CRANFORD DRIVE DRAINAGE IMPROVEMENTS

ENVIRONMENTAL ASSESSMENT

New York State Governor's Office of Storm Recovery

January 5, 2017

CRANFORD DRIVE DRAINAGE IMPROVEMENTS
Environmental Assessment

January 5, 2017

Project Name:	Cranford Drive Drainage Improvements
Project Location:	Cranford Drive – North of Old Route 304 to the intersection of Cranford Drive with Route 304 – in the New City Hamlet, Town of Clarkstown, Rockland County, New York
HTFC SHARS #:	N/A
Federal Agency:	U.S. Department of Housing and Urban Development (HUD)
Responsible Entity:	New York State Homes and Community Renewal (NYSHCR)
Responsible Agency's Certifying Officer:	Lori A. Shirley, Certifying Officer
Project Sponsor:	Governor's Office of Storm Recovery 99 Washington Avenue, Suite 1224 Albany, New York 12260
Primary Contact:	Lori A. Shirley Certifying Officer NYS Governor's Office of Storm Recovery *Email:* Lori.Shirley@nyshcr.org *Telephone:* (518) 474-0755
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	Lori A Shirley Lori A. Shirley

Environmental Assessment Prepared By:	Tectonic Engineering & Surveying Consultants, P.C. P.O. Box 37, 70 Pleasant Hill Road Mountainville, N.Y. 10953

CERTIFICATION OF NEPA CLASSIFICATION

It is the finding of the New York State Housing Trust Fund Corporation that the activity(ies) proposed in its 2013 NYS CDBG-DR project, Cranford Drive Drainage Improvements are:

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 statues 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 statues 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.

Lori A Shirley
Signature of Certifying Officer

January 5, 2017
Date

Lori A. Shirley
Print Name

Certifying Environmental Officer
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 2013 NYS CDBG-DR project, Cranford Drive Drainage Improvements are:

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

Lori A Shirley

Signature of Certifying Officer

January 5, 2017

Date

Lori A. Shirley

Print Name

Certifying Environmental Officer

Title

Description of the Proposed Project [24 CFR 50.12 & 58.32; 40 CFR 1508.25]**:**
The Cranford Drive Drainage Improvements Project is a stormwater management improvement project involving the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River (see project location maps in **Attachment 1**). This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

The work will be performed in six phases to reduce the potential for erosion (see project site plans in **Attachment 2**). Phase 1 will begin at the Old Route 304 bridge, and the subsequent phases will move south down the Demarest Kill. Approximately 4,650 linear feet of the bed and banks of the Demarest Kill, located south of Old Route 304 and running approximately parallel to Cranford Drive, will be realigned and reinforced. The redesign of the stream channel incorporates a multi-channel design including a normal low flow channel (thalwag), a bank full channel, and the floodplain channel. Backflow preventers will be installed at all drainage pipes out letting into the stream channel to prevent backflow from the channel flooding onto the roadway.

Phase 1 of the proposed project involves the installation of 3,240 square feet (SF) and 3,560 SF of riprap on the north and south side of the existing box culverts underlying Old Route 304. The box culverts include three (3) 16-foot x 8.5-foot concrete box culverts running adjacent and parallel under Old Route 304 (See **Attachment 2**, Drawing S-1 and D-18). Modular block retaining walls will be located on the south side of the three culverts, with a 165-SF gabion check dam put in place to divert low flow waters into a single culvert (See **Attachment 2**, Drawing D-18 and D-8). The existing stream channel is to be realigned, with a 190-SF rock cross-vein and a 145-SF "W" rock weir being located in the proposed stream channel (See **Attachment 2**, Drawing S-1 and D-3). A temporary stream crossing will be constructed using three (3) 30-inch x 20-foot high-density polyethylene (HDPE) pipes covered by approximately 20 cubic yards (CY) of ¾-inch aggregate fill placed on filter fabric (See **Attachment 2**, Drawing S-2 and D-13). There will be approximately one (1) foot of the ¾-inch aggregate fill placed on both sides and on top of the 20-foot pipes (See **Attachment 2**, D-13). A total of 32 trees of 8-inch diameter or higher are proposed to be removed during Phase 1 (See **Attachment 2**, Drawing S-1).

Phase 1A of the proposed project involves placement of a boulder cluster of approximately 6 to 10 CY next to 3,950 SF of riprap before the proposed stream alignment connects to the existing streambed. A 145-SF "W" rock weir will be placed on the southern portion of this area, where the proposed streambed diverges from the existing streambed (See **Attachment 2**, Drawing S-2 and D-10). As shown on the Project Drawings, a total of 44 trees of an 8-inch or larger diameter are proposed to be removed during Phase 1A (See **Attachment 2**, Drawing S-2).

Phase 2 and Phase 3 run approximately parallel with one another, with Phase 2 involving work to create the proposed stream channel on the eastern bank, and Phase 3 involving work on the western bank to fill in the existing stream and reinforce the streambed. Phase 2 involves construction of a modular block retaining wall on the northeastern edge of the streambank. A 145-SF "W" rock weir is located at the proposed streambed south of the retaining wall (See **Attachment 2**, Drawing S-3 and D-3). Two (2) boulder clusters, containing approximately 6 to 10 CY of rocks each, will be placed along the proposed streambed during Phase 2, and brush matting will be placed during Phase 3. A rock cross-vein of approximately 190 SF will be located north of a second temporary stream crossing, as described in Phase 1. Approximately 450 SF of brush matting will be placed on both sides of the streambed located north of the 18,900 SF of riprap reinforcing the junction of the tributary traveling west under Cranford Drive (See Phase 6 for the tributary work). The brush matting and riprap will be placed on the eastern side during Phase 2, and on the western side during Phase 3 (See **Attachment 2**, Drawing S-4). The southern portion of the Phase 2 includes placement of approximately 90 SF of riprap for a sewer crossing, a third temporary stream crossing as described in Phase 1, and a 150-foot boulder revetment to reinforce the new streambed curve on the western

bank of the z-curve (See **Attachment 2**, Drawing S-5). Approximately 270 trees with diameters of 8 inches or greater will be removed during Phase 2, while approximately 64 trees with diameters of 8 inches or greater will be removed during Phase 3 (See **Attachment 2**, Drawing S-3 and S-4).

Phase 4 and Phase 5 also run approximately parallel to one another, with Phase 4 occurring on the eastern bank and Phase 5 occurring on the western bank (See **Attachment 2**, Drawing S-6). Phase 5 also overlaps the southern portion of Phase 2. Phase 5 involves placement of a 150-foot boulder revetment to reinforce the new streambed curve on the eastern bank of the z-curve, with a 190-SF rock cross-vein located to the south of the boulder revetment. Approximately 175 SF of brush matting will be located on the eastern bank, north of approximately 2,800 SF of riprap for sewer crossings at the southern tip of the work area (See **Attachment 2**, Drawing S-6). Approximately 225 SF of brush matting will be placed on the western bank and approximately 65 feet of boulder revetment on the eastern bank, both located south of the sewer crossing riprap (See **Attachment 2**, Drawing S-7). Approximately 16 trees with diameters of 8 inches or greater will be removed during Phase 4, while approximately 67 trees with diameters of 8 inches or greater will be removed during Phase 5 (See **Attachment 2**, Drawing S-6 and S-7).

Phase 6 involves work on the tributary traveling west under Cranford Drive. The riprap from Phase 2 and Phase 3 ends at the eastern side of Cranford Drive. The western banks will have stabilized construction entrances from Cranford Drive. The stream will remain in approximately the same footprint as the existing streambed, but it will be reinforced with two boulder clusters of approximately 6 to 10 CY, with a single 180-SF "W" rock weir and two (2) 210-SF rock cross veins (See **Attachment 2**, Drawing S-8, S-9, S-10, and D-3). Approximately 82 trees with diameters of 8 inches or greater will be removed during Phase 6 (See **Attachment 2**, Drawing S-8).

As the stream stabilization and restoration work is completed, habitat improvements including approximately 674 major trees, 156 minor trees, 1,790 shrubs, and 4,010 ground-cover plants will be planted along the stream banks to replace the removed trees, shrubs, and grasses (See **Attachment 2**, Drawing L-1, L-2, and L-3).

The project will entail approximately 18,841 CY of top-soil to be stripped and stockpiled on the project site, with approximately 11,140 CY of the stripped top-soil to be reused on the project site (**Attachment 2**). The remaining 7,470 cubic yards of top-soil will be disposed of at New York State Department of Conservation (NYSDEC) approved locations. Excavated boulders and stones will be reused in the channels for stabilization.

Statement of Purpose and Need for the Proposal [40 CFR 1508.9(b)]**:**
During Hurricane Irene and Superstorm Sandy, the Demarest Kill rose above its banks and flowed throughout the residential area of Clarkstown. Intense flooding along Cranford Drive forced road closures in the area due to floodwaters overwhelming culverts and bridges. The Cranford Drive Drainage Improvements project design is intended to create a channel and floodplain that will have the appropriate dimensions to contain the one-percent flood within the channel banks, maintain flows with a capacity to move sediment, and limit stream bank erosion. This proposed action will alleviate 100-year flooding in and around the houses and streets which are currently within the flood prone areas. Impacts from flooding and limiting emergency access to the flooded area and street would be significantly reduced. The main objective is to protect the health, safety and welfare of the public residing and travelling in and around the surrounding area.

A plan for Clarkstown was developed by members of the NYRCR Clarkstown Planning Committee, which was made up of local residents, business owners, and civic leaders (identified in consultation with established local leaders and community organizations). The project objective is to create a channel and floodplain that have the appropriate dimensions to contain the one-percent flood within the channel banks,

maintain flows with a capacity to move sediment, and limit stream bank erosion. The project will alleviate flooding in the surrounding residential areas and confine flow to a corridor that will reduce urban waste deposited into the stream from the surrounding yards during storm events.

Existing Conditions and Trends [24 CFR 58.40(a)]**:**
A drainage study of the Demarest Kill was commissioned by the Rockland County Drainage Agency in 1991, when a survey elevation error was discovered as presented in the 1983 Flood Insurance Study (FIS). An elevation difference of approximately five (5) feet was noted in the vicinity of Old Route 304 and Cranford Drive. As such, the Base Flood Elevations (BFE's), established from the 100-year flood level were approximately five feet lower in this area than what they should have been. Subsequently, a number of homes built before and around 1991 were located within the 100-year flood zone on the 2000 revision of the FIS for Rockland County. Thus, the proposed project's objectives are to alleviate flooding in and around the houses and streets by modifying the Demarest Kill channel and floodplain to appropriate dimensions in order to contain a one-percent flood within the channel banks.

Funding Information
Estimated Total HUD Funded Amount:

CDBG-DR	$2,500,000.00

Estimated Total Project Cost (HUD and non-HUD funds) [24 CFR 58.32(d)]**:**

CDBG-DR	$2,500,000.00
Rockland County	$1,000,000.00
Total	**$3,500,000.00**

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 No ☐ ☒	Based on guidance provided by the HUD Fact Sheet #D1, the National Plan of Integrated Airport Systems (NPIAS) was reviewed for civilian, commercial service and military airports located near the project site. There are no civilian, commercial service airports located within 2,500 feet of the project site. There are no military airports located within 15,000 feet of the project site (**Attachment 1**). No additional review is required.
Coastal Barrier Resources Coastal Barrier Resources Act, as amended by the Coastal Barrier Improvement Act of 1990 [16 USC 3501]	Yes No ☐ ☒	Based on the U.S. Fish and Wildlife Service (USFWS) Coastal Barrier Resources System (CBRS) Mapper, the project site is not located in or immediately adjacent (within 150 feet) to a CBRS Unit or Otherwise Protected Area (**Attachment 3**). (https://www.fws.gov/ecological-services/habitat-conservation/cbra/maps/mapper.html)
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 No ☐ ☒	Based on the FEMA Firmette No. 36087C0111G, the project site is located within a FEMA designated flood zone, 100-year floodplain (Special Flood Hazard Area [SFHA] - AE Zone) (**Attachment 3**). An 8-step Floodplain Management Determination (Executive Order [EO] 11988) was completed pursuant to 24 CFR 55.20 for this project (**Attachment 4**). However, proof of National Flood Insurance Program (NFIP) insurance is not required as the project structures are uninsurable. (http://www.nfipiservice.com/watermark/eligible_for_coverage.html)

STATUTES, EXECUTIVE ORDERS, AND REGULATIONS LISTED AT 24 CFR 50.4 & 58.5		
Clean Air Clean Air Act, as amended, particularly section 176(c) & (d); 40 CFR Parts 6, 51, 93	Yes No ☐ ☒	This project does not involve physical work that would substantively affect the New York State Department of Environmental Conservation (NYSDEC) Air Quality State Implementation Plan (SIP). No significant impacts on air quality will result. It is recommended construction be conducted utilizing measures to ensure acceptable air quality during these temporary activities, including minimization of volatile organic compounds and nitrogen oxides emissions and operation of gas-powered construction equipment to avoid prolonged idling. Fugitive dust management is recommended, when applicable.
Coastal Zone Management Coastal Zone Management Act, sections 307(c) & (d)	Yes No ☐ ☒	The project site is not located within the New York State Coastal Boundary or Local Waterfront Revitalization Area or Program Community (**Attachment 3**). (https://appext20.dos.ny.gov/coastal_map_public/map.aspx)
Contamination and Toxic Substances 24 CFR Part 50.3(i) & 58.5(i)(2)	Yes No ☐ ☒	**<u>Project Site Records Review</u>** **U.S. Environmental Protection Agency (EPA), NYSDEC, and Rockland County Records:** The project site is not located within 3,000 feet of a toxic or solid waste landfill site. The project site is not listed on an EPA Superfund National Priorities or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) list or equivalent State list. A review of the EPA Facilities Database provides no indication of past uses of the project site that could have contaminated the project site, or potentially adversely affect the occupants of the project site. The project site is not listed on the NYSDEC Environmental Remediation or Bulk Storage databases. **<u>Surrounding Properties Records Review</u>** **EPA Records:** There are two EPA facilities located within 3,000 feet of the project site. Both facilities are located at or over 2,500 feet from the project site. The two facilities are inactive Resource Conservation Recovery Act (RCRA) facilities: **Personal Touch Cleaners**, is an operating minor Air Emission facilities in unknown compliance for the past 6 quarters. However, there are no known formal or informal enforcement actions at this facility and there are no NYSDEC spill reports reported at this facility. As such, this site is not considered a

		hazard that could affect the health and safety of occupants or conflict with the intended utilization of the project site. **Exxon Div. of CFI #70202** has no documented non-compliance issues in the last three years. Facilities with no permit violations are not considered a hazard because the facilities are in compliance with permit conditions that are enforced and meet standards that protect public health and the environment by preventing releases to the environment. **NYSDEC Records:** Seven spills have been reported near the project site on Cranford Drive, Ridgefield Road and Termakay Drive. Of the seven spills, six have been closed by the NYSDEC. A spill being closed by the NYSDEC means that the records and data submitted indicate that the necessary cleanup and removal actions have been completed and no further remedial activities are necessary under this spill report number. Therefore, these six closed spills are not considered a hazard that could affect the health and safety of occupants or conflict with the intended utilization of the project site. The remaining spill, **spill #0612050**, occurred at 19 Cranford Drive in 2007. This spill is associated with an equipment failure at a private dwelling, where No. 2 fuel oil was released into the soil. For more detail associated with this spill, see **Attachment 5**. This spill is not considered a hazard that could affect the health and safety of occupants or conflict with the intended utilization of the project site due to the nature of the spill, characteristics of the contaminate, and length of time since the spill report. There are no mapped bulk storage facilities located within 3,000 feet of the project site. **<u>Summary:</u>** Based on a review of available environmental records for the project site and surrounding area, the project site is unlikely to contain hazardous materials, contamination, toxic chemicals and gases, and radioactive substances, where a hazard could affect the health and safety of occupants or conflict with the intended utilization of the property. As a result, the funded activities do not involve actions that would involve potential

		recognized environmental conditions/ contamination. Therefore, a Phase I Environmental Site Assessment (ESA) or Phase II Investigation is not warranted. As such, no further action is required at this time. Maps, and NYSDEC and EPA reports are provided in the HUD Environmental Standards Review Report in **Attachment 5**.
Endangered Species Endangered Species Act of 1973, particularly section 7; 50 CFR Part 402	Yes No ☒ ☐	This project involves the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls. According to information reviewed from the NYSDEC Environmental Resource Mapper (**Attachment 3**), the Site is located within the NYSDEC's designated rare, threatened, or endangered species generalized review area. A formal request was submitted to the NYSDEC Natural Heritage Program (NHP) for records of threatened or endangered species in the project site. A response was received from the NHP on August 14, 2015, which identified the eastern pearlshell (unlisted) as a species of conservation concern that is found in the vicinity of the project site (**Attachment 6**). Additionally, a follow-up request for NHP records was submitted on July 26, 2016 to ensure that all records are up-to-date. A response was received from the NHP on August 24, 2016, which indicated that the eastern pearlshell remained as a species of conservation concern for the project site (**Attachment 6**). The eastern pearlshell generally lives buried in clean, mixed substrates in fast-flowing unpolluted trout streams and smaller rivers. It had been known to occupy the Hackensack River basin in Rockland County since the mid-1800's and appeared to be thriving as recently as the 1950's. However, by the early 1990's, only 3 individuals were found and it was soon expected to have become extirpated from this locale, probably as a result of the intense urbanization of the watershed (*NYSDEC Conservation Guide for the Eastern Pearlshell*, 2015). Currently, the Demarest Kill is characterized as a small stream that runs through residential backyards. No special conditions regarding the eastern pearlshell were indicated in

		the NYSDEC permit obtained for project activities (**Attachment 2**). The USFWS lists the northern long-eared bat (*Myotis septentrionalis*) and birds of conservation concern as species that could occur in the area of the project site (**Attachment 6**). Approximately 575 trees with a diameter of 8-inches or greater will be removed as a result of this project. No caves or mines occur in the vicinity of the project site. According to the NYSDEC NHP, there are no records of known maternity roost trees or hibernacula known to be occupied by the northern-long eared bat in the vicinity of the project site. To minimize potential impacts to the northern long-eared bat, tree clearing will take place from November 1 to March 31, which is outside of the active season for northern long-eared bats. Habitat improvements including the planting of approximately 674 major trees, 156 minor trees, 1,790 shrubs, and 4,010 ground-cover plants along the stream banks to replace the removed trees, shrubs, and grasses, will provide potential summer habitat for the northern long-eared bat and Indiana bat after completion of the project. Therefore, it was determined that the project May Affect, but is Not Likely to Adversely Affect the Indiana bat and northern long-eared bat, and tree removal will occur between November 1 and March 31. USFWS and the U.S. Army Corps of Engineers (USACE) have concurred with this determination and no further consultation is required (**Attachment 6**). The National Marine Fisheries Service (NMFS) lists the following ESA species for the Greater Atlantic Region that have the potential to occur in the project site: <u>Fish Species:</u> Shortnose Sturgeon (*Acipenser brevirostrum*) Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus)* This project will not directly affect any of the listed fish species. The project site does not provide suitable habitat for the Atlantic sturgeon. While the project is potentially located in the

		inland range of the Atlantic sturgeon, the project is located above the high tide line and, therefore, is not considered accessible habitat. The project site does not provide suitable habitat for the shortnose sturgeon. The shortnose sturgeon prefers the deeper, freshwater tidal reaches of the Hudson River Estuary (see NYSDEC Shortnose Sturgeon Sighting Map in **Attachment 6**). Moreover, a dam, located 4.1 miles southeast of the project on the south end of DeForest Lake, would prevent both sturgeon species from travelling upstream to the project site. Thus, based on the analysis of the listed species above and the project activities, it was determined that the project activities would not directly or indirectly affect any ESA species under NMFS jurisdiction. Pursuant to the NMFS Greater Atlantic Region Endangered Species Act Section 7 Program, a No Effect Determination has been made for the proposed project on July 26, 2016 and is included in **Attachment 6**.
Explosive and Flammable Hazards 24 CFR Part 51 Subpart C	Yes No ☐ ☒	Acceptable separation distance requirements do not apply to this project because the definition for "HUD-assisted projects" in 24 CFR Part 51.201 is predicated on whether the project increases the number of people exposed to hazardous operations. The proposed project involves the environmental review of the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls. Pursuant to the 24 CFR Part 51.201 "HUD-assisted project" definition, this project does not involve "the development, construction, rehabilitation, modernization or conversion with HUD subsidy, grant assistance, loan, loan guarantee, or mortgage insurance, of any project which is intended for residential, institutional, recreational, commercial or industrial use." Therefore, there is no review required under 24 CFR Part 51 Subpart C.
Farmlands Protection Farmland Protection Policy Act of 1981, particularly sections 1504(b) and 1541; 7 CFR Part 658	Yes No ☐ ☒	Not applicable. The proposed project will occur in an area that contains Rippowam sandy loam, Wethersfield gravelly silt loam at 3 to 8% slopes, and Yalesville sandy loam, 2 to 8% slopes that are prime farmland according to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Farmland Classification Map for the project site (**Attachment 7**). However, the project site is a

		developed residential area, and this project does not involve the conversion of farmland to other type use.
Floodplain Management Executive Order 11988, particularly section 2(a); 24 CFR Part 55	Yes No ☒ ☐	The project site is located within a FEMA designated flood zone, 100-year floodplain (SFHA - AE Zone) (**Attachment 3**). An 8-step Floodplain Management Determination (EO 11988) was completed pursuant to 24 CFR 55.20 for this project and documents the reasoning for locating the project in flood zone (**Attachment 4**).
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 ☐ ☒	The project will involve ground disturbing work associated with installing flood control measures and will occur within the limits of the intermittent stream banks. The project is located in an archaeologically sensitive landform. The New York State Historic Preservation Office (SHPO) recommended a Phase I Archaeological Survey for all portions of the project that would potentially involve ground disturbance, unless it could be proven prior ground disturbance had occurred (**Attachment 8**). As such, a Phase I Archaeological and Geomorphological Survey was performed. Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Cranford Drive Drainage Improvements project (Report dated September 26, 2016 in **Attachment 8**). On October 18, 2016, SHPO determined that this project will have no adverse effects to historic properties in or eligible for inclusion in the State or National Register of Historic Places (**Attachment 8**). Project information was sent on July 27, 2016 and the Phase I Archaeological and Geomorphological Survey was sent on September 27, 2016 to the Stockbridge-Munsee Community Band of Mohicans, Delaware Nation and Delaware Tribe of Indians. A response was received from the Stockbridge-Munsee Community Band of Mohicans on October 11, 2016 (**Attachment 8**). The Stockbridge-Munsee Community Band of Mohicans' response indicates that the proposed project is considered to have "No Effect" in regard to cultural properties of concern. No responses have been

		received from the Delaware Nation or Delaware Tribe of Indians. In the event any inadvertent discoveries of human remains and/or cultural resources including, but not limited to, funerary objects, sacred objects and objects of cultural patrimony are made during execution of the project scope, then work shall be halted immediately and the SHPO and THPO of the Stockbridge-Munsee Community Band of Mohicans, Delaware Nation and Delaware Tribe of Indians shall be consulted before work can be resumed.
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 ☐ ☒	The proposed use is not a noise-sensitive use. The proposed work is not expected to generate excessive noise during the short-term construction work and will adhere to local noise control standards. Project activities will be completed in accordance with all applicable federal, state and local permit requirements and conditions. Permits required for this project will be obtained by the Town before commencing work and appended to the environmental review record (ERR) when received from the permitting agencies (**Attachment 2**).
Sole Source Aquifers Safe Drinking Water Act of 1974, as amended, particularly section 1424(e); 40 CFR Part 149	Yes No ☐ ☒	The project does not occur within the surficial bounds of a designated sole source aquifer. See the attached map of EPA designated sole source aquifers in New York State (**Attachment 9**).
Wetlands Protection Executive Order 11990, particularly sections 2 and 5	Yes No ☒ ☐	The project is located adjacent to and partially within a federally and state designated wetland (**Attachment 3**). An 8-step review of the project pursuant to 24 CFR Part 55 was undertaken. The Wetlands Protection (EO 11990) Determination documents the reasoning for locating the project in wetland (**Attachment 4**).
Wild and Scenic Rivers Wild and Scenic Rivers Act of 1968, particularly section 7(b) and (c)	Yes No ☐ ☒	Not applicable. There are no wild and scenic rivers located within Rockland County, as designated by the U.S. Department of the Interior and the NYSDEC (**Attachment 3**).
ENVIRONMENTAL JUSTICE		
Environmental Justice Executive Order 12898	Yes No ☐ ☒	The project site does not occur in a State-identified EJ area (**Attachment 10**). The project is intended to provide improved flood control measures in order to develop community resiliency during future flood events. The project does not contribute to or promote environmental injustice.

		Rockland County: http://www.dec.ny.gov/docs/permits_ej_operations_pdf/rocklandej.pdf

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	1	The project is a Town action involving the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River located within a residential area, in order to modify existing on-site drainage infrastructure and install new drainage controls in order to contain future 100-year flood levels within the stream channel. Thus, this drainage improvement project will continue the existing land use and is in accordance with local zoning. The New York Rising Community Reconstruction (NYRCR) Plan for the Cranford Drive Drainage Improvements project outlines that the Town of Clarkstown Storm Drainage Task Force noted this area "has been identified as being at extreme risk due to repetitive flooding by the Demarest Kill." This project is aimed at improving the community's resilience from future flood events. The existing land use in the area surrounding the Demarest Kill is primarily residential. The project will not cause changes to the current use or neighborhood characteristics, and it will not alter residential or commercial density. Residential and commercial infrastructure in these neighborhoods will not be adversely affected and the flooding resiliency of the area will be improved with the implementation of this project. Thus, this project is compatible with the Town of Clarkstown *Final Comprehensive Plan and Final Generic Environmental Impact Statement* (August 2009) by

		providing improved drainage, community resiliency and reduced vulnerability to flooding. NY Rising Community Reconstruction Plan, *Town of Clarkstown*, December 2014. https://stormrecovery.ny.gov/regional-communities/town-clarkstown Town of Clarkstown, *Final Comprehensive Plan and Final Generic Environmental Impact Statement*, August 2009. http://town.clarkstown.ny.us/Html/DGEIS.asp
Soil Suitability/ Slope/ Erosion/ Drainage/ Storm Water Runoff	2	Per the USGS Topographic Map, the project site is located in an area of low to mild slope. The project is a Town action involving the modification and realignment of the Demarest Kill, in order to modify existing on-site drainage infrastructure and install new drainage controls in order to contain future 100-year flood levels within the stream channel. While the project will realign the existing waterway, it will not significantly alter the slope of the project site (**Attachment 1**). USDA NRCS maps provide information on soils types and properties that influence development sites. The information is intended for land use planning, evaluating land use alternatives, and planning site investigations prior to design and construction. According to the USDA NRCS soils map data, the project site contains primarily Rippowam sandy loam and Wethersfield gravelly silt loam with 3 to 8% slopes (**Attachment 7**). The Rippowam sandy loam soils are poorly drained soils with a moderately high to high capacity to transmit water, while the Wethersfield gravely silt loams are well drained and have a moderately low to moderately high capability to transmit water. The Rippowam sandy loam soils are also classified as farmland of statewide importance (**Attachment 7**). The project will use weirs, cross veins, and riprap to prevent erosion while allowing for continued stormwater runoff, while backflow preventers will be installed at all drainage pipes to prevent backflow from the stream channel to flood the roadway. These lands are not proposed to be converted to another use. As such, it is expected that soils will not limit the project's realignment and modification of the existing waterway. No potential undesirable impacts are anticipated and the project site should be improved in terms of its landscape and stability during the course of the project.
Hazards and Nuisances including Site Safety and Noise	2	The project is a Town action involving the modification and realignment of the Demarest Kill in order to modify existing on-site drainage infrastructure and install new drainage controls in order to contain future 100-year flood levels within the stream channel.

		Normal construction and noise hazards will be present during the construction phase of the project. Construction practices will comply with New York State, Rockland County, and local municipality regulations. The funded activities do not involve actions that would involve potential recognized environmental conditions/ contamination. There are no known or suspected environmental issues known to have contaminated the project site which would affect the health and safety of occupants or to conflict with the intended utilization of the project site. Additional details are provided in the Toxic/ Hazardous/ Radioactive Materials, Contamination, Chemicals, or Gases (24 CFR 58.5(i)(2)) section below, and its associated maps, and the EPA and NYSDEC reports are provided in the Cranford Drive Drainage Improvements HUD Environmental Standards Review Report (**Attachment 5**).
Energy Consumption	2	The project involves the modification and realignment of the Demarest Kill in order to modify existing on-site drainage infrastructure and install new drainage controls in order to contain future 100-year flood levels within the stream channel. This project would not increase long-term energy consumption.

Environmental Assessment Factor	Impact Code	Impact Evaluation
SOCIOECONOMIC		
Employment and Income Patterns	1	This project has no potential to adversely affect employment opportunities or income patterns. The modification and realignment of the Demarest Kill and installation of new drainage controls will contain future 100-year flood levels within the stream channel, preventing future damage to neighboring residences and businesses in the area. Moreover, the Town of Clarkstown NYRCR Plan notes this project is proposed to decrease vulnerability to flooding by improving drainage in an area that is an extreme risk to repetitive flooding that frequently results in road closures, which impedes through-travel by residents and emergency service providers. NY Rising Community Reconstruction Plan, *Town of Clarkstown*, December 2014. https://stormrecovery.ny.gov/regional-communities/town-clarkstown
Demographic Character Changes, Displacement	2	The project is not expected to cause any change in the demographic character of the area. This project does not involve residential development or activities. There is no known potential for the project to cause the displacement of individuals or families, destroy jobs, local businesses or public community facilities, or disproportionately affect particular populations.

Environmental Assessment Factor	Impact Code	Impact Evaluation
COMMUNITY FACILITIES AND SERVICES		
Educational and Cultural Facilities	2	The project will not introduce any new populations that would increase the student population of the area. As such, the project will not have an impact on educational or cultural facilities.
Commercial Facilities	2	The project will not introduce any new commercial development that would require additional retail services or other commercial facilities.
Health Care and Social Services	1	The proposed project involves the modification and realignment of the Demarest Kill in order to modify existing on-site drainage infrastructure and install new drainage controls in order to contain future 100-year flood levels within the stream channel. As such, it will not introduce any new development that would require the availability of additional routine or emergency health services. Moreover, the Town of Clarkstown NYRCR Plan notes this project is proposed to decrease vulnerability to flooding by improving drainage in an area that is an extreme risk to repetitive flooding that frequently results in road closures, which impedes through-travel by residents and emergency service providers. Thus, the reduced frequency of flooding in the surrounding area would allow for better access by emergency health service vehicles and other social service providers to the area. NY Rising Community Reconstruction Plan, *Town of Clarkstown*, December 2014. https://stormrecovery.ny.gov/regional-communities/town-clarkstown
Solid Waste Disposal / Recycling	2	The project will not introduce new development that would generate solid wastes on an ongoing basis. If there are construction wastes generated, it will be appropriately disposed of according to the type of waste generated and construction waste management practices in an appropriate, legally compliant receiving facility.
Waste Water / Sanitary Sewers	2	This project will not introduce new development that would generate additional waste water.
Water Supply	2	The proposed project will not increase demand for water.
Public Safety - Police, Fire and Emergency Medical	1	The proposed project will not generate new demand for police services, fire services or emergency medical services. The project will involve the installation of drainage controls in order to contain future 100-year flood events to the stream channels. Moreover, the Town of Clarkstown NYRCR Plan notes this project is proposed to decrease vulnerability to flooding by improving drainage in an area that is an extreme risk to repetitive flooding that frequently results in road closures, which impedes through-travel by residents and emergency service providers. Thus, the reduced frequency of flooding in the surrounding area would allow for better access by public safety officials in the event of an emergency to the area. NY Rising Community Reconstruction Plan, *Town of Clarkstown*, December 2014.

		https://stormrecovery.ny.gov/regional-communities/town-clarkstown
Parks, Open Space and Recreation	2	This project will not introduce new development that would generate demand for open space resources or impede open space access. No parks, open space areas, or recreational facilities are located adjacent to the project site. Therefore, the project is not expected to encroach onto parkland nor is it expected to have adverse effects on park resources, including visual, ecological, and recreational resources. The proposed project will not introduce new development that would generate demand for recreational resources nor will it impede recreational access.
Transportation and Accessibility	2	Besides limited trips generated by construction vehicles during a short window of construction defined to occur over approximately ten (10) months or less, the project will not introduce new development that generates continuing demand for transport or transport services.

Environmental Assessment Factor	Impact Code	Impact Evaluation
NATURAL FEATURES		
Unique Natural Features, Water Resources	1	The Hackensack River originates in Rockland County, New York and eventually drains into Newark Bay by Jersey City, New Jersey. The stream modification and realignment project will involve alteration of natural features and water resources of the Demarest Kill, a tributary of the western branch of the Hackensack River. The objective of the project is to create a channel and floodplain that will have the appropriate dimensions to contain the one-percent flood within the channel banks, maintain flows with a capacity to move sediment, and limit stream bank erosion. The proposed channel modifications to the Demarest Kill are for flood control purposes and to ensure that the flooding remains within acceptable levels. The proposed action will alleviate flooding in and around the houses and streets which are currently within the flood zone. The project will alleviate flooding in the surrounding residential areas and confine flow to a corridor that will reduce urban waste deposited into the stream from the surrounding yards during storm events. The project will contribute to community resiliency and reduce its vulnerability to flooding. Project activities will be completed in accordance with all applicable federal, state and local permit requirements and conditions. Permits required for this project will be obtained by the Town before commencing work and appended to the ERR when received from the permitting agencies (**Attachment 2**). Additionally, best management practices and erosion control measures will be incorporated and are detailed in

		the "*Project Description*" and "*Soil Suitability/ Slope/ Erosion/ Drainage/ Storm Water Runoff*" sections. As such, no adverse potential impacts are anticipated from the modification and realignment of the natural features and water resources of the Demarest Kill. Hackensack Riverkeeper, Inc. http://www.hackensackriverkeeper.org/history.html
Vegetation, Wildlife	3	The project includes significant vegetation clearing. Project construction will require vegetation removal within the banks and riparian area of the stream. Approximately 575 trees with a diameter of 8-inches or larger will be removed. However, significant landscaping is proposed upon the completion of the stream stabilization and restoration work, including the planting of: 674 new major (shade) trees; 156 minor (small) trees; 1,790 shrubs; and 4,010 ground cover plants. These trees will provide shading for the stream channel to minimize any thermal impacts of the project, which would be short-term. Moreover, the landscaping will establish plant cover to limit erosion and provide habitat for local wildlife. For detailed vegetation and wildlife analysis, see the Endangered Species section above (Endangered Species Act of 1973, particularly section 7; 50 CFR Part 402).
Other Factors		

Additional Studies Performed:

- Cranford Drive Flood Amelioration Project, Hydraulic Modeling Summary. March 3, 2016
- Cranford Drive Drainage Improvements Evaluation (*Chronicles historic studies*). Revised December 2015.
- Cranford Drive Drainage Improvements Evaluation Final Memorandum (*Updated with current and historic studies*). December 28, 2016.

