow (RTOR)				
Headway Factor				
Link Speed (mph)				
Link Distance (ft)				
Travel Time (s)				
Volume (vph)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type				
Protected Phases	3	4	7	8
Permitted Phases				
Detector Phases				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0
Total Split (%)	17%	17%	17%	17%
Maximum Green (s)	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Recall Mode	Max	None	None	None
Walk Time (s)	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0
Act Effct Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		32.2			8.9			24.6			31.9	
Approach LOS		C			A			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 93.5			
Natural Cycle: 110			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 27.4		Intersection LOS: C	
Intersection Capacity Utilization 50.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 10: Salt Spring Rd & RT 257



Lane Group	ø3	ø4	ø7	ø8
Approach Delay				
Approach LOS				

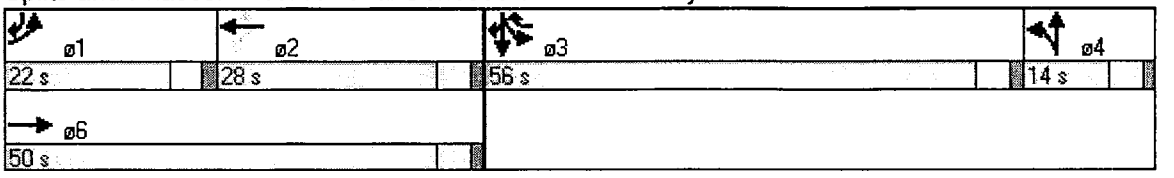
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		150	0		0	0		0
Storage Lanes	1		0	0		1	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	50
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.982				0.850		0.974				0.850
Flt Protected	0.950				0.995			0.975		0.950	0.974	
Satd. Flow (prot)	1770	3476	0	0	3522	1583	0	1769	0	1681	1724	1583
Flt Permitted	0.950				0.837			0.975		0.950	0.974	
Satd. Flow (perm)	1770	3476	0	0	2962	1583	0	1769	0	1681	1724	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15				343		8				176
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		9296			767			2053			6316	
Travel Time (s)		211.3			17.4			46.7			143.5	
Volume (vph)	191	426	60	42	371	696	54	30	20	871	275	294
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	463	65	46	403	757	59	33	22	947	299	320
Lane Group Flow (vph)	208	528	0	0	449	757	0	114	0	607	639	320
Turn Type	Prot			Perm		pm+ov	Split			Split		pt+ov
Protected Phases	1	6			2	3	4	4		3	3	3 1
Permitted Phases				2		2						
Detector Phases	1	6		2	2	3	4	4		3	3	3 1
Minimum Initial (s)	6.0	20.0		20.0	20.0	6.0	4.0	4.0		6.0	6.0	
Minimum Split (s)	11.0	25.0		25.0	25.0	11.0	9.0	9.0		11.0	11.0	
Total Split (s)	22.0	50.0	0.0	28.0	28.0	56.0	14.0	14.0	0.0	56.0	56.0	78.0
Total Split (%)	18.3%	41.7%	0.0%	23.3%	23.3%	46.7%	11.7%	11.7%	0.0%	46.7%	46.7%	65.0%
Maximum Green (s)	17.0	45.0		23.0	23.0	51.0	9.0	9.0		51.0	51.0	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.5		1.5	1.5	
Lead/Lag	Lead			Lag	Lag	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max	None	None	None		None	None	
Act Effct Green (s)	17.2	47.8			26.6	81.0		9.8		50.4	50.4	67.6
Actuated g/C Ratio	0.14	0.40			0.22	0.68		0.08		0.42	0.42	0.56
v/c Ratio	0.82	0.38			0.68	0.64		0.75		0.86	0.88	0.33
Control Delay	45.4	25.5			50.0	8.4		77.0		42.9	44.5	3.8
Queue Delay	0.0	0.0			0.0	0.4		0.0		0.0	0.0	0.0
Total Delay	45.4	25.5			50.0	8.7		77.0		42.9	44.5	3.8
LOS	D	C			D	A		E		D	D	A
Approach Delay		31.1			24.1			77.0			35.6	
Approach LOS		C			C			E			D	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 32.2 Intersection LOS: C
Intersection Capacity Utilization 83.8% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 15: RT 5/ E Genesee & N Brudick/ Lyndon



Lane Group	EBL	EBT	EBR	EBR2	WBT	NBL	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0			0		0			0	
Storage Lanes	1		1			0		0			0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50	50			50	50	50
Trailing Detector (ft)	0	0	0		0	0	0			0	0	0
Turning Speed (mph)	15		9	9		15		9	9	15	15	
Lane Util. Factor	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850				0.923					0.903
Flt Protected	0.950						0.981					0.989
Satd. Flow (prot)	1770	3539	1583	0	3539	0	1687	0	0	0	0	1664
Flt Permitted	0.270						0.706					0.905
Satd. Flow (perm)	503	3539	1583	0	3539	0	1214	0	0	0	0	1522
Right Turn on Red				Yes					Yes			
Satd. Flow (RTOR)			3				29					94
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30		30					30
Link Distance (ft)		1735			9296		2642					5337
Travel Time (s)		39.4			211.3		60.0					121.3
Volume (vph)	84	829	1161	29	555	30	4	10	35	9	35	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	901	1262	32	603	33	4	11	38	10	38	10
Lane Group Flow (vph)	91	901	1294	0	603	0	86	0	0	0	0	207
Turn Type	pm+pt		pt+ov			Perm				Perm	Perm	
Protected Phases	1	5	3 5		2		8					8
Permitted Phases	5					8				8	8	
Detector Phases	1	5	3 5		2	8	8			8	8	8
Minimum Initial (s)	4.0	10.0			10.0	4.0	4.0			4.0	4.0	4.0
Minimum Split (s)	10.0	17.5			25.0	12.0	12.0			12.0	12.0	12.0
Total Split (s)	13.0	59.0	94.0	0.0	46.0	26.0	26.0	0.0	0.0	26.0	26.0	26.0
Total Split (%)	10.8%	49.2%	78.3%	0.0%	38.3%	21.7%	21.7%	0.0%	0.0%	21.7%	21.7%	21.7%
Maximum Green (s)	7.0	51.5			38.5	18.0	18.0			18.0	18.0	18.0
Yellow Time (s)	3.5	3.5			3.5	3.5	3.5			3.5	3.5	3.5
All-Red Time (s)	2.5	4.0			4.0	4.5	4.5			4.5	4.5	4.5
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0			3.0	3.0	3.0
Recall Mode	None	C-Max			C-Max	None	None			None	None	None
Walk Time (s)					5.0							
Flash Dont Walk (s)					11.0							
Pedestrian Calls (#/hr)					0							
Act Effct Green (s)	59.4	59.4	94.4		46.7		17.6					17.6
Actuated g/C Ratio	0.50	0.50	0.79		0.39		0.15					0.15
v/c Ratio	0.27	0.51	1.04		0.44		0.42					0.68
Control Delay	11.2	11.5	54.0		21.2		34.2					32.2
Queue Delay	0.0	0.0	0.0		0.0		0.0					0.0
Total Delay	11.2	11.5	54.0		21.2		34.2					32.2
LOS	B	B	D		C		C					C



