

HYDROLOGY REPORT

In accordance with the United States Geological Survey (USGS) StreamStats online website (v4.3.11), the watershed at the Route 2 crossing over Hooper/Butterfield Brook (Hall Bridge No. 2341) near the Town of Wilton, Maine is 2.2 mi², including 2% comprised of storage areas.

The flows for the project were determined using the USGS StreamStats website. The design discharges for the Route 2 bridge over Hooper/Butterfield Brook are summarized below and miscellaneous Hydrology information is included in Appendix E. A max flood of record is not available for this site.

SUMMARY

Drainage Area	2.2	mi ²
Q1.1	53.0	ft ³ /s
Q10	230.3	ft ³ /s
Q25	301.5	ft ³ /s
Q50	357.3	ft ³ /s
Q100	418.1	ft ³ /s
Q500	571.9	ft ³ /s

Reported by: Erdman Anthony

Date: March 5, 2020

Note: All elevations based on North American Vertical Datum (NAVD) of 1988.

HYDRAULIC REPORT

The existing Bridge No. 2341 is 20 ft long between abutment bearings (19 ft clear span per survey data) and is on an approximate 0° skew. The bridge is 47 ft wide out-to-out (44 ft wide curb-to-curb), and the approach roadway width is 44 ft. The hydraulic opening of the bridge is approximately 86 ft². Hooper/Butterfield Brook is aligned well with the bridge opening (not on a skew) but does approach from a bend condition upstream. The existing structure is a reinforced concrete slab structure with cast-in-place abutments on spread footings.

Bridge 2341 is located at the corporate line between Franklin and Oxford counties and is within a FEMA Zone AE Detailed Study area with a floodway as shown on the Flood Insurance Rate Map (FIRM) for the Town of Wilton, ME, effective August 23, 2001 and the Oxford Countywide map, effective July 7, 2009 (included in Appendix E). FEMA regulations will allow no backwater increase in the 100-year water surface elevation without requiring a Conditional Letter of Map Revision.

The U.S. Army Corp of Engineers HEC-RAS Version 5.0.7 was used to model the hydraulics at the Route 2 Bridge. The existing conditions were modeled using MDOT's survey data of the channel, floodplain, and existing bridge and the peak flow data presented in the Hydrology section. Manning's n values were estimated based on photographs and channel bottom descriptions from the HEC-RAS Hydraulic Reference Manual Version 5.0, February 2016, Table 3-1. A main channel Manning's n of 0.035 was determined as the channel appears to be clean with minor pools, and a streambed consisting of gravel and some sizable stones. The floodplain has a mix mature trees with short grass resulting in a range of Manning's n values from 0.03 to 0.1.

The survey information provided by MDOT includes some 400 ft of channel and floodplain along Butterfield Brook. The slope of the channel is reasonably regular through the study reach. For the existing and proposed conditions model, normal depth boundary conditions were selected. The extents of the model are such that any error introduced due to the selected boundary condition is eliminated and has no effect on the water surface elevation at the bridge. The project area is determined to be beyond the influence of flooding elevations of Sevenmile Stream. Per the Oxford Countywide FEMA FIRM map, Butterfield Brook discharges to Sevenmile Stream at FEMA lettered section C and the outlet of the study bridge is estimated at approximately 850 feet upstream of the computed base flood elevation for Sevenmile Stream. In addition, per the FEMA Flood Insurance Study (FIS) Flood Profile (and floodway data table) at this location (FEMA Section C), Sevenmile Stream has a base flood elevation of 466.7 feet (NAVD 88), which is below the study bridge outlet elevation of approximately 470 feet.

The upstream and downstream low chord elevations for the existing bridge are 475.47 ft and 475.36, respectively. The upstream deck thickness for the existing bridge is modeled at 1.7 feet. The existing conditions analysis resulted in a mixed subcritical and supercritical flow regime utilizing upstream and downstream slopes of 0.022 ft/ft and 0.014 ft/ft, respectively, for the normal depth boundary conditions in conformance with the surveyed stream slope. Energy method and Pressure/Weir was selected for the low flow and high flow bridge modeling approach, respectively. The resulting water surface profiles show that all flows are conveyed through the existing bridge opening with 1.7 ft. and 1.4 ft of freeboard over the 50-year and 100-year flood events, respectively.

It is the design team's understanding, and to the best of their knowledge, there is no history of the bridge having ever been overtopped or flood elevations making contact with the bridge superstructure at the project location. This information was supported by discussion obtained at the public meeting with the local residents. In addition, Highway Bridge Inspection Reports (dated 2014 through 2018) document a "slight chance of overtopping bridge" as the appraisal for waterway adequacy. An excerpt of the public meeting and the 2018 Highway Bridge Inspection Report are included in Appendix E. The 2019 field survey did not include a high water stage reference point for the study bridge, nor did the bridge inspection reports indicate a high water mark. If available, this information could potentially have provided a means to calibrate the model with real world data. However, in the absence of surveyed water stage data, the existing conditions hydraulic model appears suitable in assessing the channel forming low flows (i.e. 1.1-year and 2-year) with survey channel geometry. The model also is consistent with the local testimony for the higher floods (i.e 50-year design and 100-year) not overtopping the roadway.

A comparison of results of the published effective FEMA water surface elevations versus the existing and proposed condition model water surface elevations for the FEMA 100-year flow is presented in the summary table below. The following items contribute to the difference in water surface elevations in the study model when compared to the FEMA model.

- Updated peak discharge flows were utilized in this study as determined using the United States Geological Survey (USGS) StreamStats online website (v4.3.11). The FEMA FIS used the TR-20 hydrologic simulation model to establish peak discharge flows.
- The updated computation methods in the HECRAS software (vs. NRCS's Water Surface Profile 2 (WSP2) computer program (USDA, SCS, 1993 version) used in the FEMA FIS study).
- Utilization of current field survey for the study reach geometry. Two (2) lettered cross sections from the FEMA FIS study occur within the modeled reach of this study. FEMA cross sections "A" (Oxford Countywide study) and "A" (Town of Wilton study) occur at approximately the same locations as cross sections 1000 and 1236, respectively. The

geometries of the FEMA cross sections are presumed to be different than the modeled sections of this study. Cross sections for the FEMA FIS were obtained from field survey conducted prior to 1999. The use of 2019 survey data in the current model provides a more accurate portrayal of the cross section geometry of the study reach.

- Utilization of the current 2019 field survey for the existing bridge geometry also presumes differences than the FEMA FIS structure geometry. The existing conditions model of this study utilized field survey points and measurements to establish updated bridge opening geometry.

To conclude the HEC-RAS and Existing Conditions model geometry comparison, it is common for existing water surface elevations to differ from the published elevations in the FEMA study. The purpose of the existing conditions model described in this report is to adequately reflect existing site conditions for a basis of comparison to the proposed condition and subsequent evaluation of potential water surface elevation increases between the two models. The existing model is required to provide an updated model to support conclusions about the actual impact of the proposed project.

Comparison of FEMA FIS, Existing and Proposed Water Surface Elevations
for the 100-yr Event

Hooper/Butterfield Brook					
HECRAS Section	Water Surface Elevation (NAVD 88)				
	(1) Published FEMA FIS *	(2) Existing HECRAS Model **	(3) Proposed HECRAS Model **	Difference (2)-(1)	Difference (3)-(1)
	(ft)	(ft)	(ft)	(ft)	(ft)
1236 (FEMA Section A, Town of Wilton)	477	474.43	474.43	-2.57	-2.57
1153	Hall Bridge (#2341)				
1000 (FEMA Section A, Oxford Countywide)	473.4	470.72	470.71	-2.68	-2.69

* Based on published FEMA FIS (Town of Wilton, ME) 715 cfs base flow.

** Based on updated computed (USGS Streamstats) 418 cfs base flow.

The proposed replacement culvert will be located along the same horizontal alignment as the existing structure and placed at positive grade of 1.05%. The proposed culvert will be 81 ft long, with a 6.5 ft rise and 20 ft span, and depressed approximately 2 feet. It will consist of a hydraulic opening of approximately 90 ft². Both ends of the culvert will be slope tapered to match the 2:1 side slope with a bottom step.

The proposed hydraulic model was analyzed using the same assumptions for Manning's n values, downstream boundary condition, flow regime, and bridge modeling approach as the existing hydraulic model.

The results from the proposed conditions model shows that the water surface elevations for all flow events are lower than existing conditions. The hydraulic analysis summary from the existing and proposed hydraulic models is shown on the following page.

SUMMARY

		Existing Structure	Recommended Structure
		20' Single Span Concrete Slab	6.5'H x 20' W Box Culvert Concrete
Total Area of Waterway Opening	ft ²	86	90
Headwater elevation @ Q _{1.1}	ft	471.86	471.54
Headwater elevation @ Q ₁₀	ft	473.03	472.99
Headwater elevation @ Q ₂₅	ft	473.44	473.27
Headwater elevation @ Q ₅₀	ft	473.78	473.44
Headwater elevation @ Q ₁₀₀	ft	474.11	473.59
Headwater elevation @ Q ₅₀₀	ft	474.87	473.96
Freeboard @ Q ₅₀	ft	1.7	1.1
Freeboard @ Q ₁₀₀	ft	1.4	1
HW/D for Q ₅₀	--	na	0.73
HW/D for Q ₁₀₀	--	na	0.76
Flood Of Record - NA			
Outlet Velocity @ Q _{1.1}	ft/s	4.46	2.41
Outlet Velocity @ Q ₁₀	ft/s	7.29	4.59
Outlet Velocity @ Q ₂₅	ft/s	8.01	5.09
Outlet Velocity @ Q ₅₀	ft/s	8.45	5.43
Outlet Velocity @ Q ₁₀₀	ft/s	8.91	5.94
Outlet Velocity @ Q ₅₀₀	ft/s	9.89	6.98

Reported by: Erdman Anthony

Date: March 5, 2020

Note: All elevations based on North American Vertical Datum (NAVD) of 1988.

Headwater elevation information is taken from the upstream bounding bridge cross section (Section 1196) in the hydraulic model for the existing and proposed structures. Outlet velocity information is taken from the structure downstream internal section (RS 1153D) in the hydraulic models for the existing and proposed structures. The freeboard is computed as the difference between the superstructure low chord elevation at the upstream bridge opening and the computed water surface elevation at the upstream bounding hydraulic cross section (backwater elevation).

Scour

The bridge appraisal scour rating (item 113) is listed as a 5 – “scour within limits of footings or piles” for recent bridge inspection reports dated 2014 to 2018 and there is no documented evidence of significant scour or erosion at the structure foundation. However, due to proposed box culvert inlet and outlet computed velocities approach or exceed 6 fps for the high flood events (i.e. 50-year and 100-year events) plain riprap is recommended as scour countermeasure. The observation of some channel scouring immediately upstream of the existing opening in conjunction with migration of the channel toward the existing bridge east abutment further supports this recommendation.

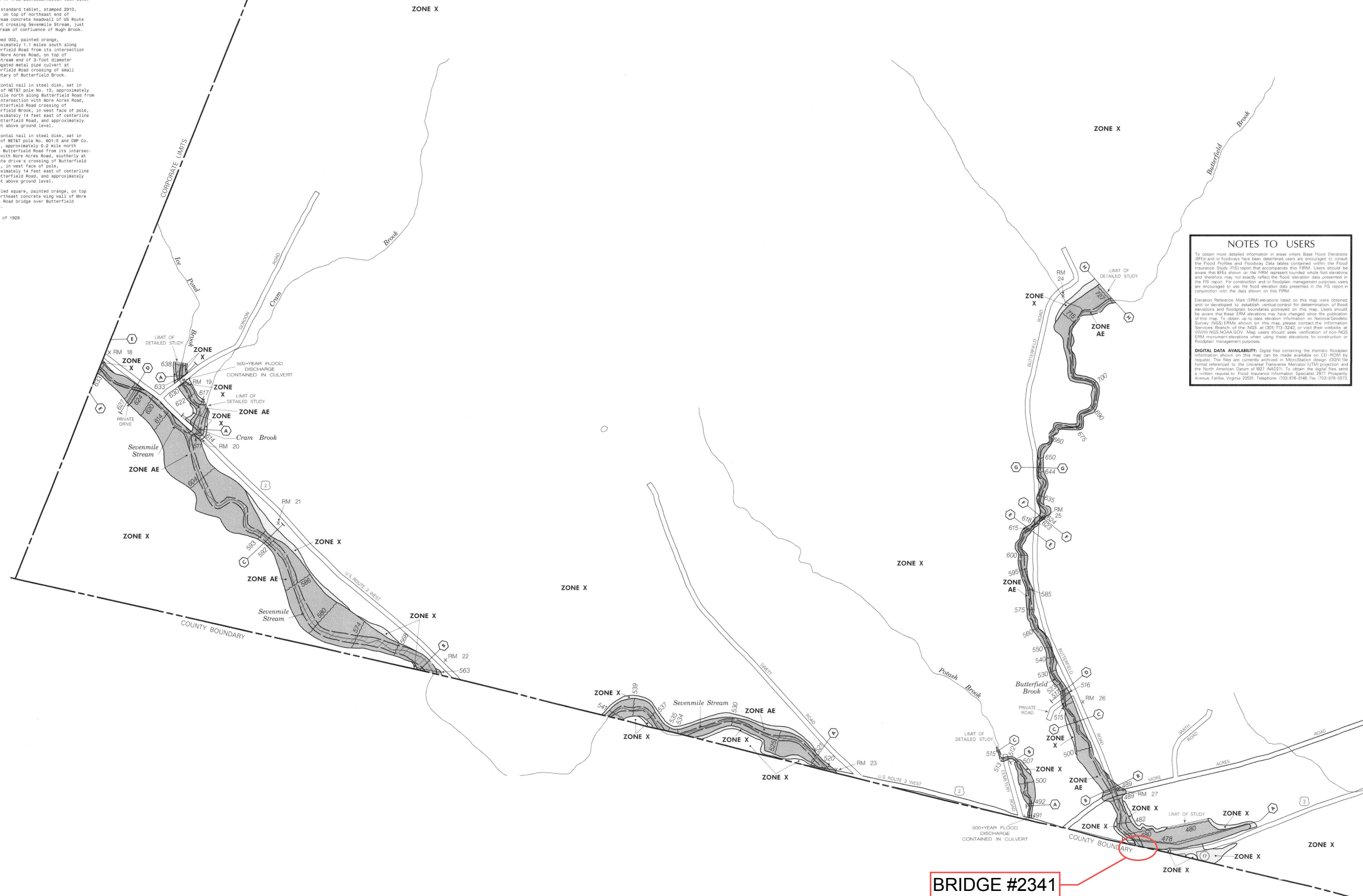
Appendix E

Hydraulics Data

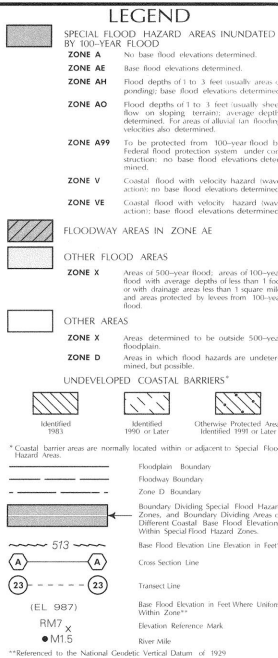
ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)	DESCRIPTION OF LOCATION
RM 18	635.12	WOT standard tablet, stamped 1496-10, 1986, at Carriage/Wilton town line, and approximately 45 feet north of centerline of US Route 2 west.
RM 19	630.30	Stamped 001, painted orange, on top of downstream end of 5-foot by 6.5-foot structural plate pipe arch culvert at Gordon Road crossing of Ten Pond Brook.
RM 20	615.26	WOT standard tablet, stamped 2745, 1988, on top of northeast end of southeast concrete abutment of US Route 2 west bridge over Cram Brook.
RM 21	598.427	USGS standard tablet, stamped 48 AFK 1985 588, on top of concrete wall on northeast side of Mystic Valley Hotel.
RM 22	572.74	Chiseled square, painted orange, on top of northeast end of 18-inch concrete culvert, located approximately 300 feet northwest along U.S. Route 2 and State Route 17 from Buffalo/Wilton town line.
RM 23	526.363	WOT standard tablet, stamped 2910, 1991, on top of northeast end of upstream concrete headwall of US Route 2 west crossing Sevenmile Stream, just upstream of confluence of Hugh Brook.
RM 24	732.68	Stamped 002, painted orange, approximately 1.1 miles south along Butterfield Road from its intersection with More Acres Road, on top of downstream end of 3-foot diameter corrugated metal pipe culvert at Butterfield Road crossing of small tributary of Butterfield Brook.
RM 25	625.02	Horizontal nail in steel disk, set in base of METT pole No. 13, approximately 0.8 mile north along Butterfield Road from its intersection with More Acres Road, at Butterfield Brook, in west face of pole, approximately 14 feet east of centerline of Butterfield Road, and approximately 1 foot above ground level.
RM 26	509.80	Horizontal nail in steel disk, set in base of METT pole No. 801's and D&P Co. pole, approximately 0.2 mile north along Butterfield Road from its intersection with More Acres Road, southerly at private drive's crossing of Butterfield Brook, in west face of pole, approximately 14 feet east of centerline of Butterfield Road, and approximately 1 foot above ground level.
RM 27	488.82	Chiseled square, painted orange, on top of northeast concrete wing wall of More Acres Road bridge over Butterfield Brook.

