MEMORANDUM

TO: Douglas DeKoskie, New York City Department of Environmental Protection

FROM: James Murac, P. E., Milone & MacBroom, Inc.

DATE: December 17, 2014

RE: NYSDOT Options for Route 23 Bridge Replacement
Prattsville, New York
MMI #3597-19-2

Introduction

Following major flooding that occurred in the town of Prattsville in August 2011 as a result of Tropical Storm Irene, a series of studies were undertaken to determine the primary causes and viable options for mitigating and minimizing future flood hazards. Under contract to the New York City Department of Environmental Protection (NYCDEP), Milone & MacBroom, Inc. (MMI) completed a study in September 2013 entitled *Local Flood Hazard Mitigation Analysis, Schoharie Creek Watershed, Town of Prattsville, Greene County, New York*. This study evaluated eight alternatives in the Prattsville area for their effectiveness at mitigating flooding during high flows (i.e., 50-year and greater storm events).

In the 2013 study, the three primary factors influencing flooding were found to be:

1. The inadequate waterway opening of the existing State Route 23 bridge over Schoharie Creek
2. Insufficient flood conveyance capacity of Schoharie Creek due to the narrowing of the channel from 300 feet to 175 feet in the vicinity of the Route 23 bridge
3. Floodplain development along the banks of Schoharie Creek

In June 2013, Governor Cuomo announced a call for projects to be funded by the Hazard Mitigation Grant Program (HMGP) to assist local governments and nonprofit organizations to rebuild stronger, more sustainable communities. Authorized by the Federal Emergency Management Agency (FEMA), the program aims to increase the state's resiliency, reduce hardship, and mitigate the risks of loss and damage associated with future disasters. The bridge scour program is the product of an unprecedented collaboration between the New York State Department of Transportation (NYSDOT), Division of Homeland Security and Emergency Services (DHSES), the Governor's Office of Storm Recovery (GOSR), and dozens of local governments. The State Route 23 bridge over the Schoharie Creek has been identified for replacement as part of this program.

Currently, NYSDOT is proceeding with planning, analysis, and subsequent design of a new bridge structure. NYSDOT initially evaluated a large number of options and has refined that list to a series of bridge replacement options that seek to increase the hydraulic capacity of the

crossing while minimizing adjacent property impacts. MMI has evaluated the NYSDOT options currently under consideration in the context of flood hazard mitigation in the town of Prattsville. This memorandum is intended to provide a summary of MMI's assessment.

Previous Hydraulic Modeling

Two hydraulic (HEC-RAS) models have been developed independently of one another for the Schoharie Creek in Prattsville. MMI developed modeling as part of the 2013 Local Flood Hazard Mitigation Assessment (LFHMA). That modeling was derived directly from the 2001 FEMA model. It does not reflect any changes to the channel geometry, floodplain, or hydrology that may have occurred as a result of the severe flooding during Tropical Storm Irene, or any other changes in the channel or within the floodplain.

A second set of modeling was developed by the NYSDOT to assess the effects of multiple bridge replacement options at the Route 23 crossing. Its models were based upon new postflood field survey for the channel bathymetry and Light Detection and Ranging (LiDAR) mapping for the upland and floodplain topography. This newer modeling is limited to the reach of the Schoharie Creek in the vicinity of the Route 23 bridge. Table 1 summarizes the data sources for each model.

TABLE 1
Comparison of MMI and NYSDOT Hydraulic Modeling Data Sources

Parameter	MMI	NYSDOT
Bathymetric Data	2001	Fall 2013
Bathymetry Type	LiDAR	Field Survey
Upland Topography Date	2001	April 2014
Topography Source(s)	LiDAR	LiDAR
Vertical Datum	NAVD 88	NAVD 88
Hydrology Source	FEMA 2008 FIS	USGS Gage No. 01350000, Log-Pearson Type III
100-year Discharge	67,900 CFS	69,600 CFS

Because the FEMA modeling was created before Tropical Storm Irene, the NYSDOT modeling is a more current reflection of the flooding behavior of the Schoharie Creek. However, this model is localized, ending 2,000 feet upstream of the New York Route 23 bridge. The center of Prattsville is approximately 2,600 feet upstream of the bridge. Table 2 provides a brief comparison of the output from both models, reflecting the difference in results.

TABLE 2
Comparison of MMI and NYSDOT Hydraulic Modeling Results
Existing Conditions

Location Relative to Route 23	MMI 100-YEAR WSEL (FT)	NYSDOT 100-YEAR WSEL (FT)	Difference between MMI and NYSDOT
2,000 FT U/S	1,161.5	1,158.3	-3.2
1,000 FT U/S	1,157.4	1,155.9	-1.5
Route 23 Bridge U/S	1,155.9	1,153.7	-2.2
1,000 FT D/S	1,149.7	1,148.9	-0.8
2,000 FT D/S	1,147.5	1,146.7	-0.8

In general, the updated NYSDOT hydraulic models predict flood water elevations that are lower than the older MMI modeling. Based upon the changes in the bed geometry between the two models, it appears that scour or sediment removal in the channel may have occurred upstream of the Route 23 bridge, followed by sediment deposition downstream of Route 23. These changes are better reflected in the NYSDOT modeling and may contribute to the difference in results.

Differences in the existing ground between the two models reflect up to 3 feet of material removal or scour upstream of the bridge and up to 5 feet of material deposition downstream of the bridge. The NYSDOT modeling also revised Manning's n numbers, using 0.25 in the main channel instead of 0.4 used by FEMA. This would indicate smaller channel substrate in the bed, which is typical following sediment removal or dredging. The bed of the Schoharie is dynamic, and natural processes may redeposit sediment through this reach, thus increasing Manning's numbers and increasing flood elevations.

Summary of NYSDOT Bridge Replacement Options

NYSDOT has refined its assessment to four replacement options for the Route 23 crossing of Schoharie Creek. The potential size and location of a new Route 23 bridge are influenced by the approaching roadway geometry and intersections, the Schoharie Creek channel configuration, property ownership, and existing buildings. The following options have been assessed by NYSDOT in more detail:

- Option 1 presents a "do-nothing" alternative, meaning the characteristics of the proposed bridge would match existing conditions. The existing bridge span is 250 feet.
- Option 2 presents a 360-foot span bridge located downstream of the existing structure.
- Option 3 presents a 300-foot span bridge located upstream of the existing structure.
- Option 4 presents a 300-foot span bridge in the same location as the current bridge.

Options 2, 3, and 4 propose structures with a low chord that is 3 feet higher than the existing structure, thus increasing the hydraulic flow area. This is an improvement over the existing

bridge in that it will not be subject to flooding as frequently and will remain passable by vehicles during extreme events. Raising the bridge, however, will not provide a significant benefit to flooding in Prattsville Center. Table 3 presents a summary of the bridge options assessed as part of NYSDOT's analysis.

