

**New York Rising Community Reconstruction Program
Town of Saugerties Replace Culvert at Wilhelm Road Project**

Environmental Assessment



The New York State Governor's Office of Storm Recovery

November 25, 2015

**Town of Saugerties
Replace Culvert at Wilhelm Road
Environmental Assessment**

November 25, 2015

Project Name: Replace Culvert at Wilhelm Road

Project Location: Wilhelm Road (crossing Beaver Kill)

HTFC SHARS #: N/A

Federal Agency: U.S. Department of Housing and Urban Development
Responsible Entity: New York State Homes and Community Renewal

**Responsible Agency's
Certifying Officer:** Thomas J. King, Assistant General Counsel and Certifying Officer

Project Sponsor: Town of Saugerties
Greg Helsmoortel, Supervisor
4 High Street

Primary Contact: Saugerties, NY 12477
(845) 246-2800
ghelsmoortel@saugerties.ny.us

Project NEPA Classification: 24 CFR 58.36 (Environmental Assessment)

Environmental Finding:

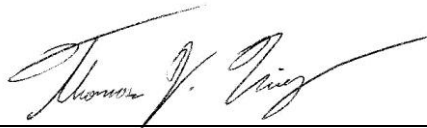
☒ Finding of No Significant Impact - The project will not result in a significant impact on the quality of the human environment.

☐ Finding of Significant Impact - The project may significantly affect the quality of the human environment.

Certification

The undersigned hereby certifies that New York State Homes and Community Renewal has conducted an environmental review of the project identified above and prepared the attached environmental review record in compliance with all applicable provisions of the National Environmental Policy Act of 1969, as amended (42 USC Sec. 4321 et seq.) and its implementing regulations at 24 CFR Part 58.

Signature



Thomas J. King, Assistant General Counsel and Certifying Officer

Environmental Review Prepared By: The LiRo Group
3 Aerial Way
Syosset, NY 11791

CERTIFICATION OF NEPA CLASSIFICATION

It is the finding of the New York State Housing Trust Fund Corporation that the activity(ies) proposed in its 2015 NYS CDBG-DR project Town of Saugerties – Replace Culvert at Wilhelm Road is:

Check the applicable classification.

- ☐ Exempt as defined in 24 CFR 58.34 (a).
- ☐ Categorically Excluded as defined in 24 CFR 58.35(b).
- ☐ Categorically Excluded as defined in 24 CFR 58.35(a) and no activities are affected by federal environmental statutes and executive orders [i.e., exempt under 58.34(a)(12)].
- ☐ Categorically Excluded as defined in 24 CFR 58.35(a) and some activities are affected by federal environmental statutes and executive orders.
- ☒ “Other” neither exempt (24 CFR 58.34(a)) nor categorically excluded (24 CFR 58.35).
- ☒ Part or all of the project is located in an area identified as a floodplain or wetland. For projects located in a floodplain or wetland, evidence of compliance with Executive Orders 11988 and/or 11990 is required.

For activities excluding those classified as “Other,” attached is the appropriate Classification Checklist (Exhibit 2-4) that identifies each activity and the corresponding citation.



Signature of Certifying Officer

Thomas J. King

Print Name

November 25, 2015

Date

Assistant General Counsel

Title

CERTIFICATION OF SEQRA CLASSIFICATION

It is the finding of the New York State Housing Trust Fund Corporation that the activity(ies) proposed in its 2015 NYS CDBG-DR project Town of Saugerties – Replace Culvert at Wilhelm Road is:

Check the applicable classification:

- ☐ Type I Action (6NYCRR Section 617.4)
- ☒ Type II Action (6NYCRR Section 617.5)
- ☐ Unlisted Action (not Type I or Type II Action)

Check if applicable:

- ☐ Environmental Impact Statement (EIS) Prepared
- ☐ Draft EIS
- ☐ Final EIS



Signature of Certifying Officer

Thomas J. King

Print Name

November 25, 2015

Date

Assistant General Counsel

Title

Description of the Proposed Project [24 CFR 50.12 & 58.32; 40 CFR 1508.25]:

The project involves the design, engineering, and construction required to replace an existing 8-foot diameter cast iron culvert located on Wilhelm Road that is inadequately-sized. (see **Figure 1**) An analysis of the hydraulics and hydrology of the watershed was performed to determine the peak discharge rates that will occur in various storm events. This critical first step determined that the required dimension for the replacement culvert on Wilhelm Road would be an interior width of 16 feet and a minimum clear opening height of 7.64 feet to pass the 100-year storm. In order to meet NYSDEC requirements, the recommended replacement culvert size for Wilhelm Road is a four-sided precast box culvert with an internal opening dimension of 9½ feet high by 16 feet wide embedded a minimum of 1.53 feet into the streambed. The Town is requesting \$575,645 for the completion of the design and installation of this project.

The project will be located on existing Town of Saugerties property, with temporary construction easements needed on adjacent private properties. There is currently adequate right-of-way available for the completion of this project. Due to the excavation of the old culvert, disturbed and damaged roadway will be replaced. Construction will involve the removal of asphalt and aggregate, extraction of the old culvert, excavation, stabilization of existing utilities near the site, placement of the new culvert, addition of fill material and repairing with a four-inch base coat and two-inch finishing coat. During construction, a 12-foot wide temporary gravel road will be installed to be used as a detour around the culvert construction project. Guiderails will be relocated from Wilhelm Road and reused during the temporary road construction. In addition, part of the demolition plan involves the removal of some trees.

Statement of Purpose and Need for the Proposal [40 CFR 1508.9(b)]:

Resizing the culvert to accommodate measured stormwater flows will minimize localized flooding during and after future storms. This project will provide long-term benefits through permanent flood mitigation and ensure continual access to vital commercial and residential areas, as well as enabling emergency personnel to respond more quickly.

The Wilhelm Road target area contains approximately 32 households, who require access to Old King's Highway to reach points south, southeast, and northeast, including the Town of Saugerties and Interstate 87.

Existing Conditions and Trends [24 CFR 58.40(a)]:

During Hurricane Irene, Tropical Storm Lee and Superstorm Sandy, the Wilhelm Road culvert was overwhelmed by stormwater, which caused flooding, erosion, and damage to the culvert as well as surrounding infrastructure.

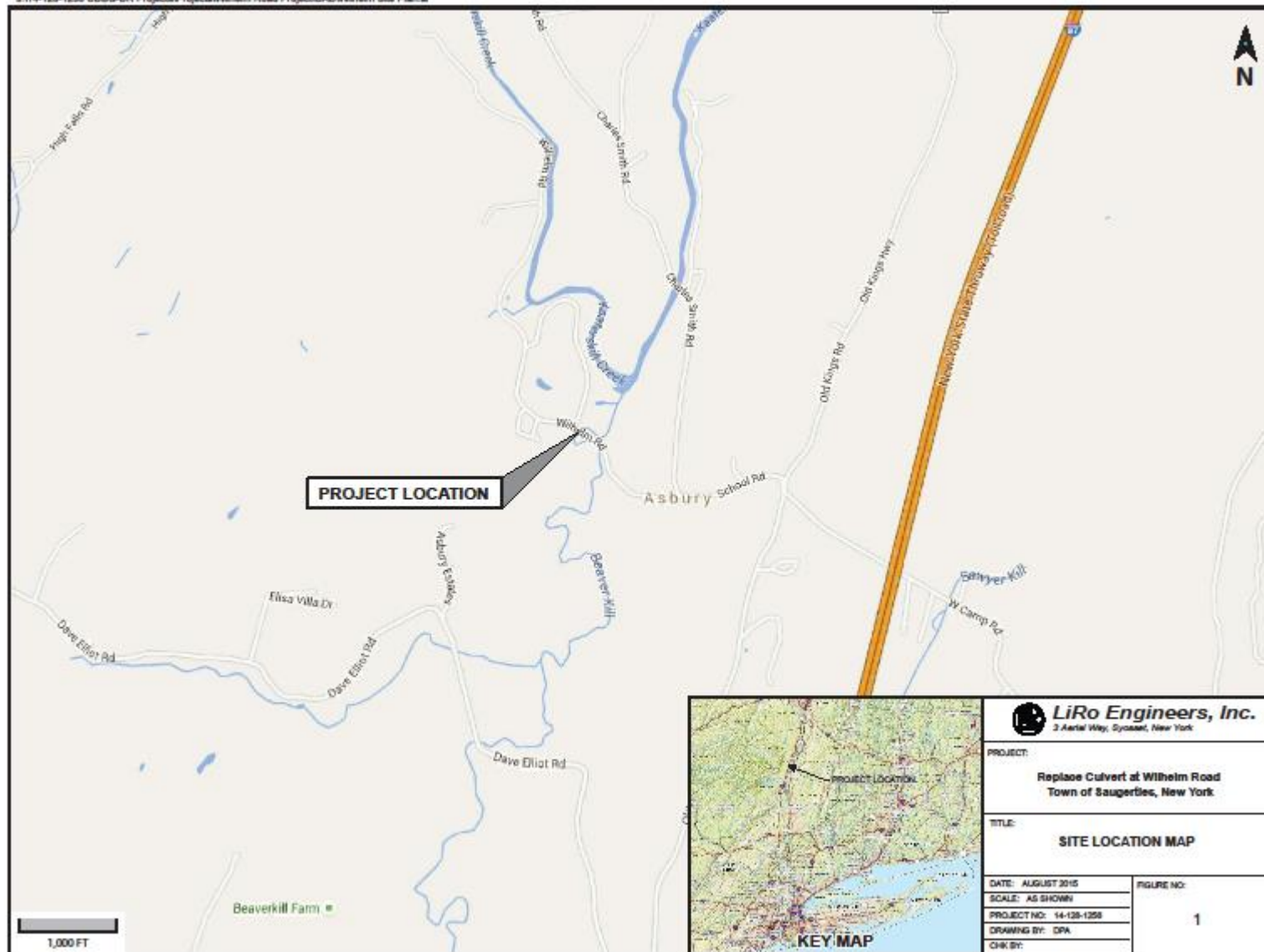
Funding Information**Estimated Total HUD Funded Amount:**

\$575,645

Estimated Total Project Cost

(HUD and non-HUD funds) [24 CFR 58.32(d)]:

\$575,645



Compliance with 24 CFR 58.5 and 58.6 Laws and Authorities

Record below the compliance or conformance determinations for each statute, executive order, or regulation. Provide credible, traceable, and supportive source documentation for each authority. Where applicable, complete the necessary reviews or consultations and obtain or note applicable permits of approvals. Clearly note citations, dates/names/titles of contacts, and page references. Attach additional documentation as appropriate.

Compliance Factors: Statutes, Executive Orders, and Regulations listed at 24 CFR §58.5 and §58.6	Are formal compliance steps or mitigation required?	Compliance determinations
STATUTES, EXECUTIVE ORDERS, AND REGULATIONS LISTED AT 24 CFR 50.4 and 58.6		
Airport Hazards 24 CFR Part 51 Subpart D	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Based on guidance provided by HUD in Fact Sheet #D1, the National Plan of Integrated Airport Systems was reviewed for civilian, commercial service airports within the vicinity of the project site. There are no military or civil airports within 1 mile of the project area. No impacts would result.
Coastal Barrier Resources Coastal Barrier Resources Act, as amended by the Coastal Barrier Improvement Act of 1990 [16 USC 3501]	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	According to the Coastal Barrier Resource System maps, the project site is not located within a coastal barrier resource area; therefore, this standard is not applicable.
Flood Insurance Flood Disaster Protection Act of 1973 and National Flood Insurance Reform Act of 1994 [42 USC 4001-4128 and 42 USC 5154a]	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Based on Flood Insurance Map 36111C0115E, the Wilhelm Road project site is located within a Special Flood Hazard Area. However, the project does not require proof of National Flood Insurance Program (NFIP) insurance. (see Figure 2)

STATUTES, EXECUTIVE ORDERS, AND REGULATIONS LISTED AT 24 CFR 50.4 & 58.5

<p>Clean Air Clean Air Act, as amended, particularly section 176(c) & (d); 40 CFR Parts 6, 51, 93</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>The proposed project is not located within a nonattainment area where air pollution levels persistently exceed the national ambient air quality standards. No significant impacts on air quality would occur. Construction of the project would not generate additional vehicular traffic; therefore, no exceedances of the National Ambient Air Quality Standard (NAAQS) associated with carbon monoxide (CO) or particular matter (PM) would occur. Operation of the proposed project would not result in any major new stationary source of air pollutants. The project would not adversely affect the State Implementation Plan (SIP).</p>
<p>Coastal Zone Management Coastal Zone Management Act, sections 307(c) & (d)</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>The project area is not located within the boundaries of the New York State Coastal Zone.</p>
<p>Contamination and Toxic Substances 24 CFR Part 50.3(i) & 58.5(i)(2)</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>There are no known hazardous materials, contaminants, toxic chemicals, gases, or radioactive substances that could affect health and safety within the project area. The proposed project is not anticipated to result in any significant adverse impacts related to toxic, hazardous, or radioactive materials.</p> <p>The project site is not listed on a U.S. Environmental protection Agency (EPA) Superfund National Priorities or CERCLA List, or equivalent State list, located within 3,000 feet of a toxic or solid waste landfill site, and is not known or suspected to be contaminated by toxic chemicals or radioactive materials.</p>
<p>Endangered Species Endangered Species Act of 1973, particularly section 7; 50 CFR Part 402</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>The proposed project may affect but is not likely to adversely affect endangered or threatened species; however, the US Fish and Wildlife Service (USFWS) lists the Indiana bat (<i>Myotis sodalis</i>) as an endangered species and the northern long-eared bat (<i>Myotis septentrionalis</i>) as a proposed endangered species that can be found within the vicinity of the project area, based upon review using the USFWS IPaC website. (see Appendix A) A copy of the USFWS correspondence and concurrence with GOSR's Section 7 determination is attached. (see Appendix A)</p> <p>The proposed project will require the removal of trees in order to complete the project. The trees will be required to be cut down between November 1 and March 31 to avoid the roosting period of the Indiana bat and northern long-eared bat. Although trees will be removed, there will be no effect on the habitats of the listed endangered species found in the vicinity of the project.</p> <p>Correspondence with the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration of the United States department of Commerce indicates that no federally-listed threatened or endangered species are</p>

		present in the project area. (see Appendix A)
Explosive and Flammable Hazards 24 CFR Part 51 Subpart C	Yes No <input type="checkbox"/> <input checked="" type="checkbox"/>	There are no known hazardous operations handling conventional fuels or chemicals of an explosive or flammable nature in the vicinity of the project area. This criterion is applicable to HUD-assisted projects that involve new residential construction, conversion of non-residential buildings to residential use, rehabilitation of residential properties that increase the number of units, or restoration of abandoned properties to habitable condition. As this project is the replacement of an existing culvert, which does not change the existing land use or add residential population, the criterion does not apply and there are no anticipated adverse impacts expected to occur.
Farmlands Protection Farmland Protection Policy Act of 1981, particularly sections 1504(b) and 1541; 7 CFR Part 658	Yes No <input type="checkbox"/> <input checked="" type="checkbox"/>	The proposed project is not located within any Agricultural District. It would not cause disturbance of Prime, Unique, or Statewide Important Farmland and would not involve the conversion of farmland to non-agriculture use. Therefore, the proposed project would not violate the farmland protection Policy Act.
Floodplain Management Executive Order 11988, particularly section 2(a); 24 CFR Part 55	Yes No <input checked="" type="checkbox"/> <input type="checkbox"/>	Based on Flood Insurance Map 36111C0115E, the Wilhelm Road project site is located within a Special Flood Hazard Area. The proposed project would not have any impact to floodplain management, but the 5-step process for floodplain management would need to be followed. (see Appendix B) The proposed project involves the installation of a new four-sided precast box culvert with an internal opening dimension of 9½ feet high by 16 feet wide embedded a minimum of 1.53 feet into the streambed.
Historic Preservation National Historic Preservation Act of 1966, particularly sections 106 and 110; 36 CFR Part 800; Tribal notification for new ground disturbance.	Yes No <input checked="" type="checkbox"/> <input type="checkbox"/>	The New York State Historic Preservation Officer (SHPO) as well as the Saint Regis Mohawk Tribe have been consulted in regards to this project. It has been determined that “no historic properties will be affected” by the proposed project. (see Appendix C).
Noise Abatement and Control Noise Control Act of 1972, as amended by the Quiet Communities Act of 1978; 24 CFR Part 51 Subpart B	Yes No <input type="checkbox"/> <input checked="" type="checkbox"/>	The proposed project would not generate noise within the project area, nor would it introduce any new or rehabilitate any existing noise sensitive uses. Therefore, no significant noise impacts would occur as a result of the proposed project.
Sole Source Aquifers Safe Drinking Water Act of 1974, as amended, particularly section 1424(e); 40 CFR Part 149	Yes No <input type="checkbox"/> <input checked="" type="checkbox"/>	The proposed project is not located above a sole source aquifer. The proposed project would not result in any indirect or secondary impacts in terms of new development or new demands. The proposed project is not expected to impact the supply or quality of water of any aquifer, or introduce new contaminants into the aquifer.
Wetlands Protection Executive Order 11990, particularly sections 2 and 5	Yes No <input checked="" type="checkbox"/> <input type="checkbox"/>	A joint permit application will be required for submittal to NYSDEC and USACE prior to any work being completed. The USACE will make a jurisdictional determination and will require USFWS and SHPO clearance prior to issuing a permit. Culvert replacements are covered under a

		<p>Nationwide Permit #14, which applies to linear transportation projects with less than 0.10 acre wetland impact and/or less than 300 linear feet of stream disturbance. (see Figures 3a and 3b)</p> <p>Although the project is not located in a designated mapped wetland, it will still adhere to and be in compliance with the guidelines and regulations of Executive Order 11990, in order to minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.</p>
<p>Wild and Scenic Rivers Wild and Scenic Rivers Act of 1968, particularly section 7(b) and (c)</p>	<p>Yes No <input type="checkbox"/> <input checked="" type="checkbox"/></p>	<p>The project area is not located within the vicinity of any designated wild, scenic, or recreational rivers. The Delaware River is the only river in New York that is included in the National Wild and Scenic Rivers System. The proposed project is not located near this river and no adverse impacts are anticipated.</p>
ENVIRONMENTAL JUSTICE		
<p>Environmental Justice Executive Order 12898</p>	<p>Yes No <input type="checkbox"/> <input checked="" type="checkbox"/></p>	<p>The project site is not located in or adjacent to potential justice areas identified by the New York State Department of Environmental Conservation. The proposed project would have no significant adverse environmental impact on the surrounding community and will provide a benefit to the residents. (see Figure 4)</p>

Environmental Assessment Factors [24 CFR 58.40; Ref. 40 CFR 1508.8 &1508.27] Recorded below is the qualitative and quantitative significance of the effects of the proposal on the character, features and resources of the project area. Each factor has been evaluated and documented, as appropriate and in proportion to its relevance to the proposed action. Verifiable source documentation has been provided and described in support of each determination, as appropriate. Credible, traceable and supportive source documentation for each authority has been provided. Where applicable, the necessary reviews or consultations have been completed and applicable permits of approvals have been obtained or noted. Citations, dates/names/titles of contacts, and page references are clear. Additional documentation is attached, as appropriate. **All conditions, attenuation or mitigation measures have been clearly identified.**

Impact Codes: Use an impact code from the following list to make the determination of impact for each factor.

- (1) Minor beneficial impact
- (2) No impact anticipated
- (3) Minor Adverse Impact – May require mitigation
- (4) Significant or potentially significant impact requiring avoidance or modification which may require an Environmental Impact Statement

Environmental Assessment Factor	Impact Code	Impact Evaluation
LAND DEVELOPMENT		
Conformance with Plans / Compatible Land Use and Zoning / Scale and Urban Design	2	The proposed project replaces an inadequately-sized culvert to minimize future localized flooding and provide long-term benefits through permanent flood mitigation. The proposed project would be compatible with existing land uses in the surrounding areas and would not result in changes to land use. Therefore, no impacts would result.
Soil Suitability/ Slope/ Erosion/ Drainage/ Storm Water Runoff	1	During construction, erosion and sediment controls would be utilized. The proposed project would minimize future localized flooding and provide long-term benefits through permanent flood mitigation. Therefore, the proposed project would be beneficial to the surrounding area by improving drainage and runoff.
Hazards and Nuisances including Site Safety and Noise	2	The proposed project would not result in hazards and nuisances. All state and local construction safety procedures would be followed. Therefore, no impacts would result.
Energy Consumption	2	The proposed project would not affect energy generation or distribution. Therefore, no impacts would result.
SOCIOECONOMIC		
Employment and Income Patterns	2	The actions comprising the proposed project are limited to the removal of asphalt and aggregate, extraction of the old culverts, excavation, stabilization of existing utilities near the sites, placement of the new culverts, addition of fill material and repairing with a four-inch base coat and two-inch finishing coat, and have no potential to affect employment

		opportunities or income patterns.
Demographic Character Changes, Displacement	2	The proposed project is being undertaken to minimize localized flooding and provide long-term benefits through permanent flood mitigation. The project is not expected to induce any change in the demographic character of the surrounding areas, displace individuals or families, eliminate jobs, local businesses, or community facilities, or disproportionately affect particular populations.

Environmental Assessment Factor	Impact Code	Impact Evaluation
COMMUNITY FACILITIES AND SERVICES		
Educational and Cultural Facilities	2	The proposed project would not introduce any new populations that would increase the student population of the area. As a result, the proposed project has no potential to affect educational facilities. In addition, the proposed project would not adversely impact historic/cultural facilities.
Commercial Facilities	2	The proposed project is limited to the removal of asphalt and aggregate, extraction of the old culverts, excavation, stabilization of existing utilities near the sites, and placement of the new culverts, and would not introduce any new development that would require retail services or other commercial facilities.
Health Care and Social Services	2	The proposed project is limited to the removal of asphalt and aggregate, extraction of the old culverts, excavation, stabilization of existing utilities near the sites, and placement of the new culverts, and would not significantly impact social services.
Solid Waste Disposal / Recycling	2	The proposed project is limited to the removal of asphalt and aggregate, extraction of the old culverts, excavation, stabilization of existing utilities near the sites, and placement of the new culverts, and would not introduce any new development that would generate solid waste.
Waste Water / Sanitary Sewers	2	The proposed project is limited to the removal of asphalt and aggregate, extraction of the old culverts, excavation, stabilization of existing utilities near the sites, and placement of the new culverts, and would not introduce any new development that would generate waste water.
Water Supply	2	The proposed project is limited to the removal of asphalt and aggregate, extraction of the old culverts, excavation, stabilization of existing utilities near the sites, and placement of the new culverts, and would not introduce any new development that would generate demand for water.
Public Safety - Police, Fire and Emergency Medical	2	The proposed project is limited to the removal of asphalt and aggregate, extraction of the old culverts, excavation, stabilization of existing utilities near the sites, and placement of the new culverts, and would not introduce any new development that would generate demand for police, fire, or emergency medical services.
Parks, Open Space and Recreation	2	The proposed project is limited to the removal of asphalt and aggregate, extraction of the old culverts, excavation, stabilization of existing utilities near the sites, and placement of the new culverts, and would not introduce any new development that would generate demand for open space resources.

Transportation and Accessibility	2	The proposed project would not introduce any new development that would require new or improved transportation connections and would not add any new demand on transportation services. During construction, traffic maintenance would take place.
NATURAL FEATURES		
Unique Natural Features, Water Resources	1	The proposed project replaces a presumed inadequately-sized culvert to minimize future localized flooding and provide long-term benefits through permanent flood mitigation. Therefore, the project would be potentially beneficial.
Vegetation, Wildlife	2	The proposed project is limited to the removal of asphalt and aggregate, extraction of the old culverts, excavation, stabilization of existing utilities near the sites, and placement of the new culverts, and would not result in any adverse impacts to vegetation or wildlife.
Other Factors	2	N/A

Additional Studies Performed:

A report entitled “Hydrology and Hydraulic Analysis, Wilhelm Road Culvert: Town of Saugerties, Ulster County, New York,” was prepared in July 2015, by Brinnier and Larios, P.C., Professional Engineers and Land Surveyors, for the Town of Saugerties.

Prior to the aforementioned report being drafted, a “Scope of Work” was prepared for the project.