National Geodetic Vertical Datum of 1929



BRIDGE #2341



**Referenced to the National Geodetic Vertical Datum of 1929

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of great size, or all diaphragmatic features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal BEFs shown on this map apply only landward of 1:10 NGVD. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE. Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency. Floodway widths in some areas may be too narrow to show; scale floodway widths are provided in the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North American Datum of 1983 (NAD83). Contour lines shown on this map are based on the information provided by the NGS at 100' intervals. The information provided by the NGS is not intended to be used as a substitute for the information provided by the NGS. The information provided by the NGS is not intended to be used as a substitute for the information provided by the NGS.

DIGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain information shown on this map can be made available on CD-ROM by request. The files are currently archived in Microfilm design (COM) file format referenced to the Universal Transverse Mercator (UTM) projection and the North American Datum of 1983 (NAD83). To obtain the digital files, send a written request to: Flood Insurance Information Specialist, 2877 Prosperity Avenue, Fairfax, Virginia 22031. Telephone: (703) 875-5748; Fax: (703) 875-0077.

BASE MAP SOURCE: Photometric base map files were provided in digital format by the State of Maine Office of GIS. These files were compiled at a scale of 1:24,000 from U.S. Geological Survey 7.5-Minute Series Topographic Maps. Additional information may have been derived from other sources. Users of the FIRM should be aware that minor adjustments may have been made to specific base map features.

MAP REPOSITORY: Wilton Town Office, 155 West Road, Wilton, Maine 04294. (Maps available for reference only, not for distribution.)

INITIAL IDENTIFICATION: FEBRUARY 28, 1975.

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE: FEBRUARY 17, 1989.

FLOOD INSURANCE RATE MAP REVISIONS:

August 22, 2007 - to add base flood elevations special flood hazard areas, floodway, and road and road names, to change special flood hazard areas and zone designations, and to update map format.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE

500 0 500 FEET



APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP

TOWN OF
WILTON,
MAINE
FRANKLIN COUNTY

PANEL 8 OF 11

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY - PANEL NUMBER
230063 0008 B

MAP REVISED:
AUGUST 23, 2001



Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only to landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 19. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NINGS12
National Geodetic Survey
SSMCO-3, #0202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov/>.

Base map information shown on this FIRM was derived from Maine GIS (<http://apollo.ogis.state.me.us/catalog/>). Base map files were provided in digital form by the Office of Maine GIS. Orthophoto images were produced at a scale of 1:2,400 and 1:4,800 dated spring of 2003 to spring of 2005.

This map reflects more detailed and up-to-date **stream channel** configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

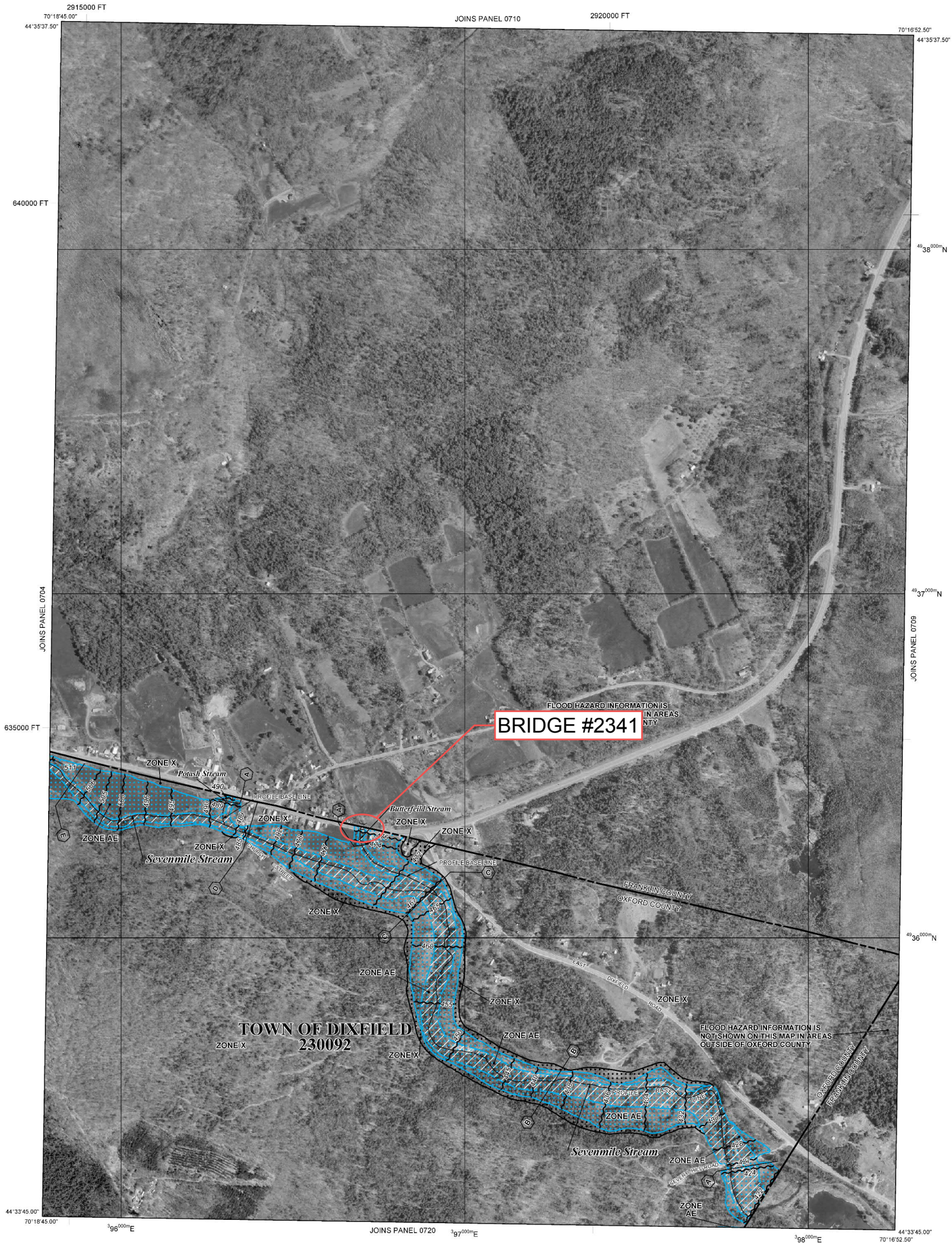
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/>.

State of Maine Floodway Note: Under the Maine Revised Statutes Annotated (M.R.S.A.) Title 38 § 439-A, 7C where the floodway is not designated on the Flood Insurance Rate Map, the floodway is considered to be the channel of a river or other water course and the adjacent land areas to a distance of one-half the width of the floodplain, as measured from the normal high water mark to the upland limit of the floodplain, unless a technical evaluation certified by a registered professional engineer is provided demonstrating the actual floodway based upon approved FEMA modeling methods.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation line and value; elevation in feet*

Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

Cross section line

Transect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

1000-meter Universal Transverse Mercator grid values, zone 19

5000-foot grid ticks: Maine State Plane coordinate system, west zone (FIPS:ZONE1802), Transverse Mercator

Bench mark (see explanation in Notes to Users section of this FIRM panel)

River Mile

MAP REPOSITORIES

Refer to Map Repositories list on Map Index.

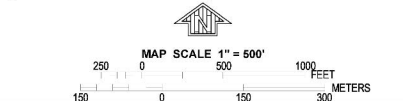
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

July 7, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6629.



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0708D

FIRM
FLOOD INSURANCE RATE MAP
OXFORD COUNTY,
MAINE
(ALL JURISDICTIONS)

PANEL 708 OF 1570
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
COMMUNITY: DIXFIELD, TOWN OF
NUMBER: 230092
PANEL: 0708
SUFFIX: D

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
23017C0708D
EFFECTIVE DATE
JULY 7, 2009

Federal Emergency Management Agency

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	805	52	171	4.8	473.4	473.4	474.4	1.0

¹ FEET ABOVE CONFLUENCE WITH SEVENMILE STREAM

TABLE 11	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	OXFORD COUNTY, ME (ALL JURISDICTIONS)	BUTTERFIELD BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NGVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Butterfield Brook								
A	55 ¹	35	174	4.6	477.5	477.5	478.5	1.0
B	715 ¹	48	205	3.7	489.2	489.2	489.8	0.6
C	1,495 ¹	17	70	9.5	507.3	507.3	508.3	1.0
D	1,775 ¹	16	84	7.9	517.0	517.0	517.4	0.4
E	3,744 ¹	21	64	9.9	616.0	616.0	616.1	0.1
F	3,925 ¹	16	78	9.2	623.3	623.3	624.2	0.9
G	4,500 ¹	16	64	9.4	644.7	644.7	645.7	1.0
H	7,175 ¹	65	106	4.6	726.5	726.5	727.4	0.9
Cram Brook								
A	140 ²	94	305	3.9	613.8	613.8	613.9	0.1
Ice Pond Brook								
A	420 ³	22	66	7.6	633.4	633.4	634.4	1.0
Pine Brook								
A	830 ⁴	34	160	4.9	592.2	592.2	592.3	0.1
Potash Brook								
A	158 ¹	15	65	5.3	491.5	491.5	492.0	0.5
B	665 ¹	9	31	9.8	506.7	506.7	507.4	0.7
C	920 ¹	15	51	6.0	514.6	514.6	515.6	1.0
Sevenmile Stream								
A	215 ¹	42	336	10.4	520.7	520.7	520.7	0.0
B	5,656 ¹	119	595	6.1	564.0	564.0	564.9	0.9
C	7,966 ¹	48	334	10.2	592.5	592.5	593.5	1.0
D	10,516 ¹	37	338	7.4	626.5	626.5	627.5	1.0
E	10,941 ¹	46	280	8.9	632.5	632.5	633.4	0.9

¹Feet above corporate limits

²Feet above confluence with Sevenmile Stream

³Feet above confluence with Cram Brook

⁴Feet above confluence with Wilson Stream

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WILTON, ME
(FRANKLIN CO.)

FLOODWAY DATA

BUTTERFIELD BROOK - CRAM BROOK - ICE POND BROOK -
PINE BROOK - POTASH BROOK - SEVENMILE STREAM

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	445	314	1,281	6.8	424.5	424.5	425.4	0.9
B	2,935	179	1,114	6.1	439.3	439.3	440.2	0.9
C	5,898	204	1,029	6.6	466.7	466.7	467.7	1.0
D	7,748	59	434	11.3	485.1	485.1	485.9	0.8
E	9,548	78	461	10.7	507.4	507.4	508.4	1.0
F	13,104	38	365	11.0	542.7	542.7	543.7	1.0
G	15,269	153	613	5.3	559.1	559.1	560.0	0.9

