Appendix E

Town of Niagara Notification

Town of Wheatfield Notification

Letter of Map Revision Determination Document

Annotated Flood Insurance Rate Map

Annotated Flood Insurance Study Report

FEMA Application for a Letter of Map Revision
Niagara County, New York

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Federal Emergency Management Agency

Washington, D.C. 20472

April 16, 2015

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Lee S. Wallace
Supervisor, Town of Niagara
7105 Lockport Road
Niagara Falls, NY 14305

IN REPLY REFER TO:
Case No.: 15-02-0453P
Community Name: Town of Niagara, NY
Community No.: 360507
Effective Date of
This Revision: **October 16, 2015**

Dear Mr. Wallace:

The Flood Insurance Study Report (FIS) and Flood Insurance Rate Map (FIRM) for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed that provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other enclosures, specific to this request, may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in New York, New York, at (212) 680-3622, or the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our Web site at http://www.fema.gov/nfip.

Sincerely,

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: The Honorable Robert B. Cliffe
Supervisor
Town of Wheatfield

Mr. Charles Haseley
Building Inspector and Floodplain Administrator
Town of Niagara

Mr. Mike Klock
Building Inspector and Floodplain Administrator
Town of Wheatfield

Colonel Roy-Alan C. Agustin
HQ AFRC/A7

Mr. William Nechamen, CFM
Chief, Floodplain Management
NYS DEC Bureau of Flood Protection
State of New York

Ms. Rebecca Anderson
NYS DEC Region 9

Mr. Paul Cocca, P.E., PMP
Chief, Hydrology and Hydraulics Engineering Team
U.S. Army Corps of Engineers, Buffalo District

Federal Emergency Management Agency

Washington, D.C. 20472

April 16, 2015

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Robert B. Cliffe
Supervisor, Town of Wheatfield
2800 Church Road, Upper Level
Wheatfield, NY 14120

IN REPLY REFER TO:
Case No.: 15-02-0453P
Community Name: Town of Wheatfield, NY
Community No.: 360513
Effective Date of
This Revision: **October 16, 2015**

Dear Mr. Cliffe:

The Flood Insurance Study Report (FIS) and Flood Insurance Rate Map (FIRM) for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed that provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in New York, New York, at (212) 680-3622, or the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Sincerely,

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

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Annotated Flood Insurance Rate Map
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cc: The Honorable Lee S. Wallace
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Mr. Mike Klock
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Chief, Hydrology and Hydraulics Engineering Team
U.S. Army Corps of Engineers, Buffalo District

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	Town of Niagara Niagara County New York	NO PROJECT	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS UPDATED TOPOGRAPHIC DATA
	COMMUNITY NO.: 360507		
IDENTIFIER	Niagara Falls Air Reserve Station	APPROXIMATE LATITUDE AND LONGITUDE: 43.117, -78.943 SOURCE: Precision Mapping Streets DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 36063C0327E DATE: September 17, 2010	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: September 17, 2010 FLOOD PROFILE: 142P SUMMARY OF DISCHARGES TABLE: 7

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map

FLOODING SOURCE AND REVISED REACH

Unnamed Tributary to Cayuga Creek - from the confluence with Cayuga Creek to a point approximately 3,050 feet upstream of Wagner Drive

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Unnamed Tributary to Cayuga Creek	Zone A	Zone AE	YES	YES
	Zone X (unshaded)	Zone X (shaded)	YES	NONE
	No BFEs*	BFEs	YES	NONE

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panel revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 360513 **Name:** Town of Wheatfield, New York

AFFECTED MAP PANELS	AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM* NO.: 36063C0327E DATE: September 17, 2010	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: September 17, 2010 FLOOD PROFILE: 142P SUMMARY OF DISCHARGES TABLE: 7

* FIRM - Flood Insurance Rate Map

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that any permits required by Federal or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

Because the FIS report establishing the BFEs for your community has been completed, certain additional requirements must be met under Section 1361 of the National Flood Insurance Act of 1968, as amended, within 6 months from the date of this letter. Prior to the effective date of this revision your community is required, as a condition of continued eligibility in the National Flood Insurance Program (NFIP), to adopt or show evidence of adoption of floodplain management regulations that meet the standards of Paragraph 60.3(d) of the enclosed NFIP regulations (44 CFR 59, etc.). These standards are the minimum requirements and do not supersede any State or local requirements of a more stringent nature.

It must be emphasized that all the standards specified in Paragraph 60.3(d) of the NFIP regulations must be enacted in a legally enforceable document. This includes adoption of the current effective FIS report and FIRM to which the regulations apply and other modifications made by this map revision. Some of the standards should already have been enacted by your community in order to establish initial eligibility in the NFIP.

Your community can meet any additional requirements by taking one of the following actions:

1. Amending existing regulations to incorporate any additional requirements of Paragraph 60.3(d).
2. Adopting all the standards of Paragraph 60.3(d) into one new, comprehensive set of regulations.
3. Showing evidence that regulations have previously been adopted that meet or exceed the minimum requirements of Paragraph 60.3(d).

Communities that fail to enact the necessary floodplain management regulations will be suspended from participation in the NFIP and subject to the prohibitions contained in Section 202(a) of the Flood Disaster Protection Act of 1973 (Public Law 93-234) as amended.

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Michael Moriarty
Director, Mitigation Division
Federal Emergency Management Agency, Region II
26 Federal Plaza, 13th floor
New York, NY 10278-0002
(212) 680-3622

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

A notice of changes will be published in the *Federal Register*. A short notice will also be published in your local newspaper on or about the dates listed below and through FEMA's Flood Hazard Mapping Web site at https://www/floodmaps.fema.gov/fhm/Scripts/bfe_main.asp.

LOCAL NEWSPAPER Name: *The Niagara Gazette*
Dates: 04/23/2015 and 04/30/2015

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. This revision will be effective 6 months from the date of this letter and only after we have resolved any appeals that we receive during the appeal period. Until this LOMR is effective, the revised flood hazard information presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

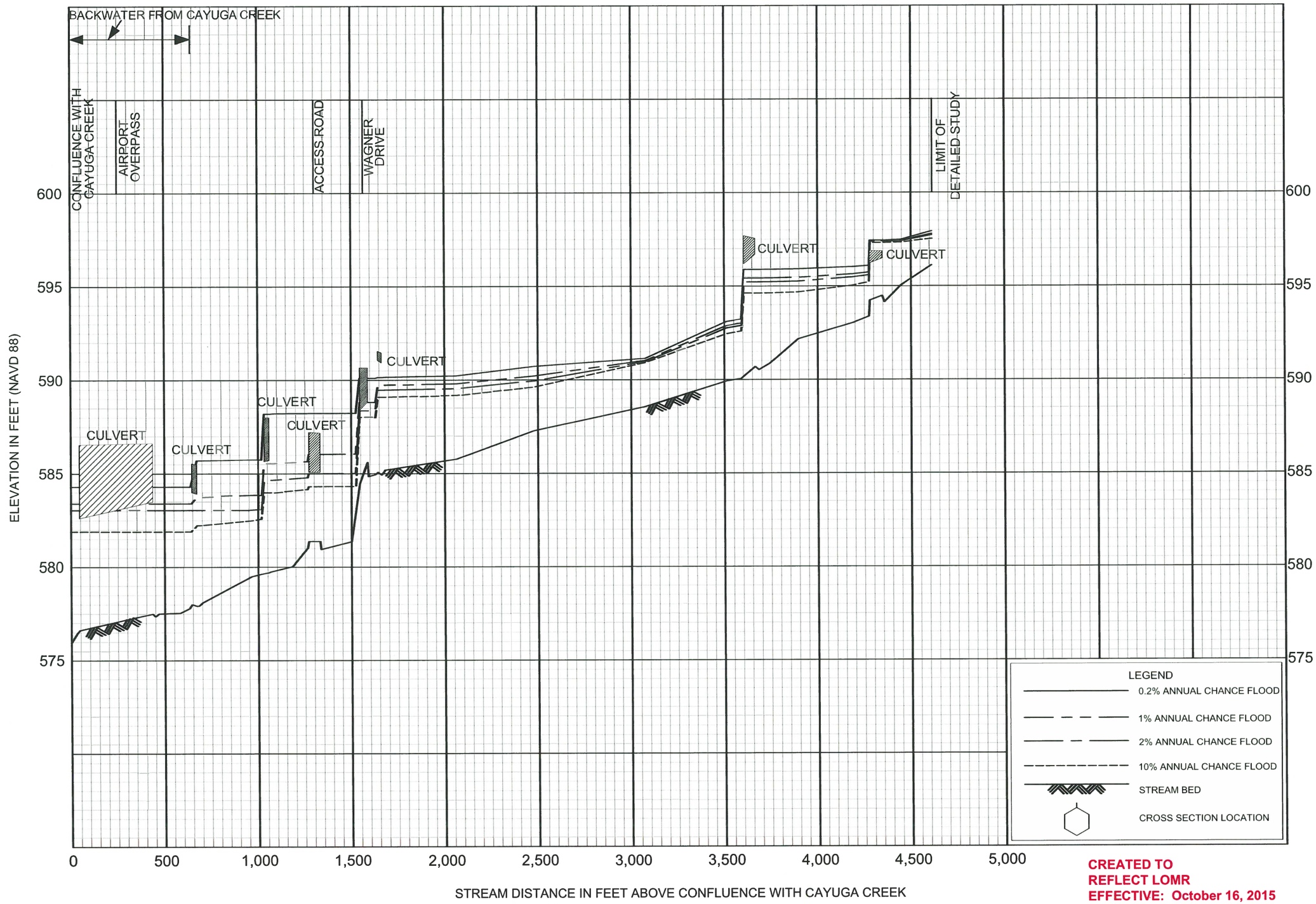
Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

TABLE 7 - SUMMARY OF DISCHARGES

(Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
UNNAMED TRIBUTARY TO CAYUGA CREEK					
At Confluence with Cayuga Creek	1.44	96	123	160	260
Approximately 500 feet upstream of Wagner Drive	1.02	75	97	105	124

CREATED TO REFLECT LOMR EFFECTIVE: October 16, 2015



CREATED TO REFLECT LOMR EFFECTIVE: October 16, 2015

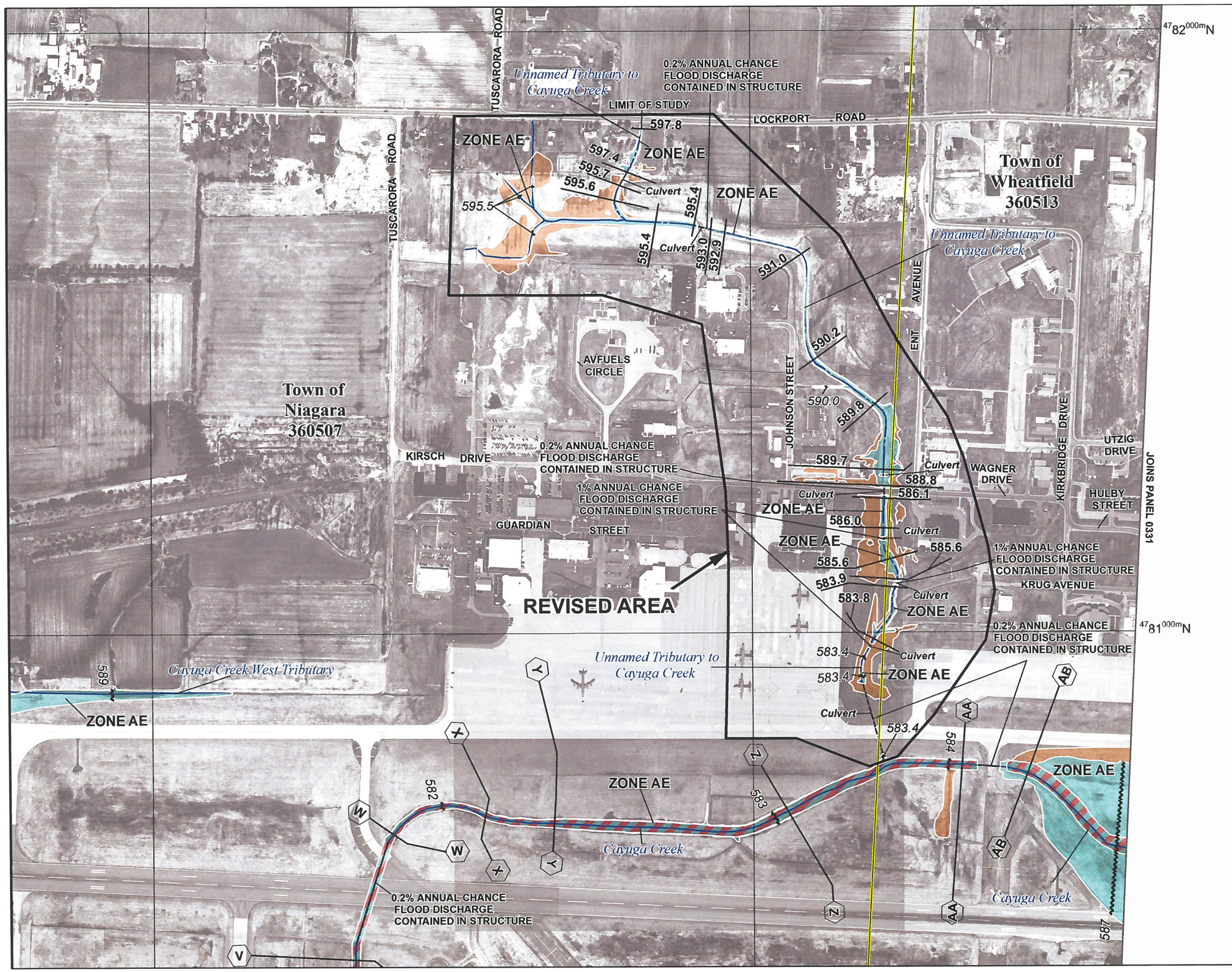
FLOOD PROFILES

UNNAMED TRIBUTARY TO CAYUGA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

NIAGARA COUNTY, NY

(ALL JURISDICTIONS)



SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*

SCALE

Map Projection:
NAD 1983 UTM Zone 18N;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 62.5 125 250 Meters

FEMA
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)

PANEL **327** OF **430**

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
NIAGARA, TOWN OF	360507	0327	E
NIAGARA FALLS, CITY OF	360506	0327	E
WHEATFIELD, TOWN OF	360513	0327	E

REVISED TO REFLECT LOMR EFFECTIVE:

October 16, 2015

VERSION NUMBER
2.3.2.0

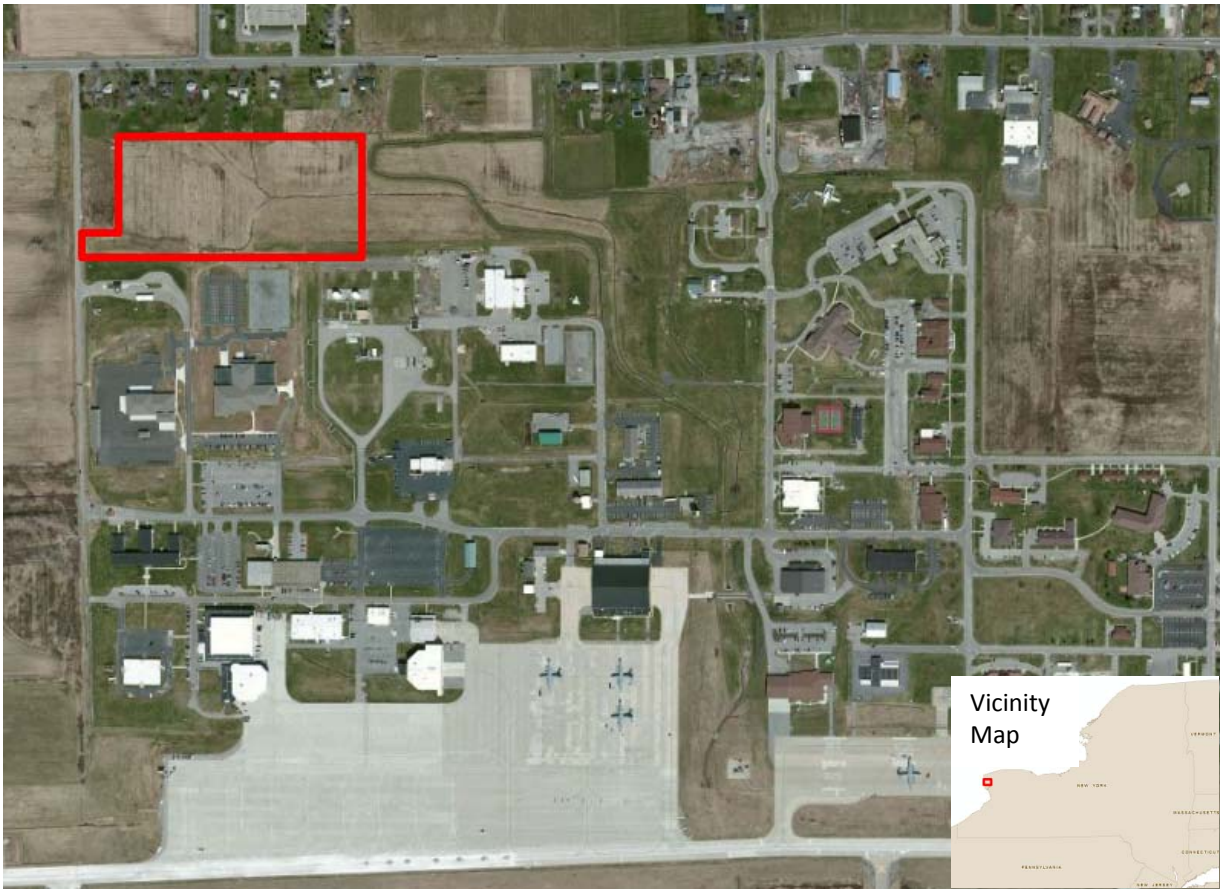
MAP NUMBER
36063C0327E

EFFECTIVE DATE
SEPTEMBER 17, 2010

Application - Letter of Map Revision (LOMR)

Niagara County, New York

Niagara Falls Air Reserve Station



Border Patrol Site Proposal

US Army Corps of Engineers®
Buffalo District
BUILDING STRONG®

June 2013

DEPARTMENT OF THE ARMY

BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF

10 June 2013

LOMC Clearinghouse
847 South Pickett Street
Alexandria, VA 22304

Re: The Unnamed Tributary to Cayuga Creek at the Niagara Falls Air Reserve Station in Niagara Falls New York

To Whom It May Concern:

1. The attached package contains the required information for a Letter of Map Revision (LOMR) for the remapping of the Unnamed Tributary to Cayuga Creek at the Niagara Falls Air Reserve Station in Niagara Falls New York. The following is a list of submitted information:

    a) Narrative for the project proposal
    b) MT-2 Form 1 and MT-2 Form 2 along with supporting explanations
    c) Hydrology and Hydraulic Report for Cayuga Creek and Unnamed Tributary for Cayuga Creek Niagara Falls, Niagara County New York
    d) HEC-RAS Report for the Unnamed Tributary and Related Profiles
    e) FEMA cHECk – RAS Report
    f) Topographic Map and Survey used for computer models
    g) Individual and Public Notification Letters
    h) FEMA Form 81-107 Payment Information

2. As a government agency, the U.S. Army Corps of Engineers does not sign documents as Registered Professional Engineers; therefore signature block three (3) on MT-2 Form 1, "Certification by Registered Engineer and/or Land Surveyor" will remain unsigned.

3. The point of contact for this LOMR is Keith Koralewski. Keith can be reached at (716) 879-4358 or through email at Keith.R.Koralewski@usace.army.mil if further information is required.

Thank you,

Keith R. Koralewski, P.E.
Chief, Hydrology and Hydraulics Engineering Section

Narrative for Project Submittal

This Letter of Map Revision (LOMR) request is being submitted for an unnamed tributary, known as Outfall Number 5 on the Niagara Falls New York Air Reserve Station. This unnamed tributary outlets into the Cayuga Creek shortly before the Cayuga meets the Niagara River. The unnamed tributary flows through the Niagara Falls New York Air Reserve Station located approximately four miles east of the central business district of Niagara Falls, in Niagara County, New York. This LOMR request is limited to the unnamed tributary identified as Outfall Number 5 on the Air Reserve Station only; it is not meant to change the AE designated portion of the Cayuga Creek.

The United States Customs Border Protection (CBP) is in need of a new U.S. Border Patrol (USBP) station in Niagara Falls, New York that meets security requirements. CBP is investigating a parcel of property that is currently part of the Niagara Falls Air Reserve Station as a location for a new USBP station. The current (2011) flood Insurance Study and associated Digital FIRM map (September 17 2010) show this parcel is within the approximate Zone A floodplain of the unnamed tributary, also identified as Outfall Number 5 by the Air Reserve Station, which flows into Cayuga Creek. The floodplain mapping that exists for this area was developed using the approximate method, meaning no base flood elevation (BFE) has been determined.

In 2005, the Niagara Falls Air Reserve Station requested the US Army Corps of Engineers (USACE) Buffalo District to determine the 1.0% annual chance exceedance rate for the Cayuga Creek and related unnamed tributary (Outfall#5) as they affect the base. At the time of this request the Air Reserve Station was investigating the feasibility of constructing a new Fire and Crash Rescue Station within the approximate Zone A floodplain (Figure One - The Niagara Falls AFRS 100-YR Floodplain and Floodway Boundary Map). In order to determine more accurately what the 1.0% floodplain is comprised of within this area of interest (i.e. The Air Reserve Station), the Buffalo District developed a detailed floodplain map for the reach of Cayuga Creek from the downstream property limit of the Air Reserve Station to Outfall #5, and proceeding upstream on Outfall #5 to the property limits. This floodplain mapping was developed for the 1.0% (100 year) and 0.2% (500 year) rainfall exceedance using the detailed method.

The runoff and peak discharges for the Cayuga Creek and Unnamed Tributary watershed were calculated using the Corps' computer program Hydraulic Engineering Center – Hydrologic Modeling System (HEC-HMS). Parameters included in this model were: watershed size, rainfall (total and temporal pattern), loss rate parameters, and unit hydrograph parameters. All parameters are explained and defined in the methodology section of the Hydrology and Hydraulic Report for the Cayuga Creek and Unnamed Tributary to Cayuga Creek Niagara Falls, New York 2005 report included with this submittal package.

Analyses of the hydraulic characteristics of flooding from sources studied were carried out using the Corps' computer program Hydraulic Engineering Center – River Analysis System (HEC-RAS) to

provide estimates of the elevations of floods for the 10%, 2%, 1.0% and 0.2% occurrences. Known water surface elevations were used for the downstream boundary conditions. The water surface elevations were taken from the 1983 Town of Niagara, Niagara County New York Flood Insurance Study (FIS). All parameters used are explained in the Hydraulic Analysis section of the Hydrology and Hydraulic Report for the Cayuga Creek and Unnamed Tributary to Cayuga Creek Niagara Falls, New York 2005 report included.

The results of the 2005 study concluded little to no flooding within the parcel of property CBP is investigating (Figure Two – Border Patrol Site Proposal). The 1.0% year flow is contained within the channel banks, for the most part. The floodway was determined with a surcharge of no more than one foot. The floodway creeks did not extend outside of the channel banks.

As a result of this analysis, this request for a Letter of Map Revision is being submitted to update the current floodplain maps along the Unnamed Tributary (Outfall #5) to Cayuga Creek to represent the findings for the unnamed tributary. This LOMR is not intended to include the Cayuga Creek, and is limited to the unnamed tributary identified as Outfall Number 5 on the air reserve station only.

Figure One

Niagara Falls AFRS

100-YR Floodplain and floodway Boundary Map

Legend

- Cross Sections
- Airbase Boundary
- Stream Centerline
- Floodway
- 100-yr Floodplain

Niagara Falls AFRS
100-YR Floodplain and Floodway Boundary Map

US Army Corps of Engineers
Buffalo District

Scale

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

Vicinity Map

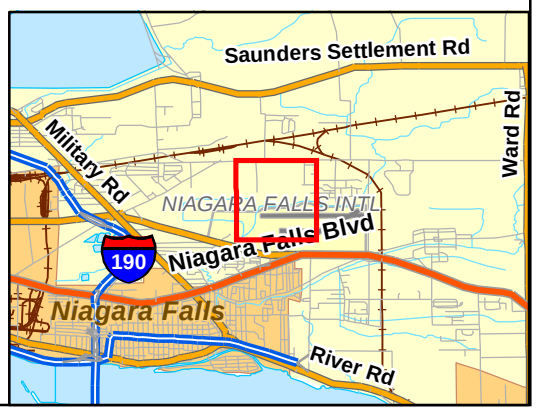
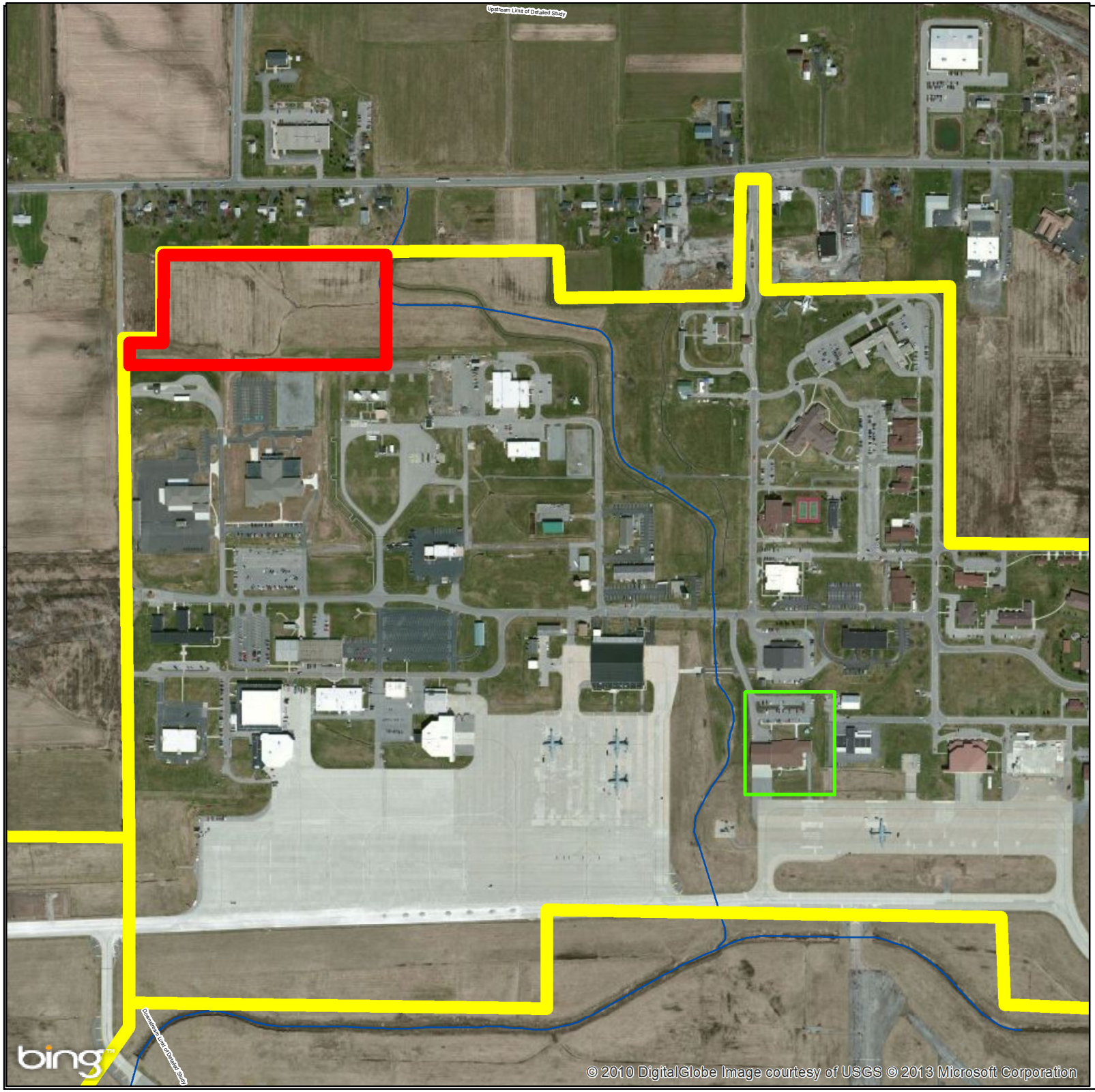


Figure 1

Figure Two

Niagara Falls AFRS

Border Patrol Site Proposal



Niagara Falls AFRS

Border Patrol Site Proposal
Sub Basins

US Army Corps of Engineers
Buffalo District

Map Date: June 21, 2013

Scale

0 250 500 1,000 Feet

N
W E
S

Legend

- Border Patrol Parcel
- NFARS-Property
- Fire and Crash Station
- Stream Centerline

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☐ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).

☒ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
360507	Niagara, Town of	NY	36063C	0327E	09/17/10

2. a. Flooding Source: Unnamed Tributary to Cayuga Creek

   b. Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)
   ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Updating Flood Plain Mapping Unnamed Tributary to Cayuga Creeek within the Niagara Falls Air Reserve Station

4. FEMA zone designations affected: A (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

5. Basis for Request and Type of Revision:

   a. The basis for this revision request is (check all that apply)

   ☐ Physical Change ☒ Improved Methodology/Data ☐ Regulatory Floodway Revision ☐ Base Map Changes
   ☐ Coastal Analysis ☒ Hydraulic Analysis ☒ Hydrologic Analysis ☐ Corrections
   ☐ Weir-Dam Changes ☐ Levee Certification ☐ Alluvial Fan Analysis ☐ Natural Changes
   ☐ New Topographic Data ☐ Other (Attach Description)

   Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☒ Channelization ☐ Levee/Floodwall ☒ Bridge/Culvert

☐ Dam ☐ Fill ☐ Other (Attach Description)

6. ☐ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $5,300.00

☐ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Col Roy-Alan C. Agustin	Company: HQ AFRC/A7	
Mailing Address: 255 Richard Ray Blvd Robins AFB GA 31098-1637	Daytime Telephone No.: 4783271100	Fax No.:
	E-Mail Address: roy_alan.agustin.1@us.af.mil	
Signature of Requester (required):	Date: 12 FEBRUARY 2014	

'he community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision MR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Joseph Cathrda Flood Admin / Bldg. Insp.	Community Name: Town of Wheatfield	
Mailing Address: 2800 Church Rd. North Tonawanda, NY 14120	Daytime Telephone No.: 716 694-1026	Fax No.: 694-1800
	E-Mail Address: inspector@wheatfield.ny.us	
Community Official's Signature (required):	Date: 6/17/13	

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name:	License No.:	Expiration Date:
Company Name:	Telephone No.:	Fax No.:
Signature:	Date:	E-Mail Address:

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☒ Channelization ☐ Levee/Floodwall ☒ Bridge/Culvert

☐ Dam ☐ Fill ☐ Other (Attach Description)

6. ☐ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☐ Yes Fee amount: $0.00

☐ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name:	Company:	
Mailing Address:	Daytime Telephone No.:	Fax No.:
	E-Mail Address:	
Signature of Requester (required):	Date:	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Building Inspector / Floodplain Adm.	Community Name: Town of Niagara	
Mailing Address: 7105 Lockport Rd Niagara Falls, NY. 14304	Daytime Telephone No.: (716) 297 2150	Fax No.: (716) 297 9262
	E-Mail Address: —	
Community Official's Signature (required):	Date: 2/19/14	

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name:	License No.:	Expiration Date:
Company Name:	Telephone No.:	Fax No.:
Signature:	Date:	E-Mail Address:

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if …
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☐ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

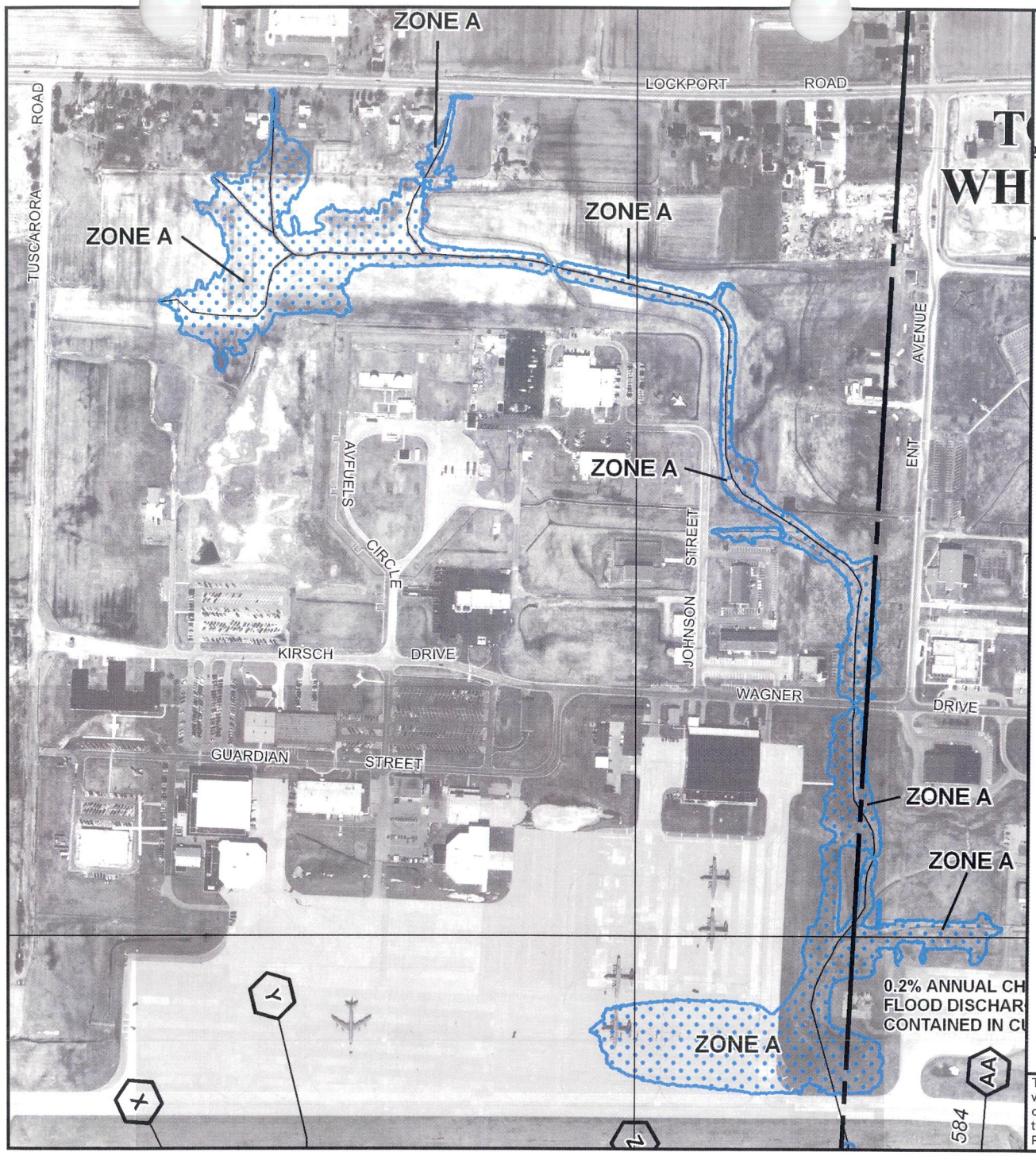
Form One Section C:

In accordance with Section 72.5 of the NFIP regulations, review and processing fees are not required for:

1. Map changes based on mapping or study analysis errors
2. Map changes based on the effects of natural changes within the Special Flood Hazard Area
3. Requests for LOMAs
4. Federally sponsored flood-control projects where 50 percent or more of the projects costs are federally funded
5. Map changes based on detailed hydrologic and hydraulic studies conducted by Federal, State or local agencies to replace approximate studies conducted by FEMA and shown on the effective Flood Insurance Rate Map (FIRM)
6. Map changes based on the flood hazard information meant to improve upon that shown on the flood map or within the flood study

This Letter of Map Revision request complies with number 5 below, and therefore is fee exempt.

5. Map changes based on detailed hydrologic and hydraulic studies conducted by Federal, state or local agencies to replace approximate studies conducted by FEMA and shown on the effective flood Insurance Rate Map.



MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0327E

FIRM

FLOOD INSURANCE RATE MAP

for NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)

CONTAINS:

COMMUNITY	NUMBER
NIAGARA, TOWN OF	360507
NIAGARA FALLS, CITY OF	360506
WHEATFIELD, TOWN OF	360513

PANEL 327 OF 430
MAP SUFFIX: E
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

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
36063C0327E

EFFECTIVE DATE
SEPTEMBER 17, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: Unnamed Tributary (Outfall#5) to Cayuga Creek

Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section B) ☒ No existing analysis ☒ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)
Outfall #5	0.8944	N/A	160

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model → Specify Model: HEC-HMS
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters), and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Is the hydrology for the revised flooding source(s) affected by sediment transport? ☐ Yes ☒ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation..

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit*	River Station 85.2877		NA	580.39
Upstream Limit*	River Station 4572.864	J	NA	596.48

*Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used: HEC-RAS

3. Pre-Submittal Review of Hydraulic Models*

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4.

Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
Corrected Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
Existing or Pre-Project Conditions Model	File Name: NFARS_RAS_trib2	Plan Name: Current Conditions	File Name:	Plan Name:	
Revised or Post-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Other - (attach description)	File Name:	Plan Name:	File Name:	Plan Name:	

* For details, refer to the corresponding section of the instructions.

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic work map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

☐ Digital Mapping (GIS/CADD) Data Submitted (preferred)

Topographic Information: _____

Source: _____ Date: _____

Accuracy: _____

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM**, at the same scale as the original, annotated to show the boundaries of the revised 1%-and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%-and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area on revision.

☐ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☒ No

   a. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:

   - The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot compared to pre-project conditions.
   - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.

   b. Does this LOMR request cause increase in the BFE and/or SFHA compared with the effective BFEs and/or SFHA? ☐ Yes ☒ No

   If Yes, please attach **proof of property owner notification and acceptance (if available)**. Elements of and examples of property owner notifications can be found in the MT-2 Form 2 Instructions.

2. Does the request involve the placement or proposed placement of fill? ☐ Yes ☒ No

   If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(A)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

3. For LOMR requests, is the regulatory floodway being revised? ☐ Yes ☒ No

   If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being established. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

4. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA).

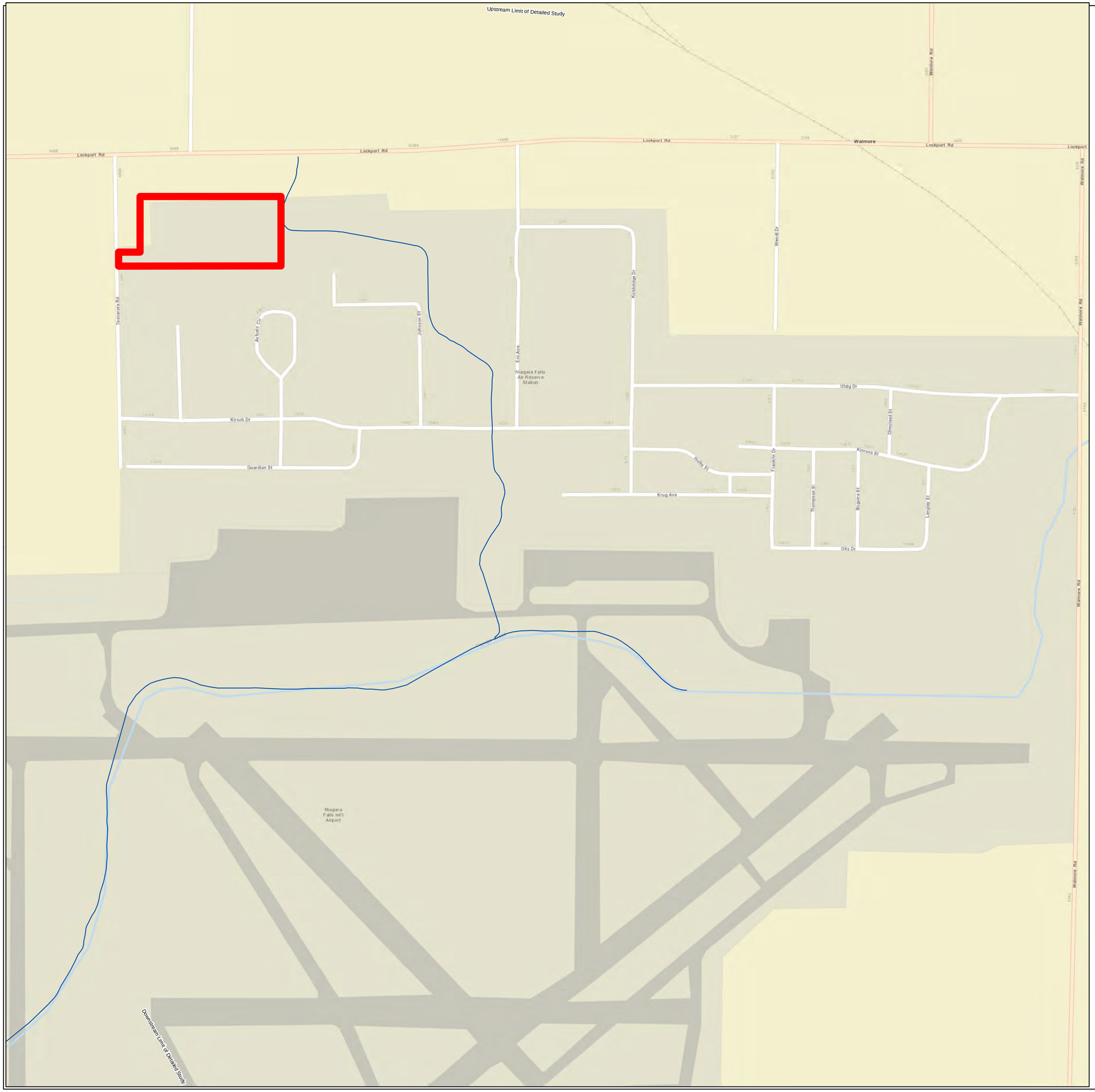
For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see the MT-2 instructions for more detail.

* Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.

MT-2 Form 2 - Continued

A. Hydrology

5. The area in question is at the headwaters of the Unnamed Tributary with stable vegetative cover. There are no signs of erosion or pitting in this area, banks appear to be shallow and stable; therefore it is assumed the current sediment transport would not be affected.



Niagara Falls AFRS

Border Patrol Site Proposal Sub Basins

US Army Corps of Engineers
Buffalo District

Map Date: February 5, 2013

Scale

0 400 800 1,600 Feet

N
W E
S

Legend

Border Patrol Parcel

Stream Centerline

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF

22 April 2013

Hydrology and Hydraulics Engineering Section

LOMC Clearinghouse
847 South Pickett Street
Alexandria, VA 22304

Re: The Hydrologic and Hydraulic Report for Cayuga Creek and Unnamed Tributary to Cayuga Creek, Niagara Falls, New York

To Whom It May Concern:

In 2005, the Niagara Falls Air Reserve Station requested the US Army Corps of Engineers (USACE) Buffalo District to determine the 1.0% annual chance exceedance rate for the Cayuga Creek and related Unnamed Tributary identified on the Air Reserve Station as Outfall Number 5 as they affect the base. At the time of this request the Air Reserve Station was investigating the feasibility of constructing a new Fire and Crash Rescue Station within the approximate Zone A, which is what the included Hydrologic and Hydraulic was intended to address.

In order to determine more accurately what the 1.0% floodplain is comprised of within this area of interest (i.e. The Air Reserve Station), the Buffalo District developed a detailed floodplain map for the reach of Cayuga Creek from the downstream property limit of the Air Reserve Station to Outfall #5, and proceeding upstream on Outfall Number 5 to the property limits. This floodplain mapping was developed for the 1.0% (100 year) and 0.2% (500 year) rainfall exceedance using the detailed method.

Although this report includes both the Cayuga Creek and the Unnamed Tributary identified as Outfall Number 5, only the unnamed tributary is being considered for the submitted Letter of Map Revision (LOMR). The current AE Zone on Cayuga Creek is not addressed as part of this LOMR application.