Field Inspection (Date and completed by):

April, 2015 – Inspection of site by Georgeanna Nugent Lussier, CHMM, FoitAlbert Associates

List of Sources, Agencies and Persons Consulted [40 CFR 1508.9(b)]:

- Environmental Protection Agency – Greenbook
<http://epa.gov/airquality/greenbook>
- Environmental Protection Agency – Region 2 Sole Source Aquifers
<http://www.epa.gov/region2/water/aquifer/index.html>
- FEMA – Flood Map Center
<https://msc.fema.gov/portal>
- National Wild and Scenic Rivers Systems
<http://www.rivers.gov/maps/conus.php>
- New York State Department of Agriculture and Markets
<http://www.agriculture.ny.gov/ap/agservices/maps>
- New York State Department of Environmental Conservation – County Maps Showing Potential Environmental Justice Areas (Ulster County)
http://www.dec.ny.gov/docs/permits_ej_operations_pdf/ulsterej.pdf
- New York State Department of Environmental Conservation – EAF Mapper
<http://www.dec.ny.gov/eafmapper/>
- New York State Department of Environmental Conservation – Environmental Resource Mapper
<http://www.dec.ny.gov/imsmaps/ERM>

- New York State Department of State Office of Planning and Development – NYS Coastal Boundary Map
http://appext20.dos.ny.gov/coastal_map_public/map.aspx
- New York State Office of Parks, Recreation and Historic Preservation - Cultural Resource Information System
<https://cris.parks.ny.gov>
- New York State Office of Parks, Recreation and Historic Preservation
Letter dated October 6, 2015 to Larry Moss, Historic Preservation Technical Specialist
- Saint Regis Mohawk Tribal Office
Letter dated October 19, 2015 to Mark H. Garrow, Chief
- United States Fish and Wildlife Service – IPaC – Information, Planning, and Conservation System
<http://ecos.fws.gov/ipac>
- United States Fish and Wildlife Service – National Wetlands Inventory – Wetland Mapper
<http://www.fws.gov/wetlands/Data/Mapper.html>

List of Permits Obtained or Required:

- New York State Department of Environmental Conservation (DEC) – ECL Article 15 and CWA Section 401 Water Quality Certification
- United States Army Corps of Engineers (USACE) – CWA Section 404 and Rivers and Harbors Act Section 10

Public Outreach [24 CFR 50.23 & 58.43]:

The Ulster New York Rising Community Group Reconstruction (NYRCR) Plan identified projects that could advance a regionally-coordinated plan for resiliency that addresses the specific needs of the included municipalities (the Town of Saugerties was one) to respond and recover from future disasters. Initial project recommendations were generated by the Ulster NYRCR Planning Committee, which was comprised of residents, business owners and municipal representatives. The Committee met approximately every other week (12 meetings) from September 2013 through March 2014. All

Committee meetings were open to the public. The Planning Committee members also created Facebook pages, posted relevant materials to their municipal websites, held additional meetings within their communities, and attended municipal meetings to report on their NYRCR Plan progress.

In addition, four public engagement meetings were held throughout the eight month planning process. These meetings provided the opportunity for Ulster County residents to learn about the NYRCR planning process and provide input to help develop community-driven plans for a more resilient future.

The Town of Saugerties made the application for New York Community Development Block Grant-Disaster Recovery (CDBG_DR) Program funds for this project available for the public to review and submit their comments on at Town Hall between March 26, 2015 And April 2, 2015.

The Town of Saugerties Town Board holds public meetings twice per month. Typically, engineering projects must be approved by the Town Board during a public meeting. The public is encouraged to attend these meetings to discuss potential projects. In addition, the Town frequently posts important information on its website.

Cumulative Impact Analysis [24 CFR 58.32]:

In the Ulster County Community Reconstruction Program Plan, the Town of Saugerties identified six (6) projects that it would like to implement to help recover and become more resilient. Aside from the proposed project at Wilhelm Road, the Town is proposing a culvert replacement/relining at Platte Clove (7 miles away), a bridge abutment replacement (4 miles away), a hardening of the Malden sewer plant (5 miles away), a Water supply protection project (5 miles away), a storm sewer replacement project (12 miles away), and a sewer extension project (7 miles away). Although these projects were proposed by the Town, only the Platte Clove culvert replacement is moving forward as of the date of this review. The Platte Clove culvert replacement is currently under engineering review as it may not need to be replaced, but rehabilitated – this project is located on a different watercourse than the Beaver Kill and as such no cumulative impacts are expected. Other projects are expected to move forward in the future. There are no known projects that are proposed for future implementation in the direct vicinity of the Wilhelm Road culvert; however past storm-related activities are considered for the purposes of cumulative impacts.

During Hurricane Irene the Wilhelm Road culvert was overwhelmed. This caused flooding, erosion, and damage to the culvert and the surrounding stream bank of the Beaver Kill. This in turn increased river turbidity, scour, and downstream river velocities and conditions. This project, once implemented, would alleviate such effects in the future.

Given the project is located in a somewhat isolated area, the cumulative environmental impacts of the project, and other proposed by the Community Reconstruction Program Planning Committee are not expected.

Alternatives [24 CFR 58.40(e); 40 CFR 1508.9]:

Aside from the no action alternative, which would leave the Wilhelm Road culvert and the surrounding stream banks of the Beaver Kill vulnerable to future rain events and grossly undersized, the only alternative to replacing this culvert would be to relocate Wilhelm Road itself, or conduct a large scale buyout program outside of the floodplain to eliminate the need for the stream crossing. Design alternatives include replacing the existing round pipe culvert with another larger round pipe culvert, which is not recommended by the NYS DEC.

Various design alternatives were considered. The proper size of the culvert was determined by conducting a hydrology and hydraulic analysis prepared in July of 2015. An analysis of the hydraulics and hydrology of the watershed was performed to determine the peak discharge rates that will occur in various storm events.

As a result of the study performed, it was determined that the replacement culvert would be sized with adequate capacity to convey the discharge from the 100-year storm. The model used calculated that a rectangular culvert having an interior width of 16 feet must have a minimum clear opening height of 7.64 feet to pass the 100-year storm. The NYSDEC requires four-sided culverts to be designed to allow the bottom of the culvert to simulate natural stream crossings conditions. The overall minimum height of the replacement box culvert would be the clear opening height of 7.64 feet plus 1.53 feet of embedment or 9.17 feet. For constructability purposes, the interior height of the replacement box culvert will be rounded up to an internal height of 9.5 feet.

The recommended replacement culvert size for Wilhelm Road is four-sided precast concrete box culvert with a 9.5 feet high by 16 feet wide internal opening dimension embedded a minimum of 1.53 feet in the streambed.

Summary of Findings and Conclusions:

The Town of Saugerties' proposed replacement of a presumed inadequately-sized culvert on Wilhelm Road will minimize localized flooding during and after future storms, while providing long-term benefits through permanent flood mitigation and ensuring continual access to vital commercial and residential areas, as well as enabling emergency personnel to respond more quickly. As shown above in the Environmental Assessment Checklist, no significant land development, neighborhood, socioeconomic,

natural resources, community facilities or other direct, indirect, or cumulative impacts would result from the proposed project. As shown in the accompanying Statutory Checklists, the proposed project would comply with all relevant regulations listed in 24 CFR subparts 58.5 and 58.6.

Mitigation Measures and Conditions [40 CFR 1505.2(c)]

Summarize below all mitigation measures adopted by the Responsible Entity to reduce, avoid, or eliminate adverse environmental impacts and to avoid non-compliance or non-conformance with the above-listed authorities and factors. These measures/conditions must be incorporated into project contracts, development agreements, and other relevant documents. The staff responsible for implementing and monitoring mitigation measures should be clearly identified in the mitigation plan.

While the proposed project is not expected to result in any environmental impacts, the US Fish and Wildlife Service (USFWS) has listed the Indiana bat (*Myotis sodalis*) as an endangered species and the northern long-eared bat (*Myotis septentrionalis*) as a proposed endangered species that can be found within the vicinity of the project area. Furthermore, since the proposed project will require the removal of trees in order to complete the project, the trees will be required to be cut down between November 1 and March 31 to avoid the roosting period of the Indiana bat and northern long-eared bat. Although trees will be removed, there will be no effect on the habitats of these endangered species found in the vicinity of the project.

Any change to the approved scope of work will require re-evaluation by the Certifying Officer for compliance with NEPA and other laws and Executive Orders.

This review does not address all federal, state and local requirements. Acceptance of federal funding requires recipient to comply with all federal state and local laws. Failure to obtain all appropriate federal, state and local environmental permits and clearances may jeopardize federal funding.

Should excavation result in unanticipated discoveries, project work must immediately halt and GOSR and SHPO must be notified before work may resume.

Determination:



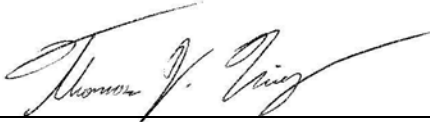
Finding of No Significant Impact [24 CFR 58.40(g)(1); 40 CFR 1508.27]

The project will not result in a significant impact on the quality of the human environment.



Finding of Significant Impact [24 CFR 58.40(g)(2); 40 CFR 1508.27]

The project may significantly affect the quality of the human environment.



Signature of Certifying Officer

Thomas J. King

Print Name

November 25, 2015

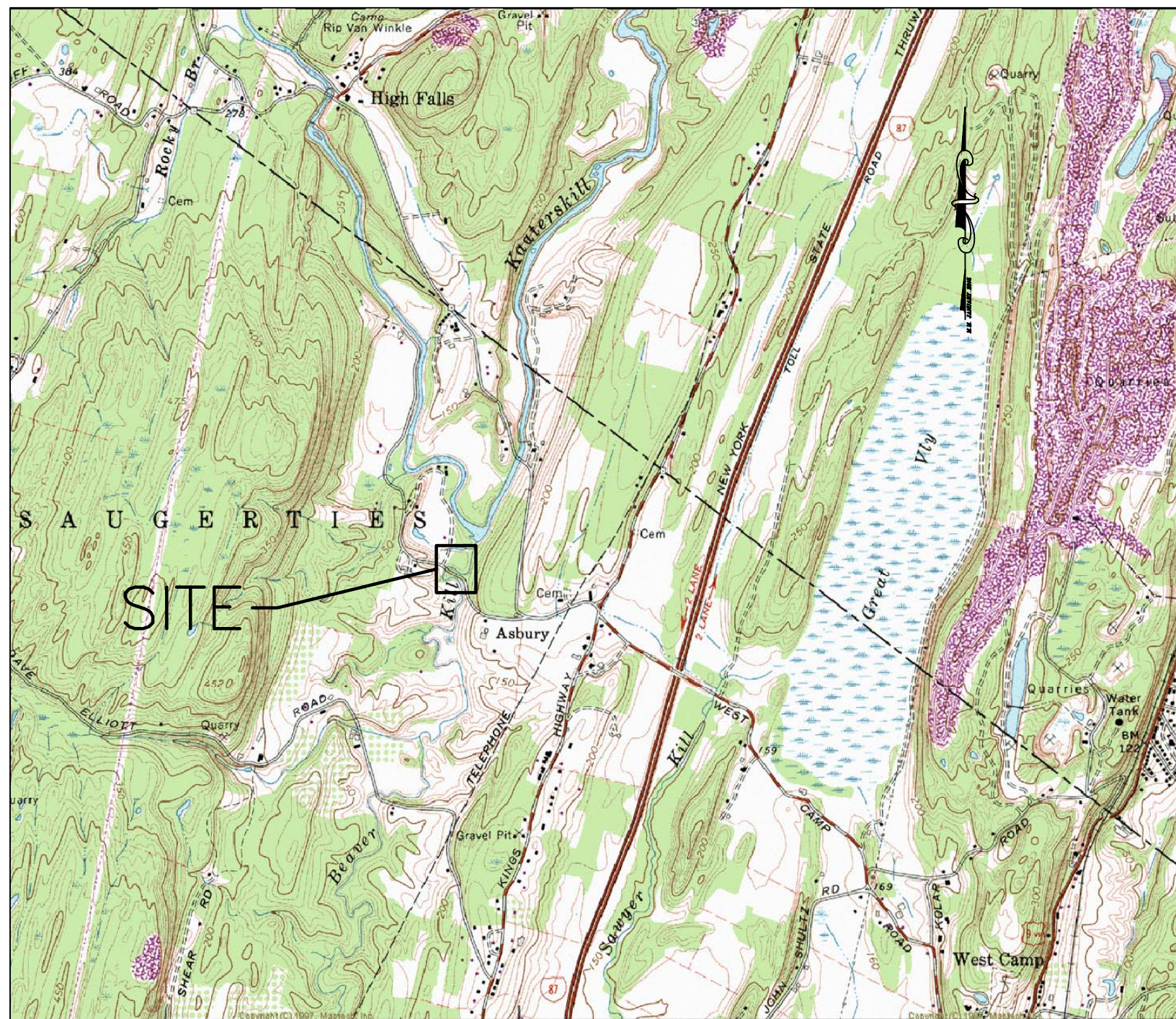
Date

Assistant General Counsel

Title

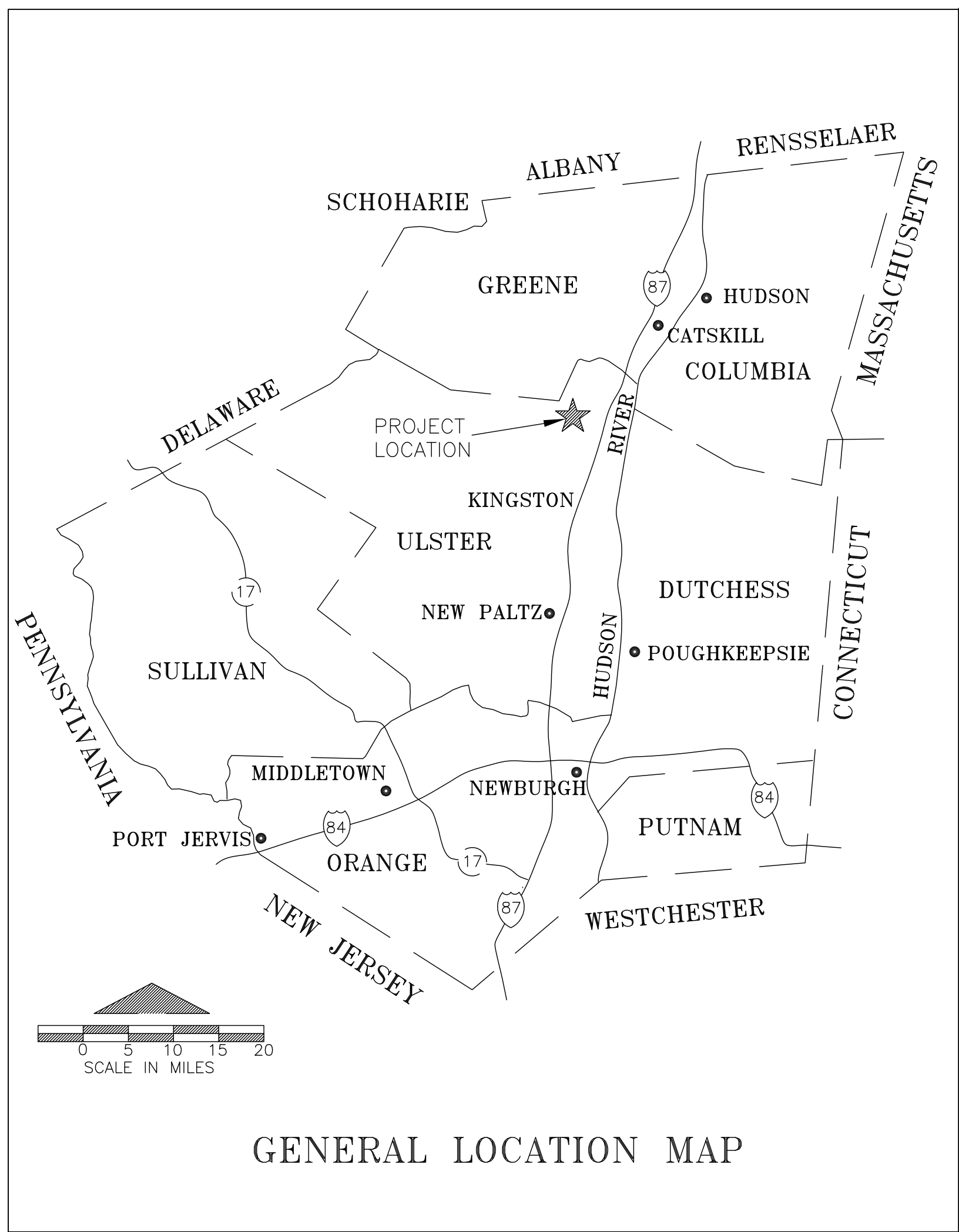
This original, signed document and related supporting material must be retained on file by the Responsible Entity in an Environmental Review Record (ERR) for the activity/project (ref: 24 CFR Part 58.38) and in accordance with recordkeeping requirements for the HUD program(s).

Figures



REFERENCE: 7.5 MINUTE USGS QUADRANCE - SAUGERTIES

LOCATION MAP
SCALE 1" = 2000'



GENERAL LOCATION MAP

CONTRACT TSA-151

WILHELM ROAD CULVERT REPLACEMENT NY RISING COMMUNITY RECONSTRUCTION PROGRAM NEW YORK STATE GOVERNOR'S OFFICE OF STORM RECOVERY

TOWN OF SAUGERTIES ULSTER COUNTY NEW YORK

TOWN OFFICIALS

GREG HELSMOORTELT, TOWN SUPERVISOR

TOWN COUNCIL

JAMES BRUNO
FRED COSTELLO, JR.
WILLIAM M. SCHIRMER
LEEANNE THORNTON

LISA A. STANLEY, TOWN CLERK

DOUG MYER, HIGHWAY SUPERINTENDENT

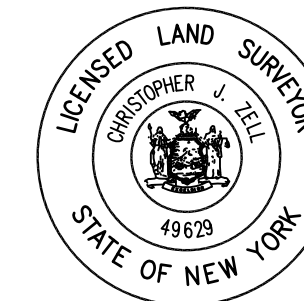
AUGUST 2015

PRELIMINARY DESIGN
FOR REVIEW AND COMMENT
NOT TO BE USED FOR CONSTRUCTION

BRINNIE AND LARIOS, P. C.
PROFESSIONAL ENGINEERS AND LAND SURVEYORS
67 MAIDEN LANE
KINGSTON, NEW YORK
(845) 338-7622



Unauthorized alteration or addition to a plan
bearing a licensed engineer's seal is a
violation of section 7209, subdivision 2, of the
New York State Education Law.



INDEX OF DRAWINGS

SHEET NO.	DRAWING
1.	COVER SHEET
2.	EXISTING CONDITIONS
3.	STREAM PROTECTION & DEMOLITION
4.	PROPOSED SITE PLAN
5.	DETAILS
6.	TEMPORARY ROAD PLANS

FRANK PFEIFER
L.4328 - P.291

BENCHMARK
TOP OF MAG NAIL
IN 12" TREE
EL. 300.00'
DATUM ASSUMED

DAVID SMITH
& DONNA SMITH
L.1105 - P.402

BENCHMARK
TOP OF MAG NAIL
IN 24" OAK
EL. 302.82'
DATUM ASSUMED

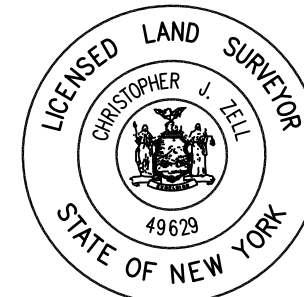
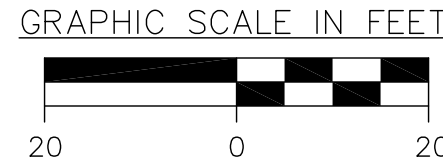
WILLIAM PEETOM
& JEFFREY PEETOM
L.2746 - P.300

LEGEND

- PL PROPERTY LINE
- 300 EXISTING CONTOUR LINE
- STREAM LINE
- GUIDE RAIL
- STONE WALL
- TREE LINE
- EXISTING GATE
- HYDRANT (6"Ø DRY HYDRANT)
- PROPOSED ACCESS ROAD
- 295 PROPOSED CONTOURS

EXISTING CONDITIONS
SCALE: 1" = 20'

NOTE:
The location of existing underground utilities are shown in an approximate way only and have not been independently verified by the owner or its representative. The contractor shall determine the exact location of all existing utilities before commencing work, and agrees to be fully responsible for any and all damages which might be occasioned by the contractor's failure to exactly locate and preserve any and all underground utilities.



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PRELIMINARY DESIGN
FOR REVIEW AND COMMENT
NOT TO BE USED FOR CONSTRUCTION

EXISTING CONDITIONS
CONTRACT TSA-151

WILHELM ROAD CULVERT REPLACEMENT

TOWN OF SAUGERTIES		ULSTER COUNTY		NEW YORK	
DATE	REVISION RECORD		BRINNIER & LARIOS, P.C. ENGINEERS & LAND SURVEYORS 67 MAIDEN LANE KINGSTON, N.Y. Phone: 845-338-7622 Fax: 845-338-7660		
			SCALE	DATE	SHEET NO.
			1" = 20'	AUG. 2014	2 OF 6
			DWG RJS	CHK JEM	

FRANK PFEIFER
L.4328 - P.291

6"Ø DRY HYDRANT
REMOVE AND REPLACE

REMOVE AND DISPOSE
EXISTING CULVERT
OFF SITE

STONEWALL
12"Ø CMP

EDGE OF PAVEMENT

REMOVE FALLEN TREES
AND LEAVE FOR OWNER (PEETOM)

WILLIAM PEETOM
& JEFFREY PEETOM
L.2746 - P.300

DEMOLITION NOTES:

1. STREAM PROTECTION MEASURES SHALL BE IN PLACE AND PROPERLY FUNCTIONING PRIOR TO DEMOLITION.

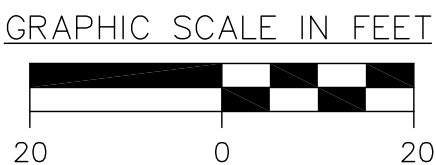


ITEMS TO BE DEMOLISHED.



REMOVE TREES AND STUMPS IN THIS AREA.

DEMOLITION PLAN
SCALE: 1" = 20'



LEGEND

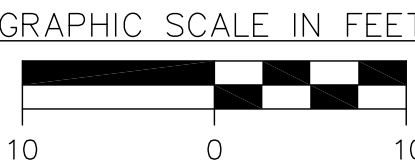
- PL — PROPERTY LINE
— 300 — EXISTING CONTOUR LINE
— — STREAM LINE
— — GUIDE RAIL
— — STONE WALL
— — TREE LINE
— — EXISTING GATE
— — HYDRANT (6"Ø DRY HYDRANT)
— — PROPOSED ACCESS ROAD
— 295 — PROPOSED CONTOURS
— — PROPOSED GATE
[TS] TEMPORARY TRAFFIC SIGNAL
— — SLOPE FAILURE

NOTE:
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PROPOSED TEMPORARY
COFFERDAMS

PROPOSED TEMPORARY
STREAM BYPASS CHANNEL

STREAM PROTECTION PLAN
SCALE: 1" = 10'

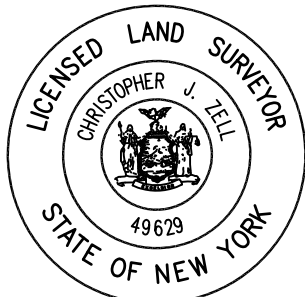


STREAM PROTECTION NOTES:

- A. THE STREAM PROTECTION PLAN INVOLVES THE CONSTRUCTION OF TEMPORARY COFFERDAMS TO ISOLATE THE WORK AREA. THE PURPOSE OF THE TEMPORARY COFFERDAMS IS TO CONTAIN THE SEDIMENT AND SOIL FROM THE CONSTRUCTION ACTIVITIES WITH LITTLE OR NO IMPACT TO THE STREAM. THE GENERAL SEQUENCE OF THE OPERATION WILL BE AS FOLLOWS:
1. INSTALL THE TEMPORARY COFFERDAMS PRIOR TO COMMENCING THE CULVERT DEMOLITION AND CONSTRUCTION WORK.
 2. IN-STREAM EXCAVATION. IN-STREAM EXCAVATION SHALL BE LIMITED TO ONLY THAT NECESSARY TO ALLOW INSTALLATION AND MAINTENANCE OF THE TEMPORARY COFFERDAM.
 3. STREAM BYPASS EXCAVATE A TEMPORARY STREAM CHANNEL THROUGH THE EMBANKMENT. BOTTOM OF TEMPORARY STREAM CHANNEL SHALL HAVE A NON-ERODABLE SURFACE.
 4. INSPECTION AND MAINTENANCE. PERIODICALLY INSPECT THE TEMPORARY COFFERDAM TO INSURE ITS INTEGRITY AND FUNCTIONALITY. REPAIR AS NECESSARY.
 5. REMOVAL. WHEN THE CONSTRUCTION WORK IS COMPLETED, THE TEMPORARY COFFERDAM MATERIALS SHALL BE REMOVED. ALL REMOVED MATERIALS SHALL BE TAKEN OFF-SITE AND NOT PLACED IN THE WATERWAY FLOODPLAIN.
 6. DEWATERING. REMOVAL OF WATER FROM WITHIN THE COFFERDAM AREA SHALL BE ACCOMPLISHED USING A PUMP(S). THE PUMP(S) SHALL BE DISCHARGED IN A CONTROLLED MANNER TO A BERMED AREA LOCATED ADJACENT TO THE CONSTRUCTION AREA TO ALLOW REMOVAL OF SEDIMENT AND SUSPENDED SOLIDS BEFORE THE WATER RE-ENTERS THE STREAM. DISCHARGING THE PUMP DIRECTLY TO THE STREAM IS PROHIBITED.
 7. PLACEMENT OF CONCRETE MATERIALS OR DISCHARGE OF CONCRETE WASH WATERS DIRECTLY INTO THE STREAM IS PROHIBITED.
- B. CONTRACTOR SHALL SUBMIT DETAILS OF THEIR STREAM PROTECTION PLAN FOR APPROVAL.