Attachments:

- **Attachment 1**: Aerial Photograph, Street Map, Topographic Map, Airport Hazards Map, and Airport Site Documentation
- **Attachment 2**: NYSDEC Permit, Project Site Plans, Hydraulic Modeling Summary, Revised Floodplain Workmap and Environmental Permits (The Town will obtain all applicable federal, state and local permits before commencing work and they will be appended to the ERR when received from the permitting agencies).
- **Attachment 3**: NYSDEC Environmental Resource Map, USFWS NWI Wetland Map, USFWS Coastal Barrier Map, FEMA FIRMette Maps, NYS Coastal Boundary Map, and USFWS Wild & Scenic River Map
- **Attachment 4**: Wetlands Protection (EO 11990) & Floodplain Management (EO 11988) Determination
- **Attachment 5**: Cranford Drive Drainage Improvements HUD Environmental Standards Review Report
- **Attachment 6**: USACE & USFWS Concurrence, USFWS Letter, NHP Response and Update, Official Species List, Trust Resources List and NMFS Determination

- **Attachment 7**: NRCS Soil Resource Map and Farmland Classification Map
- **Attachment 8**: State Historic Preservation and Tribal Historic Preservation Documentation and Phase I Archaeological Survey Report
- **Attachment 9**: EPA Sole Source Aquifer Map
- **Attachment 10**: NYS Potential Environmental Justice Areas Map

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

- NFIP Eligibility List - http://www.nfipiservice.com/watermark/eligible_for_coverage.html
- NYSDOS Coastal Boundary Map - https://appext20.dos.ny.gov/coastal_map_public/map.aspx
- Potential EJ - http://www.dec.ny.gov/docs/permits_ej_operations_pdf/rocklandej.pdf
- Cranford Drive Drainage Improvements Evaluation. Revised December 2015.
- Cranford Drive Drainage Improvements Evaluation Final Memorandum. December 28, 2016.
- New York Rising Communities – Pre-Application Report, July 1, 2015
- Clarkstown NYRCR: NY Rising Community Reconstruction Plan, December 2014. https://stormrecovery.ny.gov/sites/default/files/crp/community/documents/clarkstown_nyrcrfinal_2015_03_31_lowres.pdf
- Cranford Drive Flood Amelioration Project, *Hydraulic Modeling Summary.* March 3, 2016
- New York State Department of Environmental Conservation Guide for the Eastern Pearlshell. http://www.acris.nynhp.org/report.php?id=8410

List of Permits That Might be Required (To be added upon receipt):

- NYSDEC Article 15 - Protection of Water Permit - **Attachment 2**
- NYSDEC Section 401 Water Quality Certification - **Attachment 2**
- NYSDEC Article 24 - Freshwater Wetlands Permit
- USACE Section 404 of the Clean Water Act Permit
- Floodplain Development Permit
- SPDES General Permit
- Rockland County Drainage Authority Permit

Public Outreach [24 CFR 50.23 & 58.43]**:**

Date	Type of Outreach
July 1996	1st public meeting
August 1996	2nd public meeting
April 1997	3rd public meeting
April 1998	4th public meeting
September 1999	Post-Tropical Storm Floyd meeting with select residents
October 1999	5th public meeting
July 2000	6th public meeting
August 2000	Questionnaires sent out
October 2011	7th public meeting

Date	Type of Outreach
October 2011	Visits to all residences to obtain feedback on reduced project
October 2011	Questionnaires sent out
January 2012	8th public meeting held
February 2013	9th public meeting held
April 2014	10th public meeting held
September 2016	Early Notice of a Proposed Activity in a 100-year Floodplain and Wetland
January 2017	Combined Final Notice and Public Review of a Proposed Activity in a 100-year Floodplain and Wetland, Notice of Finding of No Significant Impact (FONSI), and Notice of Intent to Request Release of Funds (NOI-RROF)

Cumulative Impact Analysis [24 CFR 58.32]**:**
This project was evaluated according to draft plans which encompassed all proposed actions (**Attachment 2**). There are no other known future projects in the vicinity of the Cranford Drive Drainage Improvements project that would create environmental or social impacts in the area. The project is compatible with the existing land use and will contribute to community resiliency and its reduced vulnerability to flooding.

Alternatives [24 CFR 58.40(e); 40 CFR 1508.9]
One potential alternative is to construct a detention basin along the southern tributary of Demarest Kill. This alternative was analyzed to determine the potential of reducing peak flood flows by constructing a detention basin upstream from the crossing of the Demarest Kill with NYS Route 304. The potential detention basin considered had spatial limitations both in lateral extent and in depth by the existence of residences surrounding the potential site. These limitations have a direct influence on the available storage capacity that could be achieved. The HEC-1 calculations were computed and the results of the analysis were compared. The analysis revealed that the 15-, 25-, 50- and 100-year flood flows could only be reduced by less than 12 percent. The corresponding drop in flood stages at the proposed project site were modelled to be minimal and, thus, it was determined that the detention basin alternative would be ineffective.

A second alternative is to relocate the stream. The Town of Clarkstown has stated that changing the location of the stream is not feasible and would be cost prohibitive, especially because residential homes would have to be bought out in order to create space for relocating the stream.

A third alternative involves the buyout of residential homes along Cranford Drive. The Town of Clarkstown has stated that purchasing the homes at approximately $800,000 per dwelling would have a total cost in excess of $12 million. This alternative is not financially feasible and would displace current residents from the community.

A fourth alternative involves raising residential structures two feet above the 100-year BFE. This alternative would cost in excess of $200,000 per dwelling for a total cost of over $6 million, in addition to any temporary relocation fees. This alternative is not financially feasible and would not alleviate flooding of residential yards or urban waste deposited into the stream from surrounding yards during flood events.

A fifth alternative involves a reduced version of the project scope. The amended design would reduce the footprint of the project by not realigning the southern tributary portion of the project. The design was

submitted to the USACE for review in 2011. The reduced design was also shown to the residents in the project area to get feedback on which project they preferred. The Town stated, as part of the alternatives analysis presented, that the reduced version, although having less impact on the channel, does not provide the proper mitigation to the flooding problems in the area.

No Action Alternative [24 CFR 58.40(e)]:

The No Action alternative was considered and rejected by the Town of Clarkstown. No action would provide zero benefit to the residents and the Town. Flooding conditions in the areas of Cranford Drive and Bush Court, Termakay Drive and the end of Cypress Street have historically caused damage to residences and blocked access for emergency vehicles. Major storm events are likely to continue to occur. Thus, flooding of low lying areas and residences during major storm events would continue to occur if no action were taken causing costly property damage and potentially fatalities.

Summary of Findings and Conclusions:

The preceding Statutory Checklist, Environmental Assessment Checklist and the discussion below document that the proposed work will comply with regulations in 24 CFR part 58 and that there are no direct or cumulative adverse environmental impacts anticipated as a result of the proposed action.

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.

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.

If there is any unanticipated discovery of endangered or threatened species, cultural resources, soils contamination, or any other conditions affecting the factors, executive orders, stipulations, and/ or regulations discussed within this assessment, work shall be halted immediately and the appropriate agency will be consulted before work can be resumed.

Law, Authority, or Factor	Mitigation Measure
Wetlands & Floodplain	Project activities will be completed in accordance with all applicable federal, state and local permit requirements and conditions. Permits required for this project will be obtained by the Town before commencing work and appended to the ERR when received from the permitting agencies. Permits that might be required for this project include, but are not limited to: NYSDEC Article 15 - Protection of Water Permit NYSDEC Section 401 Water Quality Certification NYSDEC Article 24 - Freshwater Wetlands Permit USACE Section 404 of the Clean Water Act Permit Floodplain Development Permit

	SPDES General Permit Rockland County Drainage Authority Permit (Environmental Permits will be added upon receipt in **Attachment 2**) Significant landscaping is proposed upon the completion of stream stabilization and restoration work, including the planting of: 674 new major (shade) trees; 156 minor (small) trees; 1,790 shrubs; and 4,010 ground cover plants. Additionally, stone weirs and rock cross-veins will be used to decrease water velocity and prevent erosion. These landscaping improvements will establish plant cover to limit erosion and provide habitat for local wildlife. (**Attachment 2**)
Historic Preservation	A Phase I Archaeological and Geomorphological Survey was performed. Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Cranford Drive Drainage Improvements project (Report dated September 26, 2016 in **Attachment 8**). On October 18, 2016, SHPO determined that this project will have no adverse effects to historic properties in or eligible for inclusion in the State or National Register of Historic Places (**Attachment 8**). Project information was sent on July 27, 2016 and the Phase I Archaeological and Geomorphological Survey was sent on September 27, 2016 to the Stockbridge-Munsee Community Band of Mohicans, Delaware Nation and Delaware Tribe of Indians. A response was received from the Stockbridge-Munsee Community Band of Mohicans on October 11, 2016 (**Attachment 8**). The Stockbridge-Munsee Community Band of Mohicans' response indicates that the proposed project is considered to have "No Effect" in regard to cultural properties of concern. No responses have been received from the Delaware Nation or Delaware Tribe of Indians. In the event any inadvertent discoveries of human remains and/or cultural resources including, but not limited to, funerary objects, sacred objects and objects of cultural patrimony are made during execution of the project scope, then work shall be halted immediately and the SHPO and THPO of the Stockbridge-Munsee Community Band of Mohicans, Delaware Nation and Delaware Tribe of Indians shall be consulted before work can be resumed.
Endangered Species	A response received from the NHP on August 24, 2016, indicated the eastern pearlshell remained as a species of conservation concern for the project site (**Attachment 6**). No special conditions regarding the eastern pearlshell were indicated in the NYSDEC permit obtained for project activities (**Attachment 2**).

	The USFWS lists the northern long-eared bat (*Myotis septentrionalis*) and birds of conservation concern as species that could occur in the area of the project site (**Attachment 6**). Approximately 575 trees with a diameter of 8-inches or greater will be removed as a result of this project. No caves or mines occur in the vicinity of the project site. According to the NYSDEC NHP, there are no records of known maternity roost trees or hibernacula known to be occupied by the northern-long eared bat in the vicinity of the project site. To minimize potential impacts to the northern long-eared bat, tree clearing will take place from November 1 to March 31, which is outside of the active season for northern long-eared bats. Habitat improvements including the planting of approximately 674 major trees, 156 minor trees, 1,790 shrubs, and 4,010 ground-cover plants along the stream banks to replace the removed trees, shrubs, and grasses, will provide potential summer habitat for the northern long-eared bat and Indiana bat after completion of the project. Therefore, it was determined that the project May Affect, but is Not Likely to Adversely Affect the Indiana bat and northern long-eared bat, and tree removal will occur between November 1 and March 31. USFWS and the U.S. Army Corps of Engineers (USACE) have concurred with this determination and no further consultation is required (**Attachment 6**). The National Marine Fisheries Service (NMFS) lists the following ESA species for the Greater Atlantic Region that have the potential to occur in the project site: <u>Fish Species:</u> Shortnose Sturgeon (*Acipenser brevirostrum*) Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus)* This project will not directly affect any of the listed fish species. The project site does not provide suitable habitat for the Atlantic sturgeon. While the project is potentially located in the inland range of the Atlantic sturgeon, the project is located above the high tide line and, therefore, is not considered accessible habitat. The project site does not provide suitable habitat for the shortnose sturgeon. The shortnose sturgeon prefers the deeper, freshwater tidal reaches of the Hudson River Estuary (see NYSDEC Shortnose Sturgeon Sighting Map in **Attachment 6**). Moreover, a dam, located 4.1 miles southeast of the project on the south end of DeForest Lake, would prevent both sturgeon species from travelling upstream to the project site. Thus, based on the analysis of the listed species above and the project activities, it was determined that the project activities would not directly or indirectly affect any ESA species under NMFS jurisdiction. Pursuant to the NMFS

	Greater Atlantic Region Endangered Species Act Section 7 Program, a No Effect Determination has been made for the proposed project on July 26, 2016 and is included in **Attachment 6**. If there is any unanticipated discovery of endangered or threatened species, then work shall be halted immediately and the appropriate agency will be consulted before work can be resumed.

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.

Preparer Signature: Andrea Dievers Date: January 5, 2017

Name/Title/Organization: Tectonic Engineering & Surveying Consultants

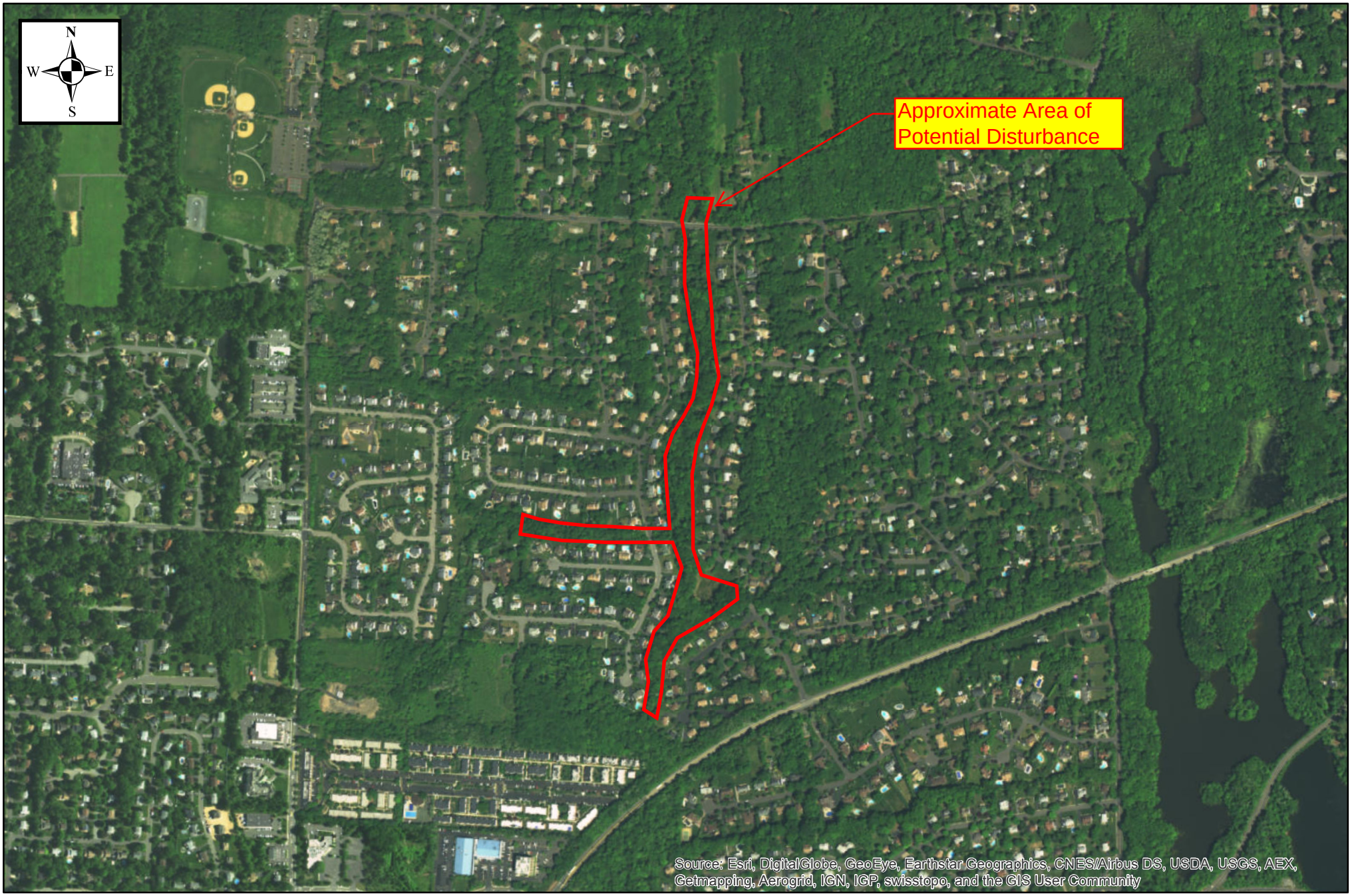
Certifying Officer Signature: Lori A Shirley Date: January 5, 2017

Name/Title: Lori A. Shirley

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).

Attachment 1

Aerial Photograph,
Street Map,
Topographic Map,
Airport Hazards Map,
and Airport Site
Documentation



TECTONIC
Practical Solutions, Exceptional Service

Tectonic
70 Pleasant Hill Road
Mountainville, N.Y. 10953
845.534.5959 voice
845.534.5999 fax
www.tectonicengineering.com

Aerial Map
Cranford Drive Drainage Improvements
Cranford Drive
Clarkstown, NY
Rockland County

0 250 500 1,000 Feet

1:10,000

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Copyright:© 2013 National Geographic Society, i-cubed

TECTONIC
Practical Solutions, Exceptional Service

Tectonic
70 Pleasant Hill Road
Mountainville, N.Y. 10953
845.534.5959 voice
845.534.5999 fax
www.tectonicengineering.com

Street Map
Cranford Drive Drainage Improvements
Cranford Drive
Clarkstown, NY
Rockland County

0 250 500 1,000 Feet

1:10,000

TECTONIC
Practical Solutions, Exceptional Service

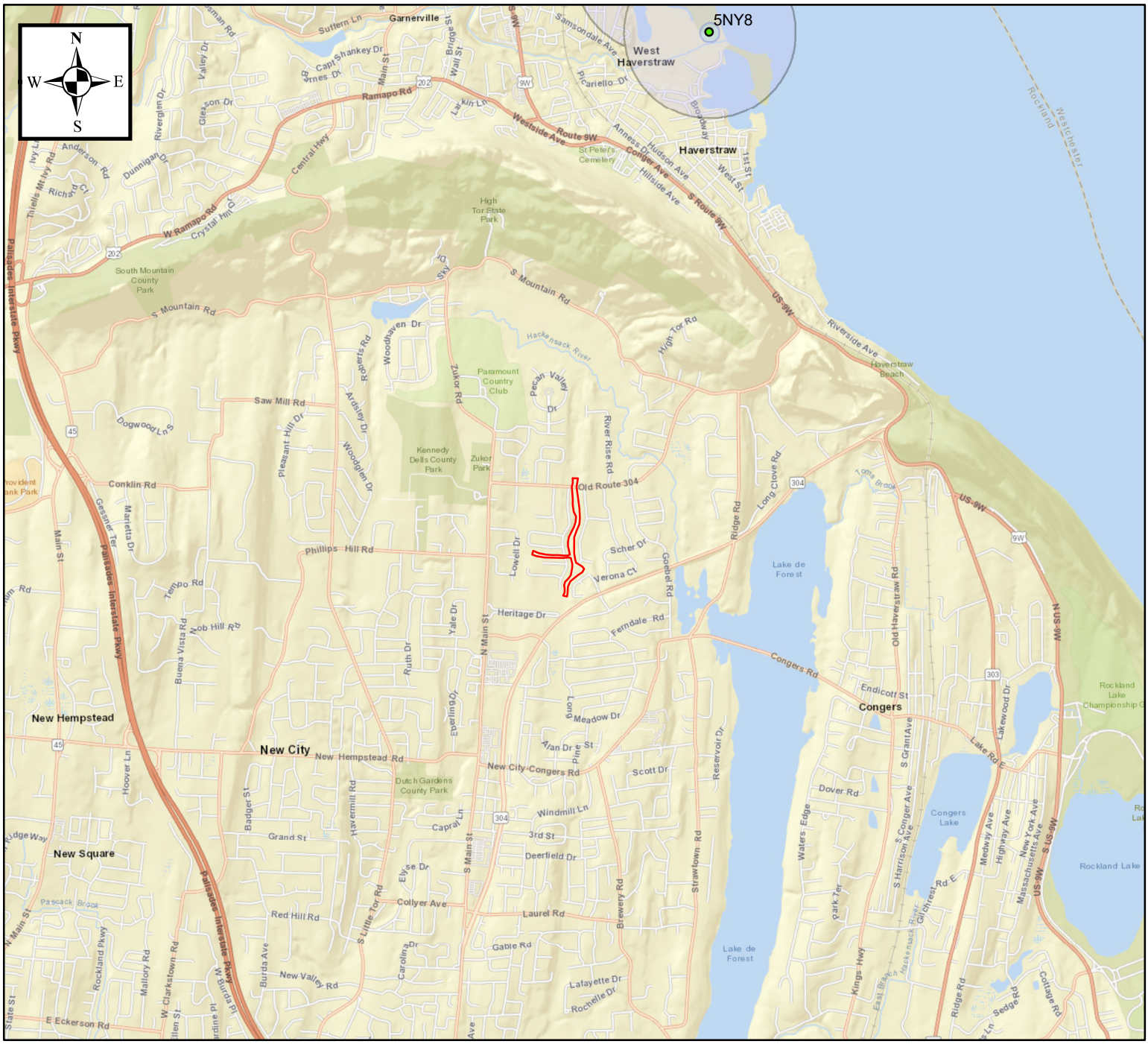
Tectonic
70 Pleasant Hill Road
Mountainville, N.Y. 10953
845.534.5959 voice
845.534.5999 fax
www.tectonicengineering.com

Topographic Map
Cranford Drive Drainage Improvements
Cranford Drive
Clarkstown, NY
Rockland County

0 250 500 1,000 Feet

1:10,000

Airport Hazards Map



TECTONIC
Practical Solutions, Exceptional Service

0 2,500 5,000 10,000 Feet

1:50,000

CRANFORD DRIVE DRAINAGE IMPROVEMENTS
Cranford Drive
North of Old Route 304 to the intersection
of Cranford Drive with Route 304
New City Hamlet, Town of Clarkstown
Rockland County, New York

Created: 10/27/2016
Source data: FAA facility data and
Airport Master Records and Reports data.

Note: This map identifies all documented airport and heliport facilities located within the shown area.

Legend

- Cranford Drive Drainage Improvements (Approximate Boundary)
- Airport and Heliport Locations (Location ID)
- Heliport Protection Zone (280 ft)
- Civilian Runway Protection Zone (2500 ft)

Aeronautical Information Services - National Flight Data Center (NFDC)

The NFDC website has been consolidated with the FAA's **Aeronautical Information Services** website. Please bookmark the **new Aeronautical Data/NFDC website** location.

Airport Not Found.

The airport with location identifier "5NY8" does not exist in the NASR system. The data presented in this page is from the current NASR publication (09/15/2016 - 11/10/2016).

New Airport Search

Attachment 2

NYSDEC Permit,
Project Site Plans,
Hydraulic Modeling Summary,
Revised Floodplain Workmap,
and Environmental Permits

Note: Any required permits received for this project will be appended here to the environmental review record upon receipt.

PERMIT

Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
TOWN OF CLARKSTOWN
10 MAPLE AVE
NEW CITY, NY 10956-5013
(845) 639-6200

Facility:
DEMAREST KILL FLOOD CONTROL
CRANFORD DR
CLARKSTOWN, NY 10956

Facility Location: in CLARKSTOWN in ROCKLAND COUNTY
Facility Principal Reference Point: NYTM-E: 585.638 NYTM-N: 4557.648
Latitude: 41°09'56.3" Longitude: 73°58'45.0"

Authorized Activity: Modification and realignment of approximately 4,650 linear feet of the bed and banks of a tributary of West Branch Hankensack [Water Index No. NJ-1-12-3, Class C(T)], also known as the Demarest Kill, in accordance with project plans referenced in Natural Resource Condition #1 and as conditioned by this permit. The authorized activities are associated with the Town's Cranford Drive Flood Amelioration Project.

Permit Authorizations

Stream Disturbance - Under Article 15, Title 5
Permit ID 3-3920-00297/00010
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

Water Quality Certification - Under Section 401 - Clean Water Act
Permit ID 3-3920-00297/00011
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: JOHN W PETRONELLA, Deputy Regional Permit Administrator
Address: NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY 12561

Authorized Signature: John W. Petronella Date 7 / 19 / 2016

JRM

Distribution List

US ARMY CORPS OF ENGINEERS - NY DISTRICT
BRIAN DRUMM
DENNIS LETSON, DEPT. OF ENVIRONMENTAL CONTROL, TOWN OF CLAKSON

Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

WATER QUALITY CERTIFICATION SPECIFIC CONDITION

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Permit Attachments

Project Location Map (Attachment I)
Site Plan (Attachment II)
Permit Sign

NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: STREAM DISTURBANCE; WATER QUALITY CERTIFICATION

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by Town of Clarkstown's Department of Environmental Control, titled "Cranford Drive Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets) (Attachment II) .

2. **Post Permit Sign** The permit sign enclosed with this permit shall be posted in a conspicuous location on the worksite and adequately protected from the weather.

3. **Notice of Intent to Commence Work** The permittee shall notify Brian Drumm, DEC Bureau of Habitat, via electronic mail (brian.drumm@dec.ny.gov) at least 48 hours in advance of the time of commencement of each phase described in plans referenced in Natural Resource Condition No. 1.

4. **Floodplain Regulations** The project must meet all local and federal floodplain regulations.

5. **Phase Project to Reduce Erosion** To reduce the potential for erosion, the project shall be constructed in six phases as defined in the plans approved by this permit and provided as an enclosure to the US Army Corps of Engineers New York District's Public Notice issued April 11, 2016 (Public Notice Number: NAN-2014-00305-ESW). Such plans are titled "Cranford Drive, Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets).

All activities within the phase must be fully completed and stablized prior to commencing project activities for the next phase.

6. **Maintain Water Flow During Work** During periods of work activity, sufficient flow of water shall be maintained at all times to sustain aquatic life downstream.

7. **Temporary Diversion Channel** A temporary diversion channel, culvert or pump-around shall be constructed to prevent running water in the work area. The area of temporary diversion must be restored to its original condition following completion of the work. If a diversion channel is used, its sides and bottom shall be protected by rock riprap or other suitable non-erodible materials to prevent scour and erosion.

8. **No Impedance to Aquatic Organisms** Structures must not impede upstream and downstream migration of aquatic organisms.

9. **No Turbidity from Dewatering** No turbid water resulting from dewatering operations shall be discharged directly to or allowed to enter the stream. Such water shall be pumped to settling basins or to an upland vegetated area prior to any discharge to the stream. All other necessary measures shall be implemented to prevent any visible increase in turbidity or sedimentation downstream of the work site.

10. **Straw Bales or Other Downslope of Work Area** Bales of straw or other effective means to control erosion are to be used on the downslope edge of any disturbed areas. This barrier to sediments is to be put in place before any disturbance of the ground occurs and is to be maintained in good condition until all disturbed land is heavily vegetated.

11. **Temporary Seeding of Disturbed/ Stockpiled Soils** All disturbed areas where soil is temporarily exposed or stockpiled for more than one month shall be stabilized with a temporary seeding or ground cover.

12. **Clean Fill Only** All fill material utilized for this project shall consist of uncontaminated earthen materials only. Acceptable fill materials include gravel, rock, overburden, topsoil and similar natural mineral resources.

13. **Work During Low Flows** All work shall be performed during low flow conditions.

14. **Materials Removed from Bed and Banks** Any debris or excess materials from construction of this project shall be immediately and completely removed from the bed and banks of all water areas to an appropriate upland area for disposal.

15. **Dredgings Disposed at Upland Site** All dredged and excavated material shall be disposed of on an upland site and be suitably stabilized so that it cannot reasonably re-enter any water body or wetland area.

16. **Seed, Mulch Disturbed Soils** All areas of soil disturbance resulting from this project (above the mean high water line) shall be seeded with an appropriate perennial grass seed and mulched with straw within one week of final grading. Mulch shall be maintained until a suitable vegetative cover is established.

17. **Temporary Mulch, Final Seeding** If seeding is impracticable due to the time of year, a temporary mulch shall be applied and final seeding shall be performed at the earliest opportunity when weather conditions favor germination and growth but not more than six months after project completion.

18. **Precautions Against Contamination of Waters** All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

19. **State May Order Removal or Alteration of Work** If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

20. **State May Require Site Restoration** If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

21. **State Not Liable for Damage** The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

WATER QUALITY CERTIFICATION SPECIFIC CONDITIONS

1. Water Quality Certification The authorized project, as conditioned pursuant to the Certificate, complies with Section 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act, as amended and as implemented by the limitations, standards, and criteria of state statutory and regulatory requirements set forth in 6 NYCRR Section 608.9(a). The authorized project, as conditioned, will also comply with applicable New York State water quality standards, including but not limited to effluent limitations, best usages and thermal discharge criteria, as applicable, as set forth in 6 NYCRR Parts 701, 702, 703, and 704.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. Facility Inspection by The Department The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. Relationship of this Permit to Other Department Orders and Determinations Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. Applications For Permit Renewals, Modifications or Transfers The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY12561

4. Submission of Renewal Application The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Stream Disturbance, Water Quality Certification.

5. Permit Modifications, Suspensions and Revocations by the Department The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. Permit Transfer Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

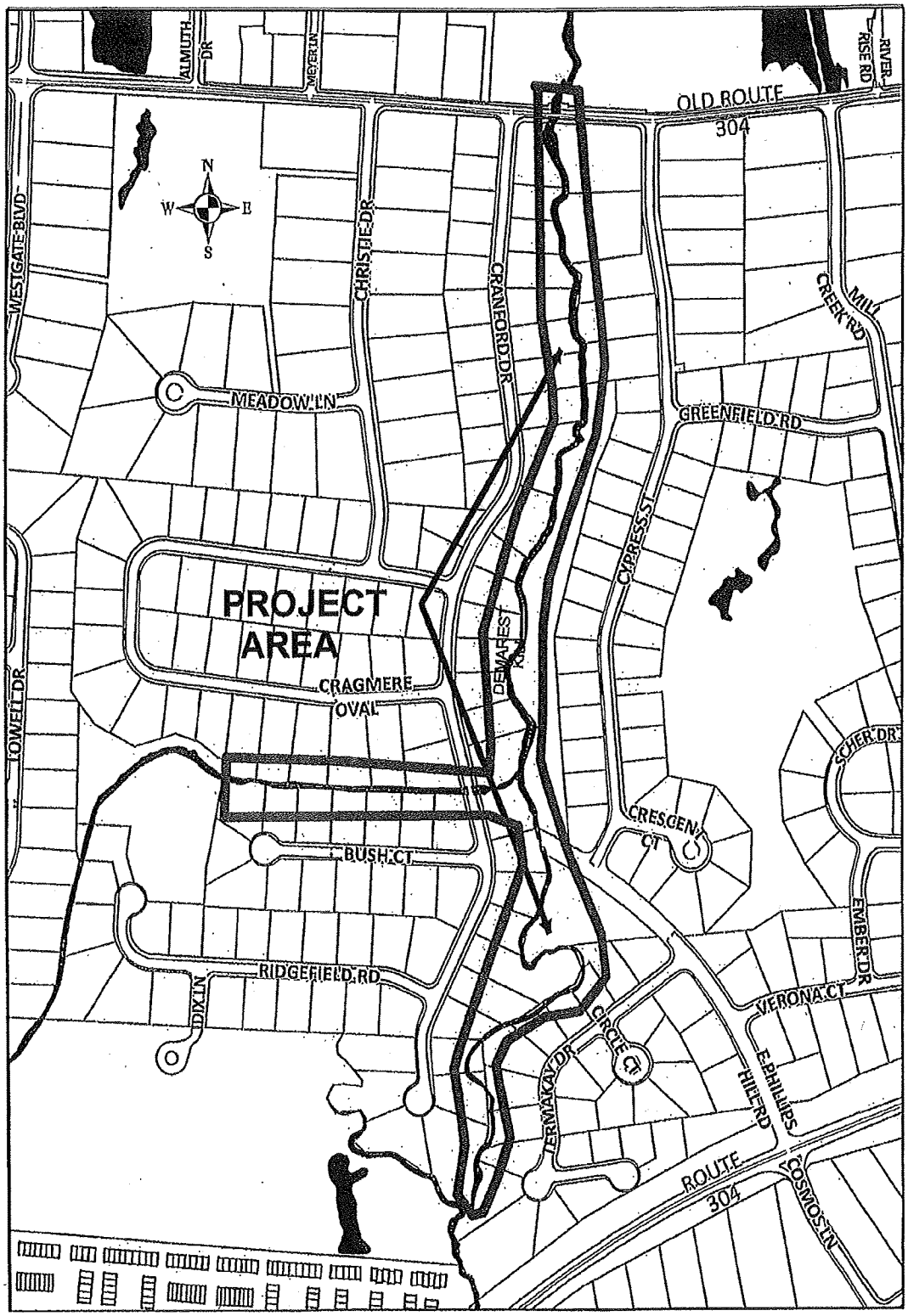
Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

Item E: SEQR Type I Action, No Significant Impact Under the State Environmental Quality Review Act (SEQR), the project associated with this permit is classified as a Type I Action with Clarkson Town Board designated as the lead agency. It has been determined that the project will not have a significant effect on the environment.