¹ FEET ABOVE COUNTY BOUNDARY

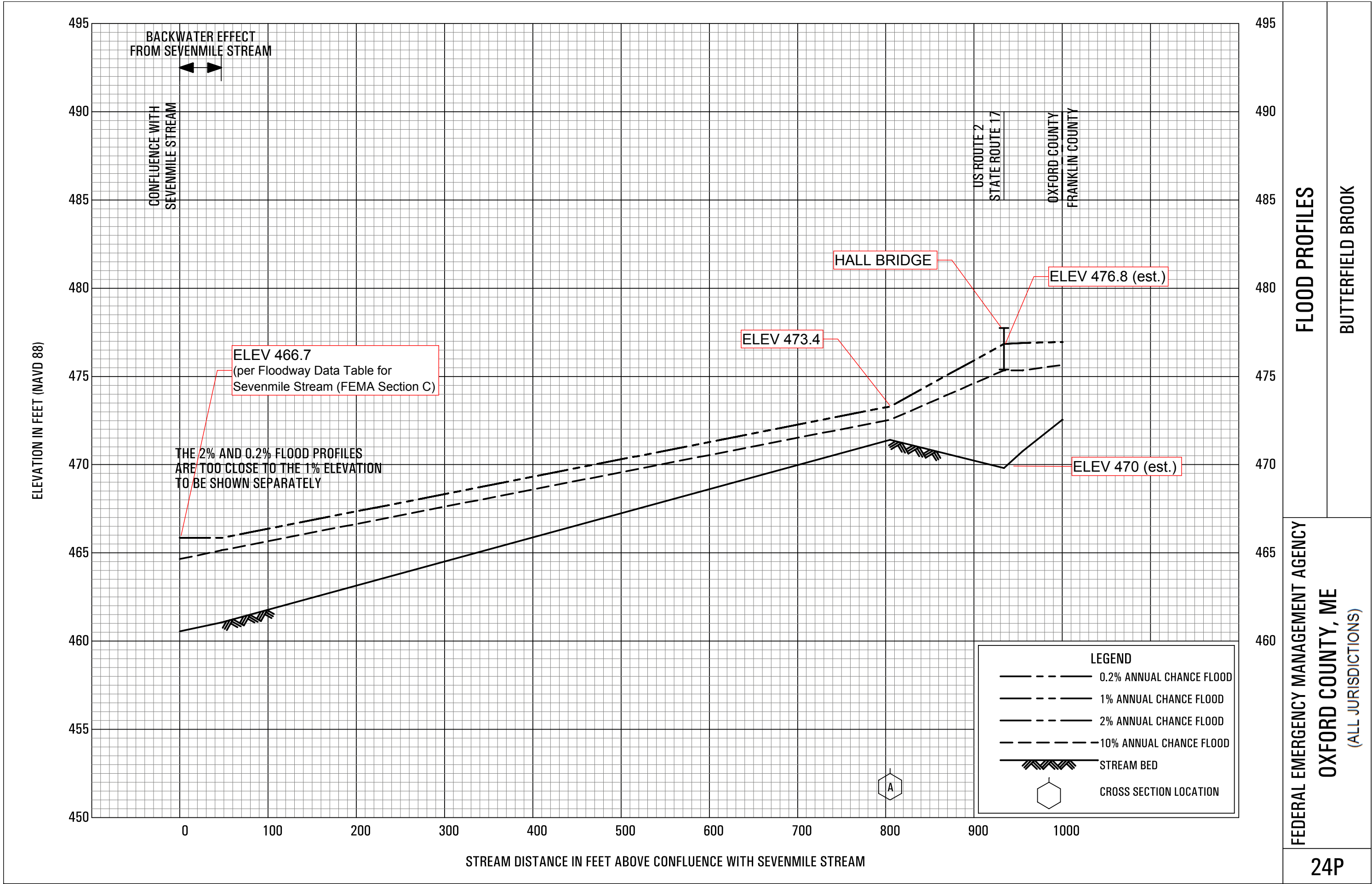
TABLE 11

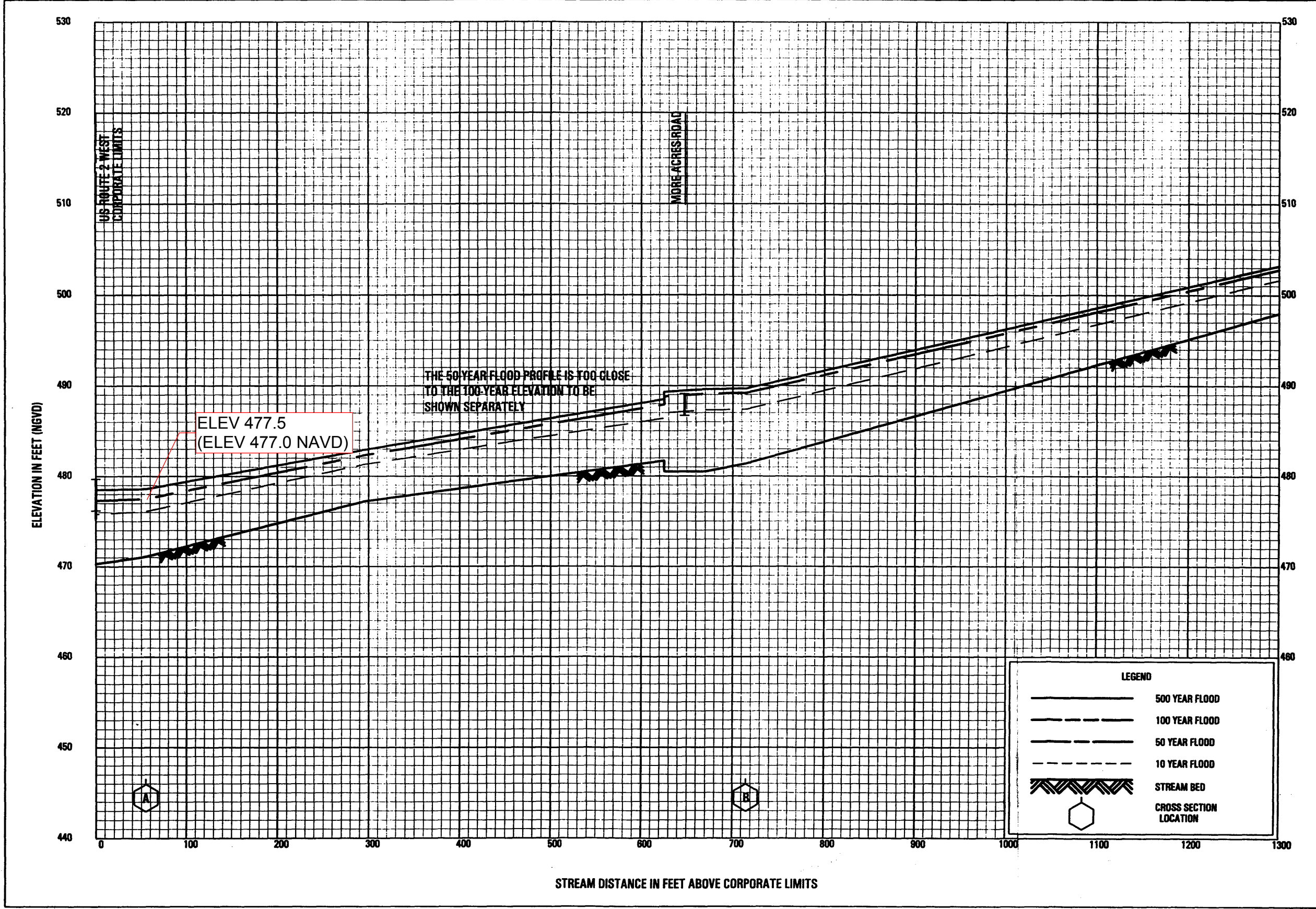
FEDERAL EMERGENCY MANAGEMENT AGENCY

OXFORD COUNTY, ME
(ALL JURISDICTIONS)

FLOODWAY DATA

SEVENMILE STREAM





FLOOD PROFILES

BUTTERFIELD BROOK

**FEDERAL EMERGENCY MANAGEMENT AGENCY
TOWN OF WILTON, ME
(FRANKLIN CO.)**

WIN:	23144.00
Town:	Wilton
Route No.	US-2
Asset ID:	2341
Lat:	44.57287
Long:	-70.300983

Project Name:	Wilton, Hall Bridge (#2341)
Stream Name:	Butterfield (Potash) Brook
Bridge Name:	Hall Bridge
Analysis by:	meg
Date:	6/10/2019

Peak Flow Calculations by USGS Regression Equations (Hodgkins, 1999 & Lombard/Hodgkins, 2015)

Enter data in blue cells only!

	km ²	mi ²	ac	Enter data in [mi ²]
A	5.70	2.20	1408.0	Watershed Area <i>DRNAREA</i>
W	0.12	0.0	28.7	Wetlands area (by NWI)
P _c	396162.4	4938031		watershed centroid (E, N; UTM 19N; meters)
County	Franklin			choose county from drop-down menu
pptA				mean annual precipitation (inches; by look-up)
A (km ²)	5.70			
W (%)	2.04			NWI Wetlands % <i>STORNWI</i>
Conf Lvl				

ver. 2018 Jul 09

Worksheet prepared by:

Charles S. Hebson, PE
Environmental Office
Maine Dept. Transportation
Augusta, ME 04333-0016
207-557-1052
Charles.Hebson@maine.gov

References:

Hodgkins, G.A., 1999.

Estimating the magnitude of peak flows for streams

in Maine for selected recurrence intervals

WRIR 99-4008, USGS Augusta, ME

Watershed Characteristics for Monthly & Daily Flows

EAVG	904	mean basin elevation (ft)
SLOPE	17.1	mean basin slope (%)
EMAX	1703	maximum basin elevation (ft)
WATER	0	percent of drainage basin land cover classified as open water
PRECIP	46.2	mean annual precipitation
SG	0.00	sand & gravel aquifer as decimal fraction of watershed A
HGA	3.59	mean basin percentage of hydrological soil group A
DIST	91.00	distance from the coast (mi)

Ret Pd	Peak Flow Estimate			Upper	Q _T (ft ³ /s)
T (yr)	Lower	Q _T (m ³ /s)			
1.1		1.50			53.0
2	2.25	3.19	4.53		112.6
5	3.57	5.10	7.29		180.2
10	4.51	6.52	9.42		230.3
25	5.81	8.54	12.55		301.5
50	6.79	10.12	15.07		357.3
100	7.84	11.84	17.89		418.1
500	10.34	16.20	0.00		571.9

Lombard, P.J. & G.A. Hodgkins, 2015.

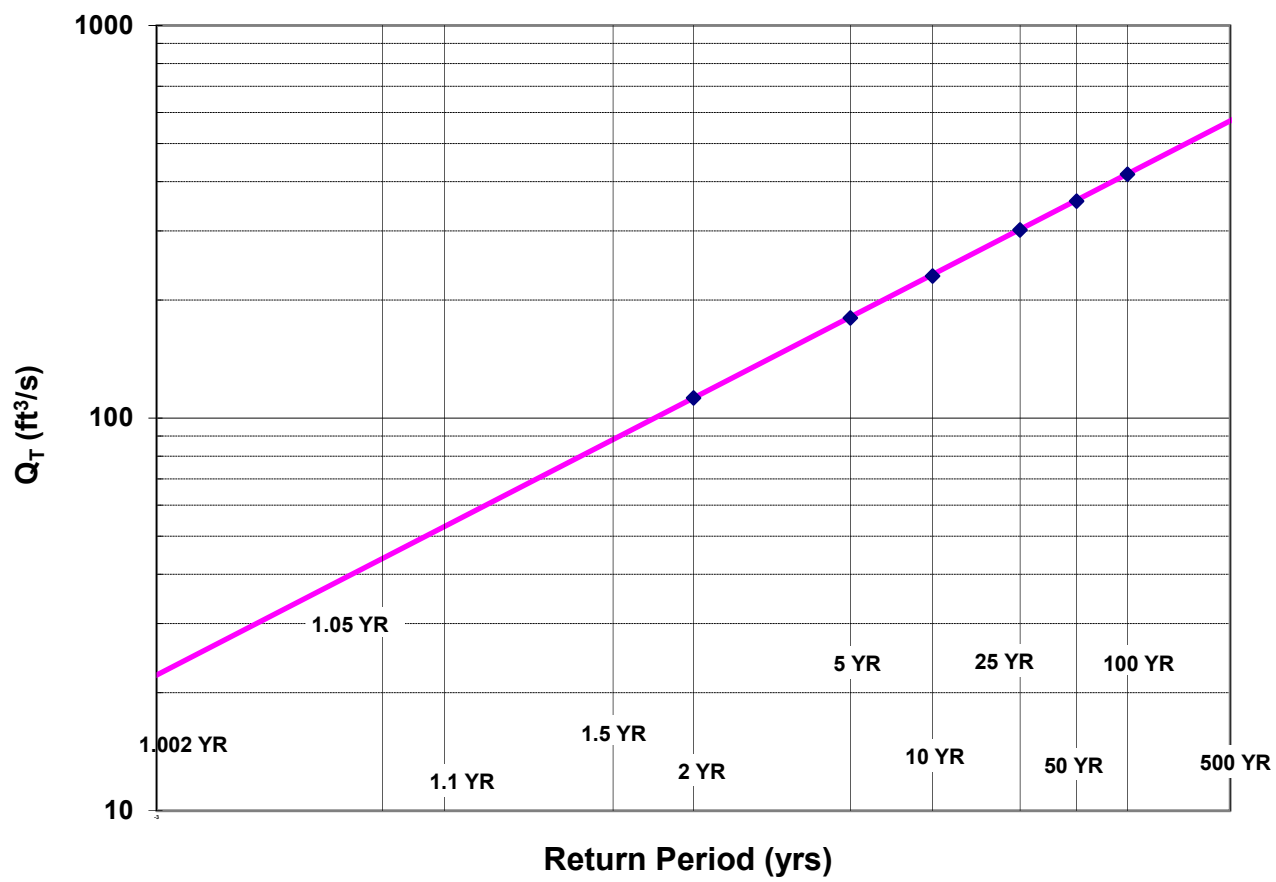
Peak flow regression equations for small, ungaged streams in

Maine - Comparing map-based to field-based variables

SIR 2015-4059, USGS, Augusta, ME

$$Q_T = b \times A^a \times 10^{-wW}$$

Log-Normal Probability Plot



WIN: 23144.00
 Town: Wilton
 Route No. US-2
 Asset ID: 2341
 Lat: 44.57287 Long: -70.30098

Project Name: Wilton, Hall Bridge (#2341)
 Stream Name: Butterfield (Potash) Brook
 Bridge Name: Hall Bridge
 Analysis by: meg
 Date: 6/10/2019

DO NOT ENTER ANY DATA ON THIS PAGE; EVERYTHING IS CALCULATED

MAINE MONTHLY MEDIAN FLOWS and HYDRAULIC GEOMETRY BY USGS REGRESSION EQUATIONS (2004, 2013, 2015)

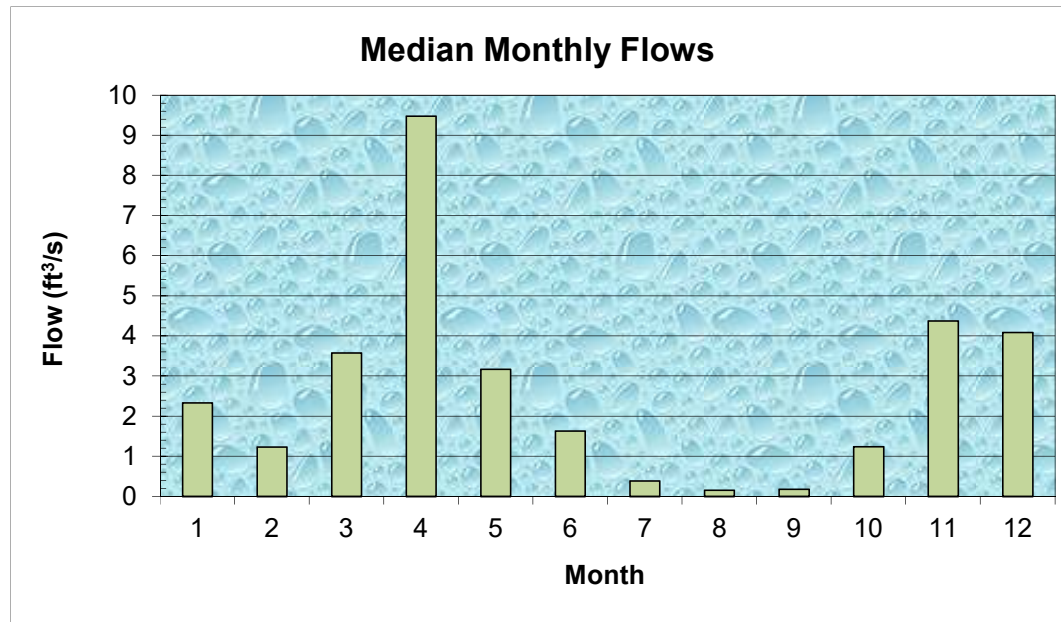
Value	Variable	Explanation
2.20	A	Area (mi ²)
396162.4	P _c	Watershed centroid (E,N; UTM; Zone 19; meters)
90.05	DIST	Distance from Coastal reference line (mi)
46.2	pptA	Mean Annual Precipitation (inches)
0.00	SG	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	Q _{median} (ft ³ /s)	(m ³ /s)
Jan	2.33	0.0661
Feb	1.23	0.0349
Mar	3.58	0.1014
Apr	9.48	0.2687
May	3.17	0.0898
Jun	1.63	0.0462
Jul	0.39	0.0111
Aug	0.16	0.0044
Sep	0.18	0.0052
Oct	1.24	0.0352
Nov	4.37	0.1240
Dec	4.09	0.1158

Q _{bf}	11.9
ann avg	5.4
ann med	2.2
Q _{1.002}	22.2
Q _{1.01}	30.2
Q _{1.05}	43.9
Q _{bf}	46.1

assume v = 4ft/s

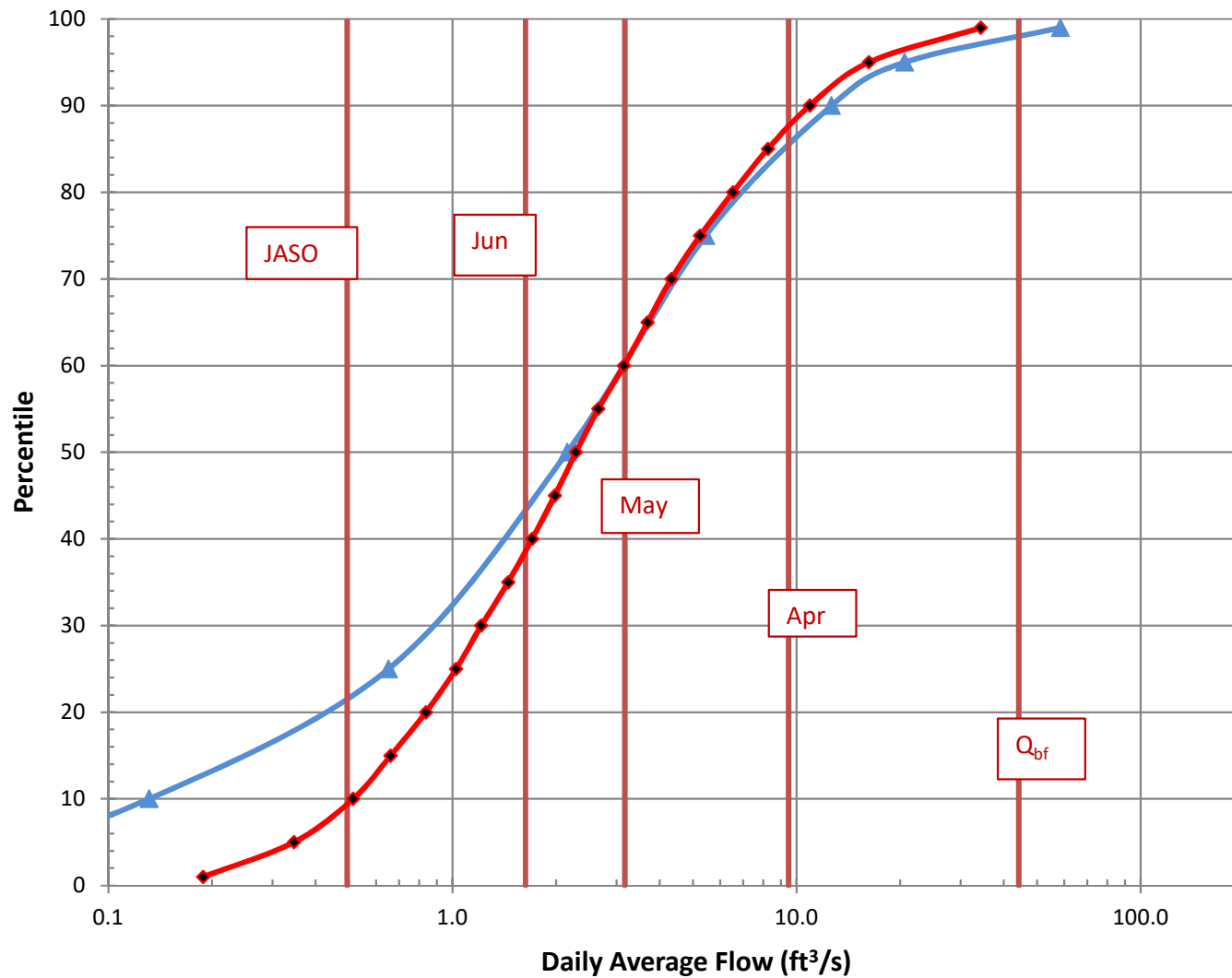
W _{bf}	14.9	estimated bankfull width (ft)
d _{bf}	0.8	estimated bankfull depth (ft)
A _{bf}	9.0	estimated bankfull flow area (ft ²)