PRELIMINARY DESIGN
FOR REVIEW AND COMMENT
NOT TO BE USED FOR CONSTRUCTION

STREAM PROTECTION PLAN
AND
DEMOLITION PLAN
CONTRACT TSA-151



Unauthorized alteration or addition to a plan bearing a licensed engineer's seal is a violation of section 7209, subdivision 2, of the New York State Education Law.

WILHELM ROAD CULVERT REPLACEMENT

TOWN OF SAUGERTIES			ULSTER COUNTY			NEW YORK		
DATE	REVISION RECORD		BRINNIER & LARIOS, P.C. ENGINEERS & LAND SURVEYORS 67 MAIDEN LANE KINGSTON, N.Y. Phone: 845-338-7622 Fax: 845-338-7660					
			SCALE	DATE	AUG. 2014		SHEET NO.	
			1" = 20'	DWG	RJS		3 OF 6	
					CHK	JEM		

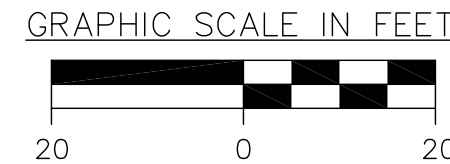
FRANK PFEIFER
L.4328 - P.291

DAVID SMITH
& DONNA SMITH
L.1105 - P.402

WILLIAM PEETOM
& JEFFREY PEETOM
L.2746 - P.300

- LEGEND
- PL ——— PROPERTY LINE
 - 300 — EXISTING CONTOUR LINE
 - — — STREAM LINE
 - — — GUIDE RAIL
 - — — STONE WALL
 - — — TREE LINE
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 - — — HYDRANT (6" DRY HYDRANT)
 - — — PROPOSED ACCESS ROAD
 - 295 — PROPOSED CONTOURS
 - — — PROPOSED GATE
 - TS ——— TEMPORARY TRAFFIC SIGNAL
 - — — SLOPE FAILURE

SITE PLAN
SCALE: 1" = 20'



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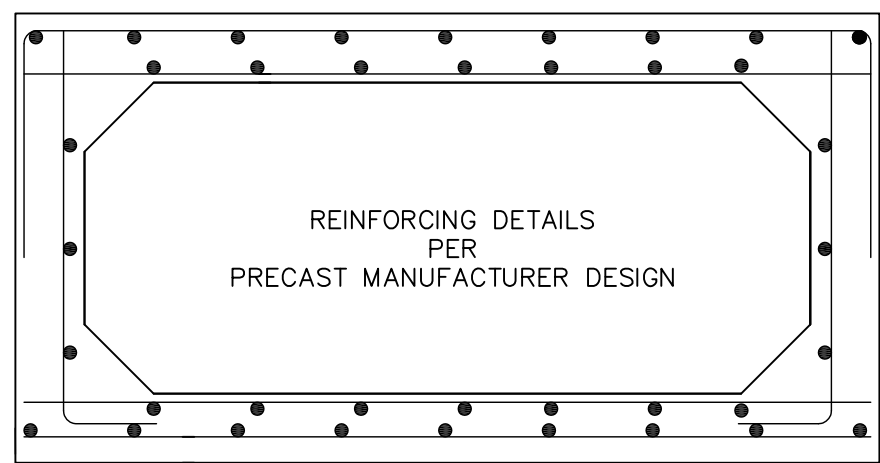
PRELIMINARY DESIGN
FOR REVIEW AND COMMENT
NOT TO BE USED FOR CONSTRUCTION

SITE PLAN
CONTRACT TSA-151

WILHELM ROAD CULVERT REPLACEMENT

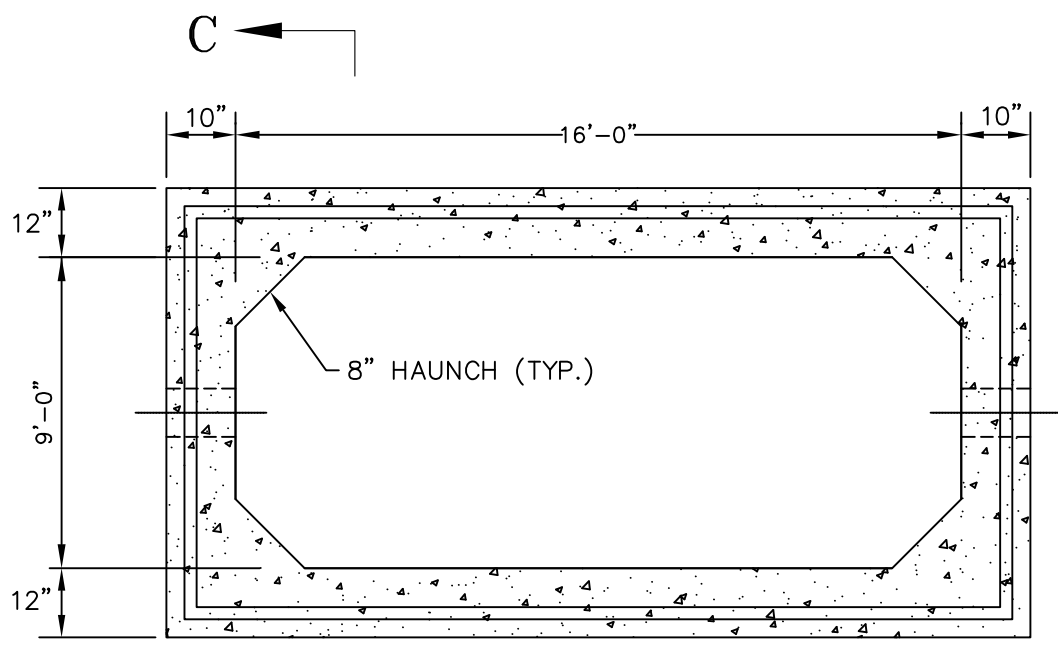
TOWN OF SAUGERTIES			ULSTER COUNTY			NEW YORK		
DATE	REVISION RECORD		BRINNIER & LARIOS, P.C. ENGINEERS & LAND SURVEYORS 67 MAIDEN LANE KINGSTON, N.Y. Phone: 845-338-7622 Fax: 845-338-7660					
			SCALE		DATE		SHEET NO.	
			1" = 20'		AUG. 2014		4 OF 6	
					DWG	CHK		
					RJS	JEM		

NOTE:
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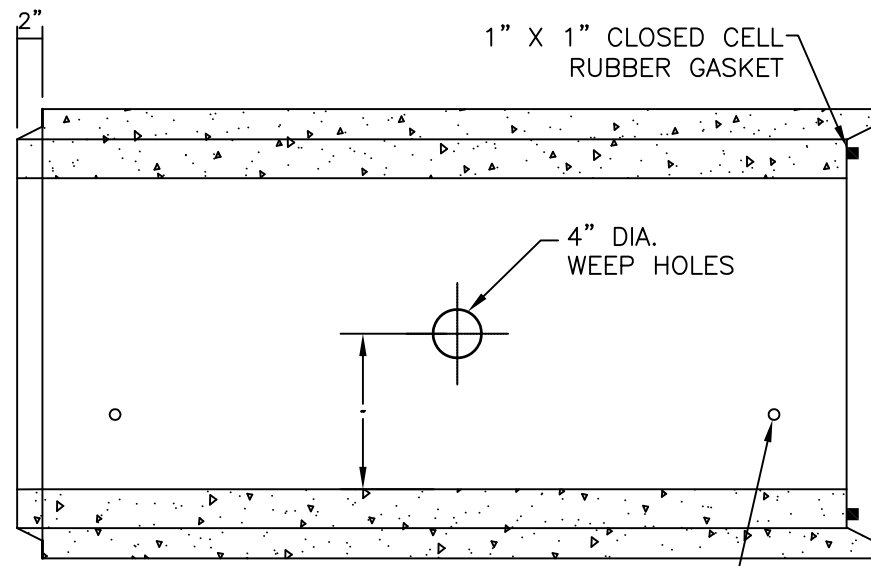


REINFORCEMENT DETAIL
NOT TO SCALE

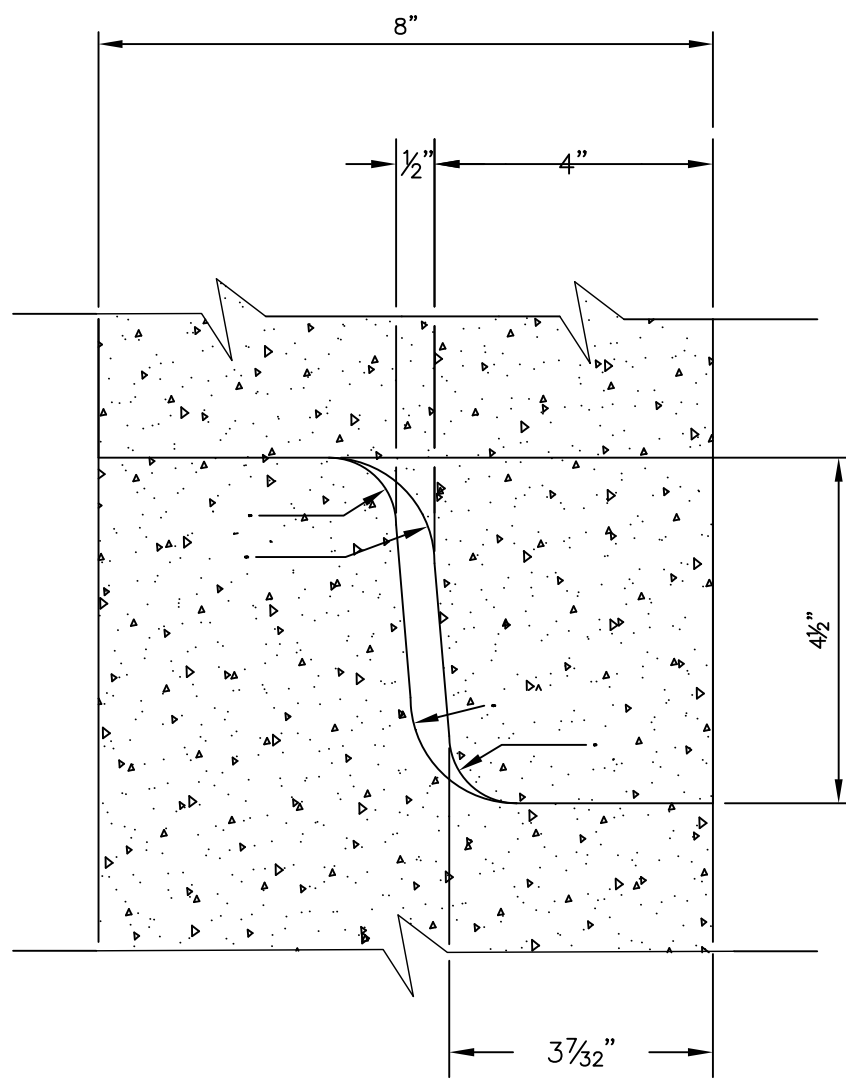
- NOTES:
1. CONCRETE: 5,000 PSI, MINIMUM STRENGTH @ 28 DAYS.
 2. STEEL REINFORCING — ASTM A-615, GRADE 60. (REINFORCEMENT SHOWN IS SCHEMATIC ONLY. CONTRACTOR TO VERIFY REINFORCEMENT FOR HS-25 LOADING). REINFORCING STEEL SCHEDULE AND PLAN OF PRECAST SECTION LOCATIONS SHALL BE PREPARED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR APPROVAL.
 3. COVER TO STEEL — 1" MINIMUM.
 4. CULVERT TO BE DESIGNED TO MEET ASTM C858 & ACI 318 WITH AASHTO HS-25 LOADING.
 5. CONSTRUCTION JOINT SEALED WITH 1"Ø BUTYL RUBBER OR EQUIVALENT.
 6. EARTH COVER = 0 TO 8 FEET MAXIMUM.
 7. APPROXIMATE BOX CULVERT WEIGHT PER FT. = 8850 LBS.
 8. LIFTING HOLES SHALL BE FILLED WITH CONCRETE PLUGS AND MASTIC AFTER THE BOX SECTIONS ARE IN PLACE.



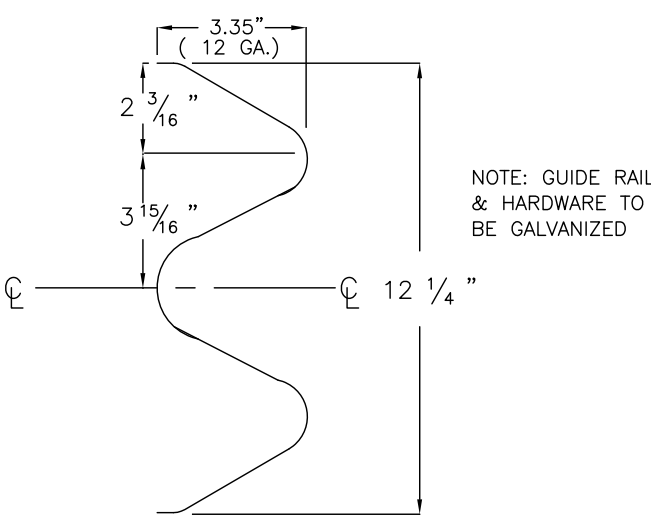
FRONT VIEW
NOT TO SCALE



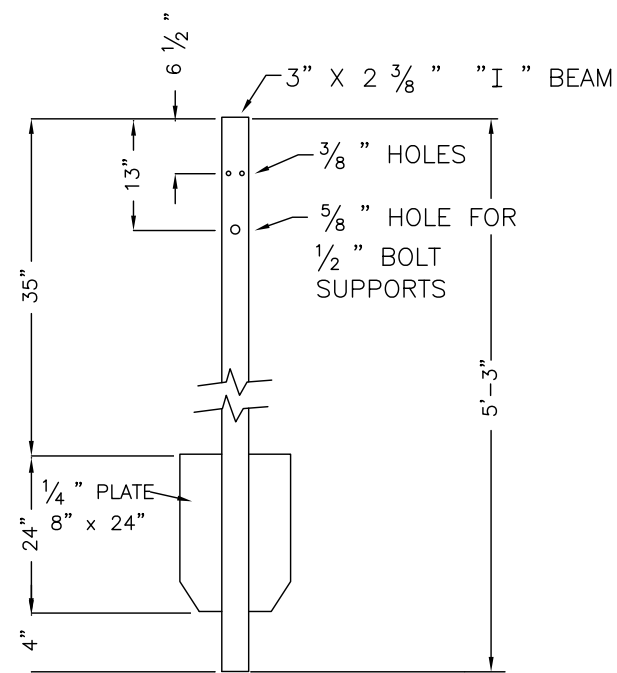
SECTION C-C
NOT TO SCALE



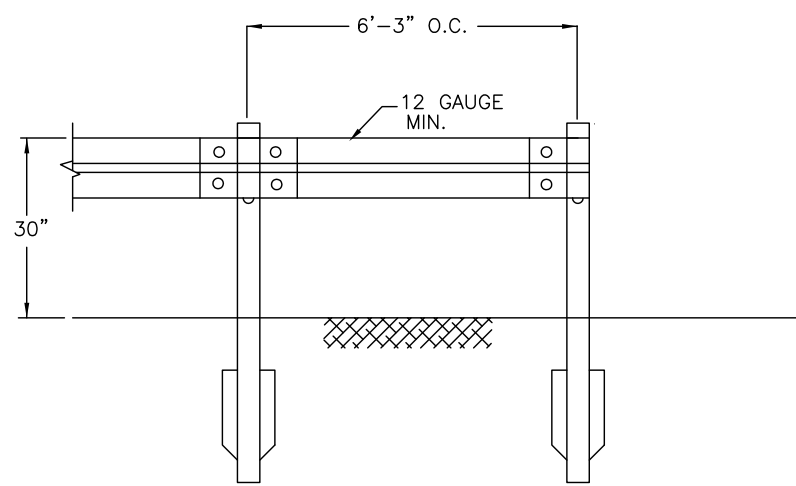
SECTION THRU BOX JOINT
NOT TO SCALE



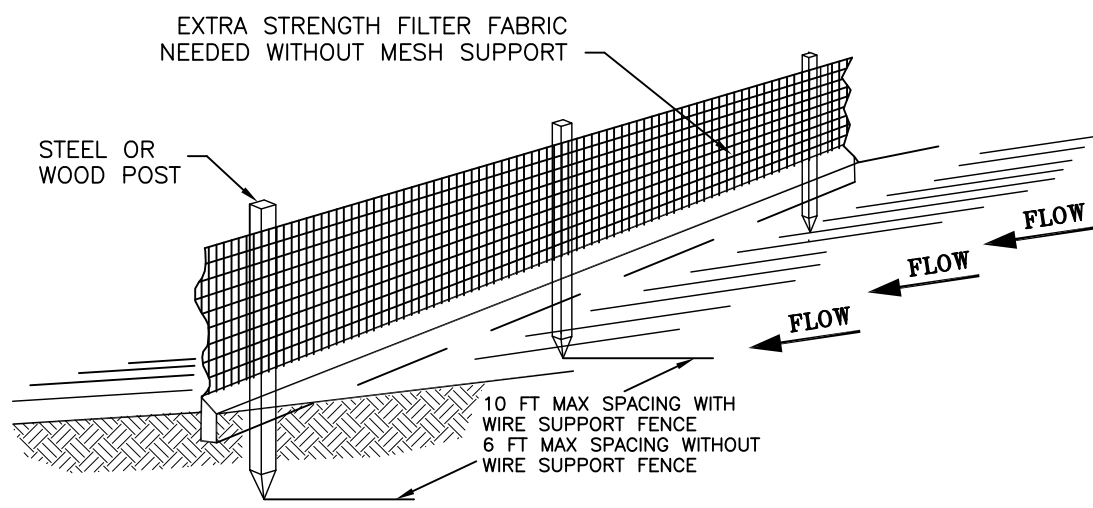
TYPICAL CORRUGATED BEAM DETAIL
NOT TO SCALE



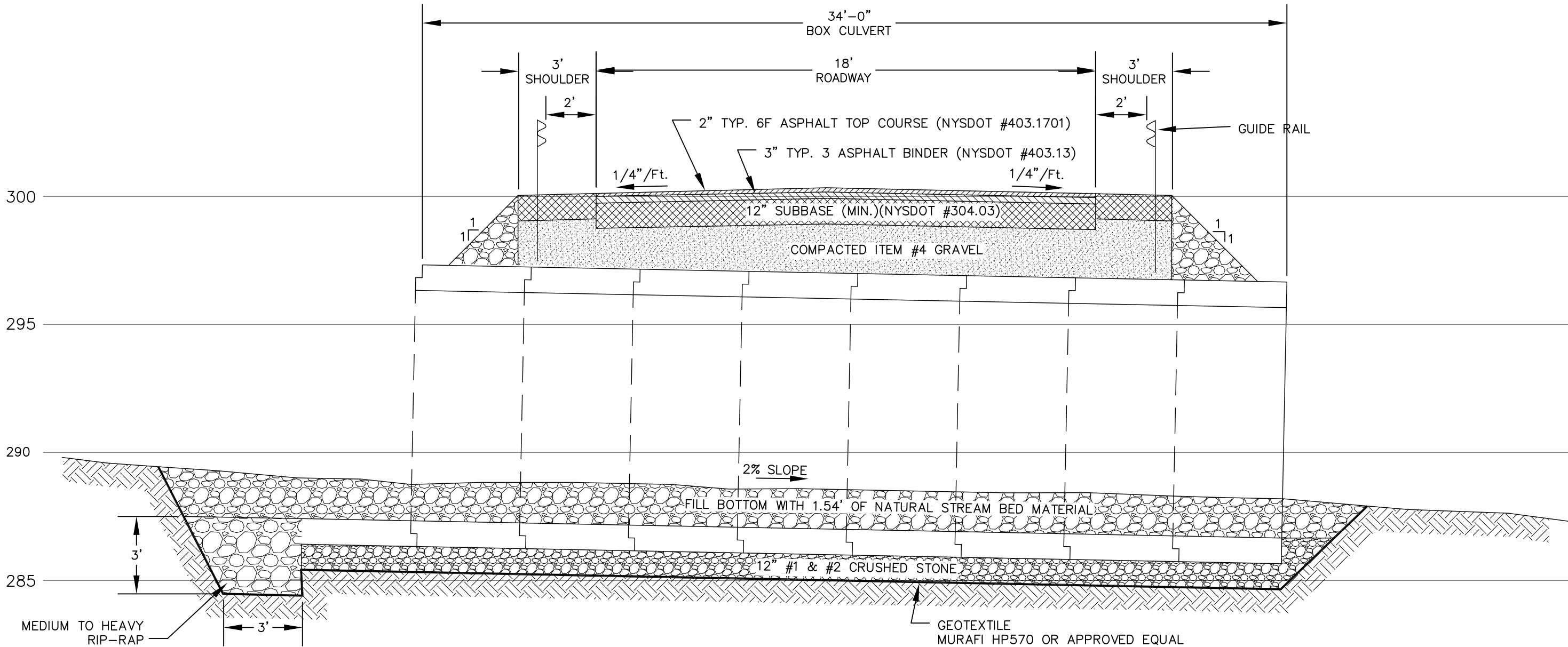
TYPICAL POST DETAIL
NOT TO SCALE



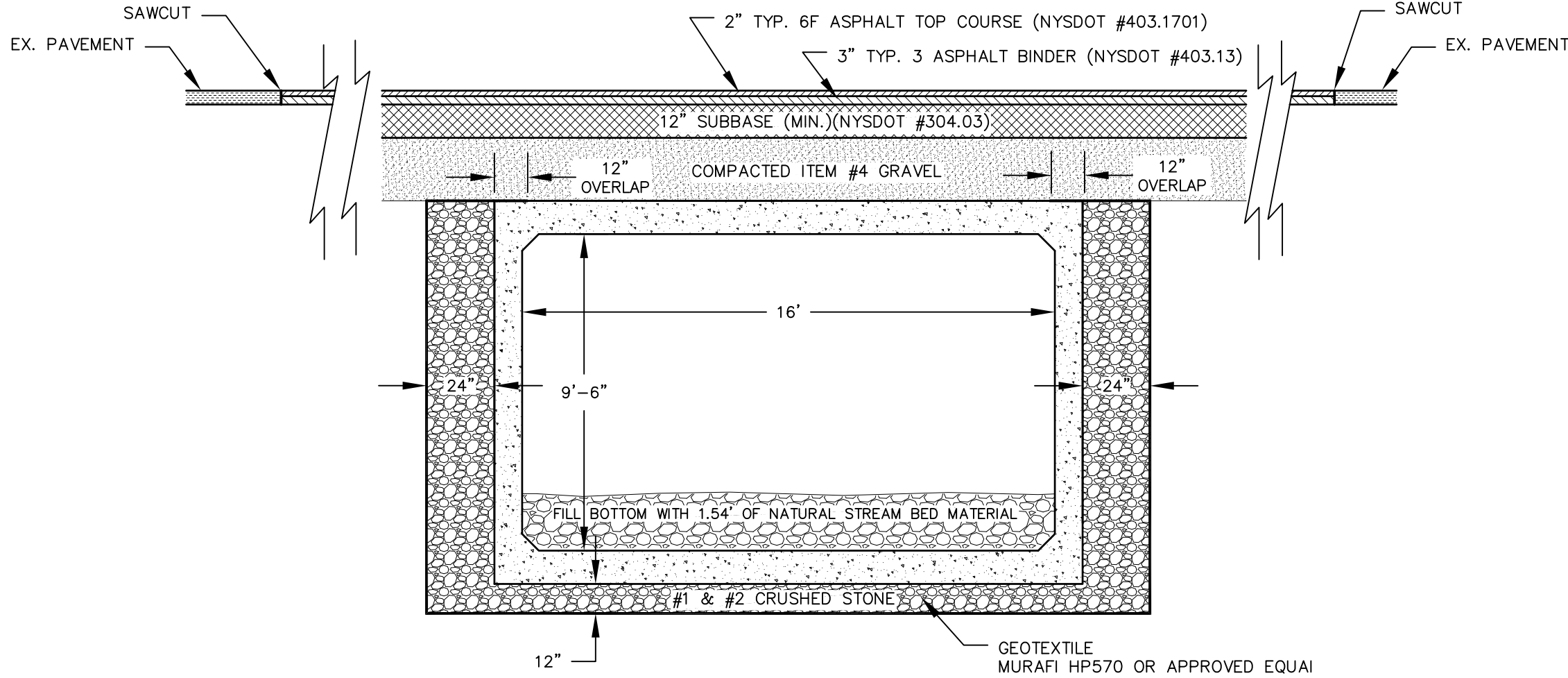
GUIDE RAIL DETAILS
NOT TO SCALE



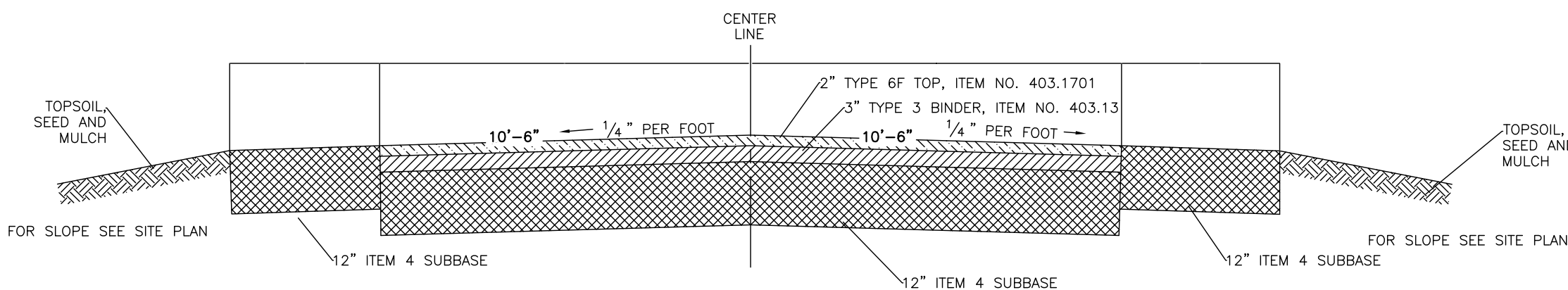
DETAIL OF SILT FENCE INSTALLATION
NOT TO SCALE



