BSDMS Summary Report

35 Otselic River at S.R. 23 at Cincinnatus, NY

Site Location:

Site ID: 35

Site Name: Otselic River at S.R. 23 at Cincinnatus, NY

County: Cortland

Nearest City: Cincinnatus

State: NY

Contact:
Pete Riehlman, NYSDOT, Region 3 hydraulic engineer (315) 428-4715.

Latitude: 423200

Longitude: 755412

USGS Station ID: 1510200

Route Number: 23

Route Class: State

Publication:

Service Level: Mainline

Route Direction: NA

Highway Mile Point:

Stream Name: Otselic River

River Mile:

Site Description:

This site is located at the State Route 23 bridge crossing the Otselic River at Cincinnatus, New York. The bridge, 187 ft long and 40 ft wide with one pier, is 0.5 mile downstream from a USGS streamflow gage. The pier footing has been undermined by scour, but the bridge is supported by pilings. A 30-degree angle between the pier and flow increases the tendency of the streambed to scour and has resulted in scour along the entire length of the pier. The deepest scour is 10 to 25 ft downstream from the pier nose.

Clear-water scour is common at this site. Multiple high flows have progressively deepened the local-scour hole. Each additional scour event is being analyzed separately for the New York study. However for the USGS national scour study, the "total" local scour is the depth of scour that the earlier high flows may have produced if the flow duration was sufficient to produce an equilibrium scour depth. The local-scour value listed in this data base for the 1990 high flow includes the previous local scour from earlier high flows.

General or contraction scour may have lowered the ambient bed 1-2 ft from the 1027 ft elevation listed in the bridge plans. The USGS stage-discharge relation can account for 0.3 ft. Contraction scour is insignificant based on approach, bridge, and exit cross sections.

The streambed is armored by gravel. Occassional mining in the stream about 0.5 mile upstream from the bridge at point bars does not appear to be degrading the thalweg. However, the thalweg may be migrating into the local-scour hole because the hole is now the lowest point in the channel.

Bed-material samples were collected in a shallow area of the channel near the bridge. The D16, D50, and D84 were analyzed. The D90 or D95 were not analyzed because of the accuracy of the limited data set.

Debris and high flow in 1993 lowered the channel near station 120 to 1019 ft msl, but the debris prevented additional local scour at the nose of the pier.

The local-scour hole does not refill after each high flow.

Local-scour depth is based on USGS measurements, although New York State Department of Transportation (NYSDOT) measurements are considered in the analysis. The 1988 NYSDOT ambient bed is questionable because it is 1.3 ft higher than the 1989 USGS measurement, and no significant high flow occurred. A USGS measurement in 1989 found scour hole at 1022.7 ft at the upstream side of the bridge (ussb). Because ambient bed is 1025.5 ft, 2.8 ft of local scour is calculated. The location of maximum scour was not measured in 1989, based on later data that show the deepest scour located 10-25 ft downstream from the pier nose. High flows in 1983, 1984, and 1986 are assumed to have contributed to the scour measured in 1989.

High flow in 1990 lowered the scour hole to 1020.6 at ussb and 1019.9 25 ft downstream. The ambient bed was lowered 0.4 ft, therefore, local scour is calculated to be 5.2 ft under the bridge (1025.1-1019.9).

In the New York study, each high flow is analyzed separately. Because the elevation of the scour hole under the bridge is unknown before the 1990 high flow, 1.7 ft of local scour is attributed to the 1990 high flow based on ussb data (scour hole was 2.1 ft deeper and ambient bed was 0.4 ft lower in 1991 than in 1990).

Elevation Reference

Datum: MSL

MSL (ft):

Description of Reference Elevation:

USSB: RM = Chiseled X in top of upstream bolt at base of first guardrail at LE of bridge. ELEVATION = 50.00 ft (local).
RP = Chiseled X in top of guardrail post at station 49. ELEVATION = 53.26 ft (local).
Bottom of pier footing = 1022.0 ft MSL (bridge plans)
RP = station 49
LE footing = station 93, LE pier at station 94
RE footing = station 99, RE pier at station 98

DSSB: RP = Chiseled X in top of guardrail post across from RP at USSB. ELEVATION = 53.27 ft (local)

APPR: RP = Lag bolt in 6-inch elm tree 200 ft upstream, left bank. ELEVATION = 41.19 ft.