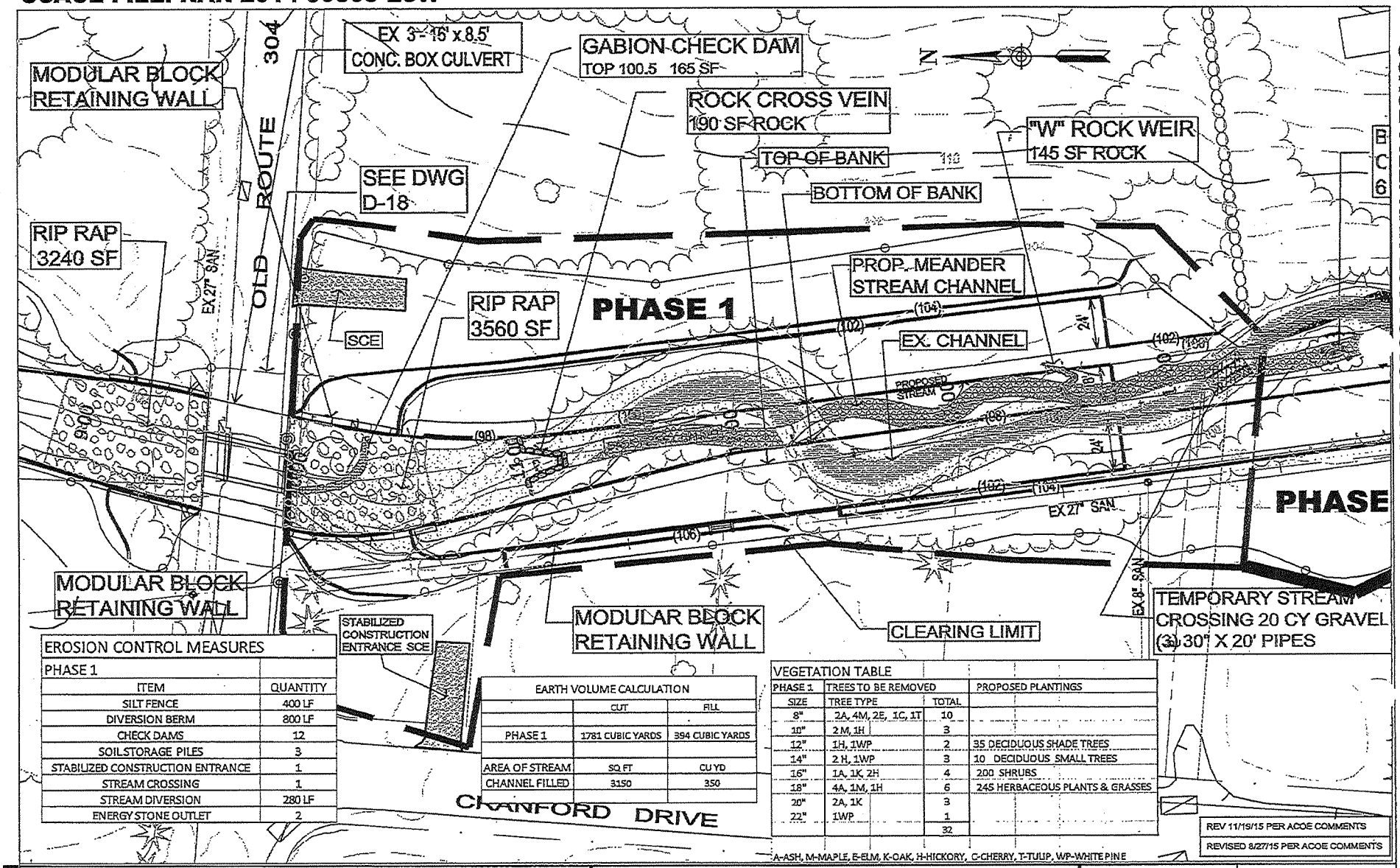
Project Location Map (Attachment I)

USACE FILE: NAN-2014-00305-ESW



500 250 0 500 Feet

CRANFORD DRIVE
FLOOD AMELIORATION PROJECT
TOWN OF CLARKSTOWN
NEW CITY, NEW YORK



EROSION CONTROL MEASURES	
PHASE 1	
ITEM	QUANTITY
SILT FENCE	400 LF
DIVERSION BERM	800 LF
CHECK DAMS	12
SOILSTORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	280 LF
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1	1781 CUBIC YARDS	394 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT 3150	CU YD 350

VEGETATION TABLE			
PHASE 1	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	2A, 4M, 2E, 1C, 1T	10	
10"	2 M, 1H	3	
12"	1H, 1WP	2	35 DECIDUOUS SHADE TREES
14"	2 H, 1WP	3	10 DECIDUOUS SMALL TREES
16"	1A, 1K, 2H	4	200 SHRUBS
18"	4A, 1M, 1H	6	245 HERBACEOUS PLANTS & GRASSES
20"	2A, 1K	3	
22"	1WP	1	
		32	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY, T-TULIP, WP-WHITE PINE

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

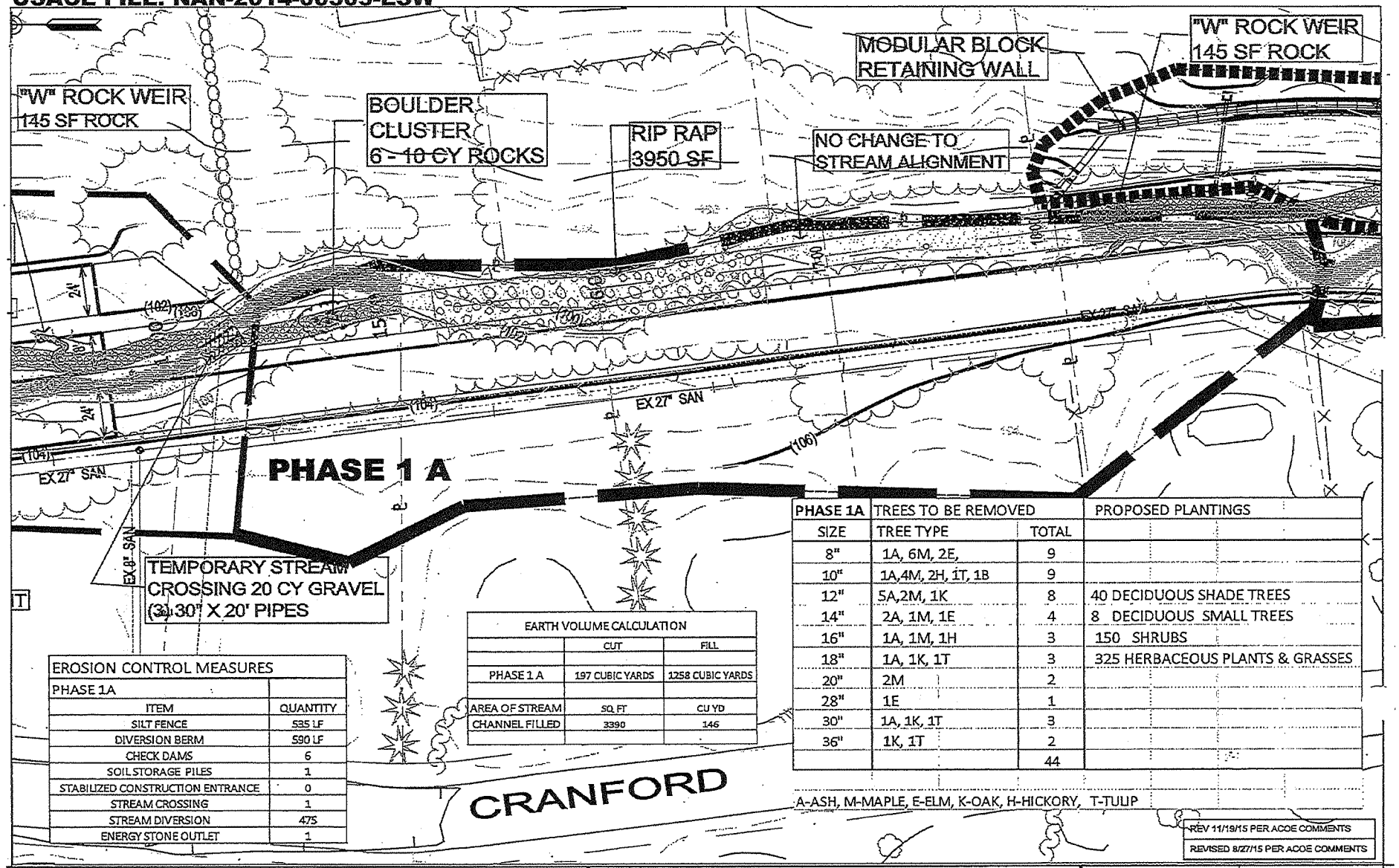
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-1
SHEET _1_ OF _31_ SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

Site Plan (Attachment 1)



EROSION CONTROL MEASURES	
PHASE 1A	
ITEM	QUANTITY
SILT FENCE	535 LF
DIVERSION BERM	590 LF
CHECK DAMS	6
SOIL STORAGE PILES	1
STABILIZED CONSTRUCTION ENTRANCE	0
STREAM CROSSING	1
STREAM DIVERSION	475
ENERGY STONE OUTLET	1

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1 A	197 CUBIC YARDS	1258 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ. FT	CU YD
	3390	146

PHASE 1A	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1A, 6M, 2E,	9	
10"	1A,4M, 2H, 1T, 1B	9	
12"	5A,2M, 1K	8	40 DECIDUOUS SHADE TREES
14"	2A, 1M, 1E	4	8 DECIDUOUS SMALL TREES
16"	1A, 1M, 1H	3	150 SHRUBS
18"	1A, 1K, 1T	3	325 HERBACEOUS PLANTS & GRASSES
20"	2M	2	
28"	1E	1	
30"	1A, 1K, 1T	3	
36"	1K, 1T	2	
		44	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

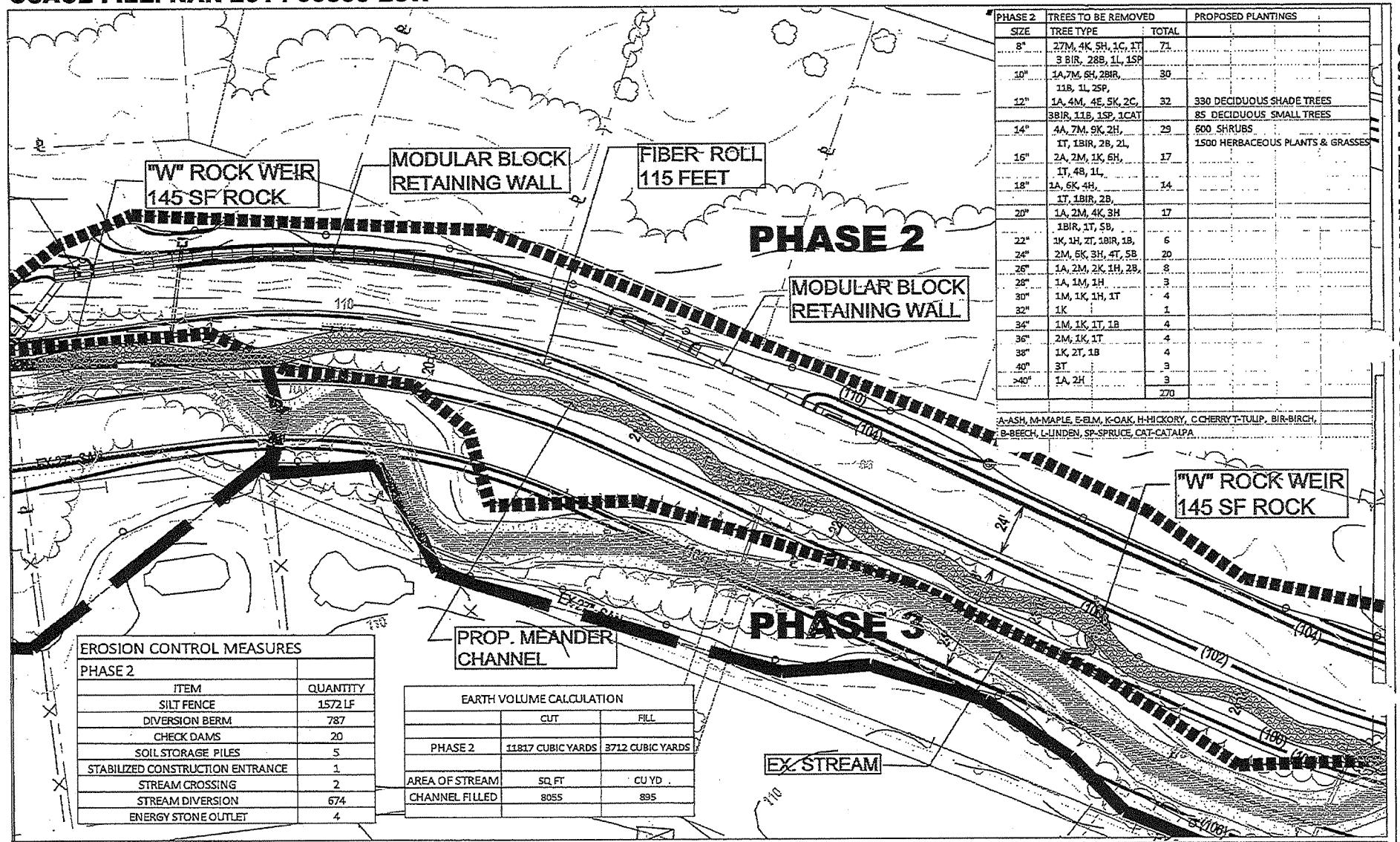
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-2
SHEET 2 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 2	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	27M, 4K, 5H, 1C, 1T 3 BIR, 28B, 1L, 1SP	71	
10"	1A,7M, 6H, 2BIR, 11B, 1L, 2SP,	30	
12"	1A, 4M, 4E, 5K, 2C, 3BIR, 11B, 1SP, 1CAT	32	330 DECIDUOUS SHADE TREES
			85 DECIDUOUS SMALL TREES
14"	4A, 7M, 9K, 2H, 1T, 1BIR, 2B, 2L,	29	600 SHRUBS
16"	2A, 2M, 1K, 6H, 1T, 4B, 1L,	17	1500 HERBACEOUS PLANTS & GRASSES
18"	1A, 6K, 4H, 1T, 1BIR, 2B,	14	
20"	1A, 2M, 4K, 3H 1BIR, 1T, 5B,	17	
22"	1K, 1H, 2T, 1BIR, 1B,	6	
24"	2M, 6K, 3H, 4T, 5B	20	
26"	1A, 2M, 2K, 1H, 2B,	8	
28"	1A, 1M, 1H	3	
30"	1M, 1K, 1H, 1T	4	
32"	1K	1	
34"	1M, 1K, 1T, 1B	4	
36"	2M, 1K, 1T	4	
38"	1K, 2T, 1B	4	
40"	3T	3	
>40"	1A, 2H	3	
		270	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY T-TULIP, BIR-BIRCH, B-BEECH, L-LINDEN, SP-SPRUCE, CAT-CATALPA

EROSION CONTROL MEASURES	
PHASE 2	
ITEM	QUANTITY
SILT FENCE	1572 LF
DIVERSION BERM	787
CHECK DAMS	20
SOIL STORAGE PILES	5
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	2
STREAM DIVERSION	674
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 2	11817 CUBIC YARDS	3712 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	8055	895

REV 11/19/15 PER ACOE COMMENTS | REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

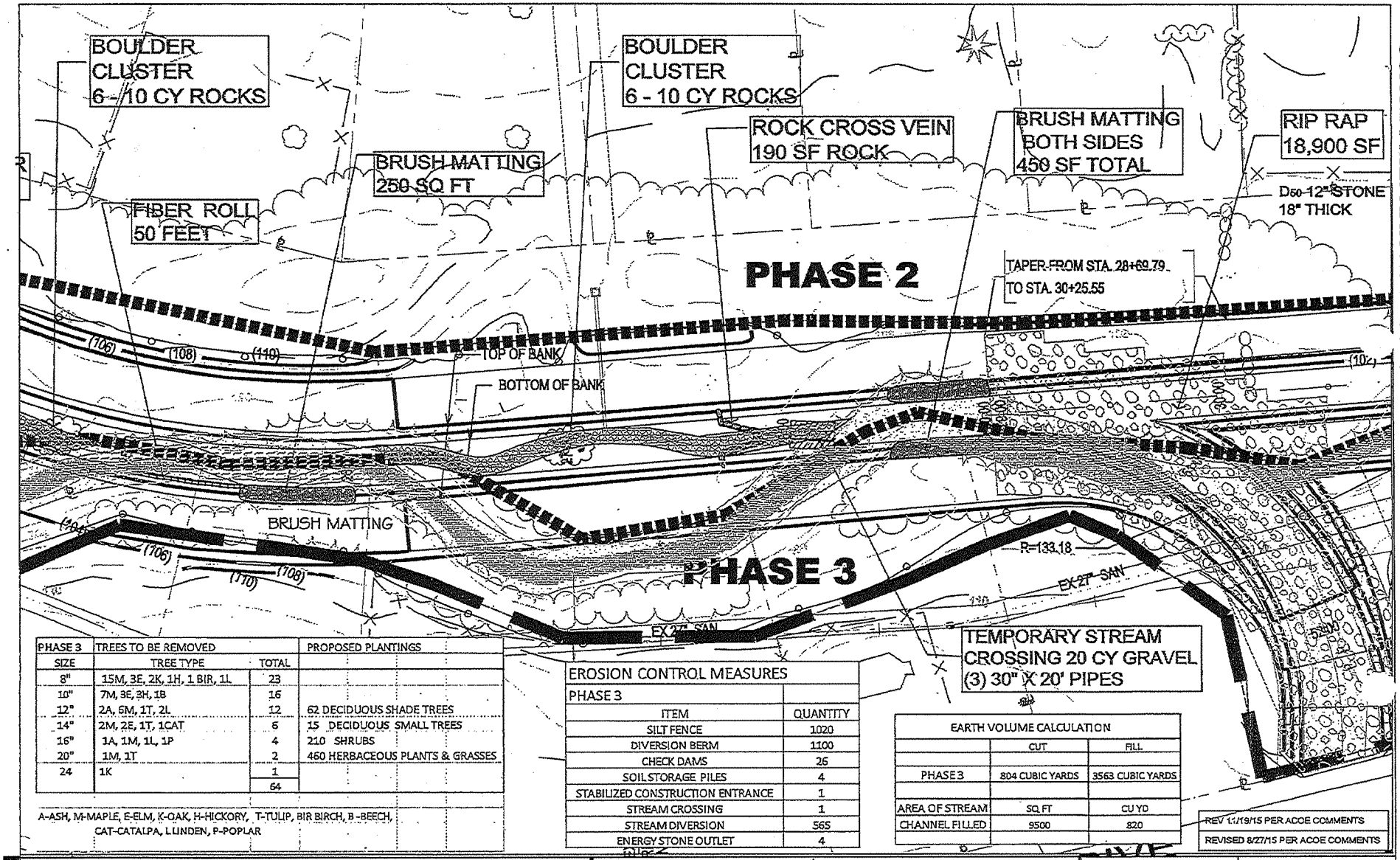
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-3

SHEET _3_ OF _31 SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 3	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	15M, 3E, 2K, 1H, 1 BIR, 1L	23	
10"	7M, 3E, 3H, 1B	16	
12"	2A, 6M, 1T, 2L	12	62 DECIDUOUS SHADE TREES
14"	2M, 2E, 1T, 1CAT	6	15 DECIDUOUS SMALL TREES
16"	1A, 1M, 1L, 1P	4	210 SHRUBS
20"	1M, 1T	2	460 HERBACEOUS PLANTS & GRASSES
24	1K	1	
		64	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, CAT-CATALPA, L LINDEN, P-POPLAR

EROSION CONTROL MEASURES	
PHASE 3	
ITEM	QUANTITY
SILT FENCE	1020
DIVERSION BERM	1100
CHECK DAMS	26
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	565
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 3	804 CUBIC YARDS	3563 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	9500	820

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

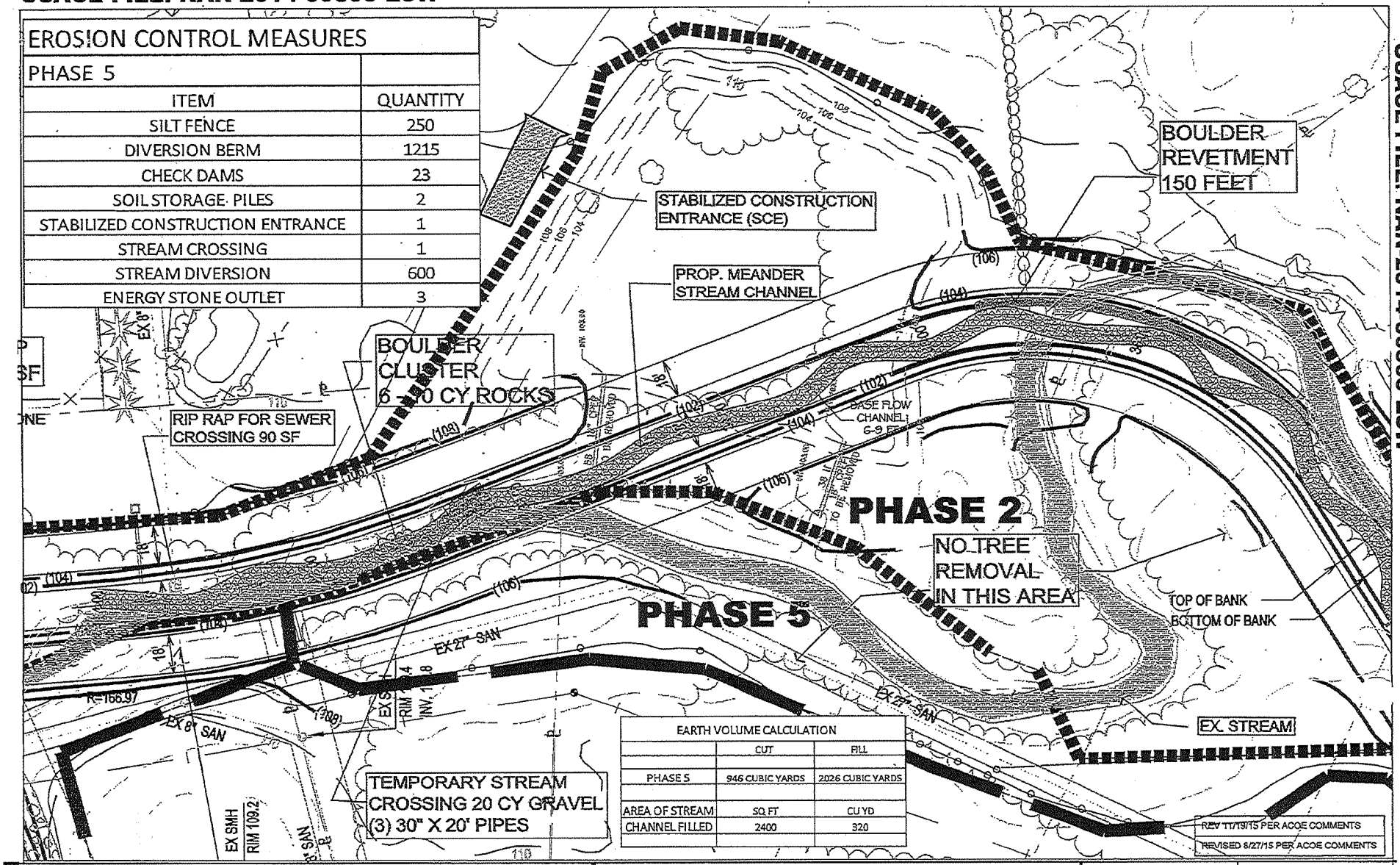
SITE LAYOUT PLAN
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-4
SHEET 4 OF 31 SHTS.
DRAWING FILE: e:\engineering\cranford drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

EROSION CONTROL MEASURES	
PHASE 5	
ITEM	QUANTITY
SILT FENCE	250
DIVERSION BERM	1215
CHECK DAMS	23
SOIL STORAGE PILES	2
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	600
ENERGY STONE OUTLET	3



EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 5	946 CUBIC YARDS	2026 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT	CU YD
	2400	320

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

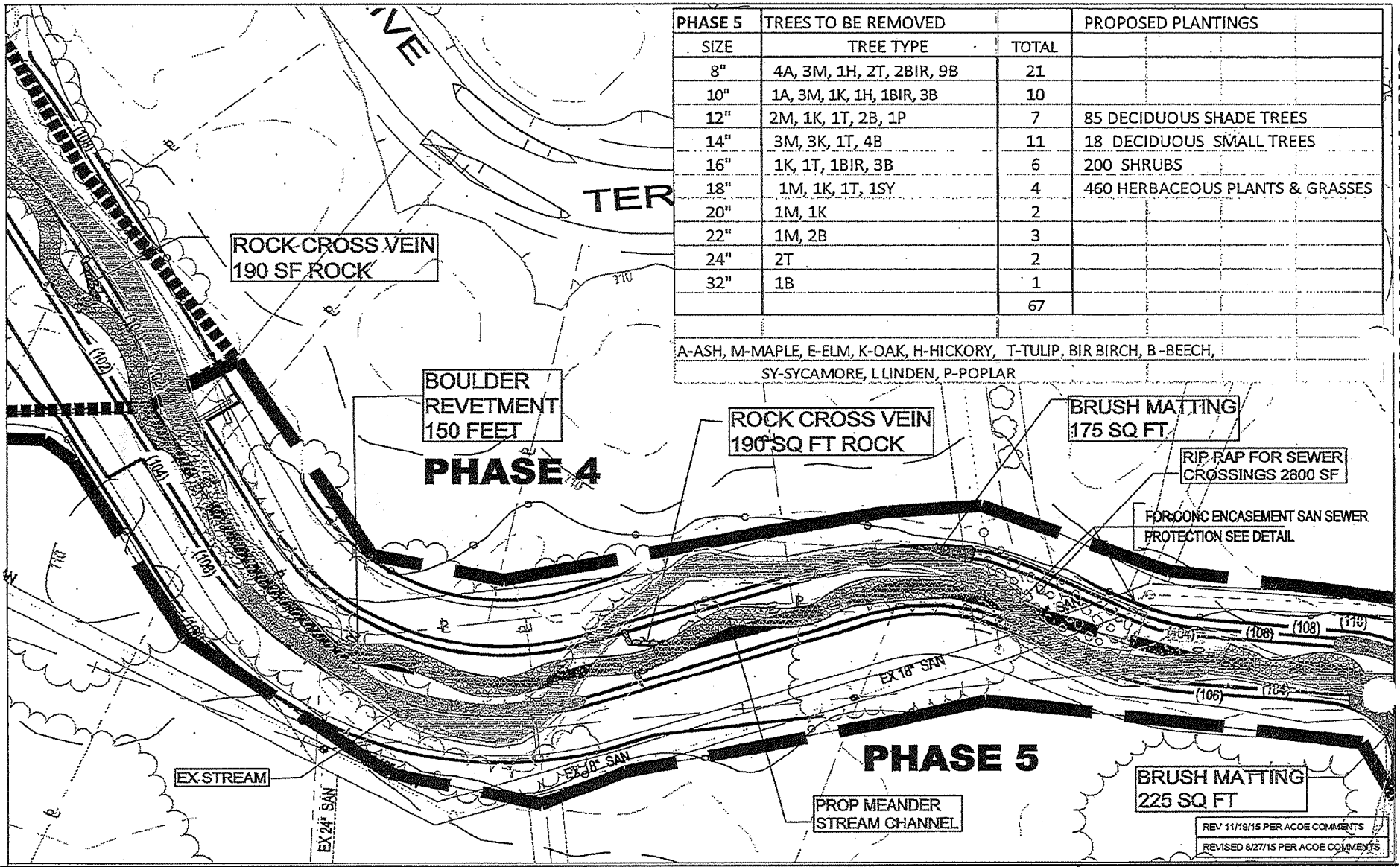
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	KOZ
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-5
SHEET 5 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

PHASE 5	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	4A, 3M, 1H, 2T, 2BIR, 9B	21	
10"	1A, 3M, 1K, 1H, 1BIR, 3B	10	
12"	2M, 1K, 1T, 2B, 1P	7	85 DECIDUOUS SHADE TREES
14"	3M, 3K, 1T, 4B	11	18 DECIDUOUS SMALL TREES
16"	1K, 1T, 1BIR, 3B	6	200 SHRUBS
18"	1M, 1K, 1T, 1SY	4	460 HERBACEOUS PLANTS & GRASSES
20"	1M, 1K	2	
22"	1M, 2B	3	
24"	2T	2	
32"	1B	1	
		67	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, SY-SYCAMORE, L LINDEN, P-POPLAR



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

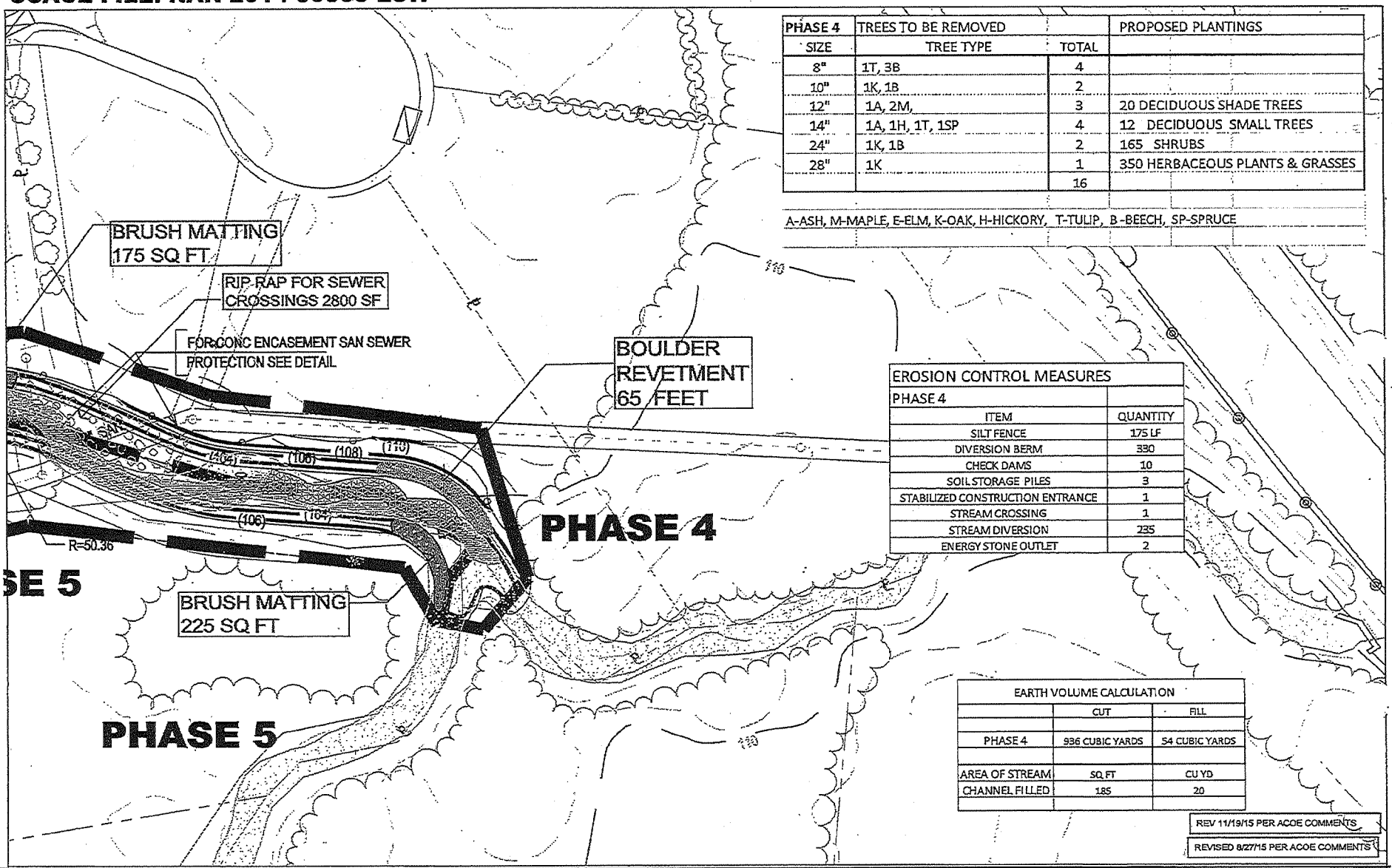
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-6

SHEET _6_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe



PHASE 4	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1T, 3B	4	
10"	1K, 1B	2	
12"	1A, 2M,	3	20 DECIDUOUS SHADE TREES
14"	1A, 1H, 1T, 1SP	4	12 DECIDUOUS SMALL TREES
24"	1K, 1B	2	165 SHRUBS
28"	1K	1	350 HERBACEOUS PLANTS & GRASSES
		16	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, B-BEECH, SP-SPRUCE

EROSION CONTROL MEASURES	
PHASE 4	
ITEM	QUANTITY
SILT FENCE	175 LF
DIVERSION BERM	330
CHECK DAMS	10
SOIL STORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	235
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 4	936 CUBIC YARDS	54 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	185	20

REV 11/19/15 PER ACOE COMMENTS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

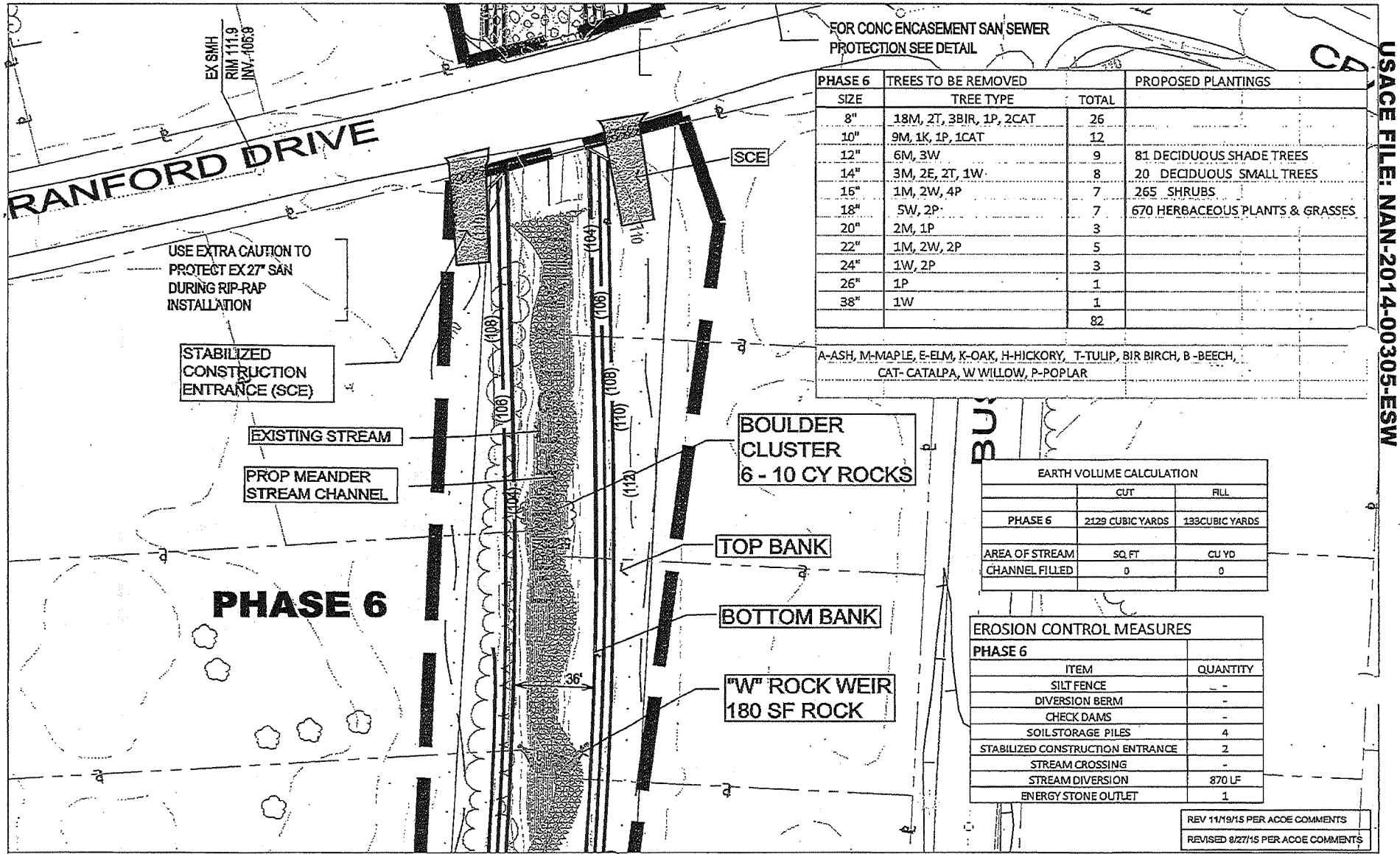
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-7

SHEET _7_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 6	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	18M, 2T, 3BIR, 1P, 2CAT	26	
10"	9M, 1K, 1P, 1CAT	12	
12"	6M, 3W	9	81 DECIDUOUS SHADE TREES
14"	3M, 2E, 2T, 1W	8	20 DECIDUOUS SMALL TREES
16"	1M, 2W, 4P	7	265 SHRUBS
18"	5W, 2P	7	670 HERBACEOUS PLANTS & GRASSES
20"	2M, 1P	3	
22"	1M, 2W, 2P	5	
24"	1W, 2P	3	
26"	1P	1	
38"	1W	1	
		82	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B -BEECH, CAT- CATALPA, W WILLOW, P-POPLAR

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 6	2129 CUBIC YARDS	133CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	0	0

EROSION CONTROL MEASURES	
PHASE 6	
ITEM	QUANTITY
SILT FENCE	-
DIVERSION BERM	-
CHECK DAMS	-
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	2
STREAM CROSSING	-
STREAM DIVERSION	870 LF
ENERGY STONE OUTLET	1