SECTION B-B
SCALE: HORIZ. 1" = 4'
VERT. 1" = 4'



SECTION A-A
SCALE: HORIZ. 1" = 4'
VERT. 1" = 4'



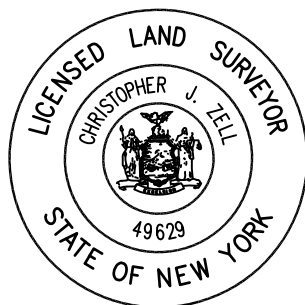
TYPICAL ROAD PAVING DETAIL
NOT TO SCALE

PRELIMINARY DESIGN
FOR REVIEW AND COMMENT
NOT TO BE USED FOR CONSTRUCTION

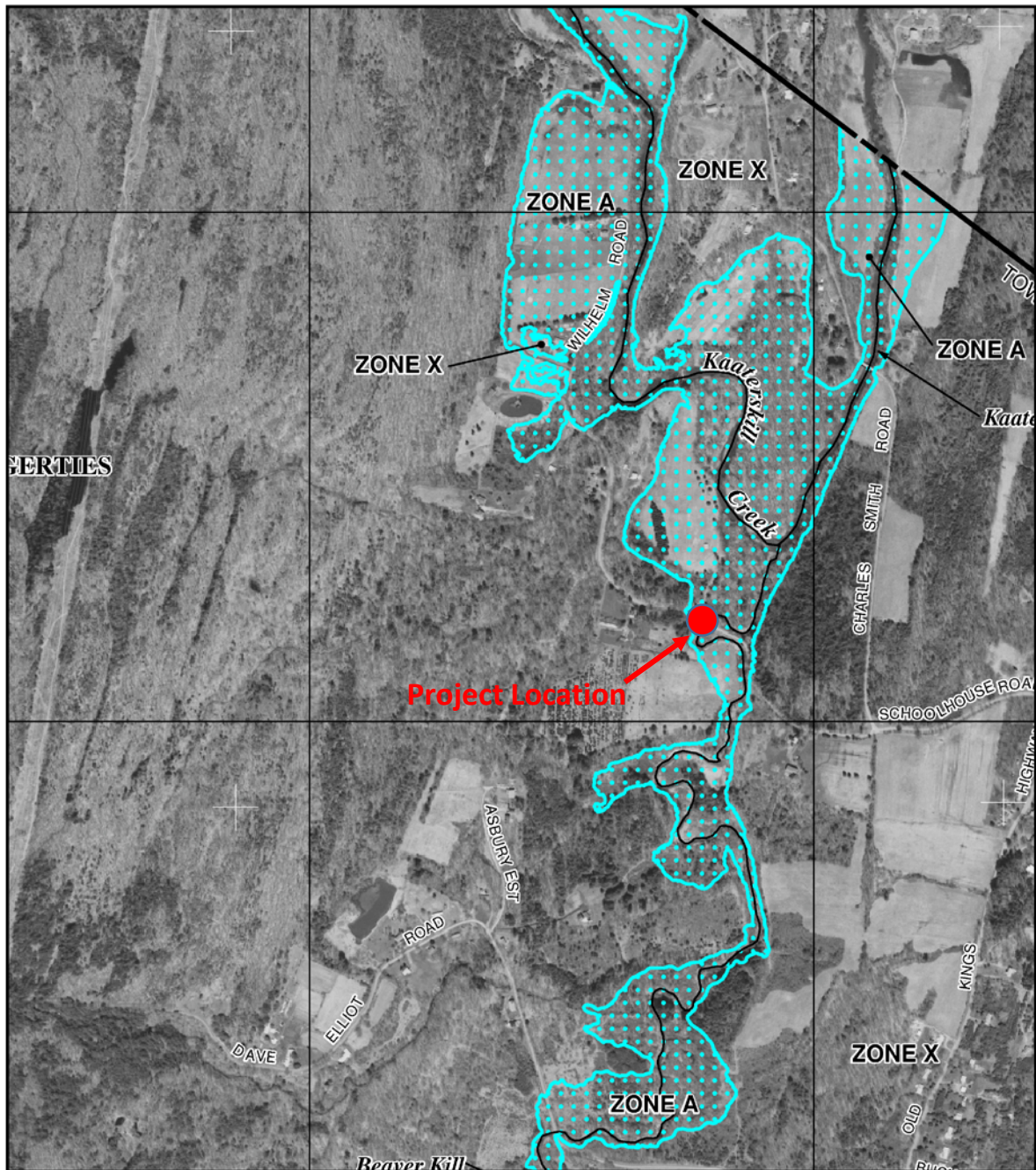
DETAILS
CONTRACT TSA-151

WILHELM ROAD CULVERT REPLACEMENT

TOWN OF SAUGERTIES		ULSTER COUNTY		NEW YORK	
DATE	REVISION	RECORD	BRINNIER & LARIOS, P.C.		
			ENGINEERS & LAND SURVEYORS		
			67 MAIDEN LANE KINGSTON, N.Y.		
			Phone: 845-338-7622 Fax: 845-338-7660		
SCALE	DATE	AUG. 2015		SHEET NO.	
AS SHOWN	DWG	RJS	CHK	5 OF 6	
			JEM		



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National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

NFIP

PANEL 0115E

FIRM
FLOOD INSURANCE RATE MAP
ULSTER COUNTY,
NEW YORK
(ALL JURISDICTIONS)

PANEL 115 OF 910
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAUGERTIES, TOWN OF	360863	0115	E

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
36111C0115E

EFFECTIVE DATE
SEPTEMBER 25, 2009

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

LEGEND

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

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

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.


ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

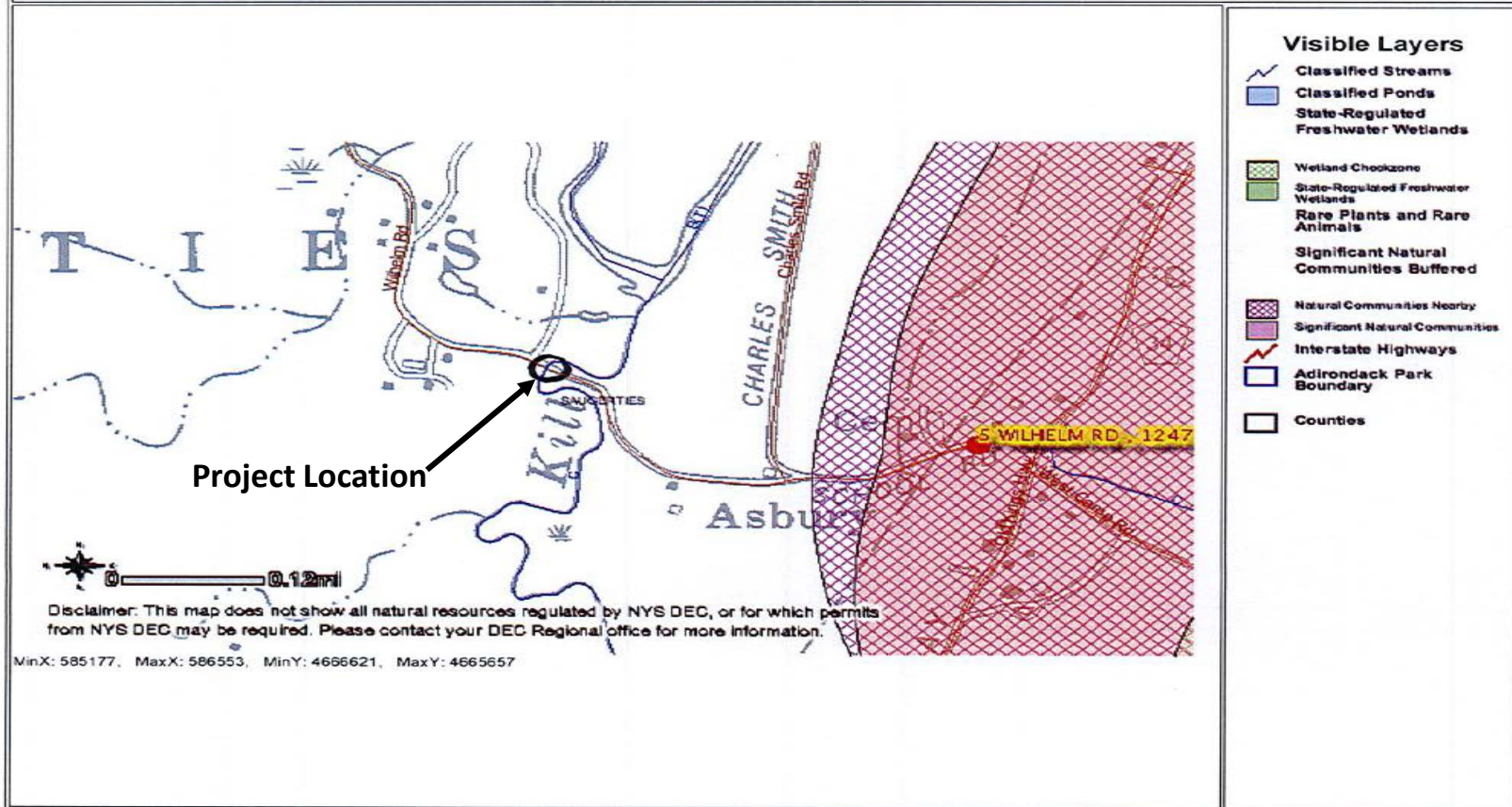
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

Replace Culvert at Wilhelm Road Project
Town of Saugerties, New York

 Flood Insurance Rate Map

Wilhelm Road Culvert Replacement



Disclaimer: This map was prepared by the New York State Department of Environmental Conservation using the most current data available. It is deemed accurate but is not guaranteed. NYS DEC is not responsible for any inaccuracies in the data and does not necessarily endorse any interpretations or products derived from the data.

Replace Culvert at Wilhelm Road Project

Town of Saugerties, New York



NYSDEC
Wetlands Map
Figure 2a





U.S. Fish and Wildlife Service

National Wetlands Inventory

Wilhelm Road

Apr 3, 2015



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

User Remarks:

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Replace Culvert at Wilhelm Road Project

Town of Saugerties, New York



USFWS
Wetlands Map
Figure 2b



Appendix A – Endangered Species Act Section 7

From: [Daniel Marrone - NOAA Federal](#)
To: [King, Thomas J \(STORMRECOVERY\)](#)
Cc: [Landler, Michael \(Landlrm@lro.com\)](#); ["Georgie Nugent Lussier" \(gnugent@foit-albert.com\)](#)
Subject: Re: NMFS ESA Section 7 Information Request
Date: Friday, October 16, 2015 2:03:56 PM

Hi Tom,
No ESA-listed species under NMFS jurisdiction occur in the proposed project area. No ESA section 7 consultation is necessary.
Dan

On Fri, Oct 16, 2015 at 2:01 PM, King, Thomas J (STORMRECOVERY)
<Thomas.King@stormrecovery.ny.gov> wrote:

Hi Daniel,

We have a project in Ulster County, NY that involves replacement of a culvert along the Beaver Kill at the location noted on the attached map. Does NMFS have any records of threatened or endangered species in this location?

Thanks,

Tom King

Director – Bureau of Environmental Review and Assessment *Interim*

Assistant General Counsel

Governor's Office of Storm Recovery

99 Washington Avenue Suite 1224

Albany, New York 12260

Office: [\(518\) 473-0015](tel:5184730015)

Mobile: [\(646\) 417-4660](tel:6464174660)

Thomas.King@StormRecovery.NY.Gov



Governor's Office of Storm Recovery



Andrew M. Cuomo
Governor

Lisa Bova-Hiatt
Interim Executive Director

October 6, 2015

Robyn A. Niver
Endangered Species Biologist
United State Fish and Wildlife Service
New York Field Office
Cortland, NY 13045

Re: Informal Section 7 Consultation for Town of Saugerties Replacement Culvert at Wilhelm Road Project

Dear Ms. Niver:

The Governor's Office of Storm Recovery (GOSR), acting under the auspices of New York State Homes and Community Renewal's (HCR) Housing Trust Fund Corporation (HTFC), on behalf of the Department of Housing & Urban Development (HUD) is currently preparing an Environmental Assessment (EA) for the Town of Saugerties Replacement Culvert at Wilhelm Road Project (the "Proposed Action").

GOSR is acting as HUD's non-federal representative for the purposes of conducting consultation pursuant to Section 7 of the Endangered Species Act.

The purpose of this letter is to provide the U.S. Fish and Wildlife Service – New York Field Office (USFWS) notice of the Proposed Action and to initiate informal consultation with USFWS under Section 7 of the Endangered Species Act (ESA) to determine whether any federally threatened, endangered, candidate, or proposed species, or their designated critical habitats could be affected. The Proposed Action involves the installation of a replacement culvert at Wilhelm Road (crossing beaver Kill) (see **Attachment 1**). During construction there will be a temporary gravel road installed to serve as a detour around the culvert project. In addition, trees will be required to be removed in order to complete the project. The trees will be required to be removed during the period of November 1 through March 31.

The USFWS Information, Planning and Conservation (IPaC) online planning tool Trust Resource List generated for the proposed project (see **Attachment 2**) has the Indiana bat (*Myotis sodalists*) listed as federally endangered and the northern long-eared bat (*Myotis septentrionalis*) listed as federally threatened. The Indiana bat and the northern long-eared bat are temperate, insectivorous bats whose life cycle can be coarsely divided into two primary phases - reproduction and hibernation. They hibernate in caves or mines during winter and then emerge in early spring, with

males dispersing and remaining solitary until mating season at the end of the summer, and pregnant females forming maternity colonies in which to rear young. No caves or mines occur near the project site. Summer habitat of the bats generally includes upland and riparian forest within heavily forested landscapes (Ford et al. 2005, Henderson et al. 2008). The proposed construction activities will occur on previously disturbed property, and although some trees are required to be removed, they will only be permitted to be cut between November 1 and March 31. For these reasons, the Proposed Action may affect but is not likely to adversely affect the Indiana bat and the northern long-eared bat or the habitat on which these species depend upon. In addition, we believe that the timing of the tree removal will result in no adverse effect to migratory birds. This correspondence represents the GOSR's assessment of effects in compliance with section 7 of the ESA of 1973, as amended, with respect to the Proposed Action.

Compliance

For purposes of consultation under Section 7(a)(2) of the ESA, we conclude that the Proposed Action may affect but is not likely to adversely affect the Indiana bat and the northern long-eared bat and the habitats on which these species depend upon. We request your concurrence with this determination.

If you have questions or require additional information regarding this request, please contact me at (646) 417-4660 or thomas.king@stormrecovery.ny.gov. Thank you for your time and consideration. Sincerely,



Thomas J. King, Esq.
Certifying Officer, NYS Homes and
Community Renewal

CC: Patricia Cole, USFWS (by email)
MaryEllen VanDonsel, USFWS (by email)

Literature Cited

- Ford, W.M., M.A. Menzel, J.L. Rodrigue, J.M. Menzel, and J.B. Johnson. 2005. Relating bat species presence to simple habitat measures in a central Appalachian forest. *Biological Conservation* 126: 528-539.
- Henderson, L.E., L.J. Farrow, and H.G. Broders. 2008. Intra-specific effects of forest loss on the distribution of the forest-dependent northern long-eared bat (*Myotis septentrionalis*). *Biological Conservation* 141:1819-1828.

Town of Saugerties - Wilhelm Road Replacement Culvert

IPaC Trust Resource Report

Generated October 05, 2015 04:18 PM MDT

This report is for informational purposes only and should not be used for planning or analyzing project-level impacts. For projects that require FWS review, please return to this project on the IPaC website and request an official species list from the Regulatory Documents page.



US Fish & Wildlife Service

IPaC Trust Resource Report



Project Description

NAME

Town of Saugerties - Wilhelm Road
Replacement Culvert

PROJECT CODE

YDEPP-7U46V-HGZJB-PJQTV-7JQXXA

LOCATION

Ulster County, New York

DESCRIPTION

This project will right-size the culvert at Wilhelm road to prevent erosion and reduce flooding.



U.S. Fish & Wildlife Contact Information

Species in this report are managed by:

New York Ecological Services Field Office

3817 Luker Road

Cortland, NY 13045-9349

(607) 753-9334

Endangered Species

Proposed, candidate, threatened, and endangered species that are managed by the [Endangered Species Program](#) and should be considered as part of an effect analysis for this project.

This unofficial species list is for informational purposes only and does not fulfill the requirements under [Section 7](#) of the Endangered Species Act, which states that Federal agencies are required to "request of the Secretary of Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action." This requirement applies to projects which are conducted, permitted or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can be obtained by returning to this project on the IPaC website and requesting an official species list on the Regulatory Documents page.

Mammals

Indiana Bat *Myotis sodalis*

Endangered

CRITICAL HABITAT

No critical habitat has been designated for this species.

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A000>

Northern Long-eared Bat *Myotis septentrionalis*

Threatened

CRITICAL HABITAT

No critical habitat has been designated for this species.

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0JE>

Critical Habitats

Potential effects to critical habitat(s) within the project area must be analyzed along with the endangered species themselves.

There is no critical habitat within this project area

Migratory Birds

Birds are protected by the [Migratory Bird Treaty Act](#) and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service ([1](#)). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

You are responsible for complying with the appropriate regulations for the protection of birds as part of this project. This involves analyzing potential impacts and implementing appropriate conservation measures for all project activities.

American Bittern *Botaurus lentiginosus*

Season: Breeding

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?scode=B0F3>

Bird of conservation concern

Bald Eagle *Haliaeetus leucocephalus*

Year-round

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?scode=B008>

Bird of conservation concern

Black-billed Cuckoo *Coccyzus erythrophthalmus*

Season: Breeding

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?scode=B0HI>

Bird of conservation concern

Black-crowned Night-heron *Nycticorax nycticorax*

Season: Breeding

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?scode=B0EU>

Bird of conservation concern

Blue-winged Warbler *Vermivora pinus*

Season: Breeding

Bird of conservation concern

Canada Warbler *Wilsonia canadensis*

Season: Breeding

Bird of conservation concern

Cerulean Warbler *Dendroica cerulea*

Season: Breeding

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?scode=B09I>

Bird of conservation concern

Golden-winged Warbler *Vermivora chrysoptera*

Season: Breeding

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?scode=B0G4>

Bird of conservation concern

Least Bittern *Ixobrychus exilis*

Season: Breeding

Bird of conservation concern

Peregrine Falcon *Falco peregrinus*

Season: Breeding

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?scode=B0FU>

Bird of conservation concern

Pied-billed Grebe *Podilymbus podiceps*

Season: Breeding

Bird of conservation concern

Prairie Warbler *Dendroica discolor*

Season: Breeding

Bird of conservation concern

Red-headed Woodpecker *Melanerpes erythrocephalus*

Season: Breeding

Bird of conservation concern**Rusty Blackbird** *Euphagus carolinus*

Season: Wintering

Bird of conservation concern**Short-eared Owl** *Asio flammeus*

Season: Wintering

Bird of conservation concern<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HD>**Wood Thrush** *Hylocichla mustelina*

Season: Breeding

Bird of conservation concern**Worm Eating Warbler** *Helmitheros vermivorum*

Season: Breeding

Bird of conservation concern

Refuges

Any activity proposed on [National Wildlife Refuge](#) lands must undergo a 'Compatibility Determination' conducted by the Refuge. If your project overlaps or otherwise impacts a Refuge, please contact that Refuge to discuss the authorization process.

There are no refuges within this project area

Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

Project proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate [U.S. Army Corps of Engineers District](#).

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

There are no wetlands identified in this project area



United States Department of the Interior

FISH AND WILDLIFE SERVICE

3817 Luker Road
Cortland, NY 13045



November 9, 2015

Mr. Thomas J. King
Certifying Officer
NYS Homes and Community Renewal
25 Beaver Street
New York, NY 10004

Dear Mr. King:

This is in response to your October 6, 2015, letter regarding the Wilhelm Road culvert replacement project, located on Wilhelm Road over the Beaver Kill River, Town of Saugerties, Ulster County, New York. We understand that the Town of Saugerties received funding from the Department of Housing and Urban Development (HUD), through New York State Homes and Community Renewal, Housing Trust Fund Corporation. The Governor's Office of Storm Recovery (GOSR) is the non-federal representative for HUD.

Pursuant to Section 7(a)(2) of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), the GOSR, on behalf of HUD, has determined that the project may affect, but is not likely to adversely affect, the Indiana bat (*Myotis sodalis*) and the northern long-eared bat (*Myotis septentrionalis*). Given the proposed project location, the extent of tree removal, and the proposed conservation measure (e.g., conducting tree removal within the October 31 and March 31 timeframe), we concur with your determination. No further ESA coordination or consultation with the U.S. Fish and Wildlife Service is required.

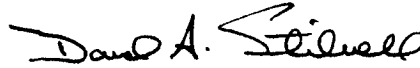
Should project plans change, or if additional information on listed or proposed species or critical habitat becomes available, this determination may be reconsidered. The most recent compilation of federally listed and proposed endangered and threatened species in New York is available for your information. Until the proposed projects are complete, we recommend that you check our website every 90 days from the date of this letter to ensure that listed species presence/absence information for the proposed projects is current.*

Any additional information regarding the proposed project and its potential to impact listed species should be coordinated with both this office and with the New York State Department of Environmental Conservation (NYSDEC) Region 3 Office.

For additional information on fish and wildlife resources or State-listed species, we suggest you contact the appropriate NYSDEC regional office(s) and the New York Natural Heritage Program Information Services.*

Thank you for your time. If you require additional information please contact Sandra Doran at 607-753-9334. Future correspondence with us on this project should reference project file number 160029.

Sincerely,

A handwritten signature in black ink, appearing to read "David A. Stilwell". The signature is fluid and cursive, with the first name "David" and last name "Stilwell" clearly distinguishable.

David A. Stilwell
Field Supervisor

*Additional information referred to above may be found on our website at:
<http://www.fws.gov/northeast/nyfo/es/section7.htm>

cc: NYSDEC, Albany, NY (Wildlife Diversity)
NYSDEC, New Paltz, NY



Governor's Office of Storm Recovery



Andrew M. Cuomo
Governor

Lisa Bova-Hiatt
Interim Executive Director

October 23, 2015

Nicholas Conrad
New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program – Information Services
625 Broadway, 5th Floor
Albany, New York 12233-4757

Re: Natural Heritage Compliance Process Request for the Culvert Replacement at
Wilhelm Road, Town of Saugerties, Ulster County, NY

Dear Mr. Conrad:

The Governor's Office of Storm Recovery (GOSR), acting under the auspices of New York State Homes and Community Renewal's (HCR) Housing Trust Fund Corporation (HTFC), on behalf of the Department of Housing & Urban Development (HUD), are currently preparing an Environmental Assessment (EA) for the replacement of an existing 8-foot diameter cast iron culvert located on Wilhelm Road that is inadequately-sized in the Town of Saugerties, Ulster County, New York (see Figure 1). The proposed project includes the installation of a four-sided precast box culvert with an internal opening dimension of 9½ feet high by 16 feet wide.