TABLE 3
Comparison of NYSDOT Bridge Replacement Options

Parameter	Existing Conditions (Option 1)	Option 2	Option 3	Option 4
Structure Location	-	D/S of Existing	U/S of Existing	Same as Existing
Structure Type	Truss	Truss	Truss	Truss
Span Length	250 ft	360 ft	300 ft	300 ft
Skew Angle	45-deg	53-deg	45-deg	45-deg
Bridge Deck Height Increase	-	3 ft	3 ft	3 ft
Property Impacts	-	0 business 9 residential 1 municipal	1 business 9 residential 1 municipal	1 business 5 residential 1 municipal

Although the bridge spans were increased and alignments were adjusted in the options, one of the primary goals set forth in the NYSDOT assessment was to minimize property impacts. Achieving this goal restricts the flexibility of realigning the crossing due to the close proximity of residential and commercial development. Consequently, the proposed replacement bridges maintain the existing skew angle of 45 degrees or, in the case of Option 2, increase the skew angle to as much as 53 degrees, which limits the hydraulic opening of the bridge structure and reduces the hydraulic efficiency of the crossing.

Table 4 presents a summary of the hydraulic modeling results for Option 2 as compared with existing conditions. This represents the longest bridge option evaluated by NYSDOT. As the results reflect, the area of flood reduction is limited to the location of the bridge and a short distance upstream. The center of Prattsville, located approximately 2,600 feet upstream of the bridge, would have little flood benefit from the new structure (0.7 foot reduction in water surface elevation during the 100-year event).

TABLE 4
Comparison of NYSDOT Hydraulic Modeling Results
Existing Conditions vs. Proposed Bridge Option 2

	Existing Conditions 100-YEAR WSEL (ft)	Bridge Option 2 100-YEAR WSEL (ft)	Difference (ft)
2,000 ft U/S	1,158.3	1,158.2	-0.1
1,000 ft U/S	1,155.9	1,153.6	-2.3
Route 23 Bridge U/S	1,153.7	1,151.4	-2.3
1,000 ft D/S	1,148.9	1,148.9	0
2,000 ft D/S	1,146.7	1,146.7	0

Table 5 presents a summary of the hydraulic modeling results for Option 3 as compared with existing conditions.

TABLE 5
Comparison of NYSDOT Hydraulic Modeling Results
Existing Conditions vs. Proposed Bridge Option 3

	Existing Conditions 100-YEAR WSEL (ft)	Bridge Option 3 100-YEAR WSEL (ft)	Difference (ft)
2,000 ft U/S	1,158.3	1,158.2	-0.1
1,000 ft U/S	1,155.9	1,153.9	-2.0
Route 23 Bridge U/S	1,153.7	1,150.8	-2.9
1,000 ft D/S	1,148.9	1,148.9	0
2,000 ft D/S	1,146.7	1,146.7	0

NYSDOT has suggested that the hydraulic performance of Option 4 is comparable to that of Option 3, and it was not modeled independently.

Overall, the assessed options provided bridge spans that are longer and higher than existing conditions. This has the effect of raising the bridge above the floodprone area but has only a limited effect on reducing backwater conditions upstream, the effects of which are negligible approximately 1,500 feet upstream of the bridge (similar to MMI findings).

Summary of MMI LFHMA Alternatives

A series of eight alternatives were assessed in the LFHMA completed by MMI in 2013. Some of these alternatives assessed varying combinations of alternatives to determine their combined effectiveness at flood mitigation. Table 6 presents all eight alternatives.

The most effective alternative was determined to be Alternative 4, which included the following elements:

- Replacement of the bridge and relocation of Route 23
- Widening the channel to a 300-foot base width and 2H:1V side slopes
- Deepening the channel to create a consistent bed channel slope from an upstream fish block to the channel downstream of the bridge

Alternative 4 focused on addressing the two primary flooding concerns: replacement of the Route 23 bridge crossing and widening of the flood conveyance area. It involved a select number of structures being relocated along the bank of the creek (refer to Figure 3). Route 23 would be relocated, and the Schoharie would require widening of up to 150 feet and sediment removal of up to 4 feet in some locations over a ¾-mile reach of the Schoharie Creek. These measures were predicted to be effective at containing flood flows up to and surpassing the 100-year event.

TABLE 6
Flood Mitigation Alternatives Evaluated by MMI in 2013

Alt.	Description	Effect During 100-Year Event (1% Chance of Occurrence)	Location of Flood Benefit
1	Berm and Floodplain Alteration	Localized flood mitigation ~ 1 foot	Route 23 bridge to ~ 2,500 ft U/S
2	Route 23 Bridge Replacement	Flood mitigation of ~ 2 to 4 feet	Route 23 bridge to ~ 4,000 ft U/S
3	Channel Deepening and Widening (210' to 260' wide channel)*	Flood mitigation of ~ 2 to 7 feet	Route 23 bridge to ~ 5,000 ft U/S
4	Channel Deepening, Widening, and Bridge Replacement	Flood mitigation of ~ 4 to 7 feet	Route 23 bridge to ~ 5,000 ft U/S
5	Construction of a Bypass Channel	Additional survey needed to fully assess	-
6	Removal of Concrete Fish Barrier	Localized flood depth reduction ~ 2 feet	Only in the immediate area of the fish barrier
7	Replacement of Main Street Bridge over Huntersfield Creek	Minimal localized flood mitigation	Only immediately adjacent to the bridge
8	Realignment of Huntersfield Creek Outlet	Insignificant flood mitigation	N/A

*Also evaluated under this alternative was a wider, 500-foot compound channel.

Combined Modeling (NYSDOT and MMI Alternative 4)

Although the bridge alternatives proposed in the NYSDOT analysis have spans ranging from 300 to 360 feet (compared to about 320 feet in MMI Alternative 4), they all have skew angles that reduce their effective waterway span and do not include channel widening. Table 7 presents a summary of the spans for each alternative, along with their effective reduction due to skew angle.

TABLE 7
Comparison of NYSDOT Bridge Replacement Alternatives

Parameter	Existing Conditions	Alternative 2	Alternative 3	Alternative 4
Span Length	250 ft	360 ft	300 ft	300 ft
Skew Angle	45-deg	53-deg	45-deg	45-deg
Effective Span Length	177 ft	216 ft	212 ft	212 ft

The existing channel ranges in width between approximately 175 and 300 feet, with the narrowest reach located near the existing Route 23 crossing. This segment is a flow constriction. Modeling has confirmed that a channel width of approximately 320 feet is necessary to contain the 100-year flow in the area of the Route 23 crossing though even with the combined bridge and channel improvements the floodplain is not fully eliminated. This is due to the constraints

caused by buildings on the eastern side of Route 23 and the attempt to construct a bridge that does not impact them. The maximum amount of water surface mitigation also is influenced by the water surface profile downstream of the Route 23 bridge, where it could be subject to backwater from the channel or from Schoharie Reservoir.

The bridge replacement options assessed by NYSDOT do not provide adequate span to accommodate a future channel widening as evaluated by MMI and would prevent such work from being completed in the future. Figure 1 presents a schematic cross section that compares the existing bridge and the NYSDOT replacement Option 2.