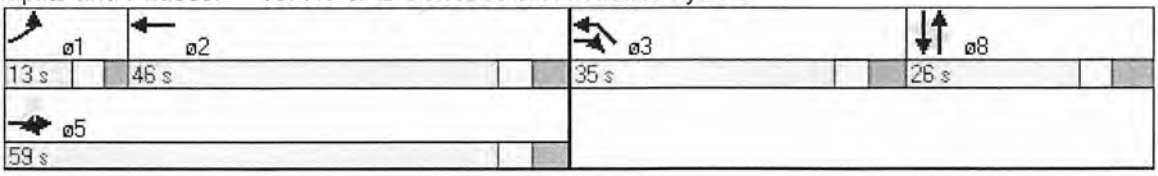
Lane Group	SBR	NWL	NWR
Lane Configurations			
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)	0	0	0
Storage Lanes	0	2	0
Total Lost Time (s)	4.0	4.0	4.0
Leading Detector (ft)		50	
Trailing Detector (ft)		0	
Turning Speed (mph)	9	15	9
Lane Util. Factor	1.00	0.97	0.95
Frt		0.992	
Flt Protected		0.955	
Satd. Flow (prot)	0	3423	0
Flt Permitted		0.955	
Satd. Flow (perm)	0	3423	0
Right Turn on Red	Yes		
Satd. Flow (RTOR)			
Headway Factor	1.00	1.00	1.00
Link Speed (mph)		30	
Link Distance (ft)		4458	
Travel Time (s)		101.3	
Volume (vph)	137	802	44
Peak Hour Factor	0.92	0.92	0.92
Adj. Flow (vph)	149	872	48
Lane Group Flow (vph)	0	920	0
Turn Type			
Protected Phases		3	
Permitted Phases			
Detector Phases		3	
Minimum Initial (s)		10.0	
Minimum Split (s)		18.5	
Total Split (s)	0.0	35.0	0.0
Total Split (%)	0.0%	29.2%	0.0%
Maximum Green (s)		27.5	
Yellow Time (s)		3.5	
All-Red Time (s)		4.0	
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)		3.0	
Recall Mode		None	
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
Act Effct Green (s)		31.0	
Actuated g/C Ratio		0.26	
v/c Ratio		1.04	
Control Delay		84.8	
Queue Delay		0.0	
Total Delay		84.8	
LOS		F	

Lane Group	EBL	EBT	EBR	EBR2	WBT	NBL	NBT	NBR	NBR2	SBL2	SBL	SBT
Approach Delay		35.6			21.2		34.2					32.2
Approach LOS		D			C		C					C

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBT and 5:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 44.3 Intersection LOS: D
Intersection Capacity Utilization 93.2% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 16: RT 5/ E Genesee & N Brudick/ Lyndon





Lane Group	SBR	NWL	NWR
Approach Delay		84.8	
Approach LOS		F	

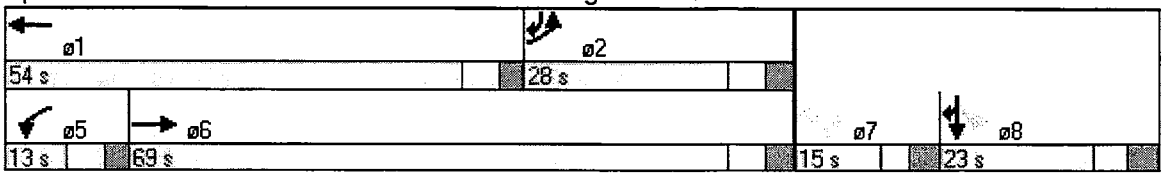
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	430		0	230		0	0		0	0		0
Storage Lanes	2		0	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50		50	50	50	50
Trailing Detector (ft)	0	0		0	0		0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.995			0.980				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950	0.954	
Satd. Flow (prot)	3433	5060	0	1770	4984	0	1770	0	1583	1681	1688	1583
Flt Permitted	0.950			0.950			0.364			0.950	0.954	
Satd. Flow (perm)	3433	5060	0	1770	4984	0	678	0	1583	1681	1688	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			30				20			34
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1878			1735			1633			1378	
Travel Time (s)		42.7			39.4			37.1			31.3	
Volume (vph)	472	1723	59	47	1207	187	79	0	18	274	5	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	513	1873	64	51	1312	203	86	0	20	298	5	34
Lane Group Flow (vph)	513	1937	0	51	1515	0	86	0	20	149	154	34
Turn Type	Prot			Prot			custom		custom	Perm		pt+ov
Protected Phases	2	6		5	1						8	2 8
Permitted Phases							7		7	8		
Detector Phases	2	6		5	1		7		7	8	8	2 8
Minimum Initial (s)	6.0	15.0		4.0	15.0		4.0		4.0	4.0	4.0	
Minimum Split (s)	13.0	22.0		10.5	21.5		10.0		10.0	11.0	11.0	
Total Split (s)	28.0	69.0	0.0	13.0	54.0	0.0	15.0	0.0	15.0	23.0	23.0	51.0
Total Split (%)	23.3%	57.5%	0.0%	10.8%	45.0%	0.0%	12.5%	0.0%	12.5%	19.2%	19.2%	42.5%
Maximum Green (s)	21.0	62.0		6.5	47.5		9.0		9.0	16.0	16.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0		3.0	3.5	3.5	
All-Red Time (s)	3.0	3.0		2.5	2.5		3.0		3.0	3.5	3.5	
Lead/Lag	Lag	Lag		Lead	Lead		Lead		Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes		Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None		None	None	None	
Act Effct Green (s)	24.0	69.1		9.0	51.7		11.0		11.0	17.3	17.3	41.3
Actuated g/C Ratio	0.20	0.58		0.08	0.43		0.09		0.09	0.14	0.14	0.34
v/c Ratio	0.75	0.66		0.38	0.70		1.39		0.12	0.62	0.63	0.06
Control Delay	52.8	19.8		59.5	20.7		288.1		21.5	56.5	57.1	5.4
Queue Delay	0.0	0.0		0.0	0.0		0.0		0.0	0.0	0.0	0.0
Total Delay	52.8	19.8		59.5	20.7		288.1		21.5	56.5	57.1	5.4
LOS	D	B		E	C		F		C	E	E	A
Approach Delay		26.7			22.0						51.6	
Approach LOS		C			C						D	