References

Dudley, R.W., 2013. FY2013 Progress Report - Phase 1 ..., USFWS QRP Project
 Dudley, R.W., 2004. Estimating Monthly Streamflows ... , SIR 2004-5026
 Dudley, R.W., 2015. Regression Equations for Monthly and Annual Mean..., USGS SIR 2015-5151

Daily Average Flow Distribution



Daily Avg Flow Dist

$A_{ws} = (\text{mi}^2)$ 2.2

Q (ft^3/s)

Pctl	Median	84 th pctl
1	0.19	0.33
5	0.35	0.56
10	0.51	0.77
15	0.66	0.97
20	0.84	1.17
25	1.02	1.37
30	1.21	1.56
35	1.45	1.79
40	1.70	2.06
45	1.98	2.32
50	2.29	2.74
55	2.65	3.19
60	3.15	3.75
65	3.69	4.37
70	4.33	5.09
75	5.24	6.13
80	6.54	7.31
85	8.25	9.37
90	10.93	12.59
95	16.22	19.57
99	34.30	45.16

Q_{bf} 11.9

$Q_{1.002}$ 22.2

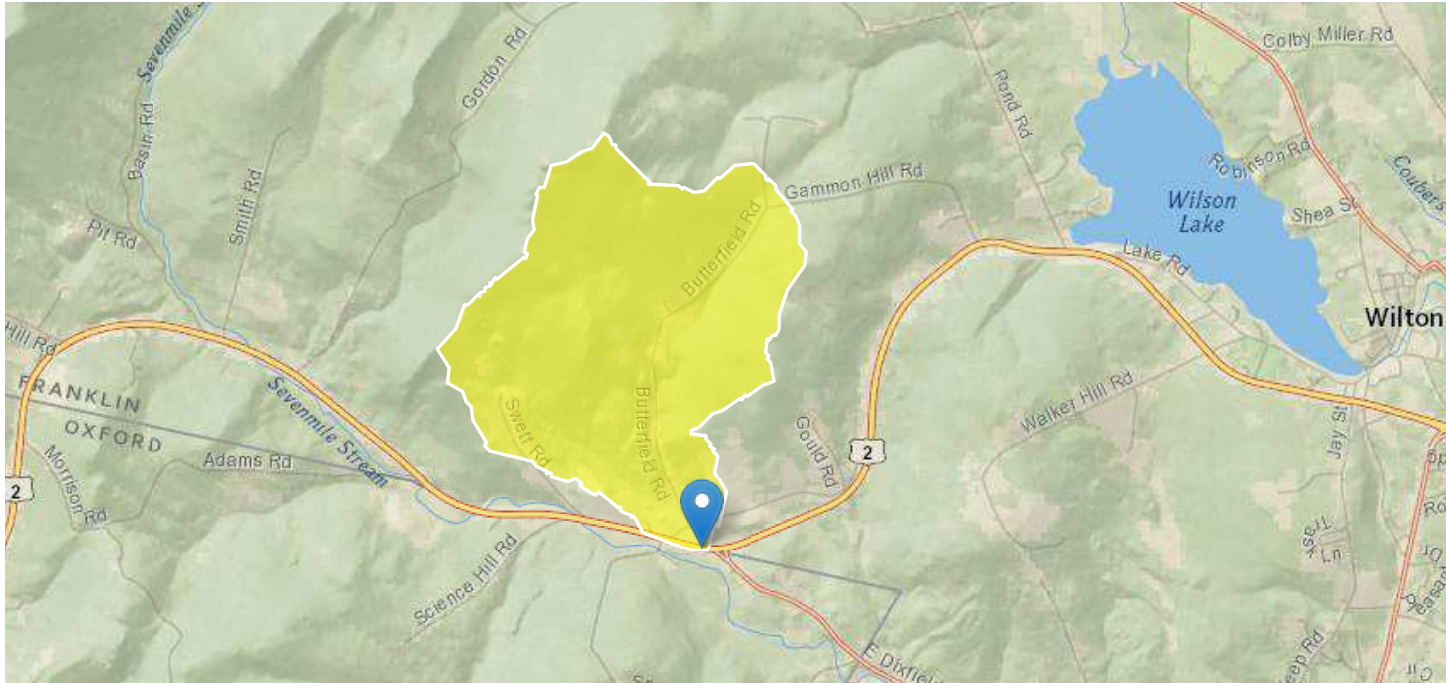
$Q_{1.1}$ 53.0

Q_2 112.6



StreamStats Report-Wilton 023144.00

Region ID: ME
Workspace ID: ME20190610135107086000
Clicked Point (Latitude, Longitude): 44.57272, -70.30104
Time: 2019-06-10 09:51:30 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	2.2	square miles
STORNWI	Percentage of storage (combined water bodies and wetlands) from the National Wetlands Inventory	2.04	percent
SANDGRAVAF	Fraction of land surface underlain by sand and gravel aquifers	0.007	dimensionless
ELEV	Mean Basin Elevation	904	feet
BSLDEM10M	Mean basin slope computed from 10 m DEM	17.1	percent
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	396162.43	feet

Parameter Code	Parameter Description	Value	Unit
CENTROIDY	Basin centroid vertical (y) location in state plane units	4938031.24	feet
COASTDIST	Shortest distance from the coastline to the basin centroid	91	miles
ELEVMAX	Maximum basin elevation	1703	feet
LC06WATER	Percent of open water, class 11, from NLCD 2006	0	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	3.57	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0.59	percent
PRECIP	Mean Annual Precipitation	46.2	inches
SANDGRAVAP	Percentage of land surface underlain by sand and gravel aquifers	0.7	percent
STATSGOA	Percentage of area of Hydrologic Soil Type A from STATSGO	3.59	percent

Bankfull Statistics Parameters[Central and Coastal Bankfull 2004 5042]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.2	square miles	2.92	298

Bankfull Statistics Disclaimers[Central and Coastal Bankfull 2004 5042]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Bankfull Statistics Flow Report[Central and Coastal Bankfull 2004 5042]

Statistic	Value	Unit
Bankfull Streamflow	11.9	ft^3/s
Bankfull Width	11.6	ft
Bankfull Depth	0.777	ft
Bankfull Area	8.96	ft^2

Bankfull Statistics Citations

Dudley, R.W.,2004, Hydraulic-Geometry Relations for Rivers in Coastal and Central Maine: U.S. Geological Survey Scientific Investigations Report 2004-5042, 30 p (<http://pubs.usgs.gov/sir/2004/5042/pdf/sir2004-5042.pdf>)

6/10/2019

StreamStats

Peak-Flow Statistics Parameters

[Statewide Peak Flow DA LT 12sqmi 2015 5049]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.2	square miles	0.31	12
STORNWI	Percentage of Storage from NWI	2.04	percent	0	22.2

Peak-Flow Statistics Flow Report

[Statewide Peak Flow DA LT 12sqmi 2015 5049]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
1.01 Year Peak Flood	32.5	ft^3/s	38
2 Year Peak Flood	113	ft^3/s	34
5 Year Peak Flood	180	ft^3/s	35
10 Year Peak Flood	230	ft^3/s	37
25 Year Peak Flood	301	ft^3/s	39
50 Year Peak Flood	357	ft^3/s	41
100 Year Peak Flood	418	ft^3/s	42
250 Year Peak Flood	480	ft^3/s	44
500 Year Peak Flood	571	ft^3/s	47

Peak-Flow Statistics Citations

Lombard, P.J., and Hodgkins, G.A.,2015, Peak flow regression equations for small, ungaged streams in Maine– Comparing map-based to field-based variables: U.S. Geological Survey Scientific Investigations Report 2015–5049, 12 p. (<http://dx.doi.org/10.3133/sir20155049>)

Annual Flow Statistics Parameters

[Statewide Annual SIR 2015 5151]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.2	square miles	14.9	1419
SANDGRAVAF	Fraction of Sand and Gravel Aquifers	0.007	dimensionless	0	0.212
ELEV	Mean Basin Elevation	904	feet	239	2120

Annual Flow Statistics Disclaimers

[Statewide Annual SIR 2015 5151]

https://streamstats.usgs.gov/ss/

3/4

6

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Annual Flow Statistics Flow Report[Statewide Annual SIR 2015 5151]

Statistic	Value	Unit
Mean Annual Flow	5.4	ft^3/s

Annual Flow Statistics Citations

Dudley, R.W.,2015, Regression equations for monthly and annual mean and selected percentile streamflows for ungaged rivers in Maine: U.S. Geological Survey Scientific Investigations Report 2015–5151, 35 p. (<http://dx.doi.org/10.3133/sir20155151>)

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Application Version: 4.3.1

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STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

IN RE BRIDGE IMPROVEMENT
HALL BRIDGE #2341

WIN 023144.00

Public Meeting At The Wilton Town Office

Reported by Robin J. Dostie, a Notary Public and
court reporter in and for the State of Maine, on
December 4, 2019, at the Wilton Town Office, 158 Weld
Street, Wilton, Maine, commencing at 6:00 p.m.

REPRESENTING THE STATE: MIKE WIGHT
FROM ERDMAN ANTHONY: CHRIS SICHAK
 JIM MANSIR

1 running last night on the More Acres Road and I heard
2 something coming up behind me, which very seldom
3 happens, and it was a logging truck and, I mean, he
4 was boogieing. I don't know if there was a plow
5 going around the other side and he was trying to get
6 ahead of that or what, but they are using it now.

7 MR. SICHAKE: Hmm.

8 MR. WIGHT: Any other questions or comments?
9 Then I'll ask a question. I always like to ask the
10 folks that live in the area, one of the things we
11 always struggle with is when you do a hydraulics is
12 I'd like to get a sense of has the road ever
13 overtopped? Has that stream ever come up to the
14 point it has gone over the road and, if so, when?

15 AUDIENCE MEMBER: (Wendell Blood.) Yeah,
16 our back yard did, but that's...

17 MR. WIGHT: Did it go over the road?

18 AUDIENCE MEMBER: (Wendell Blood.) Nope.
19 Nope. And I would -- that was -- I'll bring that up.
20 Soon after we bought the place in '92 they redid the
21 surface on Route 2 there. Well, coming in off the
22 road to our driveway they added somewhat of a raise
23 to it and when they took that down they never raised
24 that back up and now the water runs right down the
25 road and comes down in my driveway. And I've --

Highway Bridge Inspection Report

HALL
RTE'S 2 & 17
over
HOOPER(BUTTERFIELD) BRK.



Inspection Date: 07/17/2018

Inspected By: Jamie Hannum

Inspection Type(s): Routine

(48) LENGTH OF MAXIMUM SPAN (ft.)	20
(49) STRUCTURE LENGTH (ft.)	23.0
(50) CURB/SIDEWALK WIDTHS	
(50A) LEFT CURB SIDEWALK (ft.)	0
(50B) RIGHT CURB SIDEWALK (ft.)	0
(51) BRDG RDWY WIDTH CURB-TO-CURB (ft.)	44.0
(52) DECK WIDTH, OUT-TO-OUT (ft.)	47.0
(32) APPROACH ROADWAY WIDTH (ft.)	44.0
(33) BRIDGE MEDIAN	0 - No median
(34) SKEW (deg.)	0
(35) STRUCTURE FLARED	0 - No flare
(10) INV RTE, MIN VERT CLEARANCE (ft.)	328.05
(47) TOTAL HORIZONTAL CLEARANCE (ft.)	44.0
(53) VERTICAL CLEARANCE OVER BRIDGE ROADWAY (ft.)	327.76
(54) MIN VERTICAL UNDERCLEARANCE	
(54A) REFERENCE FEATURE	N - Feature not a highway or railroad
(54B) MIN VERTICAL UNDERCARENCE (ft.)	0
(55) MIN LATERAL UNDER CLEARANCE RIGHT	
(55A) REFERENCE FEATURE	N - Feature not a highway or railroad
(55B) MIN LATERAL UNDER CLEARANCE RIGHT (ft.)	327.76
(56) MIN LATERAL UNDER CLEARANCE (ft.)	99.9

Classification

(112) NBIS BRIDGE LENGTH	Yes
(104) HIGHWAY SYSTEM OF THE INVENTORY ROUTE	1 - Structure/Route is on NHS
(26) FUNCTIONAL CLASSIFICATION OF INVENTORY ROUTE	02 - Rural - Principal Arterial - Other
(100) STRAHNET HIGHWAY DESIGNATION	Not a STRAHNET route
(101) PARALLEL STRUCTURE DESIGNATION	N - No parallel structure
(102) DIRECTION OF TRAFFIC	2-way traffic
(103) TEMP STRUCTURE	
(105) FEDERAL LANDS HIGHWAYS	Not Applicable
(110) DESIGNATED NATIONAL NETWORK	Inventory route not on network
(20) TOLL	3 - On Free Road
(21) MAINTENANCE RESPONSIBILITY	01 - State Highway Agency
(22) OWNER	01 - State Highway Agency
(37) HISTORICAL SIGNIFICANCE	5 - Not eligible

Condition

(58) DECK	4 - Poor Condition (advanced deterioration)
(59) SUPERSTRUCTURE	4 - Poor Condition (advanced deterioration)
(60) SUBSTRUCTURE	6 - Satisfactory Condition (minor deterioration)
(61) CHANNEL & CHANNEL PROTECTION	5 - Bank eroded.. major damage
(62) CULVERT	N - Not Applicable

Load Rating and Posting

(31) DESIGN LOAD	5 - HS 20
(63) METHOD USED TO DETERMINE OPERATING RATING	8 - Load and Resistance Factor
(64) OPERATING RATING	1.02
(65) METHOD USED TO DETERMINE INVENTORY RATING	8 - Load and Resistance Factor
(66) INVENTORY RATING	0.79
(70) BRIDGE POSTING	5 - Equal to or above legal
(41) STRUCTURE OPEN/POSTED/CLOSED	A - Open