Sincerely,

Keith R. Koralewski, P.E.
Chief, Hydrology and Hydraulics Engineering Section

Hydrology and Hydraulic Report for Cayuga Creek and Unnamed Tributary to Cayuga Creek Niagara Falls, New York

US Army Corps of Engineers - Buffalo District

Prepared for the Niagara Falls Air Reserve Station, Niagara Falls, NY

June 2005

Summary of Hydrology for
Updating the Flood Plain Mapping, Cayuga Creek
within the
Niagara Falls Air Reserve Station,
Niagara Falls, New York

INTRODUCTION:

In 2005, the Niagara Falls Air Reserve Station (ARS) considered constructing a new fire station on a previously undisturbed portion of the ARS. At that time it was not clear whether the proposed fire station was within the floodplain or what the 1.0 % (100-year) stream elevation was at that time. The existing floodplain mapping was developed using the approximate method, i.e., no base elevation (water surface profile). The Buffalo District was asked to develop a detailed floodplain map for the reach of Cayuga Creek from the downstream property limit to the tributary identified on the airbase as Outfall #5, then proceeding upstream on Outfall #5. Floodplain mapping was developed for the 1.0% (100-year) and 0.2% (500-year) rainfall events.

Hydrology:

In March 1999, the Buffalo District was asked to help determine whether the airbase contributes to downstream flooding on Cayuga Creek. The Buffalo District developed runoff parameters and hypothetical rainfall for that study. The results of that study were completed in October 1999, indicating that the air base had very little impact on downstream peak flows. Since then, the district has had many discussions on that method for determining the rainfall pattern for hypothetical rainfall and even provided an update of the original study in May 2001. Additional discussions after May 2001 reach the conclusion that it wasn't as much the rainfall temporal pattern as much as the source of the rainfall that was not giving good results.

Although a new source of rainfall was used for this study, the runoff parameters from the previous studies were used. A new sub-basin, Upper West Branch is within the HEC-HMS model, but was not used in the study.

Hypothetical Rainfall:

Originally, the 24 hour rainfall amounts for the 50% (2-year), 20% (5-year), 10% (10-year), 4% (25-year), 2% (50-year) and 1% (100-year) events were determined using the Northeast Regional Climate Center's (@ Cornell University) Publication # RR 93-5: "Atlas of Precipitation Extremes for the Northeastern United States and Southeastern Canada," September 1993. The rainfall amounts for the 200- and 500-year events were extrapolated from the RR 93-5 data. Since there was a close match of the mass rainfall curve of the June 1987 rainfall (total rainfall of 5.01 inches) at the Buffalo Airport with the mass rainfall curve from HEC-HMS for an event of similar magnitude, the default rainfall temporal pattern of HEC-HMS was used for this study.

Due to the poor results using Publication # RR 93-5, the district switched to developing rainfall using the guidance found in the National Weather Services' (NWS) publications Technical Memorandum NWS Hydro 35 (Hydro 35), "*Five to 60-minutes Precipitation Frequency for Eastern and Central United States*", (1977) and Technical Paper 40 (TP-40), "*Rainfall Frequency Atlas of the United States for Duration from 30 minutes to 24 Hours and Return Periods from 1 to100 Years*," (1961). These are the 2 publications that the NWS recommends to use in New York State.

Rainfall amounts for this area were developed for an unpublished study on Ellicott Creek and are valid over the Cayuga Creek watershed. Rainfall amounts were determined for the following 24 hour events: 50% (2-year), 20% (5-year), 10% (10-year), 4% (25-year), 2% (50-year) and 1% (100-year). The rainfall amounts for the 0.5% (200-year) and 0.2% (500-year) events were extrapolated fusing this rainfall data. Rainfall for these events can be found on the following table. Only the 1.0% (100-year) and 0.2% (500-year) 24 hour storm events were used in this study.

Table 1: Rainfall Amounts

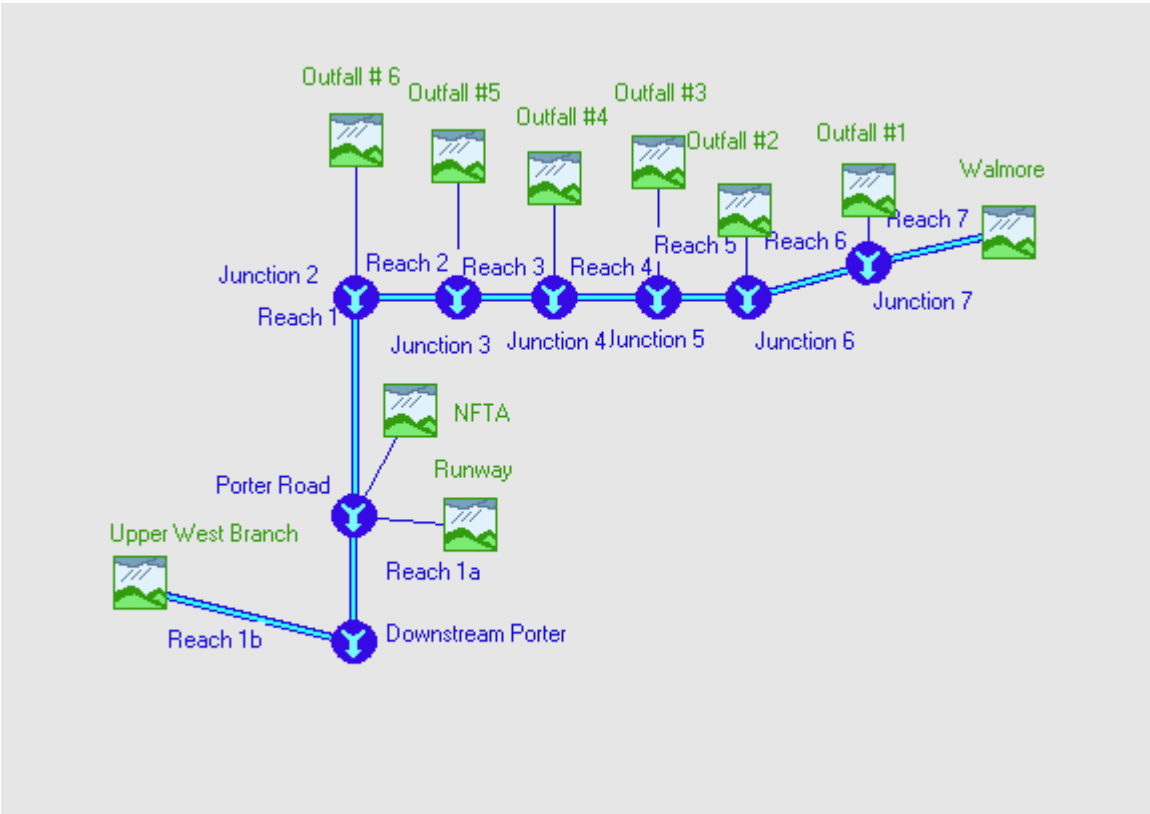
DURATION	FREQUENCY OF RAINFALL EVENT IN %							
	50	20	10	4	2	1	0.5	0.2
	RAINFALL IN INCHES							
5 MINUTES	0.40	0.45	0.50	0.55	0.65	0.80	0.90	1.10
15 MINUTES	0.65	0.80	0.90	1.10	1.20	1.30	1.40	1.50
1 HOUR	1.00	1.30	1.50	1.80	2.00	2.30	2.40	2.70
2 HOURS	1.15	1.60	1.80	2.10	2.40	2.70	3.00	3.40
3 HOURS	1.40	1.80	2.10	2.40	2.70	3.00	3.20	3.50
6 HOURS	1.55	2.00	2.30	2.80	3.10	3.50	3.90	4.40
12 HOURS	2.10	2.60	2.90	3.30	3.60	3.90	4.10	4.50
24 HOURS (a)	2.40	2.90	3.30	3.90	4.30	4.70	5.20	5.80

Note: 50%, 20%, 10%, 4%, 2%, AND 1% rainfall was developed using Hydro 35 and TP-40. 0.5% and 0.2% rainfall was extrapolated form that data.

METHODOLOGY:

The runoff and peak discharges for the Cayuga watershed were calculated using the Corps's computer program HEC-HMS (Hydrologic Modeling System). This computer model has the capability of calculating runoff for the different land uses.

The Niagara Falls Air Reserve Station (air base) occupies 624 acres within the fence line of the air base. The air base has permanent easements on an additional 361 acres, for a total of 985 acres. The Cayuga Creek watershed was broken into 10 sub-basins as shown on following schematic. The air base within the fenced area is presented by 6 of the 10 sub-basins. The total drainage area of these 6 sub-basins is 706 acres. This sum of the drainage areas (of the 6 sub-basins that represent the air base) is greater than the fenced area of the air base because some of the sub-basins drain lands that are outside of the air base. This will account for the difference between the acreage of the fenced areas and the sub-basins. The schematic of the HEC-HMS model is shown below:



Watershed size, rainfall (total and temporal pattern), loss rate parameters, and unit hydrograph parameters are all needed to calculate runoff. The assumptions and methods used to develop these parameters for use in the HEC- HMS computer model are discussed below.

The Cayuga Creek watershed to Porter Road was delineated on the U. S. Geological Survey's Ransomville and Tonawanda West Quadrangle maps. This study calculated the drainage area of Cayuga Creek at Porter Road to be 10.7 square miles. This is the same value as used by the 15 December 1983 Flood Insurance Study for the Town of Niagara.

The ten sub-basins of the Cayuga Creek watershed are:

⇒Cayuga Creek to Walmore Road;
⇒Air Reserve Station, drainage to Outfall #1;
⇒Air Reserve Station, drainage to Outfall #2;
⇒Air Reserve Station, drainage to Outfall #3;
⇒Air Reserve Station, drainage to Outfall #4;
⇒Air Reserve Station, drainage to Outfall #5;
⇒Air Reserve Station, drainage to Outfall #6;
⇒The drainage to the ditch south of the western portion of the runway; and
⇒The NFTA property (includes some of the air base property along the runways)
⇒The Upper West Branch that was diverted to Cayuga creek just downstream of Porter Road.

The Natural Resources Conservation Service's (of the U. S. Department of Agriculture, formerly the Soil Conservation Service) soil curve number Cn was used to determine rainfall losses. The rainfall losses represent the water loss to land surface interception, depression storage and infiltration. Interception and depression storage represent the surface storage of water by trees and grass, local depressions in the ground surfaces (puddles), or in cracks and crevices in parking lots or roof. Infiltration is water soaking into the ground. The Cn value is determined using both the soil type and land use. The soil types for the sub- basins were determined using the Natural Resources Conservation Service's Soil Survey of Niagara County, New York issued October 1972. The land use was determined from the quadrangle maps and a field survey of the watershed. For the Cayuga Creek watershed to Walmore Road, the Cn value was calculated using the soil type, land use and development. For the remaining watersheds, the Cn value represents the soil type with an open space land use. The buildings and roadways for these sub-basins are represented by a percent impervious value. For the six sub-basins that make up the air base, the drainage areas and percent impervious values were taken from the draft publication dated May 1997: "Integrated Natural Resources Management Plan, Niagara Falls Air Reserve Station, New York," the Environmental Division, Headquarters, Air Force Reserve Command, Robins Air Force Base, Georgia. The Cn value for each sub-basin is shown on Table 2: Sub-Basin Parameters.

Unit hydrograph parameters are needed to convert the excess rainfall (rainfall – losses) to flows. The Natural Resources Conservation Service's dimensionless unit hydrograph method was used to model the Cayuga Creek to Walmore Road and Upper West Branch sub-basins. The dimensionless unit hydrograph method consists of a single parameter, TLAG, which is equal to the lag (hours) between the center of mass of the rainfall excess and the peak of the unit hydrograph, which is equal to 0.6 * the time of concentration (Tc). The values of Tc and Cn were calculated using the guidelines and procedures of the Natural Resources Conservation Service's publication dated June 1986: "Urban Hydrology for Small Watersheds, "Technical Release 55 (TR-55). The kinematic wave method was used to model the remaining 8 sub-basins. The kinematic wave method uses the slope, roughness and shape of the sub-basin to calculate runoff. Since a ditch runs down the middle of the Outfall #5 sub-basin, this watershed was divided into two separate areas (Plane 1 and 2) that drain to the ditch. Plane 1 is the area east of the ditch and Plane 2 is the area west of the ditch. The unit hydrograph parameters are shown on the second table. The runoff model assumed that all runoff would be surface runoff. This study did not attempt to quantify the division of water between surface and storm sewer runoff. The peak discharges for the 1% (100-year) and 0.2% (500-year) events for the sub-basins are shown on the following Table. The discharges just upstream and downstream of Porter Road are also shown.

The Muskingum Cunge Routing (8-point cross section) method was used for routing the Cayuga Creek runoff hydrograph between junctions.

Peak Discharges

	Peak Discharges in cfs	
Watershed	1.0%(100-year)	0.2% (500-year)
Cayuga Creek @ Walmore Road	1,350	1,930
Outfall #1	3	5
Outfall #2	21	27
Outfall #3	17	23
Outfall #4	100	134
Outfall #5	160	260
Outfall #6	76	104
Runway	160	240
NFTA	620	870
Upper West Branch	900	1,160
Cayuga Creek, u.s. Porter Road	1,780	2,500
Cayuga Creek, d.s., Porter	2,250	3,030

Sub-basin Parameters

					Kinematic Wave Parameters		
Watershed	Drainage Area (square miles)	Cn	Imperviousness (%)	TLAG (hours)	Sub-basin slope (feet/feet)	Width (feet)	Surface Roughness
Walmore Road	7.8	67	5	3.62			
Outfall #1	0.0064	80	22		0.004	714	0.4
Outfall #2	0.014	80	40		0.007	800	0.1
Outfall #3	0.0075	80	50		0.01	375	0.1
Outfall #4	0.0983	80	63		0.0074	2000	0.1
Outfall #5	0.8944						
Plane 1	0.6261	80	14		0.0038	2520	0.4
Plane 2	0.2683	80	14		0.0038	2120	0.4
Outfall #6	0.0834	80	46		0.0045	1530	0.1
Runway	0.3768	80	30		0.01	2920	0.2
NFTA	1.42	80	50		0.0014	2720	0.1
Upper West Branch	1.79	77	15	1.650			

HYDRAULIC ANALYSES NIAGARA FALLS ARS, NEW YORK

Analyses of the hydraulic characteristics of flooding from sources studied were carried out to provide estimates of the elevations of floods for the 1% and 0.2% occurrences. The 1% and 0.2% chance flows have a one chance in 100 and 500 of being exceeded in any given year, respectively.

Data Collection:
Cross-section data for the backwater analyses on Cayuga Creek and the unnamed Tributary to Cayuga Creek were obtained from field survey performed by Buffalo District personnel in April of 2005. Structural data for all the culverts were also collected during the field survey. The survey data is referenced to the National Geodetic Vertical Datum (NGVD) of 1929. Additional data was obtained from the Louisville District that included detailed 1-foot interval contours in the vicinity of the proposed Fire and Crash Rescue Station. The contours are referenced to the North American Vertical Datum (NAVD) of
1988. A vertical datum shift at the Niagara Falls ARS was developed to convert from NAVD 88 to NGVD 29 using nine vertical control monuments within a five-mile radius from the project location. The average shift from NAVD 88 to NGVD 29 among the nine vertical monuments is +0.54 feet (Appendix A).

Stream Conditions:
The downstream study limit for Cayuga Creek is 1,128 feet upstream of Porter Road. The reach is 6,441 feet long with the upstream limit approximately 820 feet upstream of the confluence with the unnamed Tributary to Cayuga Creek. The channel is well defined throughout the entire reach, but also shows some signs of heavy shoaling and vegetative growth. The overbanks consist mainly of short grass with some scattered brush and weeds. The unnamed Tributary to Cayuga Creek was studied in detail from the confluence with Cayuga Creek to approximately 150 feet downstream of Lockport Rd. The reach is 4,573 feet in length. The lower two-thirds of the channel is well defined and clean, while the upper third has some vegetative growth. There is little to no shoaling in this reach. The overbanks are well maintained and consist mostly of short grass. See Appendix B for project photos.

Hydraulic Analysis:
Known water surface elevations were used for the downstream boundary conditions for Cayuga Creek. The water surface elevations were taken from the 1983 Town of Niagara, NY, Niagara County, Flood Insurance Study (FIS). The furthest most upstream cross section from the FIS (Cross Section “O”) coincides with the first cross section of this study. The water surface elevations at Cross Section “O” for the 100- year and 500-year peak discharges are 578.8 and 579.3 feet, respectively. A Normal Depth Slope of 0.003 was used for the downstream boundary conditions for the Tributary to Cayuga Creek. The slope was determined by calculating the slope of the two furthest downstream surveyed sections. The channel and overbank roughness factors (Manning's "n") used in the hydraulic computations were selected using engineering judgment and were based on field observations of the stream and flood

plain areas. The values for Manning's "n" and the contraction and expansion coefficients are shown in Table 1.

TABLE 1: MANNING'S "N" AND CONTRACTION & EXPANSION COEFFICIENTS

Flooding Source	Channel	Overbank	Contraction	Expansion
Cayuga Creek	0.038	0.04-0.06	0.1-0.3	0.3-0.5
Tributary to Cayuga Creek	0.036-0.038	0.04	0.1-0.3	0.3-0.5

All elevations are referenced to the National Geodetic Vertical Datum of 1929. Descriptions of the marks are presented in Table 2.

TABLE 2: ELEVATION REFERENCE MARKS

Reference Mark	Elevation	Description
Airbase Monument #4	595.78	Survey Monument near the left field fence on the northern most baseball diamond adjacent to Ent Ave.
Airbase Monument #5	589.57	Survey Monument approximately 900 feet due south of the intersection of Wagner Dr. and Ent Ave.

Results:
The 100-yr event resulted in little to no flooding within the project limits. The 100-yr flow was contained within the channel banks for most of both reaches with the most significant flooding occurring on the left overbank of Cayuga Creek just upstream of the confluence with the unnamed Tributary to Cayuga Creek. The backwater effect from Cayuga Creek, with a 100-yr elevation of 586.3 feet, on the unnamed tributary increased some of the minor flooding just downstream of the proposed Fire and Crash Rescue Station. The Floodway was also determined for both creeks with a surcharge of no more than one foot. The floodway for both creeks did not extend outside of the channel banks. See Table 3 for the Floodway Data Table.

Flood profiles (Plates 1 and 2) were drawn showing the computed water surface elevations for the 100-year event. The 100-year floodplain boundary (Figure 1) was delineated using the flood elevations determined at each cross section with the exception of the downstream portion of the unnamed Tributary, which encountered backwater effects from Cayuga Creek. The floodplain boundaries were interpolated between cross sections using the one-foot contour data from the Louisville District. The contour elevations were adjusted from NAVD 88 to NGVD 29 for mapping purposes. The remaining floodplain was delineated using contours created from the surveyed cross sections.

A HEC-RAS report summary can be found in Appendix C.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profile are considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FT)	SECTION AREA (FT^2)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET) [4]	WITHOUT FLOODWAY (FEET) [4]	WITH FLOODWAY (FEET) [4]	INCREASE (FEET) [4]
Cayuga Creek								
A	1128 [1]	62	667	3.3	578.8	578.8	579.8	1.0
B	1852 [1]	72	528	2.8	579.7	579.7	580.6	0.9
C	2690 [1]	79	429	3.5	580.3	580.3	581.1	0.8
D	3252 [1]	46	259	5.8	581.2	581.2	581.6	0.4
E	4017 [1]	38	243	6.2	582.4	582.4	582.7	0.3
F	4770 [1]	44	288	5.2	584.4	584.4	584.5	0.1
G	5631 [1]	81	481	3.1	585.5	585.5	585.6	0.1
H	6569 [1]	72	444	3.4	586.1	586.1	586.2	0.1
I	7199 [1]	70	476	2.8	586.5	586.5	586.5	0.0
J	7569 [1]	91	530	2.5	587.1	587.1	587.2	0.1
Unnamed Tributary to Cayuga Creek								
A	617 [2]	20	47	3.4	586.3 [3]	582.0	582.6	0.6
B	1037 [2]	25	59	2.7	586.3 [3]	584.7	584.7	0.0
C	1515 [2]	23	92	1.7	587.3	587.3	587.8	0.5
D	1830 [2]	26	104	1.5	590.5	590.5	591.3	0.8
E	2552 [2]	52	100	1.6	590.9	590.9	591.6	0.7
F	3127 [2]	21	27	4.0	592.4	592.4	592.4	0.0
G	3586 [2]	29	48	2.3	593.7	593.7	593.8	0.1
H	3846 [2]	39	93	1.2	596.1	596.1	596.1	0.0
I	4237 [2]	29	45	0.2	596.2	596.2	596.2	0.0
J	4573 [2]	10	6	1.6	596.5	596.5	596.5	0.0

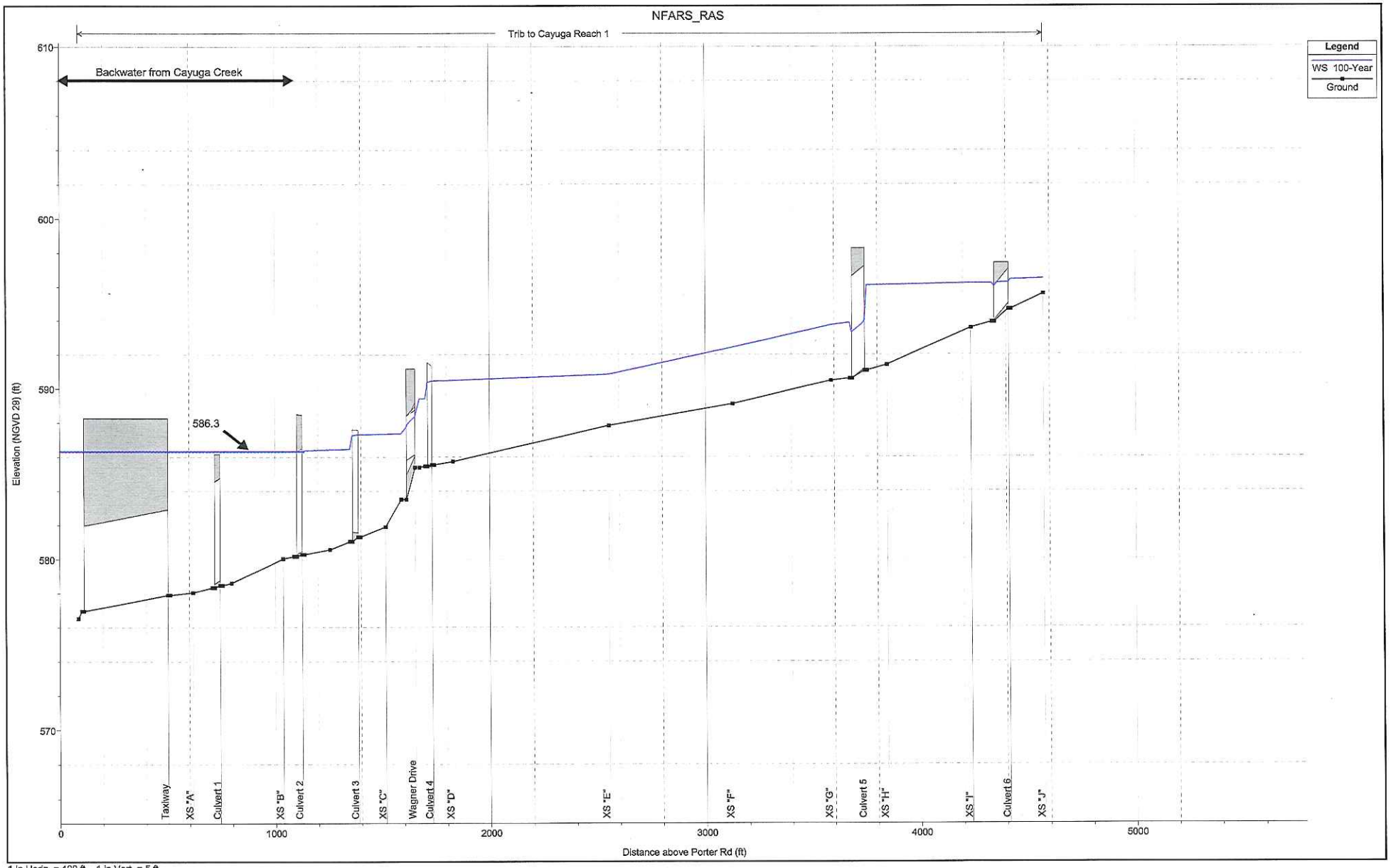
[1] Feet above Porter Road
[2] Feet above the Confluence with Cayuga Creek
[3] Backwater from Cayuga Creek
[4] Feet in NGVD 29

TABLE 3

NIAGARA FALLS ARS
(NIAGARA FALLS, NY)

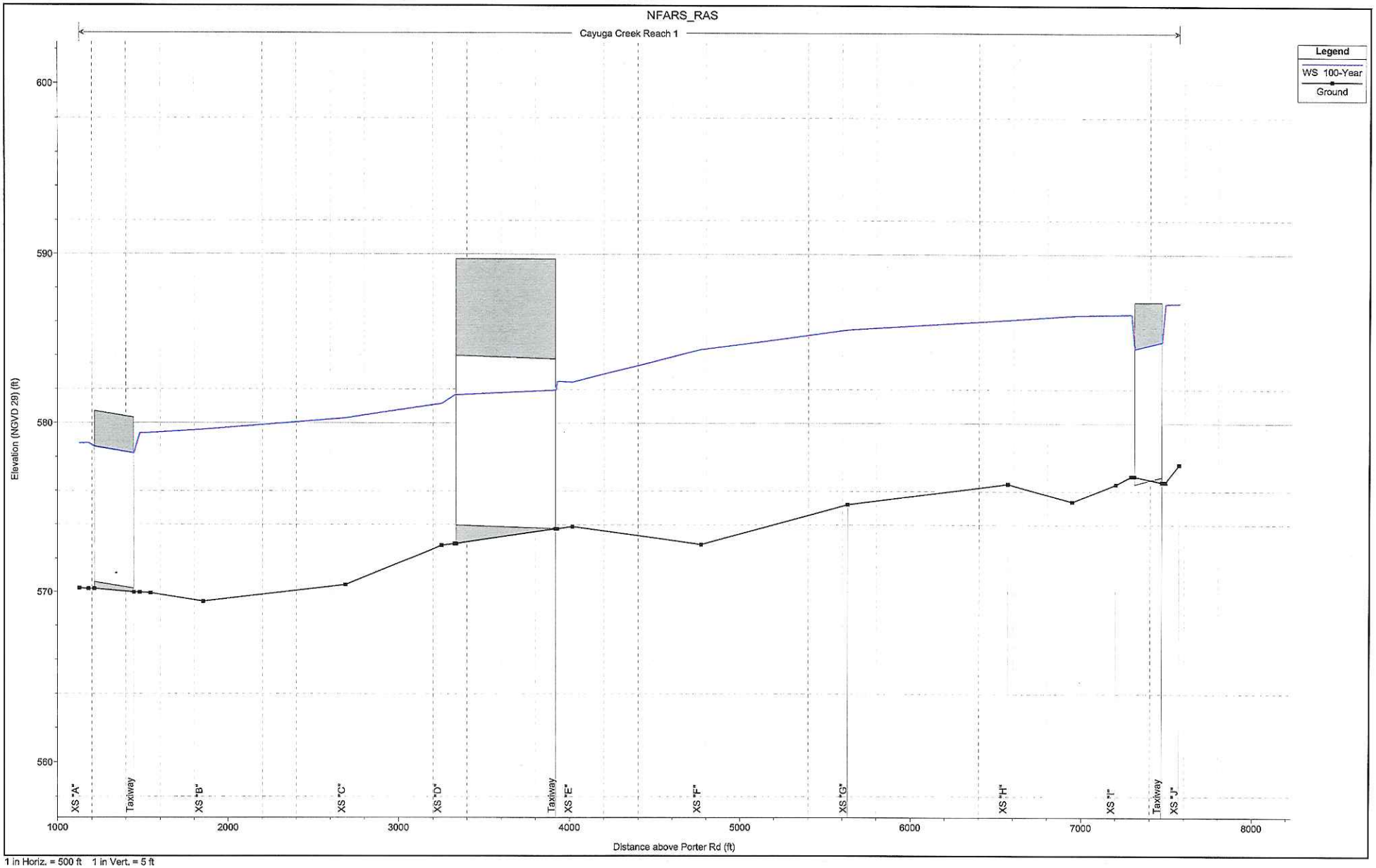
FLOODWAY DATA

CAYUGA CREEK AND UNNAMED TRIBUTARY TO CAYUGA CREEK



1 In Horiz. = 400 ft 1 in Vert. = 5 ft

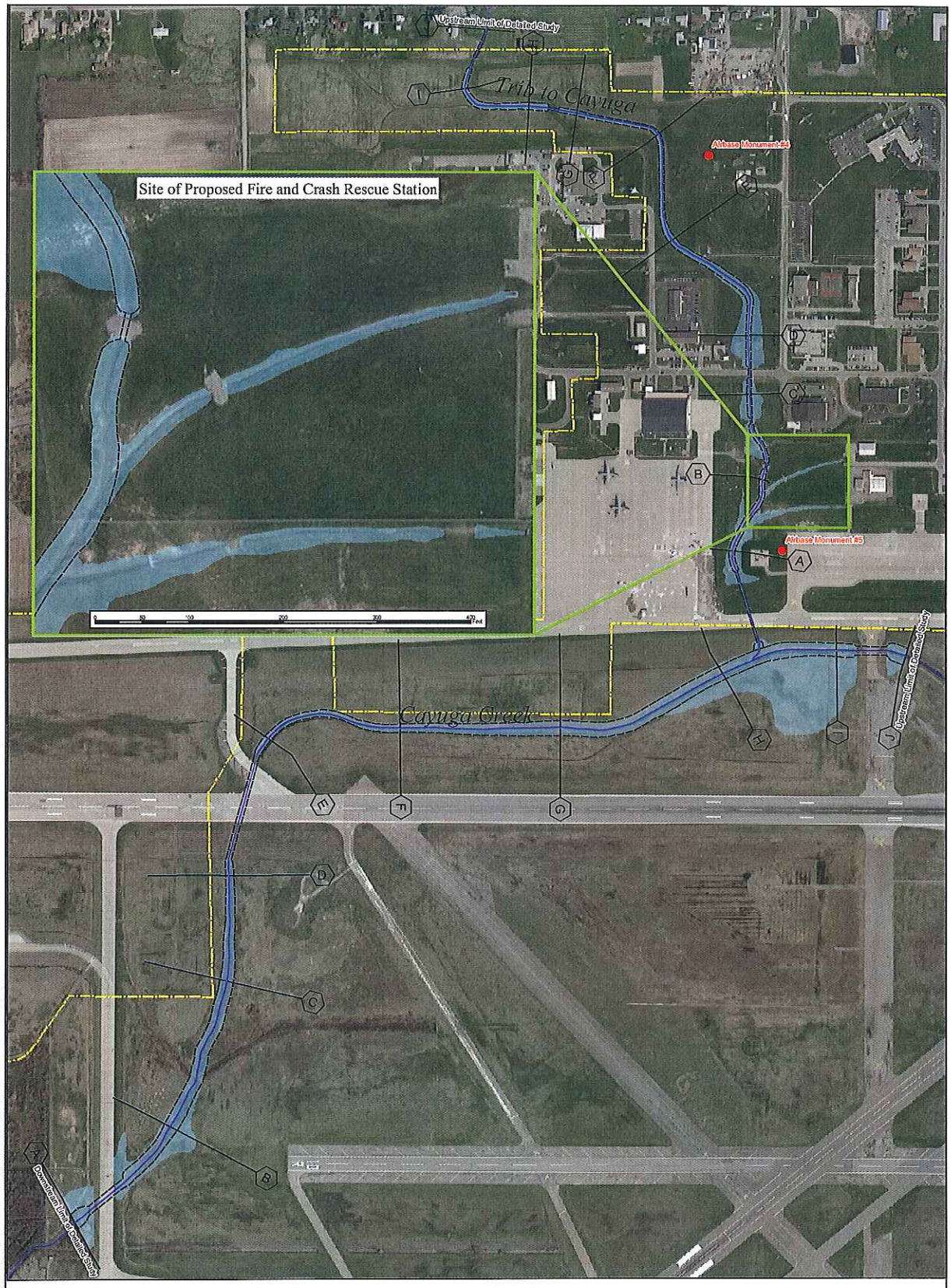
PLATE 2



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

PLATE 1

Appendix A



Legend

- Cross Sections
- Airbase Boundary
- Stream Centerline
- Floodway
- 100-yr Floodplain

Niagara Falls AFRS
100-YR Floodplain and Floodway Boundary Map

US Army Corps of Engineers
Buffalo District

Scale

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

Vicinity Map

Figure 1

Datum Conversion for Niagara Falls Air Force Reserve Base

PID	NAME	STATE	COUNTY	LATITUDE		LONGITUDE		NAVD 88	NGVD29	88 to 29
NC0688	906 3016 HUM	NY	ERIE	42 58 07.	(N)	078 55 51.	(W)	573.49	574.05	0.56
NC0689	906 3016 TRACT	NY	ERIE	42 58 06.	(N)	078 55 50.	(W)	572.11	572.67	0.56
NC0676	J 412	NY	ERIE	42 59 41.	(N)	078 55 45.	(W)	599.67	600.24	0.57
NC0677	M 412	NY	ERIE	42 59 45.	(N)	078 57 15.	(W)	598.73	599.29	0.56
NC0679	P 412	NY	ERIE	42 58 18.	(N)	078 57 29.	(W)	583.73	584.29	0.56
OG0364	D 410	NY	NIAGARA	43 04 41.	(N)	078 57 37.	(W)	578.48	579.04	0.56
OG0196	ECHOTA	NY	NIAGARA	43 04 56.	(N)	079 01 03.	(W)	572.08	572.60	0.52
OG0369	F 412	NY	NIAGARA	43 01 36.	(N)	078 52 47.	(W)	583.05	583.61	0.56
OG0370	G 412	NY	NIAGARA	43 01 36.	(N)	078 53 11.	(W)	576.37	576.93	0.56
OG0126	I20	NY	NIAGARA	43 04 43.	(N)	078 57 38.	(W)	570.99	571.51	0.52
OG0366	K 410	NY	NIAGARA	43 03 34.	(N)	078 54 39.	(W)	573.94	574.50	0.56
OG0373	K 412	NY	ERIE	43 00 04.	(N)	078 56 26.	(W)	623.05	623.62	0.57
OG0361	L 410	NY	NIAGARA	43 04 26.	(N)	078 59 08.	(W)	569.37	569.92	0.55
OG0205	N 20	NY	NIAGARA	43 09 28.	(N)	079 02 32.	(W)	568.03	568.55	0.52
OG0155	N 20 USLS	NY	NIAGARA	43 02 12.	(N)	078 53 08.	(W)	576.84	577.38	0.54
OG0157	N 21 USLS	NY	NIAGARA	43 03 58.	(N)	078 55 20.	(W)	575.82	576.36	0.54
OG0206	N 24 USLS	NY	NIAGARA	43 04 38.	(N)	079 00 10.	(W)	574.89	575.43	0.54
OG0263	N 31 USLS	NY	NIAGARA	43 10 25.	(N)	079 02 40.	(W)	374.42	374.97	0.55
OG0177	N 55	NY	NIAGARA	43 01 20.	(N)	078 52 32.	(W)	576.21	576.84	0.63
OG0200	NIAGARA FALLS 2	NY	NIAGARA	43 04 57.	(N)	079 02 28.	(W)	570.98	571.49	0.51
OG0123	NORTH TONAWANDA 2 USDWC	NY	NIAGARA	43 02 12.	(N)	078 53 08.	(W)	577.89	578.44	0.55
OG0131	PBM RANSOMVILLE	NY	NIAGARA	43 14 19.	(N)	078 54 35.	(W)	326.36	326.91	0.55
									Average =	0.55

Average = 0.54

A 10 mile search radius was used to locate the above monuments. The coversion factor (NAVD 88 to NGVD 29) utilizing all 22 monuments is +0.55 feet. The conversion factor utilizing the 9 monuments which fall within a 5 mile radius is +0.54 feet.

*****Use +0.54 feet to convert from NAVD 88 to NGVD 29 for the Niagara Falls Air Force Reserve Base.*****

Source: http://www.ngs.noaa.gov/cgi-bin/datasheet.prl

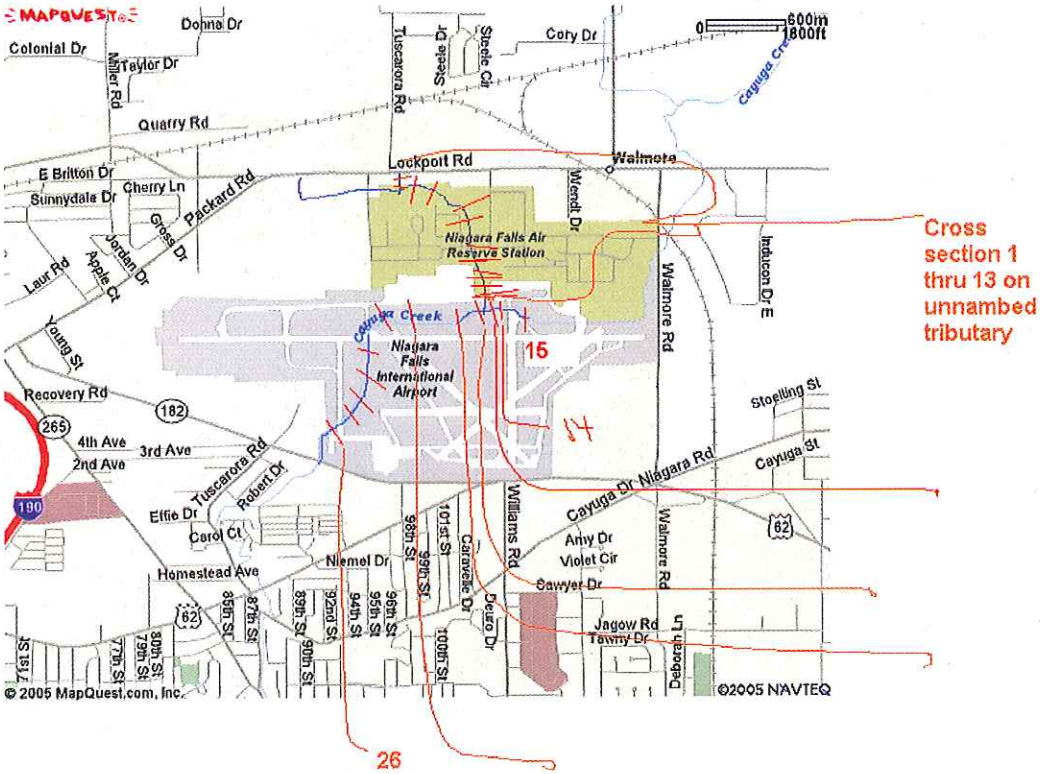
krk - 04/2005

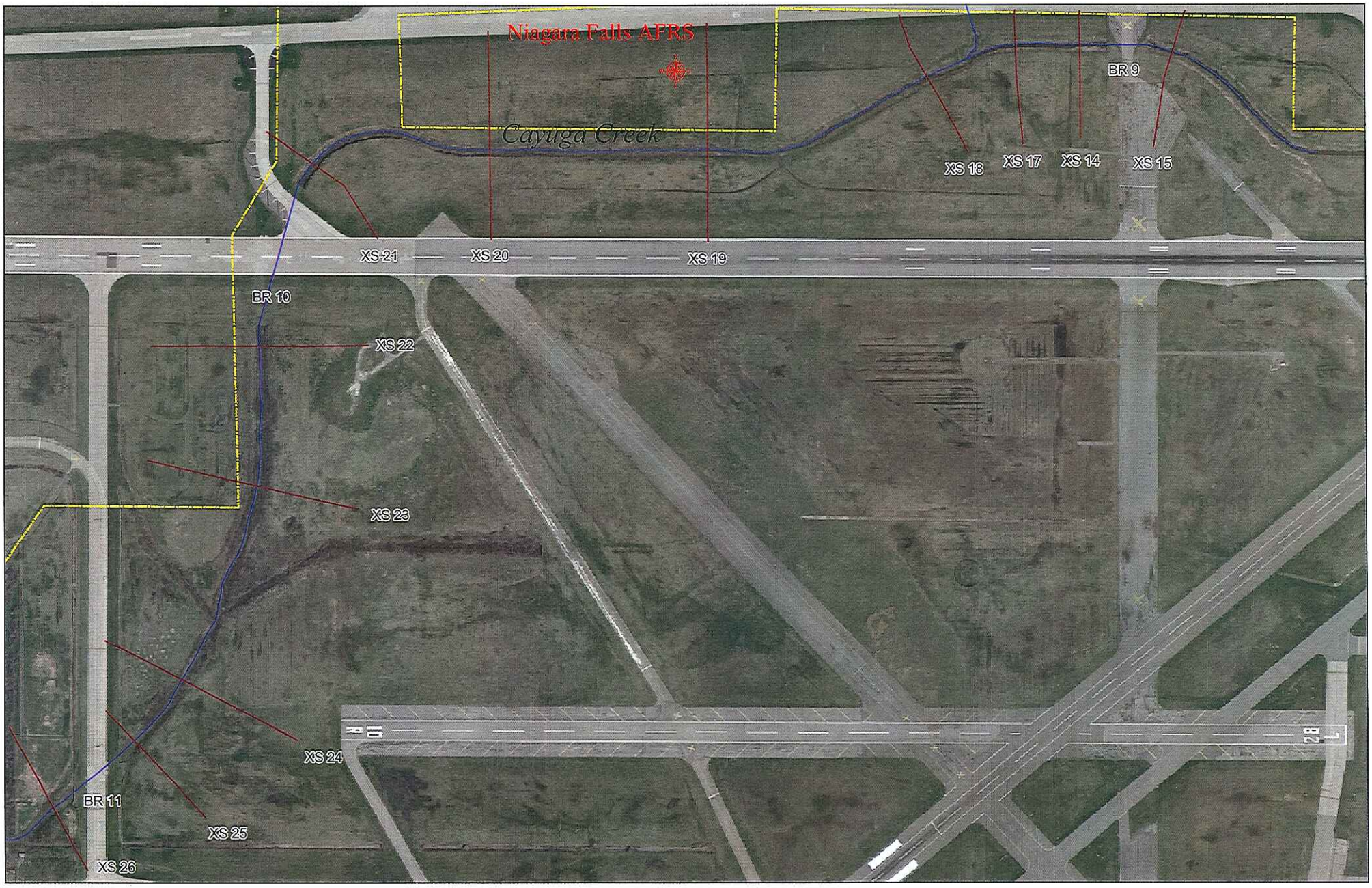
Appendix B

Description of photographs taken during surveys, 30 March thru 26 April 2005. Cross sectional data and bridge data was survey for the floodplain mapping effort for the Niagara Falls Air Reserve Base – Cayuga Creek and one of it unnamed tributaries.

The descriptions of the locations of the photos follows the nomenclature set up and provided by Keith Koralewski.

The approximate location of the cross sections and bridges are shown on the following map.