Intersection Summary

Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 68.5 (57%), Referenced to phase 1:WBT and 6:EBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.39	
Intersection Signal Delay: 32.0	Intersection LOS: C
Intersection Capacity Utilization 65.3%	ICU Level of Service C
Analysis Period (min) 15	

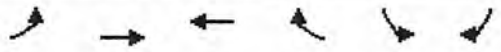
Splits and Phases: 21: RT 5/ E Genesee & Wegmans Dr





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.878	
Flt Protected	0.950			0.974		
Satd. Flow (prot)	1770	1583	0	1814	1635	0
Flt Permitted	0.950			0.974		
Satd. Flow (perm)	1770	1583	0	1814	1635	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	2056			5337	7654	
Travel Time (s)	46.7			121.3	174.0	
Volume (vph)	368	168	46	40	19	188
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	400	183	50	43	21	204
Lane Group Flow (vph)	400	183	0	93	225	0
Sign Control	Stop			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		

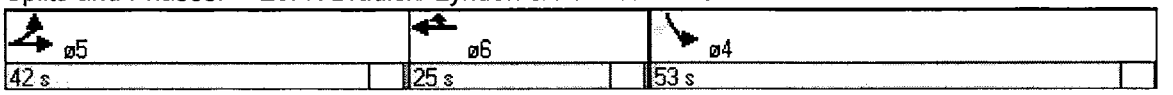


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			330	0	0
Storage Lanes	1			1	1	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1863	1583	1770	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1863	1583	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				604		40
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		7654	6316		1719	
Travel Time (s)		174.0	143.5		39.1	
Volume (vph)	63	351	136	556	614	44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	382	148	604	667	48
Lane Group Flow (vph)	68	382	148	604	667	48
Turn Type	Split			Prot		Perm
Protected Phases	5	5	6	6	4	
Permitted Phases						4
Detector Phases	5	5	6	6	4	4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	8.0	20.0	20.0	20.0	20.0
Total Split (s)	42.0	42.0	25.0	25.0	53.0	53.0
Total Split (%)	35.0%	35.0%	20.8%	20.8%	44.2%	44.2%
Maximum Green (s)	38.0	38.0	21.0	21.0	49.0	49.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lead	Lead	Lag	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	None	None
Act Effct Green (s)	25.3	25.3	21.7	21.7	41.9	41.9
Actuated g/C Ratio	0.25	0.25	0.21	0.21	0.41	0.41
v/c Ratio	0.15	0.82	0.37	0.74	0.91	0.07
Control Delay	31.0	40.9	42.3	10.0	38.9	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	40.9	42.3	10.0	38.9	8.1
LOS	C	D	D	A	D	A
Approach Delay		39.4	16.3		36.8	
Approach LOS		D	B		D	

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 101.4			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 29.4		Intersection LOS: C	
Intersection Capacity Utilization 59.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 26: N Brudick/ Lyndon & N. Burdick St



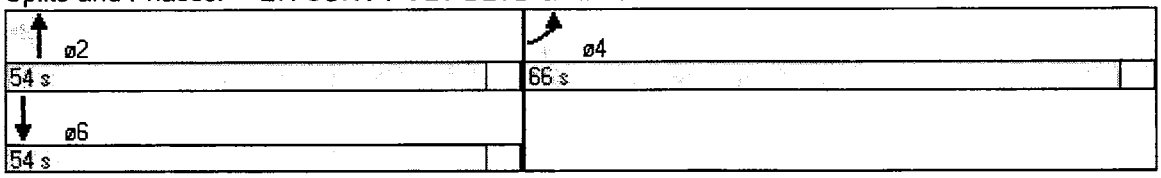


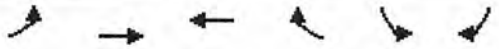
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.953	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1775	0
Flt Permitted	0.950		0.323			
Satd. Flow (perm)	1770	1583	602	1863	1775	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		293			28	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	3056			1719	4313	
Travel Time (s)	69.5			39.1	98.0	
Volume (vph)	497	270	190	225	260	140
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	540	293	207	245	283	152
Lane Group Flow (vph)	540	293	207	245	435	0
Turn Type		Perm	Perm			
Protected Phases	4			2	6	
Permitted Phases		4	2			
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	66.0	66.0	54.0	54.0	54.0	0.0
Total Split (%)	55.0%	55.0%	45.0%	45.0%	45.0%	0.0%
Maximum Green (s)	62.0	62.0	50.0	50.0	50.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	
Lead/Lag						
Lead-Lag Optimize?						
Act Effct Green (s)	62.0	62.0	50.0	50.0	50.0	
Actuated g/C Ratio	0.52	0.52	0.42	0.42	0.42	
v/c Ratio	0.59	0.31	0.82	0.32	0.58	
Control Delay	23.5	2.6	58.9	24.9	28.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	23.5	2.6	58.9	24.9	28.7	
LOS	C	A	E	C	C	
Approach Delay	16.1			40.5	28.7	
Approach LOS	B			D	C	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL, Start of Green	
Natural Cycle: 40	
Control Type: Pretimed	
Maximum v/c Ratio: 0.82	