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

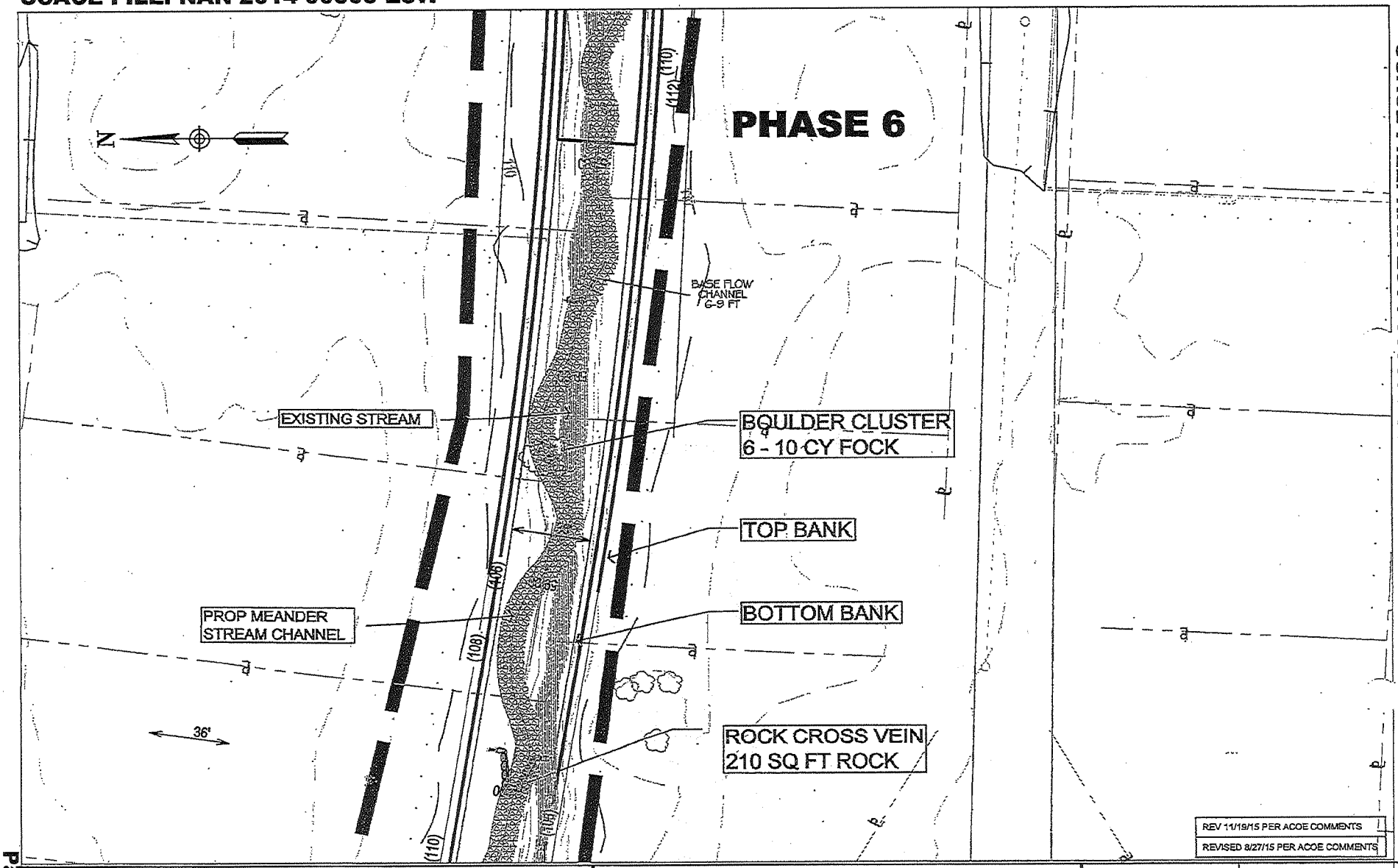
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-8
SHEET 8 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

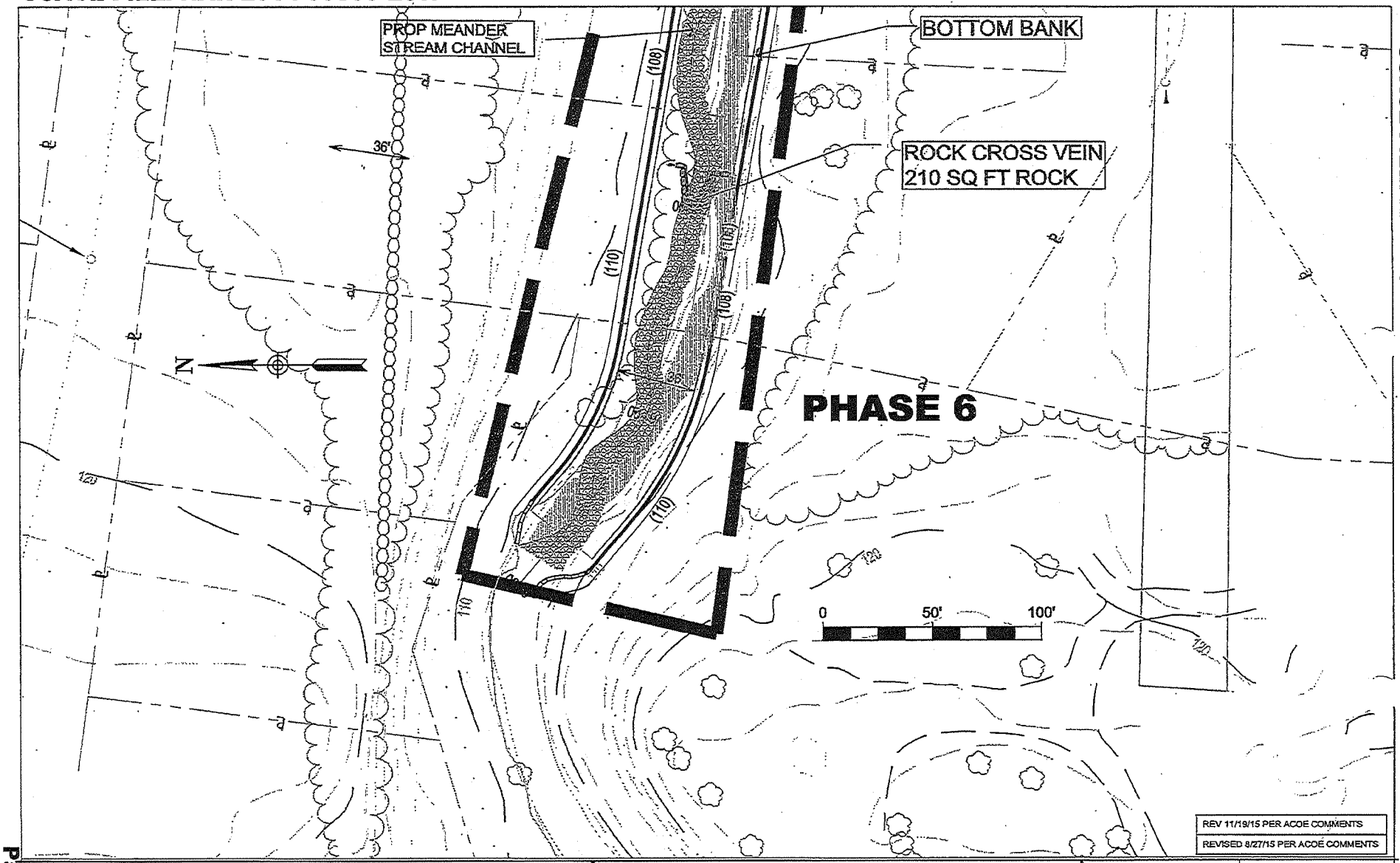
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-9

SHEET _9_ OF _31_ SHTS.

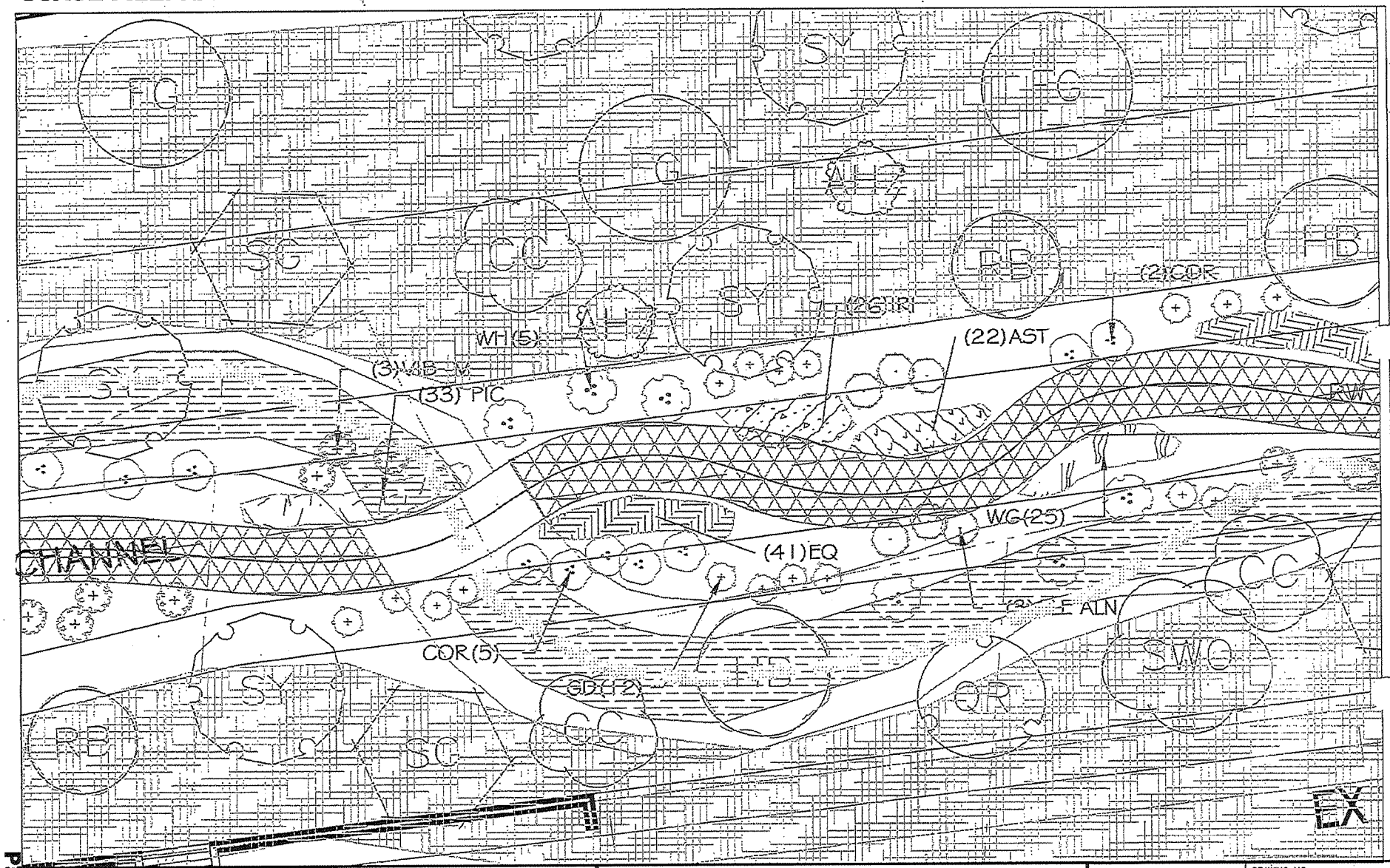
DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	SITE LAYOUT PLAN	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWING NO.: S-10 SHEET 10 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	**TYPICAL CHANNEL PLANTING**	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: **L-1** SHEET _11_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
RM	18	Red Maple / Acer rubrum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
SM	18	Sugar Maple / Acer saccharum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AML	10	Allegheny Serviceberry / Amelanchier laevis		7 gal	6-8` HT
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
CAR	15	Shagbark Hickory / Carya ovata	B & B	2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
RB	9	River Birch / Betula nigra	B & B	10` ht
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
PP	9	Paper Birch / Betula papynfera	B & B	2" CAL
	9			7 GAL	1/2" CAL
	9			3 GAL	3-4' HT
HB	8	American Hornbeam / Carpinus caroliniana		B & B	2" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
CC	9	Eastern Redbud / Cercis canadensis	B & B	2" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AHZ	24	American Hazelnut / Corylus americana		7 gal	4-5` HT
FG	19	Green Ash / Fraxinus pennsylvanica	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
HL	15	Sunburst Honey Locust / Gleditsia triacanthos `Sunburst`	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
SG	17	Sweet Gum / Liquidambar styraciflua	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
LT	10	Tulip Tree / Liriodendron tulipifera	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
N	15	Sour Gum / Nyssa sylvatica	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
BE	10	Box Elder / Acer negundo		6-8` HT
	10			7 GAL	4-5' HT
	10			3 GAL	3-4' HT
PA	5	Norway Spruce / Picea abies	B & B	6-8` HT
	15			7 GAL	4-5' HT
	15			3 GAL	3-4' HT
WP	11	White Pine / Pinus strobus	B & B	6-7` HT
	15			B & B	4-5' HT
	15			3 GAL	3-4' HT
SY	18	American Sycamore / Platanus occidentalis		B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
SWO	10	Swamp White Oak / Quercus bicolor		B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
PO	18	Pin Oak / Quercus palustris	B & B	2 1/2-3" CAL
	18			7 GAL	1/2" CAL
	18			3 GAL	3-4' HT
QR	10	Red Oak / Quercus rubra	B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	18		3 GAL	3-4' HT
TD	6	Bald Cypress / Taxodium distichum		B & B	5-6` HT
	5			B & B	3-4' HT
	15			3 GAL	2-3' HT

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-2
SHEET _12 OF _31_ SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

SHRUB AREAS

QTY		COMMON NAME / BOTANICAL NAME	CON	SPACING
AM3	122	Chokeberry / Aronia melanocarpa	2 gal	72"
CLE	110	Summersweet Clethra / Clethra alnifolia	2 gal	60"
CAM	155	Silky Dogwood / Cornus amonum	2 gal	72"
CG	168	Gray Dogwood / Cornus racemosa	2 gal	60"
HV	165	Common Witch Hazel / Hamamelis virginiana	2 gal	84"
ITE	65	Virginia Sweetspire / Itea virginica `Virginia`	2 gal	68"
IX	160	Winterberry Ilex verticillata	2 gal	60"
LIN	132	Spicebush / Lindera benzoin	2 gal	60"
ELD	60	Elderberry / Sambucus canadensis	2 gal	58"
VAC	188	Highbush Blueberry / Vaccinium corymbosum	2 gal	72"
VW	180	Arrowwood Viburnum / Viburnum dentatum	1 gal	72"
VA	130	Alleghany Viburnum Viburnum x rhytidophylloides	2 gal	72"
LEN	155	NANNYBERRY / VIBURNUM LENTAGO	2 gal	80"

GROUND COVERS

	QTY	COMMON NAME / BOTANICAL NAME		
AST	950	New York Aster / Aster novi-belgii	2 1/4" pots	24"
EQ	680	Dwarf Horsetail / Equisetum scirpoides	flat	20"
IRI	880	Blue Flag / Iris versicolor	2 1/4" pots	24"
PIC	680	Pickerel Weed / Pontederia cordata	2 1/4" pots	24"
WG	820	Wool Grass / Scirpus cyperinus	2 1/4" pots	24"

SUMMARY OF PLANTINGS

MAJOR TREES	674
MINOR TREES	156
SHRUBS	1790
GROUND COVER	4010

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

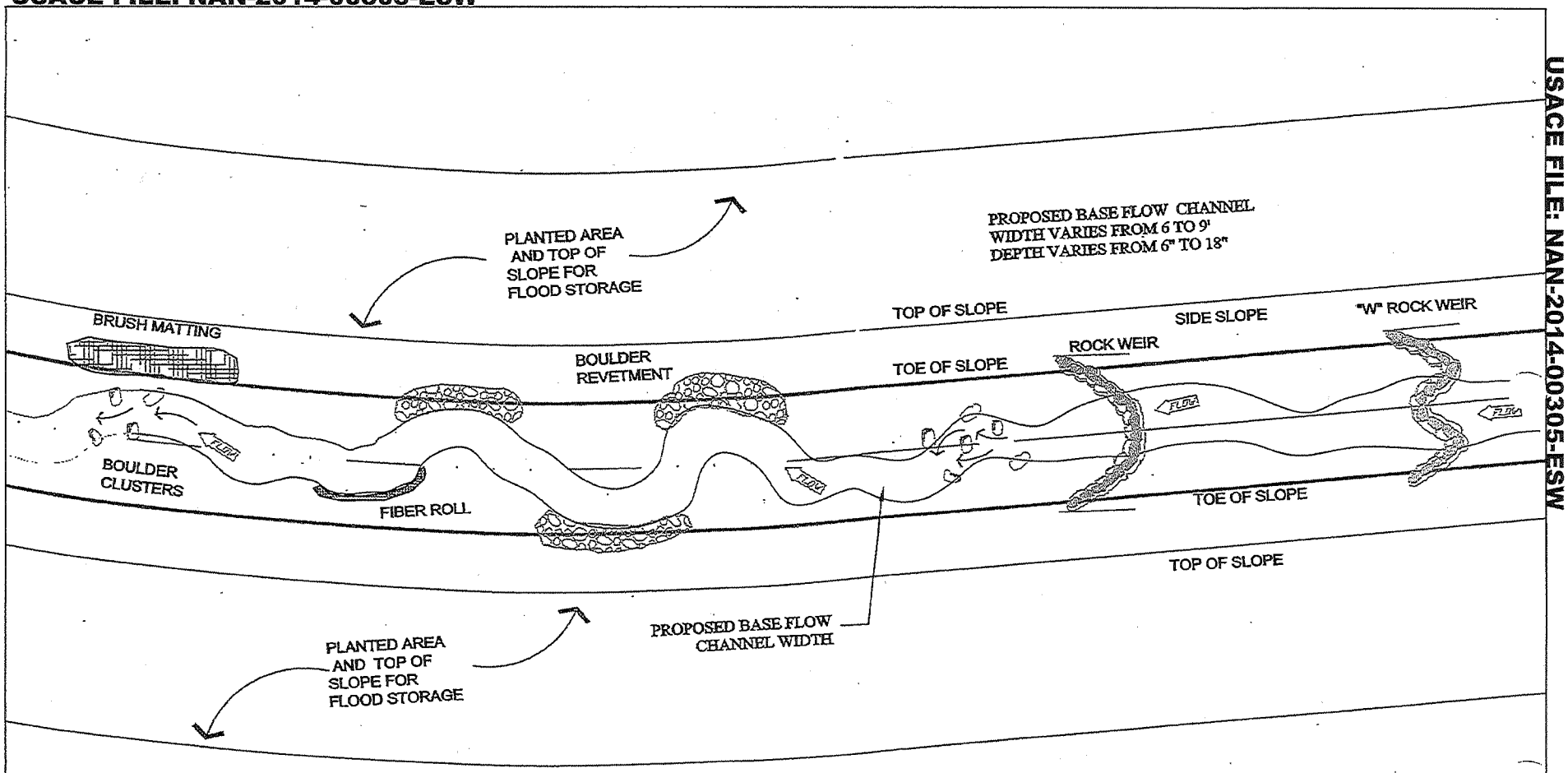
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-3

SHEET 13 OF 31 SHTS.

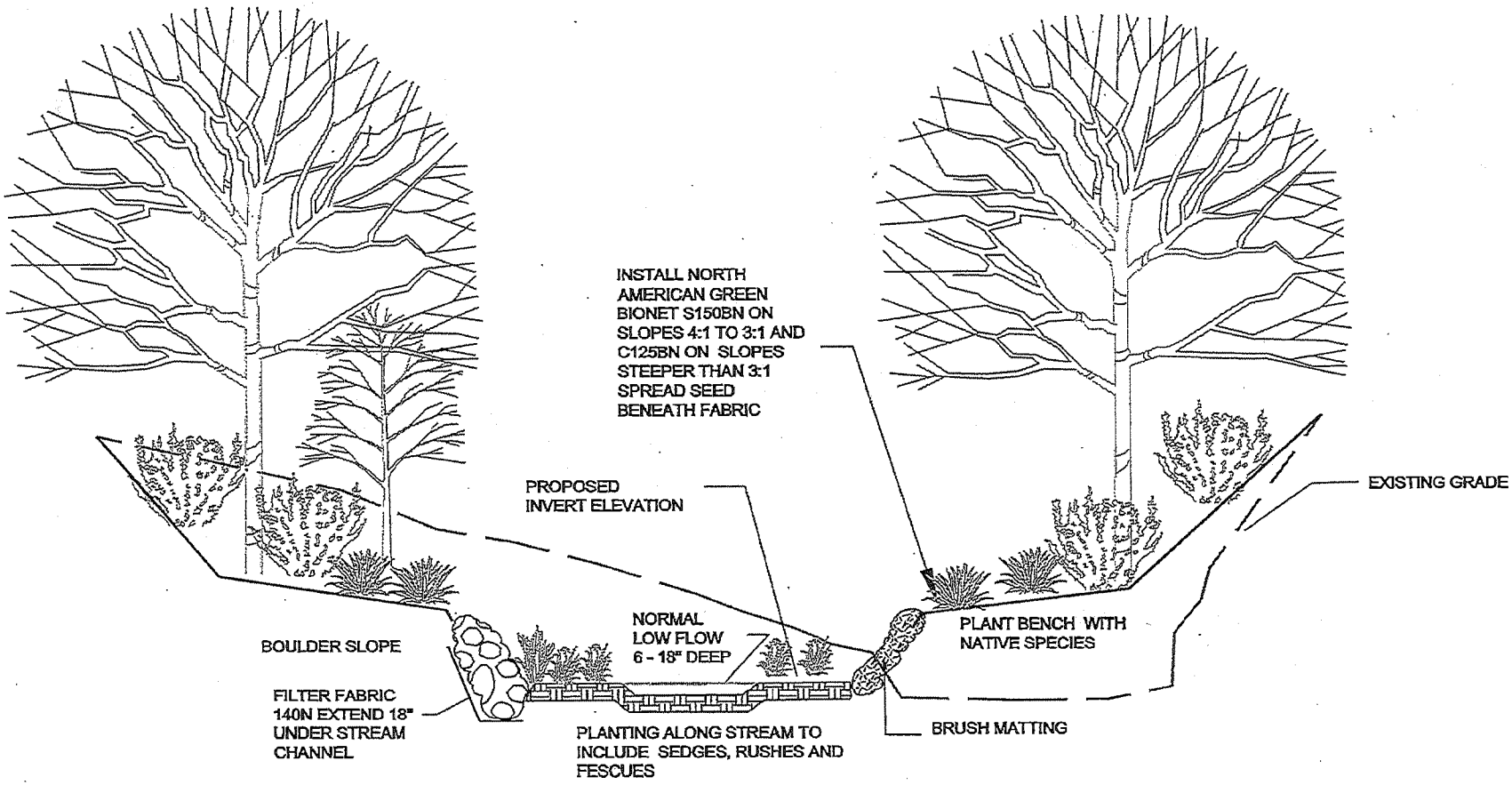
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe



CHANNEL TREATMENT MEASURES
SEE SITE PLAN AND DETAIL SHEETS
FOR LOCATIONS OF EACH TREATMENT

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-1 SHEET 14 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: x:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

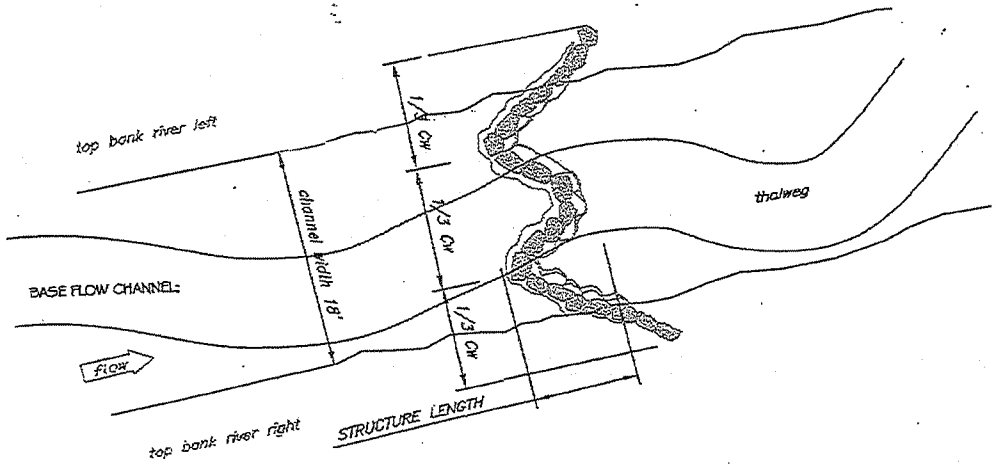


TYPICAL CHANNEL SECTION & STABILIZATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

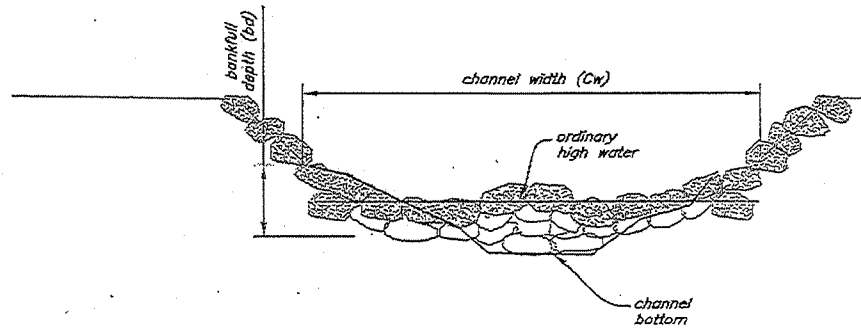
TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-2 SHEET _15_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



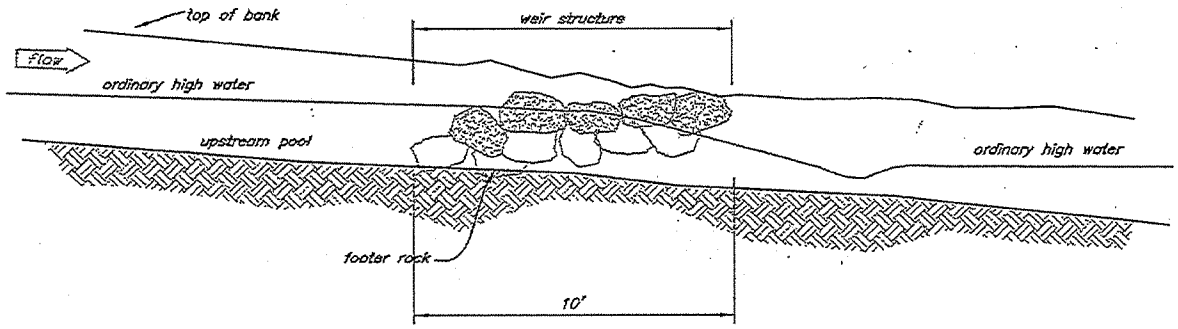
PLAN VIEW

W ROCK WEIR SCHEDULE

STRUCTURE ID	STATION	ELEVATION	Cw	L
WRW # 1	13+50	98.6	24'	12'
WRW # 2	18+19	99.36	24'	12'
WRW # 3	23+25	100.2	24'	12'
WRW # 4	37+00	102.15	24'	12'
WRW # 5	56+00	104.4	41'	18'



SECTION



PROFILE

ROCK WEIR

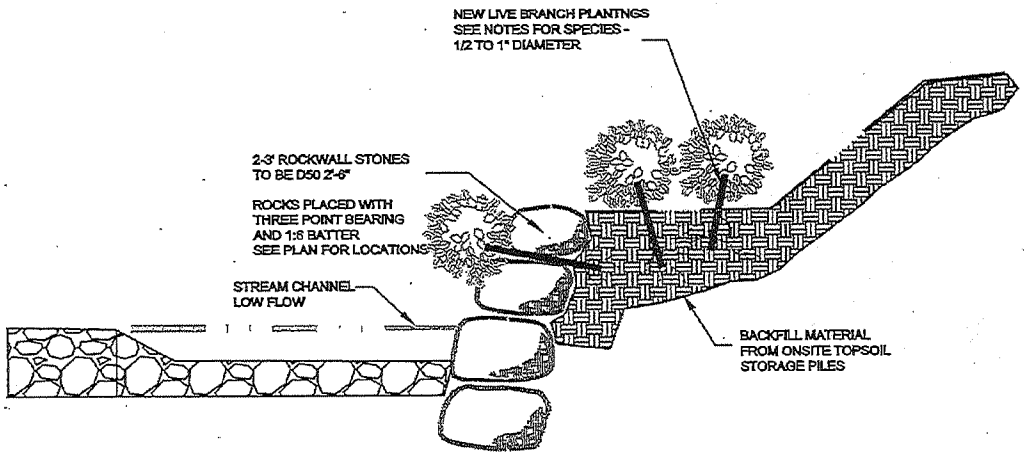
N.T.S.

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN	DRAWING NO.: D-3
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET 16 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

SCHEDULE

STRUCTURE ID	STATION	TO	LOC
BR #1	35+25	36+75	E
BR #2	39+50	41+00	W
BR #3	44+60	45+20	E



BOULDER REVETMENT

N.T.S.

NOTES
1. INSTALL SEDIMENT CONTROL MEASURES AS DIRECTED.
2 INSTALL NEW ROCKWALL BENCHES AS DETAILED AND SHOWN ON THE PLANS.
3 SPREAD STOCKPILED TOPSOIL BEHIND ROCKWALL BENCH AS DETAILED OR DIRECTED BY TOWN.

4. PLANTING LIVE FASCNES

ALL MATERIAL SHALL CONSIST OF MIXTURE OF STREAMCO WILLOW (SALIX PURPUREA) BANKERS WILLOW
SALIX COTTIRTI, PRAIRIE WILLOW (SALIX HUMILIS), GRAY DOGWOOD (CORNUS RACEMOSES AND/OR RED-OISER DOGWOOD (CORNUS SERVICEA.

A. SPACE BRANCHES 4 FT ON CENTER ALTERNATING ROWS WITH ONE FOOT VERITICAL SEPARATION.

B, LIVE BRANCHES TO BE TO ½" TO 1" DIAMETER 4 TO 6 FT LENGTH. TOPS OF LIVE BRANCHES TO PROTRUDE MINIMUM 6" BEYOND FACE OF WALL.

C, BACKFILL BEHIND WALL HAND TAMPED IN 6 IN LIFTS.

D. CUTTING SHALL BE PLACED ON THE BACKFILL AND COVER WITH MINIMUM OF 3" OF CLEAN FILL BETWEEN LAYER AND ROCK.

F. ALL PLANT MATERIAL SHALL BE INSTALLED WITHIN 8 (EIGHT) HOURS OF CUTTING UNLESS PROVISIONS FOR PROPER STORAGE IS MADE.

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

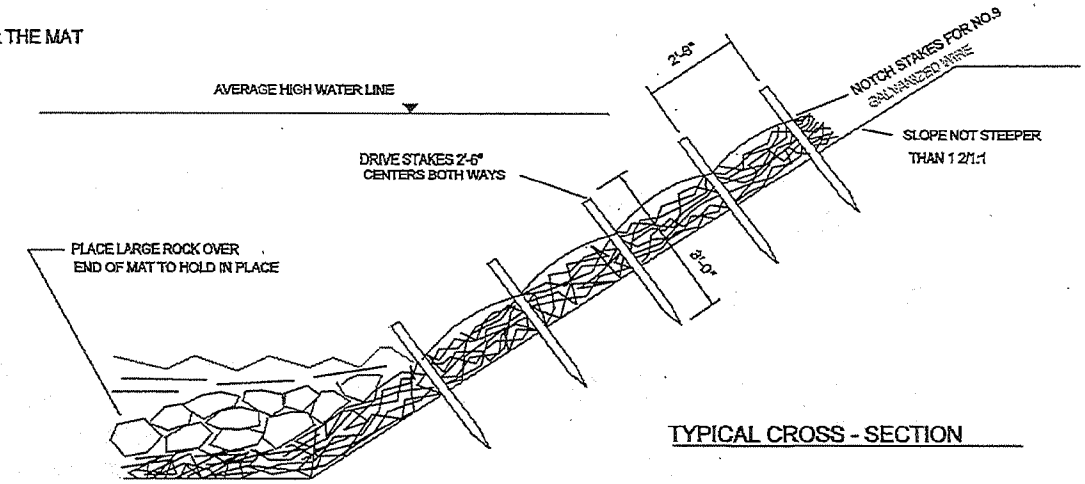
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-4
SHEET 17 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

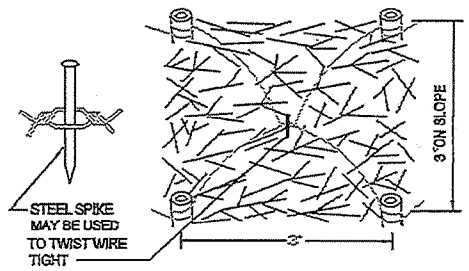
USACE FILE: NAN-2014-00305-ESW

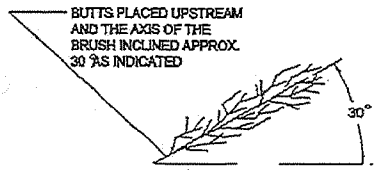
CONSTRUCTION SPECIFICATIONS

1. PREPARE SLOPE SURFACE BY GRADING TO A UNIFORM, SMOOTH SURFACE.
2. LAY HARDWOOD BRUSH IN AN UPSTREAM DIRECTION BEGINNING AT THE DOWN-STREAM END. THE TOE SHOULD BE ESTABLISHED FIRST.
3. THE BUTT END OF THE BRUSH WILL BE PLACED UPSTREAM AND THE PLANT MATERIALS INCLINED APPROXIMATELY 30 DEGREES.
4. THE UPSTREAM EDGE OF THE MAT WILL BE KEYED INTO THE SLOPE 2 FEET. STAKES WILL BE DRIVEN THROUGHOUT THE MATTING ON 3 FOOT CENTERS EACH WAY BEGINNING ALONG THE TOE OF THE MAT.
5. NO. 9 GALVANIZED WIRE WILL BE ATTACHED TO THE STAKES OVER THE MAT AND TIGHTENED TO SECURE THE MAT.
6. SLOPE AREAS ABOVE THE MAT WILL BE SLOPED AND SEEDED.