Niagara Falls AFRS
Cayuga Creek
BR 9
XS 18
XS 17
XS 14
XS 15
XS 21
XS 20
XS 19
BR 10
XS 22
XS 23
XS 24
BR 11
XS 25
XS 26
RD
28

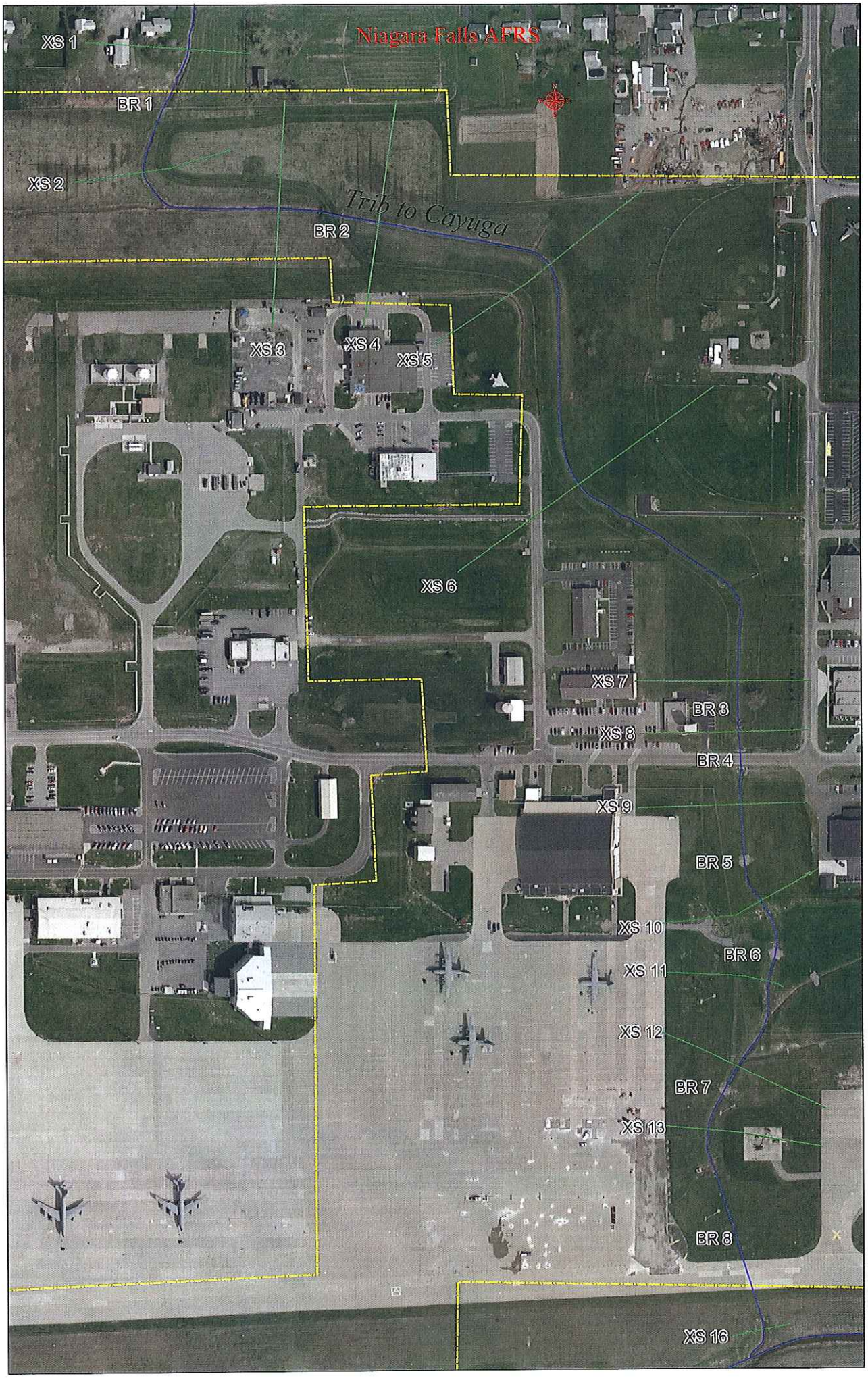

Niagara Falls AFRS
XS 1
BR 1
XS 2
Trib to Cayuga
BR 2
XS 3
XS 4
XS 5
XS 6
XS 7
BR 3
XS 8
BR 4
XS 9
BR 5
XS 10
BR 6
XS 11
XS 12
BR 7
XS 13
BR 8
XS 16

Photo Set #1 (Cross Section #1)

Culvert under Lockport Road (downstream side)

Reach of drainage ditch – looking downstream from Lockport Road

Photo Set #1 (Cross Section #1) – cont.

Photo Set #2 (Bridge #1)

Upstream side of bridge #1

Photo Set #2 (Bridge #1) – cont.

Downstream side of culvert

Culvert extends from fence

Photo Set #3 (cross section #2)

Photo Set #4 (Bridge #2 and cross section #3) – cont.

Location of temporary bench mark, downstream side of culvert

Stream downstream of bridge #2

Photo Set #4 (Bridge #2 and cross section #3) – cont.

Downstream face of bridge #2

Photo Set #5 (Cross section #4)

cross section #4 – looking downstream

View of ditch from bridge #1 – looking downstream

Confluence of smaller ditch with larger ditch flowing west to east

Photo Set #4 (Bridge #2 and cross section #3)

Upstream side of culvert identified as bridge #2

looking upstream from bridge #2 – cross section #3 is located upstream

Photo Set #6 (Cross section #5 & #6)

Looking downstream through cross section #5

Looking downstream through cross section #6

Photo Set #7 (Cross sections #7 & 8, bridges # 3 & #4)

Looking downstream through cross section # 7

Upstream face of bridge #3

Photo Set #7 (Cross sections #7 & 8, bridges # 3 & #4) – cont.

Looking upstream through cross section #7 from bridge #3

Looking downstream from bridge #3 at upstream face of bridge #4 and through cross section #9

Photo Set #7 (Cross sections #7 & 8, bridges # 3 & #4) – cont.

Downstream face of bridge #3

Upstream face of bridge #4

Photo Set #7 (Cross sections #7 & 8, bridges # 3 & #4) – cont.

Closer view of upstream face of bridge #4

Closer view of upstream face of bridge #4

Photo Set #7 (Cross sections #7 & 8, bridges # 3 & #4) – cont.

upstream face of bridge #4

Photo Set #8 (Cross section #9 & #10, bridges # 5 & 6)

Looking downstream from bridge #4 through cross section #9 and upstream face of bridge #5

Photo Set #8 (Cross section #9 & #10, bridges # 5 & 6) – cont.

Channel section between Bridges #4 & #5 – location of cross section #9

Looking upstream from Bridge #5

Photo Set #8 (Cross section #9 & #10, bridges # 5 & 6) – cont.

Looking downstream from bridge #5 – cross section # 10 is located downstream of the bridge

Downstream face of Bridge #5

Photo Set #8 (Cross section #9 & #10, bridges # 5 & 6) – cont.

Upstream face of bridge #6

Looking upstream from Bridge #6

Photo Set #8 (Cross section #9 & #10, bridges # 5 & 6) – cont.

Downstream face of Bridge #6

Photo Set #9 (Cross section #11, #12 & #13, bridges # 7 & 8)

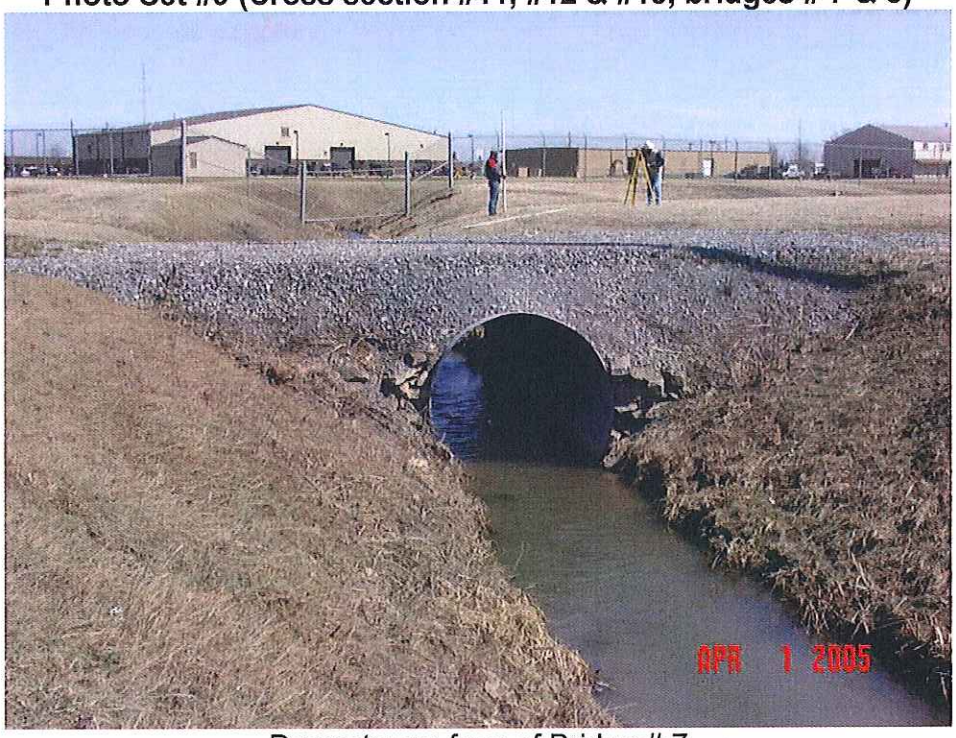
Looking downstream from Bridge #6 – Cross section #11 is location in this reach

Photo Set #9 (Cross section #11, #12 & #13, bridges # 7 & 8) – cont.

Upstream face of bridge #7

Looking upstream from bridge #7 – cross section #12 is location in this reach

Photo Set #9 (Cross section #11, #12 & #13, bridges # 7 & 8)



Downstream face of Bridge # 7

Looking downstream from bridge #7 cross section #13 is located in this reach

Photo Set #9 (Cross section #11, #12 & #13, bridges # 7 & 8)

Upstream face of Bridge #8

Looking Upstream from Bridge #8

Photo Set #9 (Cross section #11, #12 & #13, bridges # 7 & 8)

Downstream face of Bridge #8

Looking upstream thru bridge # 8

Photo Set #10 (Cross section #16)

Looking downstream from bridge #8 – location of cross section #16

Photo Set #11 (Cross section #14, #15 & #17, bridges # 9)

Looking upstream from confluence of unnamed trib. with Cayuga Creek. Cross sections # 14 and #17 are located in this reach

Photo Set #11 (Cross section #14, #15 & #17, bridges # 9) – cont.

Upstream face of bridge # 9

Looking upstream from bridge #9 – cross section #15 is located in this reach

Photo Set #11 (Cross section #14, #15 & #17, bridges # 9) – cont.

Downstream face of Bridge # 9

Looking downstream of Bridge #9 – confluence is on right bank – cross section # 17 is in this reach

Photo Set #12 (Cross section #18, #19 & #20)

Looking downstream from confluence – Cross section #18 is located in this reach

Looking downstream from ≈ location of cross section #18

Photo Set #12 (Cross section #18, #19 & #20) – cont.

Looking upstream ≈ location of cross section #19

Looking downstream from ≈ location of cross section #19

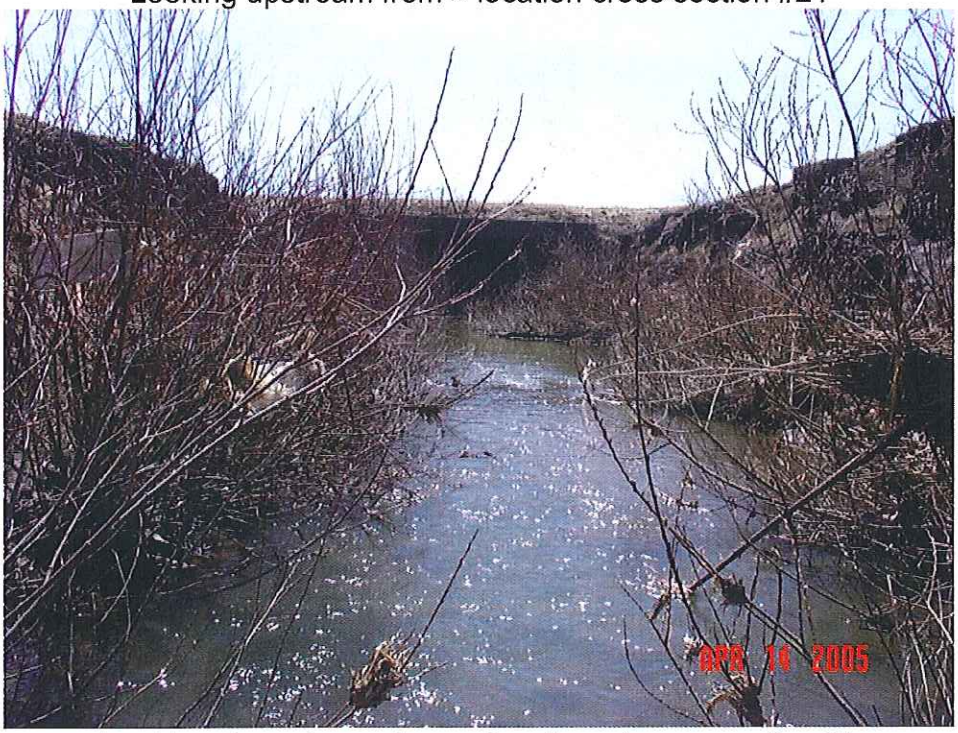
Photo Set #13 (Cross section #21, #22 & #23 & bridge #10) – cont.

Looking upstream from ≈ location of cross section #20

Looking downstream from ≈ location of cross section #20

Photo Set #13 (Cross section #21, #22 & #23 & bridge #10)

Looking upstream from ≈ location cross section #21



Looking downstream from ≈ location of cross section 21

Photo Set #13 (Cross section #21, #22 & #23 & bridge #10) – cont.

Upstream face of Bridge #10 – right half

Upstream face of bridge #10 – left half

Photo Set #13 (Cross section #21, #22 & #23 & bridge #10) – cont

Looking upstream from bridge #10

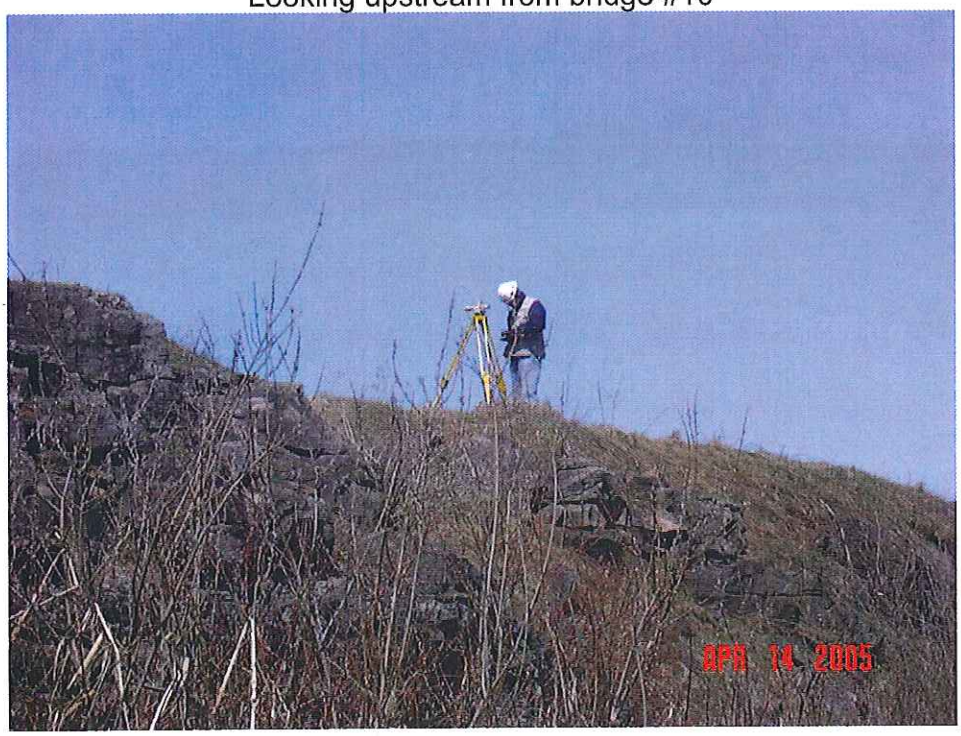


Photo Set #13 (Cross section #21, #22 & #23 & bridge #10) – cont

Downstream face of bridge #10

Looking downstream from bridge #10

Photo Set #13 (Cross section #21, #22 & #23 & bridge #10) – cont

Looking upstream from ≈ location of cross section #22

Looking downstream from ≈ location of cross section #22

Photo Set #13 (Cross section #21, #22 & #23 & bridge #10) – cont

Looking upstream of ≈ location of cross section #23

Looking downstream from ≈ location of cross section #23

Photo Set #14 (Cross section #24, #25 & #26 & bridge #11)

Looking upstream from ≈ location of cross section #24. This section is located upstream of a beaver dam and the creek is wider and deeper then other sections.

Looking downstream from ≈ location of cross section #24

Photo Set #13 (Cross section #24, #25 & #26 & bridge #11) – cont.

Looking upstream from ≈ location of cross section #25

Looking downstream from ≈ location of cross section #25

Photo Set #13 (Cross section #24, #25 & #26 & bridge #11) – cont.

Upstream face of Bridge #11

Closer look at upstream face of bridge #11

Downstream face of bridge #18

Looking upstream from bridge #11

Photo Set #13 (Cross section #24, #25 & #26 & bridge #11) – cont.

Looking downstream from bridge #11

Looking downstream from bridge 311 at security fence

Photo Set #13 (Cross section #24, #25 & #26 & bridge #11) – cont.

Looking upstream from ≈ location of cross section #26

Looking downstream from ≈ cross section #26

NFARS_RAS_trib_2.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: NFARS_RAS_trib_2
Project File : NFARS_RAS_trib_2.prj
Run Date and Time: 5/24/2013 3:59:15 PM

Project in English units

PLAN DATA

Plan Title: Current Conditions
Plan File : C:\Users\H5TDHAMJ\Documents\LOMR\Airforce Base - FEMA Submittals\cHECkRAS_TRIAL\NFARS_RAS_trib_2.p01

Geometry Title: Current Conditions
Geometry File : C:\Users\H5TDHAMJ\Documents\LOMR\Airforce Base - FEMA Submittals\cHECkRAS_TRIAL\NFARS_RAS_trib_2.g01

Flow Title : Current Conditions
Flow File : C:\Users\H5TDHAMJ\Documents\LOMR\Airforce Base - FEMA Submittals\cHECkRAS_TRIAL\NFARS_RAS_trib_2.f01

Plan Description:
100-yr and 500-yr Conditions

Plan Summary Information:

Number of:	Cross Sections	= 29	Multiple Openings	=	0
	Culverts	= 8	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Current Conditions
Flow File : C:\Users\H5TDHAMJ\Documents\LOMR\Airforce Base - FEMA Submittals\cHECkRAS_TRIAL\NFARS_RAS_trib_2.f01

Flow Data (cfs)

River	Reach	RS	10-Year	50-Year	100-Year	500-Year
Trib to Cayuga	Reach 1	4572.864	17	32	39	62
Trib to Cayuga	Reach 1	3845.845	49	90	112	175

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Trib to Cayuga	Reach 1	10-Year	Normal S = 0.003	
Trib to Cayuga	Reach 1	50-Year	Normal S = 0.003	

GEOMETRY DATA

Geometry Title: Current Conditions
Geometry File : C:\Users\H5TDHAMJ\Documents\LOMR\Airforce Base - FEMA Submittals\cHECkRAS_TRIAL\NFARS_RAS_trib_2.g01

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 4572.864

INPUT
Description: Surveyed Section 1
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600.39	63	598.52	108	598.54	138	598.97	147	598.43
151	595.97	157	595.58	158	595.68	163	597.56	172	598.09
363	600.39	399.245	600.39	416.175	600.39				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	147	.038	163	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

```
           147     163           158.31  149.49  144.36             .3       .5

CROSS SECTION OUTPUT  Profile #10-Year


  E.G. Elev (ft)            596.94    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.04    Wt. n-Val.                            0.038

  W.S. Elev (ft)            596.90    Reach Len. (ft)           158.31     149.49
 144.36
  Crit W.S. (ft)                      Flow Area (sq ft)                     10.70

  E.G. Slope (ft/ft)      0.001976    Area (sq ft)                          10.70

  Q Total (cfs)              17.00    Flow (cfs)                            17.00

  Top Width (ft)             11.76    Top Width (ft)                        11.76

  Vel Total (ft/s)            1.59    Avg. Vel. (ft/s)                       1.59

  Max Chl Dpth (ft)           1.32    Hydr. Depth (ft)                       0.91

  Conv. Total (cfs)          382.4    Conv. (cfs)                           382.4

  Length Wtd. (ft)          149.49    Wetted Per. (ft)                      12.26

  Min Ch El (ft)            595.58    Shear (lb/sq ft)                       0.11

  Alpha                       1.00    Stream Power (lb/ft s)    416.18       0.00
   0.00
  Frctn Loss (ft)             0.08    Cum Volume (acre-ft)        0.01       2.25
   0.01
  C & E Loss (ft)             0.01    Cum SA (acres)              0.02       1.80
   0.03


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #50-Year


  E.G. Elev (ft)            597.66    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.04    Wt. n-Val.                            0.038
  0.040
  W.S. Elev (ft)            597.62    Reach Len. (ft)           158.31     149.49
 144.36
  Crit W.S. (ft)                      Flow Area (sq ft)                     20.31
   0.03
  E.G. Slope (ft/ft)      0.001133    Area (sq ft)                          20.31
   0.03
  Q Total (cfs)              32.00    Flow (cfs)                            32.00
   0.00
  Top Width (ft)             15.75    Top Width (ft)                        14.69
   1.06
  Vel Total (ft/s)            1.57    Avg. Vel. (ft/s)                       1.58
   0.12
  Max Chl Dpth (ft)           2.04    Hydr. Depth (ft)                       1.38
   0.03
```

```
  Conv. Total (cfs)          950.8    Conv. (cfs)                          950.6
    0.1
  Length Wtd. (ft)          149.35    Wetted Per. (ft)                     15.51
   1.07
  Min Ch El (ft)            595.58    Shear (lb/sq ft)                      0.09
   0.00
  Alpha                       1.00    Stream Power (lb/ft s)    416.18      0.00
   0.00
  Frctn Loss (ft)             0.06    Cum Volume (acre-ft)        0.03      3.95
   0.14
  C & E Loss (ft)             0.01    Cum SA (acres)              0.25      2.41
   0.40


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #100-Year


  E.G. Elev (ft)            597.76    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.05    Wt. n-Val.                            0.038
  0.040
  W.S. Elev (ft)            597.71    Reach Len. (ft)           158.31     149.49
 144.36
  Crit W.S. (ft)                      Flow Area (sq ft)                     21.65
   0.20
  E.G. Slope (ft/ft)      0.001378    Area (sq ft)                          21.65
   0.20
  Q Total (cfs)              39.00    Flow (cfs)                            38.95
   0.05
  Top Width (ft)             17.43    Top Width (ft)                        14.83
   2.60
  Vel Total (ft/s)            1.79    Avg. Vel. (ft/s)                       1.80
   0.25
  Max Chl Dpth (ft)           2.13    Hydr. Depth (ft)                       1.46
   0.08
  Conv. Total (cfs)         1050.5    Conv. (cfs)                          1049.2
    1.3
  Length Wtd. (ft)          149.24    Wetted Per. (ft)                      15.69
   2.60
  Min Ch El (ft)            595.58    Shear (lb/sq ft)                       0.12
   0.01
  Alpha                       1.01    Stream Power (lb/ft s)    416.18      0.00
   0.00
  Frctn Loss (ft)             0.08    Cum Volume (acre-ft)        0.25      4.87
   0.36
  C & E Loss (ft)             0.02    Cum SA (acres)              0.76      2.64
   0.82


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #500-Year


  E.G. Elev (ft)            598.06    Element                   Left OB    Channel
```

```
Right OB
  Vel Head (ft)              0.09    Wt. n-Val.                          0.038
  0.040
  W.S. Elev (ft)           597.98    Reach Len. (ft)          158.31     149.49
 144.36
  Crit W.S. (ft)                     Flow Area (sq ft)                   25.61
   1.47
  E.G. Slope (ft/ft)      0.002021   Area (sq ft)                        25.61
   1.47
  Q Total (cfs)             62.00    Flow (cfs)                          61.14
   0.86
  Top Width (ft)            22.34    Top Width (ft)                      15.26
   7.07
  Vel Total (ft/s)           2.29    Avg. Vel. (ft/s)                     2.39
   0.59
  Max Chl Dpth (ft)          2.40    Hydr. Depth (ft)                     1.68
   0.21
  Conv. Total (cfs)        1379.0    Conv. (cfs)                         1359.8
   19.2
  Length Wtd. (ft)         149.36    Wetted Per. (ft)                    16.19
   7.09
  Min Ch El (ft)           595.58    Shear (lb/sq ft)                     0.20
   0.03
  Alpha                      1.07    Stream Power (lb/ft s)   416.18      0.00
   0.00
  Frctn Loss (ft)            0.10    Cum Volume (acre-ft)       0.78      7.29
   1.45
  C & E Loss (ft)            0.03    Cum SA (acres)             1.59      3.07
   2.72


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Trib to Cayuga
REACH: Reach 1            RS: 4423.391

INPUT
Description: U/S BR1
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  600.39      88  597.62     133  597.64     163  598.07     172  597.53
     176  595.07     182  594.68     183  594.78     188  596.66     197  597.19
     388  600.39 442.224  600.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     172    .038     188     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           172     188             91.4   88.92   88.18             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     168   597.6       F
     193 442.224   597.6       F

CROSS SECTION OUTPUT  Profile #10-Year
```

E.G. Elev (ft)	596.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.038	0.040
W.S. Elev (ft)	596.83	Reach Len. (ft)	91.40	88.92	88.18
Crit W.S. (ft)	595.40	Flow Area (sq ft)		21.95	0.26
E.G. Slope (ft/ft)	0.000250	Area (sq ft)		21.95	0.26
Q Total (cfs)	17.00	Flow (cfs)		16.97	0.03
Top Width (ft)	17.82	Top Width (ft)		14.87	2.95
Vel Total (ft/s)	0.77	Avg. Vel. (ft/s)		0.77	0.12
Max Chl Dpth (ft)	2.15	Hydr. Depth (ft)		1.48	0.09
Conv. Total (cfs)	1074.2	Conv. (cfs)		1072.3	1.9
Length Wtd. (ft)	88.92	Wetted Per. (ft)		15.73	2.96
Min Ch El (ft)	594.68	Shear (lb/sq ft)		0.02	0.00
Alpha	1.02	Stream Power (lb/ft s)	442.22	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.01	2.19	0.01
C & E Loss (ft)		Cum SA (acres)	0.02	1.75	0.03

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	597.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.040	0.038	0.040
W.S. Elev (ft)	597.57	Reach Len. (ft)	91.40	88.92	88.18
Crit W.S. (ft)	595.66	Flow Area (sq ft)	0.02	33.38	3.83
E.G. Slope (ft/ft)	0.000219	Area (sq ft)	0.02	33.38	10.20
Q Total (cfs)	32.00	Flow (cfs)	0.00	30.24	1.76
Top Width (ft)	48.55	Top Width (ft)	0.71	16.00	31.84
Vel Total (ft/s)	0.86	Avg. Vel. (ft/s)	0.04	0.91	0.46
Max Chl Dpth (ft)	2.89	Hydr. Depth (ft)	0.02	2.09	0.77
Conv. Total (cfs)	2161.5	Conv. (cfs)	0.0	2042.6	118.8
Length Wtd. (ft)	88.92	Wetted Per. (ft)	0.71	17.06	5.01
Min Ch El (ft)	594.68	Shear (lb/sq ft)	0.00	0.03	

```
  0.01
  Alpha                        1.07    Stream Power (lb/ft s)    442.22       0.00
  0.00
  Frctn Loss (ft)                      Cum Volume (acre-ft)        0.03       3.86
  0.12
  C & E Loss (ft)                      Cum SA (acres)              0.24       2.35
  0.35


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #100-Year


  E.G. Elev (ft)             597.67    Element                    Left OB    Channel
Right OB
  Vel Head (ft)                0.01    Wt. n-Val.                  0.040      0.038
  0.040
  W.S. Elev (ft)             597.66    Reach Len. (ft)            91.40      88.92
  88.18
  Crit W.S. (ft)             595.76    Flow Area (sq ft)           1.33      34.72
  13.06
  E.G. Slope (ft/ft)       0.000258    Area (sq ft)                1.33      34.72
  13.06
  Q Total (cfs)               39.00    Flow (cfs)                  0.07      35.02
   3.90
  Top Width (ft)             102.17    Top Width (ft)             49.36      16.00
  36.81
  Vel Total (ft/s)             0.79    Avg. Vel. (ft/s)            0.06       1.01
   0.30
  Max Chl Dpth (ft)            2.98    Hydr. Depth (ft)            0.03       2.17
   0.35
  Conv. Total (cfs)          2428.0    Conv. (cfs)                  4.6     2180.3
  243.0
  Length Wtd. (ft)            88.92    Wetted Per. (ft)           49.36      17.06
  36.83
  Min Ch El (ft)             594.68    Shear (lb/sq ft)            0.00       0.03
   0.01
  Alpha                        1.46    Stream Power (lb/ft s)    442.22       0.00
   0.00
  Frctn Loss (ft)                      Cum Volume (acre-ft)        0.25       4.78
   0.33
  C & E Loss (ft)                      Cum SA (acres)              0.67       2.58
   0.76


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #500-Year


  E.G. Elev (ft)             597.93    Element                    Left OB    Channel
Right OB
  Vel Head (ft)                0.02    Wt. n-Val.                  0.040      0.038
  0.040
  W.S. Elev (ft)             597.91    Reach Len. (ft)            91.40      88.92
  88.18
  Crit W.S. (ft)             596.04    Flow Area (sq ft)          17.76      38.80
  24.39
```

E.G. Slope (ft/ft)	0.000330	Area (sq ft)	17.76	38.80	24.39
Q Total (cfs)	62.00	Flow (cfs)	4.42	47.66	9.93
Top Width (ft)	147.53	Top Width (ft)	79.49	16.00	52.03
Vel Total (ft/s)	0.77	Avg. Vel. (ft/s)	0.25	1.23	0.41
Max Chl Dpth (ft)	3.23	Hydr. Depth (ft)	0.22	2.42	0.47
Conv. Total (cfs)	3413.3	Conv. (cfs)	243.1	2623.8	546.4
Length Wtd. (ft)	88.92	Wetted Per. (ft)	79.51	17.06	52.05
Min Ch El (ft)	594.68	Shear (lb/sq ft)	0.00	0.05	0.01
Alpha	2.03	Stream Power (lb/ft s)	442.22	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.75	7.17	1.41
C & E Loss (ft)		Cum SA (acres)	1.45	3.02	2.63

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CULVERT

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 4410

INPUT
Description: Culvert 6
Distance from Upstream XS = 11
Deck/Roadway Width = 66
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 4

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
150	597.83	580	180	597.4	580	210	597.73	580
300	597.73	580						

Upstream Bridge Cross Section Data
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600.39	88	597.62	133	597.64	163	598.07	172	597.53
176	595.07	182	594.68	183	594.78	188	596.66	197	597.19
388	600.39	442.224	600.39						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	172	.038	188	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
172	188	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	168	597.6	F
193	442.224	597.6	F

```
Downstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     175  597.83     580     205   597.4     580     235  597.73     580
     300  597.73     580

Downstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  600.39      31  599.44     167  598.35     187  597.27  193.26  595.98
     203  593.98     207  593.92     210  594.24   217.9  596.52     221   597.3
     287  598.21     421  600.39 448.163  600.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04  193.26    .038   217.9     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
        193.26   217.9             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     193   597.6       F
     218 448.163   597.6       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       2
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 11      66     .021     .021        0                   .9
      1
Number of Barrels =  2
Upstream   Elevation =  595.02
Centerline Stations
    Sta.    Sta.
     179     182
Downstream Elevation =  594.01
Centerline Stations
    Sta.    Sta.
     204     207

CULVERT OUTPUT  Profile #10-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)         17.00    Culv Full Len (ft)
  # Barrels                      2    Culv Vel US (ft/s)          5.15
  Q Barrel (cfs)              8.50    Culv Vel DS (ft/s)          5.51
  E.G. US. (ft)             596.84    Culv Inv El Up (ft)       595.02
  W.S. US. (ft)             596.83    Culv Inv El Dn (ft)       594.01
  E.G. DS (ft)              594.99    Culv Frctn Ls (ft)          1.00
  W.S. DS (ft)              594.94    Culv Exit Loss (ft)         0.48
  Delta EG (ft)               1.85    Culv Entr Loss (ft)         0.37
```

Delta WS (ft)	1.89	Q Weir (cfs)	
E.G. IC (ft)	596.64	Weir Sta Lft (ft)	
E.G. OC (ft)	596.84	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	596.06	Weir Max Depth (ft)	
Culv WS Outlet (ft)	595.00	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	0.99	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.04	Min El Weir Flow (ft)	597.41

Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #50-Year Culv Group: Culvert #1

Q Culv Group (cfs)	29.84	Culv Full Len (ft)	
# Barrels	2	Culv Vel US (ft/s)	6.20
Q Barrel (cfs)	14.92	Culv Vel DS (ft/s)	5.05
E.G. US. (ft)	597.59	Culv Inv El Up (ft)	595.02
W.S. US. (ft)	597.57	Culv Inv El Dn (ft)	594.01
E.G. DS (ft)	595.82	Culv Frctn Ls (ft)	0.86
W.S. DS (ft)	595.79	Culv Exit Loss (ft)	0.37
Delta EG (ft)	1.77	Culv Entr Loss (ft)	0.54
Delta WS (ft)	1.78	Q Weir (cfs)	2.16
E.G. IC (ft)	597.53	Weir Sta Lft (ft)	171.14
E.G. OC (ft)	597.59	Weir Sta Rgt (ft)	193.00
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	596.45	Weir Max Depth (ft)	0.18
Culv WS Outlet (ft)	595.79	Weir Avg Depth (ft)	0.11
Culv Nml Depth (ft)	1.43	Weir Flow Area (sq ft)	2.45
Culv Crt Depth (ft)	1.39	Min El Weir Flow (ft)	597.41

Note: During subcritical analysis, the culvert direct step method, the solution went to normal depth.

CULVERT OUTPUT Profile #100-Year Culv Group: Culvert #1

Q Culv Group (cfs)	29.36	Culv Full Len (ft)	66.00
# Barrels	2	Culv Vel US (ft/s)	4.67
Q Barrel (cfs)	14.68	Culv Vel DS (ft/s)	4.67
E.G. US. (ft)	597.67	Culv Inv El Up (ft)	595.02
W.S. US. (ft)	597.66	Culv Inv El Dn (ft)	594.01
E.G. DS (ft)	596.32	Culv Frctn Ls (ft)	0.73
W.S. DS (ft)	596.30	Culv Exit Loss (ft)	0.32
Delta EG (ft)	1.35	Culv Entr Loss (ft)	0.31
Delta WS (ft)	1.35	Q Weir (cfs)	9.64
E.G. IC (ft)	597.67	Weir Sta Lft (ft)	85.28
E.G. OC (ft)	597.67	Weir Sta Rgt (ft)	207.77
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	597.02	Weir Max Depth (ft)	0.31
Culv WS Outlet (ft)	596.01	Weir Avg Depth (ft)	0.11
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	10.15
Culv Crt Depth (ft)	1.38	Min El Weir Flow (ft)	597.41

CULVERT OUTPUT Profile #500-Year Culv Group: Culvert #1

Q Culv Group (cfs)	11.05	Culv Full Len (ft)	66.00
# Barrels	2	Culv Vel US (ft/s)	1.76
Q Barrel (cfs)	5.52	Culv Vel DS (ft/s)	1.76

E.G. US. (ft)	597.93	Culv Inv El Up (ft)	595.02
W.S. US. (ft)	597.91	Culv Inv El Dn (ft)	594.01
E.G. DS (ft)	597.75	Culv Frctn Ls (ft)	0.10
W.S. DS (ft)	597.74	Culv Exit Loss (ft)	0.04
Delta EG (ft)	0.18	Culv Entr Loss (ft)	0.04
Delta WS (ft)	0.18	Q Weir (cfs)	50.95
E.G. IC (ft)	597.86	Weir Sta Lft (ft)	78.58
E.G. OC (ft)	597.93	Weir Sta Rgt (ft)	240.37
Culvert Control	Outlet	Weir Submerg	0.37
Culv WS Inlet (ft)	597.02	Weir Max Depth (ft)	0.52
Culv WS Outlet (ft)	596.01	Weir Avg Depth (ft)	0.25
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	37.06
Culv Crt Depth (ft)	0.83	Min El Weir Flow (ft)	597.41

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 4334.465

INPUT
Description: D/S BR1
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600.39	31	599.44	167	598.35	187	597.27	193.26	595.98
203	593.98	207	593.92	210	594.24	217.9	596.52	221	597.3
287	598.21	421	600.39	448.163	600.39				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	193.26	.038	217.9	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
193.26	217.9	77.26	97.24	116.66	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	193	597.6	F
218	448.163	597.6	F

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	594.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.038	
W.S. Elev (ft)	594.94	Reach Len. (ft)	77.26	97.24	116.66
Crit W.S. (ft)	594.54	Flow Area (sq ft)		9.64	
E.G. Slope (ft/ft)	0.003447	Area (sq ft)		9.64	
Q Total (cfs)	17.00	Flow (cfs)		17.00	
Top Width (ft)	14.10	Top Width (ft)		14.10	
Vel Total (ft/s)	1.76	Avg. Vel. (ft/s)		1.76	
Max Chl Dpth (ft)	1.02	Hydr. Depth (ft)		0.68	
Conv. Total (cfs)	289.6	Conv. (cfs)		289.6	

Length Wtd. (ft)	97.24	Wetted Per. (ft)			14.32
Min Ch El (ft)	593.92	Shear (lb/sq ft)			0.14
Alpha	1.00	Stream Power (lb/ft s)	448.16		0.00
0.00					
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	0.01		2.19
0.01					
C & E Loss (ft)	0.01	Cum SA (acres)	0.02		1.72
0.02					

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	595.82	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.03	Wt. n-Val.			0.038
W.S. Elev (ft)	595.79	Reach Len. (ft)	77.26	97.24	
116.66					
Crit W.S. (ft)	594.78	Flow Area (sq ft)			24.61
E.G. Slope (ft/ft)	0.000929	Area (sq ft)			24.61
Q Total (cfs)	32.00	Flow (cfs)			32.00
Top Width (ft)	21.18	Top Width (ft)			21.18
Vel Total (ft/s)	1.30	Avg. Vel. (ft/s)			1.30
Max Chl Dpth (ft)	1.87	Hydr. Depth (ft)			1.16
Conv. Total (cfs)	1050.1	Conv. (cfs)			1050.1
Length Wtd. (ft)	97.24	Wetted Per. (ft)			21.60
Min Ch El (ft)	593.92	Shear (lb/sq ft)			0.07
Alpha	1.00	Stream Power (lb/ft s)	448.16		0.00
0.00					
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.03		3.84
0.12					
C & E Loss (ft)	0.01	Cum SA (acres)	0.24		2.32
0.31					

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	596.32	Element	Left OB	Channel	
Right OB					

Vel Head (ft)	0.02	Wt. n-Val.	0.040	0.038	
W.S. Elev (ft)	596.30	Reach Len. (ft)	77.26	97.24	116.66
Crit W.S. (ft)	594.87	Flow Area (sq ft)	0.08	36.30	
E.G. Slope (ft/ft)	0.000444	Area (sq ft)	0.25	36.30	
Q Total (cfs)	39.00	Flow (cfs)	0.03	38.97	
Top Width (ft)	25.44	Top Width (ft)	1.56	23.88	
Vel Total (ft/s)	1.07	Avg. Vel. (ft/s)	0.34	1.07	
Max Chl Dpth (ft)	2.38	Hydr. Depth (ft)	0.29	1.52	
Conv. Total (cfs)	1851.1	Conv. (cfs)	1.2	1849.8	
Length Wtd. (ft)	97.23	Wetted Per. (ft)	0.27	24.39	
Min Ch El (ft)	593.92	Shear (lb/sq ft)	0.01	0.04	
Alpha	1.00	Stream Power (lb/ft s)	448.16	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.25	4.74	0.33
C & E Loss (ft)	0.00	Cum SA (acres)	0.61	2.54	0.72

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	597.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.040	0.038	0.040
W.S. Elev (ft)	597.74	Reach Len. (ft)	77.26	97.24	116.66
Crit W.S. (ft)	595.12	Flow Area (sq ft)	8.96	71.56	9.44
E.G. Slope (ft/ft)	0.000107	Area (sq ft)	8.96	71.56	9.44
Q Total (cfs)	62.00	Flow (cfs)	2.44	58.04	1.52
Top Width (ft)	74.23	Top Width (ft)	14.88	24.64	34.70
Vel Total (ft/s)	0.69	Avg. Vel. (ft/s)	0.27	0.81	0.16
Max Chl Dpth (ft)	3.82	Hydr. Depth (ft)	0.60	2.90	0.27
Conv. Total (cfs)	5996.8	Conv. (cfs)	235.8	5613.9	147.1
Length Wtd. (ft)	97.82	Wetted Per. (ft)	15.03	25.18	34.80
Min Ch El (ft)	593.92	Shear (lb/sq ft)	0.00	0.02	0.00
Alpha	1.30	Stream Power (lb/ft s)	448.16	0.00	0.00

Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.75	7.08	1.41
C & E Loss (ft)	0.00	Cum SA (acres)	1.35	2.98	2.54

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 4237.225

INPUT
Description: Surveyed Section 2
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600.39	12	600.39	56	598.86	192	597.77	212	596.69
228	593.63	232	593.57	235	593.89	246	596.72	312	597.63
412.894	600.39								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	212	.038	246	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
212	246	322.8	391.36	453.6	.1	.3

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	594.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.038	
W.S. Elev (ft)	594.66	Reach Len. (ft)	322.80	391.36	453.60
Crit W.S. (ft)		Flow Area (sq ft)		10.99	
E.G. Slope (ft/ft)	0.002501	Area (sq ft)		10.99	
Q Total (cfs)	17.00	Flow (cfs)		17.00	
Top Width (ft)	15.40	Top Width (ft)		15.40	
Vel Total (ft/s)	1.55	Avg. Vel. (ft/s)		1.55	
Max Chl Dpth (ft)	1.09	Hydr. Depth (ft)		0.71	
Conv. Total (cfs)	340.0	Conv. (cfs)		340.0	
Length Wtd. (ft)	391.36	Wetted Per. (ft)		15.61	
Min Ch El (ft)	593.57	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)	412.89	0.00	0.00

```
  Frctn Loss (ft)            0.33    Cum Volume (acre-ft)        0.01       2.16
   0.01
  C & E Loss (ft)            0.00    Cum SA (acres)              0.02       1.69
   0.02


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #50-Year


  E.G. Elev (ft)           595.75    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.01    Wt. n-Val.                            0.038

  W.S. Elev (ft)           595.73    Reach Len. (ft)           322.80     391.36
 453.60
  Crit W.S. (ft)                     Flow Area (sq ft)                     32.73

  E.G. Slope (ft/ft)      0.000451   Area (sq ft)                          32.73

  Q Total (cfs)             32.00    Flow (cfs)                            32.00

  Top Width (ft)            25.17    Top Width (ft)                        25.17

  Vel Total (ft/s)           0.98    Avg. Vel. (ft/s)                       0.98

  Max Chl Dpth (ft)          2.16    Hydr. Depth (ft)                       1.30

  Conv. Total (cfs)        1507.0    Conv. (cfs)                          1507.0

  Length Wtd. (ft)         391.36    Wetted Per. (ft)                      25.62

  Min Ch El (ft)           593.57    Shear (lb/sq ft)                       0.04

  Alpha                      1.00    Stream Power (lb/ft s)    412.89       0.00
   0.00
  Frctn Loss (ft)            0.15    Cum Volume (acre-ft)        0.03       3.78
   0.12
  C & E Loss (ft)            0.00    Cum SA (acres)              0.24       2.26
   0.31


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #100-Year


  E.G. Elev (ft)           596.28    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.01    Wt. n-Val.                            0.038

  W.S. Elev (ft)           596.27    Reach Len. (ft)           322.80     391.36
 453.60
  Crit W.S. (ft)                     Flow Area (sq ft)                     47.64

  E.G. Slope (ft/ft)      0.000244   Area (sq ft)                          47.64
```