Intersection Signal Delay: 25.7 Intersection LOS: C
Intersection Capacity Utilization 70.3% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 27: SUNY POLY BLVD & N. Burdick St





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.966		0.986	
Flt Protected	0.950				0.957	
Satd. Flow (prot)	1770	1863	1799	0	1758	0
Flt Permitted	0.950				0.957	
Satd. Flow (perm)	1770	1863	1799	0	1758	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		4848	3056		4405	
Travel Time (s)		110.2	69.5		100.1	
Volume (vph)	28	677	235	80	90	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	736	255	87	98	11
Lane Group Flow (vph)	30	736	342	0	109	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 47.9%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.940		0.954	
Flt Protected		0.988			0.968	
Satd. Flow (prot)	0	1840	1751	0	1720	0
Flt Permitted		0.988			0.968	
Satd. Flow (perm)	0	1840	1751	0	1720	0
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		2160	2056		3635	
Travel Time (s)		49.1	46.7		82.6	
Volume (vph)	123	403	114	90	154	80
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	438	124	98	167	87
Lane Group Flow (vph)	0	572	222	0	254	0
Sign Control		Stop	Stop		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		



Lane Group	WBT	WBR	NBT	NBR	SBT	SBR2	NER	NER2
Lane Configurations								
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Turning Speed (mph)		9		9		9	9	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850			0.850	
Flt Protected								
Satd. Flow (prot)	1863	1583	1863	1583	1863	1863	1583	1863
Flt Permitted								
Satd. Flow (perm)	1863	1583	1863	1583	1863	1863	1583	1863
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30		30			
Link Distance (ft)	4848		3635		3790			
Travel Time (s)	110.2		82.6		86.1			
Volume (vph)	235	15	178	35	204	0	670	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	255	16	193	38	222	0	728	0
Lane Group Flow (vph)	255	16	193	38	222	0	728	0
Sign Control	Stop		Yield		Yield			

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		

APPENDIX

C

Scheme Summary

Control Data

Control Data and Model Parameters

ROundabout2	2020 Synthetic Flow Profile (veh)
Scheme-1	7.5 min Time Slice
Rodel-Win1	Queuing Delays (sec)
Right Hand Drive	Daylight conditions
PM Peak Hour	Peak 60/15 min Results
Full Geometry	Output flows: Vehicles
English Units (ft)	50% Confidence Level

Available Data

Entry Capacity Calibrated	No
Entry Capacity Modified	No
Crosswalks	No
Flows Factored	No
Approach/Exit Road Capacity Calibrated	No
Accidents	Yes
Accident Costs	No
Bypass Model	No
Bypass Calibration	No
Global Results	Yes

Operational Data

Main Geometry (ft)

Approach and Entry Geometry

Leg	Leg Names	Approach Bearing (deg)	Grade Separation G	Half Width V	Approach Lanes n	Entry Width E	Entry Lanes n	Flare Length L'	Entry Radius R	Entry Angle ?
1	Butternut S	0	0	12.00	1	15.00	1	36.50	95.00	25.00
2	New Road	90	0	12.00	1	15.00	1	30.32	95.00	25.00
3	Butternut N	180	0	12.00	1	15.00	1	31.60	95.00	25.00
4	On/Off Ramp	270	0	24.00	2	32.00	2	21.50	95.00	25.00

Circulating and Exit Geometry

Leg	Leg Names	Inscribed Diameter D	Circulating Width C	Circulating Lanes nc	Exit Width Ex	Exit Lanes nex	Exit Half Width Vx	Exit Half Width Lanes nvx
1	Butternut S	150.00	32.00	2	15.50	1	12.00	1
2	New Road	150.00	32.00	2	29.00	2	24.00	2
3	Butternut N	150.00	32.00	2	15.50	1	12.00	1
4	On/Off Ramp	150.00	32.00	2	29.00	2	12.00	1

Capacity Modifiers and Capacity Calibration (veh/hr)

Leg	Leg Names	Entry Capacity		Entry Calibration		Approach Road			Exit Road		
		Capacity + or -	XWalk Factor	Intercept + or -	Slope Factor	V (ft)	Default Capacity	Calib Capacity	V (ft)	Default Capacity	Calib Capacity
1	Butternut S	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
2	New Road	0	1.000	0	1.000	20.00	1792	0	24.00	3584	0
3	Butternut N	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
4	On/Off Ramp	0	1.000	0	1.000	20.00	3584	0	12.00	1792	0

Traffic Flow Data (veh/hr)

2020 PM Peak Peak Hour Flows

Leg	Leg Names	Turning Flows					Flow Modifiers	
		U-Turn	Exit-3	Exit-2	Exit-1	Bypass	Trucks %	Flow Factor
1	Butternut S	0	14	250	49	0	5.0	1.00
2	New Road	0	14	329	21	0	5.0	1.00
3	Butternut N	0	14	286	14	0	5.0	1.00
4	On/Off Ramp	0	14	938	14	0	5.0	1.00