To further assess the hydraulic performance of the NYSDOT bridges in the context of downtown Prattsville flooding, the proposed bridge geometry was input to the MMI hydraulic model, which extends upstream to Prattsville Center. The modeling results confirmed that the NYSDOT bridge options would remain a hydraulic bottleneck, would not significantly reduce flood elevations, and would preclude channel widening in the area immediately upstream of the bridge. The results further indicate that any bridge proposed for this reach should ideally span the recommended channel width of 320 linear feet as closely as possible to allow upstream channel improvements.

Figure 2 presents a profile generated from the HEC-RAS model output comparing the MMI modeled existing conditions, NYSDOT Option 3, and the MMI Alternative 4.

Route 23 Realignment

Increasing the channel width upstream of the Route 23 crossing will require widening the banks beyond where the Route 23 roadway is currently located along the eastern bank and beyond the opening of the existing bridge. In order for channel widening to occur, the new bridge will need to span the larger channel, and a portion of Route 23 would need to be relocated.

Figure 3 presents a hybrid alternative that reduces the skew angle of the crossing to 24 degrees (effective width of 294 feet) and replaces the truss structure with a 322-foot-long two-span bridge with an open bridge rail. The new bridge would be located downstream of the existing crossing such that the existing bridge can be used during construction. The new bridge would be constructed with a pier to provide two smaller spans. Construction of a two-span bridge rather than a truss bridge has the potential to provide an overall cost savings. The alternate structure enables widening of the Schoharie Creek upstream, similar to what was modeled under the MMI Alternative 4.

Table 8 presents a summary of design parameters for the given realignment option.

TABLE 8
Summary of Design Elements
Route 23 Realignment and Bridge Replacement

Bridge Span Length	322 FT
Bridge Skew Angle	24°
Bridge Hydraulic Opening Length	294 FT
Top of Bank Elevation	1150 FT +/-
100-year WSEL	1152.94 FT
Bridge Deck Elevation	1158.06 FT
Bridge Bottom Beam Elevation	1154.06 FT
100-Yr Freeboard	1 FT
Channel Bottom Elevation	1128.1 FT
Excavation into Western Bank	0 FT
Excavation into Eastern Bank	90 FT
Overall Channel Bottom Width	255 FT
Side Slope at Right Side of Channel	2:1 (H:V)
Bankfull Channel Dimensions	175 FT W x 2–3 FT H
Bankfull Bench	80 FT W

Figure 4 presents a graphic representation of the potential floodplain benefits of the hybrid alternative. Immediately adjacent to and upstream of the new crossing, water surface elevations during the 100-year event are predicted to decrease by 5.9 feet. Approximately 1,500 feet upstream, the majority of Prattsville Center would be removed from the 100-year floodplain entirely. Still further upstream, approximately 3,700 feet upstream of the bridge, water surface elevations are predicted to remove a large developed area upstream of Huntersfield Creek from the 100-year floodplain.

Figure 5 presents a graphic representation of the potential floodplain benefits of the NYSDOT Option 2 bridge. Immediately adjacent to and upstream of the new crossing, water surface elevations during the 100-year event are predicted to decrease by only 1.5 feet. Approximately 1,500 feet upstream, this benefit decreases to about 0.7 feet, leaving Prattsville Center under nearly 4 feet of floodwater during the 100-year event. Still further upstream, approximately 3,700 feet upstream of the bridge, water surface elevations are predicted to drop by only 0.6 feet, leaving a large developed area upstream of Huntersfield Creek in the active floodplain.

The channel widening plan presented in Figure 3 is conceptual in nature. The overall amount of channel widening varies and is maximized to the extent that seems feasible while minimizing impacts to existing structures. Although 320 feet is the preferred channel width, this was not possible at all locations. The widening involves the relocation or removal of three structures along the eastern bank of Schoharie Creek.

The proposed widening and reconstructed banks as depicted in Figure 3 have been modeled, and the hydraulic results of this hybrid alternative are presented in Figure 6, as well as in the appended cross sections. For the purposes of this evaluation, the bridge was modeled in the same horizontal position as the existing bridge, for easier comparison between the two. If pursued, the modeling would be updated to reflect actual conditions although this change is not expected to measurably modify the results. Figure 6 also presents the results of this bridge alternative if bed lowering/sediment removal was not possible or not sustainable.

The Route 23 realignment and hybrid bridge alternative are also conceptual in nature. The roadway geometry has been assessed for a 35 mph design speed through most areas, with a 40 mph design speed near Pine Street. Lane widths for the relocated Route 23 include two 12-foot travel lanes with 4-foot shoulders whereas lane widths for the old (current alignment) Route 23 have been reduced to two 13-foot travel lanes with 2-foot shoulders. On-street parking would be lost along a portion of the old Route 23 in order to maximize the space available for channel widening.