TYPICAL CROSS - SECTION



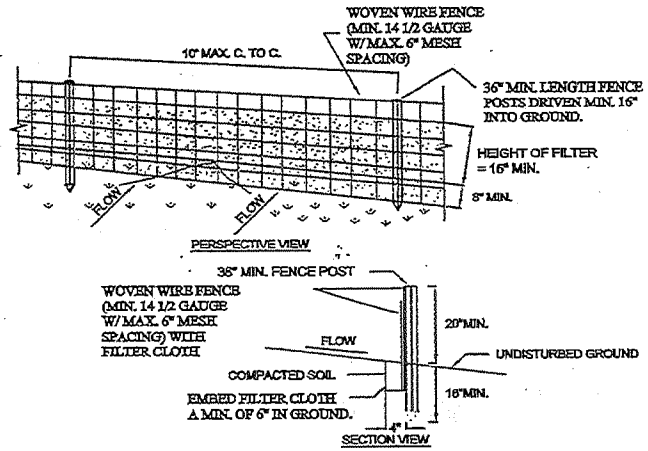


STATION	TO
25+50	26+00 W
28+50	28+95 E
28+50	28+95 W
42+50	42+89 E
44+80	45+25 W

BRUSH MATTING

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-5 SHEET _18_ OF __31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



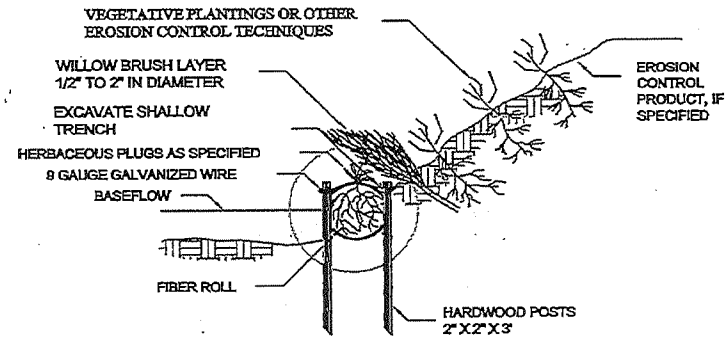
CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

SILT FENCE

FIBER ROLL SCHEDULE

STATION	TO
19+50 EAST	20+65
25+10 WEST	25+60



CROSS SECTION
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. EXCAVATE A SHALLOW TRENCH AT THE TOE OF SLOPE TO SLIGHTLY BELOW BASEFLOW.
2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" x 2" POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IF NECESSARY.
3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR 1/8" DIAMETER BRAIDED NYLON ROPE.
4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

FIBER ROLL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

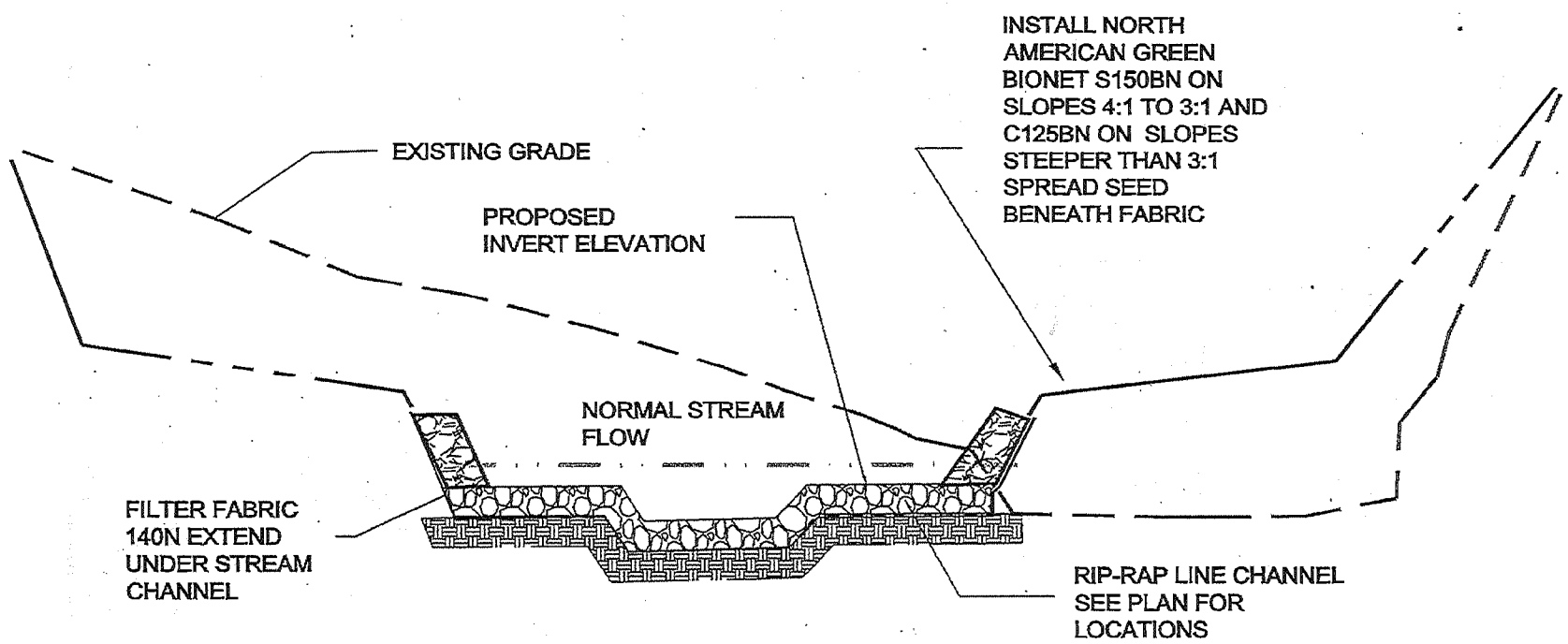
PROJECT NO.:	30--2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-6

SHEET 19 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



ARMORED CHANNEL

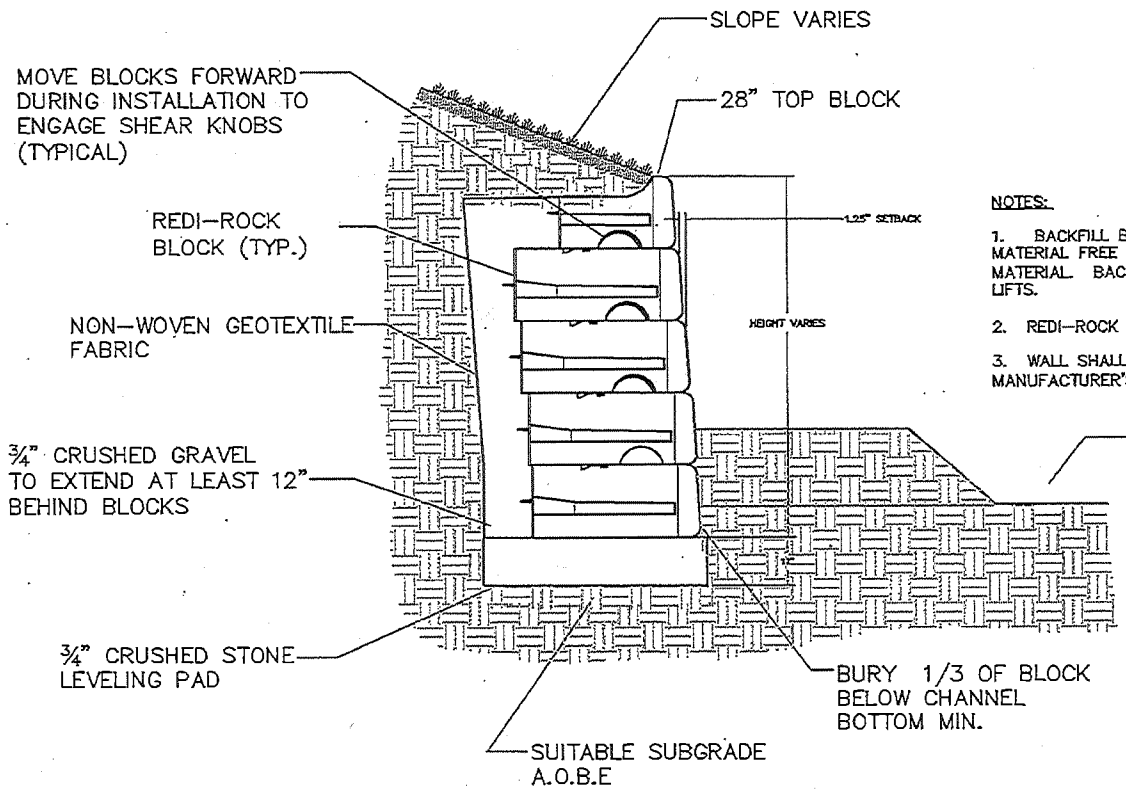
SEE PLAN FOR LOCATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN	DRAWING NO.: D-7
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET _20_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



NOTES:

1. BACKFILL BEHIND WALL SHALL BE SUITABLE FILL MATERIAL FREE FROM LARGE ROCKS, DEBRIS, AND ORGANIC MATERIAL. BACKFILL SHALL BE COMPACTED IN 8" MAXIMUM LIFTS.
2. REDI-ROCK WALL FINISH SHALL BE "LEDGESTONE".
3. WALL SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

SCHEDULE

STATION	TO
9+08	9+54.5 E
9+08	9+54.5 W
9+98	10+47 E
9+98	10+57.5 W
10+75	12+43.5W
18+75	19+87.8 E

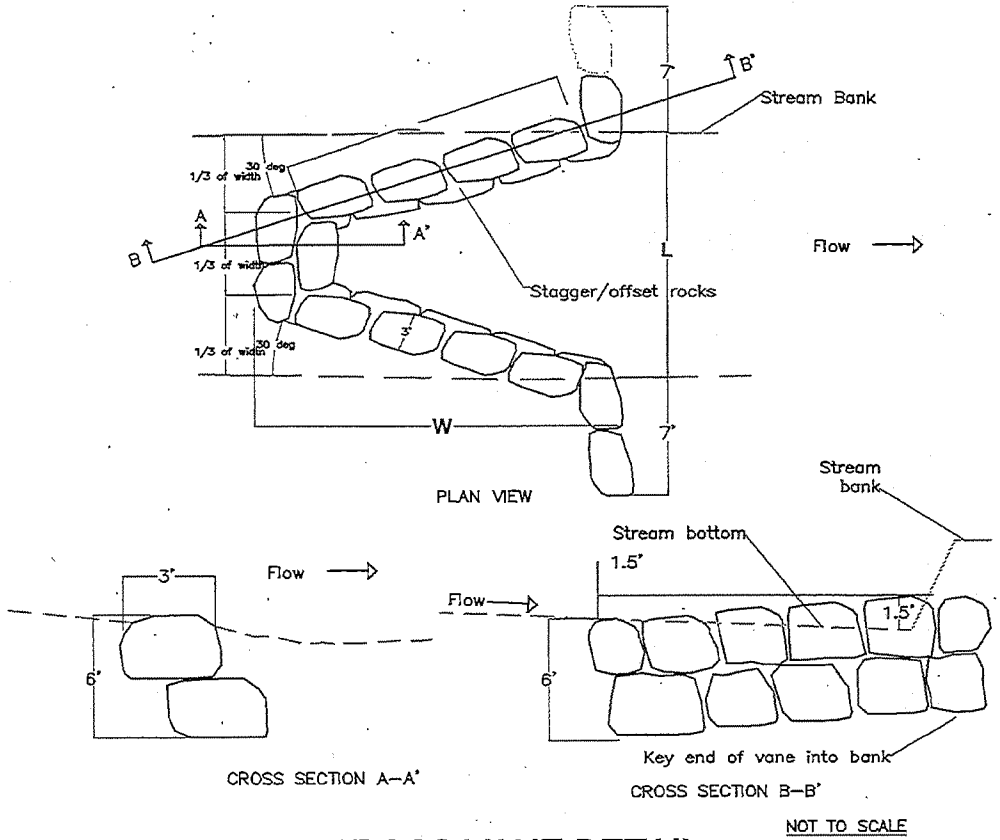
MODULAR RETAINING WALL

N.T.S.

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-8 SHEET _21_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



NOT TO SCALE

CROSS VANE DETAIL

CROSS VANE SCHEDULE

STRUCTURE ID	STATION	ELEVATION	W	L
CV # 1	11+25	97.6	24'	16'
CV # 2	28+15	100.9	24'	16'
CV # 3	38+00	102.6	24'	16'
CV # 4	41+50	102.9	24'	16'
CV # 5	60+00	105.2	44'	20'

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

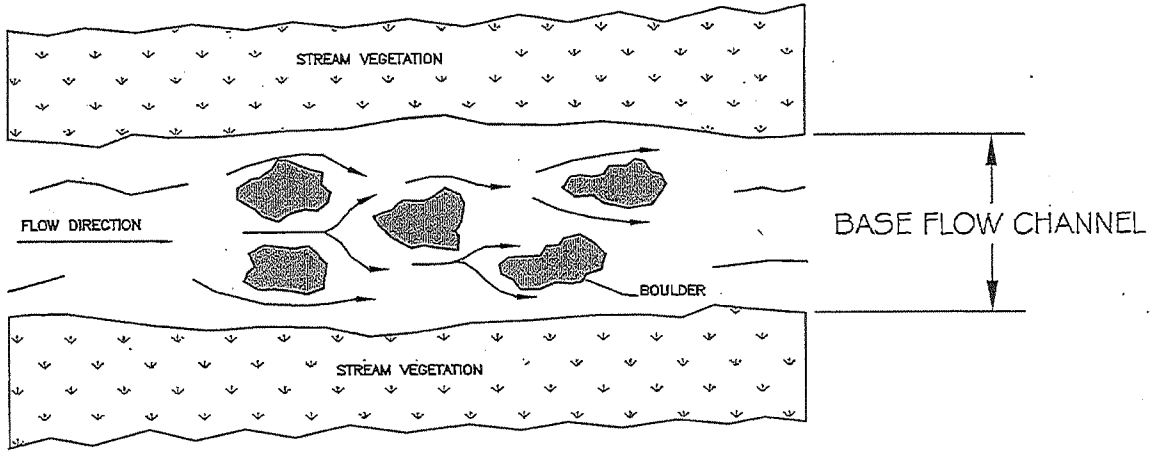
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-9

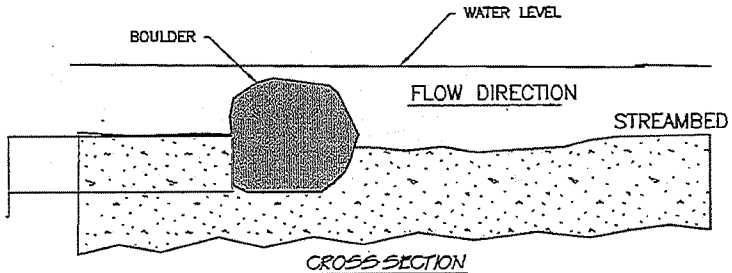
SHEET 32 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PLAN VIEW



CROSS SECTION

SCHEDULE

STATION
14+75
24+65
27+00
32+40
54+80
58+35

- AVERAGE ROCK SIZE- 2.5'-3.5' DIA.-ROCK, SIZE IS SITE DEPENDENT.
- A MINIMUM OF ONE BOULDER PER SET OF BOULDERS SHOULD PROTRUDE FROM WATER SURFACE DURING TIMES OF ORDINARY FLOW TO ACT AS MID-STREAM PERCHING/LOAFING SITES.
- USE BOULDERS WITH IRREGULARITIES OR MULITPLE BOULDERS TOGETHER TO PROVIDE SLIGHT OVERHANGING COVER.
- PLACE BOULDERS SO CURRENT WILL NOT BE DEFLECTED INTO UNPROTECTED STREAM BANKS.

BOULDER CLUSTERS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

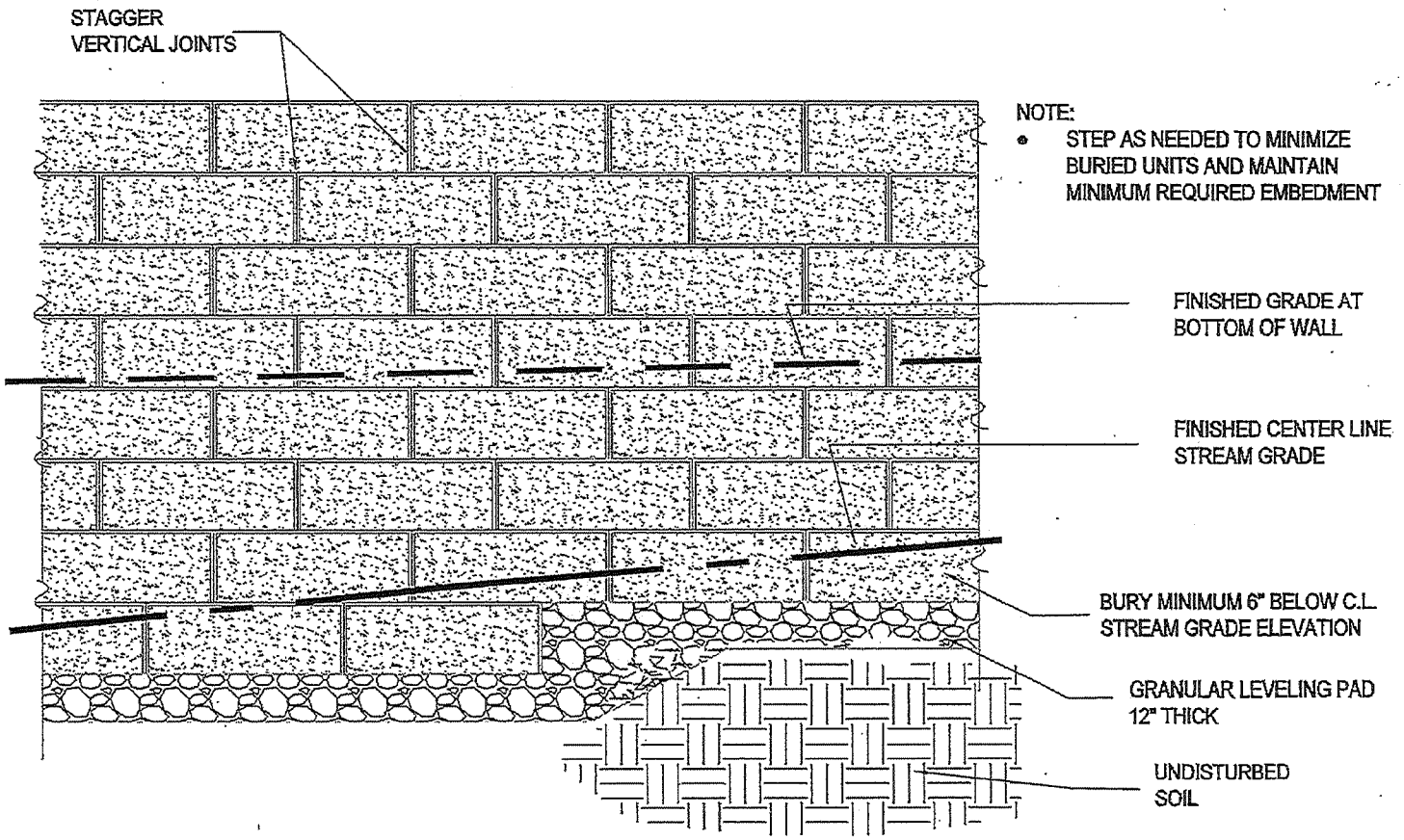
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-10

SHEET 23 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

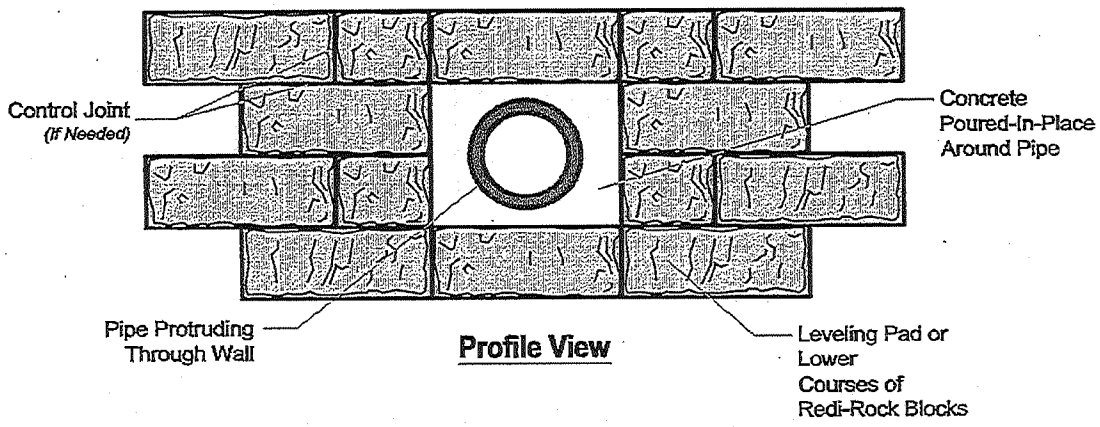
USACE FILE: NAN-2014-00305-ESW



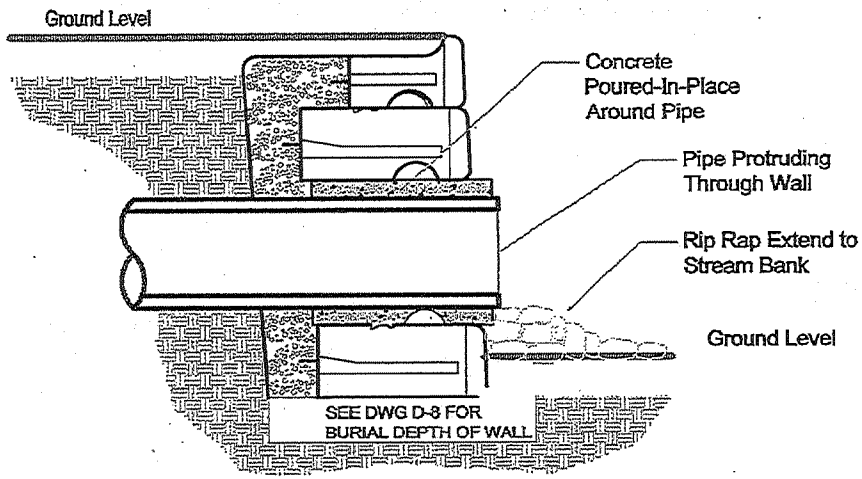
REDI ROCK RETAINING WALL

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL 10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	DETAIL CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-11 SHEET 24 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



Profile View



Section View

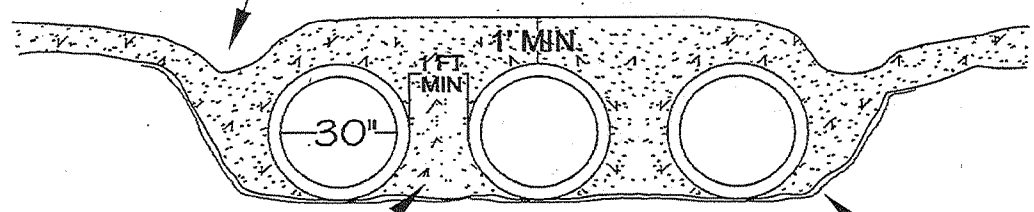
Pipe Through Wall Detail

NTS

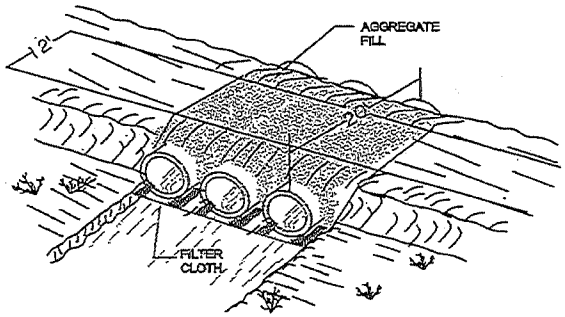
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30–2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-12 SHEET _25_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



INSTALL (3) 30" HDPE PIPES - 20' LENGTH EACH



MULTIPLE PIPES

LOCATIONS

STA 4+25
STA 28+10
STA 32+75

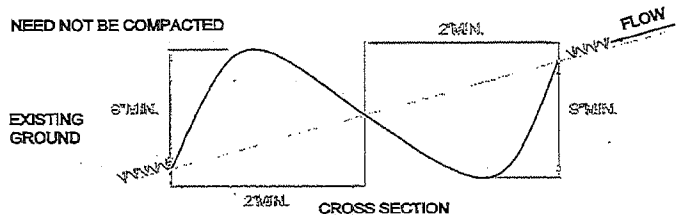
TEMPORARY STREAM CROSSING DETAIL

NOT TO SCALE

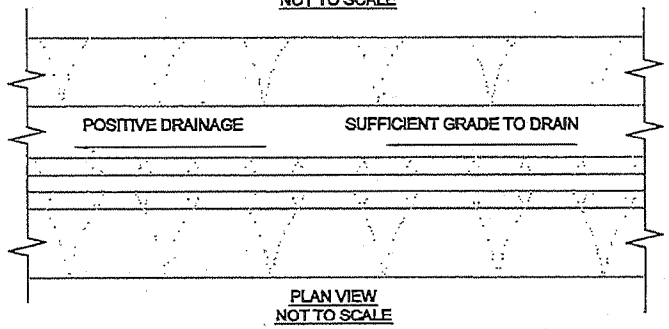
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-13 SHEET 26 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

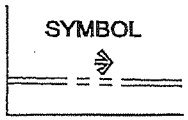
USACE FILE: NAN-2014-00305-ESW



CROSS SECTION
NOT TO SCALE



PLAN VIEW
NOT TO SCALE



CONSTRUCTION SPECIFICATIONS

1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATIONS FOR TEMPORARY SEEDING AND MULCHING, AND SHALL BE DONE WITHIN 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

MAX. DRAINAGE AREA LIMIT: 2 ACRES

PERIMETER DIKE OR SWALE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

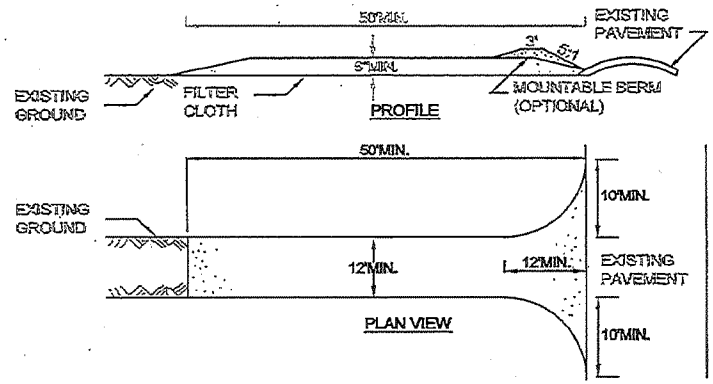
DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-14
SHEET 27 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



SYMBOL

CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – USE 2" CLEAN STONE
2. LENGTH – NOT LESS THAN 50 FEET
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY–FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ENTRANCE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

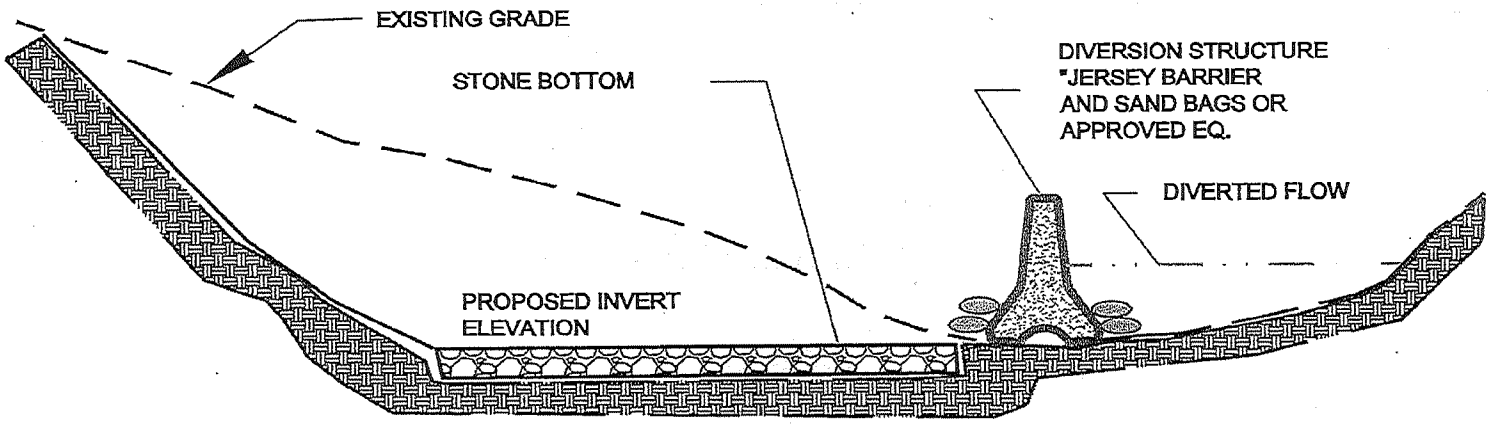
PROJECT NO.:	30–2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-15

SHEET 28 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TYPICAL TEMPORARY CHANNEL DIVERSION

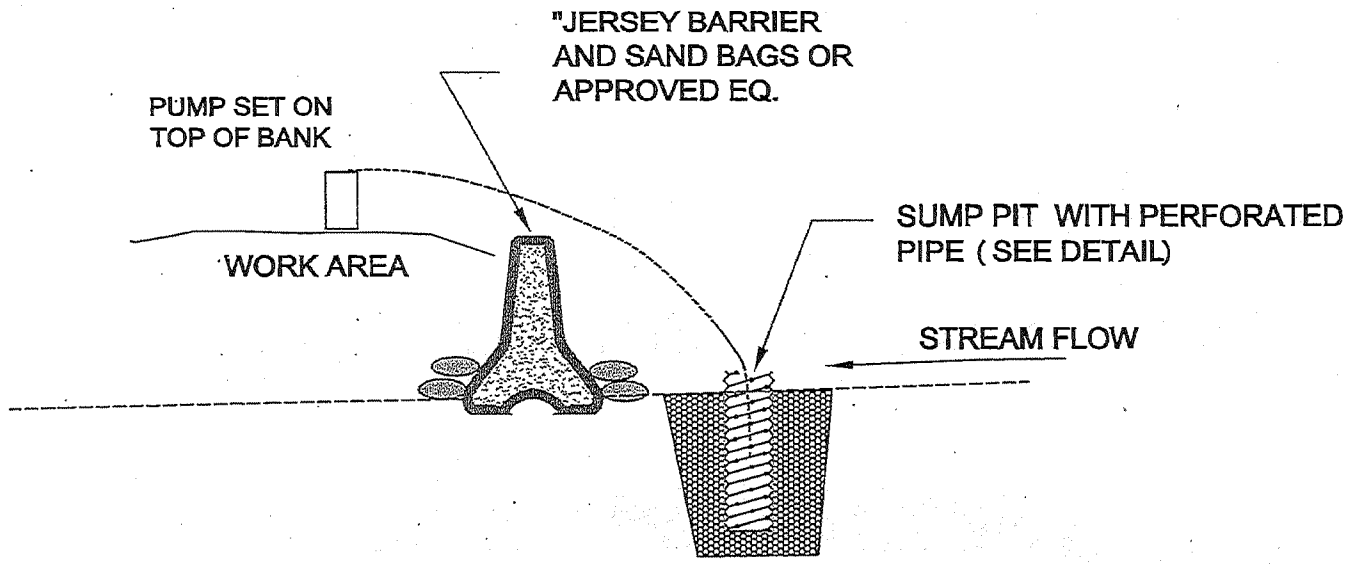
N.T.S.

NOTE
SEE CROSS SECTION DRAWINGS
FOR STREAM CONFIGURATION
AND LOCATION OF NORMAL LOW
FLOW CHANNEL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-16 SHEET 29 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



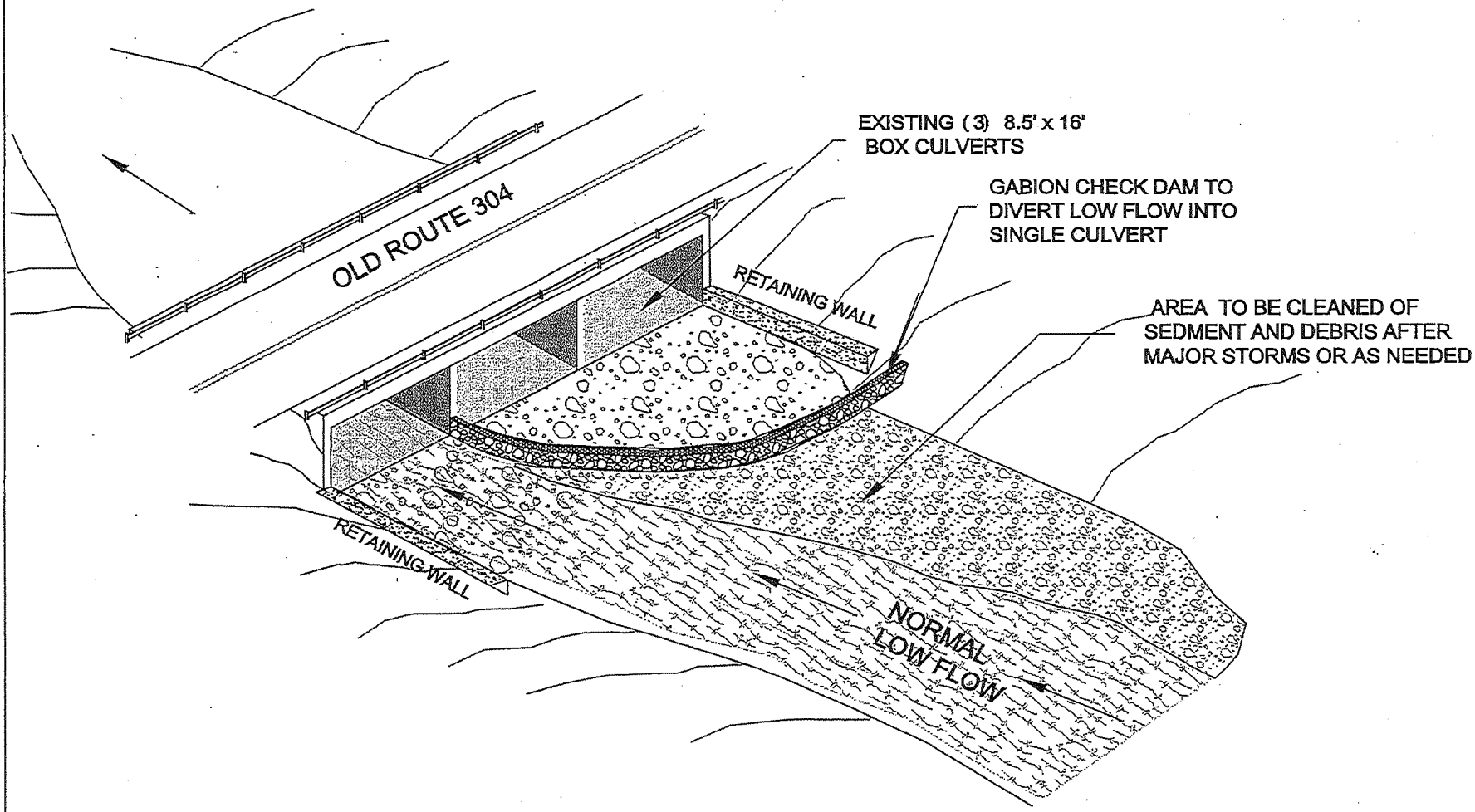
TEMPORARY COFFER DAM

N.T.S

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWING NO.: D-17 SHEET _30_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	GABION WEIR AT BOX CULVERT	PROJECT NO.: 30–2005 DATE: 05/14/15 SCALE: NONE DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-18 SHEET _31_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

New York State
Department of Environmental Conservation

NOTICE

The Department of Environmental Conservation (DEC) has issued permit(s) pursuant to the Environmental Conservation Law for work being conducted at this site. For further information regarding the nature and extent of work approved and any Department conditions on it, contact the DEC at 845/256-3054. Please refer to the permit number shown when contacting the DEC.

Permittee: (T) Clarkstown Permit No. 3- 3920-00297/00010,11

Effective Date: 7/20/2016 Expiration date: 12/31/2020

☐ Applicable if checked. No instream work allowed between October 1 & April 30

NOTE: This notice is **NOT** a permit.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 3
21 South Putt Corners Road, New Paltz, NY 12561-1620
P: (845) 256-3054 I F: (845) 255-4659
www.dec.ny.gov

IMPORTANT NOTICE TO ALL PERMITTEES

The permit you requested is enclosed. Please read it carefully and note the conditions that are included in it. The permit is valid for only that activity expressly authorized therein; work beyond the scope of the permit may be considered a violation of law and be subject to appropriate enforcement action. Granting of this permit does not relieve the permittee of the responsibility of obtaining any other permission, consent or approval from any other federal, state, or local government which may be required.

Please note the expiration date of the permit. Applications for permit renewal should be made well in advance of the expiration date (minimum of 30 days) and submitted to the Regional Permit Administrator at the above address. For SPDES, Solid Waste and Hazardous Waste Permits, renewals must be made at least 180 days prior to the expiration date.

The DEC permit number & program ID number noted on page 1 under "Permit Authorization" of the permit are important and should be retained for your records. These numbers should be referenced on all correspondence related to the permit, and on any future applications for permits associated with this facility/project area.

If a permit notice sign is enclosed, you must post it at the work site with appropriate weather protection, as well as a copy of the permit per General Condition 1.

If the permit is associated with a project that will entail construction of new water pollution control facilities or modifications to existing facilities, plan approval for the system design will be required from the appropriate Department's regional Division of Water or delegated local Health Department, as specified in the State Pollutant Discharge Elimination System (SPDES) permit.

If you have any questions on the extent of work authorized or your obligations under the permit, please contact the staff person indicated below or the Division of Environmental Permits at the above address.