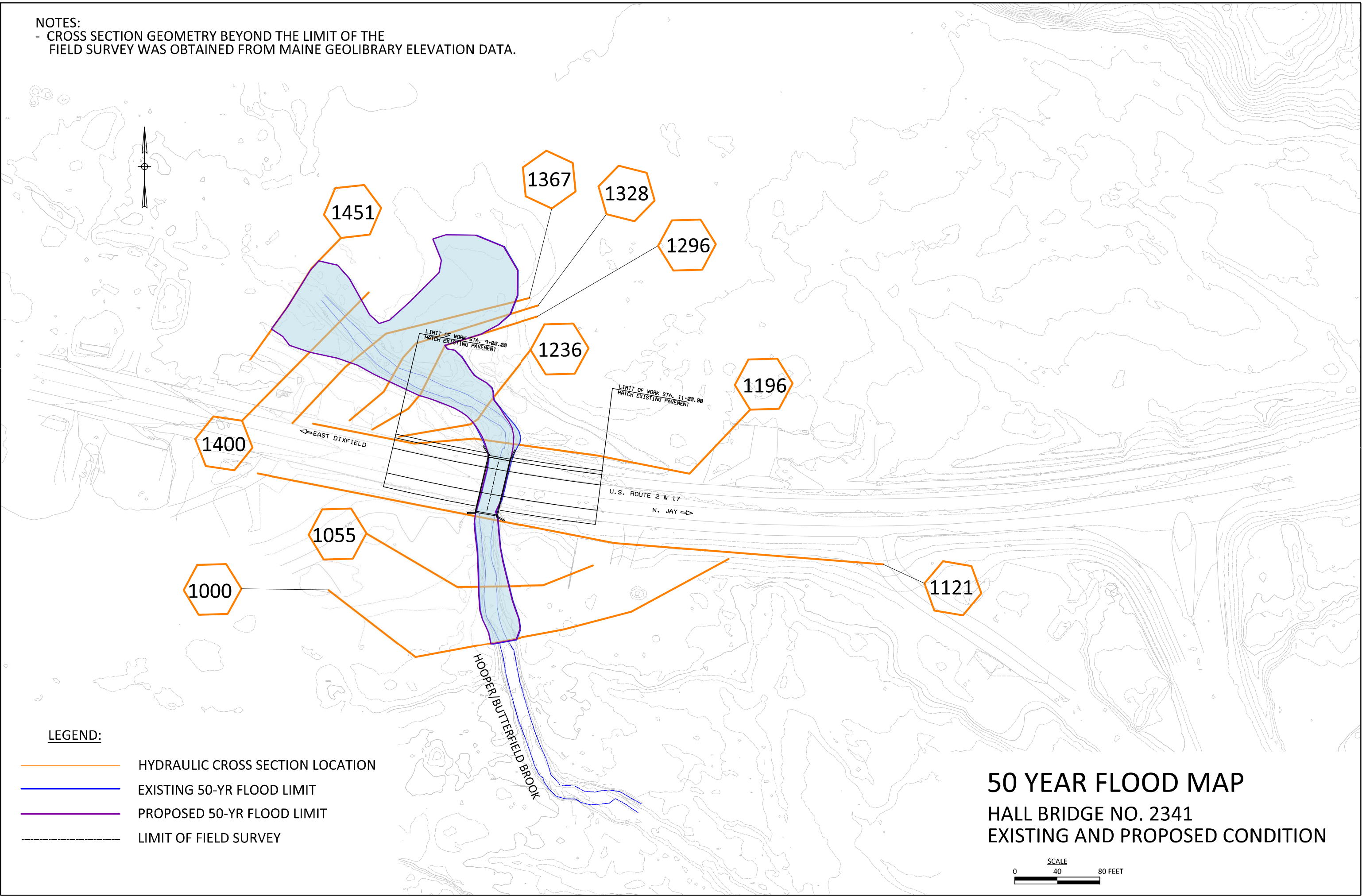
Appraisal

(67) STRUCTURAL EVALUATION	4
(68) DECK GEOMETRY	7
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL	N
(71) WATERWAY ADEQUACY	7 - Slight Chance of Overtopping Bridge
(72) APPROACH ROADWAY ALIGNMENT	8 - Equal to present desirable criteria
(36) TRAFFIC SAFETY FEATURE	
36A) BRIDGE RAILINGS:	0 - Does not meet acceptable standards/safety feature is required
36B) TRANSITIONS:	0 - Does not meet acceptable standards/safety feature is required
36C) APPROACH GUARDRAIL	0 - Does not meet acceptable standards/safety feature is required
36D) APPROACH GUARDRAIL ENDS	0 - Does not meet acceptable standards/safety feature is required
(113) SCOUR CRITICAL BRIDGES	5 - Scour within limits of footing or piles

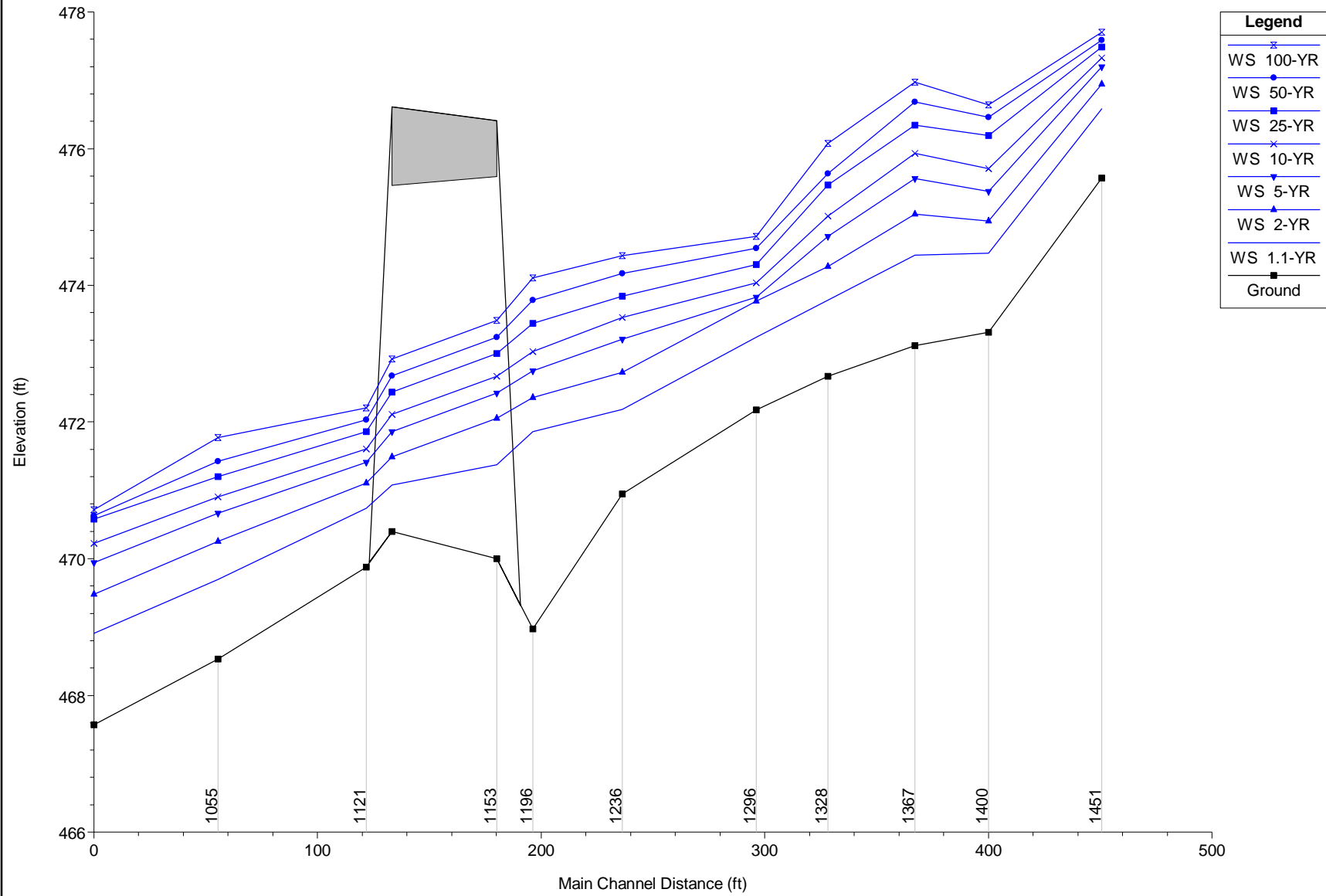
Proposed Improvements

(75) TYPE OF WORK

NOTES:
- CROSS SECTION GEOMETRY BEYOND THE LIMIT OF THE
FIELD SURVEY WAS OBTAINED FROM MAINE GEOLIBRARY ELEVATION DATA.



HEC-RAS Model Plan: Existing5_with bridgeND
Geom: Existing Geom5_with bridge Flow: USGS Streamstats



HEC-RAS Plan: EX5_bridge ND River: Butterfield Bk Reach: study

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
study	1451	1.1-YR	53.00	475.57	476.58	476.58	476.88	0.021966	4.37	12.12	20.79	1.01
study	1451	2-YR	113.00	475.57	476.95	477.02	477.42	0.021979	5.50	20.76	30.60	1.07
study	1451	5-YR	180.00	475.57	477.20	477.38	477.81	0.021944	6.38	31.57	57.05	1.11
study	1451	10-YR	230.00	475.57	477.33	477.52	478.02	0.021968	6.91	39.39	62.55	1.13
study	1451	25-YR	302.00	475.57	477.49	477.69	478.26	0.021954	7.52	49.55	66.80	1.15
study	1451	50-YR	357.00	475.57	477.59	477.86	478.43	0.021967	7.92	56.92	74.94	1.17
study	1451	100-YR	418.00	475.57	477.70	477.97	478.60	0.021942	8.31	65.76	85.77	1.18
study	1400	1.1-YR	53.00	473.31	474.47	474.69	475.21	0.050970	6.90	7.69	12.30	1.54
study	1400	2-YR	113.00	473.31	474.94	475.21	475.93	0.037740	7.99	14.48	17.06	1.42
study	1400	5-YR	180.00	473.31	475.37	475.66	476.52	0.027232	8.67	22.40	19.32	1.28
study	1400	10-YR	230.00	473.31	475.70	475.95	476.88	0.021419	8.84	29.05	21.05	1.18
study	1400	25-YR	302.00	473.31	476.19	476.65	477.32	0.015299	8.80	41.75	41.25	1.04
study	1400	50-YR	357.00	473.31	476.46	476.82	477.56	0.013363	8.88	56.71	65.26	0.99
study	1400	100-YR	418.00	473.31	476.64	476.97	477.76	0.012924	9.15	69.24	71.19	0.98
study	1367	1.1-YR	53.00	473.12	474.44	474.12	474.62	0.007258	3.45	15.38	15.94	0.62
study	1367	2-YR	113.00	473.12	475.04	474.69	475.30	0.006915	4.12	28.63	37.84	0.64
study	1367	5-YR	180.00	473.12	475.56	475.09	475.85	0.005143	4.45	47.85	128.98	0.58
study	1367	10-YR	230.00	473.12	475.93	475.35	476.22	0.004145	4.52	63.61	146.84	0.54
study	1367	25-YR	302.00	473.12	476.34	475.64	476.66	0.003783	4.83	86.00	176.40	0.53
study	1367	50-YR	357.00	473.12	476.68	475.85	476.99	0.003192	4.82	108.40	188.72	0.50
study	1367	100-YR	418.00	473.12	476.97	475.96	477.28	0.002937	4.92	128.47	192.12	0.48
study	1328	1.1-YR	53.00	472.67	473.78	473.78	474.16	0.020704	4.93	10.75	14.52	1.01
study	1328	2-YR	113.00	472.67	474.28	474.28	474.86	0.017989	6.14	18.50	16.74	1.01
study	1328	5-YR	180.00	472.67	474.72	474.72	475.48	0.015379	7.04	26.31	33.57	0.98
study	1328	10-YR	230.00	472.67	475.01	475.01	475.89	0.014092	7.55	32.51	93.26	0.97
study	1328	25-YR	302.00	472.67	475.47	475.47	476.37	0.011200	7.77	46.59	118.29	0.89
study	1328	50-YR	357.00	472.67	475.63	475.63	476.70	0.012176	8.48	52.03	123.09	0.94
study	1328	100-YR	418.00	472.67	476.07	476.07	477.03	0.009114	8.17	71.52	147.31	0.84
study	1296	1.1-YR	53.00	472.18	473.24	473.09	473.50	0.011762	4.09	12.96	15.03	0.78
study	1296	2-YR	113.00	472.18	473.77	473.60	474.20	0.012001	5.27	21.43	17.01	0.83
study	1296	5-YR	180.00	472.18	473.82	474.04	474.83	0.026684	8.03	22.42	17.23	1.24
study	1296	10-YR	230.00	472.18	474.03	474.32	475.24	0.027865	8.80	26.14	18.02	1.29
study	1296	25-YR	302.00	472.18	474.30	474.67	475.77	0.029132	9.70	31.15	19.61	1.34
study	1296	50-YR	357.00	472.18	474.54	474.91	476.09	0.025732	9.99	36.14	32.73	1.29
study	1296	100-YR	418.00	472.18	474.71	475.18	476.48	0.026209	10.69	40.06	52.97	1.32

HEC-RAS Plan: EX5_bridge ND River: Butterfield Bk Reach: study (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
study	1236	1.1-YR	53.00	470.95	472.19	472.19	472.59	0.020032	5.08	10.42	13.05	1.00
study	1236	2-YR	113.00	470.95	472.72	472.72	473.34	0.016863	6.27	18.18	15.74	0.99
study	1236	5-YR	180.00	470.95	473.21	473.21	473.98	0.013940	7.10	26.78	19.84	0.95
study	1236	10-YR	230.00	470.95	473.53	473.53	474.38	0.012489	7.52	33.40	22.67	0.92
study	1236	25-YR	302.00	470.95	473.84	473.84	474.88	0.012827	8.38	40.26	25.54	0.96
study	1236	50-YR	357.00	470.95	474.17	474.17	475.24	0.011192	8.53	48.50	32.19	0.92
study	1236	100-YR	418.00	470.95	474.43	474.43	475.59	0.010847	8.93	55.65	34.58	0.92
study	1196	1.1-YR	53.00	468.97	471.86	471.09	472.02	0.003645	3.15	17.40	13.69	0.44
study	1196	2-YR	113.00	468.97	472.36	471.83	472.72	0.006187	4.93	25.49	18.85	0.61
study	1196	5-YR	180.00	468.97	472.75	472.46	473.33	0.008058	6.32	33.66	22.91	0.71
study	1196	10-YR	230.00	468.97	473.03	472.82	473.72	0.008525	6.98	40.46	25.81	0.75
study	1196	25-YR	302.00	468.97	473.44	473.24	474.20	0.008139	7.50	52.02	30.11	0.75
study	1196	50-YR	357.00	468.97	473.78	473.59	474.51	0.007091	7.50	62.32	33.64	0.71
study	1196	100-YR	418.00	468.97	474.11	473.80	474.84	0.006501	7.62	73.32	70.37	0.69
study	1153	Bridge										
study	1121	1.1-YR	53.00	469.88	470.74	470.74	471.06	0.021216	4.58	11.57	17.86	1.00
study	1121	2-YR	113.00	469.88	471.11	471.18	471.70	0.022855	6.16	18.35	19.02	1.11
study	1121	5-YR	180.00	469.88	471.41	471.55	472.26	0.024231	7.40	24.33	19.98	1.18
study	1121	10-YR	230.00	469.88	471.60	471.81	472.64	0.024358	8.17	28.21	20.58	1.21
study	1121	25-YR	302.00	469.88	471.86	472.13	473.14	0.024210	9.09	33.51	21.38	1.24
study	1121	50-YR	357.00	469.88	472.03	472.37	473.49	0.024228	9.71	37.27	21.92	1.26
study	1121	100-YR	418.00	469.88	472.21	472.60	473.86	0.024339	10.35	41.20	22.48	1.28
study	1055	1.1-YR	53.00	468.53	469.70	469.55	469.95	0.011615	4.06	13.04	15.12	0.77
study	1055	2-YR	113.00	468.53	470.25	470.05	470.67	0.010542	5.18	21.88	16.83	0.79
study	1055	5-YR	180.00	468.53	470.66	470.47	471.28	0.010934	6.31	29.10	18.11	0.84
study	1055	10-YR	230.00	468.53	470.91	470.75	471.68	0.011536	7.06	33.62	18.87	0.88
study	1055	25-YR	302.00	468.53	471.20	471.13	472.21	0.012612	8.08	39.30	21.46	0.94
study	1055	50-YR	357.00	468.53	471.43	471.43	472.58	0.012791	8.67	44.97	28.48	0.96
study	1055	100-YR	418.00	468.53	471.77	471.77	472.95	0.011118	8.80	55.99	46.86	0.92
study	1000	1.1-YR	53.00	467.57	468.91	468.80	469.23	0.014308	4.60	11.53	12.98	0.86
study	1000	2-YR	113.00	467.57	469.48	469.38	469.98	0.014320	5.69	19.87	16.15	0.90
study	1000	5-YR	180.00	467.57	469.94	469.85	470.59	0.014309	6.45	27.92	18.70	0.93
study	1000	10-YR	230.00	467.57	470.22	470.13	470.96	0.014303	6.88	33.42	20.26	0.94