2020 PM Peak Synthetic Flow Profile - Timeslice 7.5 mins

Leg	Leg Names	Flow Ratios			Flow Times		
		Ratio 1	Ratio 2	Ratio 3	Time 1	Time 2	Time 3
1	Butternut S	0.750	1.125	0.750	0	30	60
2	New Road	0.750	1.125	0.750	0	30	60
3	Butternut N	0.750	1.125	0.750	0	30	60
4	On/Off Ramp	0.750	1.125	0.750	0	30	60

Operational Results

2020 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Butternut S	None	313		966		314	858		0.3795	
2	New Road	None	364		278		1001	1125		0.3318	
3	Butternut N	None	314		357		285	1095		0.2942	
4	On/Off Ramp	None	966		314		357	1988		0.4971	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Butternut S	None	6.24		6.24	1.82		A		A
2	New Road	None	4.41		4.41	1.40		A		A
3	Butternut N	None	4.31		4.31	1.18		A		A
4	On/Off Ramp	None	3.31		3.31	2.90		A		A

2020 PM Peak - 15 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	Butternut S	None	353		1089		354	809		0.4428	
2	New Road	None	410		313		1128	1110		0.3733	
3	Butternut N	None	354		402		321	1077		0.3320	
4	On/Off Ramp	None	1089		354		402	1959		0.5605	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Butternut S	None	6.89		6.89	1.82		A		A
2	New Road	None	4.61		4.61	1.40		A		A
3	Butternut N	None	4.49		4.49	1.18		A		A
4	On/Off Ramp	None	3.62		3.62	2.90		A		A

Approach Flow Profile

2020 PM Peak - Approach Flows (Veh / Hour)

Time Slice	Butternut S	New Road	Butternut N	On/Off Ramp
0.0 - 7.5	32.55	37.85	32.65	100.46
7.5 - 15.0	37.89	44.07	38.02	116.95
15.0 - 22.5	41.94	48.77	42.07	129.43
22.5 - 30.0	44.12	51.31	44.26	136.16
30.0 - 37.5	44.12	51.31	44.26	136.16
37.5 - 45.0	41.94	48.77	42.07	129.43
45.0 - 52.5	37.89	44.07	38.02	116.95
52.5 - 60.0	32.55	37.85	32.65	100.46
Peak 15 min	44.12	51.31	44.26	136.16
Peak 60 min	39.12	45.50	39.25	120.75

Exit Flow Profile

2020 PM Peak - Exit Flows (Veh / Hour)

Time Slice	Butternut S	New Road	Butternut N	On/Off Ramp
0.0 - 7.5	32.64	104.05	29.61	37.11
7.5 - 15.0	37.98	121.08	34.45	43.18
15.0 - 22.5	42.04	134.02	38.13	47.80
22.5 - 30.0	44.24	141.02	40.14	50.30
30.0 - 37.5	44.26	141.09	40.17	50.32
37.5 - 45.0	42.09	134.18	38.21	47.85
45.0 - 52.5	38.05	121.30	34.56	43.26
52.5 - 60.0	32.69	104.21	29.70	37.17
0-60	314	1001	285	357
%Trucks	5.00	5.00	5.00	5.00

Accidents

Accident Input Data

Accident Geometry (ft)

Leg	Leg Names	Bearing	V	E	D	C	1/R0	R1
1	Butternut S	0	12.00	15.00	150.00	32.00	0.00000	328.08
2	New Road	90	12.00	15.00	150.00	32.00	0.00000	328.08
3	Butternut N	180	12.00	15.00	150.00	32.00	0.00000	328.08
4	On/Off Ramp	270	24.00	32.00	150.00	32.00	0.00000	328.08

24 Hour Annual Average Flows

Leg	Leg Names	Vehicles				Motor Cycles %	Peds
		U-Turn	Exit-3	Exit-2	Exit-1		
1	Butternut S	0	570	1750	745	0.5	0
2	New Road	0	570	2145	605	0.5	0
3	Butternut N	0	570	1930	570	0.5	0
4	On/Off Ramp	0	570	5190	570	0.5	0

Accident Results

2020 Approach Accidents

Leg	Leg Names	AADT	Accidents (veh/yr)			Accidents / Million Vehicles		
			Damage	Injury	Total	Damage	Injury	Total
1	Butternut S	3065	0.30	0.03	0.34	0.2718	0.0270	0.3006
2	New Road	3320	0.32	0.03	0.35	0.2824	0.0277	0.3119
3	Butternut N	3070	0.30	0.03	0.34	0.2721	0.0270	0.3009
4	On/Off Ramp	6330	0.62	0.06	0.68	0.5516	0.0484	0.6030

2020 Entry / Circulating Accidents

Leg	Leg Names	AADT	Accidents (veh/yr)			Accidents / Million Vehicles		
			Damage	Injury	Total	Damage	Injury	Total
1	Butternut S	3065	0.11	0.01	0.12	0.0946	0.0102	0.1048
2	New Road	3320	0.10	0.01	0.11	0.0834	0.0089	0.0923
3	Butternut N	3070	0.10	0.01	0.11	0.0867	0.0093	0.0961
4	On/Off Ramp	6330	0.39	0.04	0.42	0.1670	0.0159	0.1829

2020 Exit / Circulating Accidents

Leg	Leg Names	AADT	Accidents (veh/yr)			Accidents / Million Vehicles		
			Damage	Injury	Total	Damage	Injury	Total
1	Butternut S	3065	0.64	0.07	0.71	0.5703	0.0614	0.6317
2	New Road	3320	0.65	0.07	0.72	0.2727	0.0290	0.3017
3	Butternut N	3070	0.53	0.06	0.59	0.5002	0.0539	0.5541
4	On/Off Ramp	6330	0.55	0.05	0.60	0.4575	0.0435	0.5010

2020 Total Vehicle Accidents

Leg	Leg Names	AADT	Accidents (veh/yr)			Accidents / Million Vehicles		
			Damage	Injury	Total	Damage	Injury	Total
1	Butternut S	3065	1.05	0.11	1.16	0.9367	0.1009	1.0376
2	New Road	3320	1.06	0.11	1.18	0.6169	0.0655	0.6824
3	Butternut N	3070	0.94	0.10	1.04	0.8586	0.0925	0.9510
4	On/Off Ramp	6330	1.55	0.15	1.70	0.8916	0.0847	0.9763