Joseph A Murray
Division of Environmental Permits, Region 3
Telephone (845) 256-3040

☐ Applicable only if checked. Please note all work authorized under this permit is prohibited during trout spawning season commencing October 1 and ending April 30.

☑ Applicable only if checked for STORMWATER SPDES INFORMATION: We have determined that your project requires coverage under the General Stormwater SPDES Permit. You must file a Notice of Intent to obtain coverage under the General Permit. This form can be downloaded at: http://www.dec.ny.gov/chemical/43133.html

☑ Applicable only if checked - MS4 Areas: This site is within an MS4 area (Municipal Separate Storm Sewer System), therefore the SWPPP must be reviewed and accepted by the municipality. The MS-4 Acceptance Form must be submitted in addition to the Notice of Intent.

Send the completed form(s) to: NYS DEC, Stormwater Permitting, Division of Water, 625 Broadway, Albany, New York 12233-3505; in addition, DEC requests that you provide one electronic copy of the approved SWPPP directly to NYS DEC, 100 Hillside Avenue - Suite 1W, White Plains, NY 10603-2860.

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

BROOKER ENGINEERING, PLLC

NY OFFICE
74 Lafayette Ave
Suffern, New York 10901
Tel: 845.357.4411
Fax: 845.357.1896

NJ OFFICE
46 North Central Ave
Ramsey, New Jersey 07446
Tel: 201.684.1221
Fax: 201.684.1223

March 3, 2016

Town of Clarkstown Department of Environmental Control
10 Maple Avenue
New City, New York 10956

Attn: Dennis Letson, PE, Deputy Director

Re: Cranford Drive Flood Amelioration Project
Hydraulic Modeling Summary
BBE # 14099

Dear Mr. Letson:

As per our discussion, we have updated the hydraulic modeling for the Cranford Drive Flood Amelioration Project. Using the HEC-2 models prepared by the original design engineer, John Kozma, PE, we updated the existing and proposed models with the new 100-year flows for the Demarest Kill from the March 3, 2014 Rockland County Flood Insurance Study. The previous Demarest Kill 100-year discharge was 1,540 cfs in the Town of Clarkstown FIS and the 100-year discharge is currently 2,612 cfs in the updated Rockland County FIS.

We converted the Kozma HEC-2 model from the original study to a HEC-RAS model and found that the improved conditions100-year floodplain with the updated 100-year peak discharge of 2,612 cfs does not inundate any of the structures along Cranford Drive that were removed from the 100-year floodplain as per the original design. The attached Floodplain Workmap shows the alignment and grading plan from the original flood control project and the updated 100-year floodplain has been delineated. Cross-sections 4180 through 6300 in the HEC models are located within the proposed improvement area. Please note that the floodplain workmap is in NGVD 29 datum, as per the previous Town of Clarkstown FIS.

Attached is the following information:

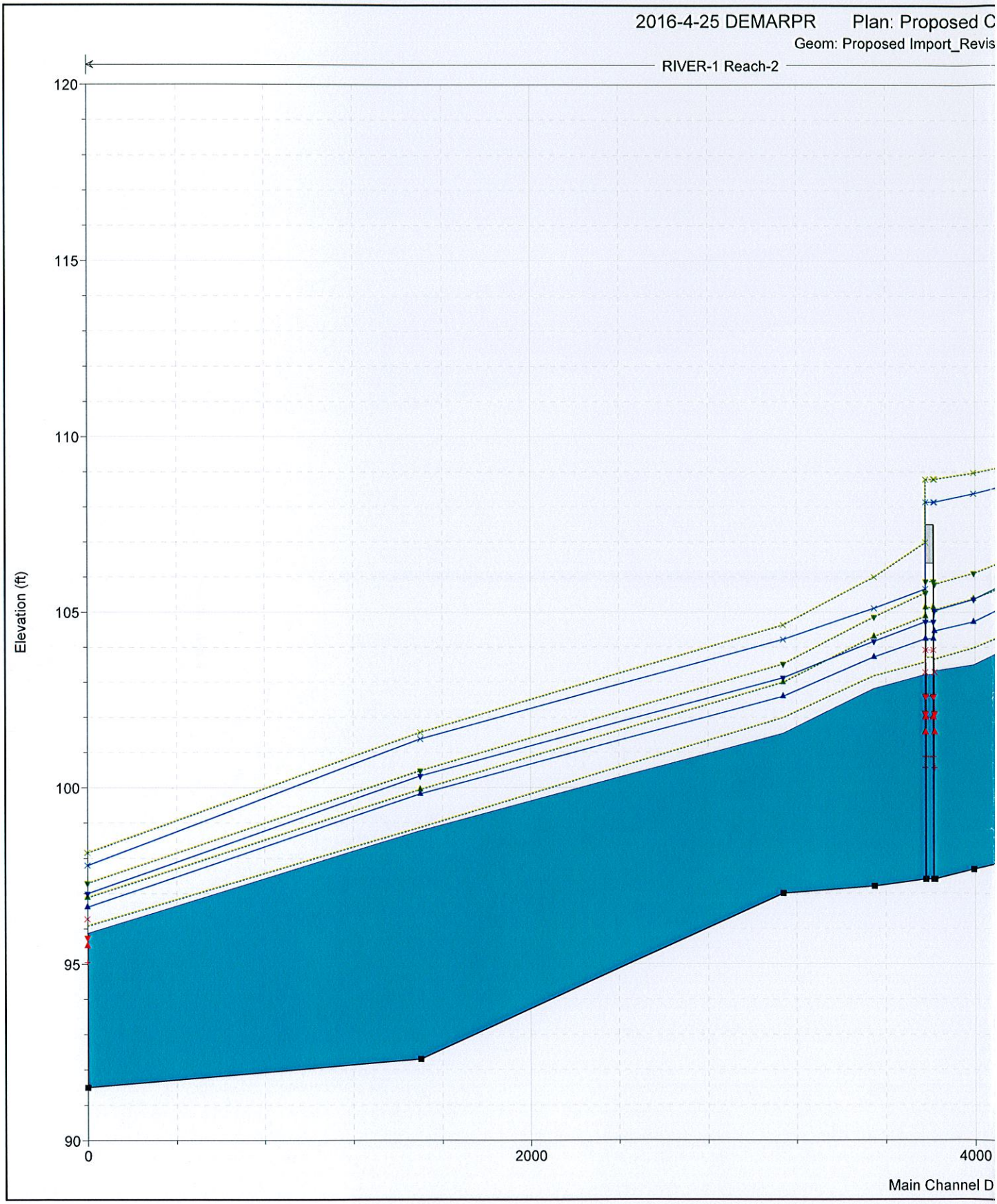
- Floodplain Workmap
- HEC RAS cross sections
- 100-Year Flood Profile
- Summary Table, "Demarest Kill – Kozma Proposed Conditions Effective FEMA 100-year Flow"

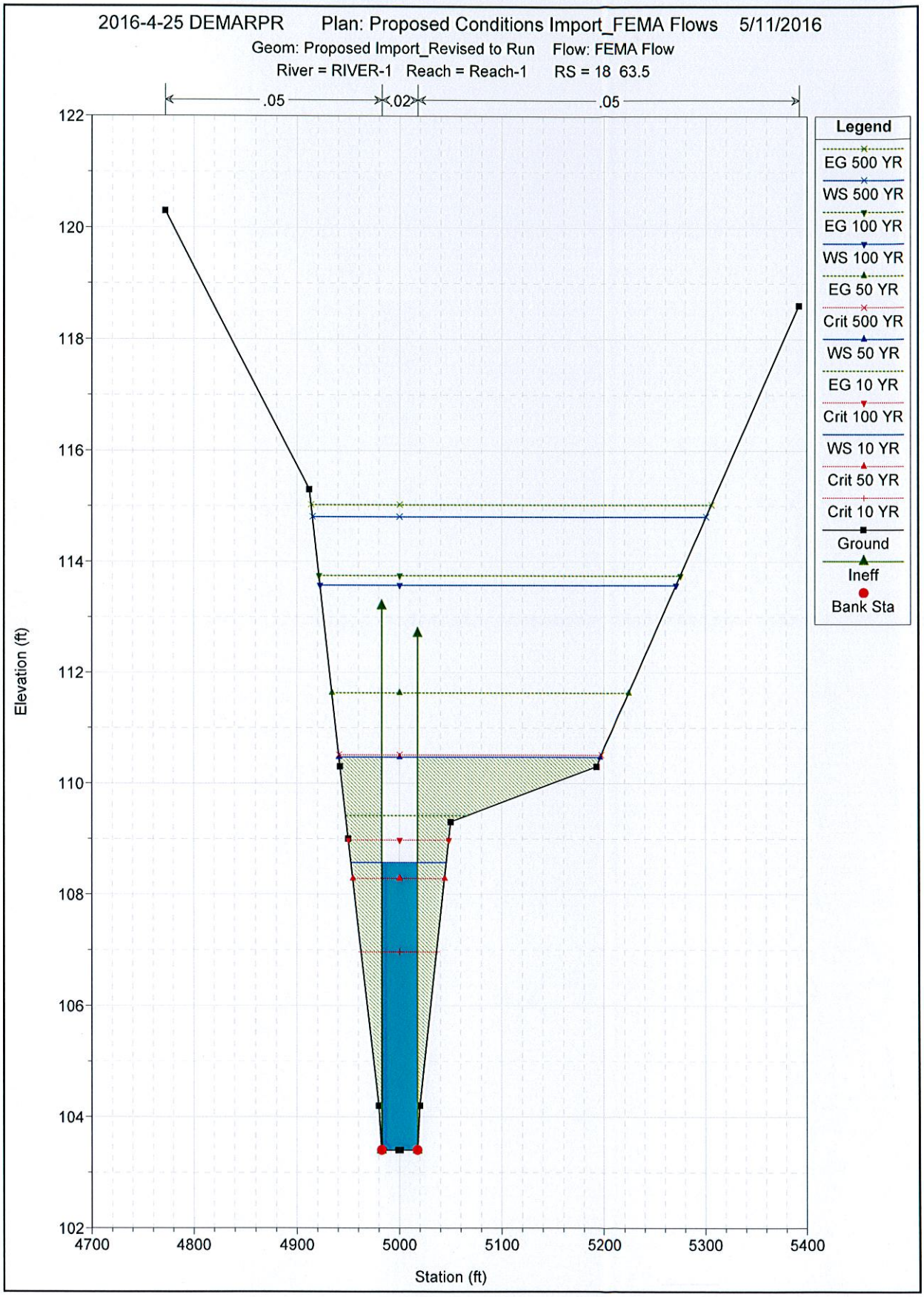
Very truly yours,

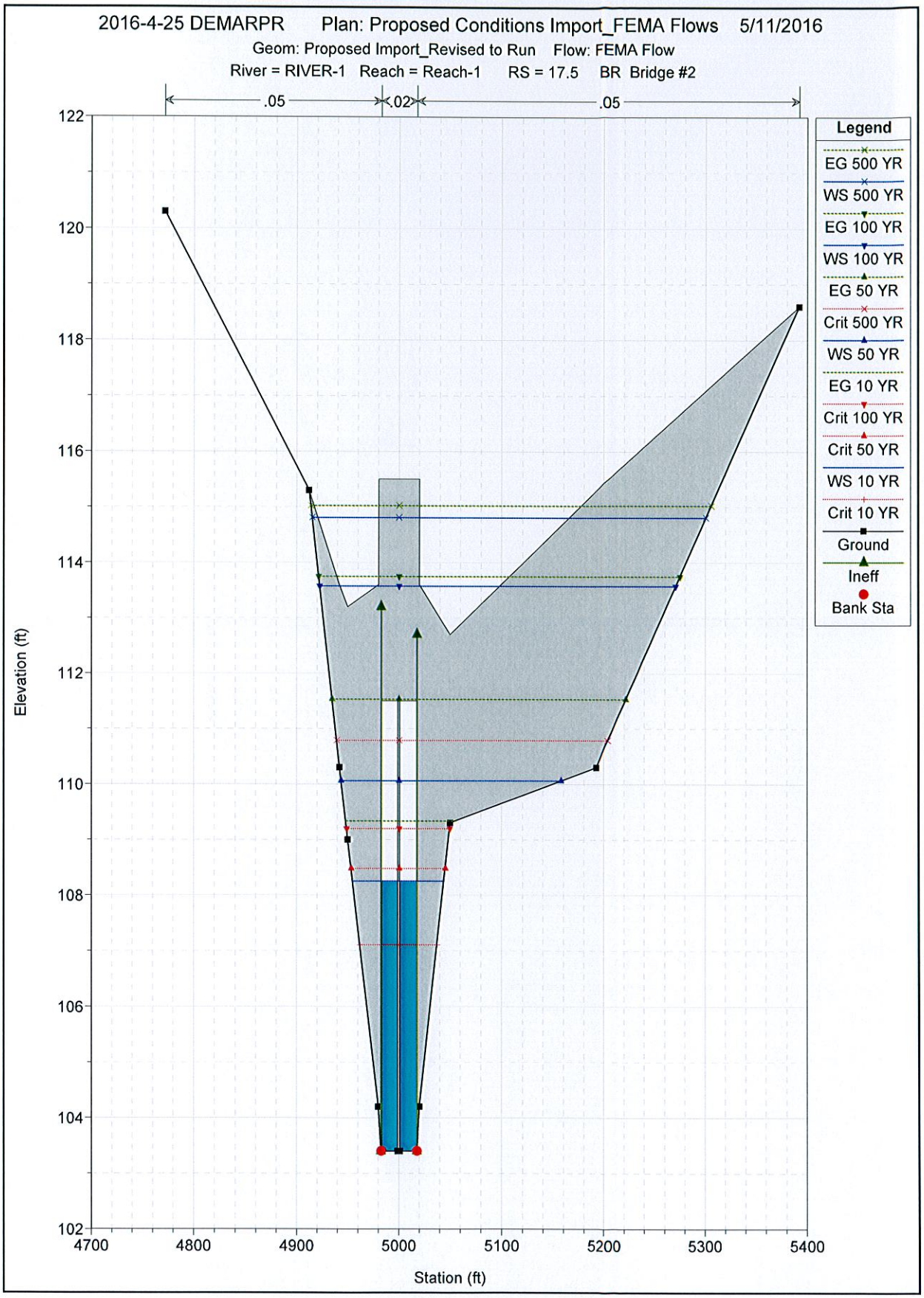
BROOKER ENGINEERING, P.L.L.C.
Kenneth DeGennaro, P.E.

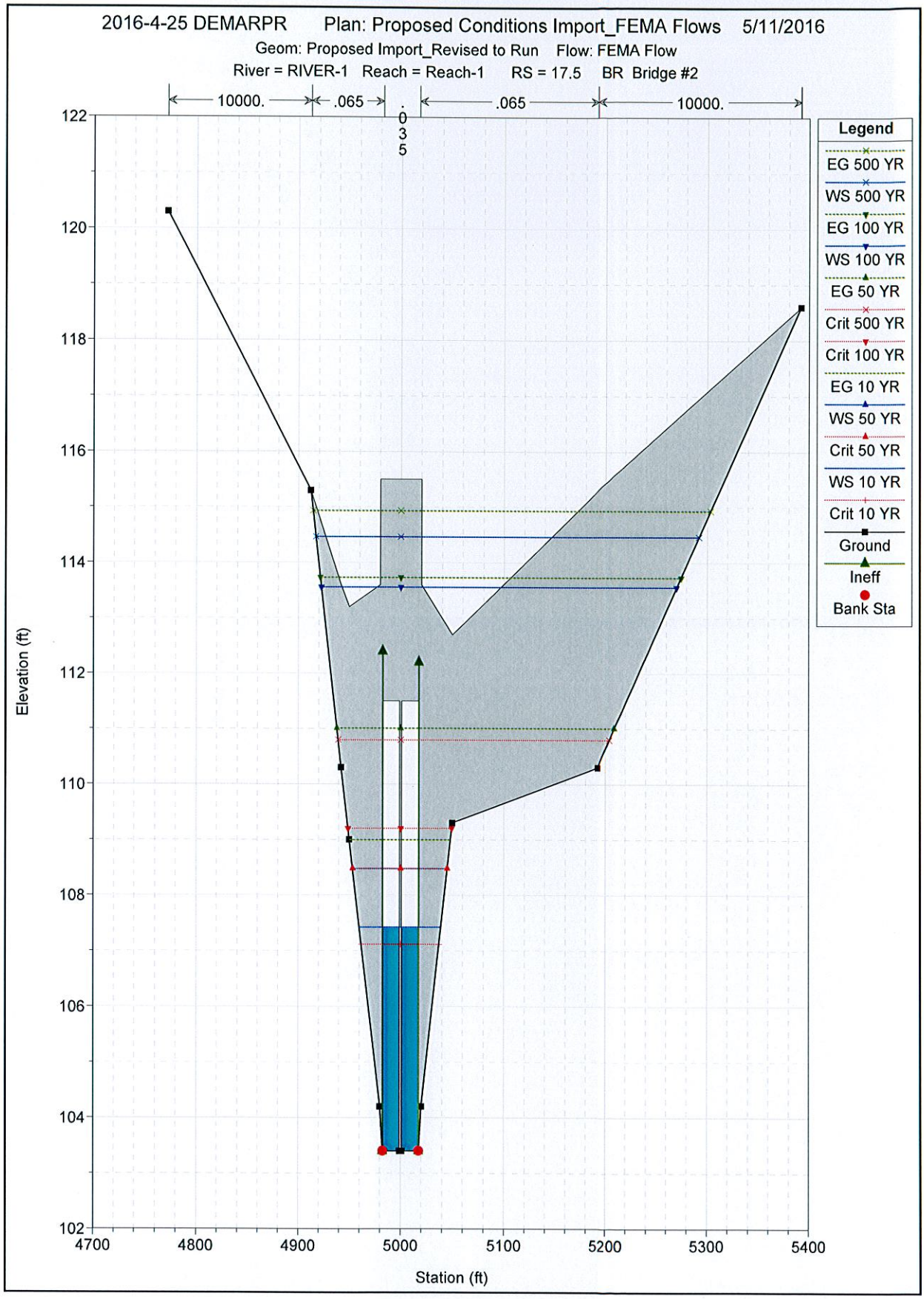
P:\BBE\14\14099\Cranford Drive\2016-05-05 letson2.docx

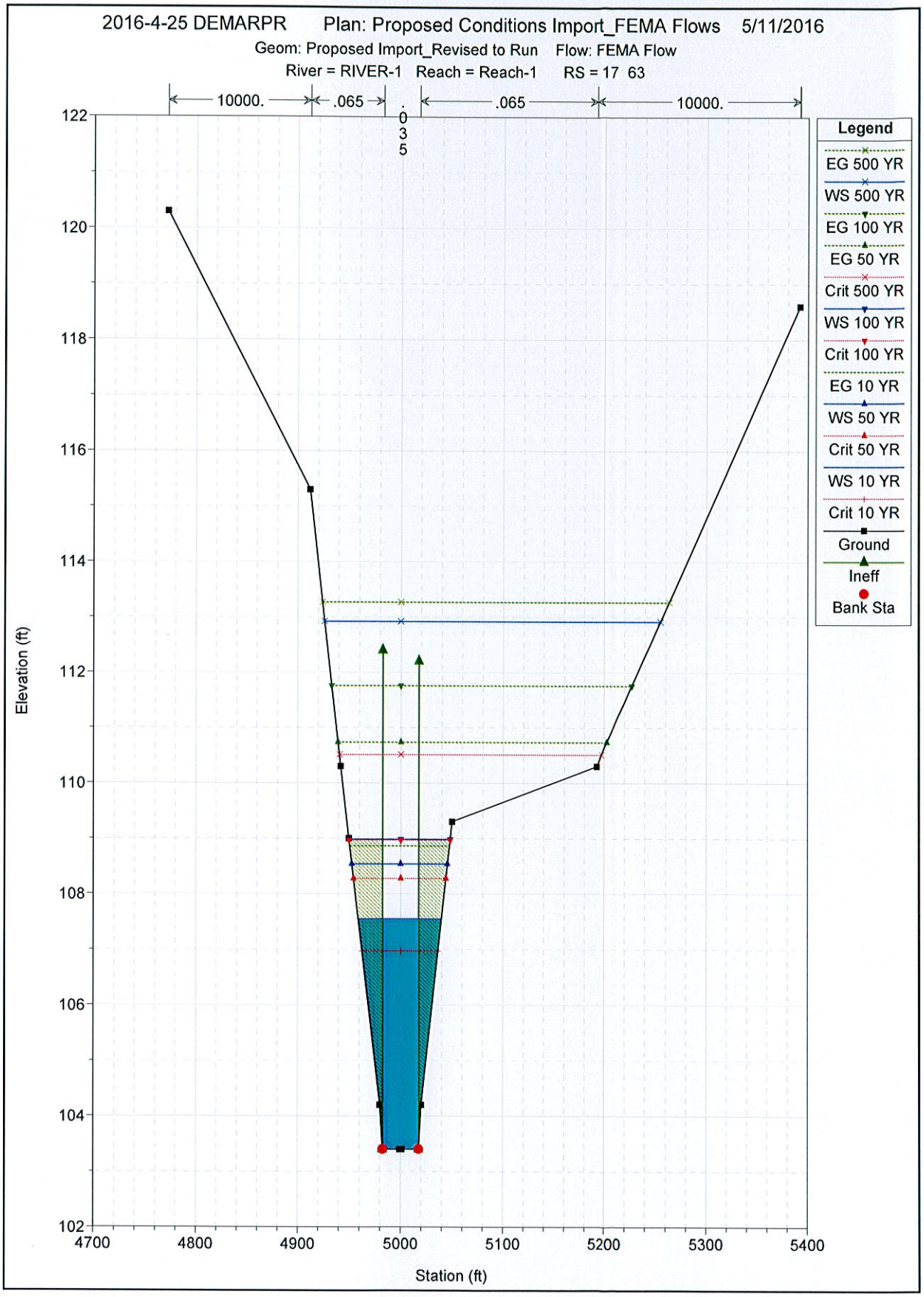
RECEIVED
MAY 12 2016
Environmental Control
Town of Clarkstown

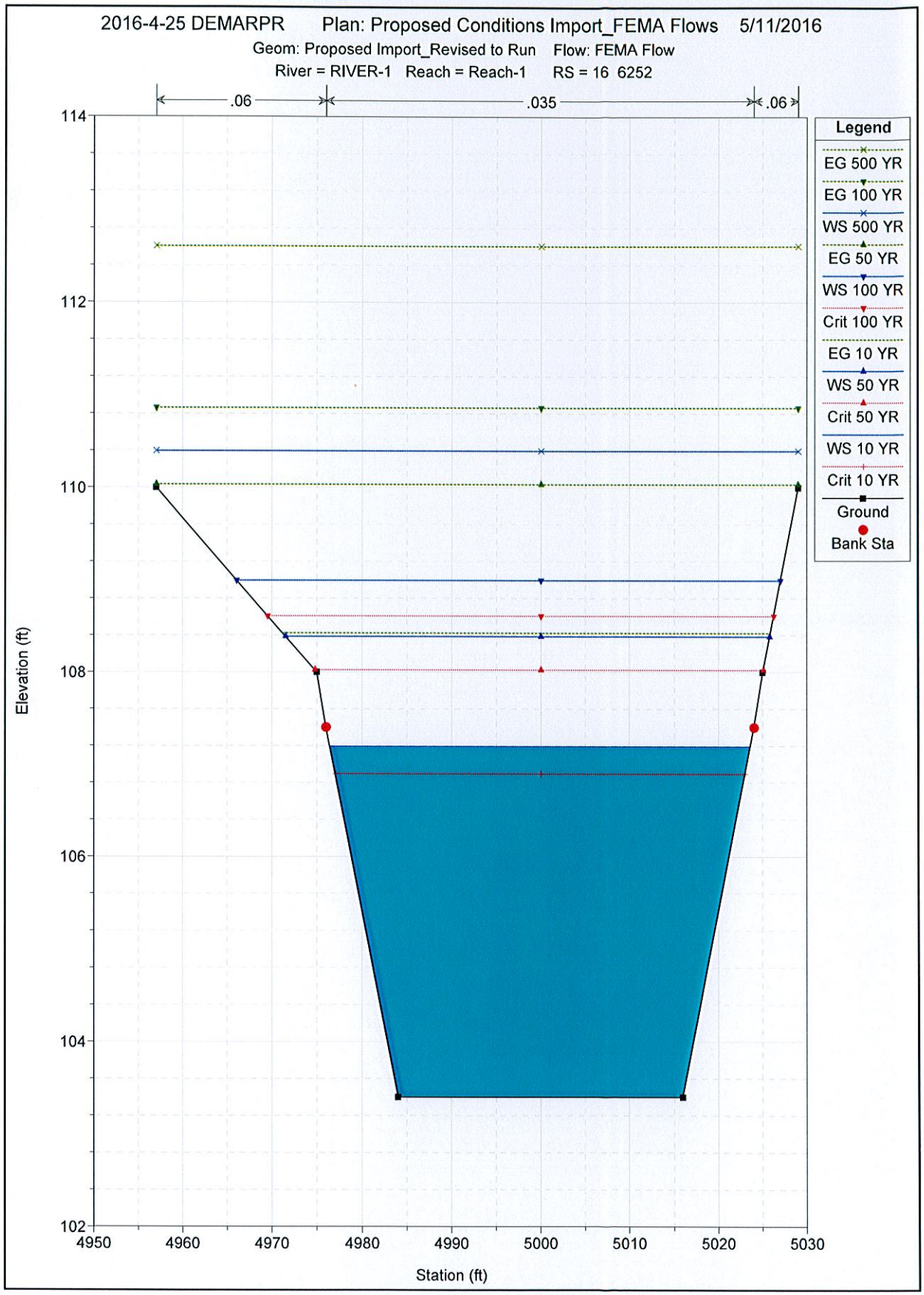

2016-4-25 DEMARPR
Plan: Proposed C
Geom: Proposed Import_Revis
RIVER-1 Reach-2
Elevation (ft)
120
115
110
105
100
95
90
0
2000
4000
Main Channel D

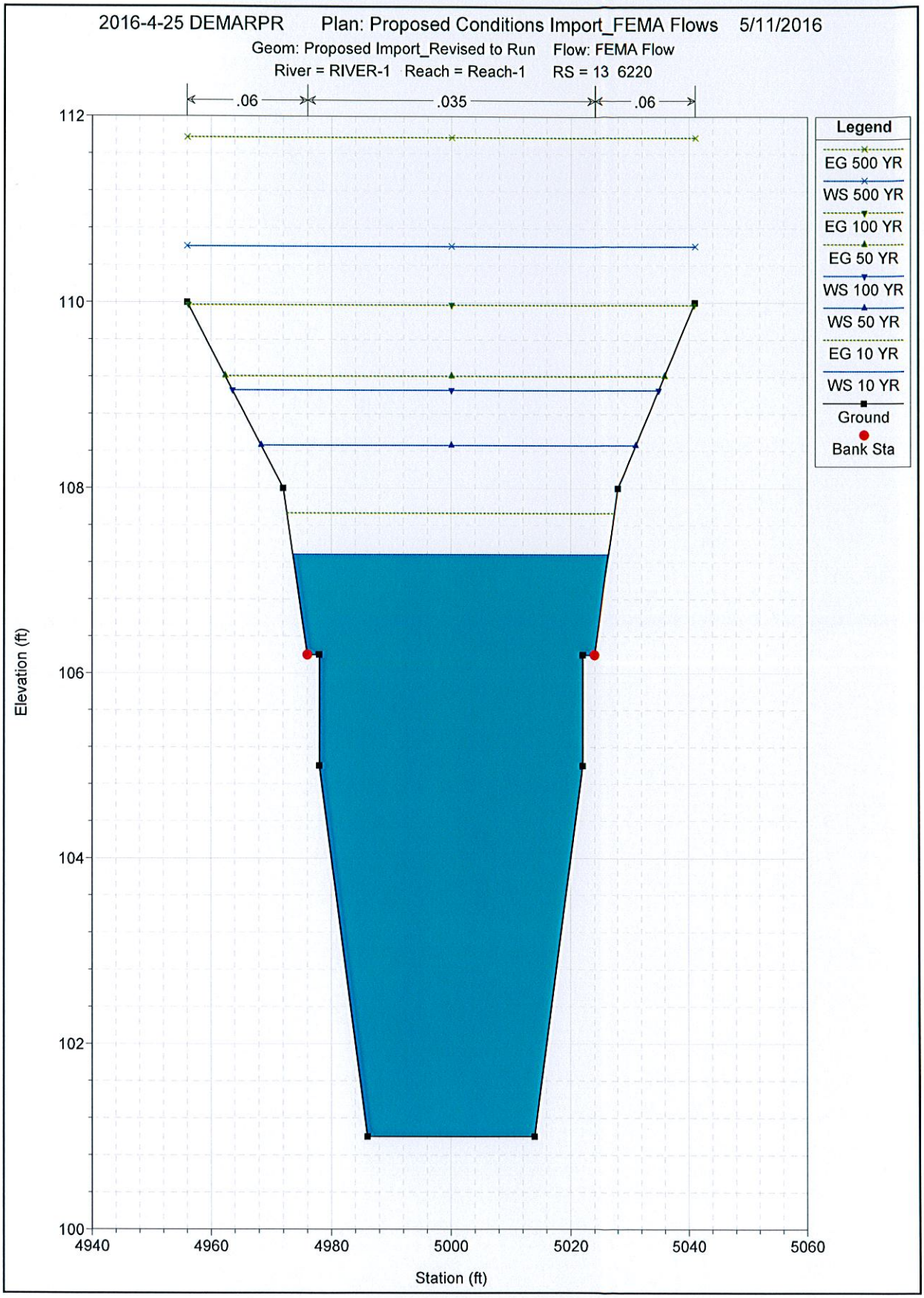

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-1 RS = 18 63.5
.05
.02
.05
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
Crit 500 YR
WS 50 YR
EG 10 YR
Crit 100 YR
WS 10 YR
Crit 50 YR
Crit 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
122
120
118
116
114
112
110
108
106
104
102
4700
4800
4900
5000
5100
5200
5300
5400

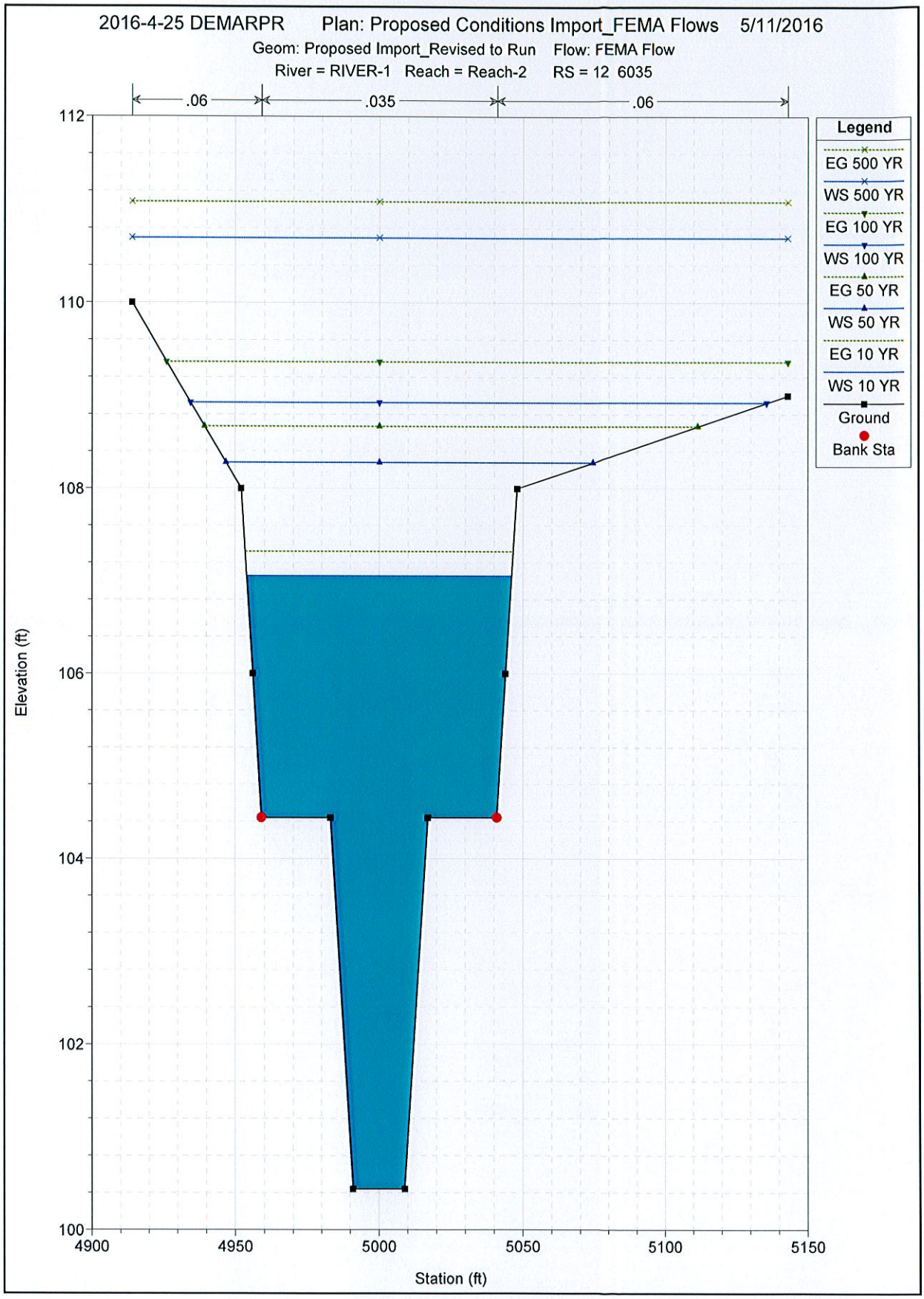

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-1 RS = 17.5 BR Bridge #2
.05
.02
.05
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
Crit 500 YR
WS 50 YR
EG 10 YR
Crit 100 YR
Crit 50 YR
WS 10 YR
Crit 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
122
120
118
116
114
112
110
108
106
104
102
4700
4800
4900
5000
5100
5200
5300
5400