Q Total (cfs)	39.00	Flow (cfs)		39.00
Top Width (ft)	30.09	Top Width (ft)		30.09
Vel Total (ft/s)	0.82	Avg. Vel. (ft/s)		0.82
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)		1.58
Conv. Total (cfs)	2499.1	Conv. (cfs)		2499.1
Length Wtd. (ft)	391.36	Wetted Per. (ft)		30.66
Min Ch El (ft)	593.57	Shear (lb/sq ft)		0.02
Alpha	1.00	Stream Power (lb/ft s)	412.89	0.00
0.00				
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.25	4.65
0.33				
C & E Loss (ft)	0.00	Cum SA (acres)	0.61	2.48
0.72				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	597.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.040	0.038	0.040
W.S. Elev (ft)	597.73	Reach Len. (ft)	322.80	391.36	453.60
Crit W.S. (ft)		Flow Area (sq ft)	10.04	96.36	36.91
E.G. Slope (ft/ft)	0.000052	Area (sq ft)	10.04	96.36	36.91
Q Total (cfs)	62.00	Flow (cfs)	1.74	53.78	6.48
Top Width (ft)	122.99	Top Width (ft)	19.28	34.00	69.70
Vel Total (ft/s)	0.43	Avg. Vel. (ft/s)	0.17	0.56	0.18
Max Chl Dpth (ft)	4.16	Hydr. Depth (ft)	0.52	2.83	0.53
Conv. Total (cfs)	8587.5	Conv. (cfs)	241.2	7449.1	897.2
Length Wtd. (ft)	392.56	Wetted Per. (ft)	19.31	34.67	69.71
Min Ch El (ft)	593.57	Shear (lb/sq ft)	0.00	0.01	0.00
Alpha	1.47	Stream Power (lb/ft s)	412.89	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.73	6.90	1.35
C & E Loss (ft)	0.00	Cum SA (acres)	1.32	2.91	2.40

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 3845.845

INPUT
Description: Surveyed Section 3
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600.39	32	599.43	132	599.96	232	599.71	242	599.01
267	593.3	271	592.02	274	591.8	279	591.4	279	591.75
280	592.76	305	598.7	386	599.23	475	599.1	578.74	600.39

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	242	.037	305	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
242	305	94.88	93.28	91.7	.3	.5

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	594.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.037	
W.S. Elev (ft)	594.34	Reach Len. (ft)	94.88	93.28	91.70
Crit W.S. (ft)		Flow Area (sq ft)		37.51	
E.G. Slope (ft/ft)	0.000634	Area (sq ft)		37.51	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	24.23	Top Width (ft)		24.23	
Vel Total (ft/s)	1.31	Avg. Vel. (ft/s)		1.31	
Max Chl Dpth (ft)	2.94	Hydr. Depth (ft)		1.55	
Conv. Total (cfs)	1946.3	Conv. (cfs)		1946.3	
Length Wtd. (ft)	93.25	Wetted Per. (ft)		25.53	
Min Ch El (ft)	591.40	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)	578.74	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.01	1.94	0.01
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	1.51	0.02

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	595.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.037	
W.S. Elev (ft)	595.58	Reach Len. (ft)	94.88	93.28	91.70
Crit W.S. (ft)		Flow Area (sq ft)		73.92	
E.G. Slope (ft/ft)	0.000358	Area (sq ft)		73.92	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	34.82	Top Width (ft)		34.82	
Vel Total (ft/s)	1.22	Avg. Vel. (ft/s)		1.22	
Max Chl Dpth (ft)	4.18	Hydr. Depth (ft)		2.12	
Conv. Total (cfs)	4759.9	Conv. (cfs)		4759.9	
Length Wtd. (ft)	93.23	Wetted Per. (ft)		36.41	
Min Ch El (ft)	591.40	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)	578.74	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.03	3.30	0.12
C & E Loss (ft)	0.00	Cum SA (acres)	0.24	1.99	0.31

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	596.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.037	
W.S. Elev (ft)	596.16	Reach Len. (ft)	94.88	93.28	91.70
Crit W.S. (ft)		Flow Area (sq ft)		95.52	
E.G. Slope (ft/ft)	0.000281	Area (sq ft)		95.52	
Q Total (cfs)	112.00	Flow (cfs)		112.00	
Top Width (ft)	39.80	Top Width (ft)		39.80	
Vel Total (ft/s)	1.17	Avg. Vel. (ft/s)		1.17	
Max Chl Dpth (ft)	4.76	Hydr. Depth (ft)		2.40	

Conv. Total (cfs)	6686.3	Conv. (cfs)			6686.3
Length Wtd. (ft)	93.22	Wetted Per. (ft)			41.51
Min Ch El (ft)	591.40	Shear (lb/sq ft)			0.04
Alpha	1.00	Stream Power (lb/ft s)	578.74		0.00
0.00					
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.25		4.00
0.33					
C & E Loss (ft)	0.00	Cum SA (acres)	0.61		2.17
0.72					

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	597.69	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.02	Wt. n-Val.		0.037	
W.S. Elev (ft)	597.67	Reach Len. (ft)	94.88	93.28	
91.70					
Crit W.S. (ft)		Flow Area (sq ft)		165.81	
E.G. Slope (ft/ft)	0.000158	Area (sq ft)		165.81	
Q Total (cfs)	175.00	Flow (cfs)		175.00	
Top Width (ft)	52.83	Top Width (ft)		52.83	
Vel Total (ft/s)	1.06	Avg. Vel. (ft/s)		1.06	
Max Chl Dpth (ft)	6.27	Hydr. Depth (ft)		3.14	
Conv. Total (cfs)	13914.1	Conv. (cfs)		13914.1	
Length Wtd. (ft)	93.21	Wetted Per. (ft)		54.89	
Min Ch El (ft)	591.40	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)	578.74	0.00	
0.00					
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.70	5.72	
1.16					
C & E Loss (ft)	0.00	Cum SA (acres)	1.25	2.52	
2.04					

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 3752.562

INPUT
Description: U/S BR2
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600.39	37	599.1	137	599.63	237	599.38	247	598.68

```
     272  592.97     276  591.07     279  591.07     284  591.07     284  591.42
     285  592.43     310  598.37     391   598.9     480  598.77 579.364  600.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     272    .037     285     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           272     285             81.5   80.02   78.58             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     267     598       F
     293 579.364     598       F

CROSS SECTION OUTPUT  Profile #10-Year


  E.G. Elev (ft)            594.33    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.02    Wt. n-Val.                  0.040      0.037
  0.040
  W.S. Elev (ft)            594.31    Reach Len. (ft)            81.50      80.02
  78.58
  Crit W.S. (ft)            592.08    Flow Area (sq ft)           3.87      37.52
   7.47
  E.G. Slope (ft/ft)      0.000226    Area (sq ft)                3.96      37.52
   7.47
  Q Total (cfs)              49.00    Flow (cfs)                  1.79      43.28
   3.94
  Top Width (ft)             26.82    Top Width (ft)              5.89      13.00
   7.93
  Vel Total (ft/s)            1.00    Avg. Vel. (ft/s)            0.46       1.15
   0.53
  Max Chl Dpth (ft)           3.24    Hydr. Depth (ft)            0.77       2.89
   0.94
  Conv. Total (cfs)         3261.6    Conv. (cfs)                119.0     2880.5
  262.0
  Length Wtd. (ft)           80.02    Wetted Per. (ft)            5.13      14.20
   8.15
  Min Ch El (ft)            591.07    Shear (lb/sq ft)            0.01       0.04
   0.01
  Alpha                       1.20    Stream Power (lb/ft s)    579.36       0.00
   0.00
  Frctn Loss (ft)                     Cum Volume (acre-ft)        0.00       1.86
   0.00
  C & E Loss (ft)                     Cum SA (acres)              0.01       1.47
   0.02


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #50-Year


  E.G. Elev (ft)            595.58    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.02    Wt. n-Val.                  0.040      0.037
  0.040
  W.S. Elev (ft)            595.56    Reach Len. (ft)            81.50      80.02
  78.58
  Crit W.S. (ft)            592.53    Flow Area (sq ft)          10.07      53.65
```

```
  17.40
  E.G. Slope (ft/ft)      0.000171    Area (sq ft)               14.63      53.65
  20.55
  Q Total (cfs)              90.00    Flow (cfs)                  7.68      68.39
  13.94
  Top Width (ft)             37.47    Top Width (ft)             11.32      13.00
  13.15
  Vel Total (ft/s)            1.11    Avg. Vel. (ft/s)            0.76       1.27
   0.80
  Max Chl Dpth (ft)           4.49    Hydr. Depth (ft)            2.01       4.13
   2.17
  Conv. Total (cfs)         6879.1    Conv. (cfs)                586.7     5227.2
 1065.3
  Length Wtd. (ft)           80.02    Wetted Per. (ft)            5.13      14.20
   8.22
  Min Ch El (ft)            591.07    Shear (lb/sq ft)            0.02       0.04
   0.02
  Alpha                       1.12    Stream Power (lb/ft s)    579.36       0.00
   0.00
  Frctn Loss (ft)                     Cum Volume (acre-ft)        0.02       3.16
   0.10
  C & E Loss (ft)                     Cum SA (acres)              0.23       1.94
   0.30


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #100-Year


  E.G. Elev (ft)            596.16    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.02    Wt. n-Val.                 0.040      0.037
  0.040
  W.S. Elev (ft)            596.13    Reach Len. (ft)            81.50      80.02
  78.58
  Crit W.S. (ft)            592.74    Flow Area (sq ft)          12.97      61.18
  22.03
  E.G. Slope (ft/ft)      0.000156    Area (sq ft)               21.92      61.18
  28.88
  Q Total (cfs)             112.00    Flow (cfs)                 11.15      81.15
  19.69
  Top Width (ft)             42.45    Top Width (ft)             13.85      13.00
  15.59
  Vel Total (ft/s)            1.16    Avg. Vel. (ft/s)            0.86       1.33
   0.89
  Max Chl Dpth (ft)           5.06    Hydr. Depth (ft)            2.59       4.71
   2.75
  Conv. Total (cfs)         8979.2    Conv. (cfs)                894.0     6506.2
 1578.9
  Length Wtd. (ft)           80.02    Wetted Per. (ft)            5.13      14.20
   8.22
  Min Ch El (ft)            591.07    Shear (lb/sq ft)            0.02       0.04
   0.03
  Alpha                       1.10    Stream Power (lb/ft s)    579.36       0.00
   0.00
  Frctn Loss (ft)                     Cum Volume (acre-ft)        0.22       3.84
   0.30
  C & E Loss (ft)                     Cum SA (acres)              0.60       2.11
   0.70
```

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	597.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.037	0.040
W.S. Elev (ft)	597.65	Reach Len. (ft)	81.50	80.02	78.58
Crit W.S. (ft)	593.26	Flow Area (sq ft)	20.53	80.85	34.13
E.G. Slope (ft/ft)	0.000127	Area (sq ft)	47.89	80.85	57.28
Q Total (cfs)	175.00	Flow (cfs)	21.64	116.50	36.86
Top Width (ft)	55.44	Top Width (ft)	20.48	13.00	21.96
Vel Total (ft/s)	1.29	Avg. Vel. (ft/s)	1.05	1.44	1.08
Max Chl Dpth (ft)	6.58	Hydr. Depth (ft)	4.11	6.22	4.27
Conv. Total (cfs)	15550.8	Conv. (cfs)	1922.8	10352.8	3275.2
Length Wtd. (ft)	80.02	Wetted Per. (ft)	5.13	14.20	8.22
Min Ch El (ft)	591.07	Shear (lb/sq ft)	0.03	0.05	0.03
Alpha	1.06	Stream Power (lb/ft s)	579.36	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.64	5.45	1.10
C & E Loss (ft)		Cum SA (acres)	1.23	2.45	2.01

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CULVERT

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 3742

INPUT
Description: Culvert 5
Distance from Upstream XS = 10
Deck/Roadway Width = 60
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 3

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
180	599.16	585	280	598.29	585	380	598.58	585

Upstream Bridge Cross Section Data
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
       0  600.39      37   599.1     137  599.63     237  599.38     247  598.68
     272  592.97     276  591.07     279  591.07     284  591.07     284  591.42
     285  592.43     310  598.37     391   598.9     480  598.77 579.364  600.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     272    .037     285     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           272     285             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     267     598       F
     293 579.364     598       F

Downstream  Deck/Roadway Coordinates
    num=       3
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     195  599.16     585     295  598.29     585     395  598.58     585

Downstream Bridge Cross Section Data
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  600.39      67  599.51     167  599.12     261  598.82     267  598.11
     284   592.7     289  590.81     294   590.6     298  590.81     300  592.33
     331  598.61     424  599.18     531  600.39 587.992  600.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     284    .037     300     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           284     300             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     282     598       F
     308 587.992     598       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       6
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 10      60     .021     .021        0                   .9
      1
Upstream   Elevation =  591.2
           Centerline Station =  280
Downstream Elevation =  590.6
           Centerline Station =  295

CULVERT OUTPUT  Profile #10-Year  Culv Group:  Culvert #1
```

Q Culv Group (cfs)	49.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.58
Q Barrel (cfs)	49.00	Culv Vel DS (ft/s)	4.72
E.G. US. (ft)	594.33	Culv Inv El Up (ft)	591.20
W.S. US. (ft)	594.31	Culv Inv El Dn (ft)	590.60
E.G. DS (ft)	593.01	Culv Frctn Ls (ft)	0.41
W.S. DS (ft)	592.97	Culv Exit Loss (ft)	0.30
Delta EG (ft)	1.32	Culv Entr Loss (ft)	0.60
Delta WS (ft)	1.34	Q Weir (cfs)	
E.G. IC (ft)	593.82	Weir Sta Lft (ft)	
E.G. OC (ft)	594.33	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	593.06	Weir Max Depth (ft)	
Culv WS Outlet (ft)	592.97	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.76	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.86	Min El Weir Flow (ft)	598.30

Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: During the supercritical calculations a hydraulic jump occurred inside of the culvert.

CULVERT OUTPUT Profile #50-Year Culv Group: Culvert #1

Q Culv Group (cfs)	90.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	7.88
Q Barrel (cfs)	90.00	Culv Vel DS (ft/s)	6.31
E.G. US. (ft)	595.58	Culv Inv El Up (ft)	591.20
W.S. US. (ft)	595.56	Culv Inv El Dn (ft)	590.60
E.G. DS (ft)	593.69	Culv Frctn Ls (ft)	0.47
W.S. DS (ft)	593.62	Culv Exit Loss (ft)	0.55
Delta EG (ft)	1.89	Culv Entr Loss (ft)	0.87
Delta WS (ft)	1.93	Q Weir (cfs)	
E.G. IC (ft)	594.98	Weir Sta Lft (ft)	
E.G. OC (ft)	595.58	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	593.75	Weir Max Depth (ft)	
Culv WS Outlet (ft)	593.62	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.43	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.55	Min El Weir Flow (ft)	598.30

Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: During the supercritical calculations a hydraulic jump occurred inside of the culvert.

CULVERT OUTPUT Profile #100-Year Culv Group: Culvert #1

Q Culv Group (cfs)	112.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	8.44
Q Barrel (cfs)	112.00	Culv Vel DS (ft/s)	7.08
E.G. US. (ft)	596.16	Culv Inv El Up (ft)	591.20
W.S. US. (ft)	596.13	Culv Inv El Dn (ft)	590.60
E.G. DS (ft)	593.97	Culv Frctn Ls (ft)	0.50
W.S. DS (ft)	593.88	Culv Exit Loss (ft)	0.69
Delta EG (ft)	2.19	Culv Entr Loss (ft)	1.00
Delta WS (ft)	2.25	Q Weir (cfs)	
E.G. IC (ft)	595.55	Weir Sta Lft (ft)	

E.G. OC (ft)	596.16	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	594.05	Weir Max Depth (ft)	
Culv WS Outlet (ft)	593.88	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.74	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.85	Min El Weir Flow (ft)	598.30

Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: During the supercritical calculations a hydraulic jump occurred inside of the culvert.

CULVERT OUTPUT Profile #500-Year Culv Group: Culvert #1

Q Culv Group (cfs)	175.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	9.86
Q Barrel (cfs)	175.00	Culv Vel DS (ft/s)	9.10
E.G. US. (ft)	597.67	Culv Inv El Up (ft)	591.20
W.S. US. (ft)	597.65	Culv Inv El Dn (ft)	590.60
E.G. DS (ft)	594.58	Culv Frctn Ls (ft)	0.57
W.S. DS (ft)	594.46	Culv Exit Loss (ft)	1.16
Delta EG (ft)	3.09	Culv Entr Loss (ft)	1.36
Delta WS (ft)	3.19	Q Weir (cfs)	
E.G. IC (ft)	597.11	Weir Sta Lft (ft)	
E.G. OC (ft)	597.67	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	594.81	Weir Max Depth (ft)	
Culv WS Outlet (ft)	594.46	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.59	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	3.61	Min El Weir Flow (ft)	598.30

Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: During the supercritical calculations a hydraulic jump occurred inside of the culvert.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 3672.534

INPUT
Description: D/S BR2
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600.39	67	599.51	167	599.12	261	598.82	267	598.11
284	592.7	289	590.81	294	590.6	298	590.81	300	592.33
331	598.61	424	599.18	531	600.39	587.992	600.39		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	284	.037	300	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
284	300	88.56	86.94	85.36	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	282	598	F

308 587.992 598 F

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	593.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.040	0.037	0.040
W.S. Elev (ft)	592.97	Reach Len. (ft)	88.56	86.94	85.36
Crit W.S. (ft)	591.63	Flow Area (sq ft)	0.11	29.26	1.01
E.G. Slope (ft/ft)	0.000816	Area (sq ft)	0.11	29.26	1.01
Q Total (cfs)	49.00	Flow (cfs)	0.03	48.47	0.50
Top Width (ft)	20.01	Top Width (ft)	0.85	16.00	3.16
Vel Total (ft/s)	1.61	Avg. Vel. (ft/s)	0.27	1.66	0.49
Max Chl Dpth (ft)	2.37	Hydr. Depth (ft)	0.14	1.83	0.32
Conv. Total (cfs)	1715.4	Conv. (cfs)	1.1	1696.9	17.4
Length Wtd. (ft)	86.93	Wetted Per. (ft)	0.89	16.87	3.22
Min Ch El (ft)	590.60	Shear (lb/sq ft)	0.01	0.09	0.02
Alpha	1.05	Stream Power (lb/ft s)	587.99	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	0.00	1.84	0.00
C & E Loss (ft)	0.00	Cum SA (acres)	0.00	1.45	0.01

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	593.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.040	0.037	0.040
W.S. Elev (ft)	593.62	Reach Len. (ft)	88.56	86.94	85.36
Crit W.S. (ft)	592.05	Flow Area (sq ft)	1.21	39.68	4.11
E.G. Slope (ft/ft)	0.000923	Area (sq ft)	1.33	39.68	4.11
Q Total (cfs)	90.00	Flow (cfs)	0.94	85.64	3.42
Top Width (ft)	25.27	Top Width (ft)	2.89	16.00	6.37
Vel Total (ft/s)	2.00	Avg. Vel. (ft/s)	0.78	2.16	0.83

Max Chl Dpth (ft)	3.02	Hydr. Depth (ft)	0.60	2.48	0.65
Conv. Total (cfs)	2962.3	Conv. (cfs)	31.0	2818.7	112.7
Length Wtd. (ft)	86.92	Wetted Per. (ft)	2.10	16.87	6.50
Min Ch El (ft)	590.60	Shear (lb/sq ft)	0.03	0.14	0.04
Alpha	1.12	Stream Power (lb/ft s)	587.99	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.02	3.12	0.10
C & E Loss (ft)	0.00	Cum SA (acres)	0.22	1.92	0.28

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	593.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.040	0.037	0.040
W.S. Elev (ft)	593.88	Reach Len. (ft)	88.56	86.94	85.36
Crit W.S. (ft)	592.24	Flow Area (sq ft)	1.73	43.85	5.94
E.G. Slope (ft/ft)	0.000984	Area (sq ft)	2.19	43.85	5.94
Q Total (cfs)	112.00	Flow (cfs)	1.77	104.46	5.77
Top Width (ft)	27.37	Top Width (ft)	3.71	16.00	7.66
Vel Total (ft/s)	2.17	Avg. Vel. (ft/s)	1.02	2.38	0.97
Max Chl Dpth (ft)	3.28	Hydr. Depth (ft)	0.86	2.74	0.78
Conv. Total (cfs)	3570.0	Conv. (cfs)	56.4	3329.7	184.0
Length Wtd. (ft)	86.91	Wetted Per. (ft)	2.10	16.87	7.82
Min Ch El (ft)	590.60	Shear (lb/sq ft)	0.05	0.16	0.05
Alpha	1.13	Stream Power (lb/ft s)	587.99	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.22	3.79	0.30
C & E Loss (ft)	0.00	Cum SA (acres)	0.58	2.09	0.68

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	594.58	Element	Left OB	Channel

```
Right OB
  Vel Head (ft)              0.12    Wt. n-Val.                 0.040      0.037
  0.040
  W.S. Elev (ft)           594.46    Reach Len. (ft)            88.56      86.94
  85.36
  Crit W.S. (ft)           592.71    Flow Area (sq ft)           2.89      53.13
  10.57
  E.G. Slope (ft/ft)     0.001140    Area (sq ft)                4.88      53.13
  11.22
  Q Total (cfs)            175.00    Flow (cfs)                  4.48     154.77
  15.75
  Top Width (ft)            32.06    Top Width (ft)              5.54      16.00
  10.52
  Vel Total (ft/s)           2.63    Avg. Vel. (ft/s)            1.55       2.91
   1.49
  Max Chl Dpth (ft)          3.86    Hydr. Depth (ft)            1.44       3.32
   1.32
  Conv. Total (cfs)        5183.8    Conv. (cfs)                132.6     4584.6
  466.6
  Length Wtd. (ft)          86.89    Wetted Per. (ft)            2.10      16.87
   8.16
  Min Ch El (ft)           590.60    Shear (lb/sq ft)            0.10       0.22
   0.09
  Alpha                      1.12    Stream Power (lb/ft s)    587.99       0.00
   0.00
  Frctn Loss (ft)            0.12    Cum Volume (acre-ft)        0.64       5.38
   1.10
  C & E Loss (ft)            0.01    Cum SA (acres)              1.20       2.42
   1.98


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION


RIVER: Trib to Cayuga
REACH: Reach 1            RS: 3585.583

INPUT
Description: Surveyed Section 4
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  600.39      86  599.25     186  598.86     280  598.56     286  597.85
     303  592.44     308  591.76     311  591.37     313  590.47     317  590.55
     319  592.07     350  598.35     443  598.92     550  600.39 583.793  600.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     286    .037     350     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           286     350            496.3   458.8   421.4             .1       .3

CROSS SECTION OUTPUT  Profile #10-Year


  E.G. Elev (ft)           592.91    Element                    Left OB    Channel
Right OB
  Vel Head (ft)              0.06    Wt. n-Val.                            0.037
```

W.S. Elev (ft)	592.85	Reach Len. (ft)	496.30	458.80	421.40
Crit W.S. (ft)		Flow Area (sq ft)		25.65	
E.G. Slope (ft/ft)	0.001850	Area (sq ft)		25.65	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	21.13	Top Width (ft)		21.13	
Vel Total (ft/s)	1.91	Avg. Vel. (ft/s)		1.91	
Max Chl Dpth (ft)	2.38	Hydr. Depth (ft)		1.21	
Conv. Total (cfs)	1139.3	Conv. (cfs)		1139.3	
Length Wtd. (ft)	458.80	Wetted Per. (ft)		22.05	
Min Ch El (ft)	590.47	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)	583.79	0.00	0.00
Frctn Loss (ft)	1.11	Cum Volume (acre-ft)	0.00	1.79	0.00
C & E Loss (ft)	0.00	Cum SA (acres)	0.00	1.41	0.00

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	593.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.037	
W.S. Elev (ft)	593.51	Reach Len. (ft)	496.30	458.80	421.40
Crit W.S. (ft)		Flow Area (sq ft)		41.36	
E.G. Slope (ft/ft)	0.001708	Area (sq ft)		41.36	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	26.46	Top Width (ft)		26.46	
Vel Total (ft/s)	2.18	Avg. Vel. (ft/s)		2.18	
Max Chl Dpth (ft)	3.04	Hydr. Depth (ft)		1.56	
Conv. Total (cfs)	2177.7	Conv. (cfs)		2177.7	
Length Wtd. (ft)	458.80	Wetted Per. (ft)		27.55	
Min Ch El (ft)	590.47	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)	583.79	0.00	0.00
Frctn Loss (ft)	1.28	Cum Volume (acre-ft)	0.02	3.04	

```
   0.09
  C & E Loss (ft)             0.01    Cum SA (acres)              0.21       1.87
   0.28


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and
previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #100-Year


  E.G. Elev (ft)            593.85    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.08    Wt. n-Val.                            0.037

  W.S. Elev (ft)            593.77    Reach Len. (ft)           496.30     458.80
 421.40
  Crit W.S. (ft)                      Flow Area (sq ft)                     48.58

  E.G. Slope (ft/ft)      0.001713    Area (sq ft)                          48.58

  Q Total (cfs)             112.00    Flow (cfs)                           112.00

  Top Width (ft)             28.58    Top Width (ft)                        28.58

  Vel Total (ft/s)            2.31    Avg. Vel. (ft/s)                       2.31

  Max Chl Dpth (ft)           3.30    Hydr. Depth (ft)                       1.70

  Conv. Total (cfs)         2706.4    Conv. (cfs)                          2706.4

  Length Wtd. (ft)          458.80    Wetted Per. (ft)                      29.74

  Min Ch El (ft)            590.47    Shear (lb/sq ft)                       0.17

  Alpha                       1.00    Stream Power (lb/ft s)    583.79       0.00
   0.00
  Frctn Loss (ft)             1.35    Cum Volume (acre-ft)        0.22       3.70
   0.30
  C & E Loss (ft)             0.01    Cum SA (acres)              0.58       2.04
   0.68


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and
previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #500-Year


  E.G. Elev (ft)            594.45    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.11    Wt. n-Val.                            0.037
```

W.S. Elev (ft)	594.34	Reach Len. (ft)	496.30	458.80	421.40
Crit W.S. (ft)		Flow Area (sq ft)		66.29	
E.G. Slope (ft/ft)	0.001810	Area (sq ft)		66.29	
Q Total (cfs)	175.00	Flow (cfs)		175.00	
Top Width (ft)	33.21	Top Width (ft)		33.21	
Vel Total (ft/s)	2.64	Avg. Vel. (ft/s)		2.64	
Max Chl Dpth (ft)	3.87	Hydr. Depth (ft)		2.00	
Conv. Total (cfs)	4113.8	Conv. (cfs)		4113.8	
Length Wtd. (ft)	458.80	Wetted Per. (ft)		34.52	
Min Ch El (ft)	590.47	Shear (lb/sq ft)		0.22	
Alpha	1.00	Stream Power (lb/ft s)	583.79	0.00	0.00
Frctn Loss (ft)	1.40	Cum Volume (acre-ft)	0.64	5.26	1.08
C & E Loss (ft)	0.01	Cum SA (acres)	1.20	2.37	1.97

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 3126.746

INPUT
Description: Surveyed Section 5
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600.39	44.619	600.39	53.445	600.39	64.042	599.56	81.529	597.11
97	596.3	196	594.98	244	595.23	256	596.44	288	595.92
309	591.6	311	589.28	315	589.1	317	590.12	317	590.92
365	596.6	410	597.23	636.056	597.11	646.293	597.11	670.604	597.11

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	288	.036	365	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
288	365	577.68	574.8	571.32	.1	.3

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	591.79	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.10	Wt. n-Val.			0.036
W.S. Elev (ft)	591.68	Reach Len. (ft)	577.68	574.80	571.32
Crit W.S. (ft)		Flow Area (sq ft)			19.11
E.G. Slope (ft/ft)	0.003314	Area (sq ft)			19.11
Q Total (cfs)	49.00	Flow (cfs)			49.00
Top Width (ft)	14.87	Top Width (ft)			14.87
Vel Total (ft/s)	2.56	Avg. Vel. (ft/s)			2.56
Max Chl Dpth (ft)	2.58	Hydr. Depth (ft)			1.28
Conv. Total (cfs)	851.1	Conv. (cfs)			851.1
Length Wtd. (ft)	574.80	Wetted Per. (ft)			17.04
Min Ch El (ft)	589.10	Shear (lb/sq ft)			0.23
Alpha	1.00	Stream Power (lb/ft s)	670.60	0.00	0.00
Frctn Loss (ft)	2.21	Cum Volume (acre-ft)	0.00	1.55	0.00
C & E Loss (ft)	0.00	Cum SA (acres)	0.00	1.22	0.00

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	592.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.			0.036
W.S. Elev (ft)	592.12	Reach Len. (ft)	577.68	574.80	571.32
Crit W.S. (ft)		Flow Area (sq ft)			26.90
E.G. Slope (ft/ft)	0.005313	Area (sq ft)			26.90
Q Total (cfs)	90.00	Flow (cfs)			90.00
Top Width (ft)	20.71	Top Width (ft)			20.71
Vel Total (ft/s)	3.35	Avg. Vel. (ft/s)			3.35
Max Chl Dpth (ft)	3.02	Hydr. Depth (ft)			1.30
Conv. Total (cfs)	1234.8	Conv. (cfs)			1234.8
Length Wtd. (ft)	574.80	Wetted Per. (ft)			22.94
Min Ch El (ft)	589.10	Shear (lb/sq ft)			0.39
Alpha	1.00	Stream Power (lb/ft s)	670.60	0.00	

```
  0.00
  Frctn Loss (ft)            2.00    Cum Volume (acre-ft)        0.02       2.68
   0.09
  C & E Loss (ft)            0.03    Cum SA (acres)              0.21       1.63
   0.28


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and
previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #100-Year


  E.G. Elev (ft)           592.50    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.21    Wt. n-Val.                            0.036

  W.S. Elev (ft)           592.29    Reach Len. (ft)           577.68     574.80
 571.32
  Crit W.S. (ft)                     Flow Area (sq ft)                     30.49

  E.G. Slope (ft/ft)      0.006130   Area (sq ft)                          30.49

  Q Total (cfs)            112.00    Flow (cfs)                           112.00

  Top Width (ft)            22.90    Top Width (ft)                        22.90

  Vel Total (ft/s)           3.67    Avg. Vel. (ft/s)                       3.67

  Max Chl Dpth (ft)          3.19    Hydr. Depth (ft)                       1.33

  Conv. Total (cfs)        1430.5    Conv. (cfs)                          1430.5

  Length Wtd. (ft)         574.80    Wetted Per. (ft)                      25.16

  Min Ch El (ft)           589.10    Shear (lb/sq ft)                       0.46

  Alpha                      1.00    Stream Power (lb/ft s)    670.60       0.00
   0.00
  Frctn Loss (ft)            1.90    Cum Volume (acre-ft)        0.22       3.28
   0.30
  C & E Loss (ft)            0.04    Cum SA (acres)              0.58       1.77
   0.68


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and
previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #500-Year


  E.G. Elev (ft)           593.04    Element                   Left OB    Channel
Right OB
```

Vel Head (ft)	0.25	Wt. n-Val.			0.036
W.S. Elev (ft)	592.79	Reach Len. (ft)	577.68	574.80	571.32
Crit W.S. (ft)		Flow Area (sq ft)			43.72
E.G. Slope (ft/ft)	0.006192	Area (sq ft)			43.72
Q Total (cfs)	175.00	Flow (cfs)			175.00
Top Width (ft)	29.61	Top Width (ft)			29.61
Vel Total (ft/s)	4.00	Avg. Vel. (ft/s)			4.00
Max Chl Dpth (ft)	3.69	Hydr. Depth (ft)			1.48
Conv. Total (cfs)	2224.0	Conv. (cfs)			2224.0
Length Wtd. (ft)	574.80	Wetted Per. (ft)			31.95
Min Ch El (ft)	589.10	Shear (lb/sq ft)			0.53
Alpha	1.00	Stream Power (lb/ft s)	670.60	0.00	0.00
Frctn Loss (ft)	1.96	Cum Volume (acre-ft)	0.64	4.68	1.08
C & E Loss (ft)	0.04	Cum SA (acres)	1.20	2.04	1.97

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 2552.012

INPUT
Description: Surveyed Section 6
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600.22	1.77	600.11	16.73	599.2	43.14	597.59	46.59	597.11
57.18	597.11	104.92	597.11	140.19	597.11	253	597.03	301	593.55
396	591.69	403	591.18	419	588.82	420.5	587.82	422	587.82
423.5	587.82	461	592.29	499	592.98	540	595.57	785.22	595.57
810.71	595.57								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	403	.036	461	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
403	461	751.8	721.8	681.6	.1	.3

CROSS SECTION OUTPUT Profile #10-Year

```
  E.G. Elev (ft)            589.58    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.10    Wt. n-Val.                            0.036

  W.S. Elev (ft)            589.48    Reach Len. (ft)           751.80     721.80
 681.60
  Crit W.S. (ft)                      Flow Area (sq ft)                     19.76

  E.G. Slope (ft/ft)      0.004508    Area (sq ft)                          19.76

  Q Total (cfs)              49.00    Flow (cfs)                            49.00

  Top Width (ft)             22.91    Top Width (ft)                        22.91

  Vel Total (ft/s)            2.48    Avg. Vel. (ft/s)                       2.48

  Max Chl Dpth (ft)           1.66    Hydr. Depth (ft)                       0.86

  Conv. Total (cfs)          729.8    Conv. (cfs)                           729.8

  Length Wtd. (ft)          721.80    Wetted Per. (ft)                      23.36

  Min Ch El (ft)            587.82    Shear (lb/sq ft)                       0.24

  Alpha                       1.00    Stream Power (lb/ft s)    810.71       0.00
   0.00
  Frctn Loss (ft)             1.03    Cum Volume (acre-ft)        0.00       1.29
   0.00
  C & E Loss (ft)             0.02    Cum SA (acres)              0.00       0.97
   0.00


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and
previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #50-Year


  E.G. Elev (ft)            590.27    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.08    Wt. n-Val.                            0.036

  W.S. Elev (ft)            590.19    Reach Len. (ft)           751.80     721.80
 681.60
  Crit W.S. (ft)                      Flow Area (sq ft)                     39.84

  E.G. Slope (ft/ft)      0.002446    Area (sq ft)                          39.84

  Q Total (cfs)              90.00    Flow (cfs)                            90.00

  Top Width (ft)             33.67    Top Width (ft)                        33.67

  Vel Total (ft/s)            2.26    Avg. Vel. (ft/s)                       2.26

  Max Chl Dpth (ft)           2.37    Hydr. Depth (ft)                       1.18

  Conv. Total (cfs)         1819.9    Conv. (cfs)                          1819.9
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  Length Wtd. (ft)          721.01    Wetted Per. (ft)                      34.21

  Min Ch El (ft)            587.82    Shear (lb/sq ft)                       0.18

  Alpha                       1.00    Stream Power (lb/ft s)    810.71       0.00
   0.00
  Frctn Loss (ft)             0.60    Cum Volume (acre-ft)        0.02       2.24
   0.09
  C & E Loss (ft)             0.01    Cum SA (acres)              0.21       1.27
   0.28


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #100-Year


  E.G. Elev (ft)            590.55    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.08    Wt. n-Val.                            0.036

  W.S. Elev (ft)            590.48    Reach Len. (ft)           751.80     721.80
 681.60
  Crit W.S. (ft)                      Flow Area (sq ft)                     50.14

  E.G. Slope (ft/ft)      0.002067    Area (sq ft)                          50.14

  Q Total (cfs)             112.00    Flow (cfs)                           112.00

  Top Width (ft)             38.03    Top Width (ft)                        38.03

  Vel Total (ft/s)            2.23    Avg. Vel. (ft/s)                       2.23

  Max Chl Dpth (ft)           2.66    Hydr. Depth (ft)                       1.32

  Conv. Total (cfs)         2463.6    Conv. (cfs)                          2463.6

  Length Wtd. (ft)          720.54    Wetted Per. (ft)                      38.61

  Min Ch El (ft)            587.82    Shear (lb/sq ft)                       0.17

  Alpha                       1.00    Stream Power (lb/ft s)    810.71       0.00
   0.00
  Frctn Loss (ft)             0.40    Cum Volume (acre-ft)        0.22       2.75
   0.30
  C & E Loss (ft)             0.02    Cum SA (acres)              0.58       1.37
   0.68


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #500-Year


  E.G. Elev (ft)            591.04    Element                   Left OB    Channel
Right OB
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```
  Vel Head (ft)              0.10    Wt. n-Val.                          0.036

  W.S. Elev (ft)           590.94    Reach Len. (ft)          751.80     721.80
 681.60
  Crit W.S. (ft)                     Flow Area (sq ft)                   69.21

  E.G. Slope (ft/ft)     0.002154    Area (sq ft)                        69.21

  Q Total (cfs)            175.00    Flow (cfs)                         175.00

  Top Width (ft)            45.00    Top Width (ft)                      45.00

  Vel Total (ft/s)           2.53    Avg. Vel. (ft/s)                     2.53

  Max Chl Dpth (ft)          3.12    Hydr. Depth (ft)                     1.54

  Conv. Total (cfs)        3770.9    Conv. (cfs)                        3770.9

  Length Wtd. (ft)         720.25    Wetted Per. (ft)                    45.64

  Min Ch El (ft)           587.82    Shear (lb/sq ft)                     0.20

  Alpha                      1.00    Stream Power (lb/ft s)   810.71      0.00
   0.00
  Frctn Loss (ft)            0.41    Cum Volume (acre-ft)       0.64      3.94
   1.08
  C & E Loss (ft)            0.02    Cum SA (acres)             1.20      1.55
   1.97


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Trib to Cayuga
REACH: Reach 1            RS: 1830.000

INPUT
Description: Surveyed Section 7
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  592.06  21.818  592.06      76  592.06     132  589.75     172  589.49
     183  586.92     183  585.73     184  585.73     190  585.73     198  588.96
     292  591.02 407.677  591.02 446.818  591.02

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     172    .036     198     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           172     198               89   88.78   88.56             .3       .5

CROSS SECTION OUTPUT  Profile #10-Year


  E.G. Elev (ft)           588.53    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.03    Wt. n-Val.                          0.036
```

W.S. Elev (ft)	588.50	Reach Len. (ft)	89.00	88.78	88.56
Crit W.S. (ft)		Flow Area (sq ft)		34.25	
E.G. Slope (ft/ft)	0.000687	Area (sq ft)		34.25	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	20.63	Top Width (ft)		20.63	
Vel Total (ft/s)	1.43	Avg. Vel. (ft/s)		1.43	
Max Chl Dpth (ft)	2.77	Hydr. Depth (ft)		1.66	
Conv. Total (cfs)	1868.8	Conv. (cfs)		1868.8	
Length Wtd. (ft)	88.78	Wetted Per. (ft)		22.54	
Min Ch El (ft)	585.73	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)	446.82	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.00	0.85	0.00
C & E Loss (ft)	0.01	Cum SA (acres)	0.00	0.61	0.00

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	589.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.036	0.040
W.S. Elev (ft)	589.63	Reach Len. (ft)	89.00	88.78	88.56
Crit W.S. (ft)		Flow Area (sq ft)	1.47	61.21	10.18
E.G. Slope (ft/ft)	0.000412	Area (sq ft)	1.47	61.21	10.18
Q Total (cfs)	90.00	Flow (cfs)	0.19	86.12	3.70
Top Width (ft)	77.73	Top Width (ft)	21.25	26.00	30.49
Vel Total (ft/s)	1.24	Avg. Vel. (ft/s)	0.13	1.41	0.36
Max Chl Dpth (ft)	3.90	Hydr. Depth (ft)	0.07	2.35	0.33
Conv. Total (cfs)	4434.9	Conv. (cfs)	9.2	4243.7	182.1
Length Wtd. (ft)	88.78	Wetted Per. (ft)	21.25	28.11	30.49
Min Ch El (ft)	585.73	Shear (lb/sq ft)	0.00	0.06	0.01
Alpha	1.24	Stream Power (lb/ft s)	446.82	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.00	1.41	

```
  0.01
  C & E Loss (ft)             0.00    Cum SA (acres)              0.03       0.77
  0.04


CROSS SECTION OUTPUT  Profile #100-Year


  E.G. Elev (ft)            590.14    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.02    Wt. n-Val.                 0.040      0.036
  0.040
  W.S. Elev (ft)            590.12    Reach Len. (ft)            89.00      88.78
  88.56
  Crit W.S. (ft)                      Flow Area (sq ft)          21.75      74.04
  30.80
  E.G. Slope (ft/ft)      0.000249    Area (sq ft)               21.75      74.04
  30.80
  Q Total (cfs)             112.00    Flow (cfs)                  7.42      92.01
  12.57
  Top Width (ft)            128.03    Top Width (ft)             49.02      26.00
  53.02
  Vel Total (ft/s)            0.88    Avg. Vel. (ft/s)            0.34       1.24
  0.41
  Max Chl Dpth (ft)           4.39    Hydr. Depth (ft)            0.44       2.85
  0.58
  Conv. Total (cfs)         7095.2    Conv. (cfs)                470.1     5828.6
  796.5
  Length Wtd. (ft)           88.77    Wetted Per. (ft)           49.02      28.11
  53.03
  Min Ch El (ft)            585.73    Shear (lb/sq ft)            0.01       0.04
  0.01
  Alpha                       1.65    Stream Power (lb/ft s)    446.82       0.00
  0.00
  Frctn Loss (ft)             0.02    Cum Volume (acre-ft)        0.03       1.72
  0.06
  C & E Loss (ft)             0.00    Cum SA (acres)              0.15       0.84
  0.26


CROSS SECTION OUTPUT  Profile #500-Year


  E.G. Elev (ft)            590.60    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.02    Wt. n-Val.                 0.040      0.036
  0.040
  W.S. Elev (ft)            590.58    Reach Len. (ft)            89.00      88.78
  88.56
  Crit W.S. (ft)                      Flow Area (sq ft)          46.66      85.92
  59.76
  E.G. Slope (ft/ft)      0.000260    Area (sq ft)               46.66      85.92
  59.76
  Q Total (cfs)             175.00    Flow (cfs)                 23.59     120.34
  31.06
  Top Width (ft)            159.94    Top Width (ft)             60.08      26.00
  73.85
  Vel Total (ft/s)            0.91    Avg. Vel. (ft/s)            0.51       1.40
  0.52
  Max Chl Dpth (ft)           4.85    Hydr. Depth (ft)            0.78       3.30
  0.81
```

Conv. Total (cfs)	10859.8	Conv. (cfs)	1464.1	7468.0	1927.6
Length Wtd. (ft)	88.77	Wetted Per. (ft)	60.10	28.11	73.87
Min Ch El (ft)	585.73	Shear (lb/sq ft)	0.01	0.05	0.01
Alpha	1.73	Stream Power (lb/ft s)	446.82	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.24	2.65	0.62
C & E Loss (ft)	0.00	Cum SA (acres)	0.68	0.96	1.39

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 1741.222

INPUT
Description: U/S BR3
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	591.87	49.705	591.87	72	591.87	128	589.56	168	589.3
169.1	588.92	179	585.54	180	585.54	186	585.54	194	588.77
288	590.83	330.151	590.83	441.109	590.83				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	169.1	.036	194	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
169.1	194	39.73	40.42	42.52	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	169	590	F
195	441.109	590	F

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
0	169	590	195	441.109	590

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	588.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.036	
W.S. Elev (ft)	588.47	Reach Len. (ft)	39.73	40.42	42.52
Crit W.S. (ft)	586.55	Flow Area (sq ft)		43.62	
E.G. Slope (ft/ft)	0.000331	Area (sq ft)		43.62	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	22.82	Top Width (ft)		22.82	
Vel Total (ft/s)	1.12	Avg. Vel. (ft/s)		1.12	
Max Chl Dpth (ft)	2.93	Hydr. Depth (ft)		1.91	

Conv. Total (cfs)	2691.5	Conv. (cfs)		2691.5
Length Wtd. (ft)	40.42	Wetted Per. (ft)		23.87
Min Ch El (ft)	585.54	Shear (lb/sq ft)		0.04
Alpha	1.00	Stream Power (lb/ft s)	441.11	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	0.77
0.00				
C & E Loss (ft)		Cum SA (acres)	0.00	0.57
0.00				

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	589.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.040	0.036	0.040
W.S. Elev (ft)	589.60	Reach Len. (ft)	39.73	40.42	42.52
Crit W.S. (ft)	586.96	Flow Area (sq ft)	0.07	71.52	0.82
E.G. Slope (ft/ft)	0.000241	Area (sq ft)	0.07	71.52	0.82
Q Total (cfs)	90.00	Flow (cfs)	0.01	89.71	0.28
Top Width (ft)	26.00	Top Width (ft)	0.10	24.90	1.00
Vel Total (ft/s)	1.24	Avg. Vel. (ft/s)	0.11	1.25	0.34
Max Chl Dpth (ft)	4.06	Hydr. Depth (ft)	0.67	2.87	0.82
Conv. Total (cfs)	5801.5	Conv. (cfs)	0.5	5783.0	18.0
Length Wtd. (ft)	40.42	Wetted Per. (ft)	0.75	26.09	1.81
Min Ch El (ft)	585.54	Shear (lb/sq ft)	0.00	0.04	0.01
Alpha	1.02	Stream Power (lb/ft s)	441.11	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	1.27	0.00
C & E Loss (ft)		Cum SA (acres)	0.01	0.72	0.01

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	590.12	Element	Left OB	Channel	Right OB