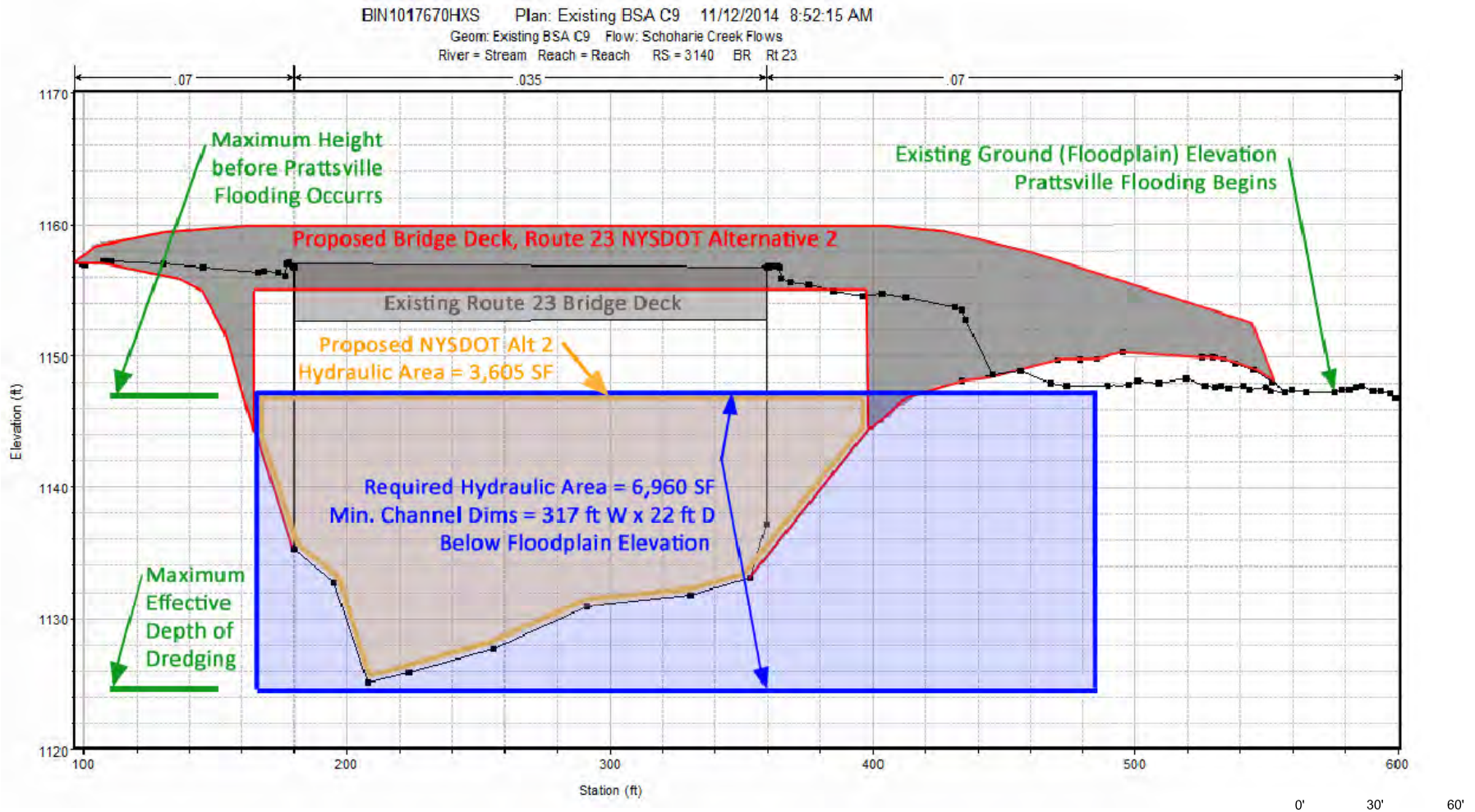
Conclusion

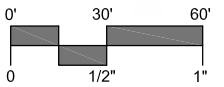
The bridge options under evaluation by NYSDOT provide limited flood relief within 1,500 feet upstream of the bridge but do not provide any relief to flooding in the center of Prattsville, located 2,600 feet upstream. The proposed bridge options are higher than the 100-year flood elevation but do not provide adequate span to pass the flow without creating a backwater condition upstream.

Replacement of the existing Route 23 bridge with a reduced skew angle crossing will decrease the total span of the bridge, thus potentially reducing construction costs and significantly increasing the effective hydraulic area. However, this will require the relocation of Route 23 and will result in property impacts. Widening of the upstream channel to better accommodate flood flows would also require the relocation and/or reconstruction of Route 23.

All effective alternatives for flood mitigation in the town of Prattsville require the widening of the Schoharie channel to accommodate flood flows. If flood mitigation is desired, channel alteration should be assessed in concert with any bridge replacement that is considered so as not to prohibit future construction of flood mitigation improvements.

Referring back to Figure 4, a combination of bridge and channel improvements has the potential to reduce water surface elevations during the 100-year event by 5.9 feet near the bridge site and completely remove out of the 100-year floodplain a large portion of Prattsville Center as well as a large developed area upstream of Huntersfield Creek. Such potential flood mitigation is markedly greater than the NYSDOT Option 2 bridge, where a flood water reduction of only 1.5 feet is predicted in the vicinity of the bridge, and a reduction of only 0.7 feet is predicted near Prattsville Center.





SCALE 1" = 60'H
1" = 12'V
(5X VERTICAL EXAGGERATION)

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DATE	12/5/14
SCALE	AS NOTED
PROJ. NO.	3597-19
DESIGNED	JCM
DRAWN	DRM
CHECKED	JAG

CROSS SECTION - ROUTE 23 BRIDGE

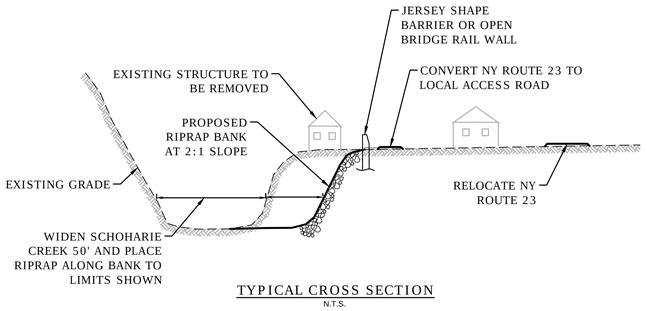
NYSDOT BRIDGE REPLACEMENT OPTIONS FOR ROUTE 23

ROUTE 23 OVER SCHOHARIE CREEK
PRATTSVILLE, NEW YORK

DRAWING NAME:

FIG. 1

DRAFT - CONCEPT DESIGN



TYPICAL CROSS SECTION
N.T.S.

RELOCATE ROUTE 23
PINE STREET
12' TRAVEL LANE
4' SHOULDER
R = 350'
DESIGN SPEED = 35MPH
SUPER ELEVATION = 6%
NY ROUTE 23
STOP CONDITION
STOP CONDITION
R = 490'
DESIGN SPEED = 40MPH
SUPER ELEVATION = 6%
R = 100'
R = 300'
STOP CONDITION
STOP CONDITION
R = 175'
R = 400'
11' TRAVEL LANE
2' SHOULDER
R = 260'
JERSEY SHAPE BARRIER OR OPEN BRIDGE RAIL WALL
HYLAN BOULEVARD
9654
9804
10116
10328
10430
10643
11309
11000
11154
11460
11611
11763
11915
12067
SCHOHARIE CREEK
24° SKEW
NY ROUTE 23
R = 350'
DESIGN SPEED = 35MPH
SUPER ELEVATION = 6%
PROPOSED ABUTMENT (TYP.)
5' SIDEWALK
REDIRECT EXISTING PRIVATE DRIVE
UTILIZE EXISTING BRIDGE FOR TEMPORARY TRAFFIC CONTROL DURING BRIDGE CONSTRUCTION
PROPOSED CENTER PIER
PROPOSED 322' TWO-SPAN BRIDGE WITH OPEN BRIDGE RAIL
WIDEN SCHOHARIE CREEK 50' AND PLACE RIPRAP AT 2:1 SLOPE ALONG BANK TO LIMITS SHOWN
REMOVE (3X) STRUCTURES ALONG SCHOHARIE CREEK BANK

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DESCRIPTION	DATE	BY

CONCEPTUAL ROADWAY REALIGNMENT

NYSDOT ALTERNATIVES
FOR ROUTE 23 BRIDGE REPLACEMENT

ROUTE 23 OVER SCHOHARIE CREEK
PRATTSVILLE, NEW YORK

CONCEPT DESIGN

DESIGNED	DRAWN	CHECKED
JCM	DRM	JCM

SCALE: 1"=80'