The purpose of this letter is to request information as to the presence of any rare, threatened or endangered species at the project site.

Program Overview

During Hurricane Irene, Tropical Storm Lee and Superstorm Sandy, the Wilhelm Road culvert was overwhelmed by stormwater, which caused flooding, erosion, and damage to the culverts as well as surrounding infrastructure. Resizing the culvert to accommodate measured stormwater flows will minimize localized flooding during and after future storms. This project will provide long-term benefits through permanent flood mitigation

and ensure continual access to vital commercial and residential areas, as well as enabling emergency personnel to respond more quickly.

Compliance

According to the USFWS, there is one endangered species that is potentially associated with the project site – the Indiana Bat, and one proposed endangered species – the Northern Long Eared bat (see attached list). In addition, there are several migratory birds of concern that could potentially found at the proposed project (see attached list).

According to information reviewed from the New York State Environmental Resource Mapper, there are no significant natural communities or rare plants or animals that are known to exist on the site. However, as the proposed project would result in the removal of trees, GOSR respectfully requests NYNHP review its records of concern for any rare or state-listed animals or plants, or significant natural communities, at this site or in its immediate vicinity.

If you have questions or require additional information regarding this request, please contact me at (646) 417-4660 or thomas.king@stormrecovery.ny.gov. Thank you for your time and consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas J. King", with a long, sweeping horizontal line extending to the right.

Thomas J. King, Esq.
Certifying Officer
Governor's Office of Storm Recovery
NYS Homes and Community Renewal



November 03, 2015

Thomas J. King, Esq.
Governor's Office of Storm Recovery
25 Beaver Street
New York, NY 10004

Re: Culvert replacement at Wilhelm Road over Beaver Creek
Town/City: Saugerties. County: Ulster.

Dear Thomas J. King, Esq.:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to the above project.

We have no records of rare or state-listed animals or plants, or significant natural communities, at your site or in its immediate vicinity.

The absence of data does not necessarily mean that rare or state-listed species, significant natural communities or other significant habitats do not exist on or adjacent to the proposed site. Rather, our files currently do not contain information that indicates their presence. For most sites, comprehensive field surveys have not been conducted. We cannot provide a definitive statement on the presence or absence of all rare or state-listed species or significant natural communities. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other resources may be required to fully assess impacts on biological resources.

This response applies only to known occurrences of rare or state-listed animals and plants, significant natural communities, and other significant habitats maintained in the Natural Heritage database. Your project may require additional review or permits; for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, as listed at www.dec.ny.gov/about/39381.html.

Sincerely,

Nicholas Conrad
Information Resources Coordinator
New York Natural Heritage Program

Appendix B – Floodplain Management and Wetland Protection

Floodplain and Wetland 5-Step Process
in accordance with Executive Order 11988: Floodplain Management and Executive Order 11990:
Protection of Wetlands

New York Governor's Office of Storm Recovery
Town of Saugerties Culvert Replacement
Thomas J. King – Certifying Environmental Officer
November 25, 2015

The Town of Saugerties is requesting funding from the New York State Governor's Office of Storm Recovery (GOSR) for the replacement of an existing culvert located on Wilhelm Road (crossing Beaver Kill) in Saugerties, New York (see **Figure 1**).

The project to be funded with up to approximately \$575,645 from the Community Development Block Grant – Disaster Recovery (CDBG-DR) program involves the design, engineering, and construction required to replace an existing 8-foot diameter cast iron culvert located on Wilhelm Road. An analysis of the hydraulics and hydrology of the watershed was performed to determine the peak discharge rates that will occur in various storm events. This critical first step determined that the required dimension for the replacement culvert on Wilhelm Road would be an interior width of 16 feet and a minimum clear opening height of 7.64 feet to pass the 100-year storm. In order to meet NYSDEC requirements, the recommended replacement culvert size for Wilhelm Road is a four-sided precast box culvert with an internal opening dimension of 9½ feet high by 16 feet wide embedded a minimum of 1.53 feet into the streambed.

Due to the excavation of the old culvert, disturbed and damaged roadway will be replaced. Construction will involve the removal of asphalt and aggregate, extraction of the old culvert, excavation, stabilization of existing utilities near the site, placement of the new culvert, addition of fill material and repairing with a four-inch base coat and two-inch finishing coat. During construction, a 12-foot wide temporary gravel road will be installed to be used as a detour around the culvert construction project. Guiderails will be relocated from Wilhelm Road and reused during the temporary road construction. In addition, part of the demolition plan involves the removal of some trees.

Pursuant to 24 CFR §55.12(a)(4), steps 2, 3, and 7 of the 8-step process for floodplain management do not apply to projects involving the improvement of existing nonresidential buildings and structures, in communities that are in the Regular Program of the National Flood Insurance Program (NFIP) and are in good standing, provided that the action does not meet the thresholds for "substantial improvement" under §55.2(b)(10) and that the footprint of the structure and paved areas is not significantly increased. The Town of Saugerties is in the NFIP (CID# 360863) and in good standing and the proposed project does not constitute a substantial improvement. Therefore, the abbreviated 5-step process for floodplain management is herein followed.

Step ONE: Determine if a Proposed Action is potentially in a wetland or a floodplain

GOSR is proposing to fund the proposed action within the 100-year Floodplain, as indicated by Flood Insurance Rate Map 36111C0115E (See **Figure 2** – FEMA floodplain map). The proposed project is not located in a state or federal designated wetland. Although the project is not located in a designated mapped wetland, it will still adhere to and be in compliance with the guidelines and regulations of Executive Order 11990, in order to minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. The work involved with this project is contained within an existing stream channel, and the necessary permits that have to be obtained will provide adequate protection and limit potential damage.

A joint permit application will be required for submittal to NYSDEC and USACE prior to any work being completed. The USACE will make a jurisdictional determination and will require USFWS and SHPO clearance prior to issuing a permit. Culvert replacements are covered under a Nationwide Permit #14, which applies to

linear transportation projects with less than 0.10 acre wetland impact and/or less than 300 linear feet of stream disturbance.

Step TWO: Identify and evaluate the direct and indirect impacts of the Proposed Action

During Hurricane Irene, Tropical Storm Lee and Superstorm Sandy, the Wilhelm Road culvert was overwhelmed by stormwater, which caused flooding, erosion, and damage to the culverts as well as surrounding infrastructure. Resizing the culvert to accommodate measured stormwater flows will minimize localized flooding during and after future storms. This project will provide long-term benefits through permanent flood mitigation and ensure continual access to vital commercial and residential areas, as well as enabling emergency personnel to respond more quickly.

Therefore, no direct or indirect adverse impacts to the floodplain are anticipated as a result of this project. At a minimum, the project will result in positive impacts to the floodplain by minimizing localized flooding and by providing permanent flood mitigation. Although the streambed will be temporarily disturbed the disturbance will adhere to all DEC and USACE permit conditions to minimize adverse effects associated with turbidity. Additionally, once complete the new culvert will allow for fish passage and decrease stream velocity thereby minimizing scour.

Step THREE: Where practicable, design or modify the Proposed Action to minimize the potential adverse impacts to and from the 100-year and to restore and preserve its natural and beneficial functions and values

The purpose of the proposed project is to minimize localized flooding during and after future storms, and provide long-term benefits through permanent flood mitigation and ensure continual access to vital commercial and residential areas, as well as enabling emergency personnel to respond more quickly. The project replaces a presumed inadequately-sized culvert to minimize flooding and provide flood mitigation. In order to meet NYSDEC requirements, the recommended replacement culvert size for Wilhelm Road is a four-sided precast box culvert with an internal opening dimension of 9½ feet high by 16 feet wide embedded a minimum of 1.53 feet into the streambed. Due to the excavation of the old culvert, disturbed and damaged roadway will be replaced. Construction will involve the removal of asphalt and aggregate, extraction of the old culvert, excavation, stabilization of existing utilities near the site, placement of the new culvert, addition of fill material and repairing with a four-inch base coat and two-inch finishing coat.

Therefore, the project will result in the improved accommodation of measured stormwater flows and will minimize localized flooding during and after future storms. Additionally, the new culvert will provide long-term benefits through permanent flood mitigation and ensure continual access to vital commercial and residential areas, as well as enabling emergency personnel to respond more quickly.

Step FOUR: Re-evaluate the Proposed Action

An analysis of the hydraulics and hydrology of the watershed was performed to determine the peak discharge rates that will occur in various storm events. This is the critical first step in determining the required dimension of the replacement culvert. The replacement culvert will be sized with adequate capacity to convey the peak discharge from the 100-year storm. The recommended culvert size for Wilhelm Road is 4-sided precast concrete box culvert with a 9½ feet high by 16 feet wide internal opening dimension embedded a minimum of 1.53 feet into the streambed. This design will maintain the same elevation of the road and provide a culvert that can pass the peak flows of a 100-year storm event.

Step FIVE: Implement the Action

GOSR has determined that the proposed project will have no direct or indirect adverse impacts to the Floodplain and has evaluated and eliminated project alternatives in favor of proceeding with the proposed project.

Appendix C – National Historic Preservation Act Section 106



ANDREW M. CUOMO
Governor

ROSE HARVEY
Commissioner

November 5, 2015

Thomas King, Certifying Officer
Governor's Office of Storm Recovery (GOSR)
99 Washington Ave, Suite 1224
Albany, NY 12231

Re: GOSR/ CDBG Disaster Recovery Program
Replacement of Steel culvert with precast concrete culvert
Wilhelm Road over Beaver Kill, Saugerties/ Ulster County
15PR05810

Dear Mr. King:

Thank you for requesting the comments of the New York State Historic Preservation Office (SHPO). We have reviewed the submitted materials in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. They do not include other environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8).

Based on this review, the SHPO concurs with your agency's determination that there will be No Historic Properties Affected by the proposed undertaking.

If I can be of further assistance, please contact me at (518) 268-2187 or Larry.moss@parks.ny.gov.

Sincerely,

A handwritten signature in black ink that reads "Larry K Moss". The signature is written in a cursive, flowing style.

Larry K Moss, Historic Preservation Technical Specialist

CC: Camilla Deiber

October 6, 2015

Larry K. Moss, Historic Preservation Technical Specialist
Technical Assistance & Compliance Unit, Division for Historic Preservation
New York State Office of Parks, Recreation & Historic Preservation
Peebles Island, P.O. Box 189
Waterford, New York 12188-0189

RE: New York State CDBG Disaster Recovery Program
New York State Sandy Recovery
Wilhelm Road Culvert Replacement, Saugerties, Ulster County, New York

Mr. Moss,

The New York State Governor's Office of Storm Recovery is proposing to fund the replacement of a 96-inch steel culvert over Beaver Kill River on Wilhelm Road in northern Ulster County (see preliminary plans). The project is to be funded through the Community Development Block Grant – Disaster Recovery (CDBG-DR) program.

Project Description

The steel culvert to be replaced is located approximately seven tenths of a mile west of Interstate 87 on Wilhelm Road. The culvert is inadequately sized for the amount of flow down Beaver Kill River. The approximately nine-foot in diameter steel plate culvert would be replaced by a precast concrete box culvert that is approximately nine and a half feet high and sixteen feet wide. Project construction will involve the removal of asphalt and aggregate, extraction of the old culvert, excavation within the previously disturbed footprint of the culvert, stabilization of existing utilities near the sites, placement of the new culvert, addition of fill material and repairing the roadbed with a 4-inch base coat and 2-inch finishing coat.

During construction, a 12-foot wide temporary gravel road will be installed to be used as a detour around the culvert construction project. Fill will be placed on the existing surface to create the new road embankment. Guiderails will be relocated from Wilhelm Road and reused during the temporary road construction. In addition, part of the demolition plan involves the removal of some trees. Upon completion of the project, the fill for the temporary road will be removed.

NY-CRIS Site File Review

The steel culvert was constructed sometime in the 1950s and was not shown as previously surveyed in CRIS. Examination of the project area in CRIS indicates that a few properties within one-half of a mile from the project area had been previously surveyed (Table 1). The closest resource is the Dillonhurst Farm that is two-tenths of a mile from the project area but is separated visually by a grove of trees. The other properties are approximately one-half mile from the project area. There are no other surveyed resources within the immediate vicinity of the project area. The project area is within an archaeologically sensitive area.

Table 1. Previously Surveyed Project Adjacent to Project Area

USN	Address	NRHP Status
11115.00005	Homestead (Stone) Trumbour Farm - Kings Hwy (NY 32)	Listed
11115.00012	Ca. 1800 Frame Dwelling; altered - 2111 Old Kings Hwy	Undetermined
11115.00015	Comfort Smith Farm, ca. 1811/1790 - 96 Charles Smith Rd	Eligible
11115.00015	Dillonhurst, Lasher Farm, ca. 1790 - 27 Wilhelm Rd	Eligible

Recommendations

Given that the project involves installation of a new culvert within the previous area of disturbance for the existing culvert and that the new roadway will also involve no new additional ground disturbance, Louis Berger recommends the proposed project will constitute **No Historic Properties Affected**. We would greatly appreciate your concurrence.

Sincerely,



Camilla Deiber
Senior Architectural Historian

Cc: Thomas King, GOSR



Governor's Office of Storm Recovery



Andrew M. Cuomo
Governor

Lisa Bova-Hiatt
Interim Executive Director

October 19, 2015

Mr. Mark H. Garrow, Chief
Saint Regis Mohawk Tribal Office
412 State Route 37
Akwesasne, New York 13655

RE: Section 106 Discussion
CDBG-DR, NYRCR Funding Application to Replace Culvert at Wilhelm Road,
Town of Saugerties, Ulster County, New York

Dear Mr. Garrow:

Pursuant to the Disaster Relief Appropriations Act, 2013 (Public Law 113-2) and the Housing and Community Development Act (42 U.S.C. § 5301 et seq.), the Governor's Office of Storm Recovery (GOSR) is acting under the auspices of New York State Homes and Community Renewal's Housing Trust Fund Corporation as a recipient of Community Development Block Grant – Disaster Recovery ("CDBG-DR") funds from the United States Department of Housing and Urban Development ("HUD") and is the entity responsible for compliance with the HUD NEPA environmental review procedures set forth in 24 CFR Part 58 and Section 106 of the National Historic Preservation Act ("NHPA" 16 USC § 470f). GOSR is acting on behalf of HUD in providing the enclosed project information and inviting this discussion with your Nation to respond with any concerns or comments.

GOSR processes environmental reviews for projects funded with HUD CDBG-DR on a case-by-case basis. Upon review of the project, GOSR referred the project to the State Historic Preservation Office for review. In accordance with Section 101(d)(6)(B) of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470a), and its implementing regulations, 36 Code of Federal Regulations (CFR) Part 800, this letter serves as notification of the proposed action.

Area of Potential Effect: GOSR proposes to fund an application to replace an existing culvert on Wilhelm Road (crossing Beaver Kill), in the Town of Saugerties, Ulster County, New York. A map depicting the area of potential effect is enclosed with this letter.

Proposed Project Description: The project replaces a presumed inadequately-sized culvert to minimize flooding and provide flood mitigation. In order to meet NYSDEC requirements, the recommended replacement culvert size for Wilhelm Road is a four-sided precast box culvert with an internal opening dimension of 9½ feet high by 16 feet wide embedded a minimum of 1.53 feet into the streambed. Due to the excavation of the old culvert, disturbed and damaged roadway will be replaced. Construction will involve the removal of asphalt and aggregate, extraction of the old culvert, excavation, stabilization of existing utilities near the site, placement of the new culvert, addition of fill material and repairing with a four-inch base coat and two-inch finishing coat.

With this letter, GOSR respectfully submits for your review the attached documentation for the proposed project described herein. If the project area encompasses historic properties of religious or cultural significance to your Tribe, please respond within 15 days or sooner. Additionally, please indicate if there are other sources of information or other parties, Nations, Tribes, or members of the public you believe should be included in the consultation process. Please respond by email or in writing to the address listed below.

Mr. Thomas King
Certifying Environmental Officer
Governor's Office of Storm Recovery
99 Washington Avenue, Suite 1224
Albany, New York 12260

I am available to answer any questions that you may have regarding this action. If you have any questions, please feel free to contact me at (518) 473-0015 or via email at Thomas.King@stormrecovery.ny.gov. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas J. King", with a long, sweeping horizontal line extending to the right.

Thomas J. King
Assistant General Counsel

CC: Arnold Printup

Hydrology and Hydraulic Analysis

HYDROLOGY AND HYDRAULIC ANALYSIS

WILHELM ROAD CULVERT

TOWN OF SAUGERTIES
ULSTER COUNTY, NEW YORK



JULY 2015

PREPARED FOR:

TOWN OF SAUGERTIES

Greg Helsmoortel, Supervisor

Town Board

James Bruno

Fred Costello Jr.

Leeanne Thornton

William Schirmer

Highway Superintendent

Doug Myer



Dennis M. Larios, P.E.

PREPARED BY:

BRINNIER & LARIOS, P.C.

Professional Engineers & Land Surveyors

67 Maiden Lane

Kingston, New York 12401

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Appendix B- Tributary Drainage Area

Appendix C- USDA Soils Report of Drainage Area and Boring Logs

Appendix D- Run-Off Hydrographs, HydroCAD Model Output

Appendix E- Hydraulic Calculations for Replacement Culvert

I. PURPOSE AND SCOPE

The Town of Saugerties is replacing the Wilhelm Road culvert located in the Town of Saugerties, N.Y., approximately 0.5 miles west of Old Kings Highway (see location map in Appendix A. The existing culvert is located at Latitude 42° 08' 35.51" N and Longitude 73° 57' 42.70" W below a section of Wilhelm Road which spans the Beaver Kill Creek. The Beaver Kill Creek joins with the Kaaterskill Creek approximately 675 feet upstream of this culvert. An analysis of the Hydraulics & Hydrology of the watershed was performed to determine the peak discharge rates that will occur in various storm events (25 yr., 100 yr.). This is the critical first step to determine the required dimensions for the replacement culvert.

The Town of Saugerties code sets requirements for the design of drainage structures in Section 215-24 (B). The code states that for drainage areas larger than 1 square mile, structures should be designed to carry peak runoff for the 100-year storm. Thus, for purposes of this report, a 100 year storm event will be analyzed for the design criteria for the bridge.

II. DESCRIPTION OF WATERSHED

A. Land Use and Topography

The watershed is depicted on Figure 1 in Appendix B of this report. This image was generated via USGS Streamstats (streamstats.usgs.gov) and confirmed by manually delineating the watershed boundaries. The watershed area is approximately 11.46 square miles, or 7,338 (+/-) acres. The watershed includes mountainous areas, including the peak of Mount Airy and the northern slopes of Mount Marion. The watershed is almost entirely in Ulster County, though approximately 135 acres (1.8%) fall within Greene County. Stormwater runoff within this watershed area drains into the Beaver Kill Creek to the culvert location. The highest elevation on the watershed is 612 ft. (+/-) and the elevation of the creek at the culvert is approximately 116 ft. (USGS 1929 datum).

The land cover in this watershed area was approximated using aerial imagery in Google Earth. This watershed area is mostly forest, with some grassed fields and urban area. The land cover is summarized in Table 1 below.

Table 1. Land Cover in Watershed Area

Land Cover	Area (acres)
Forest	6,489
Impervious	508
Grassed	342
Total	7,338

These land covers are used to assign runoff curve numbers to the catchment area in the hydrologic model, which allows us to predict how quickly stormwater will runoff.

B. Soils

Information on the soil types in this watershed area was obtained from a USDA Soil Resource Report, which is included in Appendix C. The report indicates a total of 46 different soil types in this area. In performing stormwater runoff calculations, the hydrologic soil group (HSG) for the soils in this area are of interest. Table 2 displays the total acreage of each HSG to be used in the hydrologic model.

Table 2. Hydrologic Soil Groups

	Hydrologic Soil Group (HSG)				
	A	B	C	C/D	D
Area (acres)	143	0	580	5,537	1,078
Percent of Area (%)	2	0	8	76	15

Table 2 illustrates the prevalence of rocky, bouldery soil types in hydrologic soil groups C and D. In these soils, water transmission through soil is generally restricted and runoff potential is high.

Two geotechnical borings were drilled at the location of the existing Wilhelm Road culvert. The boring logs are provided in Appendix C. The soil borings found six to eight feet of granular road embankment material underlain by a soft gray organic silt material with

some clay and medium to fine sand. The underlying clay had blow counts of 1 to 4 to drive a split spoon sampler twelve inches using a 130 pound hammer.

C. Stream Dimensions and Modeling

In order to determine the peak rates of runoff in this watershed, the "time of concentration" must be calculated. This is the time for water from the most remote point in the watershed to reach the discharge point at the bridge. This calculation was performed from the peak of Mt. Airy at 612 feet.

After analyzing the field survey plot and visually inspecting the Beaver Kill Creek, the stream dimensions were assumed. For the first 10,645 feet of flow on this path, the Beaver Kill was modeled as a 10-foot wide trapezoidal channel with 3:1 side slopes and a depth of 3 feet. After the Beaver Kill bends easterly as it approaches Route 212, the Beaver Kill was modeled as a 20-foot wide trapezoidal channel with 3:1 side slopes and a depth of 5 feet. All channel flow was modeled with a Manning's "n-value" of 0.040, the typical value for mountain streams. The time of concentration was found to be 267 minutes.

D. Stream Classification

At the location of the Wilhelm Road culvert, the Beaver Kill Creek is listed by the NYS DEC as a Class C stream with a Water Index Number of H-193-2-12. This information was obtained using the NYS DEC Environmental Resources Mapper.

E. Existing Hydraulic Conditions at Bridge Location

The existing cast iron culvert has a circular hydraulic opening with a diameter of 8 feet. The hydraulic capacity of the existing bridge opening is calculated to be 1,653 cubic feet per second (cfs) using Manning's Equation.

III. HYDRAULIC CALCULATIONS OF TRIBUTARY AREA

A. Methodology Used

For the purpose of this analysis, HydroCAD (version 10) computer software was utilized for modeling of the hydrology and hydraulics of stormwater runoff for the tributary drainage area. HydroCAD adopts the U.S.D.A. Soil Conservation Service hydrologic method known as the Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds. The watershed was modeled as one catchment. For modeling purposes, the hydrologic soil groups from Table 2 were averaged across the land cover areas compiled in Table 1. The complete HydroCAD output (existing and proposed conditions) including runoff hydrographs can be found in Appendix D.

B. Design Storms

The design storms (25 year frequency and 100 year frequency) utilized in this analysis are from Cornell University's Northeast Regional Climate Center (NRCC) precipitation database (<http://precip.eas.cornell.edu/>). This database provides site-specific design storms, allowing us to more accurately model the hydraulic conditions at the exact location of the bridge. The 24-hour rainfall depths for the two design storms analyzed are shown below in Table 2.

Table 2. Design Storms

Design Storm	Rainfall Depth (inches)
25-year	5.96
100-year	8.48

C. Results

The resulting peak rates of runoff for the two storm events considered are shown below in Table 3.

Table 3. Peak Discharges at Culvert Location

Design Storm	Peak Runoff (cfs)
25-year	3,971
100-year	6,800

IV. CULVERT SIZING

The replacement culvert will be sized with adequate capacity to convey the peak discharge from the 100-year storm (6,800 cfs). The HydroCad model calculated that the a rectangular culvert having an interior width of 16 feet must have a minimum clear opening height of 7.64 feet to pass the 100-year storm (6,800 cfs).

The NYSDEC requires four-sided culverts to be designed to allow the bottom of the culvert to simulate natural stream crossings conditions. Box culverts must be "embedded into the streambed to at least 20 percent of the culvert height at the downstream invert". The minimum embedment depth for a proposed replacement box culvert would be (7.64 feet x 20%) 1.53 feet. Therefore the overall minimum height of the replacement box culvert would be the clear opening height of 7.64 feet plus 1.53 feet of embedment or 9.17 feet. For constructability purposes, the interior height of the replacement box culvert will be rounded up to the nearest half foot interval yielding an internal height of 9.5 feet.

The recommended replacement culvert size for Wilhelm Road is four sided precast concrete box culvert with a 9.5 feet high by 16 feet wide internal opening dimension embedded a minimum of 1.53 into the streambed.

V. CONCLUSIONS

The Town of Saugerties is replacing the existing 8-foot diameter cast iron culvert at Wilhelm Road, which has a capacity of just 1,653 cfs. In order to properly design a replacement culvert, a hydrologic model of the culvert's 7,338-acre watershed was built using the HydroCAD software. The HydroCAD model calculated a peak rate of runoff of 6,800 cfs for the 100-year design storm.