```
  Vel Head (ft)              0.03    Wt. n-Val.                 0.040      0.036
  0.040
  W.S. Elev (ft)           590.09    Reach Len. (ft)           39.73      40.42
  42.52
  Crit W.S. (ft)           587.14    Flow Area (sq ft)          5.00      83.71
   6.61
  E.G. Slope (ft/ft)      0.000217    Area (sq ft)              5.00      83.71
   6.61
  Q Total (cfs)            112.00    Flow (cfs)                 0.55     110.63
   0.82
  Top Width (ft)           139.26    Top Width (ft)            54.01      24.90
  60.35
  Vel Total (ft/s)           1.17    Avg. Vel. (ft/s)           0.11       1.32
   0.12
  Max Chl Dpth (ft)          4.55    Hydr. Depth (ft)           0.09       3.36
   0.11
  Conv. Total (cfs)        7609.5    Conv. (cfs)                37.6     7516.4
   55.5
  Length Wtd. (ft)          40.42    Wetted Per. (ft)          55.06      26.09
  61.56
  Min Ch El (ft)           585.54    Shear (lb/sq ft)           0.00       0.04
   0.00
  Alpha                      1.25    Stream Power (lb/ft s)   441.11       0.00
   0.00
  Frctn Loss (ft)                    Cum Volume (acre-ft)       0.01       1.56
   0.02
  C & E Loss (ft)                    Cum SA (acres)             0.05       0.79
   0.15


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #500-Year


  E.G. Elev (ft)           590.57    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.03    Wt. n-Val.                 0.040      0.036
  0.040
  W.S. Elev (ft)           590.54    Reach Len. (ft)           39.73      40.42
  42.52
  Crit W.S. (ft)           587.60    Flow Area (sq ft)         31.66      94.87
  38.26
  E.G. Slope (ft/ft)      0.000261    Area (sq ft)             31.66      94.87
  38.26
  Q Total (cfs)            175.00    Flow (cfs)                11.65     149.55
  13.81
  Top Width (ft)           170.59    Top Width (ft)            64.88      24.90
  80.81
  Vel Total (ft/s)           1.06    Avg. Vel. (ft/s)           0.37       1.58
   0.36
  Max Chl Dpth (ft)          5.00    Hydr. Depth (ft)           0.49       3.81
   0.47
  Conv. Total (cfs)       10836.7    Conv. (cfs)               721.1     9260.7
  854.9
  Length Wtd. (ft)          40.42    Wetted Per. (ft)          65.94      26.09
  82.03
  Min Ch El (ft)           585.54    Shear (lb/sq ft)           0.01       0.06
   0.01
  Alpha                      1.90    Stream Power (lb/ft s)   441.11       0.00
   0.00
```

```
  Frctn Loss (ft)                    Cum Volume (acre-ft)        0.16       2.47
   0.52
  C & E Loss (ft)                    Cum SA (acres)              0.55       0.91
   1.24


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CULVERT


RIVER: Trib to Cayuga
REACH: Reach 1            RS: 1731

INPUT
Description: Culvert 4
Distance from Upstream XS =      10
Deck/Roadway Width        =      20
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     100  589.77     580     132  589.77     580     182  591.57     580
     232  590.18     580     300  590.18     580

Upstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  591.87  49.705  591.87      72  591.87     128  589.56     168   589.3
   169.1  588.92     179  585.54     180  585.54     186  585.54     194  588.77
     288  590.83 330.151  590.83 441.109  590.83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   169.1    .036     194     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
         169.1     194             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     169     590       F
     195 441.109     590       F
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
       0     169     590     195 441.109     590

Downstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     100  589.77     580     130  589.77     580     180  591.57     580
     230  590.18     580     300  590.18     580

Downstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  590.92    .525  590.92  15.715  590.92      69  590.92     149   589.5
     167  588.38     176  586.72     177  586.02   178.5  585.45     180  585.45
   181.5  585.45     185  586.66     194  588.59     253  590.65  400.23  590.65
 431.266  590.65

Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     167    .036     194     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           167     194            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     146     589       F
     214 431.266     589       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       6
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                10      20     .021     .021        0                   .9
      1
Upstream   Elevation =  585.35
           Centerline Station =  182
Downstream Elevation =  585.55
           Centerline Station =  180

CULVERT OUTPUT  Profile #10-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)         49.00    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          4.08
  Q Barrel (cfs)             49.00    Culv Vel DS (ft/s)          5.07
  E.G. US. (ft)             588.49    Culv Inv El Up (ft)       585.35
  W.S. US. (ft)             588.47    Culv Inv El Dn (ft)       585.55
  E.G. DS (ft)              587.86    Culv Frctn Ls (ft)          0.06
  W.S. DS (ft)              587.80    Culv Exit Loss (ft)         0.33
  Delta EG (ft)               0.62    Culv Entr Loss (ft)         0.23
  Delta WS (ft)               0.67    Q Weir (cfs)
  E.G. IC (ft)              588.03    Weir Sta Lft (ft)
  E.G. OC (ft)              588.49    Weir Sta Rgt (ft)
  Culvert Control           Outlet    Weir Submerg
  Culv WS Inlet (ft)        587.99    Weir Max Depth (ft)
  Culv WS Outlet (ft)       587.80    Weir Avg Depth (ft)
  Culv Nml Depth (ft)                 Weir Flow Area (sq ft)
  Culv Crt Depth (ft)         1.86    Min El Weir Flow (ft)     590.01


CULVERT OUTPUT  Profile #50-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)         90.00    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          5.43
  Q Barrel (cfs)             90.00    Culv Vel DS (ft/s)          6.64
  E.G. US. (ft)             589.63    Culv Inv El Up (ft)       585.35
  W.S. US. (ft)             589.60    Culv Inv El Dn (ft)       585.55
  E.G. DS (ft)              588.53    Culv Frctn Ls (ft)          0.08
  W.S. DS (ft)              588.45    Culv Exit Loss (ft)         0.60
```

Delta EG (ft)	1.09	Culv Entr Loss (ft)	0.41
Delta WS (ft)	1.15	Q Weir (cfs)	
E.G. IC (ft)	589.19	Weir Sta Lft (ft)	
E.G. OC (ft)	589.63	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	588.76	Weir Max Depth (ft)	
Culv WS Outlet (ft)	588.45	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.55	Min El Weir Flow (ft)	590.01

CULVERT OUTPUT Profile #100-Year Culv Group: Culvert #1

Q Culv Group (cfs)	109.49	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.91
Q Barrel (cfs)	109.49	Culv Vel DS (ft/s)	7.10
E.G. US. (ft)	590.12	Culv Inv El Up (ft)	585.35
W.S. US. (ft)	590.09	Culv Inv El Dn (ft)	585.55
E.G. DS (ft)	588.85	Culv Frctn Ls (ft)	0.09
W.S. DS (ft)	588.76	Culv Exit Loss (ft)	0.70
Delta EG (ft)	1.27	Culv Entr Loss (ft)	0.49
Delta WS (ft)	1.33	Q Weir (cfs)	2.51
E.G. IC (ft)	589.76	Weir Sta Lft (ft)	114.42
E.G. OC (ft)	590.12	Weir Sta Rgt (ft)	141.72
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	589.09	Weir Max Depth (ft)	0.12
Culv WS Outlet (ft)	588.76	Weir Avg Depth (ft)	0.11
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	2.90
Culv Crt Depth (ft)	2.82	Min El Weir Flow (ft)	590.01

Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet
energy grade answer may not be valid.

CULVERT OUTPUT Profile #500-Year Culv Group: Culvert #1

Q Culv Group (cfs)	116.38	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.21
Q Barrel (cfs)	116.38	Culv Vel DS (ft/s)	5.66
E.G. US. (ft)	590.57	Culv Inv El Up (ft)	585.35
W.S. US. (ft)	590.54	Culv Inv El Dn (ft)	585.55
E.G. DS (ft)	589.71	Culv Frctn Ls (ft)	0.05
W.S. DS (ft)	589.64	Culv Exit Loss (ft)	0.43
Delta EG (ft)	0.86	Culv Entr Loss (ft)	0.38
Delta WS (ft)	0.90	Q Weir (cfs)	58.62
E.G. IC (ft)	590.45	Weir Sta Lft (ft)	103.57
E.G. OC (ft)	590.57	Weir Sta Rgt (ft)	276.04
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	589.78	Weir Max Depth (ft)	0.57
Culv WS Outlet (ft)	589.64	Weir Avg Depth (ft)	0.34
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	36.70
Culv Crt Depth (ft)	2.91	Min El Weir Flow (ft)	590.01

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 1700.815

INPUT
Description: D/S BR3

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	590.92	.525	590.92	15.715	590.92	69	590.92	149	589.5
167	588.38	176	586.72	177	586.02	178.5	585.45	180	585.45
181.5	585.45	185	586.66	194	588.59	253	590.65	400.23	590.65
431.266	590.65								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	167	.036	194	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
167	194	30.61	26.8	32.19	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	146	589	F
214	431.266	589	F

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	587.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.036	
W.S. Elev (ft)	587.80	Reach Len. (ft)	30.61	26.80	32.19
Crit W.S. (ft)	586.84	Flow Area (sq ft)		23.82	
E.G. Slope (ft/ft)	0.002086	Area (sq ft)		23.82	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	20.14	Top Width (ft)		20.14	
Vel Total (ft/s)	2.06	Avg. Vel. (ft/s)		2.06	
Max Chl Dpth (ft)	2.35	Hydr. Depth (ft)		1.18	
Conv. Total (cfs)	1072.9	Conv. (cfs)		1072.9	
Length Wtd. (ft)	26.80	Wetted Per. (ft)		20.89	
Min Ch El (ft)	585.45	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)	431.27	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.00	0.75	0.00
C & E Loss (ft)	0.03	Cum SA (acres)	0.00	0.55	0.00

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	588.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.040	0.036	32.19
W.S. Elev (ft)	588.45	Reach Len. (ft)	30.61	26.80	39.18
Crit W.S. (ft)	587.35	Flow Area (sq ft)	0.04	39.18	
E.G. Slope (ft/ft)	0.001907	Area (sq ft)	0.04	39.18	
Q Total (cfs)	90.00	Flow (cfs)	0.01	89.99	
Top Width (ft)	27.53	Top Width (ft)	1.17	26.36	
Vel Total (ft/s)	2.29	Avg. Vel. (ft/s)	0.18	2.30	
Max Chl Dpth (ft)	3.00	Hydr. Depth (ft)	0.04	1.49	
Conv. Total (cfs)	2060.9	Conv. (cfs)	0.2	2060.7	
Length Wtd. (ft)	26.80	Wetted Per. (ft)	1.17	27.23	
Min Ch El (ft)	585.45	Shear (lb/sq ft)	0.00	0.17	
Alpha	1.00	Stream Power (lb/ft s)	431.27	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.00	1.24	0.00
C & E Loss (ft)	0.03	Cum SA (acres)	0.01	0.70	0.01

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	588.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.040	0.036	0.040
W.S. Elev (ft)	588.76	Reach Len. (ft)	30.61	26.80	32.19
Crit W.S. (ft)	587.54	Flow Area (sq ft)	1.18	47.50	0.43
E.G. Slope (ft/ft)	0.001584	Area (sq ft)	1.18	47.50	0.43
Q Total (cfs)	112.00	Flow (cfs)	0.58	111.30	0.12
Top Width (ft)	38.09	Top Width (ft)	6.15	27.00	4.94
Vel Total (ft/s)	2.28	Avg. Vel. (ft/s)	0.49	2.34	0.29
Max Chl Dpth (ft)	3.31	Hydr. Depth (ft)	0.19	1.76	0.09
Conv. Total (cfs)	2814.1	Conv. (cfs)	14.5	2796.5	3.1
Length Wtd. (ft)	26.82	Wetted Per. (ft)	6.16	27.88	

```
  4.95
  Min Ch El (ft)            585.45    Shear (lb/sq ft)            0.02       0.17
  0.01
  Alpha                       1.05    Stream Power (lb/ft s)    431.27       0.00
  0.00
  Frctn Loss (ft)             0.02    Cum Volume (acre-ft)        0.01       1.52
  0.02
  C & E Loss (ft)             0.03    Cum SA (acres)              0.02       0.76
  0.11


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #500-Year


  E.G. Elev (ft)            589.71    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.07    Wt. n-Val.                 0.040      0.036
  0.040
  W.S. Elev (ft)            589.64    Reach Len. (ft)            30.61      26.80
  32.19
  Crit W.S. (ft)            587.97    Flow Area (sq ft)          13.24      71.29
  15.89
  E.G. Slope (ft/ft)      0.000797    Area (sq ft)               13.24      71.29
  15.89
  Q Total (cfs)             175.00    Flow (cfs)                  8.83     155.30
  10.87
  Top Width (ft)             83.26    Top Width (ft)             26.09      27.00
  30.17
  Vel Total (ft/s)            1.74    Avg. Vel. (ft/s)            0.67       2.18
  0.68
  Max Chl Dpth (ft)           4.19    Hydr. Depth (ft)            0.51       2.64
  0.53
  Conv. Total (cfs)         6198.9    Conv. (cfs)                312.8     5501.2
  385.0
  Length Wtd. (ft)           27.16    Wetted Per. (ft)           26.12      27.88
  30.19
  Min Ch El (ft)            585.45    Shear (lb/sq ft)            0.03       0.13
  0.03
  Alpha                       1.40    Stream Power (lb/ft s)    431.27       0.00
  0.00
  Frctn Loss (ft)             0.01    Cum Volume (acre-ft)        0.16       2.39
  0.52
  C & E Loss (ft)             0.01    Cum SA (acres)              0.51       0.89
  1.18


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION
```

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 1674.005

INPUT
Description: Surveyed Section 8 / U/S BR4
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	590.86	19.849	590.86	37.139	590.86	69	590.86	149	589.44
167	588.32	172	585.39	188	585.39	194	588.53	253	590.59
380.052	590.59	428.412	590.59						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	167	.036	194	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
167	194	97.3	85.7	98.1	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	161.7	591	F
198.1	428.412	591	F

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	587.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.036	
W.S. Elev (ft)	587.81	Reach Len. (ft)	97.30	85.70	98.10
Crit W.S. (ft)	586.04	Flow Area (sq ft)		49.25	
E.G. Slope (ft/ft)	0.000248	Area (sq ft)		49.25	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	24.74	Top Width (ft)		24.74	
Vel Total (ft/s)	0.99	Avg. Vel. (ft/s)		0.99	
Max Chl Dpth (ft)	2.42	Hydr. Depth (ft)		1.99	
Conv. Total (cfs)	3112.5	Conv. (cfs)		3112.5	
Length Wtd. (ft)	85.70	Wetted Per. (ft)		26.00	
Min Ch El (ft)	585.39	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)	428.41	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	0.73	0.00
C & E Loss (ft)		Cum SA (acres)	0.00	0.53	0.00

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	588.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.036	0.040
W.S. Elev (ft)	588.46	Reach Len. (ft)	97.30	85.70	98.10
Crit W.S. (ft)	586.35	Flow Area (sq ft)	0.16	66.17	0.69
E.G. Slope (ft/ft)	0.000352	Area (sq ft)	0.16	66.17	0.82
Q Total (cfs)	90.00	Flow (cfs)	0.02	89.98	0.15
Top Width (ft)	29.13	Top Width (ft)	2.26	26.87	6.87
Vel Total (ft/s)	1.36	Avg. Vel. (ft/s)	0.12	1.36	0.22
Max Chl Dpth (ft)	3.07	Hydr. Depth (ft)	0.07	2.46	0.17
Conv. Total (cfs)	4799.2	Conv. (cfs)	1.0	4798.2	7.8
Length Wtd. (ft)	85.70	Wetted Per. (ft)	2.27	28.42	4.10
Min Ch El (ft)	585.39	Shear (lb/sq ft)	0.00	0.05	0.01
Alpha	1.00	Stream Power (lb/ft s)	428.41	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	1.21	0.00
C & E Loss (ft)		Cum SA (acres)	0.01	0.68	0.01

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	588.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.036	0.040
W.S. Elev (ft)	588.77	Reach Len. (ft)	97.30	85.70	98.10
Crit W.S. (ft)	586.49	Flow Area (sq ft)	1.51	74.51	0.69
E.G. Slope (ft/ft)	0.000365	Area (sq ft)	1.63	74.51	0.82
Q Total (cfs)	112.00	Flow (cfs)	0.46	111.39	0.15
Top Width (ft)	41.09	Top Width (ft)	7.23	27.00	6.87
Vel Total (ft/s)	1.46	Avg. Vel. (ft/s)	0.31	1.49	0.22
Max Chl Dpth (ft)	3.38	Hydr. Depth (ft)	0.28	2.76	0.17
Conv. Total (cfs)	5859.2	Conv. (cfs)	24.3	5827.2	7.8
Length Wtd. (ft)	85.70	Wetted Per. (ft)	5.31	28.57	4.10
Min Ch El (ft)	585.39	Shear (lb/sq ft)	0.01	0.06	

```
  0.00
  Alpha                        1.04    Stream Power (lb/ft s)    428.41       0.00
  0.00
  Frctn Loss (ft)                      Cum Volume (acre-ft)        0.01       1.48
  0.02
  C & E Loss (ft)                      Cum SA (acres)              0.02       0.74
  0.11


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #500-Year


  E.G. Elev (ft)            589.69    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.04    Wt. n-Val.                  0.040      0.036
  0.040
  W.S. Elev (ft)            589.64    Reach Len. (ft)             97.30      85.70
  98.10
  Crit W.S. (ft)            586.86    Flow Area (sq ft)           6.13      98.05
   4.26
  E.G. Slope (ft/ft)      0.000331    Area (sq ft)                14.85      98.05
  17.69
  Q Total (cfs)             175.00    Flow (cfs)                   4.56     167.49
   2.96
  Top Width (ft)             88.19    Top Width (ft)              29.35      27.00
  31.83
  Vel Total (ft/s)            1.61    Avg. Vel. (ft/s)            0.74       1.71
   0.69
  Max Chl Dpth (ft)           4.25    Hydr. Depth (ft)            1.16       3.63
   1.04
  Conv. Total (cfs)         9621.1    Conv. (cfs)                250.6     9208.0
  162.5
  Length Wtd. (ft)           85.70    Wetted Per. (ft)            5.31      28.57
   4.10
  Min Ch El (ft)            585.39    Shear (lb/sq ft)            0.02       0.07
   0.02
  Alpha                       1.08    Stream Power (lb/ft s)    428.41       0.00
   0.00
  Frctn Loss (ft)                     Cum Volume (acre-ft)        0.15       2.34
   0.50
  C & E Loss (ft)                     Cum SA (acres)              0.49       0.87
   1.16


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CULVERT


RIVER: Trib to Cayuga
REACH: Reach 1            RS: 1653

INPUT
Description: Wagner Drive
Distance from Upstream XS =      21
Deck/Roadway Width        =      40
Weir Coefficient          =     2.6
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Upstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  591.31     580      80  591.31     580     180  591.19     580
     280  591.39     580     500  591.39     580

Upstream Bridge Cross Section Data
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  590.86  19.849  590.86  37.139  590.86      69  590.86     149  589.44
     167  588.32     172  585.39     188  585.39     194  588.53     253  590.59
 380.052  590.59 428.412  590.59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     167    .036     194     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           167     194             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   161.7     591       F
   198.1 428.412     591       F

Downstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  591.31     580      77  591.31     580     177  591.19     580
     277  591.39     580     500  591.39     580

Downstream Bridge Cross Section Data
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  593.24      10  593.24      27  590.27      72  589.37     136  588.69
     165  588.29     169   583.5     185   583.5     188  588.16     239  589.48
 443.963  589.48

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     165    .036     188     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           165     188             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   158.7     591       F
   195.1 443.963     591       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  3

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse     3.1     4.6
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
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Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                21      40     .011     .011        0                  .5
      1
Upstream   Elevation =  586.09
           Centerline Station =  174
Downstream Elevation =  584.93
           Centerline Station =  171

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse     2.6     4.1
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                21      40     .021     .021        0                  .5
      1
Upstream   Elevation =  586.35
           Centerline Station =  180
Downstream Elevation =  585.79
           Centerline Station =  177

Culvert Name     Shape      Rise    Span
Culvert #3       Ellipse     2.6     4.2
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                21      40     .021     .021        0                  .5
      1
Upstream   Elevation =  586.14
           Centerline Station =  186
Downstream Elevation =  585.8
           Centerline Station =  183

CULVERT OUTPUT  Profile #10-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)         18.78    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          5.15
  Q Barrel (cfs)             18.78    Culv Vel DS (ft/s)         10.06
  E.G. US. (ft)             587.82    Culv Inv El Up (ft)       586.09
  W.S. US. (ft)             587.81    Culv Inv El Dn (ft)       584.93
  E.G. DS (ft)              584.82    Culv Frctn Ls (ft)          0.43
  W.S. DS (ft)              584.73    Culv Exit Loss (ft)         2.38
  Delta EG (ft)               3.01    Culv Entr Loss (ft)         0.21
  Delta WS (ft)               3.08    Q Weir (cfs)
  E.G. IC (ft)              587.60    Weir Sta Lft (ft)
  E.G. OC (ft)              587.83    Weir Sta Rgt (ft)
  Culvert Control           Outlet    Weir Submerg
  Culv WS Inlet (ft)        587.21    Weir Max Depth (ft)
  Culv WS Outlet (ft)       585.62    Weir Avg Depth (ft)
  Culv Nml Depth (ft)         0.60    Weir Flow Area (sq ft)
  Culv Crt Depth (ft)         1.12    Min El Weir Flow (ft)     591.20


Note:    The flow in the culvert is entirely supercritical.

CULVERT OUTPUT  Profile #50-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)         33.58    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          6.17
```

Q Barrel (cfs)	33.58	Culv Vel DS (ft/s)	11.20
E.G. US. (ft)	588.49	Culv Inv El Up (ft)	586.09
W.S. US. (ft)	588.46	Culv Inv El Dn (ft)	584.93
E.G. DS (ft)	585.99	Culv Frctn Ls (ft)	0.35
W.S. DS (ft)	585.92	Culv Exit Loss (ft)	1.86
Delta EG (ft)	2.50	Culv Entr Loss (ft)	0.30
Delta WS (ft)	2.54	Q Weir (cfs)	
E.G. IC (ft)	588.24	Weir Sta Lft (ft)	
E.G. OC (ft)	588.49	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	587.61	Weir Max Depth (ft)	
Culv WS Outlet (ft)	585.90	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	0.80	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.52	Min El Weir Flow (ft)	591.20

Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #100-Year Culv Group: Culvert #1

Q Culv Group (cfs)	41.73	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.63
Q Barrel (cfs)	41.73	Culv Vel DS (ft/s)	11.66
E.G. US. (ft)	588.80	Culv Inv El Up (ft)	586.09
W.S. US. (ft)	588.77	Culv Inv El Dn (ft)	584.93
E.G. DS (ft)	586.57	Culv Frctn Ls (ft)	0.33
W.S. DS (ft)	586.51	Culv Exit Loss (ft)	1.57
Delta EG (ft)	2.23	Culv Entr Loss (ft)	0.34
Delta WS (ft)	2.26	Q Weir (cfs)	
E.G. IC (ft)	588.57	Weir Sta Lft (ft)	
E.G. OC (ft)	588.81	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	587.79	Weir Max Depth (ft)	
Culv WS Outlet (ft)	586.03	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	0.89	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.70	Min El Weir Flow (ft)	591.20

Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #500-Year Culv Group: Culvert #1

Q Culv Group (cfs)	65.38	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	7.89
Q Barrel (cfs)	65.38	Culv Vel DS (ft/s)	12.76
E.G. US. (ft)	589.69	Culv Inv El Up (ft)	586.09
W.S. US. (ft)	589.64	Culv Inv El Dn (ft)	584.93
E.G. DS (ft)	587.53	Culv Frctn Ls (ft)	0.30
W.S. DS (ft)	587.44	Culv Exit Loss (ft)	1.38
Delta EG (ft)	2.16	Culv Entr Loss (ft)	0.48
Delta WS (ft)	2.20	Q Weir (cfs)	
E.G. IC (ft)	589.50	Weir Sta Lft (ft)	
E.G. OC (ft)	589.69	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	588.24	Weir Max Depth (ft)	
Culv WS Outlet (ft)	586.38	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.11	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.15	Min El Weir Flow (ft)	591.20

Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #10-Year Culv Group: Culvert #2

Q Culv Group (cfs)	13.04	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	4.74
Q Barrel (cfs)	13.04	Culv Vel DS (ft/s)	5.52
E.G. US. (ft)	587.82	Culv Inv El Up (ft)	586.35
W.S. US. (ft)	587.81	Culv Inv El Dn (ft)	585.79
E.G. DS (ft)	584.82	Culv Frctn Ls (ft)	0.54
W.S. DS (ft)	584.73	Culv Exit Loss (ft)	2.29
Delta EG (ft)	3.01	Culv Entr Loss (ft)	0.17
Delta WS (ft)	3.08	Q Weir (cfs)	
E.G. IC (ft)	587.65	Weir Sta Lft (ft)	
E.G. OC (ft)	587.82	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	587.30	Weir Max Depth (ft)	
Culv WS Outlet (ft)	586.64	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	0.85	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	0.95	Min El Weir Flow (ft)	591.20

Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #50-Year Culv Group: Culvert #2

Q Culv Group (cfs)	25.20	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.83
Q Barrel (cfs)	25.20	Culv Vel DS (ft/s)	6.78
E.G. US. (ft)	588.49	Culv Inv El Up (ft)	586.35
W.S. US. (ft)	588.46	Culv Inv El Dn (ft)	585.79
E.G. DS (ft)	585.99	Culv Frctn Ls (ft)	0.52
W.S. DS (ft)	585.92	Culv Exit Loss (ft)	1.70
Delta EG (ft)	2.50	Culv Entr Loss (ft)	0.26
Delta WS (ft)	2.54	Q Weir (cfs)	
E.G. IC (ft)	588.28	Weir Sta Lft (ft)	
E.G. OC (ft)	588.47	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	587.68	Weir Max Depth (ft)	
Culv WS Outlet (ft)	586.98	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.19	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.33	Min El Weir Flow (ft)	591.20

Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #100-Year Culv Group: Culvert #2

Q Culv Group (cfs)	31.81	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.32
Q Barrel (cfs)	31.81	Culv Vel DS (ft/s)	7.25
E.G. US. (ft)	588.80	Culv Inv El Up (ft)	586.35
W.S. US. (ft)	588.77	Culv Inv El Dn (ft)	585.79
E.G. DS (ft)	586.57	Culv Frctn Ls (ft)	0.52
W.S. DS (ft)	586.51	Culv Exit Loss (ft)	1.38
Delta EG (ft)	2.23	Culv Entr Loss (ft)	0.31
Delta WS (ft)	2.26	Q Weir (cfs)	
E.G. IC (ft)	588.60	Weir Sta Lft (ft)	
E.G. OC (ft)	588.79	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	

Culv WS Inlet (ft)	587.86	Weir Max Depth (ft)	
Culv WS Outlet (ft)	587.14	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.35	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.51	Min El Weir Flow (ft)	591.20

Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #500-Year Culv Group: Culvert #2

Q Culv Group (cfs)	51.66	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	7.73
Q Barrel (cfs)	51.66	Culv Vel DS (ft/s)	8.22
E.G. US. (ft)	589.69	Culv Inv El Up (ft)	586.35
W.S. US. (ft)	589.64	Culv Inv El Dn (ft)	585.79
E.G. DS (ft)	587.53	Culv Frctn Ls (ft)	0.55
W.S. DS (ft)	587.44	Culv Exit Loss (ft)	1.14
Delta EG (ft)	2.16	Culv Entr Loss (ft)	0.46
Delta WS (ft)	2.20	Q Weir (cfs)	
E.G. IC (ft)	589.58	Weir Sta Lft (ft)	
E.G. OC (ft)	589.68	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	588.28	Weir Max Depth (ft)	
Culv WS Outlet (ft)	587.62	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.83	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.93	Min El Weir Flow (ft)	591.20

Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #10-Year Culv Group: Culvert #3

Q Culv Group (cfs)	17.18	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.03
Q Barrel (cfs)	17.18	Culv Vel DS (ft/s)	5.11
E.G. US. (ft)	587.82	Culv Inv El Up (ft)	586.14
W.S. US. (ft)	587.81	Culv Inv El Dn (ft)	585.80
E.G. DS (ft)	584.82	Culv Frctn Ls (ft)	0.34
W.S. DS (ft)	584.73	Culv Exit Loss (ft)	2.47
Delta EG (ft)	3.01	Culv Entr Loss (ft)	0.20
Delta WS (ft)	3.08	Q Weir (cfs)	
E.G. IC (ft)	587.65	Weir Sta Lft (ft)	
E.G. OC (ft)	587.82	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	587.23	Weir Max Depth (ft)	
Culv WS Outlet (ft)	586.88	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.09	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.08	Min El Weir Flow (ft)	591.20

Note: During subcritical analysis, the culvert direct step method, the solution went to normal depth.

CULVERT OUTPUT Profile #50-Year Culv Group: Culvert #3

Q Culv Group (cfs)	31.22	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.01
Q Barrel (cfs)	31.22	Culv Vel DS (ft/s)	6.20
E.G. US. (ft)	588.49	Culv Inv El Up (ft)	586.14
W.S. US. (ft)	588.46	Culv Inv El Dn (ft)	585.80

E.G. DS (ft)	585.99	Culv Frctn Ls (ft)	0.34
W.S. DS (ft)	585.92	Culv Exit Loss (ft)	1.89
Delta EG (ft)	2.50	Culv Entr Loss (ft)	0.28
Delta WS (ft)	2.54	Q Weir (cfs)	
E.G. IC (ft)	588.34	Weir Sta Lft (ft)	
E.G. OC (ft)	588.50	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	587.66	Weir Max Depth (ft)	
Culv WS Outlet (ft)	587.28	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.52	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.48	Min El Weir Flow (ft)	591.20

Note: During subcritical analysis, the culvert direct step method, the solution went to normal depth.

CULVERT OUTPUT Profile #100-Year Culv Group: Culvert #3

Q Culv Group (cfs)	38.46	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.33
Q Barrel (cfs)	38.46	Culv Vel DS (ft/s)	6.75
E.G. US. (ft)	588.80	Culv Inv El Up (ft)	586.14
W.S. US. (ft)	588.77	Culv Inv El Dn (ft)	585.80
E.G. DS (ft)	586.57	Culv Frctn Ls (ft)	0.35
W.S. DS (ft)	586.51	Culv Exit Loss (ft)	1.58
Delta EG (ft)	2.23	Culv Entr Loss (ft)	0.31
Delta WS (ft)	2.26	Q Weir (cfs)	
E.G. IC (ft)	588.68	Weir Sta Lft (ft)	
E.G. OC (ft)	588.81	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	587.87	Weir Max Depth (ft)	
Culv WS Outlet (ft)	587.44	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.73	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.64	Min El Weir Flow (ft)	591.20

Note: During subcritical analysis, the culvert direct step method, the solution went to normal depth.

CULVERT OUTPUT Profile #500-Year Culv Group: Culvert #3

Q Culv Group (cfs)	57.96	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	7.11
Q Barrel (cfs)	57.96	Culv Vel DS (ft/s)	8.12
E.G. US. (ft)	589.69	Culv Inv El Up (ft)	586.14
W.S. US. (ft)	589.64	Culv Inv El Dn (ft)	585.80
E.G. DS (ft)	587.53	Culv Frctn Ls (ft)	0.43
W.S. DS (ft)	587.44	Culv Exit Loss (ft)	1.31
Delta EG (ft)	2.16	Culv Entr Loss (ft)	0.42
Delta WS (ft)	2.20	Q Weir (cfs)	
E.G. IC (ft)	589.69	Weir Sta Lft (ft)	
E.G. OC (ft)	589.67	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	588.49	Weir Max Depth (ft)	
Culv WS Outlet (ft)	587.82	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.60	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.02	Min El Weir Flow (ft)	591.20

Note: The normal depth exceeds the height of the culvert. The program assumes that the normal depth is equal to the height of the culvert.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 1588.307

INPUT
Description: D/S BR4
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	593.24	10	593.24	27	590.27	72	589.37	136	588.69
165	588.29	169	583.5	185	583.5	188	588.16	239	589.48
443.963	589.48								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	165	.036	188	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
165	188	76.88	73.12	80.88	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	158.7	591	F
195.1	443.963	591	F

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	584.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.036	
W.S. Elev (ft)	584.73	Reach Len. (ft)	76.88	73.12	80.88
Crit W.S. (ft)	584.16	Flow Area (sq ft)		20.79	
E.G. Slope (ft/ft)	0.002905	Area (sq ft)		20.79	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	17.82	Top Width (ft)		17.82	
Vel Total (ft/s)	2.36	Avg. Vel. (ft/s)		2.36	
Max Chl Dpth (ft)	1.23	Hydr. Depth (ft)		1.17	
Conv. Total (cfs)	909.1	Conv. (cfs)		909.1	
Length Wtd. (ft)	73.12	Wetted Per. (ft)		19.06	
Min Ch El (ft)	583.50	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)	443.96	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.00	0.69	0.00
C & E Loss (ft)	0.02	Cum SA (acres)	0.00	0.49	0.00

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	585.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.036	
W.S. Elev (ft)	585.92	Reach Len. (ft)	76.88	73.12	80.88
Crit W.S. (ft)	584.48	Flow Area (sq ft)		43.01	
E.G. Slope (ft/ft)	0.001053	Area (sq ft)		43.01	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	19.58	Top Width (ft)		19.58	
Vel Total (ft/s)	2.09	Avg. Vel. (ft/s)		2.09	
Max Chl Dpth (ft)	2.42	Hydr. Depth (ft)		2.20	
Conv. Total (cfs)	2773.9	Conv. (cfs)		2773.9	
Length Wtd. (ft)	73.12	Wetted Per. (ft)		22.03	
Min Ch El (ft)	583.50	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)	443.96	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.00	1.16	0.00
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.64	0.01

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	586.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.036	
W.S. Elev (ft)	586.51	Reach Len. (ft)	76.88	73.12	80.88
Crit W.S. (ft)	584.64	Flow Area (sq ft)		54.79	
E.G. Slope (ft/ft)	0.000793	Area (sq ft)		54.79	
Q Total (cfs)	112.00	Flow (cfs)		112.00	
Top Width (ft)	20.45	Top Width (ft)		20.45	
Vel Total (ft/s)	2.04	Avg. Vel. (ft/s)		2.04	
Max Chl Dpth (ft)	3.01	Hydr. Depth (ft)		2.68	

Conv. Total (cfs)	3977.1	Conv. (cfs)			3977.1
Length Wtd. (ft)	73.12	Wetted Per. (ft)			23.49
Min Ch El (ft)	583.50	Shear (lb/sq ft)			0.12
Alpha	1.00	Stream Power (lb/ft s)	443.96		0.00
0.00					
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.01		1.43
0.02					
C & E Loss (ft)	0.01	Cum SA (acres)	0.01		0.70
0.10					

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	587.53	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.09	Wt. n-Val.		0.036	
W.S. Elev (ft)	587.44	Reach Len. (ft)	76.88	73.12	
80.88					
Crit W.S. (ft)	585.01	Flow Area (sq ft)		74.58	
E.G. Slope (ft/ft)	0.000786	Area (sq ft)		74.58	
Q Total (cfs)	175.00	Flow (cfs)		175.00	
Top Width (ft)	21.83	Top Width (ft)		21.83	
Vel Total (ft/s)	2.35	Avg. Vel. (ft/s)		2.35	
Max Chl Dpth (ft)	3.94	Hydr. Depth (ft)		3.42	
Conv. Total (cfs)	6242.0	Conv. (cfs)		6242.0	
Length Wtd. (ft)	73.34	Wetted Per. (ft)		25.83	
Min Ch El (ft)	583.50	Shear (lb/sq ft)		0.14	
Alpha	1.00	Stream Power (lb/ft s)	443.96	0.00	
0.00					
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.15	2.25	
0.50					
C & E Loss (ft)	0.02	Cum SA (acres)	0.46	0.82	
1.12					

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 1515.168

```
INPUT
Description: Surveyed Section 9
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  591.64       4  591.64      21  588.67      66  587.77     130  587.09
     159  586.69     168  582.66   168.5   581.9     171   581.9   173.5   581.9
     176  582.73     182  586.56     233  587.88 431.135  587.88

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     159    .036     182     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           159     182           115.08  117.12  119.04             .3       .5

CROSS SECTION OUTPUT  Profile #10-Year


  E.G. Elev (ft)            584.69    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.05    Wt. n-Val.                             0.036

  W.S. Elev (ft)            584.64    Reach Len. (ft)           115.08     117.12
 119.04
  Crit W.S. (ft)                      Flow Area (sq ft)                     27.89

  E.G. Slope (ft/ft)      0.000931    Area (sq ft)                          27.89

  Q Total (cfs)              49.00    Flow (cfs)                            49.00

  Top Width (ft)             15.40    Top Width (ft)                        15.40

  Vel Total (ft/s)            1.76    Avg. Vel. (ft/s)                       1.76

  Max Chl Dpth (ft)           2.74    Hydr. Depth (ft)                       1.81

  Conv. Total (cfs)         1605.8    Conv. (cfs)                          1605.8

  Length Wtd. (ft)          117.12    Wetted Per. (ft)                      16.93

  Min Ch El (ft)            581.90    Shear (lb/sq ft)                       0.10

  Alpha                       1.00    Stream Power (lb/ft s)    431.14       0.00
   0.00
  Frctn Loss (ft)             0.07    Cum Volume (acre-ft)        0.00       0.65
   0.00
  C & E Loss (ft)             0.01    Cum SA (acres)              0.00       0.46
   0.00


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #50-Year


  E.G. Elev (ft)            585.92    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.05    Wt. n-Val.                             0.036
```

W.S. Elev (ft)	585.87	Reach Len. (ft)	115.08	117.12	119.04
Crit W.S. (ft)		Flow Area (sq ft)		49.69	
E.G. Slope (ft/ft)	0.000658	Area (sq ft)		49.69	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	20.08	Top Width (ft)		20.08	
Vel Total (ft/s)	1.81	Avg. Vel. (ft/s)		1.81	
Max Chl Dpth (ft)	3.97	Hydr. Depth (ft)		2.48	
Conv. Total (cfs)	3507.8	Conv. (cfs)		3507.8	
Length Wtd. (ft)	117.12	Wetted Per. (ft)		22.22	
Min Ch El (ft)	581.90	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)	431.14	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.00	1.08	0.00
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.60	0.01

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	586.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.036	
W.S. Elev (ft)	586.47	Reach Len. (ft)	115.08	117.12	119.04
Crit W.S. (ft)		Flow Area (sq ft)		62.41	
E.G. Slope (ft/ft)	0.000552	Area (sq ft)		62.41	
Q Total (cfs)	112.00	Flow (cfs)		112.00	
Top Width (ft)	22.35	Top Width (ft)		22.35	
Vel Total (ft/s)	1.79	Avg. Vel. (ft/s)		1.79	
Max Chl Dpth (ft)	4.57	Hydr. Depth (ft)		2.79	
Conv. Total (cfs)	4765.7	Conv. (cfs)		4765.7	
Length Wtd. (ft)	117.12	Wetted Per. (ft)		24.80	
Min Ch El (ft)	581.90	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)	431.14	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.01	1.33	0.02
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.66	0.10

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	587.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.040	0.036	0.040
W.S. Elev (ft)	587.42	Reach Len. (ft)	115.08	117.12	119.04
Crit W.S. (ft)		Flow Area (sq ft)	20.33	84.22	14.20
E.G. Slope (ft/ft)	0.000437	Area (sq ft)	20.33	84.22	14.20
Q Total (cfs)	175.00	Flow (cfs)	7.69	161.05	6.26
Top Width (ft)	115.92	Top Width (ft)	59.80	23.00	33.12
Vel Total (ft/s)	1.47	Avg. Vel. (ft/s)	0.38	1.91	0.44
Max Chl Dpth (ft)	5.52	Hydr. Depth (ft)	0.34	3.66	0.43
Conv. Total (cfs)	8372.9	Conv. (cfs)	367.8	7705.4	299.7
Length Wtd. (ft)	117.14	Wetted Per. (ft)	59.80	25.52	33.13
Min Ch El (ft)	581.90	Shear (lb/sq ft)	0.01	0.09	0.01
Alpha	1.56	Stream Power (lb/ft s)	431.14	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.13	2.11	0.49
C & E Loss (ft)	0.01	Cum SA (acres)	0.40	0.79	1.09

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 1398.047

INPUT
Description: U/S BR5
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	591.04	28	591.04	45	588.07	90	587.17	154	586.49
183	586.09	192	582.06	192.5	581.3	195	581.3	197.5	581.3
200	582.13	206	585.96	257	587.28	364.403	587.28		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	183	.036	206	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
183	206	48.65	48.62	48.56	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	182	587.09	F
208	364.403	587.05	F

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	182	587.09

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	584.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.036	
W.S. Elev (ft)	584.58	Reach Len. (ft)	48.65	48.62	48.56
Crit W.S. (ft)	582.52	Flow Area (sq ft)		36.72	
E.G. Slope (ft/ft)	0.000442	Area (sq ft)		36.72	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	17.45	Top Width (ft)		17.45	
Vel Total (ft/s)	1.33	Avg. Vel. (ft/s)		1.33	
Max Chl Dpth (ft)	3.28	Hydr. Depth (ft)		2.10	
Conv. Total (cfs)	2331.8	Conv. (cfs)		2331.8	
Length Wtd. (ft)	48.62	Wetted Per. (ft)		19.24	
Min Ch El (ft)	581.30	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)	364.40	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	0.56	0.00
C & E Loss (ft)		Cum SA (acres)	0.00	0.42	0.00

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	585.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.036	
W.S. Elev (ft)	585.82	Reach Len. (ft)	48.65	48.62	48.56
Crit W.S. (ft)	583.03	Flow Area (sq ft)		61.35	
E.G. Slope (ft/ft)	0.000373	Area (sq ft)		61.35	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	22.17	Top Width (ft)		22.17	
Vel Total (ft/s)	1.47	Avg. Vel. (ft/s)		1.47	
Max Chl Dpth (ft)	4.52	Hydr. Depth (ft)		2.77	

Conv. Total (cfs)	4657.5	Conv. (cfs)			4657.5
Length Wtd. (ft)	48.62	Wetted Per. (ft)			24.60
Min Ch El (ft)	581.30	Shear (lb/sq ft)			0.06
Alpha	1.00	Stream Power (lb/ft s)	364.40		0.00
0.00					
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00		0.93
0.00					
C & E Loss (ft)		Cum SA (acres)	0.01		0.55
0.01					

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	586.46	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.036	
0.040					
W.S. Elev (ft)	586.43	Reach Len. (ft)	48.65	48.62	
48.56					
Crit W.S. (ft)	583.25	Flow Area (sq ft)	0.33	75.25	
0.88					
E.G. Slope (ft/ft)	0.000305	Area (sq ft)	0.33	75.25	
4.21					
Q Total (cfs)	112.00	Flow (cfs)	0.08	111.58	
0.33					
Top Width (ft)	42.04	Top Width (ft)	1.00	23.00	
18.04					
Vel Total (ft/s)	1.46	Avg. Vel. (ft/s)	0.26	1.48	
0.38					
Max Chl Dpth (ft)	5.13	Hydr. Depth (ft)	0.33	3.27	
0.44					
Conv. Total (cfs)	6409.5	Conv. (cfs)	4.9	6385.6	
19.0					
Length Wtd. (ft)	48.62	Wetted Per. (ft)	1.32	25.52	
2.00					
Min Ch El (ft)	581.30	Shear (lb/sq ft)	0.00	0.06	
0.01					
Alpha	1.02	Stream Power (lb/ft s)	364.40	0.00	
0.00					
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	1.14	
0.01					
C & E Loss (ft)		Cum SA (acres)	0.01	0.60	
0.08					

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	587.42	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.036