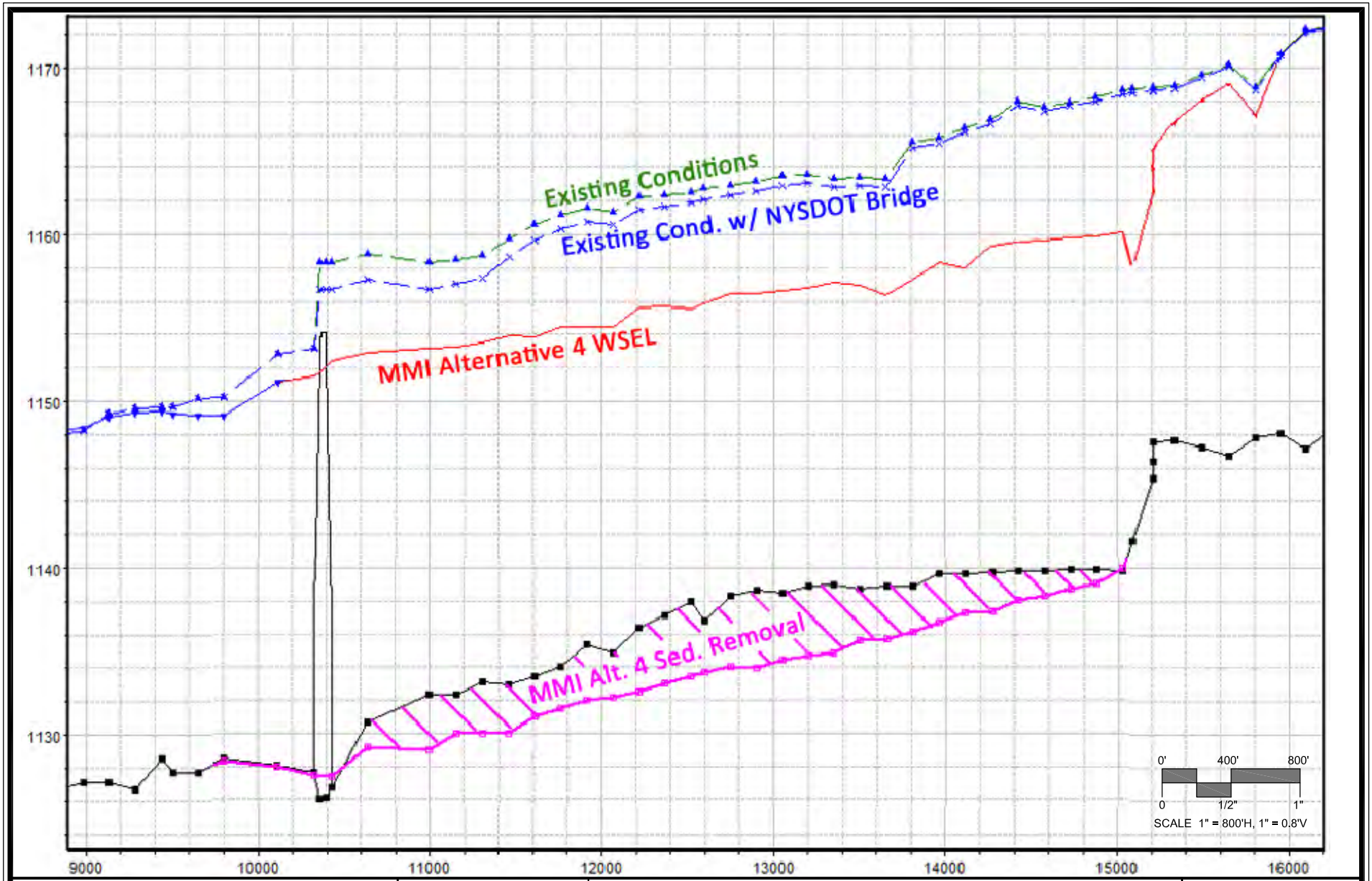
DATE: 12/5/2014

PROJECT NO.: 3597-19

SHEET NO.: 1 OF 1

FIG. 3

SHEET NAME



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DATE	12/5/14
SCALE	AS NOTED
PROJ. NO.	3597-19
DESIGNED	JCM
DRAWN	DRM
CHECKED	JAG

PROFILE - ROUTE 23 BRIDGE

NYSDOT BRIDGE REPLACEMENT OPTIONS FOR ROUTE 23

ROUTE 23 OVER SCHOHARIE CREEK
PRATTSVILLE, NEW YORK

DRAWING NAME:

FIG. 2

0' 150' 300'
0 1/2" 1"
SCALE 1" = 300'

N
W E
S

NY ROUTE 23

9654

9804

NY ROUTE 23 BRIDGE

10116

10328

10430

10643

RTE 23 - MAIN STREET BRIDGE
RAS 10379

REDUCE 100-YR WSEL BY: 1.6 FT
FINAL FLOODING DEPTH: 5.8 FT

PINE STREET

REDUCE 100-YR WSEL BY: 5.9 FT
FINAL FLOODING DEPTH: 4.9 FT

NY ROUTE 23

11000

11154

11309

11460

11611

11763

11915

12067

12218

12370

12519

12747

12899

13050

13201

13350

13501

13655

13809

13963

14113

14267

14420

14573

14726

14877

15027

REDUCE 100-YR WSEL BY: 6.7 FT
FINAL FLOODING DEPTH: 0 FT (DRY)

WASHINGTON STREET

HUNTERSFIELD CREEK

NY ROUTE 23

APPROX. AREA REMOVED FROM 100-YEAR FLOODPLAIN

PRATTSVILLE CENTER

SCHOHARIE CREEK

REDUCE 100-YR WSEL BY: 7.1 FT
FINAL FLOODING DEPTH: 0 FT (DRY)

NOTE

FLOODPLAIN DELINEATION BASED UPON FEMA FIRM, LIDAR TOPOGRAPHY AND CONCEPTUAL-LEVEL HYDRAULIC MODELING. DELINEATION IS SUBJECT TO CHANGE UPON PROJECT ADVANCEMENT.

LEGEND

APPROX. 100 YEAR FLOODPLAIN AFTER IMPLEMENTATION OF MMI ALTERNATIVE 4 (CHANNEL DREDGING AND WIDENING)

APPROX. AREA REMOVED FROM 100-YEAR FLOODPLAIN, AFTER IMPLEMENTATION OF MMI ALTERNATIVE 4 (CHANNEL DREDGING AND WIDENING)