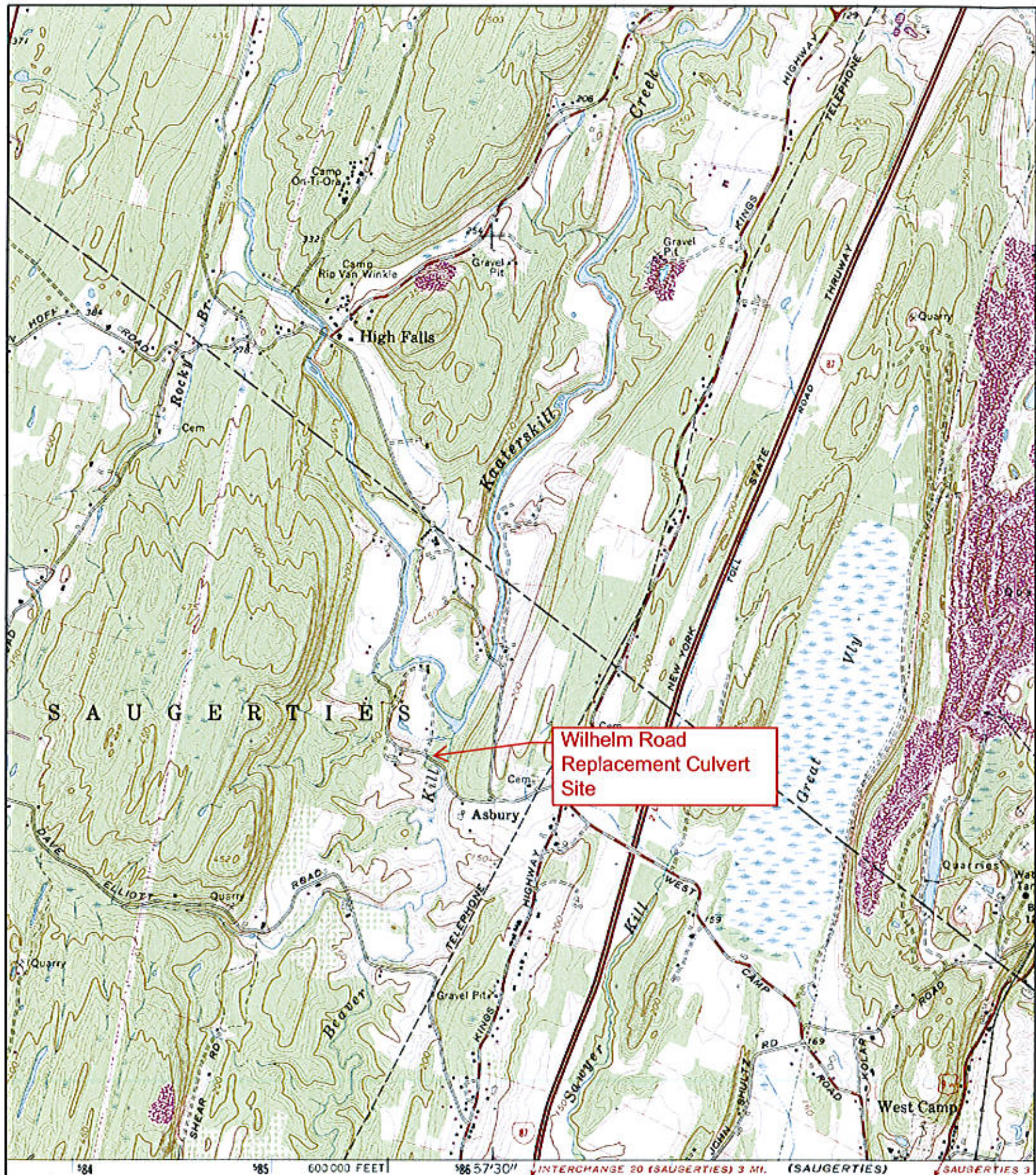
It is proposed that the replacement culvert be a precast concrete box culvert with a minimum hydraulic opening height of 7.64 feet high and width of 16 feet. To comply with

HYDROLOGY & HYDRAULIC ANALYSIS OF WILHELM ROAD CULVERT
TOWN OF SAUGERTIES, ULSTER COUNTY, N.Y.

NYSDEC requirements for natural stream crossings, this structure must be at least 9.6 feet in height so that 20 percent of the open height can be embedded in the stream bottom. This design will maintain the same elevation of the road and provide a culvert that can pass the peak flows a 100-year storm event.

Appendix A

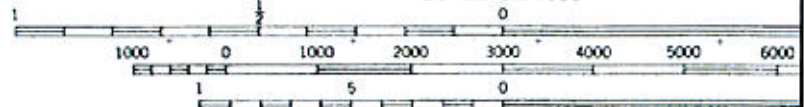
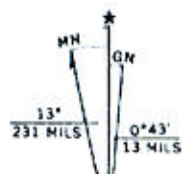
Location Map



red by the Geological Survey

ethods from aerial
eck 1963

ed from NOS chart 283 (1962)
r navigational purposes

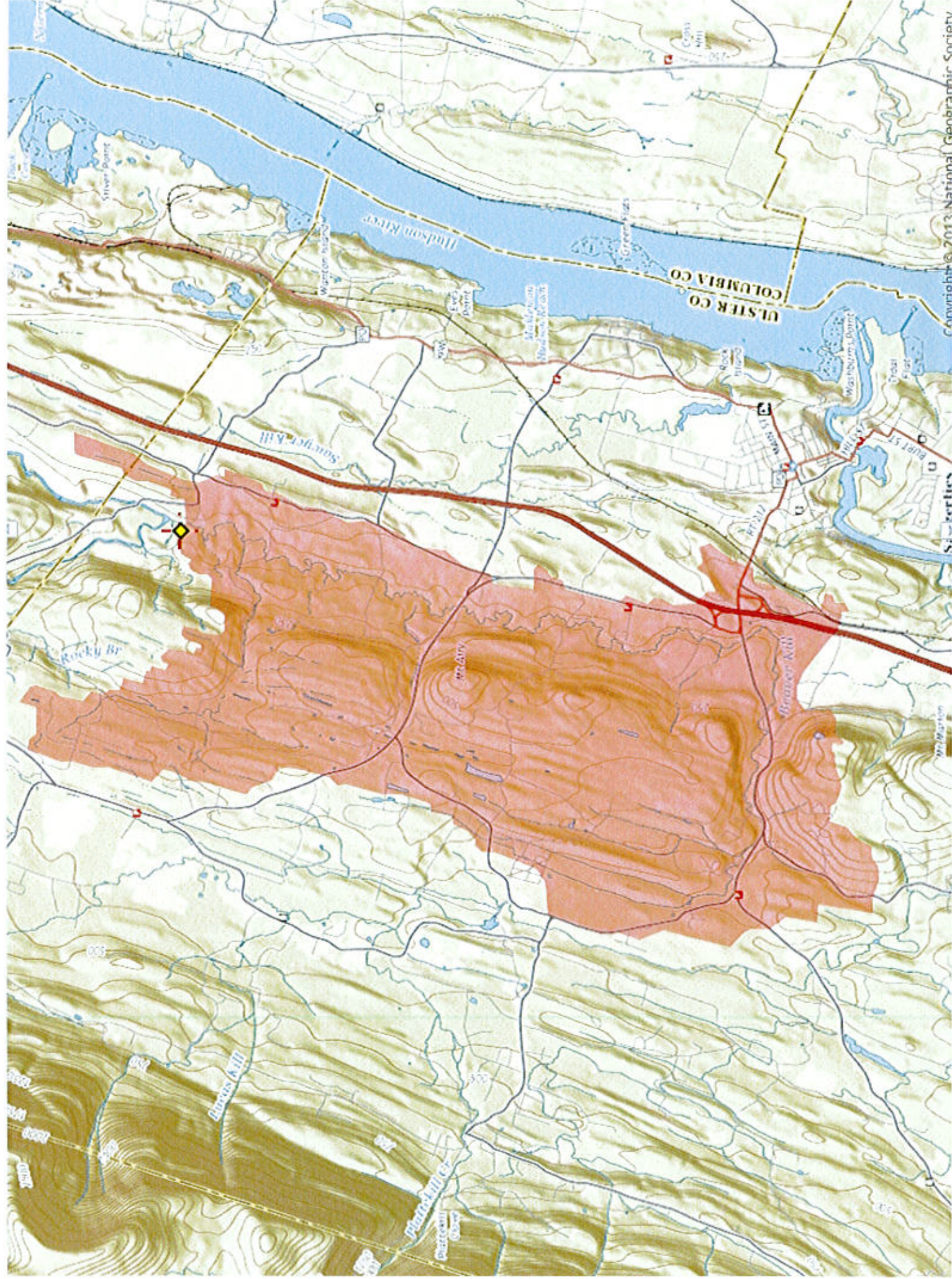


CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER

Appendix B

Tributary Drainage Area Map

(Note: Elevations shown on Figure 1 are not same USGS datum as referenced in report.



Appendix C

USDA Soil Survey



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Greene County, New York, and Ulster County, New York

Wilhelm Road Replacement Culvert

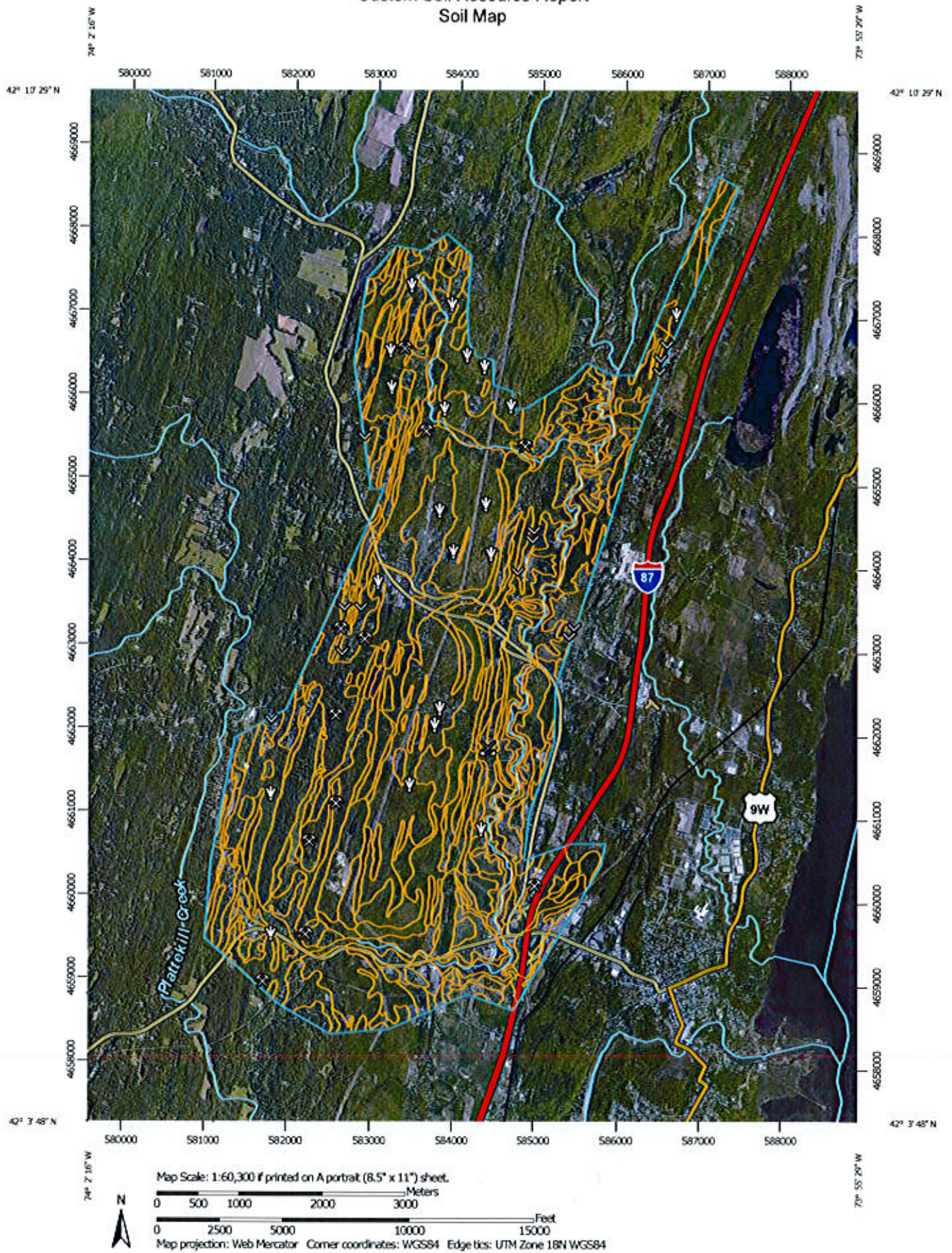


July 21, 2015

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



MAP LEGEND



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:15,800 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Greene County, New York
Survey Area Data: Version 13, Sep 15, 2014

Soil Survey Area: Ulster County, New York
Survey Area Data: Version 12, Sep 16, 2014

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 19, 2010—May 12, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Greene County, New York (NY039)			
Map Unit Symbol	Map Unit Name	Acres In AOI	Percent of AOI
FaC	Farmington gravelly silt loam, rolling, rocky	0.4	0.0%
FaD	Farmington gravelly silt loam, hilly, rocky	45.6	0.6%
GrB	Galway-Farmington gravelly silt loams, 2 to 8 percent slopes, rocky	70.4	1.0%
GrC	Galway-Farmington gravelly silt loams, rolling, rocky	6.6	0.1%
HvB	Hudson and Vergennes soils, 3 to 8 percent slopes	0.6	0.0%
HwC3	Hudson and Vergennes silty clay loams, 8 to 15 percent slopes, severely eroded	3.8	0.1%
KrB	Kingsbury and Rhinebeck soils, 3 to 8 percent slopes	8.0	0.1%
Subtotals for Soil Survey Area		135.3	1.8%
Totals for Area of Interest		7,337.9	100.0%

Ulster County, New York (NY111)			
Map Unit Symbol	Map Unit Name	Acres In AOI	Percent of AOI
AA	Alluvial land	12.1	0.2%
AcB	Arnot channery silt loam, 0 to 8 percent slopes	393.8	5.4%
ARD	Arnot-Lordstown-Rock outcrop complex, moderately steep	832.0	8.6%
ARF	Arnot-Oquaga-Rock outcrop complex, very steep	57.1	0.8%
At	Atherton silt loam	6.2	0.1%
Ba	Basher silt loam	3.5	0.0%
BnC	Bath-Nassau complex, 8 to 25 percent slopes	289.3	3.7%
BOD	Bath-Nassau-Rock outcrop complex, hilly	177.0	2.4%
BRC	Bath and Mardin soils, sloping, very stony	6.2	0.1%
Cc	Canandaigua silt loam	69.4	0.9%
Cd	Canandaigua silt loam, till substratum	33.1	0.5%
CgA	Castile gravelly silt loam, 0 to 3 percent slopes	11.0	0.1%
CgB	Castile gravelly silt loam, 3 to 8 percent slopes	7.2	0.1%

Custom Soil Resource Report

Ulster County, New York (NY111)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CnB	Chenango gravelly silt loam, 3 to 8 percent slopes	41.8	0.6%
CnC	Chenango gravelly silt loam, 8 to 15 percent slopes	36.5	0.5%
FAE	Farmington-Rock outcrop complex, steep	43.3	0.8%
GP	Gravel pit	20.3	0.3%
HuB	Hudson silt loam, 3 to 8 percent slopes	502.3	8.8%
HuC	Hudson silt loam, 8 to 15 percent slopes	294.7	4.0%
HuD	Hudson and Schoharie soils, 15 to 25 percent slopes	70.7	1.0%
LCD	Lackawanna and Swartswood very bouldery soils, moderately steep	14.8	0.2%
Lm	Lamson fine sandy loam	0.4	0.0%
LnB	Lordstown channery silt loam, 3 to 8 percent slopes	160.8	2.2%
LOC	Lordstown-Amot-Rock outcrop complex, sloping	1,998.4	27.2%
LY	Lyons-Atherton complex, very stony	11.8	0.2%
Ma	Madalin silty clay loam	58.8	0.8%
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	2.8	0.0%
MgB	Mardin-Nassau complex, 3 to 8 percent slopes	72.1	1.0%
Mn	Menlo silt loam	266.0	3.6%
MO	Menlo very bouldery soils	51.0	0.7%
Mr	Middlebury silt loam	68.6	0.9%
MTB	Morris-Tuller complex, very bouldery, gently sloping	67.7	0.9%
NBF	Nassau-Bath-Rock outcrop complex, very steep	383.1	5.2%
OgB	Oquaga channery silt loam, 3 to 8 percent slopes	37.3	0.5%
OIC	Oquaga and Lordstown channery silt loams, 8 to 15 percent slopes	32.4	0.4%
ORC	Oquaga-Amot-Rock outcrop complex, sloping	72.0	1.0%
ORD	Oquaga-Amot-Rock outcrop complex, moderately steep	1.1	0.0%
Pa	Palms muck	24.2	0.3%
QU	Quarry	417.5	5.7%
Re	Red Hook gravelly silt loam	25.8	0.4%

Custom Soil Resource Report

Ulster County, New York (NY111)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
RhA	Rhinebeck silt loam, 0 to 3 percent slopes	161.9	2.2%
RhB	Rhinebeck silt loam, 3 to 8 percent slopes	12.7	0.2%
SdB	Scriba and Morris soils, 0 to 8 percent slopes	10.5	0.1%
SEB	Scriba and Morris very bouldery soils, gently sloping	3.5	0.0%
Smb	Stockbridge-Farmington gravelly silt loams, 3 to 8 percent slope	20.4	0.3%
STD	Stockbridge-Farmington-Rock outcrop complex, hilly	255.0	3.5%
Tg	Tioga fine sandy loam	4.8	0.1%
TKA	Tunkhannock gravelly loam, 0 to 3 percent slopes	17.9	0.2%
TKB	Tunkhannock gravelly loam, 3 to 8 percent slopes	33.5	0.5%
W	Water	20.7	0.3%
Wb	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	154.4	2.1%
WeB	Wellsboro flaggy silt loam, 3 to 8 percent slopes	7.5	0.1%
WLB	Wellsboro and Wurtsboro very bouldery soils, gently sloping	15.7	0.2%
WsA	Williamson silt loam, 0 to 3 percent slopes	15.5	0.2%
WsB	Williamson silt loam, 3 to 8 percent slopes	15.0	0.2%
Subtotals for Soil Survey Area		7,202.6	98.2%
Totals for Area of Interest		7,337.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Client: Brinnier and Larios, PC
 Project: Subsurface Investigation
Culvert Replacement - Wilhelm Road
Saugerties, New York

Report No.: CD3891D-01-08-15
 Boring Location: See Boring Location Plan

Boring No.: B-1 Sheet 1 of 2

Start Date: 7/21/2015 Finish Date: 7/21/2015

Coordinates
 Latitude: _____
 Longitude: _____

Sampler Hammer
 Weight: 140 lbs.
 Fall: 30 in.
 Hammer Type: Automatic

Groundwater Observations
 Date Time Depth Casing

Ground Elev.: _____
 Boring Advance By:
4 1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE		SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
			From	To					
1	AUGER	1	0.0	2.0	SS	58 25 18 18	0.5	6" ASPHALT PAVEMENT	14
2		2	2.0	4.0	SS	15 23 17 18	2.0	Brown cmf SAND; and SILT; little mf GRAVEL (wet, non-plastic)	14
3		3	4.0	6.0	SS	6 5 3 2	8.0	Brown cmf SAND; and mf GRAVEL; trace SILT (wet, non-plastic) CRUSHED STONE	10
4		4	6.0	8.0	SS	15 26 5 4		Brown cmf SAND; some mf GRAVEL; little SILT; trace CLAY (wet, very slightly plastic)	4
5		5	8.0	10.0	SS	4 3 1 1		Brown mf GRAVEL; some cmf SAND; some SILT (wet, non-plastic) COBBLE Fragments	8
6		6	10.0	12.0	SS	WH/12" 1 1		Brownish-Grey SILT, little mf SAND; trace CLAY (saturated, very slightly plastic)	22
7		7	12.0	14.0	SS	WH/12" 3 2	17.0	Dark Brown mf SAND; and ORGANIC SILT little CLAY (saturated, slightly plastic)	22
8		8	14.0	16.0	SS	WH/18" 2		Dark Brownish-Grey mf SAND; some ORGANIC SILT; little CLAY; trace ORGANIC MATERIAL (wood fragments) (saturated, slightly plastic)	22
9								Reddish-Brown SILT; some CLAY, trace mf SAND (saturated, moderately plastic) LL = 32, PL = 19, PI = 13, w = 31.2%	22
10									
11							17.0		
12									
13									
14									
15							17.0		
16									
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100									

SS Soft Soils Sample
 NA Rock Core
 SH Undisturbed Sample (Shelby Tube)
 Estimated Groundwater

Drillers: Josh Perry, Pat Collins
 Inspector: _____

ATL-LOG1 CD3891D BRINNIER AND LARIOS - SAUGERTIES, NEW YORK.GPJ LOG-WEL.GDT 8/5/15

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: B-1

Report No.: CD38910-01-08-15

Sheet 2 of 2

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE		SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
			From	To					
25		10	25.0	27.0	SS	WH/18" 3		Similar Soil (saturated, plastic)	24
26									
27									
28									
29									
30									
31		11	30.0	32.0	SS	WH 1 1 2		Similar Soil (saturated, plastic)	24
32									
33									
34									
35		12	35.0	37.0	SS	WH/12" 1 2		Similar Soil (saturated, plastic)	24
36									
37							37.0	Boring terminated at 37.0 feet.	
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ATLANTIC TESTING LABORATORIES, NEW YORK, LTD. LOG-WELL LOG 105/15

Notes:

- Borehole backfilled with cement-bentonite grout.