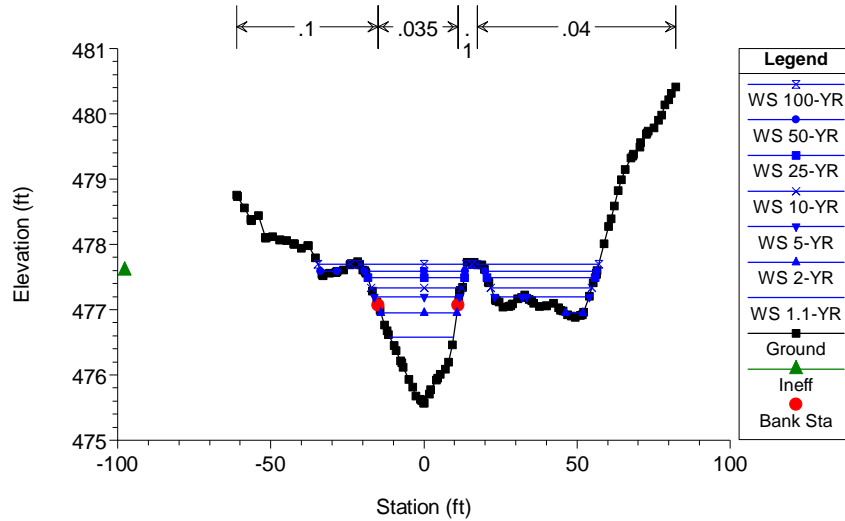
HEC-RAS Plan: EX5_bridge ND River: Butterfield Bk Reach: study (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
study	1000	25-YR	302.00	467.57	470.58	470.51	471.41	0.014306	7.32	41.34	23.89	0.96
study	1000	50-YR	357.00	467.57	470.63	470.74	471.73	0.018135	8.41	42.64	24.88	1.09
study	1000	100-YR	418.00	467.57	470.72	471.06	472.09	0.021414	9.41	44.82	26.44	1.19

HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

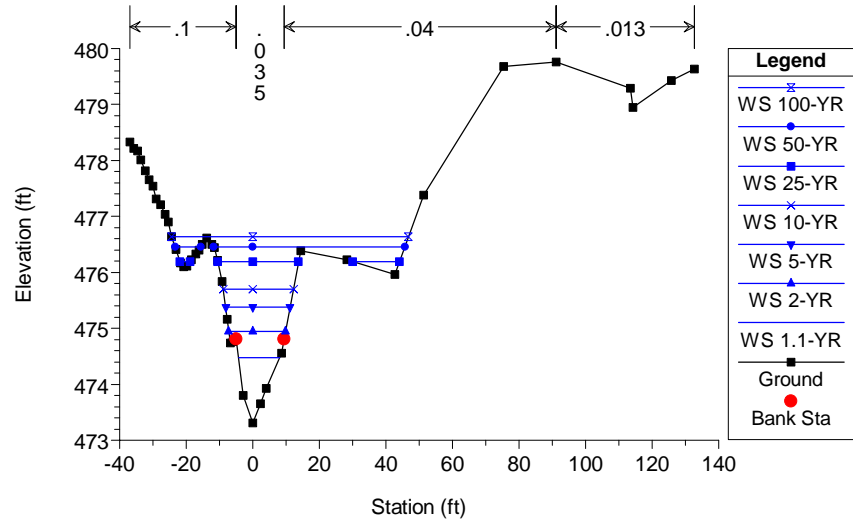
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HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

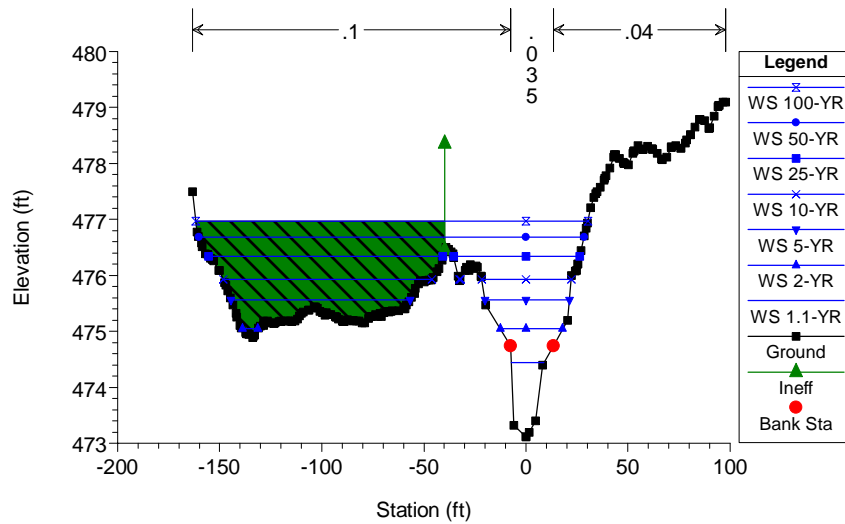
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HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

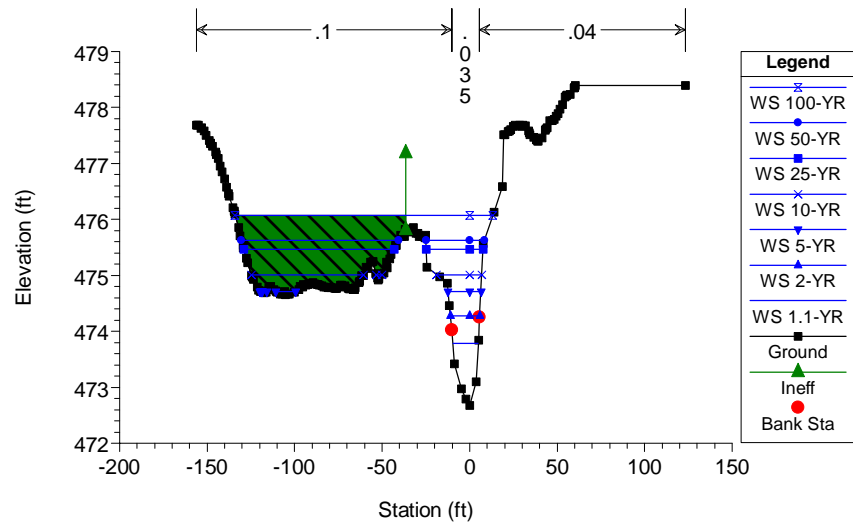
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HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

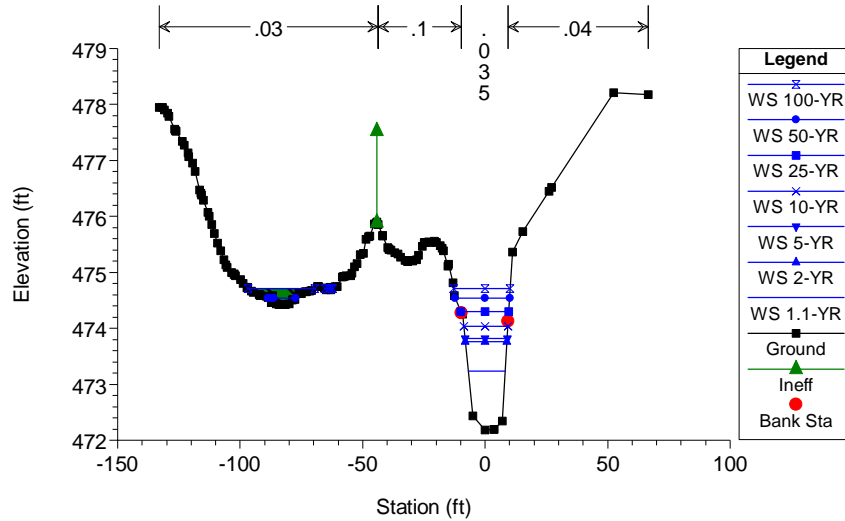
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HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

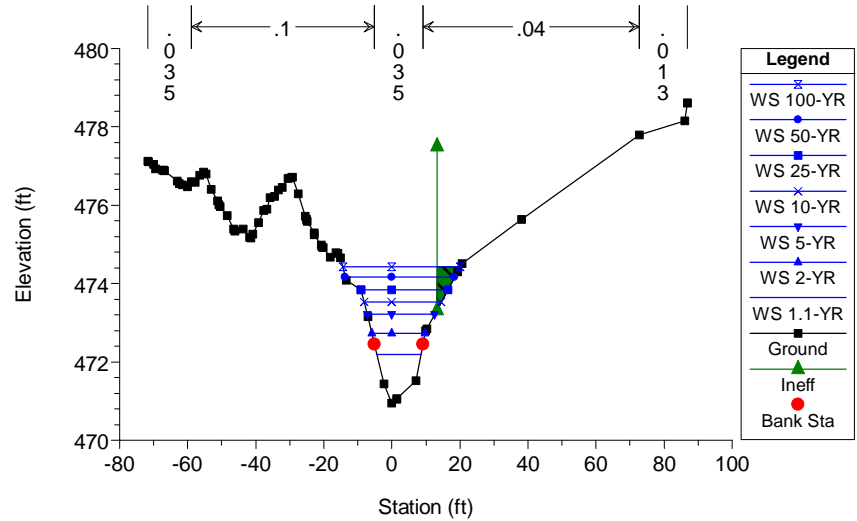
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HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

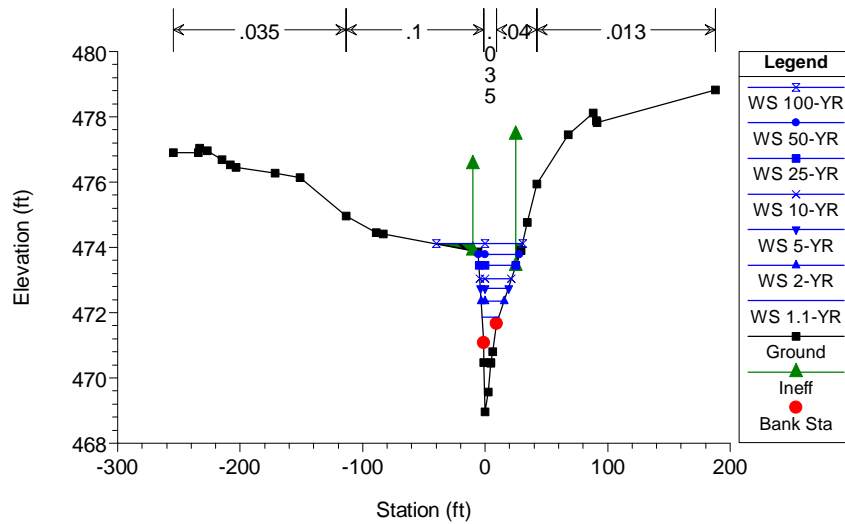
RS = 1236 Franklin Co. FIS



HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

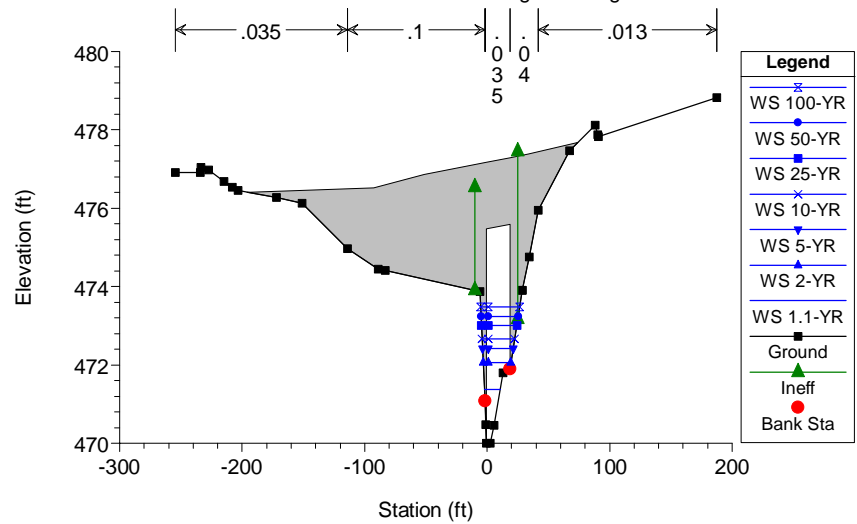
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HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

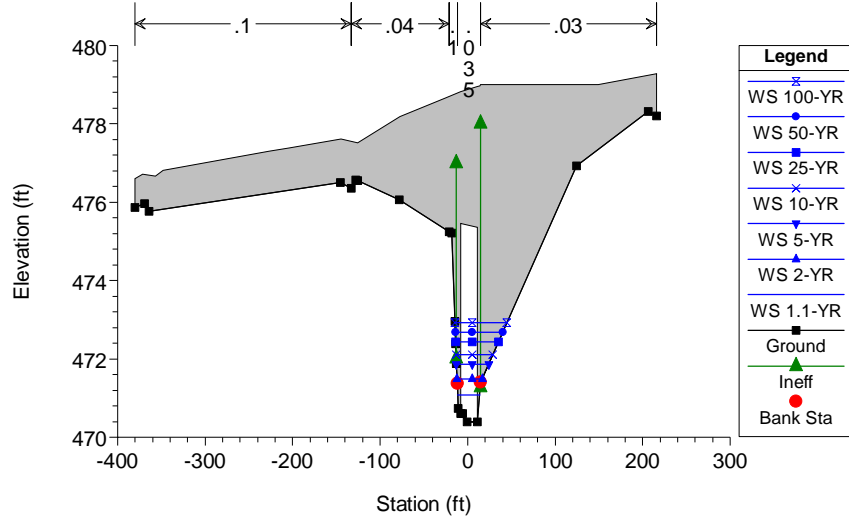
RS = 1153 BR Hall Bridge-Existing



HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

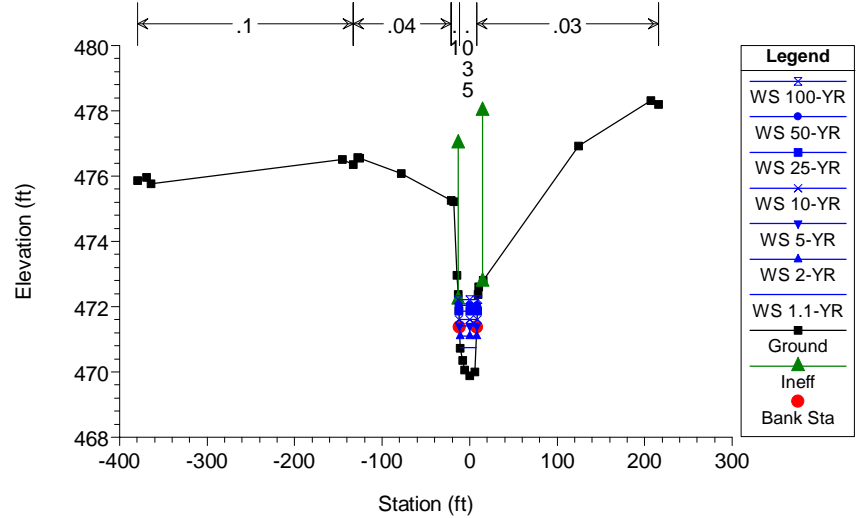
RS = 1153 BR Hall Bridge-Existing



HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

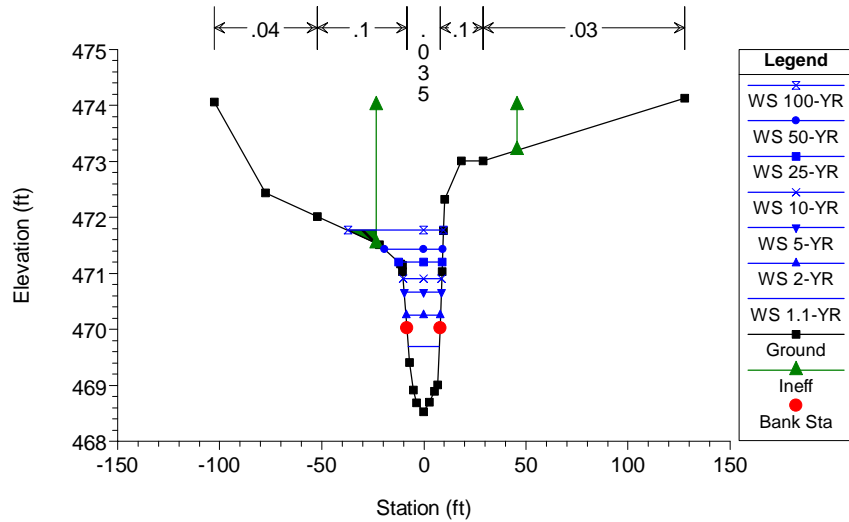
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HEC-RAS Model Plan: Existing5_with bridgeND