2020 Pedestrian Injury Accidents

Leg	Leg Names	AADP	Injuries / Year	Injuries / Million Peds
1	Butternut S			
2	New Road			
3	Butternut N			
4	On/Off Ramp			

Economics

Economic Input Data

2020 - Vehicle Delay Parameters

Peaks	Peak / Day	Days / Year	Delay Cost ($ / hour)
AM Peak	1	325	15.00
OFF Peak	14	325	15.00
PM Peak	1	325	15.00

2020 - Accident Severity Proportions and Costs

Accident Type	Proportion (%)	Cost ($)
Fatal Vehicle Accident	0.3	0
Incapacitating Vehicle Accident	17.7	0
Non-incapacitating Vehicle Accident	82	0
Damage Only Vehicle Accident	100	0
Pedestrian Injury Accident	100	0

Economics - Results Data

2020 Delay and Accident Costs

Delay Costs			Accident Costs			Total Costs	
Peak	Delays Veh.hrs	Costs ($)	Accident Types	Annual Accidents	Accident Costs	Cost Type	Costs ($/year)
AM	0.00	0	Vehicles Injury	0.47	0	Vehicle Delay Cost	10986
OFF	0.00	0	Vehicles DO	4.60	0	Vehicle Injury Acc Cost	0
PM	732.37	10986	Pedestrians	0.00	0	Vehicle DO Acc Cost	0
						Pedestrian Accident Cost	0
						Total Accident Cost	0
Total	732.37	10986	Totals	5.07	0	TOTAL COST	10986

Global Results

Performance and Accidents

2020 PM Peak Global Performance

Parameter	Units	Entries	Bypasses	Total
Arrive Flows	veh/hr	1957		1957
Capacity	veh/hr	5066		5066
Average Delay	sec/veh	4.15		4.15
L.O.S. (Signal)	A – F	A		A
L.O.S. (Unsig)	A – F	A		A
Total Delay	veh.hrs	2.25		2.25

2020 PM Peak Global Vehicle Accidents

Parameter	Units	Value
Damage	vehs/yr	4.60
Injury	vehs/yr	0.47
Total	vehs/yr	5.07
Damage Rate	/mill vehs	0.83
Injury Rate	/mill vehs	0.09
Total Rate	/mill vehs	0.91

DUNN& SGROMO ENGINEERS, PLLC

5800 HERITAGE LANDING DRIVE, EAST SYRACUSE, NEW YORK 13057
Telephone (315) 449-4940 Facsimile (315) 449-4941

October 14, 2021

Mark Frechette, P.E., Project Director
New York State Department of Transportation, Region 3
333 East Washington Street
Syracuse, NY 13202

Re: Route I-81 Project DEIS Comment Period
File No.: 119.002

Dear Mark:

I'm writing this letter as part of the comment period for the above project. Although I see great benefits to the grid system option, I have concerns relative to the amount of traffic which will still require traveling along the Almond Street corridor. I am sure all my concerns have been previously stated and range from everything including emergency services reaching the emergency rooms at Upstate and Crouse Hospitals, to traffic during sporting events. These concern can be summarized as the ability for travelers from the South portions of the City of Syracuse, and areas further south to travel through the city and get to areas north of downtown and south of the Route 481 interchange.

The option that I hoped to see studied is an option very similar to the Recessed Highway (Orange Option), previously studied by New York State DOT. The big difference is that I feel a modified option merits study. I have enclosed a plan which was studied by one of my senior Capstone Design classes at SUNY Polytechnic Institute. This option has the following characteristics:

1. Route 481 would continue to become the new Route 81, with all through traffic still being encouraged and carried via rebranded Route 481 around the City.
2. The existing Route 81 from the 481/81 interchange, to its eventual connection to proposed BL81, would become a narrowed two-lane roadway in each of the south and north bound directions.
3. The design speed would be 40-45 mph.
4. The roadway would be recessed between Adams Street and the connection to the proposed BL81.
5. The recessed portion of the roadway would only need to be approximately 16 feet below existing grade and much narrower than the Orange alternative, due to the reduced speed and classification, greatly minimizing cost.

This would basically act as express lane through the heart of the City, no different than what can be found in many cities, including portions of the currently proposed BL81 alternative north of downtown. The reduced speed would enable for the elimination of many of the substandard features that have been a concern of the New York State DOT, that were part impediments to the Depressed Highway Alternatives when the design speed was 60 mph.

Some of potential benefits for this alternative would include the following:

1. This would enable unencumbered free-flowing traffic that although is not at highway speeds would greatly improve travel times through the city.
2. Reduce environmental pollution impacts that would result from the large amount of stop and go traffic at the proposed signalized intersections.
3. Greatly reduce travel times between the south side of Syracuse and many of the economic centers north of downtown, enhancing opportunities for south side residents.
4. Reduce travel times to the emergency rooms at Crouse and Upstate Hospitals.

Although including this option would result in additional cost, it will be far less than the original Orange Option for the Recessed Highway, which was previously studied, and would likely be offset by the tremendous benefits related to improved environmental conditions and reduce travel times for the residents of the south side of Syracuse. I have included a Preliminary Plan which was part of the class study.

Thank you for your consideration and available to talk about this option at any time.

Sincerely,



Gregory Sgromo P.E.

GS/mbs
Attachments

SKANEATELES WATERSHED MUNICIPAL PARTNERSHIP

RECEIVED
SEP - 3 2021
BY:

Town of Skaneateles
Village of Skaneateles
Town of Spafford
Town of Niles
Town of Scott
City of Syracuse
Onondaga County Legislator

August 31, 2021

Honorable Kathy Hochul
Governor of New York State
NYS Capitol Building
Albany, NY 12224

Mark Frechette, P.E.
Project Director
NYS Department of Transportation, Region 3
333 East Washington Street
Syracuse, NY 13202

Rick Marquis
Division Administrator
Federal Highway Administration
Leo W. O'Brien Federal Building
11A Clinton Avenue, Suite 719
Albany, NY 12207

Re: Response to in the Final Design Report/Final EIS for the I-81 Project.