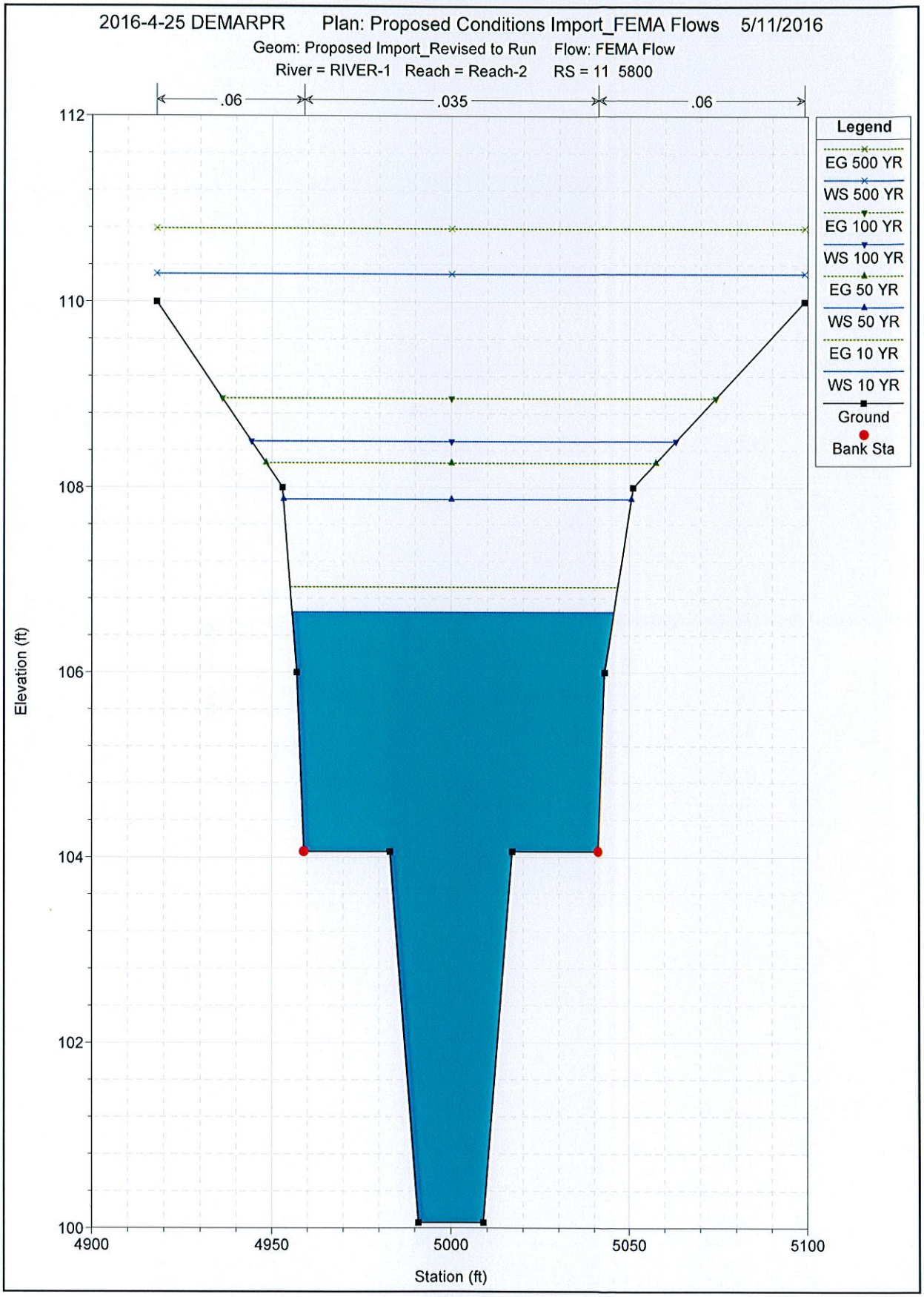

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-1 RS = 17.5 BR Bridge #2
10000.
.065
.035
.065
10000.
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
Crit 500 YR
Crit 100 YR
EG 10 YR
WS 50 YR
Crit 50 YR
WS 10 YR
Crit 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
122
120
118
116
114
112
110
108
106
104
102
4700
4800
4900
5000
5100
5200
5300
5400

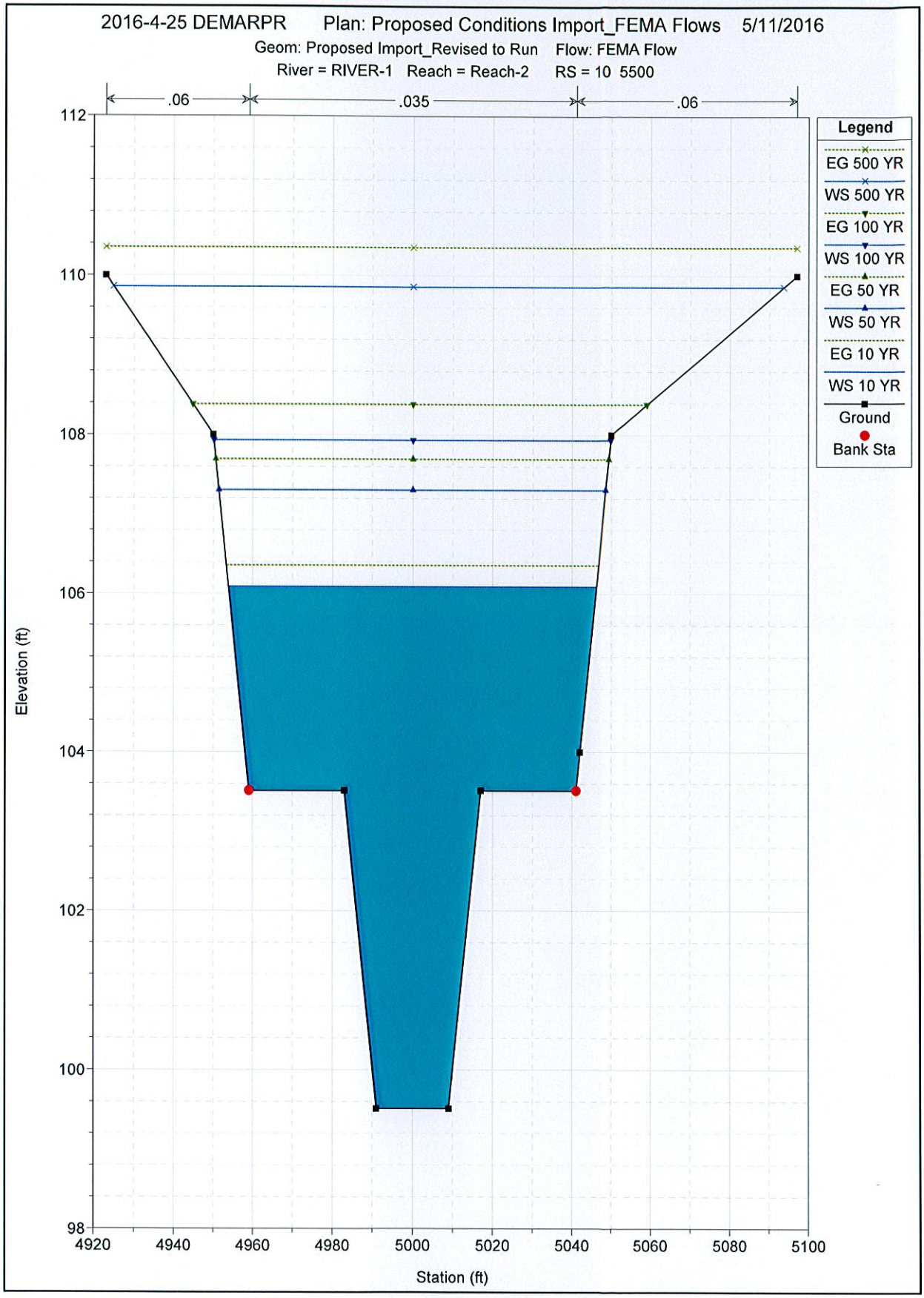

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-1 RS = 17 63
10000.
.065
.035
.065
10000.
Legend
EG 500 YR
WS 500 YR
EG 100 YR
EG 50 YR
Crit 500 YR
WS 100 YR
Crit 100 YR
EG 10 YR
WS 50 YR
Crit 50 YR
WS 10 YR
Crit 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
122
120
118
116
114
112
110
108
106
104
102
4700
4800
4900
5000
5100
5200
5300
5400
Station (ft)

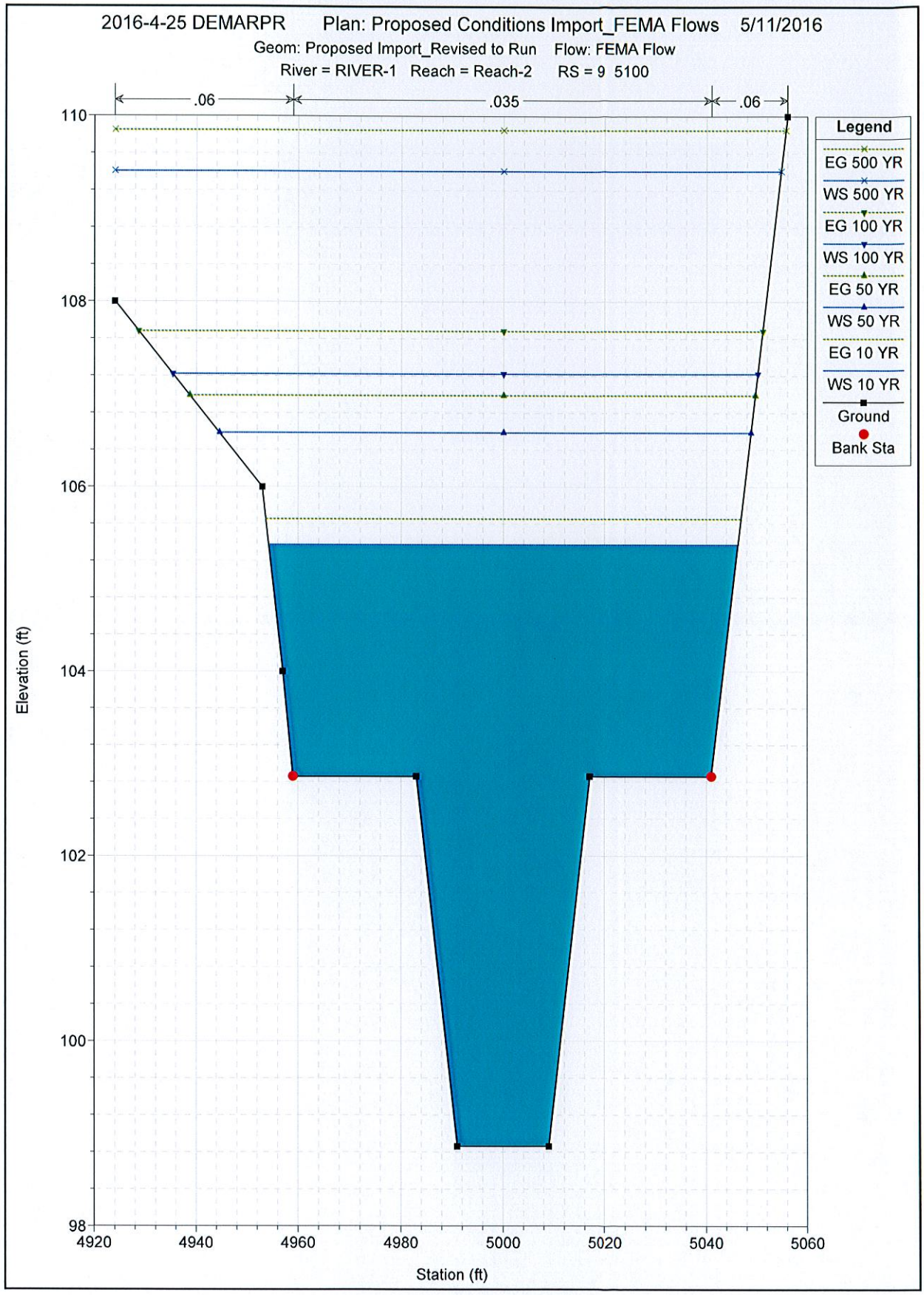

2016-4-25 DEMARPR
Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run
Flow: FEMA Flow
River = RIVER-1 Reach = Reach-1
RS = 16 6252
.06
.035
.06
Legend
EG 500 YR
EG 100 YR
WS 500 YR
EG 50 YR
WS 100 YR
Crit 100 YR
EG 10 YR
WS 50 YR
Crit 50 YR
WS 10 YR
Crit 10 YR
Ground
Bank Sta
Elevation (ft)
114
112
110
108
106
104
102
4950
4960
4970
4980
4990
5000
5010
5020
5030
Station (ft)

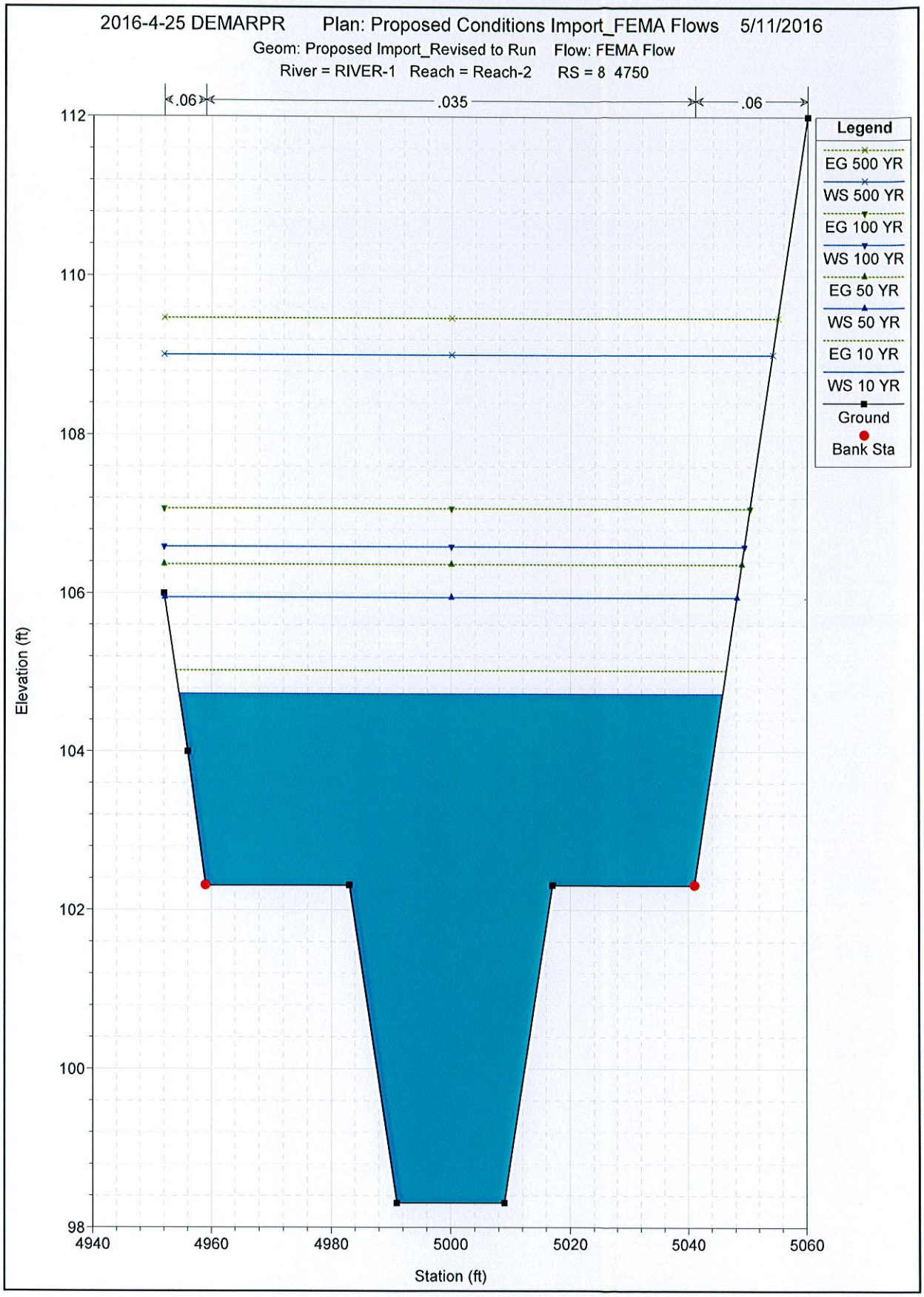

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-1 RS = 13 6220
.06
.035
.06
Legend
EG 500 YR
WS 500 YR
EG 100 YR
EG 50 YR
WS 100 YR
WS 50 YR
EG 10 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
112
110
108
106
104
102
100
4940
4960
4980
5000
5020
5040
5060

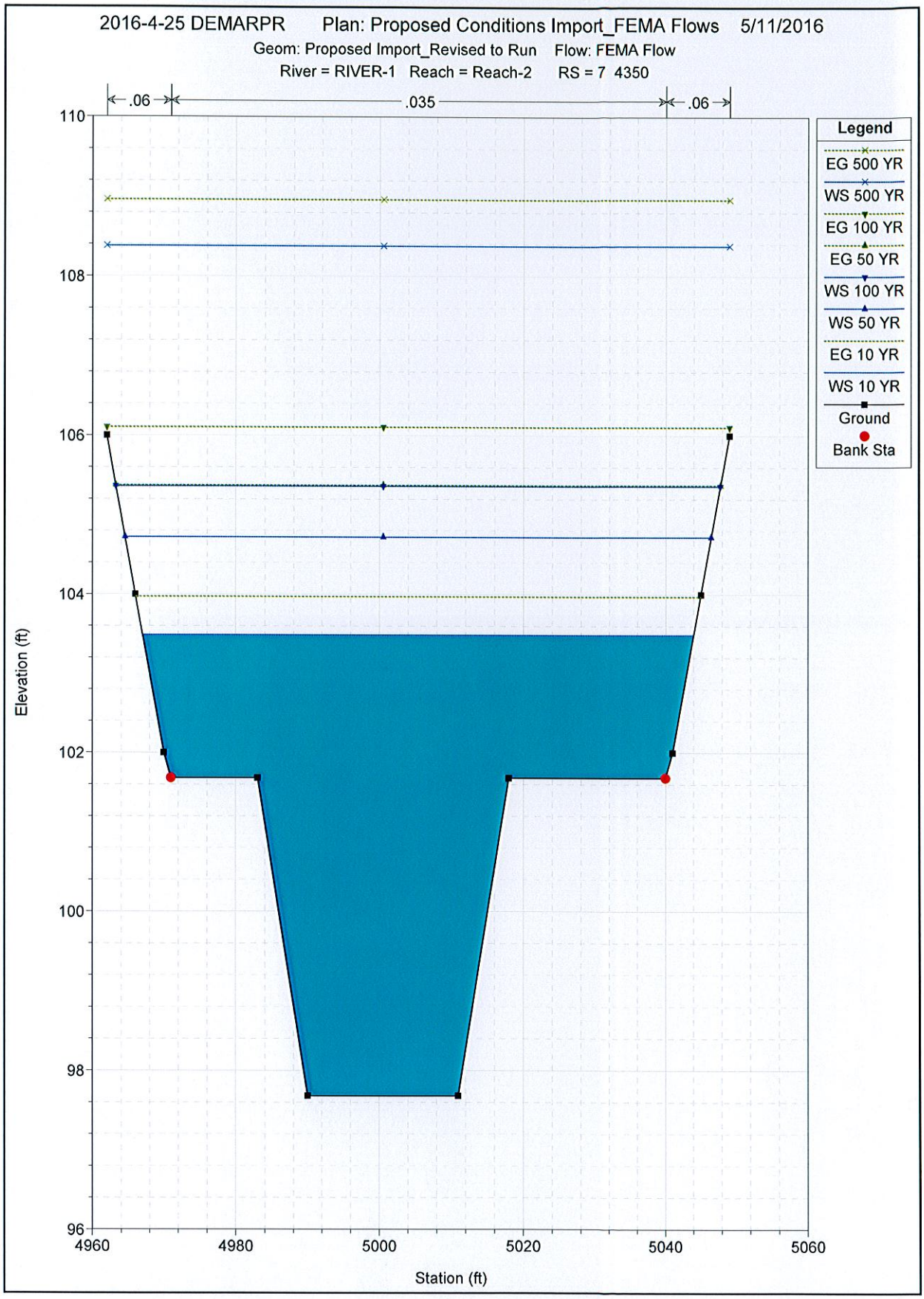

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-2 RS = 12 6035
.06
.035
.06
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
WS 50 YR
EG 10 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
112
110
108
106
104
102
100
4900
4950
5000
5050
5100
5150
Station (ft)

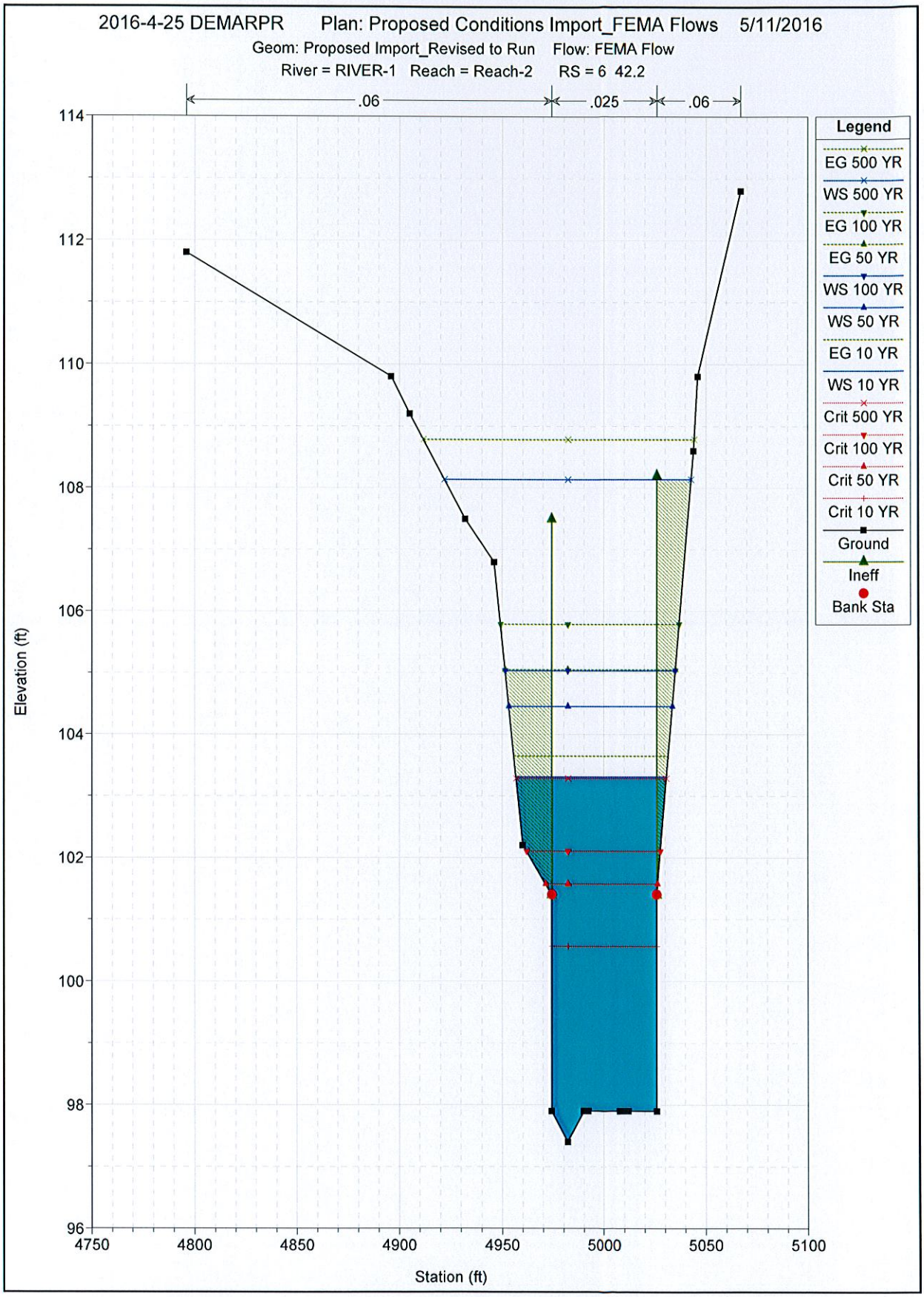

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-2 RS = 11 5800
.06
.035
.06
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
WS 50 YR
EG 10 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
112
110
108
106
104
102
100
4900
4950
5000
5050
5100
Station (ft)

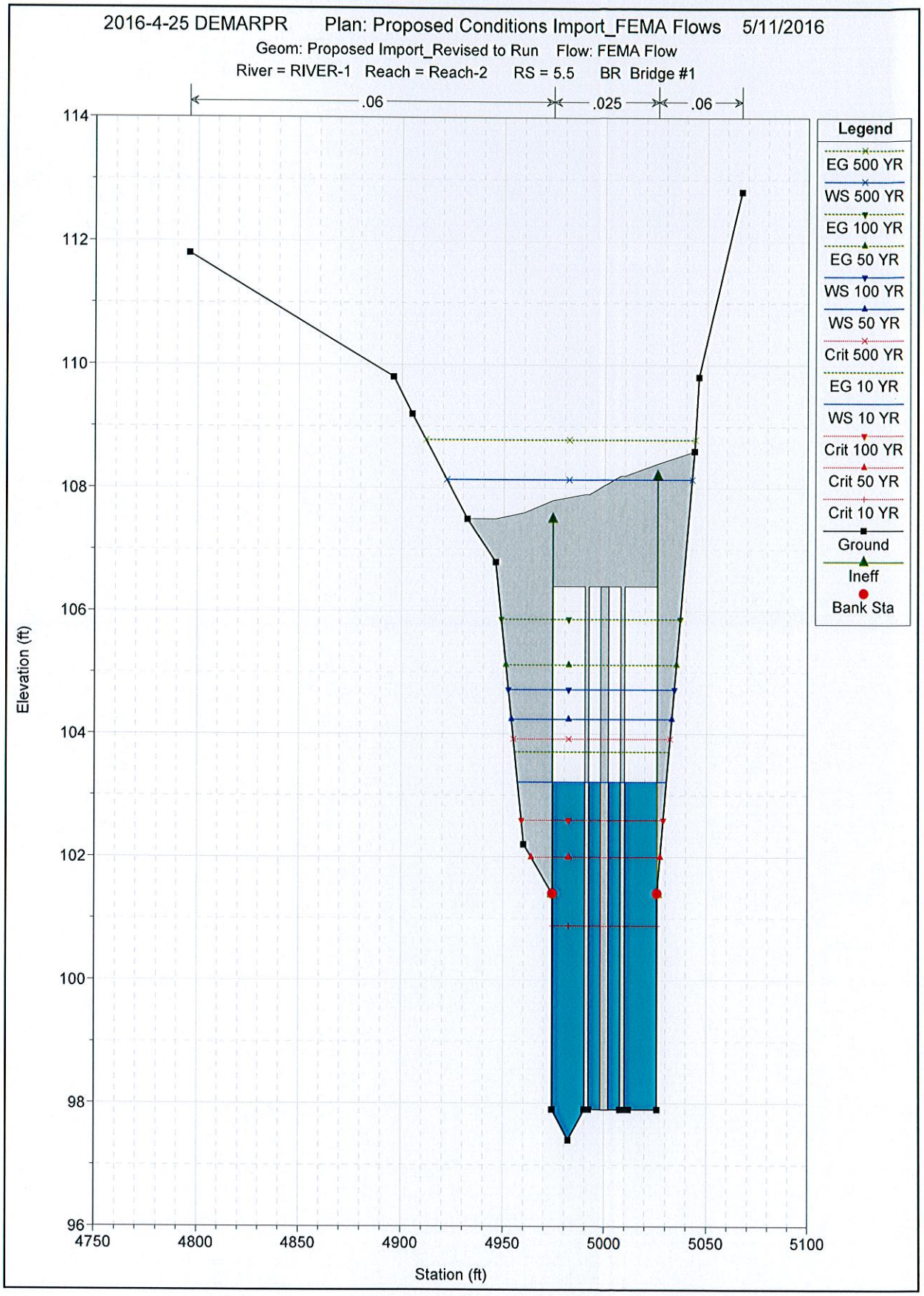

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-2 RS = 10 5500
.06
.035
.06
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
WS 50 YR
EG 10 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
112
110
108
106
104
102
100
98
4920
4940
4960
4980
5000
5020
5040
5060
5080
5100

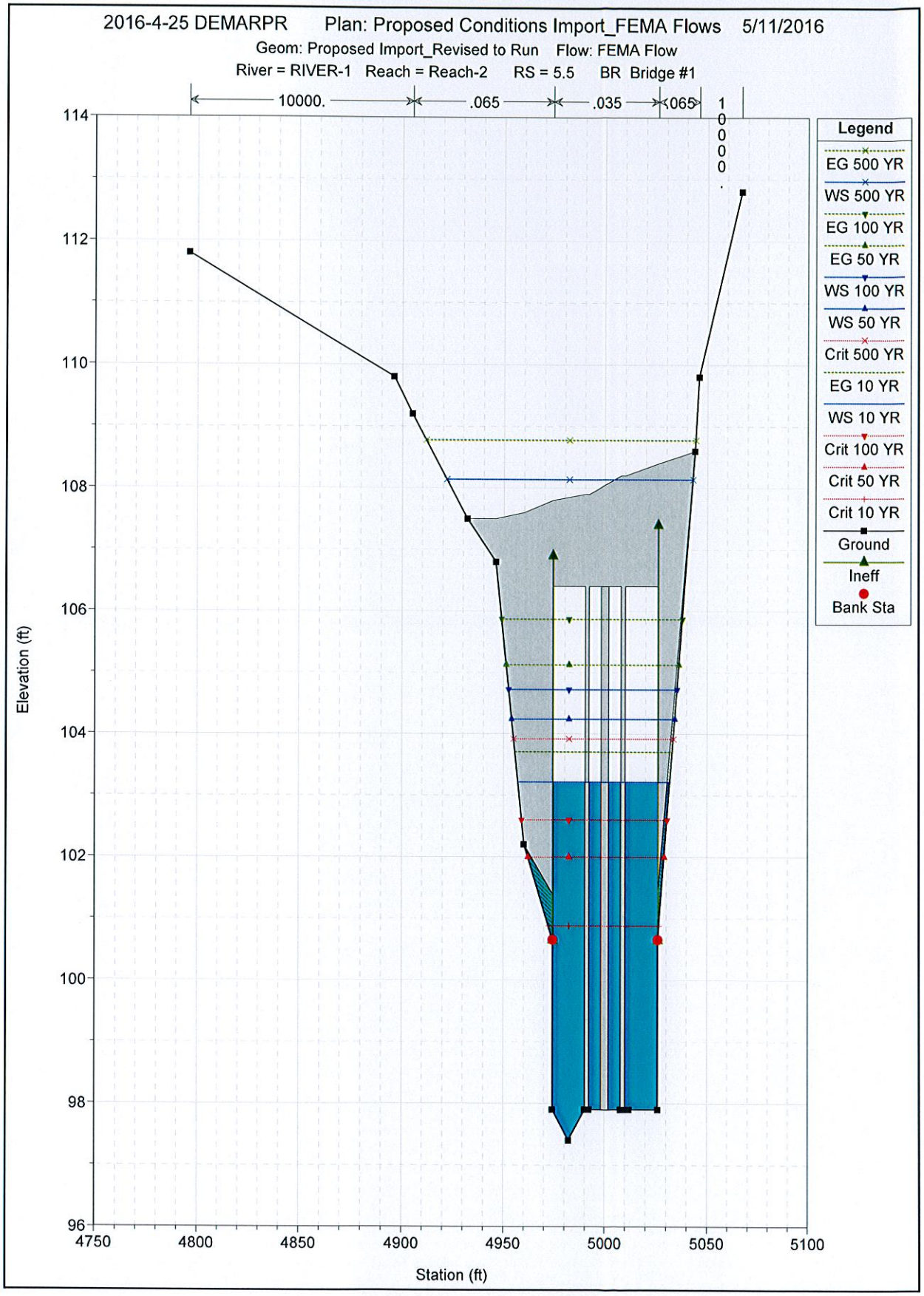

2016-4-25 DEMARPR
Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run
Flow: FEMA Flow
River = RIVER-1 Reach = Reach-2 RS = 9 5100
.06
.035
.06
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
WS 50 YR
EG 10 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
110
108
106
104
102
100
98
4920
4940
4960
4980
5000
5020
5040
5060
Station (ft)

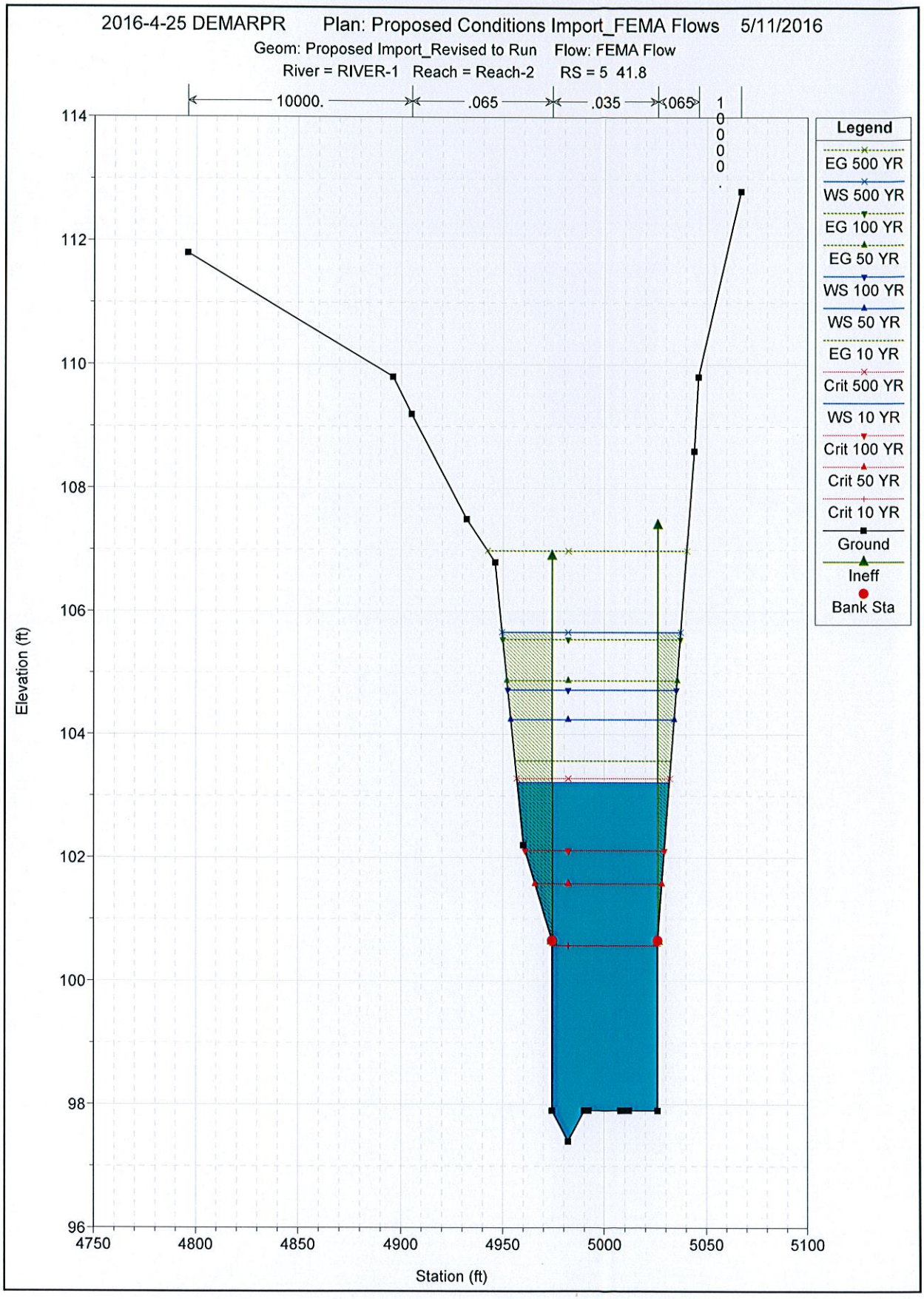

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-2 RS = 8 4750
.06
.035
.06
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
WS 50 YR
EG 10 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
112
110
108
106
104
102
100
98
4940
4960
4980
5000
5020
5040
5060
Station (ft)