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Client: Brunner and Laros, PC
 Project: Subsurface Investigation
Culvert Replacement - Wilhelm Road
Saugerties, New York

Report No.: CD3891D-01-08-15
 Boring Location: See Boring Location Plan

Boring No.: B-2 Sheet 1 of 2
 Coordinates
 Latitude _____
 Longitude _____
 Sampler Hammer
 Weight: 140 lbs.
 Fall: 30 in.
 Hammer Type: Automatic
 Ground Elev.: _____
 Boring Advance By:
4 1/4" Auger

Start Date: 7/21/2015 Finish Date: 7/22/2015

Groundwater Observations
 Date Time Depth Casing
7/21/2015 PM DRY 4.0'
7/22/2015 AM 16.5' 30.0'

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE		SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER				DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
			From	To								
1	A	1	0.0	2.0	SS	31	18	18	37	0.5	8" ASPHALT PAVEMENT	12
2	G	2	2.0	4.0	SS	19	11	10	13	2.0	Dark Brown cmf SAND; some mf GRAVEL; little SILT (wet, non-plastic)	
3											Brown SILT; some cmf SAND; little mf GRAVEL; trace CLAY (wet, very slightly plastic)	14
4		3	4.0	6.0	SS	8	11	20	18		Reddish-Brown SILT; some cmf SAND; some mf GRAVEL (wet, non-plastic) COBBLE Fragments in spl. spoon shoe	3
5										6.0		
6		4	6.0	8.0	SS	20	8	7	9		Reddish-Brown SILT; some CLAY; little cmf SAND; trace f GRAVEL; trace ORGANIC MATERIAL (wood fragments) (saturated, moderately plastic)	14
7											Mottled Grey and Red SILT; some CLAY; little cmf SAND (saturated, moderately plastic)	14
8		5	8.0	10.0	SS	6	6	6	10		Varved Grey ORGANIC SILT; some mf SAND; little CLAY; trace ORGANIC MATERIAL (wood fragments) (saturated, slightly plastic)	12
9											Reddish-Grey SILT; trace f SAND (saturated, non-plastic)	12
10		6	10.0	12.0	SS	11	3	4	4			
11										14.0		
12		7	12.0	14.0	SS	3	4	4	3		Grey SILT; some CLAY; little cmf SAND; trace f GRAVEL (saturated, moderately plastic)	14
13												
14		8	14.0	16.0	SS	2	2	6	9			
15												
16												
17												
18												
19												
20		9	20.0	22.0	SS	WH/18"			1		Grey SILT; some CLAY; trace f SAND (saturated, moderately plastic) LL = 42, PL = 22, P _a = 20, w = 44.8%	24
21												
22												
23										23.0		
24												
25												

SS Split Spoon Sample
 RC Rock Core
 SH Undisturbed Sample (Shells, Tubes)
 Estimated Groundwater

Order: Josh Perry, Pat Collins
 Inspector: _____

ATL-LOG1 CD3891D-BRUNNER AND LAROS - SAUGERTIES, NEW YORK.DPJ LOGWELLEDIT 10/2/15

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No. B-2

Report No. CD3891D-01-08-15

Sheet 2 of 2

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE		SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
			From	To					
26		10	25.0	27.0	SS	WH/12" 1 1		Grey CLAY: some SILT; trace f SAND (saturated, plastic)	22
27									
28									
29									
30		11	30.0	32.0	SS	WH/12" 1 2		Similar Soil (saturated, plastic)	24
31							32.0		
32								Boring terminated at 32.0 feet.	
33									
34								Notes:	
35								1. Borehole backfilled with cement-bentonite grout.	
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ATL-0061 CD3891 GRINNIE AND LAROS - SAUGERTES NEW YORK GPJ LOGS W/ILL LOGS REVIS

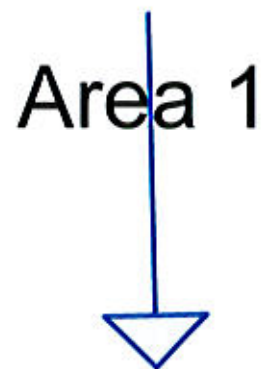
Appendix D

Run Off Hydrographs

HydroCAD Model Output

HydroCAD Iterations included:

1. Existing Conditions (25-yr, 100-yr)
2. Proposed Conditions (25-yr, 100-yr)



Existing Culvert



WilhelmRoadCulvert-Existing

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
507.940	98	(1S)
257.920	79	Pasture/grassland/range, Fair, HSG C (1S)
6.670	39	Pasture/grassland/range, Good, HSG A (1S)
27.020	74	Pasture/grassland/range, Good, HSG C (1S)
50.200	80	Pasture/grassland/range, Good, HSG D (1S)
4,896.000	73	Woods, Fair, HSG C (1S)
952.940	79	Woods, Fair, HSG D (1S)
126.660	30	Woods, Good, HSG A (1S)
512.970	70	Woods, Good, HSG C (1S)
7,338.320	75	TOTAL AREA

WilhelmRoadCulvert-Existing

Type II 24-hr 25-yr Rainfall=5.96"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area 1

Runoff Area=7,338.320 ac 6.92% Impervious Runoff Depth=2.52"

Flow Length=59,675' Tc=268.3 min CN=75 Runoff=3,971.50 cfs 1,542.353 af

Reach 2R: Existing Culvert

Avg. Flow Depth=8.00' Max Vel=37.47 fps Inflow=3,971.50 cfs 1,542.353 af

96.0" Round Pipe n=0.013 L=32.0' S=0.0328 ' Capacity=1,652.16 cfs Outflow=1,735.23 cfs 991.409 af

Total Runoff Area = 7,338.320 ac Runoff Volume = 1,542.353 af Average Runoff Depth = 2.52"**93.08% Pervious = 6,830.380 ac 6.92% Impervious = 507.940 ac**

Summary for Subcatchment 1S: Area 1

Runoff = 3,971.50 cfs @ 15.23 hrs, Volume= 1,542.353 af, Depth> 2.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

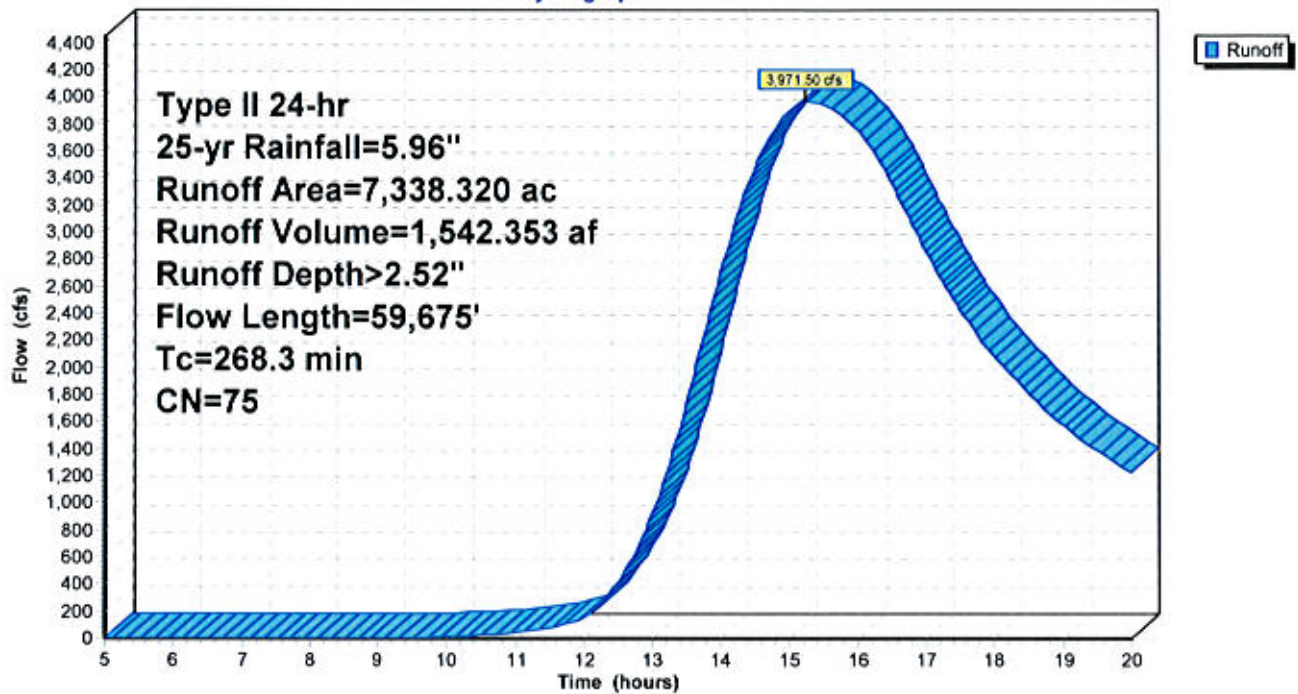
Type II 24-hr 25-yr Rainfall=5.96"

Area (ac)	CN	Description
126.660	30	Woods, Good, HSG A
512.970	70	Woods, Good, HSG C
4,896.000	73	Woods, Fair, HSG C
952.940	79	Woods, Fair, HSG D
* 9.920	98	
* 40.160	98	
* 383.260	98	
* 74.600	98	
6.670	39	Pasture/grassland/range, Good, HSG A
27.020	74	Pasture/grassland/range, Good, HSG C
257.920	79	Pasture/grassland/range, Fair, HSG C
50.200	80	Pasture/grassland/range, Good, HSG D
7,338.320	75	Weighted Average
6,830.380		93.08% Pervious Area
507.940		6.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	100	0.2000	0.19		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.15"
97.5	5,360	0.0336	0.92		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
28.6	10,645	0.0113	6.20	353.20	Channel Flow, trib channel Area= 57.0 sf Perim= 29.0' r= 1.97' n= 0.040 Mountain streams
133.6	43,570	0.0042	5.43	951.07	Channel Flow, Beaver Kill main (after bend at 212) Area= 175.0 sf Perim= 51.6' r= 3.39' n= 0.040 Mountain streams
268.3	59,675	Total			

Subcatchment 1S: Area 1

Hydrograph



Summary for Reach 2R: Existing Culvert

[52] Hint: Inlet/Outlet conditions not evaluated

[55] Hint: Peak inflow is 240% of Manning's capacity

[76] Warning: Detained 574.362 af (Pond w/culvert advised)

Inflow Area = 7,338.320 ac, 6.92% Impervious, Inflow Depth > 2.52" for 25-yr event

Inflow = 3,971.50 cfs @ 15.23 hrs, Volume= 1,542.353 af

Outflow = 1,735.23 cfs @ 13.50 hrs, Volume= 991.409 af, Atten= 56%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 37.47 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 24.35 fps, Avg. Travel Time= 0.0 min

Peak Storage= 1,608 cf @ 13.55 hrs

Average Depth at Peak Storage= 8.00'

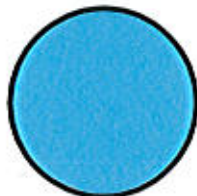
Bank-Full Depth= 8.00' Flow Area= 50.3 sf, Capacity= 1,652.16 cfs

96.0" Round Pipe

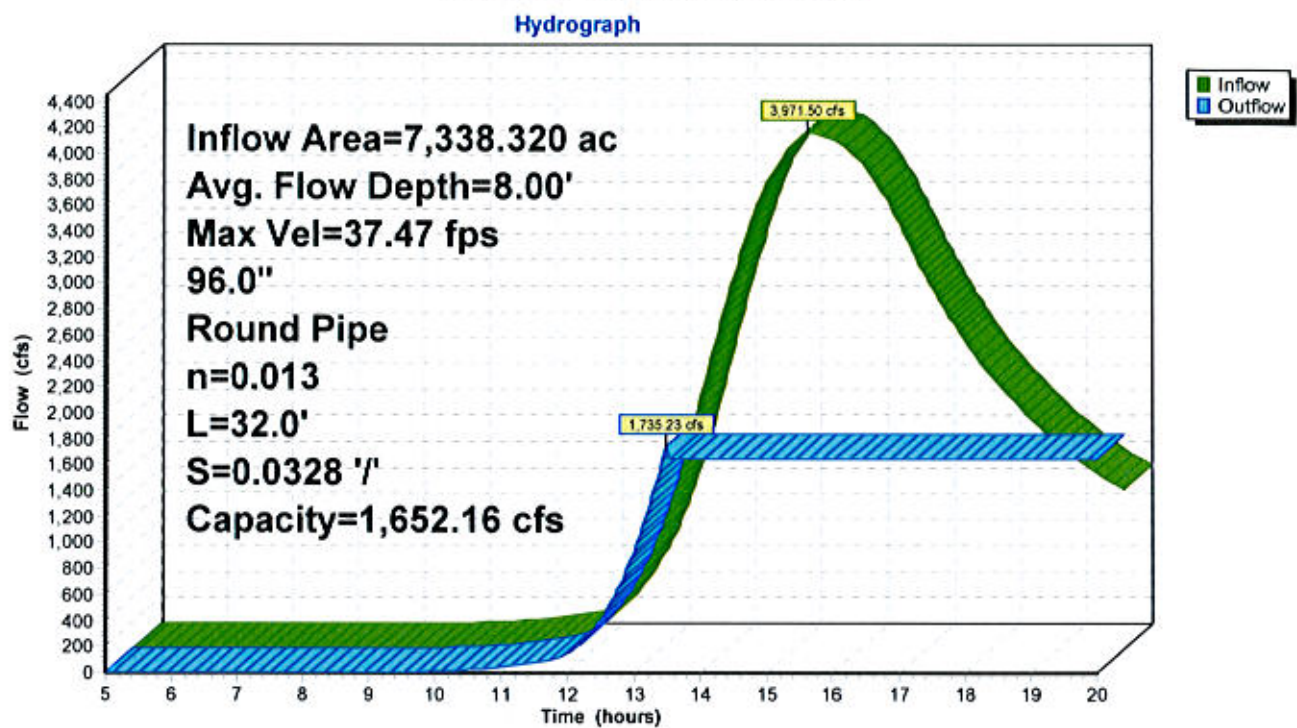
n= 0.013 Cast iron, coated

Length= 32.0' Slope= 0.0328 '/'

Inlet Invert= 116.05', Outlet Invert= 115.00'



Reach 2R: Existing Culvert



WilhelmRoadCulvert-Existing

Type II 24-hr 25-yr Rainfall=5.96"

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Stage-Discharge for Reach 2R: Existing Culvert

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)	Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
116.05	0.00	0.00	121.25	36.13	1,249.71
116.15	3.35	0.46	121.35	36.32	1,283.79
116.25	5.34	1.88	121.45	36.49	1,317.45
116.35	6.99	4.36	121.55	36.66	1,350.62
116.45	8.44	7.93	121.65	36.81	1,383.25
116.55	9.75	12.84	121.75	36.94	1,415.16
116.65	10.97	18.89	121.85	37.06	1,446.40
116.75	12.11	26.11	121.95	37.16	1,476.89
116.85	13.19	34.49	122.05	37.26	1,506.57
116.95	14.20	44.23	122.15	37.33	1,535.20
117.05	15.17	55.12	122.25	37.39	1,562.86
117.15	16.10	67.15	122.35	37.43	1,589.47
117.25	16.99	80.31	122.45	37.46	1,614.93
117.35	17.84	94.77	122.55	37.47	1,638.95
117.45	18.66	110.34	122.65	37.46	1,661.61
117.55	19.45	126.98	122.75	37.43	1,682.82
117.65	20.22	144.68	122.85	37.39	1,702.45
117.75	20.95	163.59	122.95	37.31	1,720.07
117.85	21.67	183.52	123.05	37.22	1,735.80
117.95	22.36	204.44	123.15	37.10	1,749.47
118.05	23.03	226.32	123.25	36.95	1,760.87
118.15	23.68	249.29	123.35	36.77	1,769.29
118.25	24.31	273.17	123.45	36.56	1,774.81
118.35	24.92	297.93	123.55	36.30	1,776.99
118.45	25.51	323.54	123.65	35.99	1,775.27
118.55	26.08	350.11	123.75	35.60	1,767.75
118.65	26.64	377.47	123.85	35.12	1,753.30
118.75	27.18	405.58	123.95	34.45	1,727.57
118.85	27.71	434.42	124.05	32.87	1,652.16
118.95	28.22	464.06			
119.05	28.71	494.35			
119.15	29.19	525.26			
119.25	29.65	556.76			
119.35	30.10	588.89			
119.45	30.54	621.53			
119.55	30.96	654.63			
119.65	31.37	688.17			
119.75	31.76	722.17			
119.85	32.14	756.51			
119.95	32.51	791.16			
120.05	32.87	826.08			
120.15	33.21	861.26			
120.25	33.54	896.61			
120.35	33.86	932.10			
120.45	34.16	967.69			
120.55	34.45	1,003.32			
120.65	34.73	1,038.94			
120.75	35.00	1,074.51			
120.85	35.25	1,109.99			
120.95	35.49	1,145.28			
121.05	35.72	1,180.36			
121.15	35.93	1,215.19			

WilhelmRoadCulvert-Exl sting

Type II 24-hr 100-yr Rainfall=8.48"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area 1

Runoff Area=7,338.320 ac 8.92% Impervious Runoff Depth>4.35"

Flow Length=59,675' Tc=268.3 min CN=75 Runoff=6,799.96 cfs 2,659.029 af

Reach 2R: Existing Culvert

Avg. Flow Depth=8.00' Max Vel=37.45 fps Inflow=6,799.96 cfs 2,658.029 af

96.0" Round Pipe n=0.013 L=32.0' S=0.0328 ' Capacity=1,652.16 cfs Outflow=1,718.14 cfs 1,083.812 af

Total Runoff Area = 7,338.320 ac Runoff Volume = 2,659.029 af Average Runoff Depth = 4.35"**93.08% Pervious = 6,830.380 ac 6.92% Impervious = 507.940 ac**

Summary for Subcatchment 1S: Area 1

Runoff = 6,799.96 cfs @ 15.22 hrs, Volume= 2,659.029 af, Depth> 4.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type II 24-hr 100-yr Rainfall=8.48"

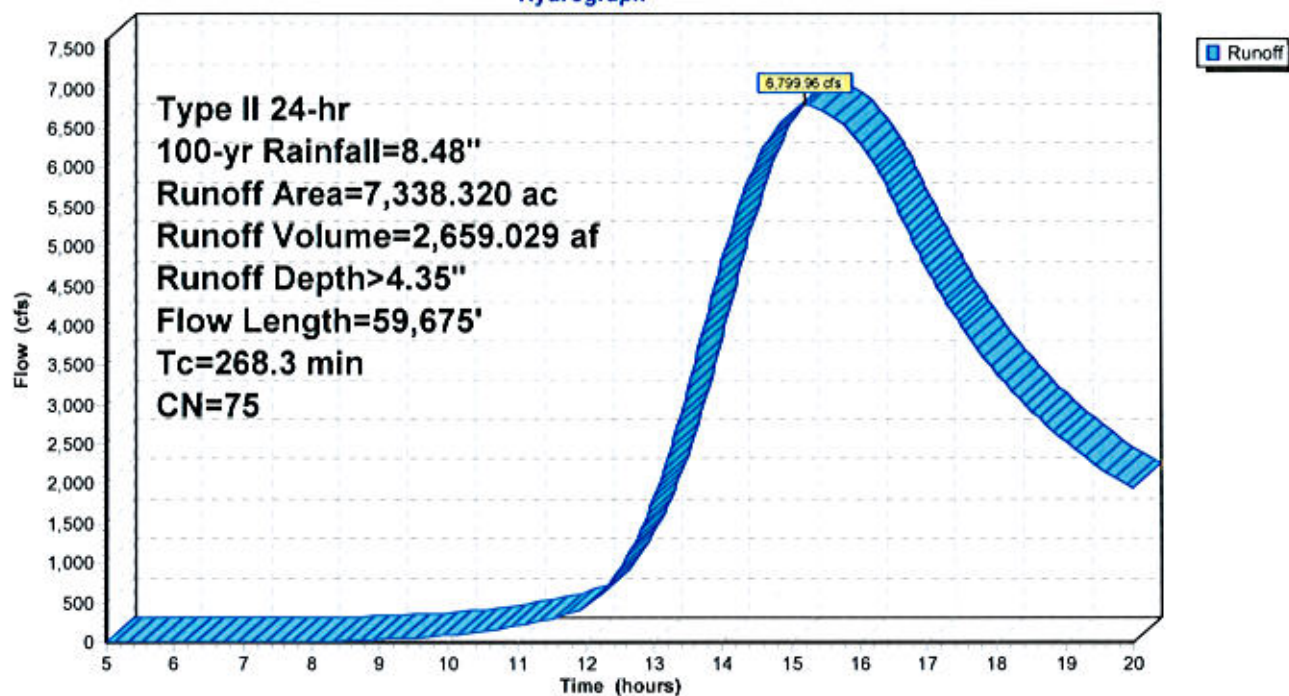
Area (ac)	CN	Description
126.680	30	Woods, Good, HSG A
512.970	70	Woods, Good, HSG C
4,896.000	73	Woods, Fair, HSG C
952.940	79	Woods, Fair, HSG D
* 9.920	98	
* 40.160	98	
* 383.260	98	
* 74.600	98	
6.670	39	Pasture/grassland/range, Good, HSG A
27.020	74	Pasture/grassland/range, Good, HSG C
257.920	79	Pasture/grassland/range, Fair, HSG C
50.200	80	Pasture/grassland/range, Good, HSG D
7,338.320	75	Weighted Average
6,830.380		93.08% Pervious Area
507.940		6.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	100	0.2000	0.19		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.15"
97.5	5,360	0.0336	0.92		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
28.6	10,645	0.0113	6.20	353.20	Channel Flow, trib channel Area= 57.0 sf Perim= 29.0' r= 1.97' n= 0.040 Mountain streams
133.6	43,570	0.0042	5.43	951.07	Channel Flow, Beaver Kill main (after bend at 212) Area= 175.0 sf Perim= 51.6' r= 3.39' n= 0.040 Mountain streams

268.3 59,675 Total

Subcatchment 1S: Area 1

Hydrograph



WilhelmRoadCulvert-Existing

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Type II 24-hr 100-yr Rainfall=8.48"

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Summary for Reach 2R: Existing Culvert

[52] Hint: Inlet/Outlet conditions not evaluated

[55] Hint: Peak inflow is 412% of Manning's capacity

[76] Warning: Detained 1,575.147 af (Pond w/culvert advised)

Inflow Area = 7,338.320 ac, 6.92% Impervious, Inflow Depth > 4.35" for 100-yr event

Inflow = 6,799.96 cfs @ 15.22 hrs, Volume= 2,659.029 af

Outflow = 1,718.14 cfs @ 12.96 hrs, Volume= 1,083.812 af, Atten= 75%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 37.45 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 24.63 fps, Avg. Travel Time= 0.0 min

Peak Storage= 1,608 cf @ 13.00 hrs

Average Depth at Peak Storage= 8.00'

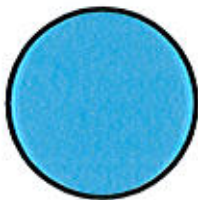
Bank-Full Depth= 8.00' Flow Area= 50.3 sf, Capacity= 1,652.16 cfs

96.0" Round Pipe

n= 0.013 Cast iron, coated

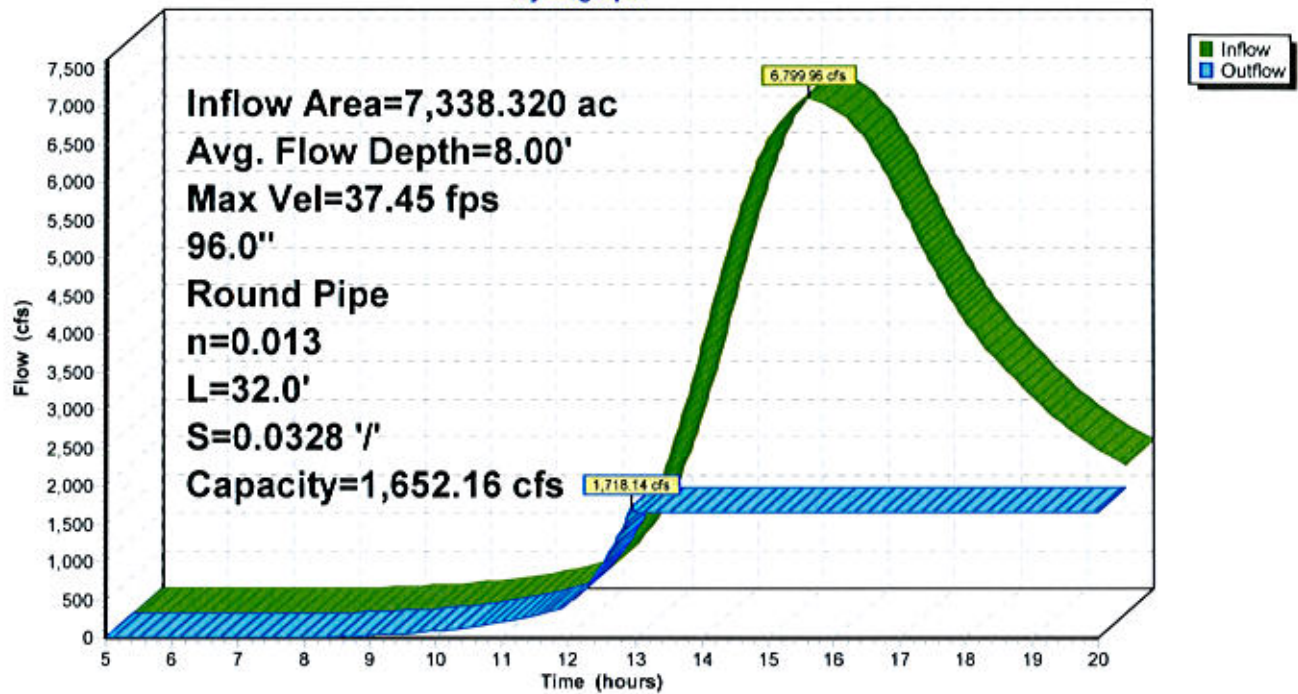
Length= 32.0' Slope= 0.0328 1'

Inlet Invert= 116.05', Outlet Invert= 115.00'



Reach 2R: Existing Culvert

Hydrograph



WilhelmRoadCulvert-Existing

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Type II 24-hr 100-yr Rainfall=8.48"

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Stage-Discharge for Reach 2R: Existing Culvert