Dear Governor Hochul, Mr. Frechette and Mr. Marquis:

The Final Design Report/Final EIS that the Federal Highway Administration (FHWA) and NYS Department of Transportation (NYSDOT) recently released identifies that the Community Grid Alternative is the project's preferred alternative. This letter voices our concerns for the impact of an increase in interstate trucks entering or exiting Interstate 81 in Homer as a shortcut from or to the Thruway and Seneca Falls. This will create an untenable negative impact on our small rural communities on Skaneateles Lake and throughout the Finger Lakes. Skaneateles Lake provides unfiltered drinking water to over 200,000 people in Skaneateles, the City of

Syracuse, and surrounding communities. Truck traffic entering or exiting Interstate 81 in Homer will travel along highways on the east side and west side of Skaneateles Lake and this has potential consequences to Skaneateles Lake, and all communities and surrounding Towns and Villages in Central New York that has not been adequately addressed in the DEIS.

The "Project Area" in the Draft Environmental Impact Study (DEIS) should be expanded to include areas south of the City of Syracuse to at least the Homer/Cortland exit. This area has not been properly evaluated to determine travel times using the new Interstate 81 (former Rt. 481) vs. travel times entering or exiting Interstate 81 south of Syracuse to reach the Thruway west of Syracuse. Without an expanded "Project Area" our concerns will not be properly addressed.

We seek mitigation of this problem as it exists now and could increase if vehicles attempt to shorten their routes between the new Interstate 81 as it circles east of Syracuse and the Thruway west of Syracuse. Rerouting Interstate 81 to the existing Rt.481 without implementing measures to ensure that through traffic interchanges directly between Interstate 81 and the Thruway, will further exacerbate the already existing problem of interstate trucks traveling through our small, rural-residential communities. Therefore, the Skaneateles Lake communities stand together in voicing our concerns by agreeing to the following resolution:

WHEREAS Skaneateles Lake provides drinking water to over 200,000 people in Skaneateles, the City of Syracuse and surrounding communities; and,

WHEREAS truck traffic exiting or entering Interstate 81 to or from Interstate 90 west of Syracuse travel along highways on the east side and west side of Skaneateles Lake as well as other small communities in the Finger Lakes; and,

WHEREAS the DEIS project area should be expanded south to provide ways to keep interstate trucks on Interstate 81 instead of traveling through our small communities in order to save time and toll fees; and,

WHEREAS excessive truck traffic is currently an ongoing problem for communities on Skaneateles Lake including the Towns of Scott, Spafford, Niles, Skaneateles, and the Village of Skaneateles; and,

WHEREAS increased traffic causes increased use of petroleum-based fuels, noise, dust, emissions, and atmospheric deposition of pollutants on land and water, businesses, homes, and schools; and,

WHEREAS additional distance and time that interstate trucks will need to travel using the new Interstate 81 would encourage trucks to take short cuts through the small communities of the Finger Lakes that has not been sufficiently addressed; and,

WHEREAS the potential negative impact on Skaneateles Lake, and the surrounding Towns and Village on Skaneateles Lake have not been adequately addressed in the DEIS; and

WHEREAS, it is the sense of the Town of Skaneateles, Spafford, Niles, Scott, the Village of Skaneateles, City of Syracuse Mayor, Ben Walsh, and Onondaga County Legislator (6th District), Julie Abbott-Kenan, that any decision reached by the NYS DOT should include solutions to prevent increase in truck traffic in these communities on Skaneateles Lake and throughout the Finger Lakes by providing incentives to stay on Interstate 81 and deterrents to taking shortcuts; and,

WHEREAS, the NYSDOT and the FHWA should include incentives such as removal of tolls between designated exits on the Thruway and incorporating ways to encourage trucks to stay on Interstate 81;

NOW, THEREFORE, BE IT RESOLVED, that the Towns of Skaneateles, Spafford, Niles and Scott, the Village of Skaneateles of Skaneateles, City of Syracuse Mayor, Ben Walsh, and Onondaga County Legislator, Julie Abbott-Kenan (6th District) request that the NYSDOT address all socioeconomic and environmental impacts in the DEIS that will affect our Central New York Communities, including but not limited to, Environmental and Economic impacts increased truck traffic will have on Skaneateles Lake, our Finger Lakes communities and our local roads throughout the Finger Lakes region.

Respectfully submitted,

Skaneateles Supervisor Janet Aaron
Skaneateles Mayor Mary Sennett
Spafford Supervisor Chris Kozub
Niles Supervisor Joan Jayne
Scott Supervisor Guy Ruoff
City of Syracuse Mayor Ben Walsh
Onondaga County Legislator (6th District) Julie Abbott-Kenan

Cc: Lauren Mannerberg,
Lauren.Mannerberg@exec.ny.gov
Bryan Lesswing
Bryan.Lesswing@exec.ny.gov

RECEIVED
SEP - 2 2021
BY:

August 31, 2021

Mark Frechette P.E.
Project Director
New York State Dept. of Transportation, Region 3
333 East Washington Street
Syracuse, New York 13202

Dear Mark,

Attached is an August 29, 2021 Syracuse Post Standard article by Assemblyman William Magnarelli regarding consensus on Interstate 81. I respond yearly to Assemblyman Magnarelli's constituent survey. He shares the results of that survey with us. It shows that the majority of his constituents want to maintain the high-speed thoroughfare of Interstate 81 through the city. I travelled that route daily for my engineering employment at GE / Lockheed Martin. I can personally attest to the large volume of traffic that the section between the Adams and Harrison Street off ramps handles. If it becomes a street level boulevard through the city (at least three traffic lanes will be required in each direction) a heavy amount of traffic will back up at stop lights. The noise and air pollution will be horrendous. This will be a further injustice to what remains of the 15th Ward.