```
 0.040
 W.S. Elev (ft)            587.39    Reach Len. (ft)            48.65      48.62
 48.56
 Crit W.S. (ft)            583.76    Flow Area (sq ft)          29.68      97.37
 50.90
 E.G. Slope (ft/ft)      0.000245    Area (sq ft)               29.68      97.37
 50.90
 Q Total (cfs)             175.00    Flow (cfs)                  7.44     153.68
 13.88
 Top Width (ft)            285.35    Top Width (ft)            103.94      23.00
158.40
 Vel Total (ft/s)            0.98    Avg. Vel. (ft/s)            0.25       1.58
  0.27
 Max Chl Dpth (ft)           6.09    Hydr. Depth (ft)            0.29       4.23
  0.32
 Conv. Total (cfs)        11174.3    Conv. (cfs)                475.1     9812.6
 886.6
 Length Wtd. (ft)           48.62    Wetted Per. (ft)          104.93      25.52
158.53
 Min Ch El (ft)            581.30    Shear (lb/sq ft)            0.00       0.06
  0.00
 Alpha                       2.27    Stream Power (lb/ft s)    364.40       0.00
  0.00
 Frctn Loss (ft)                     Cum Volume (acre-ft)        0.06       1.87
  0.40
 C & E Loss (ft)                     Cum SA (acres)              0.19       0.72
  0.83


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CULVERT


RIVER: Trib to Cayuga
REACH: Reach 1            RS: 1387

INPUT
Description: Culvert 3
Distance from Upstream XS =      11
Deck/Roadway Width        =      26
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
      90  587.17     575     145  587.09     575     195  587.81     575
     245  587.05     575     257  587.28     575

Upstream Bridge Cross Section Data
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  591.04      28  591.04      45  588.07      90  587.17     154  586.49
     183  586.09     192  582.06   192.5   581.3     195   581.3   197.5   581.3
     200  582.13     206  585.96     257  587.28 364.403  587.28

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     183    .036     206     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           183     206             .3       .5
```

```
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     182  587.09       F
     208 364.403  587.05       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0     182  587.09

Downstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     140  587.09     575     190  587.81     575     240  587.05     575
     283   587.1     575

Downstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  592.04      39  592.04      55  588.98     145  587.85     175  586.34
     186  582.57     187  581.05     190  581.05     193  581.05     193  582.75
     200  585.54     283   587.1 364.764  587.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     175    .036     200     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           175     200             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  149.41   586.3       F
  230.59 364.764   586.3       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       6
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                11      26     .021     .021        0                   .9
      1
Upstream   Elevation =  581.58
           Centerline Station =  195
Downstream Elevation =  581.6
           Centerline Station =  190

CULVERT OUTPUT  Profile #10-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)         49.00    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          4.76
  Q Barrel (cfs)             49.00    Culv Vel DS (ft/s)          5.52
  E.G. US. (ft)             584.60    Culv Inv El Up (ft)       581.58
  W.S. US. (ft)             584.58    Culv Inv El Dn (ft)       581.60
```

E.G. DS (ft)	583.80	Culv Frctn Ls (ft)	0.10
W.S. DS (ft)	583.71	Culv Exit Loss (ft)	0.39
Delta EG (ft)	0.81	Culv Entr Loss (ft)	0.32
Delta WS (ft)	0.86	Q Weir (cfs)	
E.G. IC (ft)	584.23	Weir Sta Lft (ft)	
E.G. OC (ft)	584.60	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	583.93	Weir Max Depth (ft)	
Culv WS Outlet (ft)	583.71	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.86	Min El Weir Flow (ft)	587.06

CULVERT OUTPUT Profile #50-Year Culv Group: Culvert #1

Q Culv Group (cfs)	90.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.46
Q Barrel (cfs)	90.00	Culv Vel DS (ft/s)	5.82
E.G. US. (ft)	585.85	Culv Inv El Up (ft)	581.58
W.S. US. (ft)	585.82	Culv Inv El Dn (ft)	581.60
E.G. DS (ft)	584.91	Culv Frctn Ls (ft)	0.09
W.S. DS (ft)	584.82	Culv Exit Loss (ft)	0.44
Delta EG (ft)	0.95	Culv Entr Loss (ft)	0.42
Delta WS (ft)	1.00	Q Weir (cfs)	
E.G. IC (ft)	585.39	Weir Sta Lft (ft)	
E.G. OC (ft)	585.85	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	584.97	Weir Max Depth (ft)	
Culv WS Outlet (ft)	584.82	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.55	Min El Weir Flow (ft)	587.06

CULVERT OUTPUT Profile #100-Year Culv Group: Culvert #1

Q Culv Group (cfs)	112.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.74
Q Barrel (cfs)	112.00	Culv Vel DS (ft/s)	6.03
E.G. US. (ft)	586.46	Culv Inv El Up (ft)	581.58
W.S. US. (ft)	586.43	Culv Inv El Dn (ft)	581.60
E.G. DS (ft)	585.43	Culv Frctn Ls (ft)	0.09
W.S. DS (ft)	585.35	Culv Exit Loss (ft)	0.48
Delta EG (ft)	1.03	Culv Entr Loss (ft)	0.46
Delta WS (ft)	1.08	Q Weir (cfs)	
E.G. IC (ft)	585.96	Weir Sta Lft (ft)	
E.G. OC (ft)	586.46	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	585.49	Weir Max Depth (ft)	
Culv WS Outlet (ft)	585.35	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.85	Min El Weir Flow (ft)	587.06

CULVERT OUTPUT Profile #500-Year Culv Group: Culvert #1

Q Culv Group (cfs)	112.03	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	4.23
Q Barrel (cfs)	112.03	Culv Vel DS (ft/s)	4.27
E.G. US. (ft)	587.42	Culv Inv El Up (ft)	581.58
W.S. US. (ft)	587.39	Culv Inv El Dn (ft)	581.60
E.G. DS (ft)	586.89	Culv Frctn Ls (ft)	0.04
W.S. DS (ft)	586.85	Culv Exit Loss (ft)	0.24
Delta EG (ft)	0.54	Culv Entr Loss (ft)	0.25

Delta WS (ft)	0.54	Q Weir (cfs)	62.97
E.G. IC (ft)	587.27	Weir Sta Lft (ft)	76.03
E.G. OC (ft)	587.42	Weir Sta Rgt (ft)	364.40
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	586.90	Weir Max Depth (ft)	0.40
Culv WS Outlet (ft)	586.85	Weir Avg Depth (ft)	0.21
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	50.87
Culv Crt Depth (ft)	2.86	Min El Weir Flow (ft)	587.06

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 1349.409

INPUT
Description: D/S BR5
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	592.04	39	592.04	55	588.98	145	587.85	175	586.34
186	582.57	187	581.05	190	581.05	193	581.05	193	582.75
200	585.54	283	587.1	364.764	587.26				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	175	.036	200	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175	200	70.96	93.74	116.18	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	149.41	586.3	F
230.59	364.764	586.3	F

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	583.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.036	
W.S. Elev (ft)	583.71	Reach Len. (ft)	70.96	93.74	116.18
Crit W.S. (ft)	582.30	Flow Area (sq ft)		20.92	
E.G. Slope (ft/ft)	0.002183	Area (sq ft)		20.92	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	12.74	Top Width (ft)		12.74	
Vel Total (ft/s)	2.34	Avg. Vel. (ft/s)		2.34	
Max Chl Dpth (ft)	2.66	Hydr. Depth (ft)		1.64	
Conv. Total (cfs)	1048.8	Conv. (cfs)		1048.8	
Length Wtd. (ft)	93.74	Wetted Per. (ft)		15.63	
Min Ch El (ft)	581.05	Shear (lb/sq ft)		0.18	
Alpha	1.00	Stream Power (lb/ft s)	364.76	0.00	

```
   0.00
  Frctn Loss (ft)             0.16    Cum Volume (acre-ft)        0.00       0.54
   0.00
  C & E Loss (ft)             0.01    Cum SA (acres)              0.00       0.40
   0.00


CROSS SECTION OUTPUT  Profile #50-Year


  E.G. Elev (ft)            584.91    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.09    Wt. n-Val.                            0.036

  W.S. Elev (ft)            584.82    Reach Len. (ft)            70.96      93.74
 116.18
  Crit W.S. (ft)            582.96    Flow Area (sq ft)                     38.41

  E.G. Slope (ft/ft)      0.001538    Area (sq ft)                          38.41

  Q Total (cfs)              90.00    Flow (cfs)                            90.00

  Top Width (ft)             18.77    Top Width (ft)                        18.77

  Vel Total (ft/s)            2.34    Avg. Vel. (ft/s)                       2.34

  Max Chl Dpth (ft)           3.77    Hydr. Depth (ft)                       2.05

  Conv. Total (cfs)         2295.1    Conv. (cfs)                          2295.1

  Length Wtd. (ft)           93.74    Wetted Per. (ft)                      22.06

  Min Ch El (ft)            581.05    Shear (lb/sq ft)                       0.17

  Alpha                       1.00    Stream Power (lb/ft s)    364.76       0.00
   0.00
  Frctn Loss (ft)             0.11    Cum Volume (acre-ft)        0.00       0.90
   0.00
  C & E Loss (ft)             0.01    Cum SA (acres)              0.01       0.52
   0.01


CROSS SECTION OUTPUT  Profile #100-Year


  E.G. Elev (ft)            585.43    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.08    Wt. n-Val.                            0.036

  W.S. Elev (ft)            585.35    Reach Len. (ft)            70.96      93.74
 116.18
  Crit W.S. (ft)            583.27    Flow Area (sq ft)                     49.06

  E.G. Slope (ft/ft)      0.001252    Area (sq ft)                          49.06

  Q Total (cfs)             112.00    Flow (cfs)                           112.00

  Top Width (ft)             21.63    Top Width (ft)                        21.63

  Vel Total (ft/s)            2.28    Avg. Vel. (ft/s)                       2.28
```

Max Chl Dpth (ft)	4.30	Hydr. Depth (ft)			2.27
Conv. Total (cfs)	3165.0	Conv. (cfs)			3165.0
Length Wtd. (ft)	93.77	Wetted Per. (ft)			25.11
Min Ch El (ft)	581.05	Shear (lb/sq ft)			0.15
Alpha	1.00	Stream Power (lb/ft s)	364.76		0.00
0.00					
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.00		1.11
0.01					
C & E Loss (ft)	0.01	Cum SA (acres)	0.01		0.58
0.07					

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	586.89	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.04	Wt. n-Val.	0.040	0.036	
0.040					
W.S. Elev (ft)	586.85	Reach Len. (ft)	70.96	93.74	
116.18					
Crit W.S. (ft)	583.91	Flow Area (sq ft)	2.56	85.05	
45.47					
E.G. Slope (ft/ft)	0.000418	Area (sq ft)	2.56	85.05	
45.47					
Q Total (cfs)	175.00	Flow (cfs)	0.78	148.20	
26.02					
Top Width (ft)	104.64	Top Width (ft)	10.08	25.00	
69.56					
Vel Total (ft/s)	1.31	Avg. Vel. (ft/s)	0.30	1.74	
0.57					
Max Chl Dpth (ft)	5.80	Hydr. Depth (ft)	0.25	3.40	
0.65					
Conv. Total (cfs)	8556.1	Conv. (cfs)	38.0	7246.0	
1272.1					
Length Wtd. (ft)	97.48	Wetted Per. (ft)	10.09	28.68	
69.57					
Min Ch El (ft)	581.05	Shear (lb/sq ft)	0.01	0.08	
0.02					
Alpha	1.52	Stream Power (lb/ft s)	364.76	0.00	
0.00					
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.06	1.76	
0.40					
C & E Loss (ft)	0.01	Cum SA (acres)	0.12	0.70	
0.70					

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 1255.663

INPUT
Description: Surveyed Section 10
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	591.56	18	591.56	34	588.5	124	587.37	154	585.86
165	582.09	166	580.57	169	580.57	172	580.57	172	582.27
179	585.06	262	586.62	431.234	587.26				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	154	.036	179	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
154	179	148.89	118.41	87.69	.3	.5

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	583.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.036	
W.S. Elev (ft)	583.57	Reach Len. (ft)	148.89	118.41	87.69
Crit W.S. (ft)		Flow Area (sq ft)		25.54	
E.G. Slope (ft/ft)	0.001315	Area (sq ft)		25.54	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	14.57	Top Width (ft)		14.57	
Vel Total (ft/s)	1.92	Avg. Vel. (ft/s)		1.92	
Max Chl Dpth (ft)	3.00	Hydr. Depth (ft)		1.75	
Conv. Total (cfs)	1351.4	Conv. (cfs)		1351.4	
Length Wtd. (ft)	118.41	Wetted Per. (ft)		17.59	
Min Ch El (ft)	580.57	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)	431.23	0.00	0.00
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	0.00	0.49	0.00
C & E Loss (ft)	0.00	Cum SA (acres)	0.00	0.37	0.00

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	584.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.036	
W.S. Elev (ft)	584.72	Reach Len. (ft)	148.89	118.41	87.69
Crit W.S. (ft)		Flow Area (sq ft)		45.95	
E.G. Slope (ft/ft)	0.000961	Area (sq ft)		45.95	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	20.83	Top Width (ft)		20.83	

Vel Total (ft/s)	1.96	Avg. Vel. (ft/s)			1.96
Max Chl Dpth (ft)	4.15	Hydr. Depth (ft)			2.21
Conv. Total (cfs)	2903.1	Conv. (cfs)			2903.1
Length Wtd. (ft)	118.41	Wetted Per. (ft)			24.26
Min Ch El (ft)	580.57	Shear (lb/sq ft)			0.11
Alpha	1.00	Stream Power (lb/ft s)	431.23		0.00
0.00					
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	0.00		0.81
0.00					
C & E Loss (ft)	0.00	Cum SA (acres)	0.01		0.48
0.01					

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	585.33	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.06	Wt. n-Val.		0.036	
0.040					
W.S. Elev (ft)	585.27	Reach Len. (ft)	148.89	118.41	
87.69					
Crit W.S. (ft)		Flow Area (sq ft)		58.11	
1.16					
E.G. Slope (ft/ft)	0.000776	Area (sq ft)		58.11	
1.16					
Q Total (cfs)	112.00	Flow (cfs)		111.73	
0.27					
Top Width (ft)	34.40	Top Width (ft)		23.28	
11.13					
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)		1.92	
0.23					
Max Chl Dpth (ft)	4.70	Hydr. Depth (ft)		2.50	
0.10					
Conv. Total (cfs)	4021.4	Conv. (cfs)		4011.8	
9.6					
Length Wtd. (ft)	118.17	Wetted Per. (ft)		26.86	
11.13					
Min Ch El (ft)	580.57	Shear (lb/sq ft)		0.10	
0.01					
Alpha	1.03	Stream Power (lb/ft s)	431.23	0.00	
0.00					
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.00	0.99	
0.01					
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.53	
0.05					

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	586.85	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.02	Wt. n-Val.	0.040	0.036	
0.040					

```
  W.S. Elev (ft)            586.83    Reach Len. (ft)           148.89     118.41
  87.69
  Crit W.S. (ft)                      Flow Area (sq ft)           9.27      96.52
  87.46
  E.G. Slope (ft/ft)      0.000229    Area (sq ft)                9.27      96.52
  87.46
  Q Total (cfs)             175.00    Flow (cfs)                  3.21     135.42
  36.37
  Top Width (ft)            181.68    Top Width (ft)             19.19      25.00
 137.49
  Vel Total (ft/s)            0.91    Avg. Vel. (ft/s)            0.35       1.40
   0.42
  Max Chl Dpth (ft)           6.26    Hydr. Depth (ft)            0.48       3.86
   0.64
  Conv. Total (cfs)        11561.0    Conv. (cfs)                211.8     8946.3
 2402.8
  Length Wtd. (ft)          114.20    Wetted Per. (ft)           19.22      28.68
 137.50
  Min Ch El (ft)            580.57    Shear (lb/sq ft)            0.01       0.05
   0.01
  Alpha                       1.90    Stream Power (lb/ft s)    431.23       0.00
   0.00
  Frctn Loss (ft)             0.03    Cum Volume (acre-ft)        0.05       1.56
   0.23
  C & E Loss (ft)             0.00    Cum SA (acres)              0.10       0.64
   0.43


CROSS SECTION


RIVER: Trib to Cayuga
REACH: Reach 1            RS: 1137.230

INPUT
Description: U/S BR6
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  591.27      35  591.27      51  588.21     141  587.08     171  585.57
     182   581.8     183  580.28     186  580.28     189  580.28     189  581.98
     196  584.77     279  586.33 479.429  587.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     171    .036     196     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           171     196             50.2   48.13   46.46             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     165   588.6       F
     207 479.429   588.6       F

CROSS SECTION OUTPUT  Profile #10-Year


  E.G. Elev (ft)            583.48    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.05    Wt. n-Val.                            0.036

  W.S. Elev (ft)            583.43    Reach Len. (ft)            50.20      48.13
  46.46
```

Crit W.S. (ft)	581.52	Flow Area (sq ft)		27.87
E.G. Slope (ft/ft)	0.001050	Area (sq ft)		27.87
Q Total (cfs)	49.00	Flow (cfs)		49.00
Top Width (ft)	15.42	Top Width (ft)		15.42
Vel Total (ft/s)	1.76	Avg. Vel. (ft/s)		1.76
Max Chl Dpth (ft)	3.15	Hydr. Depth (ft)		1.81
Conv. Total (cfs)	1512.2	Conv. (cfs)		1512.2
Length Wtd. (ft)	48.13	Wetted Per. (ft)		18.49
Min Ch El (ft)	580.28	Shear (lb/sq ft)		0.10
Alpha	1.00	Stream Power (lb/ft s)	479.43	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	0.42
0.00				
C & E Loss (ft)		Cum SA (acres)	0.00	0.33
0.00				

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	584.68	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.05	Wt. n-Val.		0.036
W.S. Elev (ft)	584.63	Reach Len. (ft)	50.20	48.13
46.46				
Crit W.S. (ft)	582.20	Flow Area (sq ft)		50.08
E.G. Slope (ft/ft)	0.000766	Area (sq ft)		50.08
Q Total (cfs)	90.00	Flow (cfs)		90.00
Top Width (ft)	21.88	Top Width (ft)		21.88
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)		1.80
Max Chl Dpth (ft)	4.35	Hydr. Depth (ft)		2.29
Conv. Total (cfs)	3251.7	Conv. (cfs)		3251.7
Length Wtd. (ft)	48.13	Wetted Per. (ft)		25.38
Min Ch El (ft)	580.28	Shear (lb/sq ft)		0.09
Alpha	1.00	Stream Power (lb/ft s)	479.43	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	0.68
0.00				
C & E Loss (ft)		Cum SA (acres)	0.01	0.42
0.01				

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	585.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.036	0.040
W.S. Elev (ft)	585.19	Reach Len. (ft)	50.20	48.13	46.46
Crit W.S. (ft)	582.52	Flow Area (sq ft)		63.19	3.53
E.G. Slope (ft/ft)	0.000593	Area (sq ft)		63.19	4.80
Q Total (cfs)	112.00	Flow (cfs)		110.50	1.50
Top Width (ft)	46.49	Top Width (ft)		23.90	22.59
Vel Total (ft/s)	1.68	Avg. Vel. (ft/s)		1.75	0.42
Max Chl Dpth (ft)	4.91	Hydr. Depth (ft)		2.64	0.32
Conv. Total (cfs)	4600.5	Conv. (cfs)		4538.9	61.6
Length Wtd. (ft)	48.13	Wetted Per. (ft)		27.53	11.00
Min Ch El (ft)	580.28	Shear (lb/sq ft)		0.08	0.01
Alpha	1.07	Stream Power (lb/ft s)	479.43	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	0.83	0.01
C & E Loss (ft)		Cum SA (acres)	0.01	0.46	0.02

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	586.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.036	0.040
W.S. Elev (ft)	586.79	Reach Len. (ft)	50.20	48.13	46.46
Crit W.S. (ft)	583.14	Flow Area (sq ft)	6.42	102.88	21.09
E.G. Slope (ft/ft)	0.000235	Area (sq ft)	14.80	102.88	125.80
Q Total (cfs)	175.00	Flow (cfs)	3.82	152.64	18.54
Top Width (ft)	231.48	Top Width (ft)	24.25	25.00	182.23
Vel Total (ft/s)	1.34	Avg. Vel. (ft/s)	0.60	1.48	

```
  0.88
  Max Chl Dpth (ft)           6.51    Hydr. Depth (ft)            1.07       4.12
   1.92
  Conv. Total (cfs)        11408.2    Conv. (cfs)                249.1     9950.3
 1208.8
  Length Wtd. (ft)           48.13    Wetted Per. (ft)            6.01      28.68
  11.00
  Min Ch El (ft)            580.28    Shear (lb/sq ft)            0.02       0.05
   0.03
  Alpha                       1.12    Stream Power (lb/ft s)    479.43       0.00
   0.00
  Frctn Loss (ft)                     Cum Volume (acre-ft)        0.01       1.29
   0.01
  C & E Loss (ft)                     Cum SA (acres)              0.03       0.58
   0.11


Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CULVERT


RIVER: Trib to Cayuga
REACH: Reach 1            RS: 1126

INPUT
Description: Culvert 2
Distance from Upstream XS =      11
Deck/Roadway Width        =      26
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
      40  589.45     575     136  588.46     575     186  588.54     575
     236  588.76     575     480  589.04     575

Upstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  591.27      35  591.27      51  588.21     141  587.08     171  585.57
     182   581.8     183  580.28     186  580.28     189  580.28     189  581.98
     196  584.77     279  586.33 479.429  587.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     171    .036     196     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           171     196             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     165   588.6       F
     207 479.429   588.6       F

Downstream  Deck/Roadway Coordinates
    num=       3
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
      28  588.46     575      78  588.54     575     128  588.76     575

Downstream Bridge Cross Section Data
Station Elevation Data    num=       9
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	589.45	40	589.45	56	588.51	76	581.12	78	580.17
81	580.95	101	589.21	146	589.04	363.091	589.04		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	56	.036	101	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
56	101	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	40.21	588.5	F
116.18	363.091	588.5	F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	6	

FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	11	26	.021	.021	0	.9	1

Upstream Elevation = 580.48
Centerline Station = 186
Downstream Elevation = 580.31
Centerline Station = 78.3

CULVERT OUTPUT Profile #10-Year Culv Group: Culvert #1

Q Culv Group (cfs)	49.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.31
Q Barrel (cfs)	49.00	Culv Vel DS (ft/s)	4.91
E.G. US. (ft)	583.48	Culv Inv El Up (ft)	580.48
W.S. US. (ft)	583.43	Culv Inv El Dn (ft)	580.31
E.G. DS (ft)	582.75	Culv Frctn Ls (ft)	0.10
W.S. DS (ft)	582.61	Culv Exit Loss (ft)	0.24
Delta EG (ft)	0.73	Culv Entr Loss (ft)	0.39
Delta WS (ft)	0.82	Q Weir (cfs)	
E.G. IC (ft)	583.11	Weir Sta Lft (ft)	
E.G. OC (ft)	583.48	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	582.65	Weir Max Depth (ft)	
Culv WS Outlet (ft)	582.61	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.96	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.86	Min El Weir Flow (ft)	588.52

CULVERT OUTPUT Profile #50-Year Culv Group: Culvert #1

Q Culv Group (cfs)	90.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.27

Q Barrel (cfs)	90.00	Culv Vel DS (ft/s)	5.99
E.G. US. (ft)	584.68	Culv Inv El Up (ft)	580.48
W.S. US. (ft)	584.63	Culv Inv El Dn (ft)	580.31
E.G. DS (ft)	583.60	Culv Frctn Ls (ft)	0.11
W.S. DS (ft)	583.46	Culv Exit Loss (ft)	0.41
Delta EG (ft)	1.07	Culv Entr Loss (ft)	0.55
Delta WS (ft)	1.17	Q Weir (cfs)	
E.G. IC (ft)	584.27	Weir Sta Lft (ft)	
E.G. OC (ft)	584.68	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	583.52	Weir Max Depth (ft)	
Culv WS Outlet (ft)	583.46	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.73	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.55	Min El Weir Flow (ft)	588.52

CULVERT OUTPUT Profile #100-Year Culv Group: Culvert #1

Q Culv Group (cfs)	112.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.54
Q Barrel (cfs)	112.00	Culv Vel DS (ft/s)	6.31
E.G. US. (ft)	585.24	Culv Inv El Up (ft)	580.48
W.S. US. (ft)	585.19	Culv Inv El Dn (ft)	580.31
E.G. DS (ft)	584.05	Culv Frctn Ls (ft)	0.11
W.S. DS (ft)	583.91	Culv Exit Loss (ft)	0.48
Delta EG (ft)	1.19	Culv Entr Loss (ft)	0.60
Delta WS (ft)	1.28	Q Weir (cfs)	
E.G. IC (ft)	584.84	Weir Sta Lft (ft)	
E.G. OC (ft)	585.24	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	583.98	Weir Max Depth (ft)	
Culv WS Outlet (ft)	583.91	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.10	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.85	Min El Weir Flow (ft)	588.52

CULVERT OUTPUT Profile #500-Year Culv Group: Culvert #1

Q Culv Group (cfs)	175.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	7.20
Q Barrel (cfs)	175.00	Culv Vel DS (ft/s)	7.10
E.G. US. (ft)	586.82	Culv Inv El Up (ft)	580.48
W.S. US. (ft)	586.79	Culv Inv El Dn (ft)	580.31
E.G. DS (ft)	585.30	Culv Frctn Ls (ft)	0.12
W.S. DS (ft)	585.20	Culv Exit Loss (ft)	0.68
Delta EG (ft)	1.52	Culv Entr Loss (ft)	0.72
Delta WS (ft)	1.59	Q Weir (cfs)	
E.G. IC (ft)	586.40	Weir Sta Lft (ft)	
E.G. OC (ft)	586.82	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	585.29	Weir Max Depth (ft)	
Culv WS Outlet (ft)	585.20	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	4.16	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	3.61	Min El Weir Flow (ft)	588.52

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 1089.117

INPUT

Description: D/S BR6

Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	589.45	40	589.45	56	588.51	76	581.12	78	580.17
81	580.95	101	589.21	146	589.04	363.091	589.04		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	56	.036	101	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
56	101	60.1	52.26	51.24	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	40.21	588.5	F
116.18	363.091	588.5	F

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	582.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.036	
W.S. Elev (ft)	582.61	Reach Len. (ft)	60.10	52.26	51.24
Crit W.S. (ft)	581.95	Flow Area (sq ft)		16.42	
E.G. Slope (ft/ft)	0.004213	Area (sq ft)		16.42	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	13.05	Top Width (ft)		13.05	
Vel Total (ft/s)	2.98	Avg. Vel. (ft/s)		2.98	
Max Chl Dpth (ft)	2.44	Hydr. Depth (ft)		1.26	
Conv. Total (cfs)	754.9	Conv. (cfs)		754.9	
Length Wtd. (ft)	52.26	Wetted Per. (ft)		13.96	
Min Ch El (ft)	580.17	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)	363.09	0.00	0.00
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	0.00	0.41	0.00
C & E Loss (ft)	0.02	Cum SA (acres)	0.00	0.32	0.00

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	583.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.036	

W.S. Elev (ft)	583.46	Reach Len. (ft)	60.10	52.26	51.24
Crit W.S. (ft)	582.47	Flow Area (sq ft)		29.33	
E.G. Slope (ft/ft)	0.003017	Area (sq ft)		29.33	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	17.40	Top Width (ft)		17.40	
Vel Total (ft/s)	3.07	Avg. Vel. (ft/s)		3.07	
Max Chl Dpth (ft)	3.29	Hydr. Depth (ft)		1.69	
Conv. Total (cfs)	1638.6	Conv. (cfs)		1638.6	
Length Wtd. (ft)	52.26	Wetted Per. (ft)		18.63	
Min Ch El (ft)	580.17	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)	363.09	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	0.00	0.66	0.00
C & E Loss (ft)	0.00	Cum SA (acres)	0.01	0.40	0.01

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	584.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.036	
W.S. Elev (ft)	583.91	Reach Len. (ft)	60.10	52.26	51.24
Crit W.S. (ft)	582.68	Flow Area (sq ft)		37.82	
E.G. Slope (ft/ft)	0.002371	Area (sq ft)		37.82	
Q Total (cfs)	112.00	Flow (cfs)		112.00	
Top Width (ft)	19.74	Top Width (ft)		19.74	
Vel Total (ft/s)	2.96	Avg. Vel. (ft/s)		2.96	
Max Chl Dpth (ft)	3.74	Hydr. Depth (ft)		1.92	
Conv. Total (cfs)	2299.9	Conv. (cfs)		2299.9	
Length Wtd. (ft)	52.26	Wetted Per. (ft)		21.14	
Min Ch El (ft)	580.17	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)	363.09	0.00	0.00
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	0.00	0.79	0.01

C & E Loss (ft)	0.00	Cum SA (acres)	0.01	0.44	0.01

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	585.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.036	
W.S. Elev (ft)	585.20	Reach Len. (ft)	60.10	52.26	51.24
Crit W.S. (ft)	583.18	Flow Area (sq ft)		67.34	
E.G. Slope (ft/ft)	0.001242	Area (sq ft)		67.34	
Q Total (cfs)	175.00	Flow (cfs)		175.00	
Top Width (ft)	26.32	Top Width (ft)		26.32	
Vel Total (ft/s)	2.60	Avg. Vel. (ft/s)		2.60	
Max Chl Dpth (ft)	5.03	Hydr. Depth (ft)		2.56	
Conv. Total (cfs)	4965.5	Conv. (cfs)		4965.5	
Length Wtd. (ft)	52.26	Wetted Per. (ft)		28.20	
Min Ch El (ft)	580.17	Shear (lb/sq ft)		0.19	
Alpha	1.00	Stream Power (lb/ft s)	363.09	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.01	1.21	0.01
C & E Loss (ft)	0.00	Cum SA (acres)	0.01	0.55	0.01

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 1036.844

INPUT
Description: Surveyed Section 11
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	589.32	5	589.32	21	588.38	41	580.99	43	580.04
46	580.82	66	589.08	111	588.91	315.322	588.91		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	21	.036	66	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
21	66	247.65	239.4	228.3	.1	.3

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	582.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.036	
W.S. Elev (ft)	582.23	Reach Len. (ft)	247.65	239.40	228.30
Crit W.S. (ft)		Flow Area (sq ft)		13.36	
E.G. Slope (ft/ft)	0.007305	Area (sq ft)		13.36	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	11.79	Top Width (ft)		11.79	
Vel Total (ft/s)	3.67	Avg. Vel. (ft/s)		3.67	
Max Chl Dpth (ft)	2.19	Hydr. Depth (ft)		1.13	
Conv. Total (cfs)	573.3	Conv. (cfs)		573.3	
Length Wtd. (ft)	239.40	Wetted Per. (ft)		12.61	
Min Ch El (ft)	580.04	Shear (lb/sq ft)		0.48	
Alpha	1.00	Stream Power (lb/ft s)	315.32	0.00	0.00
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)	0.00	0.39	0.00
C & E Loss (ft)	0.05	Cum SA (acres)	0.00	0.30	0.00

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	583.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.036	
W.S. Elev (ft)	583.28	Reach Len. (ft)	247.65	239.40	228.30
Crit W.S. (ft)		Flow Area (sq ft)		28.59	
E.G. Slope (ft/ft)	0.003231	Area (sq ft)		28.59	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	17.18	Top Width (ft)		17.18	
Vel Total (ft/s)	3.15	Avg. Vel. (ft/s)		3.15	

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  Max Chl Dpth (ft)           3.24    Hydr. Depth (ft)                      1.66

  Conv. Total (cfs)         1583.2    Conv. (cfs)                         1583.2

  Length Wtd. (ft)          239.40    Wetted Per. (ft)                     18.39

  Min Ch El (ft)            580.04    Shear (lb/sq ft)                      0.31

  Alpha                       1.00    Stream Power (lb/ft s)    315.32      0.00
   0.00
  Frctn Loss (ft)             0.36    Cum Volume (acre-ft)        0.00      0.62
   0.00
  C & E Loss (ft)             0.03    Cum SA (acres)              0.01      0.38
   0.01


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #100-Year


  E.G. Elev (ft)            583.93    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.14    Wt. n-Val.                            0.036

  W.S. Elev (ft)            583.79    Reach Len. (ft)           247.65     239.40
 228.30
  Crit W.S. (ft)                      Flow Area (sq ft)                     37.96

  E.G. Slope (ft/ft)      0.002347    Area (sq ft)                          37.96

  Q Total (cfs)             112.00    Flow (cfs)                          112.00

  Top Width (ft)             19.78    Top Width (ft)                        19.78

  Vel Total (ft/s)            2.95    Avg. Vel. (ft/s)                       2.95

  Max Chl Dpth (ft)           3.75    Hydr. Depth (ft)                       1.92

  Conv. Total (cfs)         2311.7    Conv. (cfs)                         2311.7

  Length Wtd. (ft)          239.40    Wetted Per. (ft)                      21.19

  Min Ch El (ft)            580.04    Shear (lb/sq ft)                       0.26

  Alpha                       1.00    Stream Power (lb/ft s)    315.32      0.00
   0.00
  Frctn Loss (ft)             0.30    Cum Volume (acre-ft)        0.00      0.75
   0.01
  C & E Loss (ft)             0.02    Cum SA (acres)              0.01      0.42
   0.01


Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #500-Year
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E.G. Elev (ft)	585.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.036	
W.S. Elev (ft)	585.14	Reach Len. (ft)	247.65	239.40	228.30
Crit W.S. (ft)		Flow Area (sq ft)		69.20	
E.G. Slope (ft/ft)	0.001155	Area (sq ft)		69.20	
Q Total (cfs)	175.00	Flow (cfs)		175.00	
Top Width (ft)	26.68	Top Width (ft)		26.68	
Vel Total (ft/s)	2.53	Avg. Vel. (ft/s)		2.53	
Max Chl Dpth (ft)	5.10	Hydr. Depth (ft)		2.59	
Conv. Total (cfs)	5149.2	Conv. (cfs)		5149.2	
Length Wtd. (ft)	239.40	Wetted Per. (ft)		28.59	
Min Ch El (ft)	580.04	Shear (lb/sq ft)		0.17	
Alpha	1.00	Stream Power (lb/ft s)	315.32	0.00	0.00
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	0.01	1.13	0.01
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.51	0.01

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 797.4444

INPUT
Description: Surveyed Section 12
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	589.54	36	589.54	136	587.71	224	586.21	236	585.61
240	584.66	249	580.92	250	578.73	253	578.6	256	578.74
257	580.2	268	585.9	368	588.41	467.29	590.28		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	236	.036	268	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
236	268	46.26	42.58	39.83	.3	.5

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	581.90	Element	Left OB	Channel	

Right OB					
Vel Head (ft)	0.05	Wt. n-Val.			0.036
W.S. Elev (ft)	581.85	Reach Len. (ft)		46.26	42.58
39.83					
Crit W.S. (ft)		Flow Area (sq ft)			27.17
E.G. Slope (ft/ft)	0.000957	Area (sq ft)			27.17
Q Total (cfs)	49.00	Flow (cfs)			49.00
Top Width (ft)	13.42	Top Width (ft)			13.42
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)			1.80
Max Chl Dpth (ft)	3.25	Hydr. Depth (ft)			2.02
Conv. Total (cfs)	1583.8	Conv. (cfs)			1583.8
Length Wtd. (ft)	42.54	Wetted Per. (ft)			16.20
Min Ch El (ft)	578.60	Shear (lb/sq ft)			0.10
Alpha	1.00	Stream Power (lb/ft s)		467.29	0.00
0.00					
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		0.00	0.28
0.00					
C & E Loss (ft)	0.00	Cum SA (acres)		0.00	0.23
0.00					

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	583.05	Element		Left OB	Channel
Right OB					
Vel Head (ft)	0.06	Wt. n-Val.			0.036
W.S. Elev (ft)	582.99	Reach Len. (ft)		46.26	42.58
39.83					
Crit W.S. (ft)		Flow Area (sq ft)			45.28
E.G. Slope (ft/ft)	0.000867	Area (sq ft)			45.28
Q Total (cfs)	90.00	Flow (cfs)			90.00
Top Width (ft)	18.36	Top Width (ft)			18.36
Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)			1.99
Max Chl Dpth (ft)	4.39	Hydr. Depth (ft)			2.47
Conv. Total (cfs)	3057.1	Conv. (cfs)			3057.1
Length Wtd. (ft)	42.55	Wetted Per. (ft)			21.64
Min Ch El (ft)	578.60	Shear (lb/sq ft)			0.11
Alpha	1.00	Stream Power (lb/ft s)		467.29	0.00
0.00					
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		0.00	0.42
0.00					

C & E Loss (ft)	0.00	Cum SA (acres)	0.01	0.28	0.01

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	583.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.036	
W.S. Elev (ft)	583.55	Reach Len. (ft)	46.26	42.58	39.83
Crit W.S. (ft)		Flow Area (sq ft)		56.20	
E.G. Slope (ft/ft)	0.000763	Area (sq ft)		56.20	
Q Total (cfs)	112.00	Flow (cfs)		112.00	
Top Width (ft)	20.78	Top Width (ft)		20.78	
Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)		1.99	
Max Chl Dpth (ft)	4.95	Hydr. Depth (ft)		2.70	
Conv. Total (cfs)	4055.6	Conv. (cfs)		4055.6	
Length Wtd. (ft)	42.57	Wetted Per. (ft)		24.31	
Min Ch El (ft)	578.60	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)	467.29	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.00	0.49	0.01
C & E Loss (ft)	0.00	Cum SA (acres)	0.01	0.30	0.01

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	585.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.036	
W.S. Elev (ft)	584.98	Reach Len. (ft)	46.26	42.58	39.83
Crit W.S. (ft)		Flow Area (sq ft)		90.61	
E.G. Slope (ft/ft)	0.000540	Area (sq ft)		90.61	
Q Total (cfs)	175.00	Flow (cfs)		175.00	
Top Width (ft)	27.59	Top Width (ft)		27.59	
Vel Total (ft/s)	1.93	Avg. Vel. (ft/s)		1.93	
Max Chl Dpth (ft)	6.38	Hydr. Depth (ft)		3.28	
Conv. Total (cfs)	7528.4	Conv. (cfs)		7528.4	

```
  Length Wtd. (ft)           42.62    Wetted Per. (ft)                      31.73

  Min Ch El (ft)            578.60    Shear (lb/sq ft)                       0.10

  Alpha                       1.00    Stream Power (lb/ft s)    467.29       0.00
   0.00
  Frctn Loss (ft)             0.02    Cum Volume (acre-ft)        0.01       0.69
   0.01
  C & E Loss (ft)             0.00    Cum SA (acres)              0.01       0.37
   0.01


CROSS SECTION


RIVER: Trib to Cayuga
REACH: Reach 1            RS: 754.8596

INPUT
Description: U/S BR7
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  589.41      53  589.41     153  587.58     241  586.08     253  585.48
     257  584.53     266  580.79     267   578.6     270  578.47     273  578.61
     274  580.07     285  585.77     385  588.28 464.665  590.28

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     266    .036     274     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           266     274            44.98    47.9   50.85             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     257   586.5       F
     283 464.665   586.5       F

CROSS SECTION OUTPUT  Profile #10-Year


  E.G. Elev (ft)            581.87    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.05    Wt. n-Val.                  0.040      0.036
  0.040
  W.S. Elev (ft)            581.81    Reach Len. (ft)            44.98      47.90
  50.85
  Crit W.S. (ft)            579.77    Flow Area (sq ft)           1.26      24.25
   2.93
  E.G. Slope (ft/ft)      0.000661    Area (sq ft)                1.26      24.25
   2.93
  Q Total (cfs)              49.00    Flow (cfs)                  0.73      45.90
   2.36
  Top Width (ft)             13.83    Top Width (ft)              2.46       8.00
   3.37
  Vel Total (ft/s)            1.72    Avg. Vel. (ft/s)            0.58       1.89
   0.81
  Max Chl Dpth (ft)           3.34    Hydr. Depth (ft)            0.51       3.03
   0.87
  Conv. Total (cfs)         1905.6    Conv. (cfs)                 28.4     1785.2
   91.9
  Length Wtd. (ft)           47.90    Wetted Per. (ft)            2.67      10.18
```

3.79					
Min Ch El (ft)	578.47	Shear (lb/sq ft)	0.02	0.10	0.03
Alpha	1.14	Stream Power (lb/ft s)	464.67	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.25	
C & E Loss (ft)		Cum SA (acres)	0.00	0.22	0.00

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	583.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.040	0.036	0.040
W.S. Elev (ft)	582.95	Reach Len. (ft)	44.98	47.90	50.85
Crit W.S. (ft)	580.36	Flow Area (sq ft)	5.59	33.31	7.98
E.G. Slope (ft/ft)	0.000630	Area (sq ft)	5.59	33.31	7.98
Q Total (cfs)	90.00	Flow (cfs)	5.20	76.04	8.76
Top Width (ft)	18.74	Top Width (ft)	5.19	8.00	5.55
Vel Total (ft/s)	1.92	Avg. Vel. (ft/s)	0.93	2.28	1.10
Max Chl Dpth (ft)	4.48	Hydr. Depth (ft)	1.08	4.16	1.44
Conv. Total (cfs)	3584.8	Conv. (cfs)	207.0	3028.9	348.8
Length Wtd. (ft)	47.90	Wetted Per. (ft)	5.62	10.18	6.25
Min Ch El (ft)	578.47	Shear (lb/sq ft)	0.04	0.13	0.05
Alpha	1.24	Stream Power (lb/ft s)	464.67	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.38	
C & E Loss (ft)		Cum SA (acres)	0.00	0.27	0.00

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	583.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.040	0.036	0.040
W.S. Elev (ft)	583.50	Reach Len. (ft)	44.98	47.90	50.85
Crit W.S. (ft)	580.62	Flow Area (sq ft)	8.86	37.77	11.38
E.G. Slope (ft/ft)	0.000573	Area (sq ft)	8.86	37.77	11.38
Q Total (cfs)	112.00	Flow (cfs)	9.16	89.44	13.40

Top Width (ft)	21.16	Top Width (ft)	6.53	8.00	6.63
Vel Total (ft/s)	1.93	Avg. Vel. (ft/s)	1.03	2.37	1.18
Max Chl Dpth (ft)	5.03	Hydr. Depth (ft)	1.36	4.72	1.72
Conv. Total (cfs)	4678.3	Conv. (cfs)	382.7	3735.8	559.9
Length Wtd. (ft)	47.90	Wetted Per. (ft)	7.07	10.18	7.46
Min Ch El (ft)	578.47	Shear (lb/sq ft)	0.04	0.13	0.05
Alpha	1.27	Stream Power (lb/ft s)	464.67	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.44	
C & E Loss (ft)		Cum SA (acres)	0.00	0.29	0.00