EXIT: RP = Lag bolt in 8-inch willow tree 200 ft downstream, left bank. ELEVATION = 40.70 ft (local)

Stream Data

Drainage Area (sq mi):	153	**Floodplain Width:**	Narrow
Slope in Vicinity(ft/ft):	0.0004	**Natural Levees:**	Concave
Flow Impact:	Straight	**Apparent Incision:**	None

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Channel Evolution	Premodified	**Channel Boundary:**	Alluvial
Armoring:	High	**Banks Tree Cover:**	Low
Debris Frequency:	Occasional	**Sinuosity:**	Sinuous
Debris Effect:	Local	**Braiding:**	None
Stream Size:	Medium	**Anabranching:**	None
Flow Habit:	Flashy	**Bars:**	Narrow
Bed Material:	Gravel	**Stream Width Variability:**	Unknown
Valley Setting:	Moderate		

Roughness Data

Manning's n Values

	Left Overbank	Channel	Right Overbank
High:			
Typical	0.05	0.033	0.07
Low:			

Bed Material

Measurement Number	Yr	Mo	Dy	Sampler	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)	SP	Shape	Cohesion
1	1989	10	24	GRID	76	55	32	18	2.65		Non-Cohesive
2	1989	10	24	SHOVEL		33	15	2	2.65		Non-Cohesive

Bed Material Comments

Measurement No: 1

Bed-material samples were collected in a shallow area of the channel near the bridge. The sizes are based on 100 samples using the grid-sampling technique

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Measurement No: 2

Bed-material samples were collected in a shallow area of the channel near the bridge. The D16, D50, and D84 were analyzed. The D90 or D95 were not analyzed because of the accuracy of the limited data set.

Bridge Data

Structure No: 3312170

Length(ft): 187

Width(ft): 40

Number of Spans: 2

Vertical Configuration: Horizontal

Low Chord Elev (ft): 1036

Upper Chord Elev (ft):

Overtopping Elev (ft): 1042

Skew (degrees): 30

Guide Banks: None

Waterway Classification: Main

Year Built: 1981

Avg Daily Traffic:

Plans on File: Yes

Parallel Bridges No

Upstream/Downstream: N/A

Continuous Abutment: No

Distance Between Centerlines:

Distance Between Pier Faces:

Bridge Description:

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Abutment Data

Left Station: 0

Right Station: 186

Left Skew (deg): 0

Right Skew (deg) 0

Left Abutment Length (ft):

Right Abutment Length (ft)

Left Abutment to Channel Bank (ft): 20

Right Abutment to Channel Bank (ft): 50

Left Abutment Protection:

Right Abutment Protection

Contracted Opening Type: III

Embankment Skew (deg): 0

Embankment Slope (ft/ft):

Abutment Slope (ft/ft)

Wingwalls: Yes

Wingwall Angle (deg): 0

Pier Data

Pier ID	Bridge Station(ft)	Alignment	Highway Station	PierType	# Of Piles	Pile Spacing(ft)
1	96	0	96	Single	0	

Pier ID	Pier Width(ft)	Pier Shape	Shape Factor	Length(ft)	Protection	Foundation
1	3	Round		40	None	Piles

Pier ID	Top Elevation(ft)	Bottom Elevation(ft)	Foot or Pile Cap Width(ft)	Cap Shape	Pile Tip Elevation(ft)
1	1025.5	1022	6	Square	

Pier Description

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Pier ID 1

The flow angle of 30 degrees results in scour along the entire length of the right side of the pier. The footing is undermined 2 ft. Flow aligns with the pier before reaching the downstream side.

Pier Scour Data

Pier ID	Date	Time	USOrDS
1	10/24/90	0:00	Upstream

Pier ID	Scour Depth	Accuracy (ft)	Side Slope (ft/ft)	TopWidth (ft)	Apprch Vel (ft/s)	Apprch Depth(ft)	Effective Pier Width	Skew to Flow(deg)
1	5.2	0.2	6.6	52	6.8	10.3	3	30

PierID	Sediment Transport	Bed Material	BedForm	Trough (ft)	Crest (ft)	Sigma	Debris Effects
1	Clear-water	Non-cohesive	Unknown			1.75	Insignificant

PierID	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)
1	76	55	32	18

Pier Scour Comments

Pier ID 1 **Time:** 0:00 **US/DS:** Upstream

The sounding weight became lodged under the footing during measurement. Local scour at the upstream side of the bridge (ussb) is 4.5 ft. The maximum local scour is 5.2 ft 25 ft downstream from ussb, based on the 8-28-91 cross section. The ambient bed was lowered 0.4 ft.

Abutment Scour

ContractionScour

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Stage and Discharge Data

Peak Discharge					Flow (cfs)	Qacc	Peak Stage					Stage (ft)	Water Temp (C)	Return Period(yr)
year	mo	dy	hr	mi			year	mo	dy	hr	mi			
1993	4	11		0	7300	95	1993	4	11		0			15
1983	12	14		0	6600	95	1983	12	14		0			8
1984	2	15		0	5900	95	1984	2	15		0			5
1986	3	15		0	6200	95	1986	3	15		0			6
1990	10	24		0	6100	95	1990	10	24		0			6

Hydrograph

Hydrograph Number	Year	Month	Day	Hr	Min	Sec	Stage(ft)	Discharge (cfs)

Supporting Files