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FLOODPLAIN COMPARISON

MMI ALT. 4 VS FEMA 100-YR FLOODPLAIN

NYSDOT BRIDGE REPLACEMENT OPTIONS FOR NY ROUTE 23

ROUTE 23 OVER SCHOHARIE CREEK
PRATTSVILLE, NEW YORK

DATE	12/5/14
SCALE	1"=300'
PROJ. NO.	3597-19

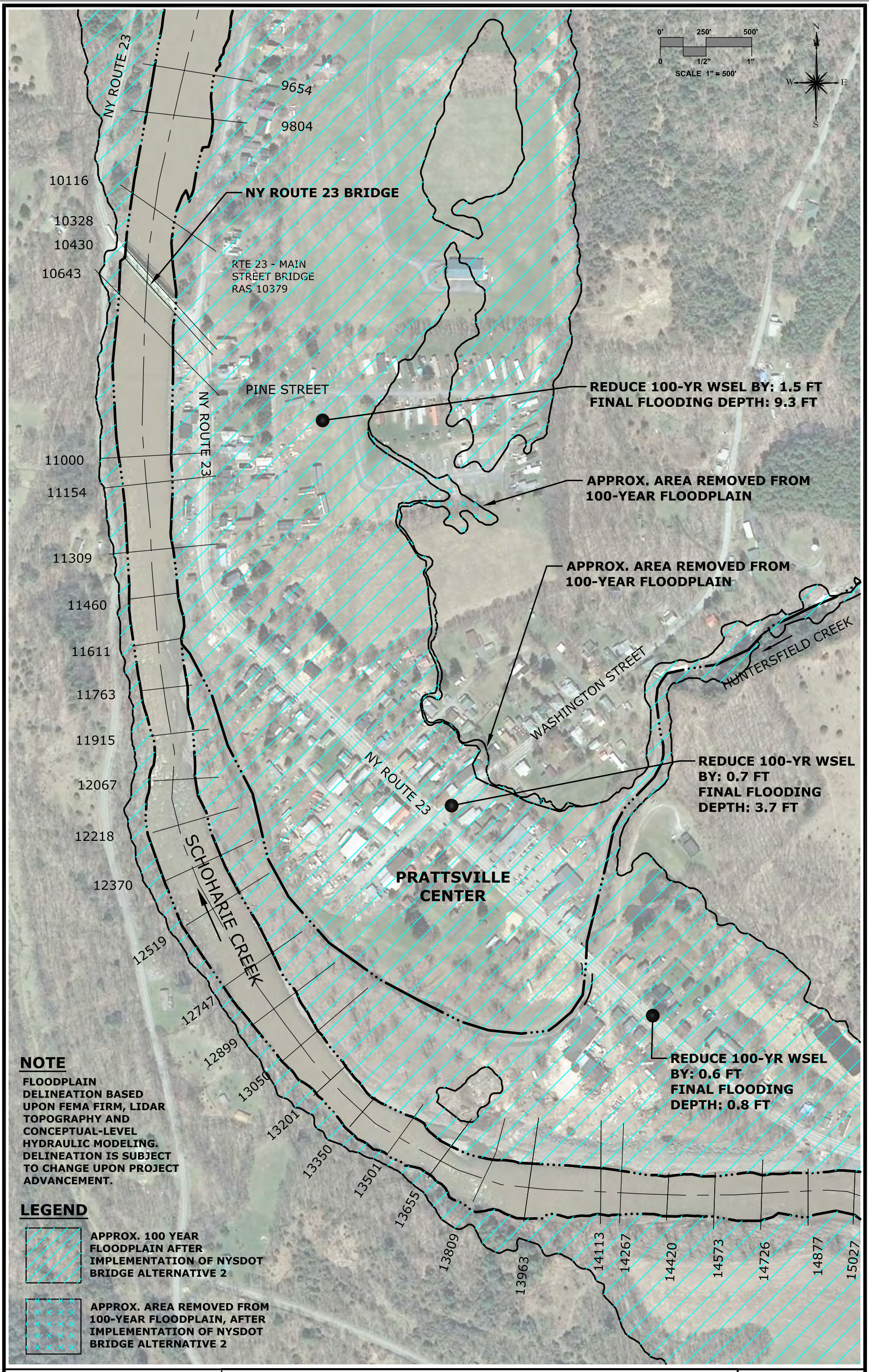
DESIGNED	DRAWN	CHECKED
JCM	JCM	JAG

DRAWING NAME:

FIG. 4

Drawing: P:\3597-19\DESIGN\DOCS\2014-11-21 NYSDOT BRIDGE MEMO\FIGURE 4&5 11X17.DWG Layout Tab:FIG 4 11X17

Plotted by: JAMESM On this date: Tue, 2014 December 9 - 3:37pm



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FLOODPLAIN COMPARISON

NYSDOT OPTION 2 VS FEMA 100-YR FLOODPLAIN

NYSDOT BRIDGE REPLACEMENT OPTIONS FOR NY ROUTE 23

ROUTE 23 OVER SCHOHARIE CREEK
PRATTSVILLE, NEW YORK

DATE	12/5/14
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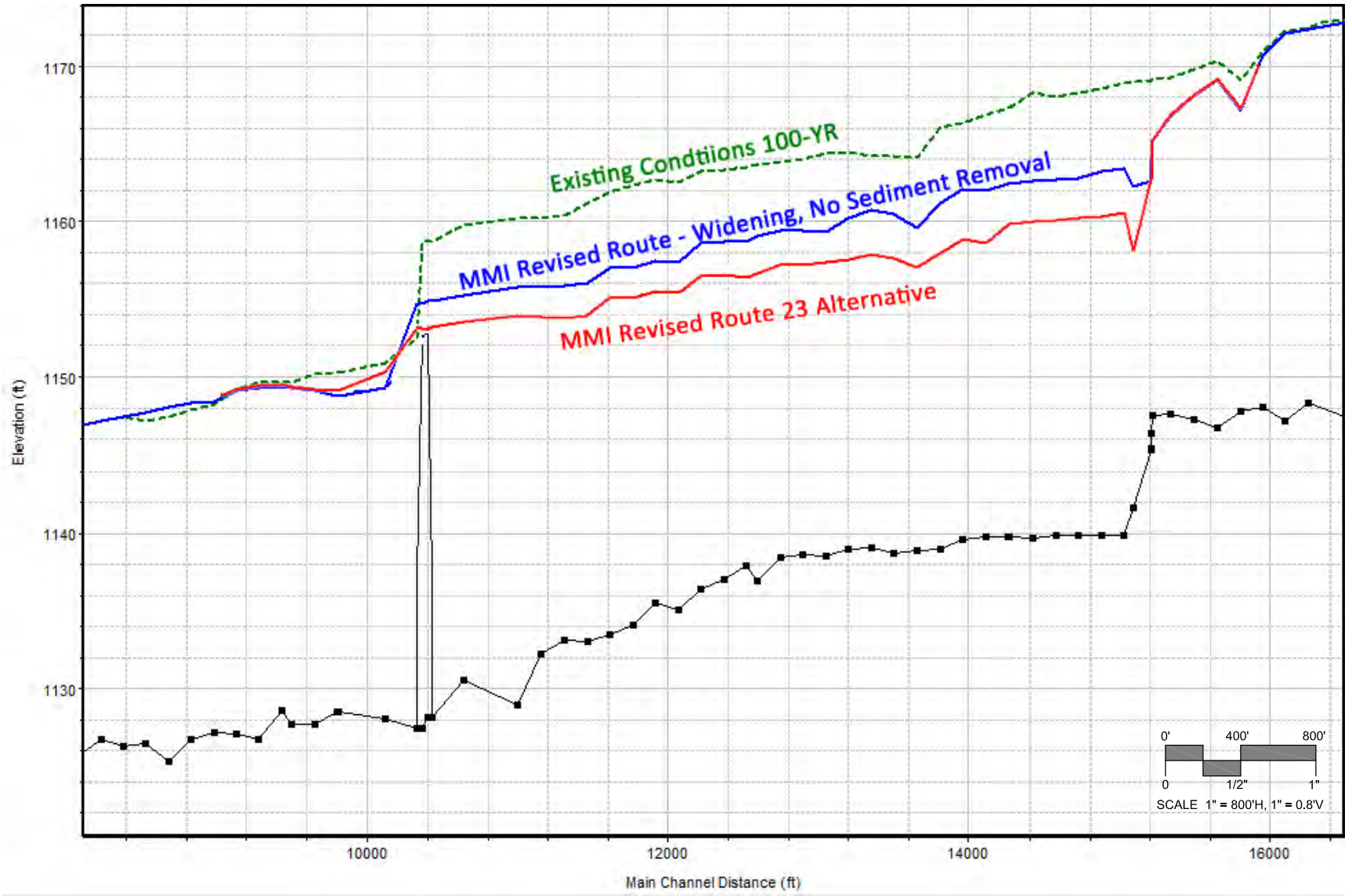
DRAWING NAME:	FIG. 5