Geom: Existing Geom5_with bridge Flow: USGS Streamstats

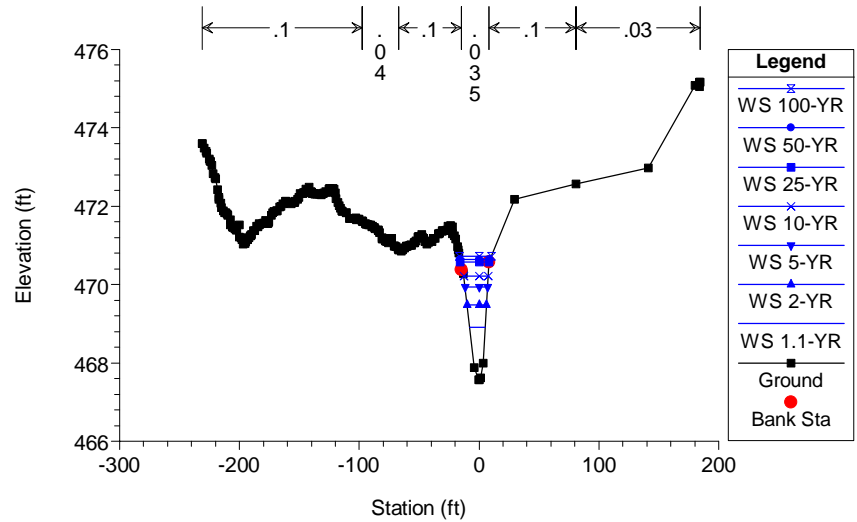
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HEC-RAS Model Plan: Existing5_with bridgeND

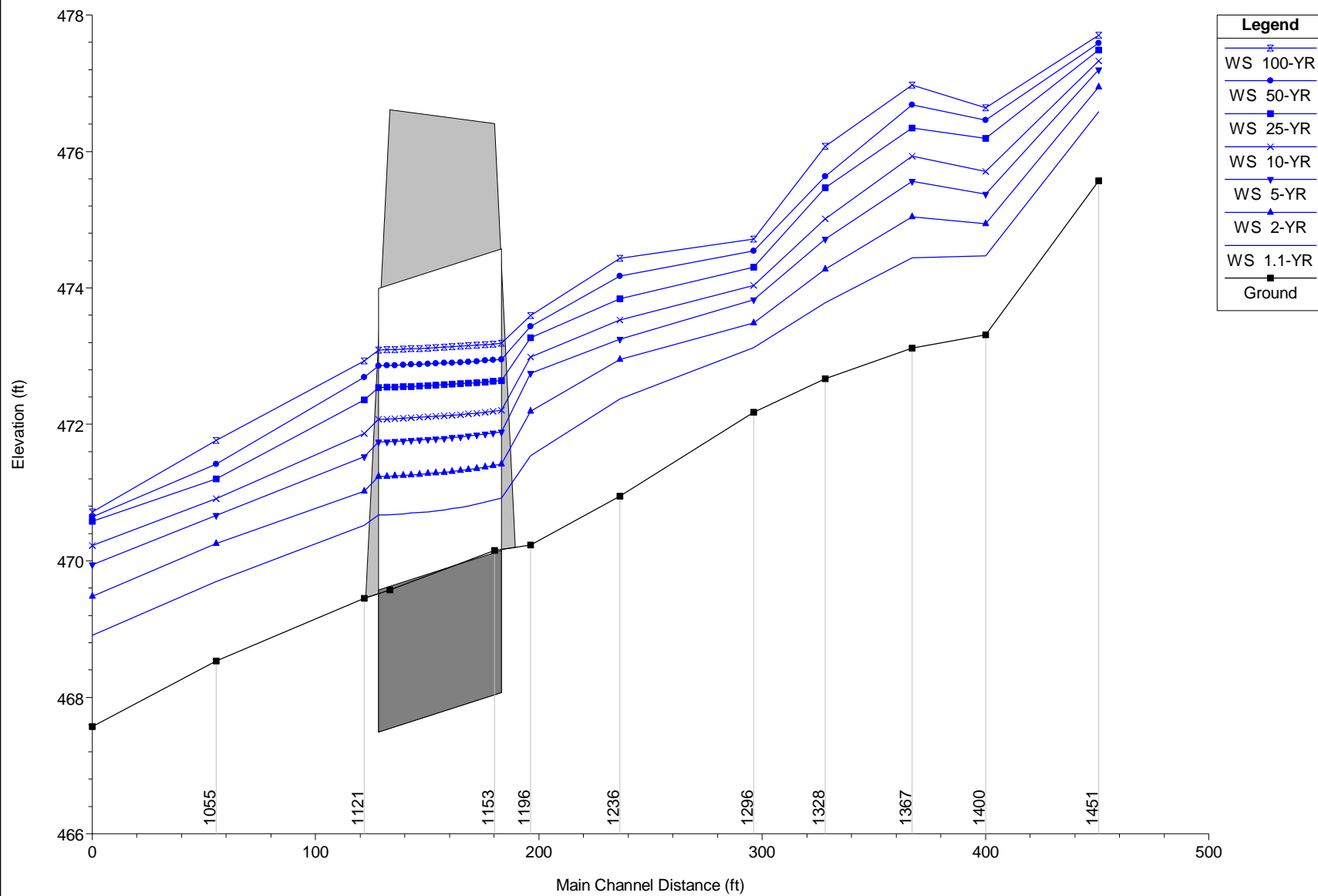
Geom: Existing Geom5_with bridge Flow: USGS Streamstats

RS = 1000 Oxford Co., ME FIS



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats



HEC-RAS Plan: PR3_5 River: Butterfield Bk Reach: study

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
study	1451	1.1-YR	53.00	475.57	476.58	476.58	476.88	0.021966	4.37	12.12	20.79	1.01
study	1451	2-YR	113.00	475.57	476.95	477.02	477.42	0.021979	5.50	20.76	30.60	1.07
study	1451	5-YR	180.00	475.57	477.20	477.38	477.81	0.021944	6.38	31.57	57.05	1.11
study	1451	10-YR	230.00	475.57	477.33	477.52	478.02	0.021968	6.91	39.39	62.55	1.13
study	1451	25-YR	302.00	475.57	477.49	477.69	478.26	0.021954	7.52	49.55	66.80	1.15
study	1451	50-YR	357.00	475.57	477.59	477.86	478.43	0.021967	7.92	56.92	74.94	1.17
study	1451	100-YR	418.00	475.57	477.70	477.97	478.60	0.021942	8.31	65.76	85.77	1.18
study	1400	1.1-YR	53.00	473.31	474.47	474.69	475.21	0.050970	6.90	7.69	12.30	1.54
study	1400	2-YR	113.00	473.31	474.94	475.21	475.93	0.037740	7.99	14.48	17.06	1.42
study	1400	5-YR	180.00	473.31	475.37	475.66	476.52	0.027232	8.67	22.40	19.32	1.28
study	1400	10-YR	230.00	473.31	475.70	475.95	476.88	0.021419	8.84	29.05	21.05	1.18
study	1400	25-YR	302.00	473.31	476.19	476.65	477.32	0.015299	8.80	41.75	41.25	1.04
study	1400	50-YR	357.00	473.31	476.46	476.82	477.56	0.013363	8.88	56.71	65.26	0.99
study	1400	100-YR	418.00	473.31	476.64	476.97	477.76	0.012924	9.15	69.24	71.19	0.98
study	1367	1.1-YR	53.00	473.12	474.44	474.12	474.62	0.007262	3.45	15.37	15.94	0.62
study	1367	2-YR	113.00	473.12	475.04	474.69	475.30	0.006915	4.12	28.63	37.84	0.64
study	1367	5-YR	180.00	473.12	475.56	475.09	475.85	0.005144	4.45	47.85	128.98	0.58
study	1367	10-YR	230.00	473.12	475.93	475.35	476.22	0.004145	4.52	63.61	146.84	0.54
study	1367	25-YR	302.00	473.12	476.34	475.64	476.66	0.003783	4.83	86.00	176.40	0.53
study	1367	50-YR	357.00	473.12	476.68	475.85	476.99	0.003192	4.82	108.40	188.72	0.50
study	1367	100-YR	418.00	473.12	476.97	475.96	477.28	0.002937	4.92	128.47	192.12	0.48
study	1328	1.1-YR	53.00	472.67	473.78	473.78	474.16	0.020684	4.93	10.75	14.52	1.01
study	1328	2-YR	113.00	472.67	474.28	474.28	474.86	0.017989	6.14	18.50	16.74	1.01
study	1328	5-YR	180.00	472.67	474.72	474.72	475.48	0.015379	7.04	26.31	33.57	0.98
study	1328	10-YR	230.00	472.67	475.01	475.01	475.89	0.014092	7.55	32.51	93.26	0.97
study	1328	25-YR	302.00	472.67	475.47	475.47	476.37	0.011200	7.77	46.59	118.29	0.89
study	1328	50-YR	357.00	472.67	475.63	475.63	476.70	0.012176	8.48	52.03	123.09	0.94
study	1328	100-YR	418.00	472.67	476.07	476.07	477.03	0.009114	8.17	71.52	147.31	0.84
study	1296	1.1-YR	53.00	472.18	473.12	473.09	473.47	0.017850	4.69	11.30	14.61	0.94
study	1296	2-YR	113.00	472.18	473.49	473.60	474.19	0.024468	6.71	16.83	15.97	1.15
study	1296	5-YR	180.00	472.18	473.82	474.04	474.83	0.026684	8.03	22.42	17.23	1.24
study	1296	10-YR	230.00	472.18	474.03	474.32	475.24	0.027865	8.80	26.14	18.02	1.29
study	1296	25-YR	302.00	472.18	474.30	474.67	475.77	0.029132	9.70	31.15	19.61	1.34
study	1296	50-YR	357.00	472.18	474.54	474.91	476.09	0.025732	9.99	36.14	32.73	1.29
study	1296	100-YR	418.00	472.18	474.71	475.18	476.48	0.026209	10.69	40.06	52.97	1.32

HEC-RAS Plan: PR3_5 River: Butterfield Bk Reach: study (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
study	1236	1.1-YR	53.00	470.95	472.37	472.19	472.63	0.010750	4.10	12.93	13.98	0.75
study	1236	2-YR	113.00	470.95	472.95	472.72	473.38	0.009676	5.30	21.87	17.49	0.77
study	1236	5-YR	180.00	470.95	473.25	473.21	473.99	0.012974	6.94	27.50	20.16	0.92
study	1236	10-YR	230.00	470.95	473.53	473.53	474.38	0.012489	7.52	33.40	22.67	0.92
study	1236	25-YR	302.00	470.95	473.84	473.84	474.88	0.012827	8.38	40.26	25.54	0.96
study	1236	50-YR	357.00	470.95	474.17	474.17	475.24	0.011192	8.53	48.50	32.19	0.92
study	1236	100-YR	418.00	470.95	474.43	474.43	475.59	0.010847	8.93	55.65	34.58	0.92
study	1196	1.1-YR	53.00	470.23	471.54	471.54	472.01	0.019292	5.48	9.82	10.99	1.00
study	1196	2-YR	113.00	470.23	472.19	472.19	472.85	0.014308	6.58	18.86	17.14	0.93
study	1196	5-YR	180.00	470.23	472.75	472.75	473.50	0.011464	7.23	29.98	22.91	0.88
study	1196	10-YR	230.00	470.23	472.99	473.07	473.88	0.012226	8.02	35.74	25.39	0.92
study	1196	25-YR	302.00	470.23	473.27	473.52	474.36	0.013243	9.00	43.32	28.32	0.98
study	1196	50-YR	357.00	470.23	473.44	473.73	474.69	0.014309	9.75	48.20	30.06	1.03
study	1196	100-YR	418.00	470.23	473.59	473.84	475.01	0.015358	10.47	52.88	31.67	1.08
study	1153		Culvert									
study	1121	1.1-YR	53.00	469.45	470.52	470.40	470.76	0.012587	3.91	13.56	17.53	0.78
study	1121	2-YR	113.00	469.45	471.02	470.85	471.41	0.011728	5.00	22.59	18.76	0.80
study	1121	5-YR	180.00	469.45	471.53	471.25	472.01	0.009771	5.56	32.41	20.34	0.77
study	1121	10-YR	230.00	469.45	471.87	471.50	472.40	0.008421	5.86	39.56	21.41	0.74
study	1121	25-YR	302.00	469.45	472.36	471.83	472.94	0.006819	6.12	50.49	22.96	0.69
study	1121	50-YR	357.00	469.45	472.69	472.07	473.32	0.006211	6.35	58.24	26.29	0.67
study	1121	100-YR	418.00	469.45	472.93	472.32	473.63	0.006400	6.81	64.57	32.81	0.69
study	1055	1.1-YR	53.00	468.53	469.70	469.55	469.95	0.011615	4.06	13.04	15.12	0.77
study	1055	2-YR	113.00	468.53	470.25	470.05	470.67	0.010533	5.18	21.88	16.83	0.79
study	1055	5-YR	180.00	468.53	470.66	470.47	471.28	0.010934	6.31	29.10	18.11	0.84
study	1055	10-YR	230.00	468.53	470.91	470.75	471.68	0.011532	7.06	33.62	18.87	0.88
study	1055	25-YR	302.00	468.53	471.20	471.13	472.21	0.012612	8.08	39.30	21.46	0.94
study	1055	50-YR	357.00	468.53	471.42	471.43	472.58	0.012887	8.69	44.82	28.31	0.96
study	1055	100-YR	418.00	468.53	471.76	471.77	472.95	0.011203	8.82	55.79	46.49	0.92
study	1000	1.1-YR	53.00	467.57	468.91	468.80	469.23	0.014308	4.60	11.53	12.98	0.86
study	1000	2-YR	113.00	467.57	469.48	469.38	469.98	0.014320	5.69	19.87	16.15	0.90
study	1000	5-YR	180.00	467.57	469.94	469.85	470.59	0.014309	6.45	27.92	18.70	0.93
study	1000	10-YR	230.00	467.57	470.22	470.13	470.96	0.014304	6.88	33.42	20.26	0.94