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	585.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.040	0.036	0.040
W.S. Elev (ft)	584.95	Reach Len. (ft)	44.98	47.90	50.85
Crit W.S. (ft)	581.32	Flow Area (sq ft)	20.59	49.32	22.91
E.G. Slope (ft/ft)	0.000419	Area (sq ft)	20.96	49.32	22.96
Q Total (cfs)	175.00	Flow (cfs)	25.76	119.24	30.00
Top Width (ft)	28.17	Top Width (ft)	10.76	8.00	9.41
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)	1.25	2.42	1.31
Max Chl Dpth (ft)	6.48	Hydr. Depth (ft)	2.29	6.17	2.55
Conv. Total (cfs)	8552.8	Conv. (cfs)	1259.2	5827.6	1466.0
Length Wtd. (ft)	47.90	Wetted Per. (ft)	9.75	10.18	10.14
Min Ch El (ft)	578.47	Shear (lb/sq ft)	0.06	0.13	0.06
Alpha	1.27	Stream Power (lb/ft s)	464.67	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		0.62	
C & E Loss (ft)		Cum SA (acres)	0.01	0.35	0.01

CULVERT

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 745

```
INPUT
Description: Culvert 1
Distance from Upstream XS =      11
Deck/Roadway Width        =      26
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     170  587.04     575     270  586.19     575     370  588.04     575
     385  588.28     575

Upstream Bridge Cross Section Data
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  589.41      53  589.41     153  587.58     241  586.08     253  585.48
     257  584.53     266  580.79     267   578.6     270  578.47     273  578.61
     274  580.07     285  585.77     385  588.28 464.665  590.28

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     266    .036     274     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           266     274             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     257   586.5       F
     283 464.665   586.5       F

Downstream  Deck/Roadway Coordinates
    num=       3
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     185  587.04     575     285  586.19     575     385  588.04     575

Downstream Bridge Cross Section Data
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  588.51  44.291  588.51 125.197  588.51     218  588.51     235  587.48
     245  586.05     271  584.52     281  580.22     281  578.95   284.5  578.33
     288  579.01     288  580.13     303  585.95     404  589.32 450.558  589.32

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     271    .036     303     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           271     303             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     229     585       F
     341 450.558     585       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
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Culvert #1      Circular       6
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                11      26     .021     .021        0                  .9
      1
Upstream   Elevation =  578.78
           Centerline Station =  270
Downstream Elevation =  578.56
           Centerline Station =  285

CULVERT OUTPUT  Profile #10-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)         49.00    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          6.30
  Q Barrel (cfs)             49.00    Culv Vel DS (ft/s)          5.34
  E.G. US. (ft)             581.87    Culv Inv El Up (ft)       578.78
  W.S. US. (ft)             581.81    Culv Inv El Dn (ft)       578.56
  E.G. DS (ft)              580.88    Culv Frctn Ls (ft)          0.15
  W.S. DS (ft)              580.72    Culv Exit Loss (ft)         0.28
  Delta EG (ft)               0.98    Culv Entr Loss (ft)         0.55
  Delta WS (ft)               1.09    Q Weir (cfs)
  E.G. IC (ft)              581.41    Weir Sta Lft (ft)
  E.G. OC (ft)              581.87    Weir Sta Rgt (ft)
  Culvert Control           Outlet    Weir Submerg
  Culv WS Inlet (ft)        580.70    Weir Max Depth (ft)
  Culv WS Outlet (ft)       580.72    Weir Avg Depth (ft)
  Culv Nml Depth (ft)         1.83    Weir Flow Area (sq ft)
  Culv Crt Depth (ft)         1.86    Min El Weir Flow (ft)     586.20


CULVERT OUTPUT  Profile #50-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)         90.00    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          7.05
  Q Barrel (cfs)             90.00    Culv Vel DS (ft/s)          6.42
  E.G. US. (ft)             583.02    Culv Inv El Up (ft)       578.78
  W.S. US. (ft)             582.95    Culv Inv El Dn (ft)       578.56
  E.G. DS (ft)              581.75    Culv Frctn Ls (ft)          0.14
  W.S. DS (ft)              581.54    Culv Exit Loss (ft)         0.43
  Delta EG (ft)               1.27    Culv Entr Loss (ft)         0.69
  Delta WS (ft)               1.40    Q Weir (cfs)
  E.G. IC (ft)              582.57    Weir Sta Lft (ft)
  E.G. OC (ft)              583.02    Weir Sta Rgt (ft)
  Culvert Control           Outlet    Weir Submerg
  Culv WS Inlet (ft)        581.55    Weir Max Depth (ft)
  Culv WS Outlet (ft)       581.54    Weir Avg Depth (ft)
  Culv Nml Depth (ft)         2.54    Weir Flow Area (sq ft)
  Culv Crt Depth (ft)         2.55    Min El Weir Flow (ft)     586.20


CULVERT OUTPUT  Profile #100-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)        112.00    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          7.55
  Q Barrel (cfs)            112.00    Culv Vel DS (ft/s)          7.02
  E.G. US. (ft)             583.58    Culv Inv El Up (ft)       578.78
  W.S. US. (ft)             583.50    Culv Inv El Dn (ft)       578.56
  E.G. DS (ft)              582.09    Culv Frctn Ls (ft)          0.15
  W.S. DS (ft)              581.86    Culv Exit Loss (ft)         0.54
  Delta EG (ft)               1.49    Culv Entr Loss (ft)         0.80
```

Delta WS (ft)	1.64	Q Weir (cfs)	
E.G. IC (ft)	583.14	Weir Sta Lft (ft)	
E.G. OC (ft)	583.58	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	581.90	Weir Max Depth (ft)	
Culv WS Outlet (ft)	581.86	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.87	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.85	Min El Weir Flow (ft)	586.20

CULVERT OUTPUT Profile #500-Year Culv Group: Culvert #1

Q Culv Group (cfs)	175.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	8.59
Q Barrel (cfs)	175.00	Culv Vel DS (ft/s)	8.33
E.G. US. (ft)	585.02	Culv Inv El Up (ft)	578.78
W.S. US. (ft)	584.95	Culv Inv El Dn (ft)	578.56
E.G. DS (ft)	582.98	Culv Frctn Ls (ft)	0.17
W.S. DS (ft)	582.74	Culv Exit Loss (ft)	0.84
Delta EG (ft)	2.04	Culv Entr Loss (ft)	1.03
Delta WS (ft)	2.21	Q Weir (cfs)	
E.G. IC (ft)	584.69	Weir Sta Lft (ft)	
E.G. OC (ft)	585.02	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	582.84	Weir Max Depth (ft)	
Culv WS Outlet (ft)	582.74	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.79	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	3.61	Min El Weir Flow (ft)	586.20

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 706.9435

INPUT
Description: D/S BR7
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	588.51	44.291	588.51	125.197	588.51	218	588.51	235	587.48
245	586.05	271	584.52	281	580.22	281	578.95	284.5	578.33
288	579.01	288	580.13	303	585.95	404	589.32	450.558	589.32

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	271	.036	303	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
271	303	72.04	89.7	107.32	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	229	585	F
341	450.558	585	F

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	580.88	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.16	Wt. n-Val.		0.036
W.S. Elev (ft)	580.72	Reach Len. (ft)	72.04	89.70

107.32

Crit W.S. (ft)	579.80	Flow Area (sq ft)		15.22
E.G. Slope (ft/ft)	0.004643	Area (sq ft)		15.22
Q Total (cfs)	49.00	Flow (cfs)		49.00
Top Width (ft)	9.69	Top Width (ft)		9.69
Vel Total (ft/s)	3.22	Avg. Vel. (ft/s)		3.22
Max Chl Dpth (ft)	2.39	Hydr. Depth (ft)		1.57
Conv. Total (cfs)	719.1	Conv. (cfs)		719.1
Length Wtd. (ft)	89.70	Wetted Per. (ft)		12.42
Min Ch El (ft)	578.33	Shear (lb/sq ft)		0.36
Alpha	1.00	Stream Power (lb/ft s)	450.56	0.00
0.00				
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)		0.24
C & E Loss (ft)	0.05	Cum SA (acres)		0.21

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	581.75	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.20	Wt. n-Val.		0.036
W.S. Elev (ft)	581.54	Reach Len. (ft)	72.04	89.70
107.32				
Crit W.S. (ft)	580.46	Flow Area (sq ft)		24.81
E.G. Slope (ft/ft)	0.004579	Area (sq ft)		24.81
Q Total (cfs)	90.00	Flow (cfs)		90.00
Top Width (ft)	13.71	Top Width (ft)		13.71
Vel Total (ft/s)	3.63	Avg. Vel. (ft/s)		3.63
Max Chl Dpth (ft)	3.21	Hydr. Depth (ft)		1.81
Conv. Total (cfs)	1330.0	Conv. (cfs)		1330.0
Length Wtd. (ft)	89.70	Wetted Per. (ft)		16.76
Min Ch El (ft)	578.33	Shear (lb/sq ft)		0.42
Alpha	1.00	Stream Power (lb/ft s)	450.56	0.00
0.00				

Frctn Loss (ft)	0.58	Cum Volume (acre-ft)	0.36
C & E Loss (ft)	0.05	Cum SA (acres)	0.26

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	582.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.036	
W.S. Elev (ft)	581.86	Reach Len. (ft)	72.04	89.70	107.32
Crit W.S. (ft)	580.77	Flow Area (sq ft)		29.49	
E.G. Slope (ft/ft)	0.004535	Area (sq ft)		29.49	
Q Total (cfs)	112.00	Flow (cfs)		112.00	
Top Width (ft)	15.30	Top Width (ft)		15.30	
Vel Total (ft/s)	3.80	Avg. Vel. (ft/s)		3.80	
Max Chl Dpth (ft)	3.53	Hydr. Depth (ft)		1.93	
Conv. Total (cfs)	1663.1	Conv. (cfs)		1663.1	
Length Wtd. (ft)	89.70	Wetted Per. (ft)		18.47	
Min Ch El (ft)	578.33	Shear (lb/sq ft)		0.45	
Alpha	1.00	Stream Power (lb/ft s)	450.56	0.00	0.00
Frctn Loss (ft)	0.53	Cum Volume (acre-ft)		0.42	
C & E Loss (ft)	0.04	Cum SA (acres)		0.28	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	582.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.036	
W.S. Elev (ft)	582.74	Reach Len. (ft)	72.04	89.70	107.32
Crit W.S. (ft)	581.43	Flow Area (sq ft)		44.71	

E.G. Slope (ft/ft)	0.003727	Area (sq ft)	44.71
Q Total (cfs)	175.00	Flow (cfs)	175.00
Top Width (ft)	19.57	Top Width (ft)	19.57
Vel Total (ft/s)	3.91	Avg. Vel. (ft/s)	3.91
Max Chl Dpth (ft)	4.41	Hydr. Depth (ft)	2.28
Conv. Total (cfs)	2866.6	Conv. (cfs)	2866.6
Length Wtd. (ft)	89.70	Wetted Per. (ft)	23.09
Min Ch El (ft)	578.33	Shear (lb/sq ft)	0.45
Alpha	1.00	Stream Power (lb/ft s) 450.56	0.00
0.00			
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	0.58
C & E Loss (ft)	0.01	Cum SA (acres)	0.33

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 617.2497

INPUT
Description: Surveyed Section 13
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	588.23	43.471	588.23	213.747	588.23	231	588.23	248	587.2
258	585.77	284	584.24	294	579.94	294	578.67	297.5	578.05
301	578.73	301	579.85	316	585.67	413.419	589.04		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	284	.036	316	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
284	316	82.47	104.46	126.3	.3	.5

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	580.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.		0.036	
W.S. Elev (ft)	579.91	Reach Len. (ft)	82.47	104.46	126.30
Crit W.S. (ft)		Flow Area (sq ft)		10.72	
E.G. Slope (ft/ft)	0.010634	Area (sq ft)		10.72	
Q Total (cfs)	49.00	Flow (cfs)		49.00	

Top Width (ft)	7.14	Top Width (ft)		7.14
Vel Total (ft/s)	4.57	Avg. Vel. (ft/s)		4.57
Max Chl Dpth (ft)	1.86	Hydr. Depth (ft)		1.50
Conv. Total (cfs)	475.2	Conv. (cfs)		475.2
Length Wtd. (ft)	104.46	Wetted Per. (ft)		9.63
Min Ch El (ft)	578.05	Shear (lb/sq ft)		0.74
Alpha	1.00	Stream Power (lb/ft s)	413.42	0.00
0.00				
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)		0.21
C & E Loss (ft)	0.12	Cum SA (acres)		0.19

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	581.11	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.38	Wt. n-Val.		0.036
W.S. Elev (ft)	580.74	Reach Len. (ft)	82.47	104.46
126.30				
Crit W.S. (ft)		Flow Area (sq ft)		18.30
E.G. Slope (ft/ft)	0.009919	Area (sq ft)		18.30
Q Total (cfs)	90.00	Flow (cfs)		90.00
Top Width (ft)	11.15	Top Width (ft)		11.15
Vel Total (ft/s)	4.92	Avg. Vel. (ft/s)		4.92
Max Chl Dpth (ft)	2.69	Hydr. Depth (ft)		1.64
Conv. Total (cfs)	903.7	Conv. (cfs)		903.7
Length Wtd. (ft)	104.46	Wetted Per. (ft)		13.99
Min Ch El (ft)	578.05	Shear (lb/sq ft)		0.81
Alpha	1.00	Stream Power (lb/ft s)	413.42	0.00
0.00				
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)		0.31
C & E Loss (ft)	0.15	Cum SA (acres)		0.23

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	581.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.		0.036	
W.S. Elev (ft)	581.16	Reach Len. (ft)	82.47	104.46	126.30
Crit W.S. (ft)		Flow Area (sq ft)		23.45	
E.G. Slope (ft/ft)	0.008192	Area (sq ft)		23.45	
Q Total (cfs)	112.00	Flow (cfs)		112.00	
Top Width (ft)	13.22	Top Width (ft)		13.22	
Vel Total (ft/s)	4.78	Avg. Vel. (ft/s)		4.78	
Max Chl Dpth (ft)	3.11	Hydr. Depth (ft)		1.77	
Conv. Total (cfs)	1237.5	Conv. (cfs)		1237.5	
Length Wtd. (ft)	104.46	Wetted Per. (ft)		16.23	
Min Ch El (ft)	578.05	Shear (lb/sq ft)		0.74	
Alpha	1.00	Stream Power (lb/ft s)	413.42	0.00	0.00
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)		0.36	
C & E Loss (ft)	0.13	Cum SA (acres)		0.25	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	582.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.		0.036	
W.S. Elev (ft)	582.35	Reach Len. (ft)	82.47	104.46	126.30
Crit W.S. (ft)		Flow Area (sq ft)		42.67	
E.G. Slope (ft/ft)	0.004213	Area (sq ft)		42.67	
Q Total (cfs)	175.00	Flow (cfs)		175.00	
Top Width (ft)	19.06	Top Width (ft)		19.06	
Vel Total (ft/s)	4.10	Avg. Vel. (ft/s)		4.10	
Max Chl Dpth (ft)	4.30	Hydr. Depth (ft)		2.24	

Conv. Total (cfs)	2696.2	Conv. (cfs)			2696.2
Length Wtd. (ft)	104.46	Wetted Per. (ft)			22.53
Min Ch El (ft)	578.05	Shear (lb/sq ft)			0.50
Alpha	1.00	Stream Power (lb/ft s)	413.42		0.00
0.00					
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)			0.49
C & E Loss (ft)	0.09	Cum SA (acres)			0.29

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 512.8022

INPUT
Description: U/S BR8
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	587.93	47.014	587.93	209	587.93	226	586.9	236	585.47
262	583.94	270	577.9	280	577.9	289.9	583	294	585.37
395	588.74	422.769	588.74						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	262	.036	289.9	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
262	289.9	413.1	411.12	410.13	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	260	586	F
290	422.769	586	F

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	579.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.036	
W.S. Elev (ft)	579.63	Reach Len. (ft)	413.10	411.12	410.13
Crit W.S. (ft)	578.76	Flow Area (sq ft)		22.20	
E.G. Slope (ft/ft)	0.001949	Area (sq ft)		22.20	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	15.65	Top Width (ft)		15.65	
Vel Total (ft/s)	2.21	Avg. Vel. (ft/s)		2.21	

Max Chl Dpth (ft)	1.73	Hydr. Depth (ft)		1.42
Conv. Total (cfs)	1109.8	Conv. (cfs)		1109.8
Length Wtd. (ft)	411.12	Wetted Per. (ft)		16.65
Min Ch El (ft)	577.90	Shear (lb/sq ft)		0.16
Alpha	1.00	Stream Power (lb/ft s)	422.77	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)		0.17
C & E Loss (ft)		Cum SA (acres)		0.17

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	580.66	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.08	Wt. n-Val.		0.036
W.S. Elev (ft)	580.58	Reach Len. (ft)	413.10	411.12
410.13				
Crit W.S. (ft)	579.15	Flow Area (sq ft)		38.52
E.G. Slope (ft/ft)	0.001364	Area (sq ft)		38.52
Q Total (cfs)	90.00	Flow (cfs)		90.00
Top Width (ft)	18.75	Top Width (ft)		18.75
Vel Total (ft/s)	2.34	Avg. Vel. (ft/s)		2.34
Max Chl Dpth (ft)	2.68	Hydr. Depth (ft)		2.05
Conv. Total (cfs)	2437.1	Conv. (cfs)		2437.1
Length Wtd. (ft)	411.12	Wetted Per. (ft)		20.30
Min Ch El (ft)	577.90	Shear (lb/sq ft)		0.16
Alpha	1.00	Stream Power (lb/ft s)	422.77	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)		0.24
C & E Loss (ft)		Cum SA (acres)		0.20

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	581.12	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.09	Wt. n-Val.		0.036
W.S. Elev (ft)	581.04	Reach Len. (ft)	413.10	411.12
410.13				
Crit W.S. (ft)	579.35	Flow Area (sq ft)		47.41
E.G. Slope (ft/ft)	0.001180	Area (sq ft)		47.41
Q Total (cfs)	112.00	Flow (cfs)		112.00
Top Width (ft)	20.24	Top Width (ft)		20.24
Vel Total (ft/s)	2.36	Avg. Vel. (ft/s)		2.36
Max Chl Dpth (ft)	3.14	Hydr. Depth (ft)		2.34
Conv. Total (cfs)	3260.0	Conv. (cfs)		3260.0
Length Wtd. (ft)	411.12	Wetted Per. (ft)		22.05
Min Ch El (ft)	577.90	Shear (lb/sq ft)		0.16
Alpha	1.00	Stream Power (lb/ft s)	422.77	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)		0.28
C & E Loss (ft)		Cum SA (acres)		0.21

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	582.36	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.08	Wt. n-Val.		0.036
W.S. Elev (ft)	582.28	Reach Len. (ft)	413.10	411.12
410.13				
Crit W.S. (ft)	579.80	Flow Area (sq ft)		75.05
E.G. Slope (ft/ft)	0.000809	Area (sq ft)		75.05
Q Total (cfs)	175.00	Flow (cfs)		175.00
Top Width (ft)	24.29	Top Width (ft)		24.29
Vel Total (ft/s)	2.33	Avg. Vel. (ft/s)		2.33
Max Chl Dpth (ft)	4.38	Hydr. Depth (ft)		3.09
Conv. Total (cfs)	6151.4	Conv. (cfs)		6151.4
Length Wtd. (ft)	411.12	Wetted Per. (ft)		26.82
Min Ch El (ft)	577.90	Shear (lb/sq ft)		0.14

Alpha	1.00	Stream Power (lb/ft s)	422.77	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)		0.35
C & E Loss (ft)		Cum SA (acres)		0.24

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CULVERT

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 510

INPUT
Description: Taxiway
Distance from Upstream XS = 11
Deck/Roadway Width = 390
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 5

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	588.56	570	175	588.56	570	275	588.27	570
375	588.79	570	430	588.79	570			

Upstream Bridge Cross Section Data
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	587.93	47.014	587.93	209	587.93	226	586.9	236	585.47
262	583.94	270	577.9	280	577.9	289.9	583	294	585.37
395	588.74	422.769	588.74						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	262	.036	289.9	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
262	289.9	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	260	586	F
290	422.769	586	F

Downstream Deck/Roadway Coordinates
num= 3

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-30	588.56	570	70	588.27	570	170	588.79	570

Downstream Bridge Cross Section Data
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	588.34	29	586.28	50	585.41	58	580.93	65	576.97
75	576.97	84	580.93	97	586.48	152.198	587.3		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	58	.036	84	.04

Bank Sta: Left Right Coeff Contr. Expan.

```
            58      84             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      55     586       F
      85 152.198     586       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1   Semi-Circle       5
FHWA Chart # 41- Arch; Corrugated metal
FHWA Scale # 2 - Mitered to slope
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 11     390     .021     .021        0                   .7
      1
Upstream   Elevation =  577.9
           Centerline Station =  275
Downstream Elevation =  576.97
           Centerline Station =  70

CULVERT OUTPUT  Profile #10-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)         49.00    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          3.26
  Q Barrel (cfs)             49.00    Culv Vel DS (ft/s)          2.46
  E.G. US. (ft)             579.71    Culv Inv El Up (ft)       577.90
  W.S. US. (ft)             579.63    Culv Inv El Dn (ft)       576.97
  E.G. DS (ft)              579.06    Culv Frctn Ls (ft)          0.48
  W.S. DS (ft)              579.02    Culv Exit Loss (ft)         0.05
  Delta EG (ft)               0.65    Culv Entr Loss (ft)         0.12
  Delta WS (ft)               0.61    Q Weir (cfs)
  E.G. IC (ft)              579.36    Weir Sta Lft (ft)
  E.G. OC (ft)              579.71    Weir Sta Rgt (ft)
  Culvert Control           Outlet    Weir Submerg
  Culv WS Inlet (ft)        579.43    Weir Max Depth (ft)
  Culv WS Outlet (ft)       579.02    Weir Avg Depth (ft)
  Culv Nml Depth (ft)         1.38    Weir Flow Area (sq ft)
  Culv Crt Depth (ft)         0.91    Min El Weir Flow (ft)     588.28


CULVERT OUTPUT  Profile #50-Year  Culv Group:  Culvert #1

  Q Culv Group (cfs)         90.00    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          3.99
  Q Barrel (cfs)             90.00    Culv Vel DS (ft/s)          3.47
  E.G. US. (ft)             580.67    Culv Inv El Up (ft)       577.90
  W.S. US. (ft)             580.58    Culv Inv El Dn (ft)       576.97
  E.G. DS (ft)              579.78    Culv Frctn Ls (ft)          0.60
  W.S. DS (ft)              579.71    Culv Exit Loss (ft)         0.12
  Delta EG (ft)               0.89    Culv Entr Loss (ft)         0.17
  Delta WS (ft)               0.87    Q Weir (cfs)
  E.G. IC (ft)              580.12    Weir Sta Lft (ft)
  E.G. OC (ft)              580.67    Weir Sta Rgt (ft)
```

Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	580.25	Weir Max Depth (ft)	
Culv WS Outlet (ft)	579.71	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.12	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.36	Min El Weir Flow (ft)	588.28

CULVERT OUTPUT Profile #100-Year Culv Group: Culvert #1

Q Culv Group (cfs)	112.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	4.33
Q Barrel (cfs)	112.00	Culv Vel DS (ft/s)	3.95
E.G. US. (ft)	581.12	Culv Inv El Up (ft)	577.90
W.S. US. (ft)	581.04	Culv Inv El Dn (ft)	576.97
E.G. DS (ft)	580.08	Culv Frctn Ls (ft)	0.68
W.S. DS (ft)	580.00	Culv Exit Loss (ft)	0.16
Delta EG (ft)	1.04	Culv Entr Loss (ft)	0.20
Delta WS (ft)	1.03	Q Weir (cfs)	
E.G. IC (ft)	580.49	Weir Sta Lft (ft)	
E.G. OC (ft)	581.12	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	580.63	Weir Max Depth (ft)	
Culv WS Outlet (ft)	580.00	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.50	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.57	Min El Weir Flow (ft)	588.28

CULVERT OUTPUT Profile #500-Year Culv Group: Culvert #1

Q Culv Group (cfs)	175.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.21
Q Barrel (cfs)	175.00	Culv Vel DS (ft/s)	5.25
E.G. US. (ft)	582.36	Culv Inv El Up (ft)	577.90
W.S. US. (ft)	582.28	Culv Inv El Dn (ft)	576.97
E.G. DS (ft)	580.79	Culv Frctn Ls (ft)	0.96
W.S. DS (ft)	580.68	Culv Exit Loss (ft)	0.32
Delta EG (ft)	1.57	Culv Entr Loss (ft)	0.30
Delta WS (ft)	1.60	Q Weir (cfs)	
E.G. IC (ft)	581.45	Weir Sta Lft (ft)	
E.G. OC (ft)	582.36	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	581.65	Weir Max Depth (ft)	
Culv WS Outlet (ft)	580.68	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.81	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.12	Min El Weir Flow (ft)	588.28

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 101.6786

INPUT
Description: D/S BR8
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	588.34	29	586.28	50	585.41	58	580.93	65	576.97
75	576.97	84	580.93	97	586.48	152.198	587.3		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	58	.036	84	.04

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            58      84            24.31    16.4   10.56             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      55     586       F
      85 152.198     586       F

CROSS SECTION OUTPUT  Profile #10-Year


  E.G. Elev (ft)            579.06    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.04    Wt. n-Val.                            0.036

  W.S. Elev (ft)            579.02    Reach Len. (ft)            24.31      16.40
  10.56
  Crit W.S. (ft)            577.83    Flow Area (sq ft)                     28.94

  E.G. Slope (ft/ft)      0.000976    Area (sq ft)                          28.94

  Q Total (cfs)              49.00    Flow (cfs)                            49.00

  Top Width (ft)             18.27    Top Width (ft)                        18.27

  Vel Total (ft/s)            1.69    Avg. Vel. (ft/s)                       1.69

  Max Chl Dpth (ft)           2.05    Hydr. Depth (ft)                       1.58

  Conv. Total (cfs)         1568.4    Conv. (cfs)                          1568.4

  Length Wtd. (ft)           16.40    Wetted Per. (ft)                      19.24

  Min Ch El (ft)            576.97    Shear (lb/sq ft)                       0.09

  Alpha                       1.00    Stream Power (lb/ft s)    152.20       0.00
   0.00
  Frctn Loss (ft)             0.03    Cum Volume (acre-ft)                   0.01

  C & E Loss (ft)             0.02    Cum SA (acres)                         0.01



Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #50-Year


  E.G. Elev (ft)            579.78    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.07    Wt. n-Val.                            0.036

  W.S. Elev (ft)            579.71    Reach Len. (ft)            24.31      16.40
  10.56
  Crit W.S. (ft)            578.21    Flow Area (sq ft)                     42.59

  E.G. Slope (ft/ft)      0.001111    Area (sq ft)                          42.59
```

Q Total (cfs)	90.00	Flow (cfs)		90.00
Top Width (ft)	21.07	Top Width (ft)		21.07
Vel Total (ft/s)	2.11	Avg. Vel. (ft/s)		2.11
Max Chl Dpth (ft)	2.74	Hydr. Depth (ft)		2.02
Conv. Total (cfs)	2700.0	Conv. (cfs)		2700.0
Length Wtd. (ft)	16.40	Wetted Per. (ft)		22.37
Min Ch El (ft)	576.97	Shear (lb/sq ft)		0.13
Alpha	1.00	Stream Power (lb/ft s)	152.20	0.00
0.00				
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		0.01
C & E Loss (ft)	0.02	Cum SA (acres)		0.01

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	580.08	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.08	Wt. n-Val.		0.036
W.S. Elev (ft)	580.00	Reach Len. (ft)	24.31	16.40
10.56				
Crit W.S. (ft)	578.39	Flow Area (sq ft)		48.91
E.G. Slope (ft/ft)	0.001171	Area (sq ft)		48.91
Q Total (cfs)	112.00	Flow (cfs)		112.00
Top Width (ft)	22.25	Top Width (ft)		22.25
Vel Total (ft/s)	2.29	Avg. Vel. (ft/s)		2.29
Max Chl Dpth (ft)	3.03	Hydr. Depth (ft)		2.20
Conv. Total (cfs)	3272.9	Conv. (cfs)		3272.9
Length Wtd. (ft)	16.40	Wetted Per. (ft)		23.69
Min Ch El (ft)	576.97	Shear (lb/sq ft)		0.15
Alpha	1.00	Stream Power (lb/ft s)	152.20	0.00
0.00				
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		0.02
C & E Loss (ft)	0.02	Cum SA (acres)		0.01

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	580.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.036	
W.S. Elev (ft)	580.68	Reach Len. (ft)	24.31	16.40	10.56
Crit W.S. (ft)	578.83	Flow Area (sq ft)		64.87	
E.G. Slope (ft/ft)	0.001310	Area (sq ft)		64.87	
Q Total (cfs)	175.00	Flow (cfs)		175.00	
Top Width (ft)	24.98	Top Width (ft)		24.98	
Vel Total (ft/s)	2.70	Avg. Vel. (ft/s)		2.70	
Max Chl Dpth (ft)	3.71	Hydr. Depth (ft)		2.60	
Conv. Total (cfs)	4834.2	Conv. (cfs)		4834.2	
Length Wtd. (ft)	16.40	Wetted Per. (ft)		26.74	
Min Ch El (ft)	576.97	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)	152.20	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		0.02	
C & E Loss (ft)	0.03	Cum SA (acres)		0.01	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Trib to Cayuga
REACH: Reach 1 RS: 85.2877

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	587.87	27	586.23	48	585.36	66	577.18	68	576.5
72	577.37	82	580.88	95	586.43	148.95	586.83		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	48	.036	95	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48	95	10.34	85.27	11.48	.1	.3

CROSS SECTION OUTPUT Profile #10-Year

E.G. Elev (ft)	579.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.036	
W.S. Elev (ft)	578.91	Reach Len. (ft)			
Crit W.S. (ft)	578.12	Flow Area (sq ft)		18.73	
E.G. Slope (ft/ft)	0.003001	Area (sq ft)		18.73	
Q Total (cfs)	49.00	Flow (cfs)		49.00	
Top Width (ft)	14.20	Top Width (ft)		14.20	
Vel Total (ft/s)	2.62	Avg. Vel. (ft/s)		2.62	
Max Chl Dpth (ft)	2.41	Hydr. Depth (ft)		1.32	
Conv. Total (cfs)	894.5	Conv. (cfs)		894.5	
Length Wtd. (ft)		Wetted Per. (ft)		15.04	
Min Ch El (ft)	576.50	Shear (lb/sq ft)		0.23	
Alpha	1.00	Stream Power (lb/ft s)	148.95	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #50-Year

E.G. Elev (ft)	579.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.036	
W.S. Elev (ft)	579.58	Reach Len. (ft)			
Crit W.S. (ft)	578.60	Flow Area (sq ft)		29.43	
E.G. Slope (ft/ft)	0.003000	Area (sq ft)		29.43	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	17.60	Top Width (ft)		17.60	
Vel Total (ft/s)	3.06	Avg. Vel. (ft/s)		3.06	
Max Chl Dpth (ft)	3.08	Hydr. Depth (ft)		1.67	

Conv. Total (cfs)	1643.1	Conv. (cfs)		1643.1
Length Wtd. (ft)		Wetted Per. (ft)		18.70
Min Ch El (ft)	576.50	Shear (lb/sq ft)		0.29
Alpha	1.00	Stream Power (lb/ft s)	148.95	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)		
C & E Loss (ft)		Cum SA (acres)		

CROSS SECTION OUTPUT Profile #100-Year

E.G. Elev (ft)	580.03	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.16	Wt. n-Val.		0.036
W.S. Elev (ft)	579.87	Reach Len. (ft)		
Crit W.S. (ft)	578.81	Flow Area (sq ft)		34.63
E.G. Slope (ft/ft)	0.003002	Area (sq ft)		34.63
Q Total (cfs)	112.00	Flow (cfs)		112.00
Top Width (ft)	19.03	Top Width (ft)		19.03
Vel Total (ft/s)	3.23	Avg. Vel. (ft/s)		3.23
Max Chl Dpth (ft)	3.37	Hydr. Depth (ft)		1.82
Conv. Total (cfs)	2044.3	Conv. (cfs)		2044.3
Length Wtd. (ft)		Wetted Per. (ft)		20.25
Min Ch El (ft)	576.50	Shear (lb/sq ft)		0.32
Alpha	1.00	Stream Power (lb/ft s)	148.95	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)		
C & E Loss (ft)		Cum SA (acres)		

CROSS SECTION OUTPUT Profile #500-Year

E.G. Elev (ft)	580.73	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.20	Wt. n-Val.		0.036
W.S. Elev (ft)	580.53	Reach Len. (ft)		
Crit W.S. (ft)	579.30	Flow Area (sq ft)		48.31

E.G. Slope (ft/ft)	0.003003	Area (sq ft)		48.31
Q Total (cfs)	175.00	Flow (cfs)		175.00
Top Width (ft)	22.37	Top Width (ft)		22.37
Vel Total (ft/s)	3.62	Avg. Vel. (ft/s)		3.62
Max Chl Dpth (ft)	4.03	Hydr. Depth (ft)		2.16
Conv. Total (cfs)	3193.7	Conv. (cfs)		3193.7
Length Wtd. (ft)		Wetted Per. (ft)		23.84
Min Ch El (ft)	576.50	Shear (lb/sq ft)		0.38
Alpha	1.00	Stream Power (lb/ft s)	148.95	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)		
C & E Loss (ft)		Cum SA (acres)		

SUMMARY OF MANNING'S N VALUES

River:Trib to Cayuga

Reach	River Sta.	n1	n2	n3
Reach 1	4572.864	.04	.038	.04
Reach 1	4423.391	.04	.038	.04
Reach 1	4410	Culvert		
Reach 1	4334.465	.04	.038	.04
Reach 1	4237.225	.04	.038	.04
Reach 1	3845.845	.04	.037	.04
Reach 1	3752.562	.04	.037	.04
Reach 1	3742	Culvert		
Reach 1	3672.534	.04	.037	.04
Reach 1	3585.583	.04	.037	.04
Reach 1	3126.746	.04	.036	.04
Reach 1	2552.012	.04	.036	.04
Reach 1	1830.000	.04	.036	.04
Reach 1	1741.222	.04	.036	.04
Reach 1	1731	Culvert		
Reach 1	1700.815	.04	.036	.04
Reach 1	1674.005	.04	.036	.04
Reach 1	1653	Culvert		
Reach 1	1588.307	.04	.036	.04
Reach 1	1515.168	.04	.036	.04
Reach 1	1398.047	.04	.036	.04
Reach 1	1387	Culvert		
Reach 1	1349.409	.04	.036	.04
Reach 1	1255.663	.04	.036	.04
Reach 1	1137.230	.04	.036	.04
Reach 1	1126	Culvert		
Reach 1	1089.117	.04	.036	.04
Reach 1	1036.844	.04	.036	.04
Reach 1	797.4444	.04	.036	.04
Reach 1	754.8596	.04	.036	.04

Reach 1	745	Culvert		
Reach 1	706.9435	.04	.036	.04
Reach 1	617.2497	.04	.036	.04
Reach 1	512.8022	.04	.036	.04
Reach 1	510	Culvert		
Reach 1	101.6786	.04	.036	.04
Reach 1	85.2877	.04	.036	.04

SUMMARY OF REACH LENGTHS

River: Trib to Cayuga

Reach	River Sta.	Left	Channel	Right
Reach 1	4572.864	158.31	149.49	144.36
Reach 1	4423.391	91.4	88.92	88.18
Reach 1	4410	Culvert		
Reach 1	4334.465	77.26	97.24	116.66
Reach 1	4237.225	322.8	391.36	453.6
Reach 1	3845.845	94.88	93.28	91.7
Reach 1	3752.562	81.5	80.02	78.58
Reach 1	3742	Culvert		
Reach 1	3672.534	88.56	86.94	85.36
Reach 1	3585.583	496.3	458.8	421.4
Reach 1	3126.746	577.68	574.8	571.32
Reach 1	2552.012	751.8	721.8	681.6
Reach 1	1830.000	89	88.78	88.56
Reach 1	1741.222	39.73	40.42	42.52
Reach 1	1731	Culvert		
Reach 1	1700.815	30.61	26.8	32.19
Reach 1	1674.005	97.3	85.7	98.1
Reach 1	1653	Culvert		
Reach 1	1588.307	76.88	73.12	80.88
Reach 1	1515.168	115.08	117.12	119.04
Reach 1	1398.047	48.65	48.62	48.56
Reach 1	1387	Culvert		
Reach 1	1349.409	70.96	93.74	116.18
Reach 1	1255.663	148.89	118.41	87.69
Reach 1	1137.230	50.2	48.13	46.46
Reach 1	1126	Culvert		
Reach 1	1089.117	60.1	52.26	51.24
Reach 1	1036.844	247.65	239.4	228.3
Reach 1	797.4444	46.26	42.58	39.83
Reach 1	754.8596	44.98	47.9	50.85
Reach 1	745	Culvert		
Reach 1	706.9435	72.04	89.7	107.32
Reach 1	617.2497	82.47	104.46	126.3
Reach 1	512.8022	413.1	411.12	410.13
Reach 1	510	Culvert		
Reach 1	101.6786	24.31	16.4	10.56
Reach 1	85.2877	10.34	85.27	11.48

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Trib to Cayuga

Reach	River Sta.	Contr.	Expan.

Reach 1	4572.864		.3	.5
Reach 1	4423.391		.3	.5
Reach 1	4410	Culvert		
Reach 1	4334.465		.3	.5
Reach 1	4237.225		.1	.3
Reach 1	3845.845		.3	.5
Reach 1	3752.562		.3	.5
Reach 1	3742	Culvert		
Reach 1	3672.534		.3	.5
Reach 1	3585.583		.1	.3
Reach 1	3126.746		.1	.3
Reach 1	2552.012		.1	.3
Reach 1	1830.000		.3	.5
Reach 1	1741.222		.3	.5
Reach 1	1731	Culvert		
Reach 1	1700.815		.3	.5
Reach 1	1674.005		.3	.5
Reach 1	1653	Culvert		
Reach 1	1588.307		.3	.5
Reach 1	1515.168		.3	.5
Reach 1	1398.047		.3	.5
Reach 1	1387	Culvert		
Reach 1	1349.409		.3	.5
Reach 1	1255.663		.3	.5
Reach 1	1137.230		.3	.5
Reach 1	1126	Culvert		
Reach 1	1089.117		.3	.5
Reach 1	1036.844		.1	.3
Reach 1	797.4444		.3	.5
Reach 1	754.8596		.3	.5
Reach 1	745	Culvert		
Reach 1	706.9435		.3	.5
Reach 1	617.2497		.3	.5
Reach 1	512.8022		.3	.5
Reach 1	510	Culvert		
Reach 1	101.6786		.3	.5
Reach 1	85.2877		.1	.3

Profile Output Table - Standard Table 1

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/s)	(sq ft)	(ft)	
Reach 1	4572.864 XS "J"	10-Year	17.00	595.58	596.90		596.94	0.001976	1.59	10.70	11.76	0.29
Reach 1	4572.864 XS "J"	50-Year	32.00	595.58	597.62		597.66	0.001133	1.58	20.35	15.75	0.24
Reach 1	4572.864 XS "J"	100-Year	39.00	595.58	597.71		597.76	0.001378	1.80	21.85	17.43	0.26
Reach 1	4572.864 XS "J"	500-Year	62.00	595.58								

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597.98                  598.06     0.002021       2.39       27.09       22.34
    0.32


  Reach 1       4423.391                     10-Year      17.00      594.68
596.83      595.40      596.84     0.000250       0.77       22.21       17.82
    0.11
  Reach 1       4423.391                     50-Year      32.00      594.68
597.57      595.66      597.58     0.000219       0.91       37.23       48.55
    0.11
  Reach 1       4423.391                     100-Year     39.00      594.68
597.66      595.76      597.67     0.000258       1.01       49.11      102.17
    0.12
  Reach 1       4423.391                     500-Year     62.00      594.68
597.91      596.04      597.93     0.000330       1.23       80.94      147.53
    0.14


  Reach 1       4410     Culvert 6                      Culvert



  Reach 1       4334.465                     10-Year      17.00      593.92
594.94      594.54      594.99     0.003447       1.76        9.64       14.10
    0.38
  Reach 1       4334.465                     50-Year      32.00      593.92
595.79      594.78      595.82     0.000929       1.30       24.61       21.18
    0.21
  Reach 1       4334.465                     100-Year     39.00      593.92
596.30      594.87      596.32     0.000444       1.07       36.37       25.44
    0.15
  Reach 1       4334.465                     500-Year     62.00      593.92
597.74      595.12      597.75     0.000107       0.81       89.97       74.23
    0.08


  Reach 1       4237.225 XS "I"              10-Year      17.00      593.57
594.66                  594.70     0.002501       1.55       10.99       15.40
    0.32
  Reach 1       4237.225 XS "I"              50-Year      32.00      593.57
595.73                  595.75     0.000451       0.98       32.73       25.17
    0.15
  Reach 1       4237.225 XS "I"              100-Year     39.00      593.57
596.27                  596.28     0.000244       0.82       47.64       30.09
    0.11
  Reach 1       4237.225 XS "I"              500-Year     62.00      593.57
597.73                  597.74     0.000052       0.56      143.31      122.99
    0.06


  Reach 1       3845.845 XS "H"              10-Year      49.00      591.40
594.34                  594.37     0.000634       1.31       37.51       24.23
    0.19
  Reach 1       3845.845 XS "H"              50-Year      90.00      591.40
595.58                  595.60     0.000358       1.22       73.92       34.82
    0.15
  Reach 1       3845.845 XS "H"              100-Year    112.00      591.40
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596.16                  596.18     0.000281       1.17       95.52       39.80
    0.13
  Reach 1       3845.845 XS "H"             500-Year    175.00      591.40
597.67                  597.69     0.000158       1.06      165.81       52.83
    0.10



  Reach 1       3752.562                    10-Year      49.00      591.07
594.31      592.08      594.33     0.000226       1.15       48.87       26.82
    0.12
  Reach 1       3752.562                    50-Year      90.00      591.07
595.56      592.53      595.58     0.000171       1.27       81.12       37.47
    0.11
  Reach 1       3752.562                    100-Year    112.00      591.07
596.13      592.74      596.16     0.000156       1.33       96.18       42.45
    0.11
  Reach 1       3752.562                    500-Year    175.00      591.07
597.65      593.26      597.67     0.000127       1.44      135.51       55.44
    0.10



  Reach 1       3742     Culvert 5                      Culvert



  Reach 1       3672.534                    10-Year      49.00      590.60
592.97      591.63      593.01     0.000816       1.66       30.39       20.01
    0.22
  Reach 1       3672.534                    50-Year      90.00      590.60
593.62      592.05      593.69     0.000923       2.16       45.00       25.27
    0.24
  Reach 1       3672.534                    100-Year    112.00      590.60
593.88      592.24      593.97     0.000984       2.38       51.52       27.37
    0.25
  Reach 1       3672.534                    500-Year    175.00      590.60
594.46      592.71      594.58     0.001140       2.91       66.59       32.06
    0.28



  Reach 1       3585.583 XS "G"             10-Year      49.00      590.47
592.85                  592.91     0.001850       1.91       25.65       21.13
    0.31
  Reach 1       3585.583 XS "G"             50-Year      90.00      590.47
593.51                  593.58     0.001708       2.18       41.36       26.46
    0.31
  Reach 1       3585.583 XS "G"             100-Year    112.00      590.47
593.77                  593.85     0.001713       2.31       48.58       28.58
    0.31
  Reach 1       3585.583 XS "G"             500-Year    175.00      590.47
594.34                  594.45     0.001810       2.64       66.29       33.21
    0.33



  Reach 1       3126.746 XS "F"             10-Year      49.00      589.10
591.68                  591.79     0.003314       2.56       19.11       14.87
    0.40
  Reach 1       3126.746 XS "F"             50-Year      90.00      589.10
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592.12                  592.30     0.005313       3.35       26.90       20.71
    0.52
  Reach 1       3126.746 XS "F"             100-Year    112.00      589.10
592.29                  592.50     0.006130       3.67       30.49       22.90
    0.56
  Reach 1       3126.746 XS "F"             500-Year    175.00      589.10
592.79                  593.04     0.006192       4.00       43.72       29.61
    0.58



  Reach 1       2552.012 XS "E"             10-Year      49.00      587.82
589.48                  589.58     0.004508       2.48       19.76       22.91
    0.47
  Reach 1       2552.012 XS "E"             50-Year      90.00      587.82
590.19                  590.27     0.002446       2.26       39.84       33.67
    0.37
  Reach 1       2552.012 XS "E"             100-Year    112.00      587.82
590.48                  590.55     0.002067       2.23       50.14       38.03
    0.34
  Reach 1       2552.012 XS "E"             500-Year    175.00      587.82
590.94                  591.04     0.002154       2.53       69.21       45.00
    0.36



  Reach 1       1830.000 XS "D"             10-Year      49.00      585.73
588.50                  588.53     0.000687       1.43       34.25       20.63
    0.20
  Reach 1       1830.000 XS "D"             50-Year      90.00      585.73
589.63                  589.66     0.000412       1.41       72.86       77.73
    0.16
  Reach 1       1830.000 XS "D"             100-Year    112.00      585.73
590.12                  590.14     0.000249       1.24      126.60      128.03
    0.13
  Reach 1       1830.000 XS "D"             500-Year    175.00      585.73
590.58                  590.60     0.000260       1.40      192.34      159.94
    0.14



  Reach 1       1741.222                    10-Year      49.00      585.54
588.47      586.55      588.49     0.000331       1.12       43.62       22.82
    0.14
  Reach 1       1741.222                    50-Year      90.00      585.54
589.60      586.96      589.63     0.000241       1.25       72.41       26.00
    0.13
  Reach 1       1741.222                    100-Year    112.00      585.54
590.09      587.14      590.12     0.000217       1.32       95.32      139.26
    0.13
  Reach 1       1741.222                    500-Year    175.00      585.54
590.54      587.60      590.57     0.000261       1.58      164.80      170.59
    0.14



  Reach 1       1731     Culvert 4                      Culvert



  Reach 1       1700.815                    10-Year      49.00      585.45
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587.80      586.84      587.86     0.002086       2.06       23.82       20.14
    0.33
  Reach 1       1700.815                     50-Year      90.00      585.45
588.45      587.35      588.53     0.001907       2.30       39.22       27.53
    0.33
  Reach 1       1700.815                     100-Year    112.00      585.45
588.76      587.54      588.85     0.001584       2.34       49.10       38.09
    0.31
  Reach 1       1700.815                     500-Year    175.00      585.45
589.64      587.97      589.71     0.000797       2.18      100.43       83.26
    0.24



  Reach 1       1674.005                     10-Year      49.00      585.39
587.81      586.04      587.82     0.000248       0.99       49.25       24.74
    0.12
  Reach 1       1674.005                     50-Year      90.00      585.39
588.46      586.35      588.49     0.000352       1.36       66.33       29.13
    0.15
  Reach 1       1674.005                     100-Year    112.00      585.39
588.77      586.49      588.80     0.000365       1.49       76.71       41.09
    0.16
  Reach 1       1674.005                     500-Year    175.00      585.39
589.64      586.86      589.69     0.000331       1.71      108.44       88.19
    0.16



  Reach 1       1653     Wagner Drive                   Culvert



  Reach 1       1588.307                     10-Year      49.00      583.50
584.73      584.16      584.82     0.002905       2.36       20.79       17.82
    0.38
  Reach 1       1588.307                     50-Year      90.00      583.50
585.92      584.48      585.99     0.001053       2.09       43.01       19.58
    0.25
  Reach 1       1588.307                     100-Year    112.00      583.50
586.51      584.64      586.57     0.000793       2.04       54.79       20.45
    0.22
  Reach 1       1588.307                     500-Year    175.00      583.50
587.44      585.01      587.53     0.000786       2.35       74.58       21.83
    0.22



  Reach 1       1515.168 XS "C"              10-Year      49.00      581.90
584.64                  584.69     0.000931       1.76       27.89       15.40
    0.23
  Reach 1       1515.168 XS "C"              50-Year      90.00      581.90
585.87                  585.92     0.000658       1.81       49.69       20.08
    0.20
  Reach 1       1515.168 XS "C"              100-Year    112.00      581.90
586.47                  586.52     0.000552       1.79       62.41       22.35
    0.19
  Reach 1       1515.168 XS "C"              500-Year    175.00      581.90
587.42                  587.47     0.000437       1.91      118.75      115.92
    0.18
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  Reach 1       1398.047                    10-Year      49.00      581.30
584.58      582.52      584.60     0.000442       1.33       36.72       17.45
    0.16
  Reach 1       1398.047                    50-Year      90.00      581.30
585.82      583.03      585.85     0.000373       1.47       61.35       22.17
    0.16
  Reach 1       1398.047                    100-Year    112.00      581.30
586.43      583.25      586.46     0.000305       1.48       76.46       42.04
    0.14
  Reach 1       1398.047                    500-Year    175.00      581.30
587.39      583.76      587.42     0.000245       1.58      177.95      285.35
    0.14


  Reach 1       1387     Culvert 3                      Culvert




  Reach 1       1349.409                    10-Year      49.00      581.05
583.71      582.30      583.80     0.002183       2.34       20.92       12.74
    0.32
  Reach 1       1349.409                    50-Year      90.00      581.05
584.82      582.96      584.91     0.001538       2.34       38.41       18.77
    0.29
  Reach 1       1349.409                    100-Year    112.00      581.05
585.35      583.27      585.43     0.001252       2.28       49.06       21.63
    0.27
  Reach 1       1349.409                    500-Year    175.00      581.05
586.85      583.91      586.89     0.000418       1.74      133.08      104.64
    0.17


  Reach 1       1255.663                    10-Year      49.00      580.57
583.57                  583.63     0.001315       1.92       25.54       14.57
    0.26
  Reach 1       1255.663                    50-Year      90.00      580.57
584.72                  584.78     0.000961       1.96       45.95       20.83
    0.23
  Reach 1       1255.663                    100-Year    112.00      580.57
585.27                  585.33     0.000776       1.92       59.27       34.40
    0.21
  Reach 1       1255.663                    500-Year    175.00      580.57
586.83                  586.85     0.000229       1.40      193.25      181.68
    0.13


  Reach 1       1137.230                    10-Year      49.00      580.28
583.43      581.52      583.48     0.001050       1.76       27.87       15.42
    0.23
  Reach 1       1137.230                    50-Year      90.00      580.28
584.63      582.20      584.68     0.000766       1.80       50.08       21.88
    0.21
  Reach 1       1137.230                    100-Year    112.00      580.28
585.19      582.52      585.24     0.000593       1.75       66.72       46.49
    0.19
  Reach 1       1137.230                    500-Year    175.00      580.28
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586.79 583.14 586.82 0.000235 1.48 130.39 231.48
0.13

Reach 1 1126 Culvert 2 Culvert

Reach 1 1089.117 10-Year 49.00 580.17
582.61 581.95 582.75 0.004213 2.98 16.42 13.05
0.47
Reach 1 1089.117 50-Year 90.00 580.17
583.46 582.47 583.60 0.003017 3.07 29.33 17.40
0.42
Reach 1 1089.117 100-Year 112.00 580.17
583.91 582.68 584.05 0.002371 2.96 37.82 19.74
0.38
Reach 1 1089.117 500-Year 175.00 580.17
585.20 583.18 585.30 0.001242 2.60 67.34 26.32
0.29

Reach 1 1036.844 XS "B" 10-Year 49.00 580.04
582.23 582.44 0.007305 3.67 13.36 11.79
0.61
Reach 1 1036.844 XS "B" 50-Year 90.00 580.04
583.28 583.44 0.003231 3.15 28.59 17.18
0.43
Reach 1 1036.844 XS "B" 100-Year 112.00 580.04
583.79 583.93 0.002347 2.95 37.96 19.78
0.38
Reach 1 1036.844 XS "B" 500-Year 175.00 580.04
585.14 585.24 0.001155 2.53 69.20 26.68
0.28

Reach 1 797.4444 10-Year 49.00 578.60
581.85 581.90 0.000957 1.80 27.17 13.42
0.22
Reach 1 797.4444 50-Year 90.00 578.60
582.99 583.05 0.000867 1.99 45.28 18.36
0.22
Reach 1 797.4444 100-Year 112.00 578.60
583.55 583.61 0.000763 1.99 56.20 20.78
0.21
Reach 1 797.4444 500-Year 175.00 578.60
584.98 585.04 0.000540 1.93 90.61 27.59
0.19

Reach 1 754.8596 10-Year 49.00 578.47
581.81 579.77 581.87 0.000661 1.89 28.45 13.83
0.19
Reach 1 754.8596 50-Year 90.00 578.47
582.95 580.36 583.02 0.000630 2.28 46.88 18.74
0.20
Reach 1 754.8596 100-Year 112.00 578.47

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583.50      580.62      583.58     0.000573       2.37       58.01       21.16
    0.19
  Reach 1       754.8596                    500-Year    175.00      578.47
584.95      581.32      585.02     0.000419       2.42       92.82       28.17
    0.17


  Reach 1       745      Culvert 1                      Culvert


  Reach 1       706.9435                    10-Year      49.00      578.33
580.72      579.80      580.88     0.004643       3.22       15.22        9.69
    0.45
  Reach 1       706.9435                    50-Year      90.00      578.33
581.54      580.46      581.75     0.004579       3.63       24.81       13.71
    0.48
  Reach 1       706.9435                    100-Year    112.00      578.33
581.86      580.77      582.09     0.004535       3.80       29.49       15.30
    0.48
  Reach 1       706.9435                    500-Year    175.00      578.33
582.74      581.43      582.98     0.003727       3.91       44.71       19.57
    0.46


  Reach 1       617.2497 XS "A"             10-Year      49.00      578.05
579.91                  580.23     0.010634       4.57       10.72        7.14
    0.66
  Reach 1       617.2497 XS "A"             50-Year      90.00      578.05
580.74                  581.11     0.009919       4.92       18.30       11.15
    0.68
  Reach 1       617.2497 XS "A"             100-Year    112.00      578.05
581.16                  581.52     0.008192       4.78       23.45       13.22
    0.63
  Reach 1       617.2497 XS "A"             500-Year    175.00      578.05
582.35                  582.61     0.004213       4.10       42.67       19.06
    0.48


  Reach 1       512.8022                    10-Year      49.00      577.90
579.63      578.76      579.71     0.001949       2.21       22.20       15.65
    0.33
  Reach 1       512.8022                    50-Year      90.00      577.90
580.58      579.15      580.66     0.001364       2.34       38.52       18.75
    0.29
  Reach 1       512.8022                    100-Year    112.00      577.90
581.04      579.35      581.12     0.001180       2.36       47.41       20.24
    0.27
  Reach 1       512.8022                    500-Year    175.00      577.90
582.28      579.80      582.36     0.000809       2.33       75.05       24.29
    0.23


  Reach 1       510      Taxiway                        Culvert
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  Reach 1       101.6786                    10-Year      49.00      576.97
579.02      577.83      579.06     0.000976       1.69       28.94       18.27
    0.24
  Reach 1       101.6786                    50-Year      90.00      576.97
579.71      578.21      579.78     0.001111       2.11       42.59       21.07
    0.26
  Reach 1       101.6786                    100-Year    112.00      576.97
580.00      578.39      580.08     0.001171       2.29       48.91       22.25
    0.27
  Reach 1       101.6786                    500-Year    175.00      576.97
580.68      578.83      580.79     0.001310       2.70       64.87       24.98
    0.30



  Reach 1       85.2877                     10-Year      49.00      576.50
578.91      578.12      579.02     0.003001       2.62       18.73       14.20
    0.40
  Reach 1       85.2877                     50-Year      90.00      576.50
579.58      578.60      579.73     0.003000       3.06       29.43       17.60
    0.42
  Reach 1       85.2877                     100-Year    112.00      576.50
579.87      578.81      580.03     0.003002       3.23       34.63       19.03
    0.42
  Reach 1       85.2877                     500-Year    175.00      576.50
580.53      579.30      580.73     0.003003       3.62       48.31       22.37
    0.43
```