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PROFILE - ROUTE 23 BRIDGE

MMI BRIDGE REPLACEMENT ALTERNATIVES FOR ROUTE 23

ROUTE 23 OVER SCHOHARIE CREEK
PRATTSVILLE, NEW YORK

DRAWING NAME:

FIG. 6

APPENDIX
HEC-RAS MODELING OUTPUT
CROSS SECTIONS

NYSDOT OPTIONS FOR ROUTE 23 BRIDGE REPLACEMENT
PRATTSVILLE, NEW YORK

MMI Schoharie Creek Prattsville Plan: 1) MMI W REV SPAN 2:08:42 PM 2) MMI Existing 11:59:45 AM

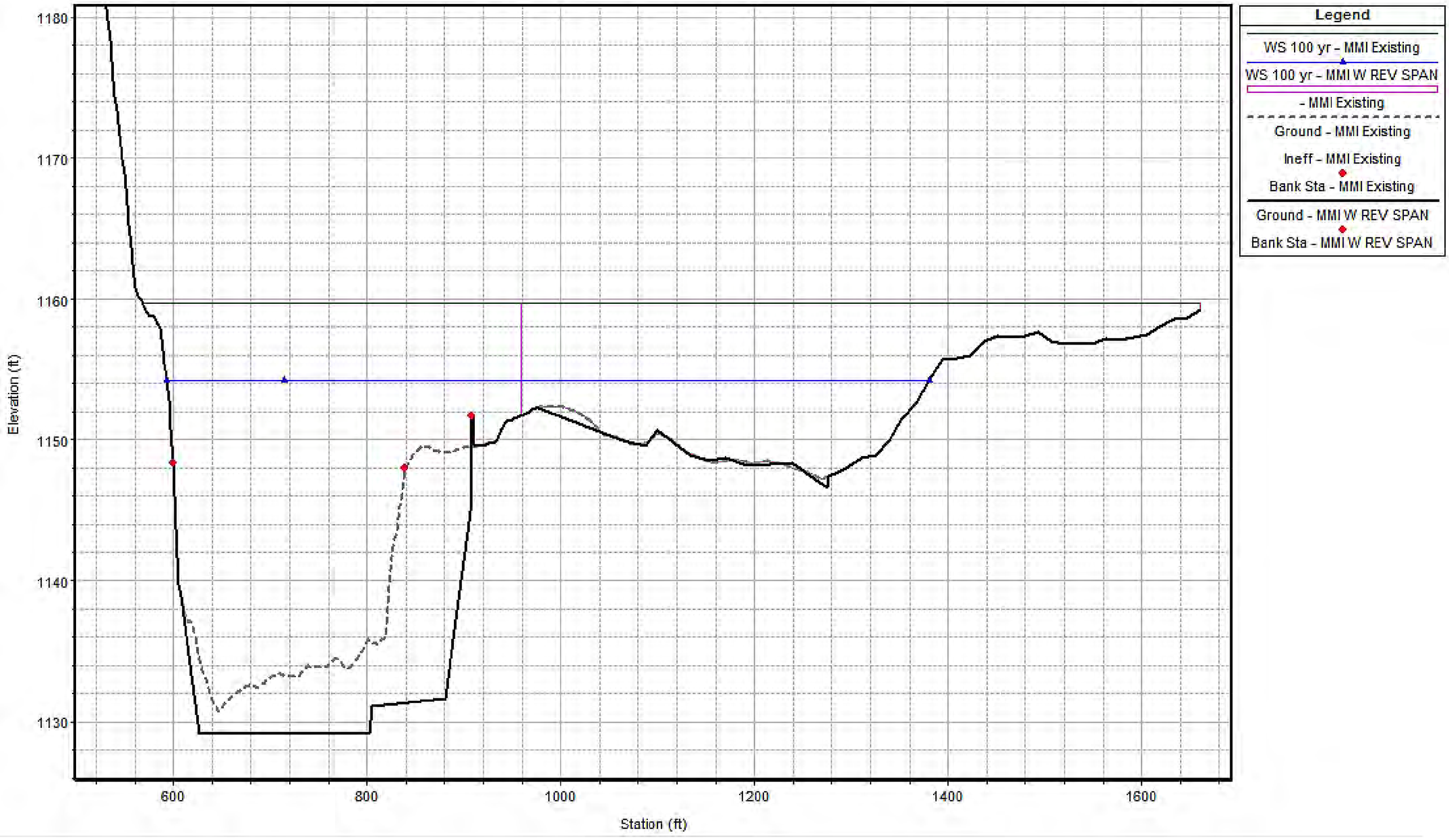
Geom: MMI Alt 4 w/ revised MMI Span Flow: FEMA, Bankfull, Irene (short) Discharges

River = R1 Reach = R1 RS = 10379 BR Rte 23 Bridge 10378.55 1.97811 Elevations of Ineffectives Above WSEL in over

MMI Schoharie Creek Prattsville Plan: 1) MMI W REV SPAN 3:00:44 PM 2) MMI Existing 11:59:45 AM

Geom: MMI Alt 4 w/ revised MMI Span Flow: FEMA, Bankfull, Irene (short) Discharges