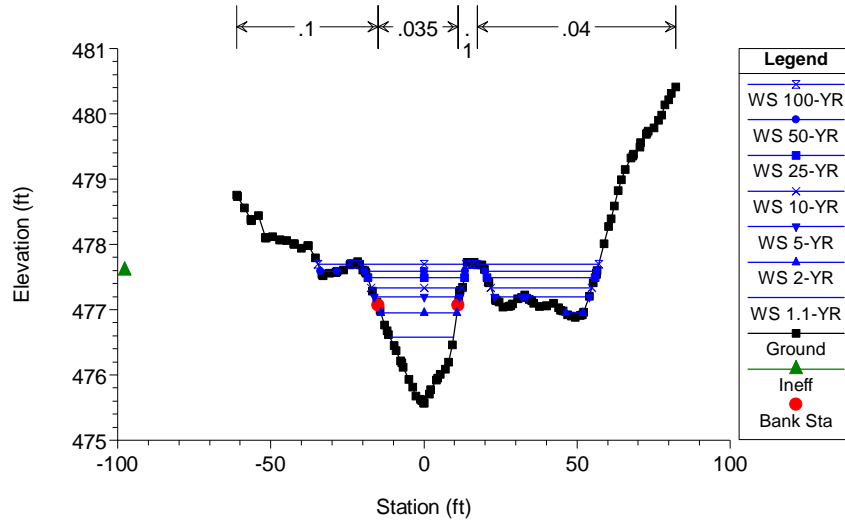
HEC-RAS Plan: PR3_5 River: Butterfield Bk Reach: study (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
study	1000	25-YR	302.00	467.57	470.58	470.51	471.41	0.014306	7.32	41.34	23.89	0.96
study	1000	50-YR	357.00	467.57	470.64	470.74	471.73	0.017806	8.36	42.90	25.06	1.08
study	1000	100-YR	418.00	467.57	470.71	471.06	472.09	0.021568	9.43	44.71	26.36	1.19

Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

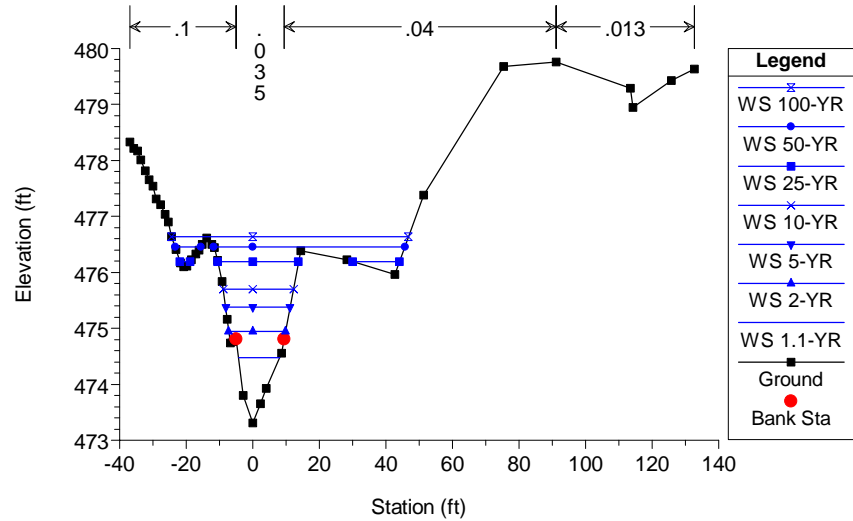
RS = 1451



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

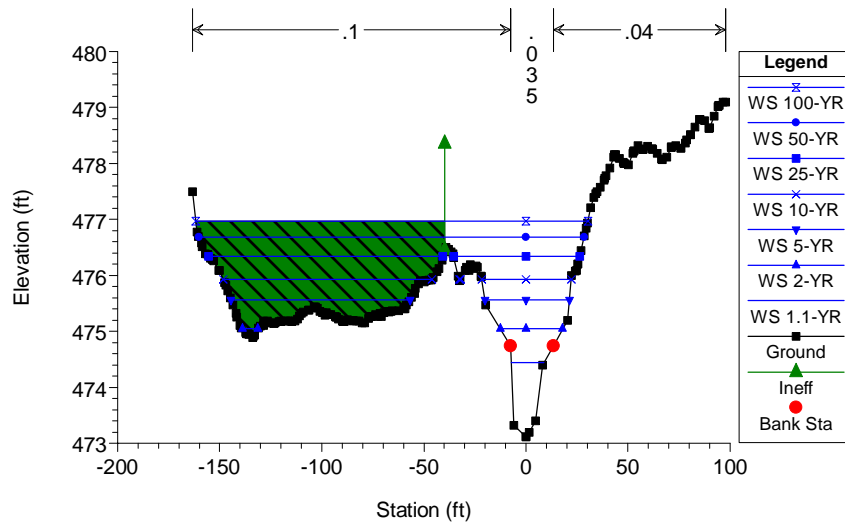
RS = 1400



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

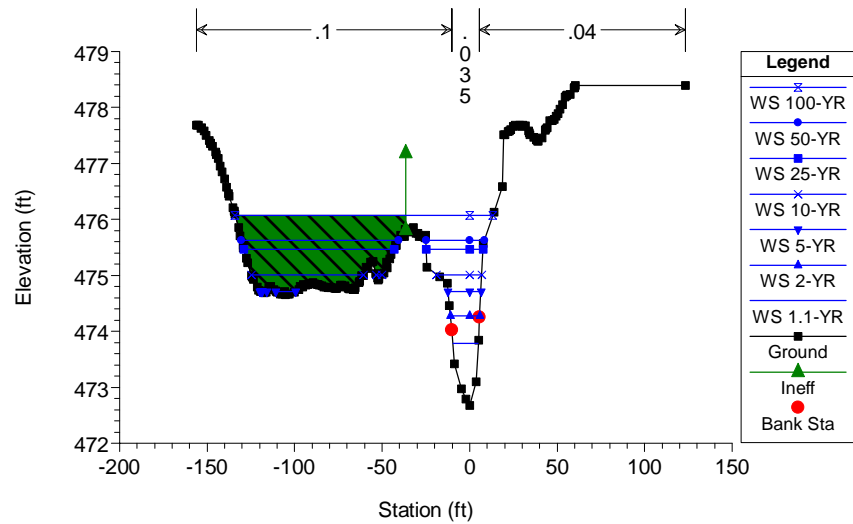
RS = 1367



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

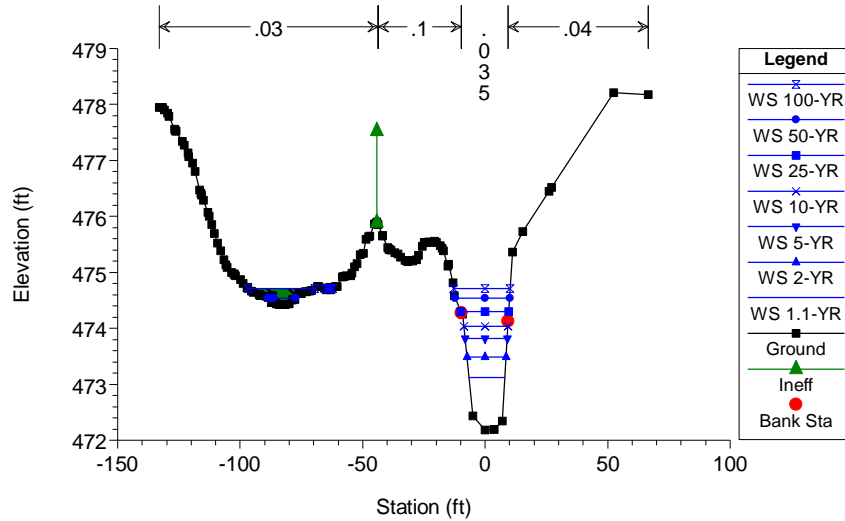
RS = 1328



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

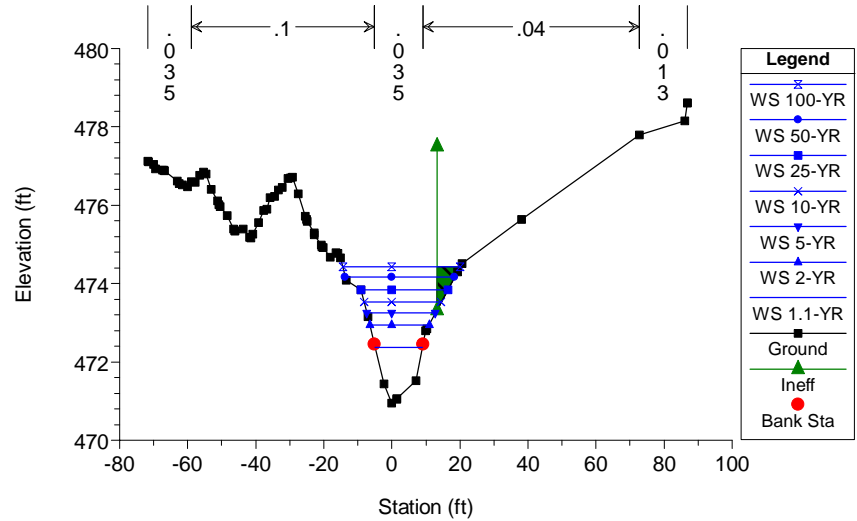
RS = 1296



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

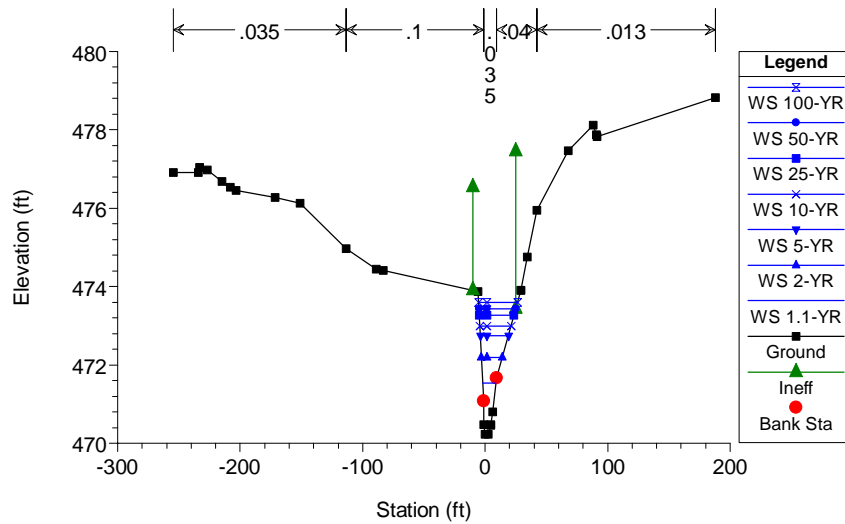
RS = 1236 Franklin Co. FIS



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

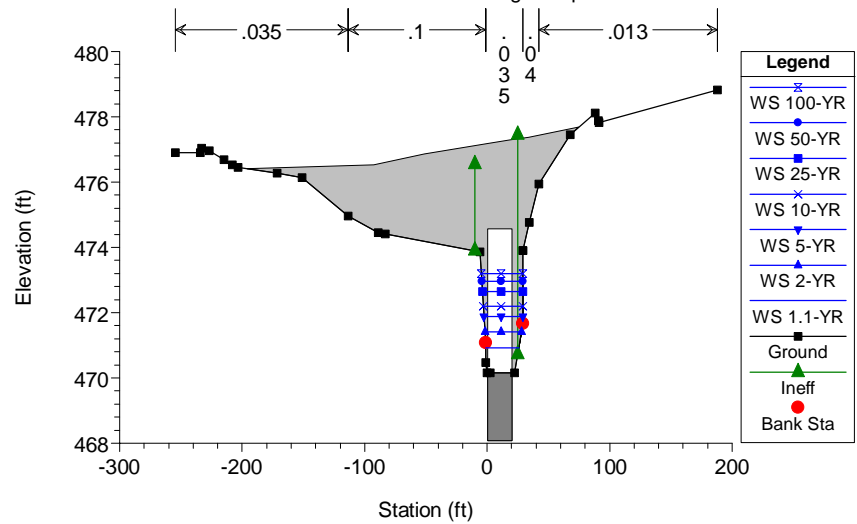
RS = 1196



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

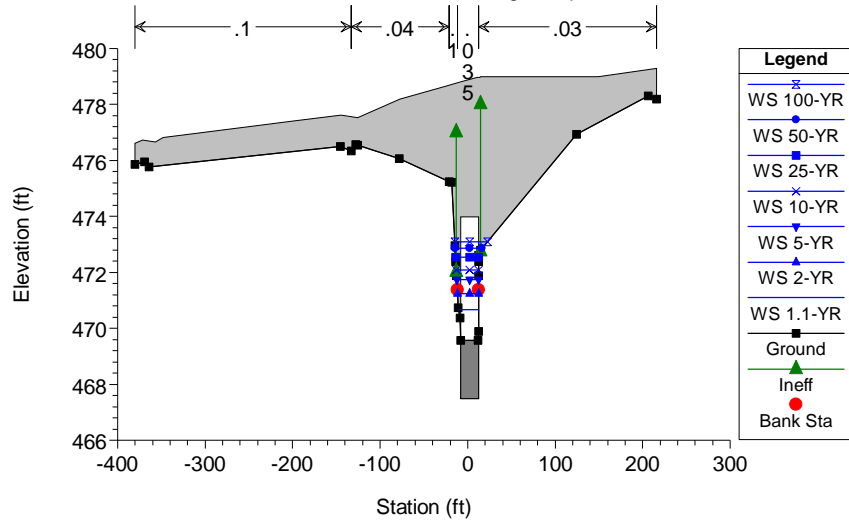
RS = 1153 Culv Hall Bridge-Prop Culv1



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

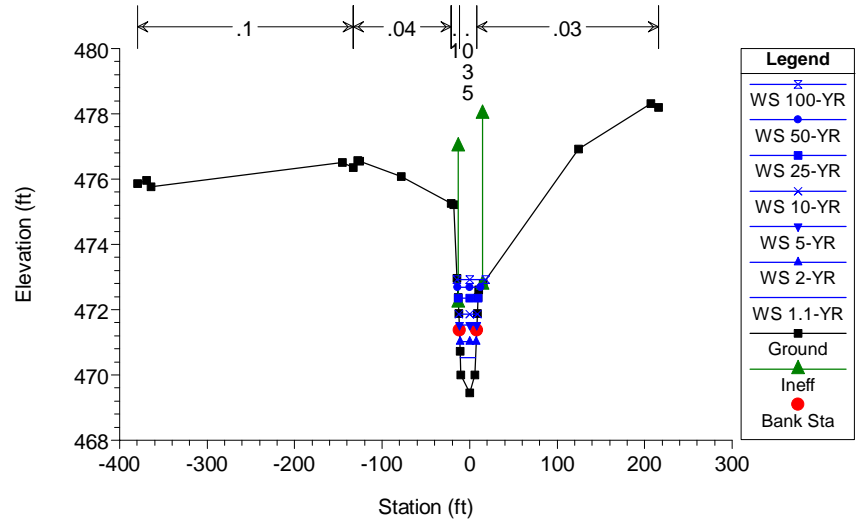
RS = 1153 Culv Hall Bridge-Prop Culv1



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

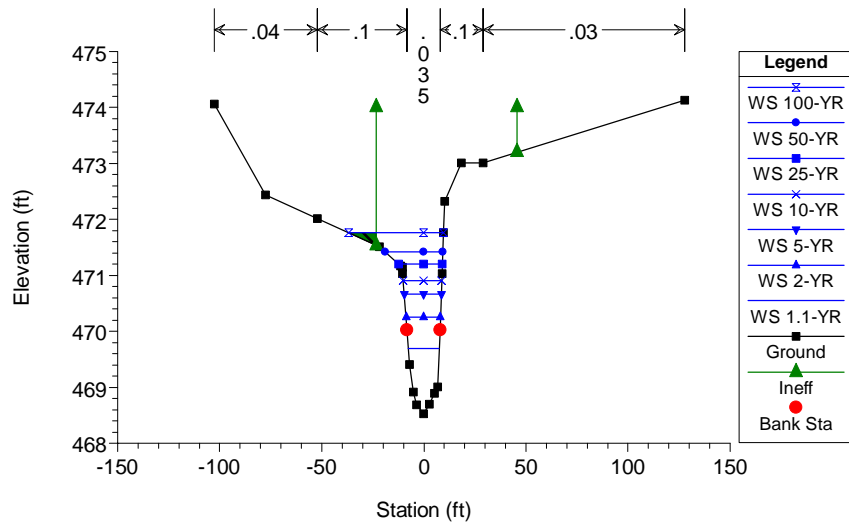
RS = 1121



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

RS = 1055



Hall Bridge: No. 2341 Plan: Prop conditions 3_5

Geom: Prop Geom_culvert3_5 Flow: USGS Streamstats

RS = 1000 Oxford Co., ME FIS