While it will be inconvenient, we need to at least have a compromise (the Hybrid model) between all street level (the Grid) and our current Interstate structure, in order to keep north / south traffic moving on an Interstate. The compromise consists of the following:

a. I-81 North connection to I-690 East is eliminated.

b. I-81 North connection to I-690 West is eliminated.

c. I-690 East connection to I-81 South is eliminated.

d. I-690 West connection to I-81 South is eliminated.

e. Almond Street on-ramp to 81 North / I-690 East is eliminated.

f. I-81 North exit to Adams Street to be moved further south (provides a longer off-ramp/path for traffic).

g. Adams Street on-ramp to I-81 South possibly moved further south.

Traffic would use the street grid to find its way from I-81 to I-690, and vice versa. But an elevated I-81 for high speed north / south through traffic will be rebuilt in an aesthetic manner (e.g. longer support spans to provide a more open look, use of architectural concrete, earth berms with trees, appealing LED lighting underneath the highway).

I believe this compromise will enable some/all of the air space above Almond Street to be used for the Federally required widening of I-81, without a major removal of existing buildings. The speed limit in this section should be kept at 45 miles per hour to keep widening and curves to a minimum. A key element of this compromise it that street grid traffic will continue to travel under I-81. This is efficient utilization of space.

Sincerely,

Kevin G. Smith

Kevin G. Smith P.E.
141 Brampton Road
Syracuse, New York 13205

THE POST-STANDARD SUNDAY, AUGUST 29, 2021 E3

SYRACUSE I81 PROJECT

Central New York is far from consensus on I-81

Assemblyman William B. Magnarelli *Guest Opinion*

For some 60 years, Interstate 81 has served as a major thoroughfare and economic driver for the entire Central New York region continuing and reinforcing Syracuse's historical identity as the "Hub of New York."

Eight years ago, on July 7, 2013, I attended the first official regional meeting of "electeds" held by then-New York state Department of Transportation Commissioner Joan McDonald to discuss the deteriorating condition of I-81. McDonald made it clear to the assembled group of mayors, legislators and town supervisors: the region "must come to a consensus" about how to replace I-81. That has not happened.

While advocates for removing I-81 from the city have been the most vocal, they in fact represent only one of the perspectives I have heard from the greater regional community. Although much has been said, rightfully, about the racial injustices that occurred due to the original I-81 project, we must also keep in mind the mission we were originally tasked with — local/state/national transportation needs. And, although we were originally told not to focus on the cost of the new project, cost has been used to redirect the debate away from the more consensus-building alternatives.

I have concerns that the DEIS did not adequately address some of the most important questions related to this significant regional project.

- While a handful of U.S. cities have removed sections of highways in their urban cores, these were auxiliary spurs off of a larger traffic (Tier One Federal Highway) artery. Why should I-81 in Syracuse be the first Tier One Federal Highway in the United States to be decommissioned? It has served as a north-south conduit for people and goods for decades. It is part of what makes Syracuse the "Hub of New York."
- Today, much of the project area consists of public housing managed by the Syracuse Housing Authority. Some of the housing is only feet from the viaduct. The DEIS offers no information regarding new housing, and maybe it "technically" need not. NYSDOT has stated it will not "force" people from their present housing. However, where are those who choose not to live in a construction site going to be relocated? What new housing is going to be constructed and where? How will the NYSDOT prevent gentrification of this area and prevent future racial injustices? And if tenants are not going to be relocated, how will the city/state mitigate the impacts of construction?

- The SPECTRA Report, authored in 2019 by former NYSDOT Chief Engineer John Shafer, found that 61 intersections in the city of Syracuse would have a Level of Service (LOS) of E (severe congestion) or F (failure) during peak rush-hour periods. How can NYSDOT be dismissive of this report when it was authored by a former DOT engineer? Although the DOT has made changes to the community grid plan, data used has been questioned by some and many feel the problems described in the SPECTRA Report were not fully addressed.
- According to the DEIS, hotels in the town of Salina will lose approximately 1.3% of their annual bookings, and Destiny USA will lose about 2.8% of shoppers. If the grid alone should be implemented, traffic coming from the north and south would be directed around the city to the east, in the opposite direction of Destiny USA and hotels in Salina. Wouldn't one expect these two figures to be much higher, particularly for the hotels who rely on interstate traffic? And why would we divert traffic away from one of the major attractions of Central New York?
- The DEIS shows that a roundabout will be constructed at the intersection of Business Loop 81 and Martin Luther King East, at the point in which the highway comes down to street level. This is immediately adjacent to Dr. King Elementary School. Many have questioned if the roundabout is too close to the school and endangers the safety of children.

This opportunity should not be squandered. We can have connectivity within the city, including walking and bike trails, and continue to keep the city connected to its suburbs and the rest of the region. These are not mutually exclusive.

I have never been against the community grid idea itself. What we need is a community grid in conjunction with a rebuilt viaduct, tunnel or new bridge to keep traffic flowing through Syracuse.

Further, I do not believe that a consensus for this project has ever been reached by the city, suburbs and outlying towns in our region. Given the amount of federal monies available, why don't we have an option that satisfies everyone's needs? I believe that Central New York requires and deserves more.

I would like to thank the NYSDOT for its time, efforts and professionalism during this EIS process. I stand ready, as a member of the New York State Assembly and as Chair of its Transportation Committee, to do whatever I can to facilitate the project that is finally selected.

It is critical that the adverse impacts of construction — housing, traffic, noise, environmental pollution — are mitigated and that local workers and businesses benefit from this billion dollar plus investment.

However, the majority of my constituents and I hope NYSDOT will select an option that works best for and represents the views of the entire Central New York region.

William B. Magnarelli, D-Syracuse, represents the 129th Assembly District in the New York state Legislature. He submitted the following as part of the record of the public comment period for the I-81 Project Draft Environmental Impact Statement (DEIS).