cHECk-RAS Report

HEC-RAS Project:	*nfars_ras_trib_2.prj*
Plan File:	*nfars_ras_trib_2.p01*
Geometry File:	*nfars_ras_trib_2.g01*
Flow File:	*nfars_ras_trib_2.f01*
Report Date:	*5/24/2013*

Message ID	Message	Cross sections affected	Comments
BR LF 01	This is ($strucname$). The selected profile is $profilename$. Type of flow is low flow because, 1. EGEL 3 of $egel3$ is less than or equal to MinTopRd of $minelweirflow$. 2. EGEL 3 of $egel3$ is less than MxLoCdU of $mxlocdu$.	510(Culvert-UP); 745(Culvert-UP); 1126(Culvert-UP); 1387(Culvert-UP); 1653(Culvert-UP); 1731(Culvert-UP); 3742(Culvert-UP); 4410(Culvert-UP)	
BR PF 01	This is a Bridge Section. The selected profile is $profilename$. Type of flow is sluice gate pressure flow because, 1. EGEL 3 of $egel3$ is less than or equal to MinTopRd of $minelweirflow$. 2. EGEL 3 of $egel3$ is greater than or equal to MxLoCdU of $mxlocdu$. 3. WSEL 2 of $wsel2$ is less than MxLoCdD of $mxlocdd$.	745(Culvert-UP); 1126(Culvert-UP); 1653(Culvert-UP); 3742(Culvert-UP)	
BR PW 01	This is a Bridge Section. The selected profile is $profilename$. Type of flow is sluice gate pressure and weir flow because, 1. EGEL 3 of $egel3$ is greater than MinTopRd of $minelweirflow$. 2. EGEL 3 of $egel3$ is equal to or greater than MxLoCdU of $mxlocdu$. 3. WSEL 2 of $wsel2$ is less than MxLoCdD of $mxlocdd$.	4410(Culvert-UP)	
BR PW 02	This is a Bridge Section. The selected profile is $profilename$. Type of flow is submerged pressure and weir flow because, 1. EGEL 3 of $egel3$ is greater than MinTopRd of $minelweirflow$. 2. EGEL 3 of $egel3$ is equal to or greater than MxLoCdU of $mxlocdu$. 3. WSEL 2 of $wsel2$ is equal to or greater than MxLoCdD of $mxlocdd$.	4410(Culvert-UP)	
CV CF 03	This is ($strucname$). Type of material is $material$. Culvert n-value is $nculv$. Culvert n-value is not within the recommended range. It should be within $nculv1$ and $nculv2$. Please refer to Table 6-1 on Page 6-24 and Table 6-2 on Page 6-25 of the HEC-RAS Hydraulic Reference Manual.	1653	The Manning's n entered in the RAS model for this cross section is 0.011 for the top and bottom of the concrete culvert, which is within the acceptable range according to table 6-1 of the Reference Manual
CV LF 01	This is ($strucname$). The selected profile is $profilename$. Type of flow is low flow because, 1. EGEL 3 of $egel3$ is less than or equal to MinTopRd of $minelweirflow$. 2. EGEL 3 of $egel3$ is less than MxLoCdU of $mxlocdu$.	510; 745; 1126; 1387; 1653; 1731; 3742; 4410	

CV PF 01	This is ($strucname$). The selected profile is $profilename$. Type of flow is pressure flow because, 1. EGEL 3 of $egel3$ is less than or equal to MinTopRd of $minelweirflow$. 2. CulvWSIn of $Culv_WS_Inlet$ is equal to or greater than MxLoCdU of $mxLocdu$. 3. CulvWSOut of $culvwsoutlet$ is equal to or greater than MxLoCdD of $mxlocdd$.	745; 1126; 1653; 3742	
CV PW 01	This is ($strucname$). The selected profile is $profilename$. Type of flow is low and weir flow because, 1. EGEL 3 of $egel3$ is greater than MinTopRd of $Min_El_Weir_Flow$. 2. EGEL 3 of $egel3$ is less than MxLoCdU of $MxLoCdU$.	4410	
ST DT 03	This is ($Structure$) section. The Contraction Length is longer than the Expansion Length. Section 4 channel distance of $Length_Chnl4$ is longer than Section 2 channel distance of $Length_Chnl2$. Section 4 and Section 1 should be relocated. The HEC-RAS geometry file may need to be recreated using a GIS program.	510(Culvert-UP); 1126(Culvert-UP); 1387(Culvert-UP); 1731(Culvert-UP); 3742(Culvert-UP); 4410(Culvert-UP)	

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF

22 March 2013

CELRB-TD
Buffalo District, Corps of Engineers
1776 Niagara Street
Buffalo, NY 14207

LOMC Clearinghouse
847 South Pickett Street
Alexandria, VA 22304

Re: The Unnamed Tributary to Cayuga Creek at the Niagara Falls Air Reserve Station in Niagara Falls New York

To Whom It May Concern:

The Flood Insurance Rate Map (FIRM) for a community depicts land which has been determined to be subject to a 1% annual exceedance probability (100-year) or greater chance of flooding in any given year. The FIRM is used to determine flood insurance rates and to help the community with floodplain management.

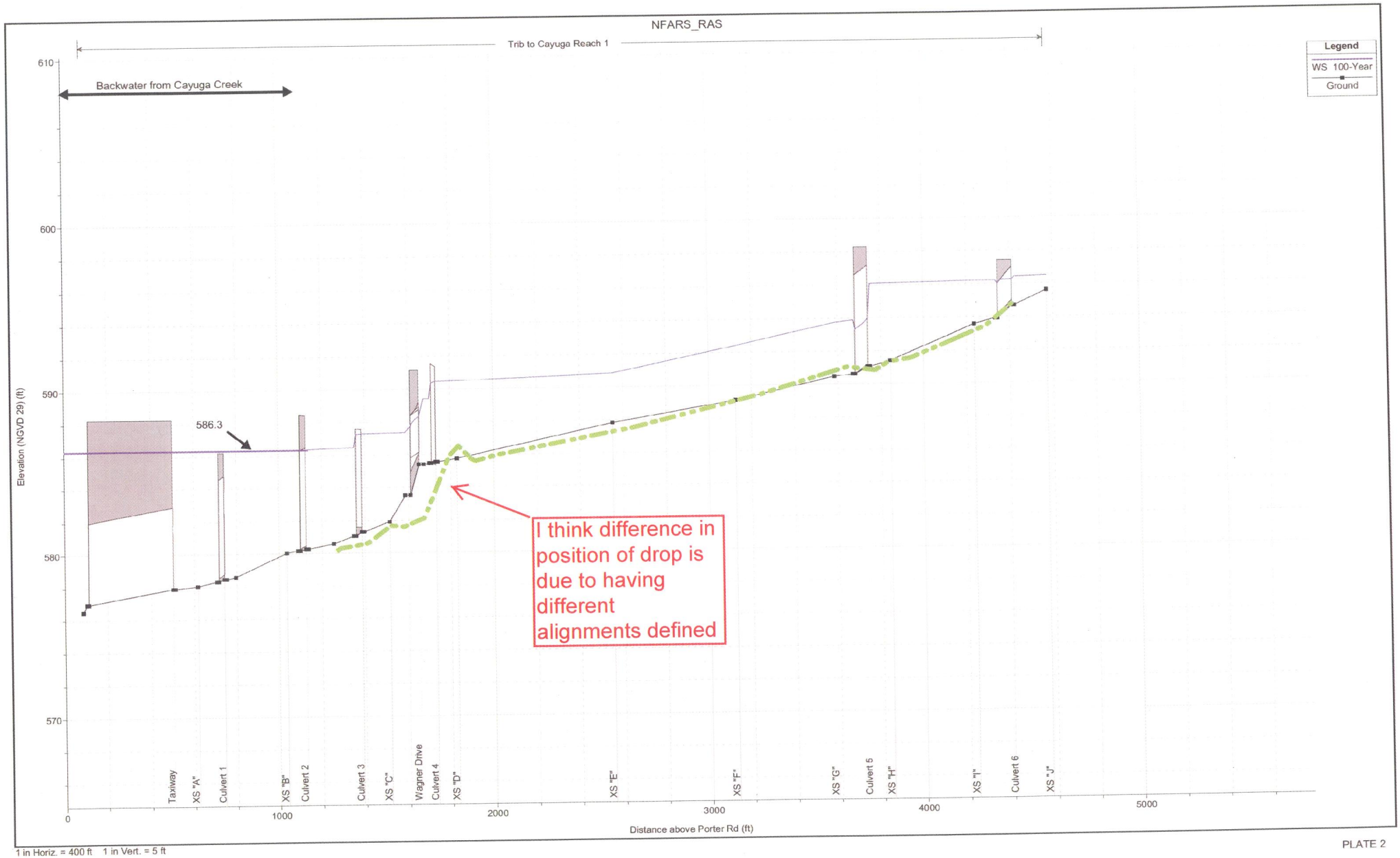
The United States Army Corp of Engineers (USACE) is applying for a Letter of Map Revision (LOMR) from the Federal Emergency Management Agency (DHS-FEMA) on behalf of the United States Border Patrol (USBP) to revise FIRM Map Number 36063C0327E Panel 327 of 430 Map Suffix: E, for the Town of Niagara, Niagara County New York along the Unnamed Tributary which flows through the Niagara Air Reserve Station and outfalls at Outlet #5 into Cayuga Creek. The USACE is proposing to revise the FIRM to reflect the results found from a detailed analysis which concluded the 1% annual exceedance probability flow is contained primarily within the channel banks of the Unnamed Tributary.

The survey used in support of this investigation was completed in support of a 2005 hydraulic study. The cross sections used were ground truth/field verified in MARCH 2013 by USACE Buffalo District Survey Section personnel under my direct supervision, using the National Geodetic Vertical Datum 1929 (NGVD 29). The elevation comparison results agree within a reasonable tolerance, and are illustrated in the attached.

If you have any questions or require any additional information please contact Roman Figler at (716) 879-4429 or by email at Roman.H.Figler@usace.army.mil.

Thank you.

Roman H. Figler III, PLS
Chief, Survey Section



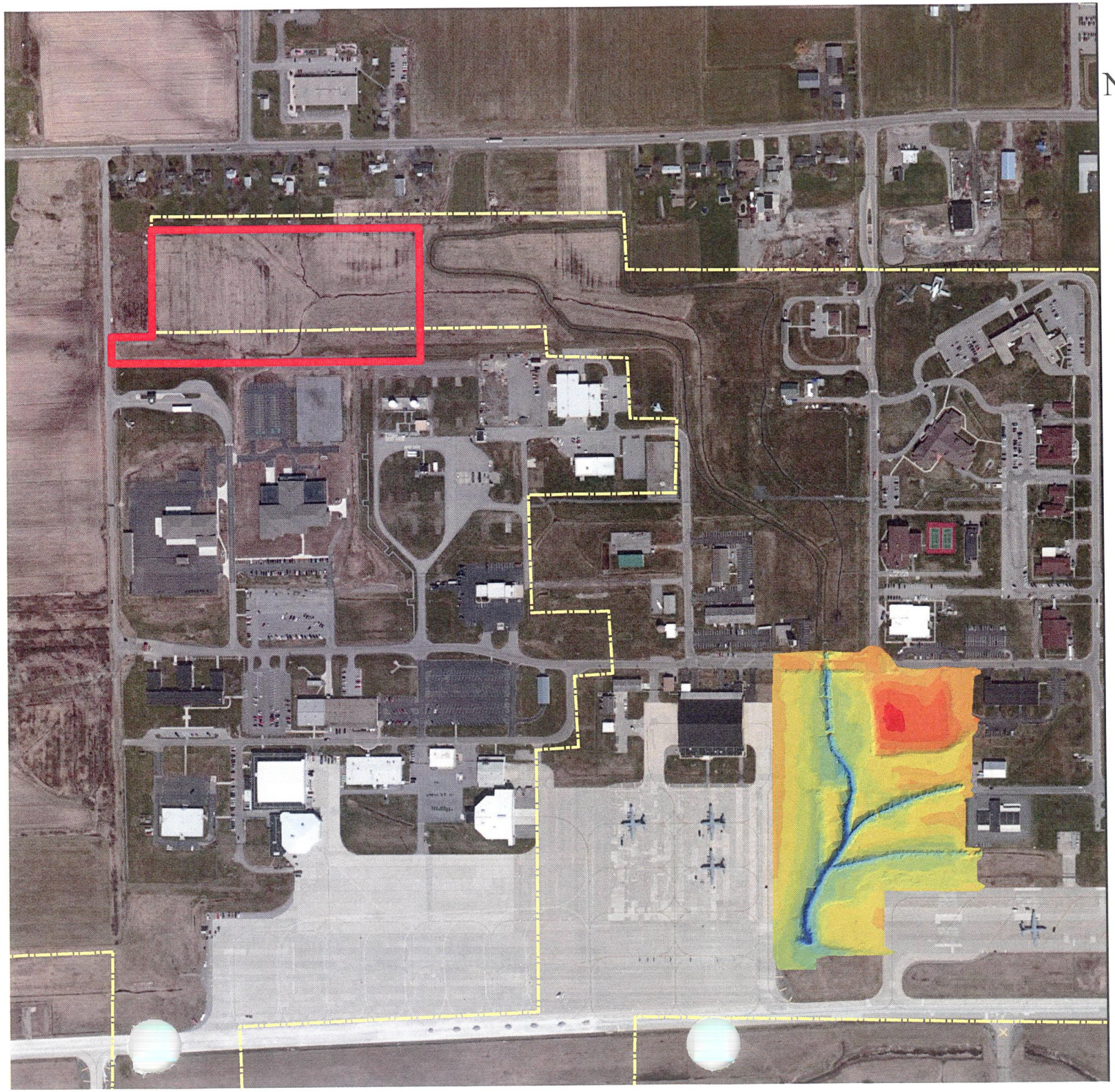
1 in Horiz. = 400 ft 1 in Vert. = 5 ft

PLATE 2

2005 SURVEY

2013 SURVEY

Niagara Falls AFRS
Floodplain Boundary Map



N
W E
S

Scale

1 inch = 500 feet

Legend

Airbase Boundary

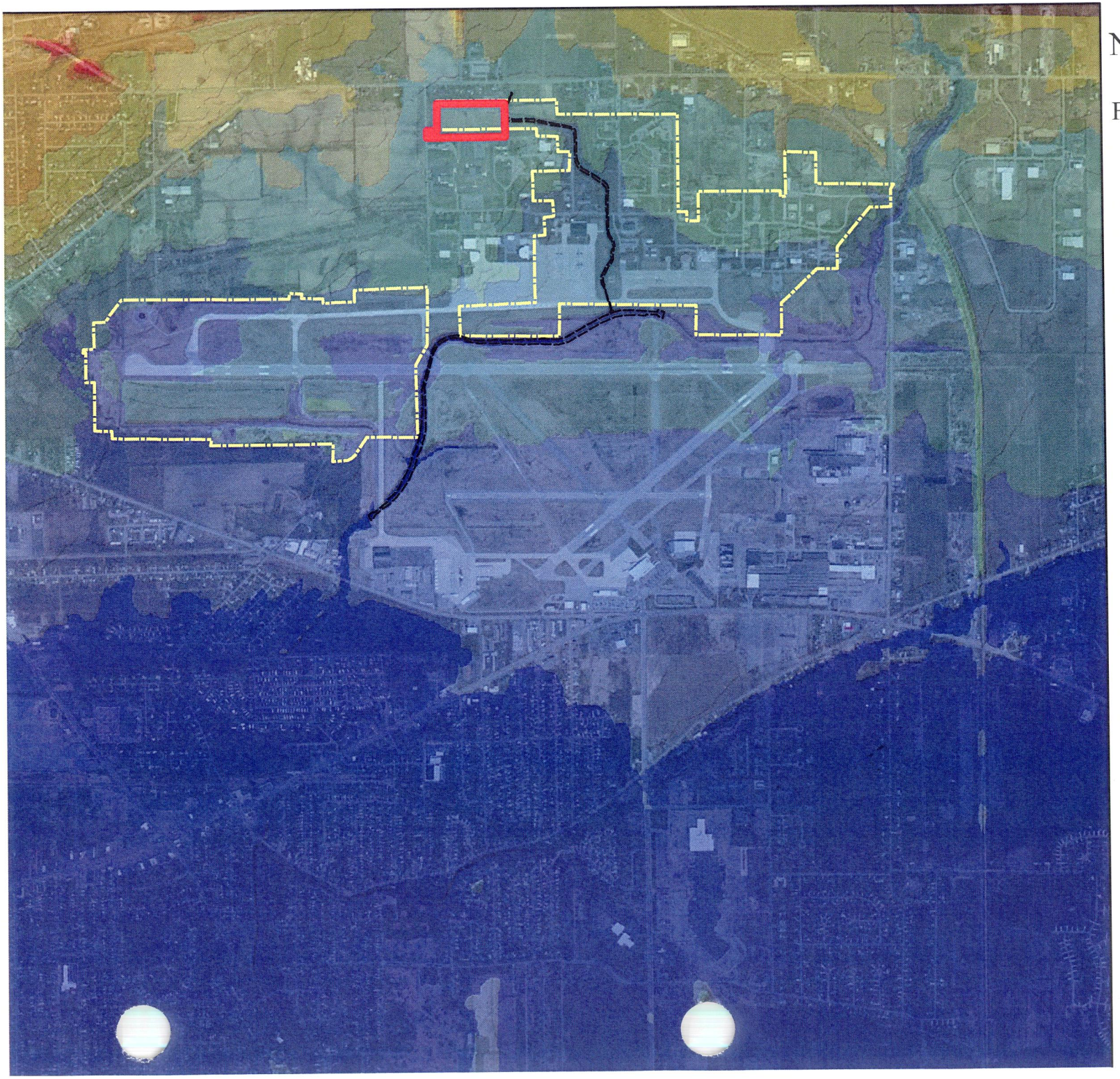
Border Patrol Parcel

Elevation

593 - 594
592 - 593
591 - 592
590 - 591
589 - 590
588 - 589
587 - 588
586 - 587
585 - 586
584 - 585
583 - 584
582 - 583
581 - 582
580 - 581
579 - 580
578 - 579
577 - 578

Niagara Falls AFRS

Floodplain Boundary Map



Scale

1 inch = 2,000 feet

Legend

Airbase Boundary

Border_Patrol_Parcel

Elevation

643 - 652

633 - 643

623 - 633

613 - 623

603 - 613

593 - 603

583 - 593

574 - 583

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF

13March 2013

Niagara Falls Air Reserve Station
Otis Drive
Niagara Falls, NY 14304

Re: Notification of Narrowing of 1% (100 year) Annual Chance Floodplain and Establishment of Base Flood Elevations at the Niagara Falls Air Reserve Station.

To Whom It May Concern:

The Flood Insurance Rate Map (FIRM) for a community depicts land which has been determined to be subject to a 1% annual exceedance probability (100-year) or greater chance of flooding in any given year. The FIRM is used to determine flood insurance rates and to help the community with floodplain management.

The United States Army Corp of Engineers (USACE) is applying for a Letter of Map Revision (LOMR) from the Department of Homeland Security - Federal Emergency Management Agency (DHS-FEMA) on behalf of the United States Border Patrol (USBP) to revise FIRM Map Number 36063C0327E Panel 327 of 430 Map Suffix: E, for the Town of Niagara, Niagara County New York along the Unnamed Tributary which flows through the Niagara Air Reserve Station and outfalls at Outlet #5 into Cayuga Creek. The USACE is proposing to revise the FIRM to reflect the results found from a detailed analysis which concluded the 1% annual exceedance probability flow is contained primarily within the channel banks of the Unnamed Tributary.

The Letter of Map Revision will result in:

1. Establishment of Base (1% annual exceedance probability) Flood Elevations (BFEs). Currently, the flooding along The Unnamed Tributary to Outlet #5 is based on an approximate study.
2. Narrowing of the 1% annual exceedance probability floodplain with the maximum narrowing of 170 feet at a point approximately 700 feet downstream of Wagner Drive.

This letter is to inform you of the establishment of Base Flood Elevations and revision of the 1% annual exceedance probability floodplain on the Niagara Falls Air Reserve Station, Niagara County New York.

If you have any questions or concerns about the proposed changes to the FIRM or its effect on your property, you may contact me at (716) 879-4358 or through email at Keith.R.Koralewski@usace.army.mil.

Sincerely,

Keith R. Koralewski, P.E.
Chief, Hydrology and Hydraulics Engineering Section

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Public Notice

The Niagara County, Town of Niagara Floodplain Manager, hereby gives notice of the Niagara County intent to revise the flood hazards, generally located along the Unnamed Tributary which outlets at Outfall #5 on the Niagara Air Reserve Station, located approximately four miles east of the central business district of Niagara Falls in Niagara County, New York.

Specifically, the flood hazards shall be revised from a point along the Unnamed Tributary as it confluences with the Cayuga Creek to a point upstream to the Air Reserve Station property limits. As a result of the revision, the 1% annual exceedance probability water-surface elevations shall decrease and/or the 1% annual exceedance probability floodplain shall narrow within the area of revision.

Maps and detailed analysis of the revision can be reviewed at _____ at ___(ADDRESS)___. Interested persons may call Laura Ortiz at (716) 879-4407 for additional information from ___DATE ___ to ___DATE___.

FEDERAL EMERGENCY MANAGEMENT AGENCY

PAYMENT INFORMATION FORM

Community Name: Town of Niagara

Project Identifier: **The Unnamed Tributary to Cayuga Creek at the Niagara Falls Air Reserve Station in Niagara Falls, NY**

THIS FORM MUST BE MAILED, ALONG WITH THE APPROPRIATE FEE, TO THE ADDRESS BELOW OR FAXED TO THE FAX NUMBER BELOW.

Type of Request:

☐ MT-1 application
☒ MT-2 application

FEMA
Fee Charge System Administrator
7390 Coca Cola Dr.
Suite 204
Hanover, MD 21076

☐ EDR application

FEMA Project Library
847 South Pickett St.
Alexandria, VA 22304
FAX (703) 212-4090

Request No.: _____ (if known) Amount: $0

☐ INITIAL FEE* ☐ FINAL FEE ☐ FEE BALANCE** ☐ MASTER CARD ☐ VISA ☐ CHECK ☐ MONEY ORDER

*Note: Check only for EDR and/or Alluvial Fan requests (as appropriate).

**Note: Check only if submitting a corrected fee for an ongoing request.

COMPLETE THIS SECTION *ONLY* IF PAYING BY CREDIT CARD

CARD NUMBER EXP. DATE

				–					–					–					–		
1	2	3	4		5	6	7	8		9	10	11	12		13	14	15	16		Month	Year

January 10, 2013 _____
Date Signature

NAME *(AS IT APPEARS ON CARD)*: _____
(please print or type)

ADDRESS: _____
(*for your credit card receipt-please print or type*) _____

DAYTIME PHONE: _____

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Appendix F

Emissions Calculations

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Table E-1 Construction Equipment Use

Equipment Type	Number of Units	Days on Site	Hours Per Day	Operating Hours
Excavators Composite	1	115	4	460
Rollers Composite	1	173	8	1,384
Rubber Tired Dozers Composite	1	115	8	920
Plate Compactors Composite	2	115	4	920
Trenchers Composite	2	58	8	928
Air Compressors	2	115	4	920
Cement & Mortar Mixers	2	115	6	1,380
Cranes	1	115	7	805
Generator Sets	2	115	4	920
Tractors/Loaders/Backhoes	2	230	7	3,220
Pavers Composite	1	58	8	464
Paving Equipment	2	58	8	928

Table E-2 Construction Equipment Emission Factors (lbs/hour)

Equipment	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	CO_2
Excavators Composite	0.5828	1.3249	0.1695	0.0013	0.0727	0.0727	119.6
Rollers Composite	0.4341	0.8607	0.1328	0.0008	0.0601	0.0601	67.1
Rubber Tired Dozers Composite	1.5961	3.2672	0.3644	0.0025	0.1409	0.1409	239.1
Plate Compactors Composite	0.0263	0.0328	0.0052	0.0001	0.0021	0.0021	4.3
Trenchers Composite	0.5080	0.8237	0.1851	0.0007	0.0688	0.0688	58.7
Air Compressors	0.3782	0.7980	0.1232	0.0007	0.0563	0.0563	63.6
Cement and Mortar Mixers	0.0447	0.0658	0.0113	0.0001	0.0044	0.0044	7.2
Cranes	0.6011	1.6100	0.1778	0.0014	0.0715	0.0715	128.7
Generator Sets	0.3461	0.6980	0.1075	0.0007	0.0430	0.0430	61.0
Tractors/Loaders/Backhoes	0.4063	0.7746	0.1204	0.0008	0.0599	0.0599	66.8
Pavers Composite	0.5874	1.0796	0.1963	0.0009	0.0769	0.0769	77.9
Paving Equipment	0.0532	0.1061	0.0166	0.0002	0.0063	0.0063	12.6

Source: CARB 2007a and 2007b

Table E-3 Construction Equipment Emissions (Tons per Year)

Equipment	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	CO_2
Excavators Composite	0.1341	0.3047	0.0390	0.0003	0.0167	0.0167	27.5037
Rollers Composite	0.3004	0.5956	0.0919	0.0005	0.0416	0.0416	46.4006
Rubber Tired Dozers Composite	0.7342	1.5029	0.1676	0.0011	0.0648	0.0648	109.9886
Plate Compactors Composite	0.0121	0.0151	0.0024	0.0000	0.0010	0.0010	1.9843
Trenchers Composite	0.2357	0.3822	0.0859	0.0003	0.0319	0.0319	27.2467
Air Compressors	0.1740	0.3671	0.0567	0.0003	0.0259	0.0259	29.2594
Cement and Mortar Mixers	0.0309	0.0454	0.0078	0.0001	0.0031	0.0031	5.0012
Cranes	0.2419	0.6480	0.0716	0.0006	0.0288	0.0288	51.7885
Generator Sets	0.1592	0.3211	0.0494	0.0003	0.0198	0.0198	28.0566
Tractors/Loaders/Backhoes	0.6542	1.2470	0.1939	0.0012	0.0964	0.0964	107.5583
Pavers Composite	0.1363	0.2505	0.0455	0.0002	0.0178	0.0178	18.0811
Paving Equipment	0.0247	0.0492	0.0077	0.0001	0.0029	0.0029	5.8593
Total	**2.84**	**5.73**	**0.82**	**0.0051**	**0.35**	**0.35**	**458.73**

Table E-4 Painting

VOC Content	0.84	lbs/gallon	
Coverage	400	sqft/gallon	
Emission Factor	0.0021	lbs/sqft	
Building/Facility	**Wall Surface**	**VOC [lbs]**	**VOC [tpy]**
All Buildings Combined	34,000	68,000	142.8
Total	**34,000**	**68,000**	**142.80**

Source: SCAQMD 1993

Table E-5 Delivery of Equipment and Supplies

Number of Deliveries	2						
Number of Trips	2						
Miles Per Trip	30						
Days of Construction	192						
Total Miles	27,600						
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**
Emission Factor (lbs/mile)	0.0219	0.0237	0.0030	0.0000	0.0009	0.0007	2.7
Total Emissions (lbs)	605.80	654.47	82.60	0.71	23.63	20.41	75056.4
Total Emissions (tpy)	**0.30**	**0.33**	**0.04**	**0.0004**	**0.01**	**0.01**	**37.53**

Source: CARB 2011

Table E-6 Surface Disturbance

TSP Emissions	80	lb/acre				
PM_{10}/TSP	0.45					
$PM_{2.5}$/PM_{10}	0.15					
Period of Disturbance	30	days				
Capture Fraction	0.5					
Building/Facility	**Area [acres]**	**TSP[lbs]**	**PM_{10}[lbs]**	**PM_{10}[tons]**	**$PM_{2.5}$[lbs]**	**$PM_{2.5}$[tons]**
Demolition	1.1	2650	1192	0.60	89	0.04
Total	**1.1**	**2,650**	**1,192**	**0.60**	**89**	**0.04**

Sources: USEPA 1995 and USEPA 2005

Table E-7 Worker Commutes

Number of Workers	50						
Number of Trips	2						
Miles Per Trip	30						
Days of Construction	230						
Total Miles	690000						
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**
Emission Factor (lbs/mile)	0.0105	0.0011	0.0011	0.0000	0.0001	0.0001	1.1
Total Emissions (lbs)	7,278.42	760.99	744.64	7.42	58.69	36.52	758,677.3
Total Emissions (tpy)	**3.64**	**0.38**	**0.37**	**0.0037**	**0.03**	**0.02**	**379.34**

Source: CARB 2011

Table E-8 Total Construction Emissions (Tons per Year)

Activity/Source	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	CO_2
Construction Equipment	2.84	5.73	0.82	0.0051	0.35	0.35	458.73
Painting	0.00	0.00	0.07	0.0000	0.00	0.00	0.00
Delivery of Equipment and Supplies	0.30	0.33	0.04	0.0004	0.01	0.01	37.53
Surface Disturbance	0.00	0.00	0.00	0.0000	0.60	0.04	0.00
Worker Commutes	3.64	0.38	0.37	0.0037	0.03	0.02	379.34
Total Construction Emissions	**6.78**	**6.44**	**1.30**	**0.0092**	**0.99**	**0.42**	**875.60**

Table E-9 Boiler Emissions

Gross Area	34000	sf				
Heating Requirements	99000	btu/sf				
Total Annual Heat Required	3366	MMBTU				
Heating Value	150	MMBtu/1000 Gallons				
Total #2 Oil Used	22.4	10^3 Gallons				
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lb/1000 gal)	5	24	2.493	0.1	2	2
Total Emissions (tons)	**0.06**	**0.27**	**0.03**	**<0.01**	**0.02**	**0.02**

1. Emission factors for all pollutants were obtained from USEPA's AP-42, Section 1.3. Conservatively assume that PM_{10} = PM.
2. Assumed sulfur concentration 1%
3. Heating requirements obtained from Commercial Buildings Energy Consumption Survey, DOE 2003

Table E-10 Emergency Generators

Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**		
Emission Factor [lb/hp-hr]	0.0055	0.024	0.000705	0.00809	0.0007	0.0007		
Generator Rating [kW]	**Estimated Run Time (hr/yr)**	**Annual Power Output [kW-hr/yr]**	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
700	100	70,000	0.26	1.13	0.03	0.38	0.03	0.03
		Total Emissions [tpy]	**0.26**	**1.13**	**0.03**	**0.38**	**0.03**	**0.03**

1. Emission factors for all pollutants were obtained from USEPA's AP-42, Section 3.4 Stationary Diesel Engines

Table E-11 Worker Commutes

Number of Workers	75					
Number of Trips	2					
Miles Per Trip	30					
Days of Work	260					
Total Miles	1170000					
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lbs/mile)	0.0105	0.0011	0.0011	0.0000	0.0001	0.0001
Total Emissions (lbs)	12,341.67	1,290.37	1,262.66	12.57	99.51	61.93
Total Emissions (tons)	**6.17**	**0.65**	**0.63**	**0.01**	**0.05**	**0.03**

Source: CARB 2011

Table E-12 Total Operational Emissions (tons)

Activity/Source	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Boiler Emissions	0.06	0.27	0.03	0.00	0.02	0.02
Emergency Generators	0.26	1.13	0.03	0.38	0.03	0.03
Worker Commutes	6.17	0.65	0.63	0.01	0.05	0.02
Total Operational Emissions	**6.5**	**2.0**	**0.7**	**0.4**	**0.01**	**0.01**

References

CARB (California Air Resources Board). 2011. *EMFAC (v2.3) Emission Factors (On-Road)*. <http://www.arb.ca.gov/msei/onroad/latest_version.htm> Accessed April 2012.

DOE (Department of Energy). 2003. *Consumption and Gross Energy Intensity by Census Region for Sum of Major Fuels, Commercial Buildings Energy Consumption Survey*. Department of Energy, Washington, DC.

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SCAQMD (South Coast Air Quality Management District). 1993. *CEQA Air Quality Handbook*. Coast Air Quality Management District, Diamond Bar, CA.

USEPA (U.S. Environmental Protection Agency). 1995. *Compilation of Air Pollutant Emission Factors*, AP-42, 5th ed. Vol. I: Stationary Point and Area Sources.

USEPA (U.S. Environmental Protection Agency). 2005. Methodology to Estimate the Transportable Fraction (TF) of Fugitive Dust Emissions for Regional and Urban Scale Air Quality Analyses.