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)	Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
116.05	0.00	0.00	121.25	36.13	1,249.71
116.15	3.35	0.46	121.35	36.32	1,283.79
116.25	5.34	1.88	121.45	36.49	1,317.45
116.35	6.99	4.36	121.55	36.66	1,350.62
116.45	8.44	7.93	121.65	36.81	1,383.25
116.55	9.75	12.84	121.75	36.94	1,415.16
116.65	10.97	18.89	121.85	37.06	1,446.40
116.75	12.11	26.11	121.95	37.16	1,476.89
116.85	13.19	34.49	122.05	37.26	1,506.57
116.95	14.20	44.23	122.15	37.33	1,535.20
117.05	15.17	55.12	122.25	37.39	1,562.86
117.15	16.10	67.15	122.35	37.43	1,589.47
117.25	16.99	80.31	122.45	37.46	1,614.93
117.35	17.84	94.77	122.55	37.47	1,638.95
117.45	18.66	110.34	122.65	37.46	1,661.61
117.55	19.45	126.98	122.75	37.43	1,682.82
117.65	20.22	144.68	122.85	37.39	1,702.45
117.75	20.95	163.59	122.95	37.31	1,720.07
117.85	21.67	183.52	123.05	37.22	1,735.80
117.95	22.36	204.44	123.15	37.10	1,749.47
118.05	23.03	226.32	123.25	36.95	1,760.87
118.15	23.68	249.29	123.35	36.77	1,769.29
118.25	24.31	273.17	123.45	36.56	1,774.81
118.35	24.92	297.93	123.55	36.30	1,776.99
118.45	25.51	323.54	123.65	35.99	1,775.27
118.55	26.08	350.11	123.75	35.60	1,767.75
118.65	26.64	377.47	123.85	35.12	1,753.30
118.75	27.18	405.58	123.95	34.45	1,727.57
118.85	27.71	434.42	124.05	32.87	1,652.16
118.95	28.22	464.06			
119.05	28.71	494.35			
119.15	29.19	525.26			
119.25	29.65	556.76			
119.35	30.10	588.89			
119.45	30.54	621.53			
119.55	30.96	654.63			
119.65	31.37	688.17			
119.75	31.76	722.17			
119.85	32.14	756.51			
119.95	32.51	791.16			
120.05	32.87	826.08			
120.15	33.21	861.26			
120.25	33.54	896.61			
120.35	33.86	932.10			
120.45	34.16	967.69			
120.55	34.45	1,003.32			
120.65	34.73	1,038.94			
120.75	35.00	1,074.51			
120.85	35.25	1,109.99			
120.95	35.49	1,145.28			
121.05	35.72	1,180.36			
121.15	35.93	1,215.19			



Area 1



Proposed Culvert



WilhelmRoadCulvert - Proposed

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
507.940	98	(1S)
257.920	79	Pasture/grassland/range, Fair, HSG C (1S)
6.670	39	Pasture/grassland/range, Good, HSG A (1S)
27.020	74	Pasture/grassland/range, Good, HSG C (1S)
50.200	80	Pasture/grassland/range, Good, HSG D (1S)
4,896.000	73	Woods, Fair, HSG C (1S)
952.940	79	Woods, Fair, HSG D (1S)
126.660	30	Woods, Good, HSG A (1S)
512.970	70	Woods, Good, HSG C (1S)
7,338.320	75	TOTAL AREA

WilhelmRoadCulvert - Proposed

Type II 24-hr 25-yr Rainfall=5.96"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area 1

Runoff Area=7,338.320 ac 6.92% Impervious Runoff Depth=2.52"

Flow Length=59,675' Tc=268.3 min CN=75 Runoff=3,971.50 cfs 1,542.353 af

Reach 2R: Proposed Culvert

Avg. Flow Depth=5.16' Max Vel=48.08 fps Inflow=3,971.50 cfs 1,542.353 af

n=0.012 L=32.0' S=0.0328 ' Capacity=7,235.03 cfs Outflow=3,971.53 cfs 1,542.308 af

Total Runoff Area = 7,338.320 ac Runoff Volume = 1,542.353 af Average Runoff Depth = 2.52"**93.08% Pervious = 6,830.380 ac 6.92% Impervious = 507.940 ac**

WilhelmRoadCulvert - Proposed

Type II 24-hr 25-yr Rainfall=5.96"

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Summary for Subcatchment 1S: Area 1

Runoff = 3,971.50 cfs @ 15.23 hrs, Volume= 1,542.353 af, Depth> 2.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type II 24-hr 25-yr Rainfall=5.96"

Area (ac)	CN	Description
126.660	30	Woods, Good, HSG A
512.970	70	Woods, Good, HSG C
4,896.000	73	Woods, Fair, HSG C
952.940	79	Woods, Fair, HSG D
* 507.940	98	
6.670	39	Pasture/grassland/range, Good, HSG A
27.020	74	Pasture/grassland/range, Good, HSG C
257.920	79	Pasture/grassland/range, Fair, HSG C
50.200	80	Pasture/grassland/range, Good, HSG D
7,338.320	75	Weighted Average
6,830.380		93.08% Pervious Area
507.940		6.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	100	0.2000	0.19		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.15"
97.5	5,360	0.0336	0.92		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
28.6	10,645	0.0113	6.20	353.20	Channel Flow, trib channel Area= 57.0 sf Perim= 29.0' r= 1.97' n= 0.040 Mountain streams
133.6	43,570	0.0042	5.43	951.07	Channel Flow, Beaver Kill main (after bend at 212) Area= 175.0 sf Perim= 51.6' r= 3.39' n= 0.040 Mountain streams
268.3	59,675	Total			

WilhelmRoadCulvert - Proposed

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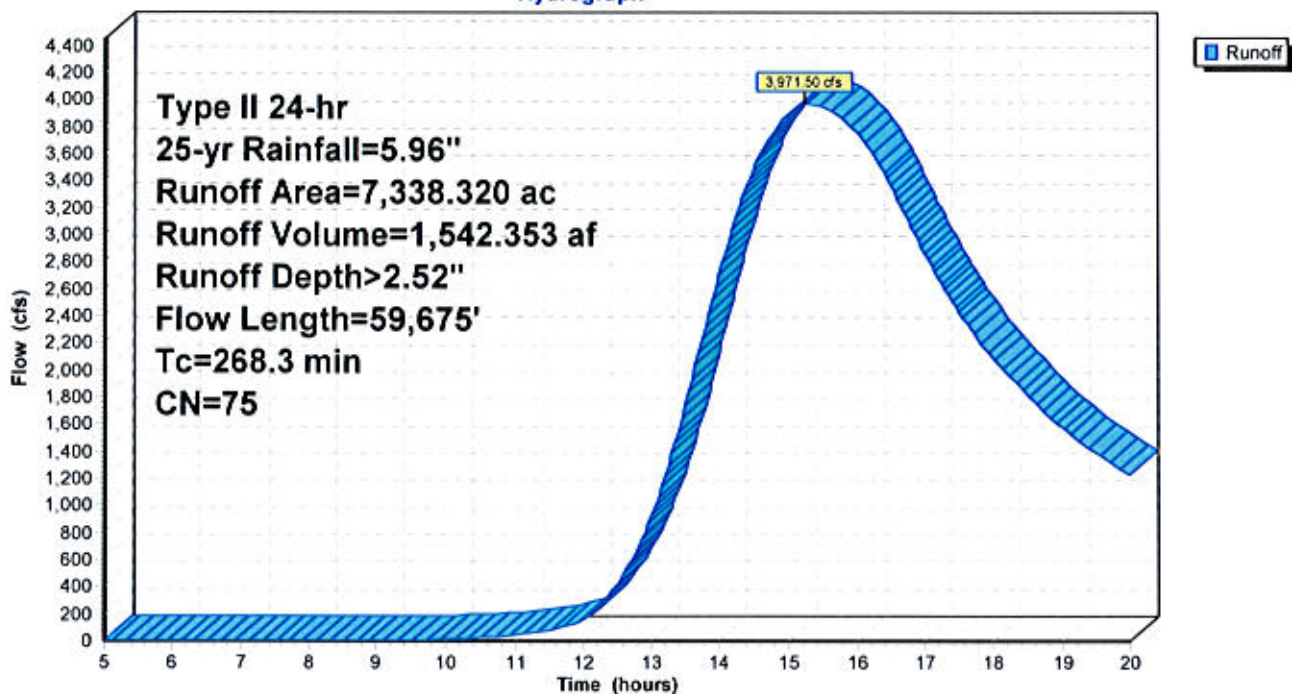
Type II 24-hr 25-yr Rainfall=5.96"

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Subcatchment 1S: Area 1

Hydrograph



WilhelmRoadCulvert - Proposed

Prepared by Microsoft

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Type II 24-hr 25-yr Rainfall=5.96"

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Summary for Reach 2R: Proposed Culvert

[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area = 7,338.320 ac, 6.92% Impervious, Inflow Depth > 2.52" for 25-yr event
Inflow = 3,971.50 cfs @ 15.23 hrs, Volume= 1,542.353 af
Outflow = 3,971.53 cfs @ 15.23 hrs, Volume= 1,542.308 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 48.08 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 27.92 fps, Avg. Travel Time= 0.0 min

Peak Storage= 2,643 cf @ 15.23 hrs

Average Depth at Peak Storage= 5.16'

Bank-Full Depth= 8.00' Flow Area= 128.0 sf, Capacity= 7,235.03 cfs

16.00' x 8.00' deep channel, n= 0.012 Concrete pipe, finished

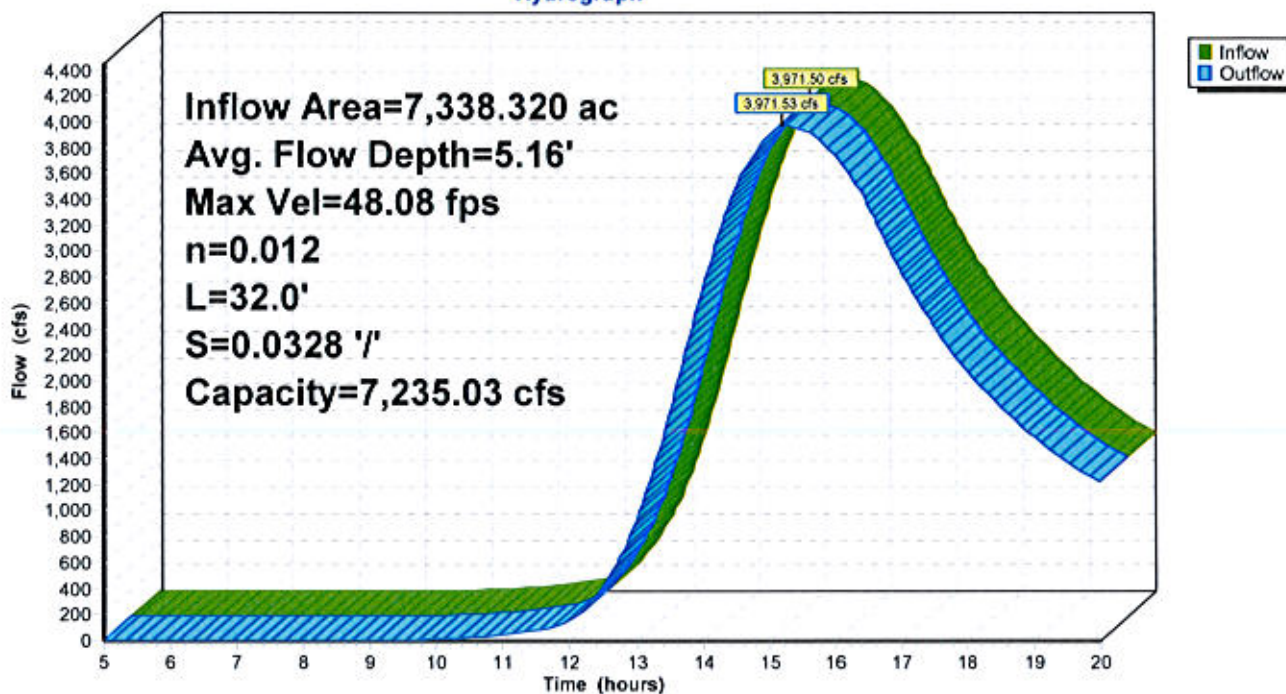
Length= 32.0' Slope= 0.0328 '/'

Inlet Invert= 116.05', Outlet Invert= 115.00'



Reach 2R: Proposed Culvert

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.96"

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Stage-Discharge for Reach 2R: Proposed Culvert

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)	Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
116.05	0.00	0.00	121.25	48.22	4,011.68
116.15	4.73	8.15	121.35	48.59	4,120.34
116.25	7.51	24.66	121.45	48.95	4,229.56
116.35	9.79	47.41	121.55	49.31	4,339.33
116.45	11.79	75.44	121.65	49.68	4,449.64
116.55	13.58	108.82	121.75	50.01	4,560.56
116.65	15.20	146.29	121.85	50.34	4,671.99
116.75	16.72	187.51	121.95	50.68	4,783.91
116.85	18.14	232.20	122.05	51.00	4,896.33
116.95	19.47	280.63	122.15	51.32	5,009.30
117.05	20.73	332.03	122.25	51.64	5,122.72
117.15	21.93	386.23	122.35	51.95	5,236.60
117.25	23.08	443.08	122.45	52.26	5,350.92
117.35	24.16	502.82	122.55	52.55	5,465.75
117.45	25.21	564.90	122.65	52.85	5,580.99
117.55	26.21	629.21	122.75	53.14	5,696.84
117.65	27.17	695.65	122.85	53.43	5,812.70
117.75	28.10	764.43	122.95	53.71	5,929.21
117.85	28.99	835.13	123.05	53.98	6,046.10
117.95	29.85	907.66	123.15	54.25	6,163.37
118.05	30.69	981.95	123.25	54.52	6,281.00
118.15	31.49	1,058.19	123.35	54.79	6,399.05
118.25	32.27	1,136.03	123.45	55.05	6,517.46
118.35	33.02	1,215.42	123.55	55.30	6,636.20
118.45	33.76	1,296.28	123.65	55.55	6,755.28
118.55	34.47	1,378.81	123.75	55.80	6,874.74
118.65	35.16	1,462.70	123.85	56.05	6,994.53
118.75	35.83	1,547.90	123.95	56.29	7,114.63
118.85	36.48	1,634.37	124.05	56.52	7,235.03
118.95	37.12	1,722.27			
119.05	37.73	1,811.34			
119.15	38.34	1,901.55			
119.25	38.92	1,992.85			
119.35	39.49	2,085.39			
119.45	40.05	2,178.96			
119.55	40.60	2,273.51			
119.65	41.13	2,369.02			
119.75	41.65	2,465.62			
119.85	42.15	2,563.11			
119.95	42.65	2,661.47			
120.05	43.14	2,760.68			
120.15	43.61	2,860.84			
120.25	44.07	2,961.80			
120.35	44.53	3,063.52			
120.45	44.97	3,166.00			
120.55	45.41	3,269.32			
120.65	45.83	3,373.34			
120.75	46.25	3,478.05			
120.85	46.66	3,583.43			
120.95	47.06	3,689.57			
121.05	47.45	3,796.33			
121.15	47.84	3,903.71			

WilhelmRoadCulvert - Proposed

Type II 24-hr 100-yr Rainfall=8.48"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area 1

Runoff Area=7,338.320 ac 6.92% Impervious Runoff Depth=4.35"

Flow Length=59,675' Tc=268.3 min CN=75 Runoff=6,799.96 cfs 2,659.029 af

Reach 2R: Proposed Culvert

Avg. Flow Depth=7.64' Max Vel=55.64 fps Inflow=6,799.96 cfs 2,659.029 af

n=0.012 L=32.0' S=0.0328 ' Capacity=7,235.03 cfs Outflow=6,799.82 cfs 2,658.967 af

Total Runoff Area = 7,338.320 ac Runoff Volume = 2,659.029 af Average Runoff Depth = 4.35"**93.08% Pervious = 6,830.380 ac 6.92% Impervious = 507.940 ac**

WilhelmRoadCulvert - Proposed

Type II 24-hr 100-yr Rainfall=8.48"

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Summary for Subcatchment 1S: Area 1

Runoff = 6,799.96 cfs @ 15.22 hrs, Volume= 2,659.029 af, Depth> 4.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type II 24-hr 100-yr Rainfall=8.48"

Area (ac)	CN	Description
126.660	30	Woods, Good, HSG A
512.970	70	Woods, Good, HSG C
4,896.000	73	Woods, Fair, HSG C
952.940	79	Woods, Fair, HSG D
* 507.940	98	
6.670	39	Pasture/grassland/range, Good, HSG A
27.020	74	Pasture/grassland/range, Good, HSG C
257.920	79	Pasture/grassland/range, Fair, HSG C
50.200	80	Pasture/grassland/range, Good, HSG D
7,338.320	75	Weighted Average
6,830.380		93.08% Pervious Area
507.940		6.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	100	0.2000	0.19		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.15"
97.5	5,360	0.0336	0.92		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
28.6	10,645	0.0113	6.20	353.20	Channel Flow, trib channel Area= 57.0 sf Perim= 29.0' r= 1.97' n= 0.040 Mountain streams
133.6	43,570	0.0042	5.43	951.07	Channel Flow, Beaver Kill main (after bend at 212) Area= 175.0 sf Perim= 51.6' r= 3.39' n= 0.040 Mountain streams
268.3	59,675	Total			

WilhelmRoadCulvert - Proposed

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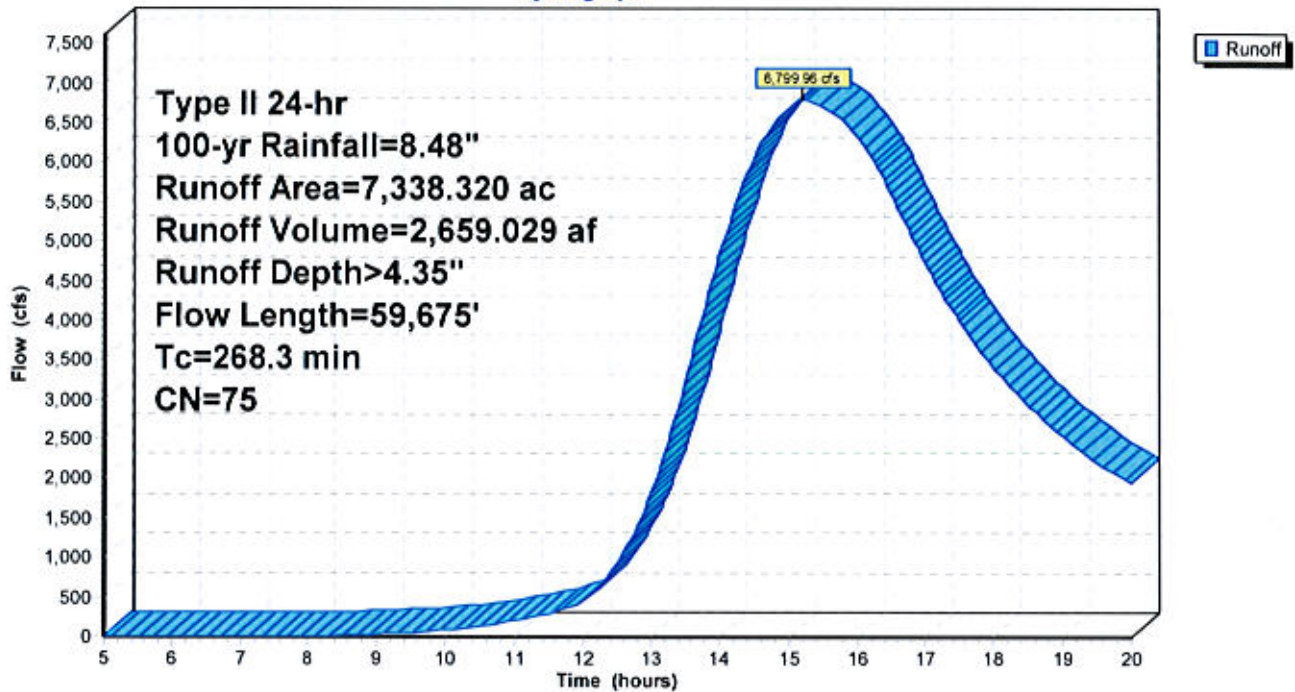
Type II 24-hr 100-yr Rainfall=8.48"

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Subcatchment 1S: Area 1

Hydrograph



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Type II 24-hr 100-yr Rainfall=8.48"

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Summary for Reach 2R: Proposed Culvert

Inflow Area = 7,338.320 ac, 6.92% Impervious, Inflow Depth > 4.35" for 100-yr event
Inflow = 6,799.96 cfs @ 15.22 hrs, Volume= 2,659.029 af
Outflow = 6,799.82 cfs @ 15.22 hrs, Volume= 2,658.967 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 55.64 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 31.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 3,910 cf @ 15.22 hrs

Average Depth at Peak Storage= 7.64'

Bank-Full Depth= 8.00' Flow Area= 128.0 sf, Capacity= 7,235.03 cfs

16.00' x 8.00' deep channel, n= 0.012 Concrete pipe, finished

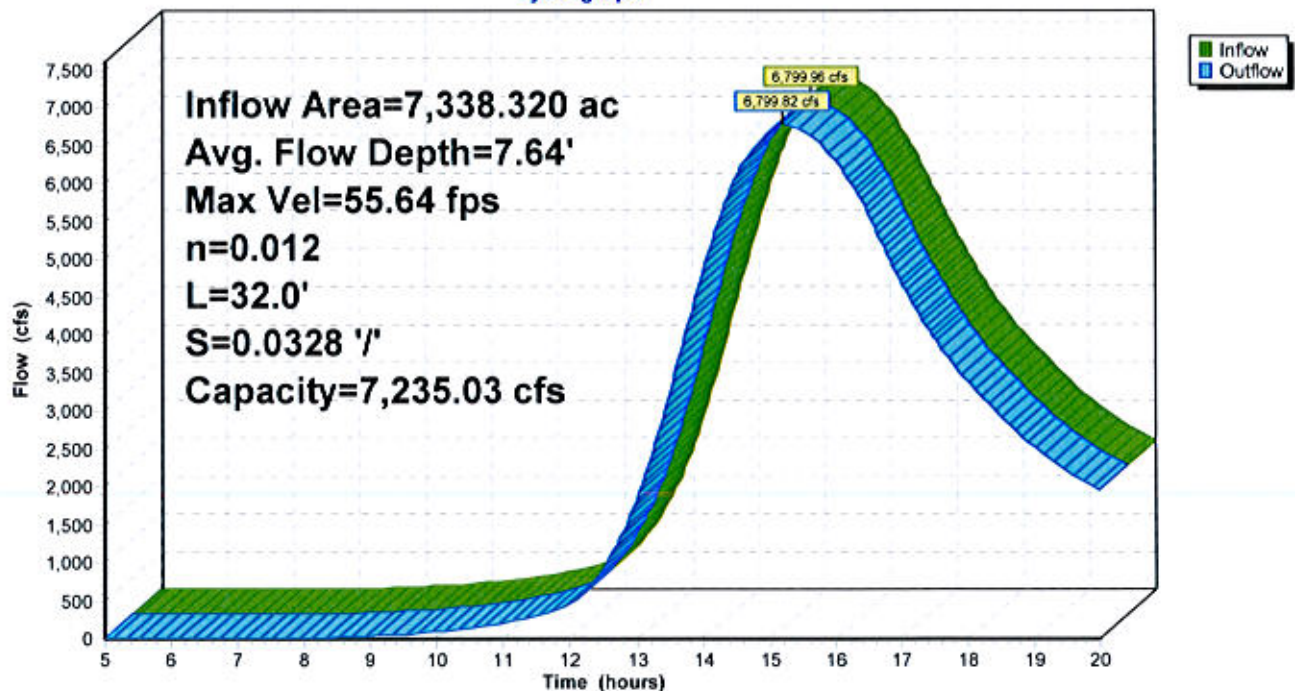
Length= 32.0' Slope= 0.0328 '/'

Inlet Invert= 116.05', Outlet Invert= 115.00'



Reach 2R: Proposed Culvert

Hydrograph



WilhelmRoadCulvert - Proposed

Type II 24-hr 100-yr Rainfall=8.48"

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Stage-Discharge for Reach 2R: Proposed Culvert

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)	Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
116.05	0.00	0.00	121.25	48.22	4,011.68
116.15	4.73	8.15	121.35	48.59	4,120.34
116.25	7.51	24.66	121.45	48.95	4,229.56
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116.45	11.79	75.44	121.65	49.66	4,449.64
116.55	13.56	108.82	121.75	50.01	4,560.56
116.65	15.20	146.29	121.85	50.34	4,671.99
116.75	16.72	187.51	121.95	50.68	4,783.91
116.85	18.14	232.20	122.05	51.00	4,896.33
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118.45	33.76	1,296.28	123.65	55.55	6,755.28
118.55	34.47	1,378.81	123.75	55.80	6,874.74
118.65	35.16	1,462.70	123.85	56.05	6,994.53
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120.85	46.66	3,583.43			
120.95	47.06	3,689.57			
121.05	47.45	3,796.33			
121.15	47.84	3,903.71			

Appendix E

Hydraulic Calculations for Replacement Culvert

Mannings Equation:

$$Q = \frac{1.49}{n} A_x R^{2/3} \sqrt{S}$$

where: [Q=flow rate (cfs), n=roughness coefficient, A_x=cross-sectional area (ft²), R=hydraulic radius, S=slope]

Q=6,800 cfs (100-yr storm peak runoff)

A_x=height*width=HW=8*W (maintain 8' height)

S=.033 (maintain existing slope)

n=.012 (for concrete)

$$R = \frac{A_x}{P} = \frac{\text{Area}}{\text{Wetted Perimeter}} = \frac{H * W}{2 * H + W} = \frac{8W}{W + 16}$$

Solve for required width (W):

$$6,800 \text{ cfs} = \left(\frac{1.49}{.012} \right) * (8 * W) * \left(\frac{8W}{W + 16} \right)^{2/3} * \sqrt{.033}$$

W= 15.21 feet≈16 feet