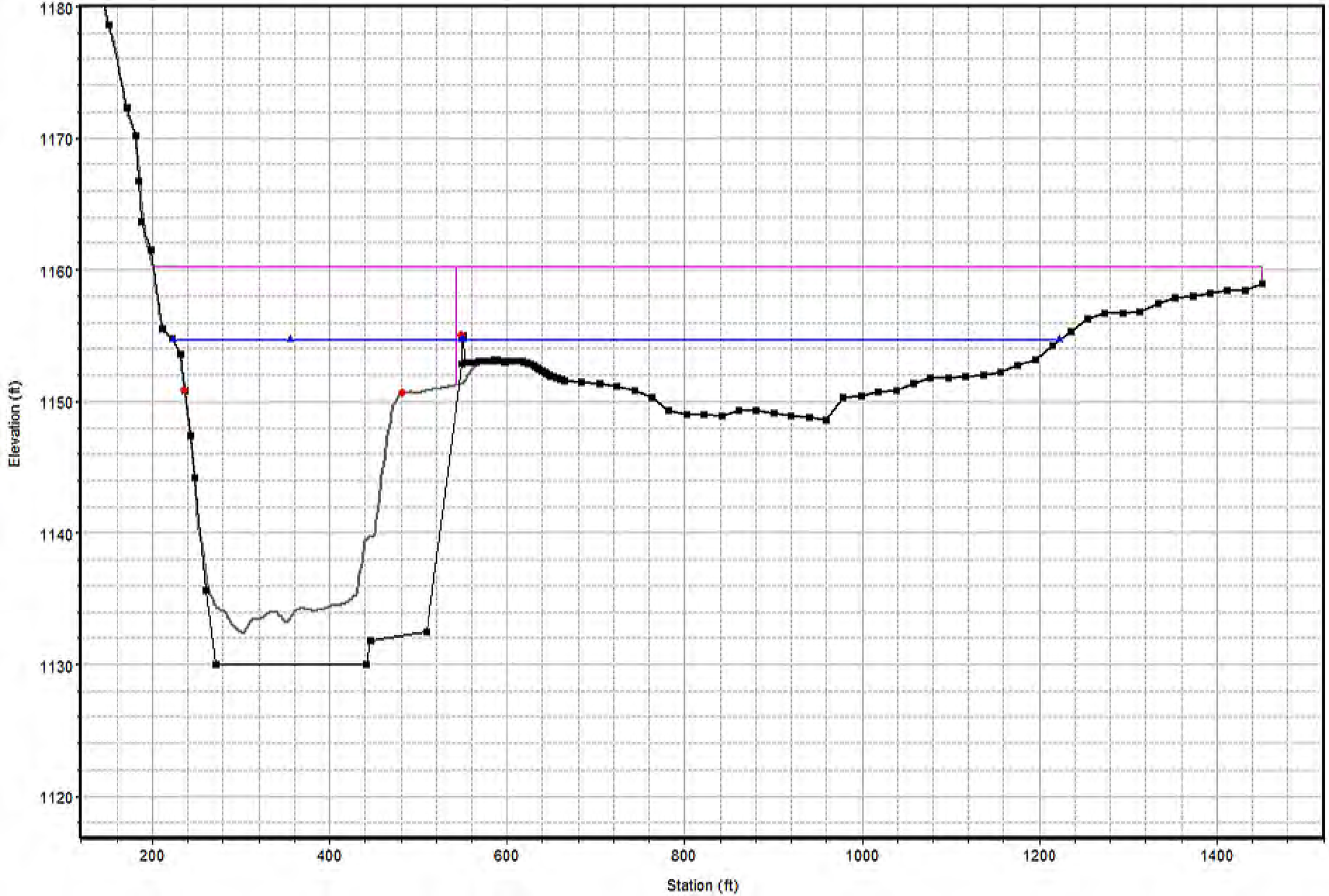
River = R1 Reach = R1 RS = 10643 10642.70 2.03182



MMI Schoharie Creek Prattsville Plan: 1) MMI W REV SPAN 3:00:44 PM 2) MMI Existing 11:59:45 AM

Geom: MMI Alt 4 w/ revised MMI Span Flow: FEMA, Bankfull, Irene (short) Discharges

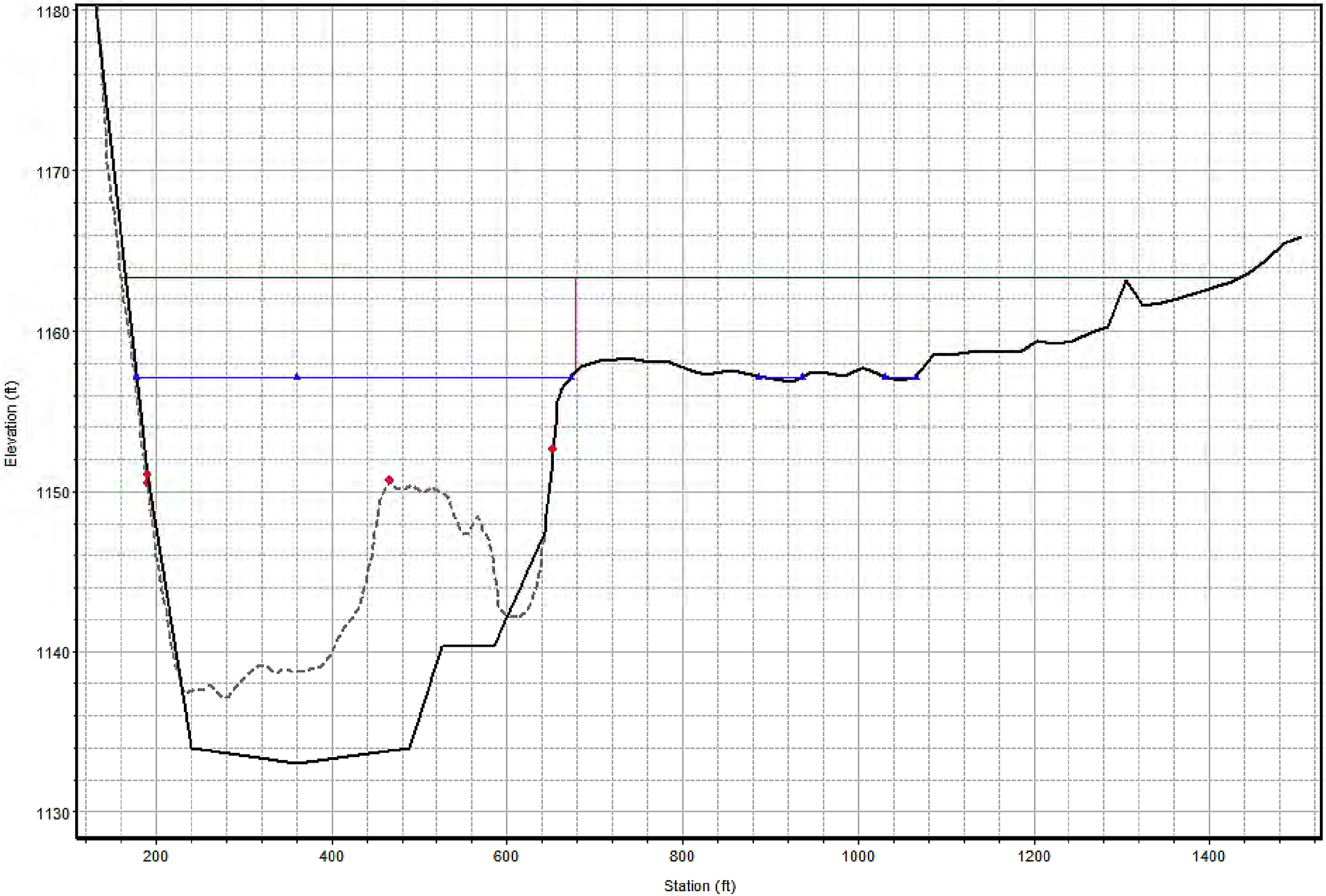
River = R1 Reach = R1 RS = 11154 11153.64 2.12859



MMI Schoharie Creek Prattsville Plan: 1) MMI W REV SPAN 3:00:44 PM 2) MMI Existing 11:59:45 AM

Geom: MMI Alt 4 w/ revised MMI Span Flow: FEMA, Bankfull, Irene (short) Discharges

River = R1 Reach = R1 RS = 12370 12369.67 2.3589



MMI Schoharie Creek Prattsville Plan: 1) MMI W REV SPAN 3:00:44 PM 2) MMI Existing 11:59:45 AM

Geom: MMI Alt 4 w/ revised MMI Span Flow: FEMA, Bankfull, Irene (short) Discharges

River = R1 Reach = R1 RS = 13655 13655.26 2.60238