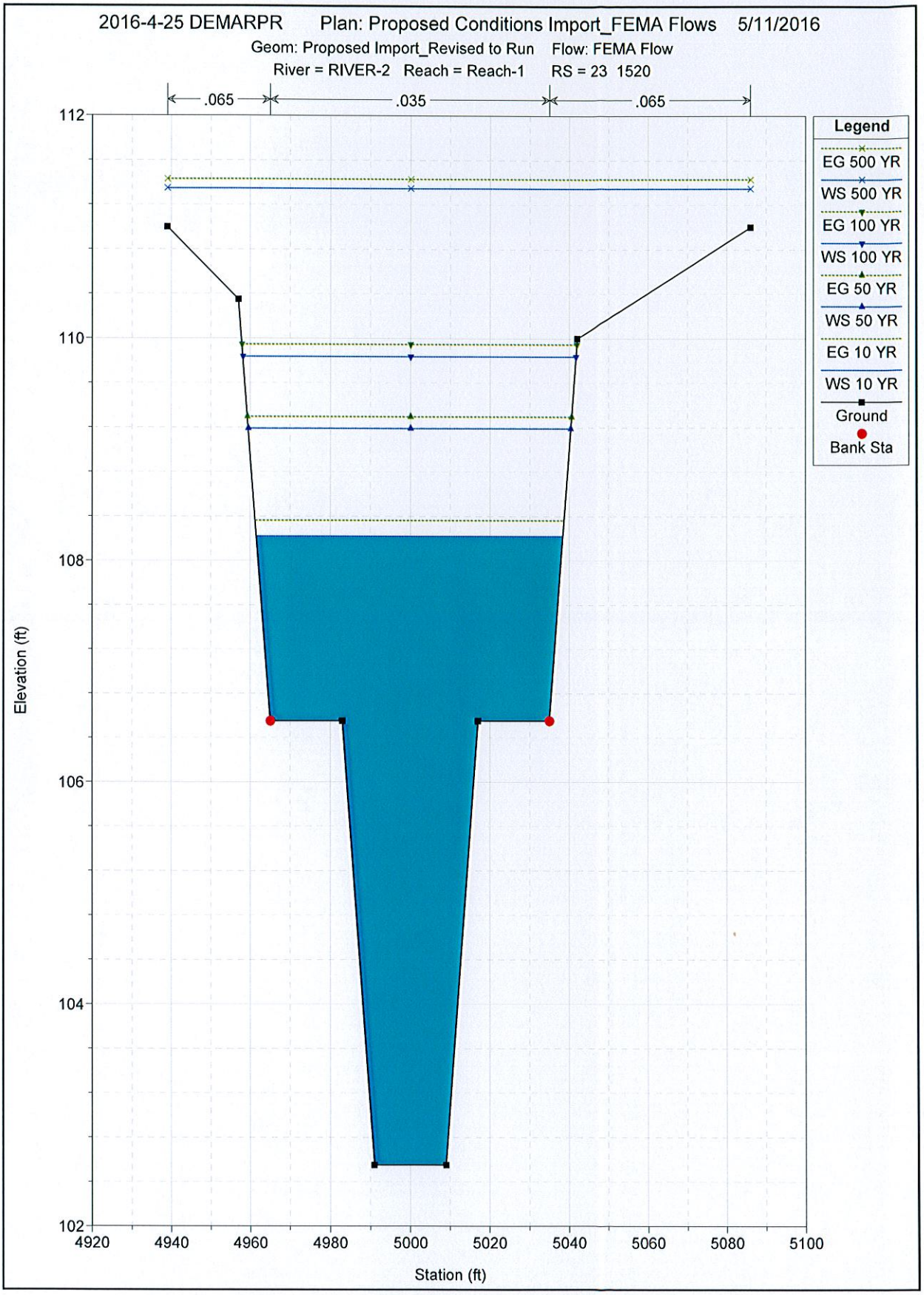

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-2 RS = 7 4350
.06
.035
.06
Legend
EG 500 YR
WS 500 YR
EG 100 YR
EG 50 YR
WS 100 YR
WS 50 YR
EG 10 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
110
108
106
104
102
100
98
96
4960
4980
5000
5020
5040
5060
Station (ft)

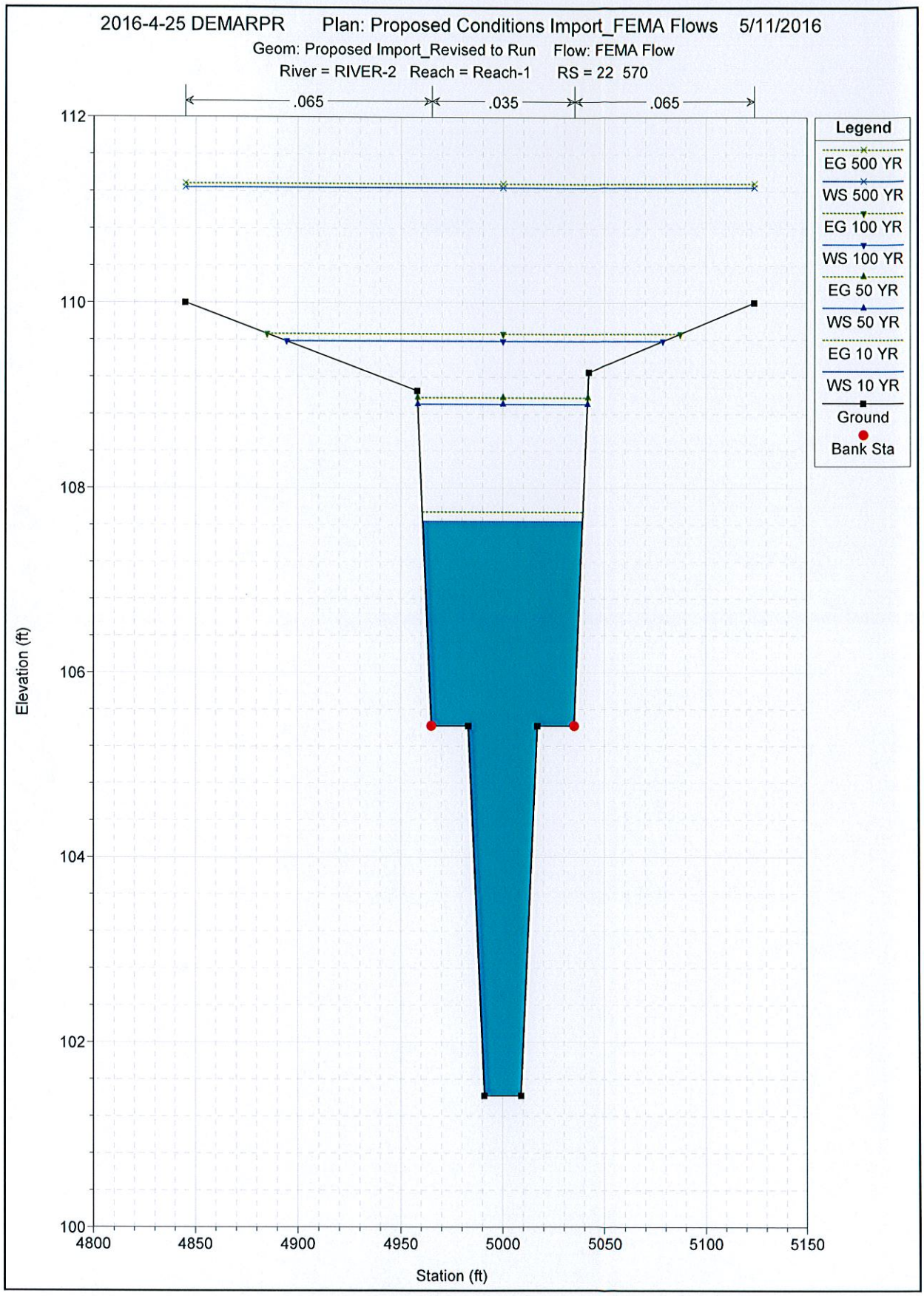

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-2 RS = 6 42.2
.06
.025
.06
Legend
EG 500 YR
WS 500 YR
EG 100 YR
EG 50 YR
WS 100 YR
WS 50 YR
EG 10 YR
WS 10 YR
Crit 500 YR
Crit 100 YR
Crit 50 YR
Crit 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
114
112
110
108
106
104
102
100
98
96
4750
4800
4850
4900
4950
5000
5050
5100
Station (ft)

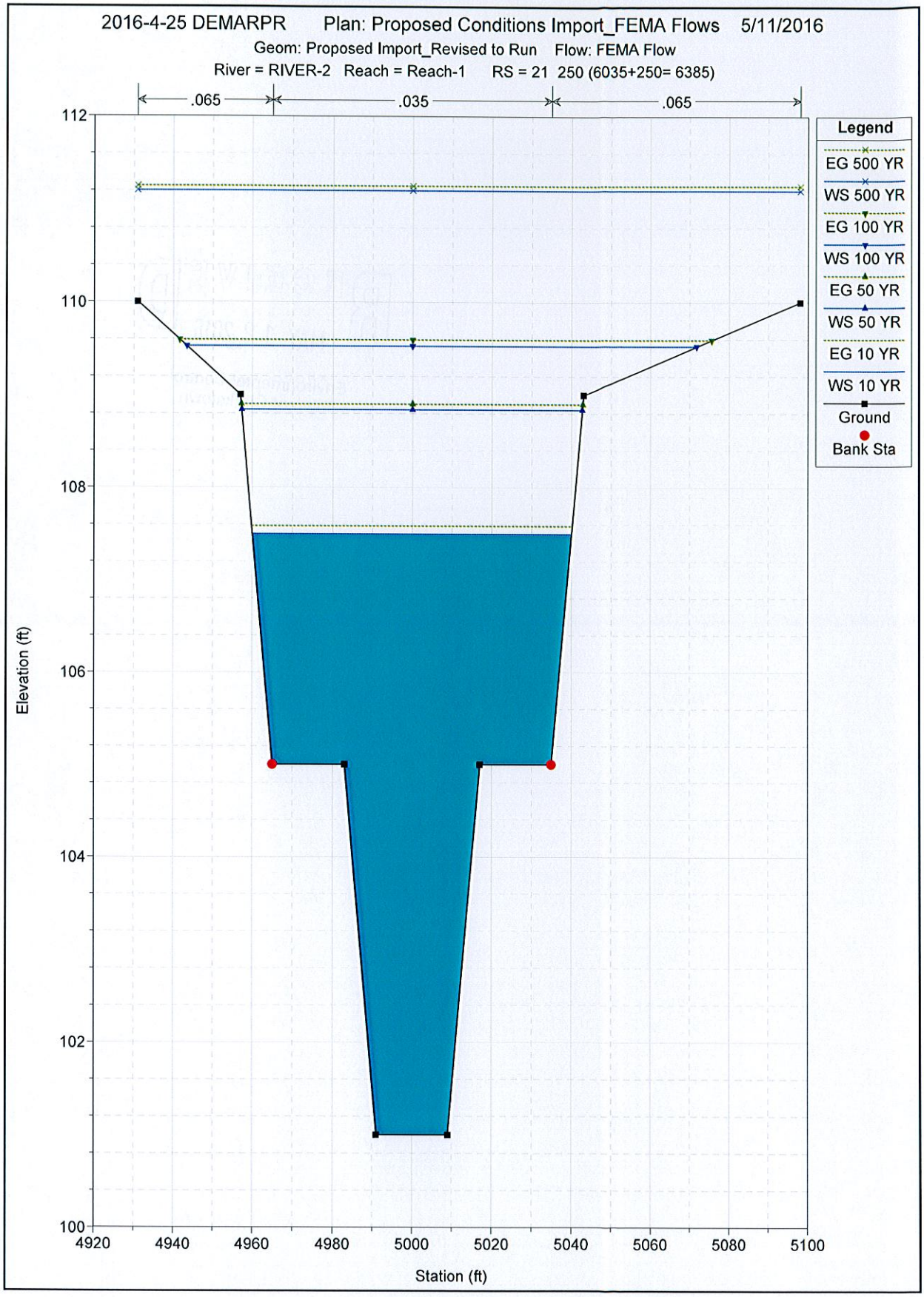

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-2 RS = 5.5 BR Bridge #1
.06
.025
.06
Legend
EG 500 YR
WS 500 YR
EG 100 YR
EG 50 YR
WS 100 YR
WS 50 YR
Crit 500 YR
EG 10 YR
WS 10 YR
Crit 100 YR
Crit 50 YR
Crit 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
114
112
110
108
106
104
102
100
98
96
4750
4800
4850
4900
4950
5000
5050
5100
Station (ft)


2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-2 RS = 5.5 BR Bridge #1
10000.
.065
.035
.065
100000.
Legend
EG 500 YR
WS 500 YR
EG 100 YR
EG 50 YR
WS 100 YR
WS 50 YR
Crit 500 YR
EG 10 YR
WS 10 YR
Crit 100 YR
Crit 50 YR
Crit 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
114
112
110
108
106
104
102
100
98
96
4750
4800
4850
4900
4950
5000
5050
5100


2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-1 Reach = Reach-2 RS = 5 41.8
10000.
.065
.035
.065
10000.
Legend
EG 500 YR
WS 500 YR
EG 100 YR
EG 50 YR
WS 100 YR
WS 50 YR
EG 10 YR
Crit 500 YR
WS 10 YR
Crit 100 YR
Crit 50 YR
Crit 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
114
112
110
108
106
104
102
100
98
96
4750
4800
4850
4900
4950
5000
5050
5100


2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-2 Reach = Reach-1 RS = 23 1520
.065
.035
.065
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
WS 50 YR
EG 10 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
112
110
108
106
104
102
4920
4940
4960
4980
5000
5020
5040
5060
5080
5100
Station (ft)

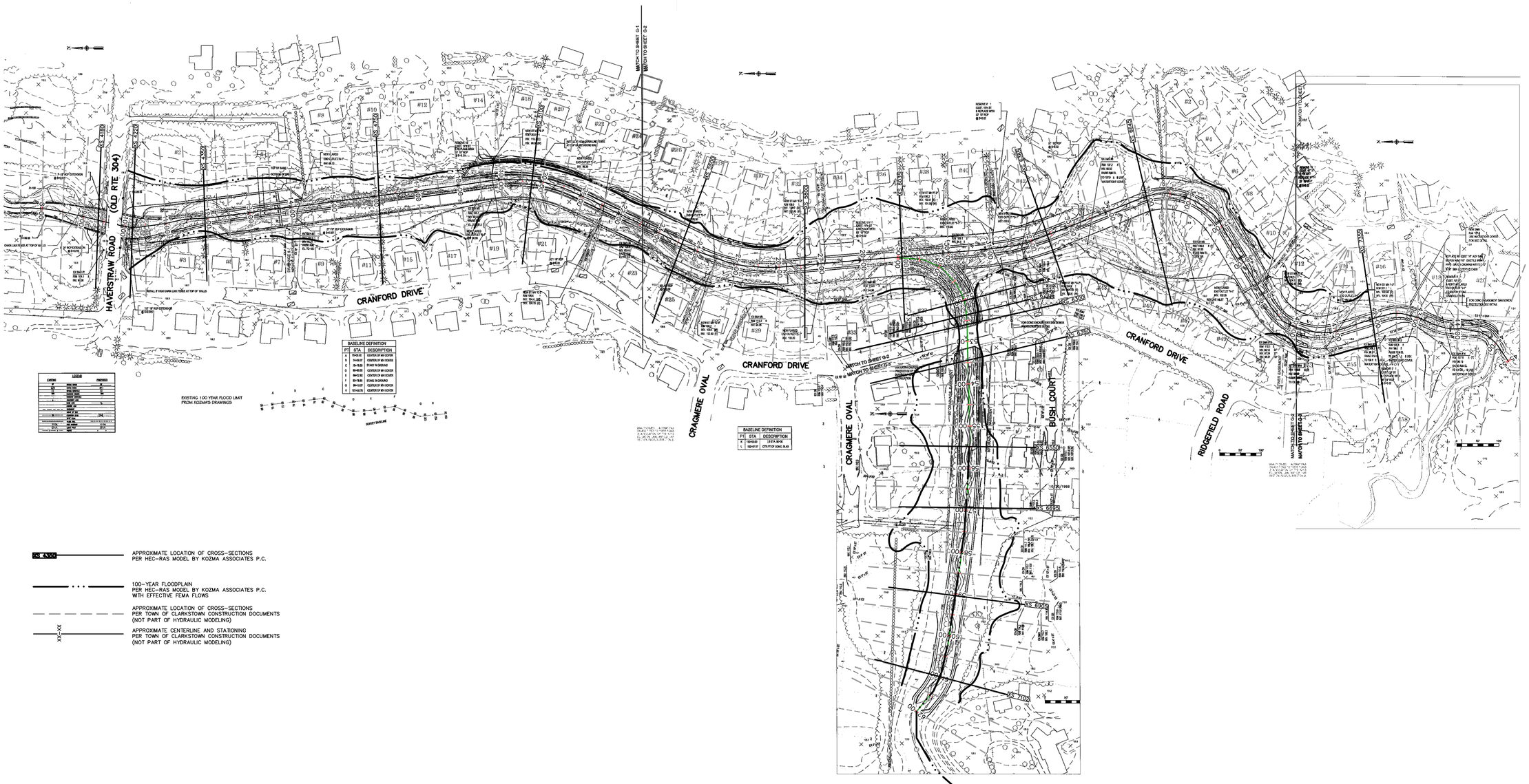

2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-2 Reach = Reach-1 RS = 22 570
.065
.035
.065
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
WS 50 YR
EG 10 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
112
110
108
106
104
102
100
4800
4850
4900
4950
5000
5050
5100
5150
Station (ft)


2016-4-25 DEMARPR Plan: Proposed Conditions Import_FEMA Flows 5/11/2016
Geom: Proposed Import_Revised to Run Flow: FEMA Flow
River = RIVER-2 Reach = Reach-1 RS = 21 250 (6035+250= 6385)
.065
.035
.065
Legend
EG 500 YR
WS 500 YR
EG 100 YR
WS 100 YR
EG 50 YR
WS 50 YR
EG 10 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
112
110
108
106
104
102
100
4920
4940
4960
4980
5000
5020
5040
5060
5080
5100
Station (ft)

DEMAREST KILL - KOZMA ASSOCIATES PROPOSED CONDITIONS
FLOW: EFFECTIVE FEMA 100 YEAR FLOW

River	Reach	River Sta	KOZMA XS#	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
RIVER-2	Reach-1	26		100 YR	914	105.3	111.32	111.32	112.72	0.006154	10.8	159.47	75.22	0.79
RIVER-2	Reach-1	25		100 YR	914	103.1	110.17		110.37	0.001158	5.21	446.95	163.15	0.35
RIVER-2	Reach-1	24		100 YR	914	103	109.94		110.18	0.000966	4.8	398.1	154.1	0.32
RIVER-2	Reach-1	23	**7355**	100 YR	914	102.55	109.84		109.95	0.000518	2.69	356.29	83.58	0.22
RIVER-2	Reach-1	22	**6645**	100 YR	914	101.42	109.58		109.66	0.000296	2.28	450.81	184.14	0.17
RIVER-2	Reach-1	21	**6385**	100 YR	914	101	109.52		109.59	0.00024	2.13	471.97	128.31	0.15
RIVER-1	Reach-1	19	**6550**	100 YR	2612	103.8	113.67		113.81	0.000564	4.42	1144.55	202.51	0.25
RIVER-1	Reach-1	18	**6350**	100 YR	2612	103.4	113.57	108.97	113.75	0.000153	4.32	1547.12	348.5	0.24
RIVER-1	Reach-1	17.5			Bridge									
RIVER-1	Reach-1	17	**6300**	100 YR	2612	103.4	108.98	108.96	111.76	0.010028	13.37	195.3	97.99	1
RIVER-1	Reach-1	16	**6252**	100 YR	2612	103.4	108.99	108.61	110.86	0.00841	10.99	244.56	60.94	0.87
RIVER-1	Reach-1	15		100 YR	2612	102.2	109.39		110.45	0.003512	8.29	326.83	65.24	0.57
RIVER-1	Reach-1	14		100 YR	2612	102.2	108.82		110.22	0.00536	9.57	288.18	67.84	0.71
RIVER-1	Reach-1	13	**6220**	100 YR	2612	101	109.05		109.97	0.002803	7.73	357.45	71.28	0.52
RIVER-1	Reach-2	12	**6035**	100 YR	2612	100.44	108.92		109.36	0.001613	5.39	557.5	201.07	0.4
RIVER-1	Reach-2	11	**5800**	100 YR	2612	100.06	108.5		108.96	0.0017	5.5	504.86	118.65	0.41
RIVER-1	Reach-2	10	**5500**	100 YR	2612	99.51	107.93		108.38	0.001682	5.47	505.67	99.72	0.4
RIVER-1	Reach-2	9	**5100**	100 YR	2612	98.86	107.22		107.68	0.001746	5.53	508.37	114.8	0.41
RIVER-1	Reach-2	8	**4750**	100 YR	2612	98.31	106.59		107.07	0.001836	5.62	489.61	97.39	0.42
RIVER-1	Reach-2	7	**4350**	100 YR	2612	97.68	105.36		106.1	0.003037	6.97	395.79	84.45	0.53
RIVER-1	Reach-2	6	**4220**	100 YR	2612	97.4	105.04	102.1	105.79	0.001166	6.96	375.14	83.73	0.46
RIVER-1	Reach-2	5.5			Bridge									
RIVER-1	Reach-2	5	**4180**	100 YR	2612	97.4	104.72	102.1	105.55	0.002562	7.28	358.77	82.9	0.49
RIVER-1	Reach-2	4		100 YR	2612	97.2	104.16		104.85	0.002906	7.09	480.45	164.26	0.51
RIVER-1	Reach-2	3		100 YR	2612	97	103.12		103.52	0.004021	7.91	830.68	271.22	0.61
RIVER-1	Reach-2	2		100 YR	2612	92.3	100.34		100.48	0.001301	5.41	1249.34	281.71	0.36
RIVER-1	Reach-2	1		100 YR	2612	91.5	97	95.75	97.29	0.005001	7.6	850.85	301.05	0.66

RECEIVED
MAY 12 2016
Environmental Control
Town of Clarkstown



APPROXIMATE LOCATION OF CROSS-SECTIONS PER HEC-RAS MODEL BY KOZMA ASSOCIATES P.C.

100-YEAR FLOODPLAIN PER HEC-RAS MODEL BY KOZMA ASSOCIATES P.C. WITH EFFECTIVE FEMA FLOWS

APPROXIMATE LOCATION OF CROSS-SECTIONS PER TOWN OF CLARKSTOWN CONSTRUCTION DOCUMENTS (NOT PART OF HYDRAULIC MODELING)

XX-XX APPROXIMATE CENTERLINE AND STATIONING PER TOWN OF CLARKSTOWN CONSTRUCTION DOCUMENTS (NOT PART OF HYDRAULIC MODELING)

FLOODPLAIN WORKMAP
CRANFORD DRIVE FLOOD AMELIORATION

APPROXIMATE SCALE: 1" = 100'

REV	DESCRIPTION	BY	DATE
1	REVISED FLOODPLAIN	MB	10/18/16

DISCLAIMER:
UNAUTHORIZED ALTERATION OR ADDITIONS TO THESE PLANS IS A VIOLATION OF THE N.Y.S. EDUCATION LAW, ARTICLE 145, SECTION 7209, SUBSECTION 2.

BROOKER ENGINEERING, PLLC
PROFESSIONAL ENGINEERS AND LAND SURVEYORS
LAND DEVELOPMENT • MUNICIPAL • STRUCTURAL • HYDROLOGICAL • SURVEYING
www.BrookerEngineering.com
74 Lafayette Avenue, Suite 501
Suffern, NY 10901
(845) 357-4411
46 N. Central Avenue
Ramsey, NJ 07446
(201) 684-1221

PROJECT:
CRANFORD DRIVE
TOWN OF CLARKSTOWN
ROCKLAND COUNTY
NEW YORK

TITLE:
FLOODPLAIN WORKMAP

PROJECT NO:	DRAWN:	CHECKED:
14099	MB	KD

SCALE: 1"=100'

GRAPHIC SCALE: 0 100' 200'

DATE: 5/11/16

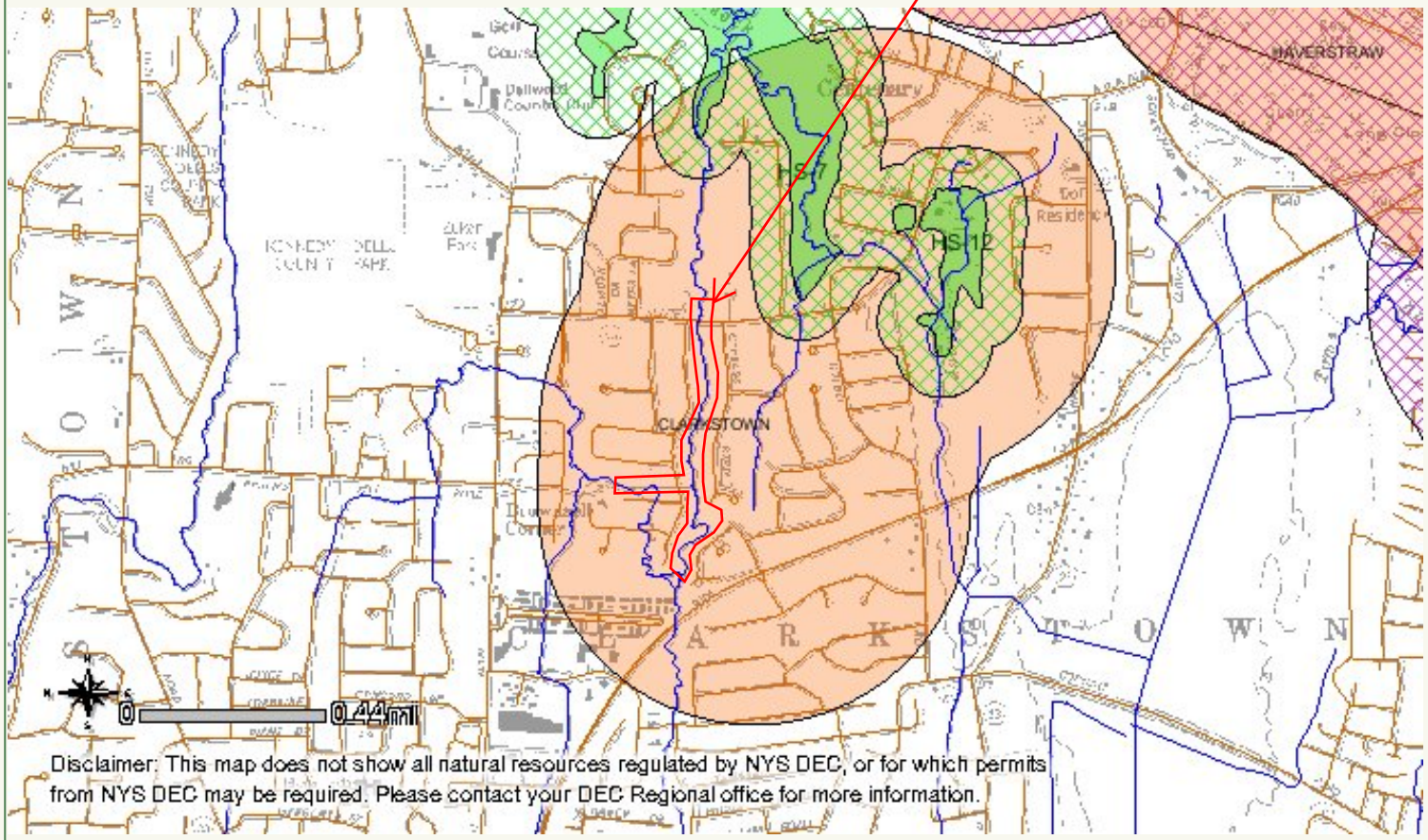
DRAWING NO: 1

P:\BREL\14099\Cranford Drive\Dwg\2016-4 Cross Section Analysis.dwg, 10/18/2016 6:13:32 PM, MBrusch

Attachment 3

NYSDEC Environmental Resource Map,
USFWS NWI Map,
USFWS Coastal Barrier Map,
FEMA FIRMette Maps,
NYS Coastal Boundary Map,
and USFWS Wild & Scenic River Map

Please set your printer orientation to "Landscape".



MinX: 583047, MaxX: 588376, MinY: 4558908, MaxY: 4556475

Visible Layers

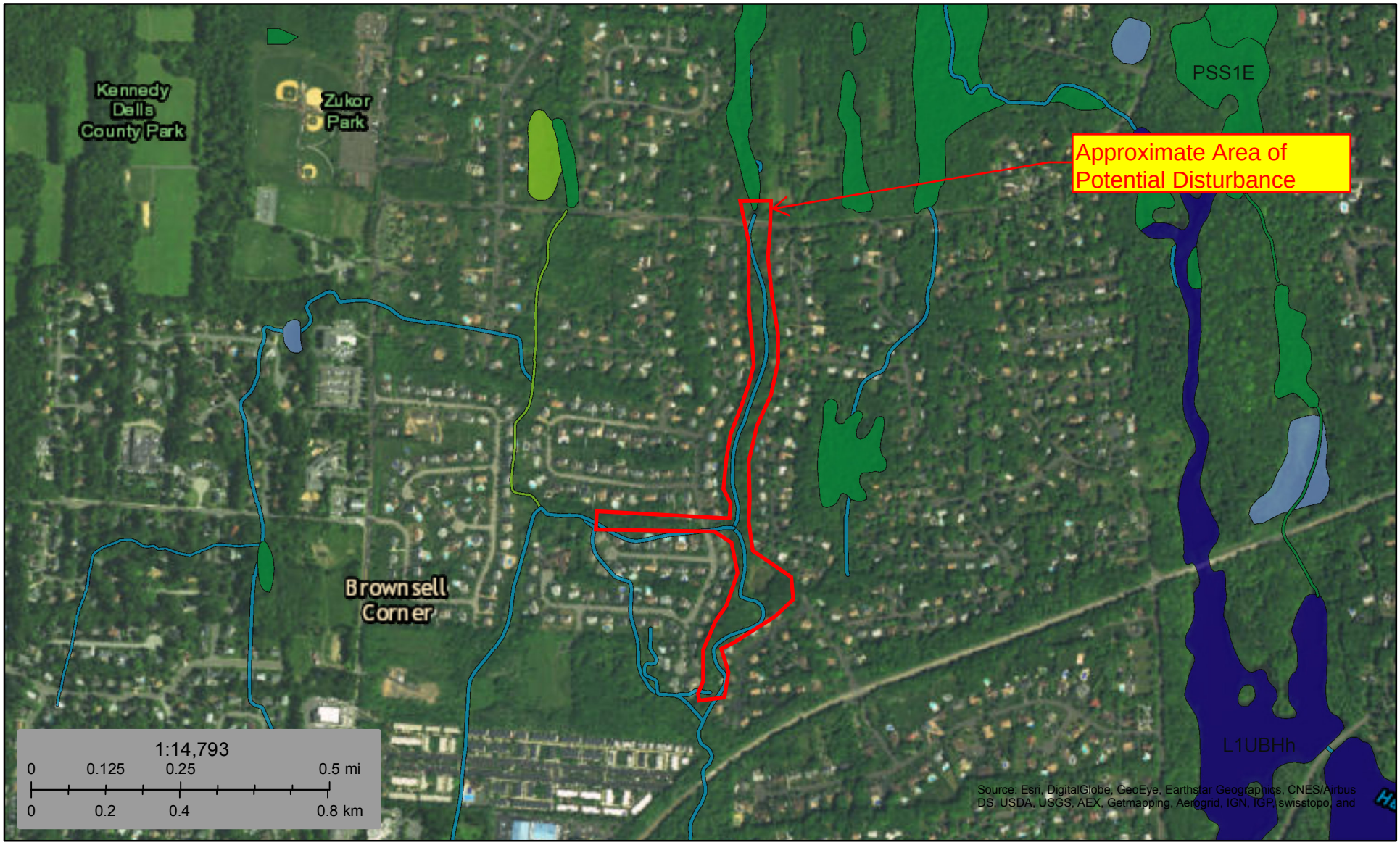
- Classified Streams
- Classified Ponds
- State-Regulated Freshwater Wetlands
- Wetland Checkzone
- State-Regulated Freshwater Wetlands
- Rare Plants and Rare Animals
- Significant Natural Communities Buffered
- Natural Communities Nearby
- Significant Natural Communities
- Interstate Highways
- Adirondack Park Boundary
- Counties

Disclaimer:This map was prepared by the New York State Department of Environmental Conservation

U.S. Fish and Wildlife Service

National Wetlands Inventory

Wetlands

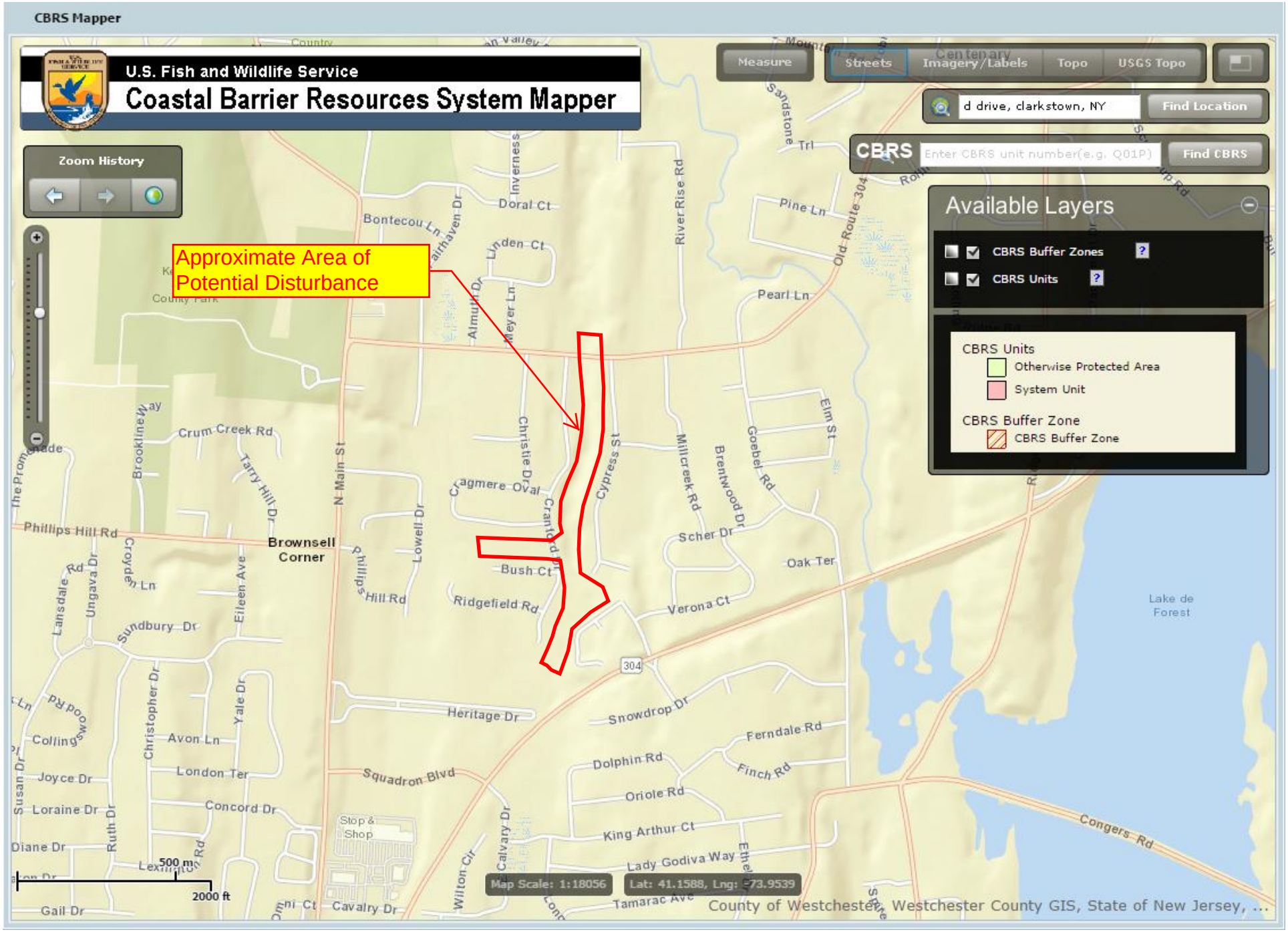


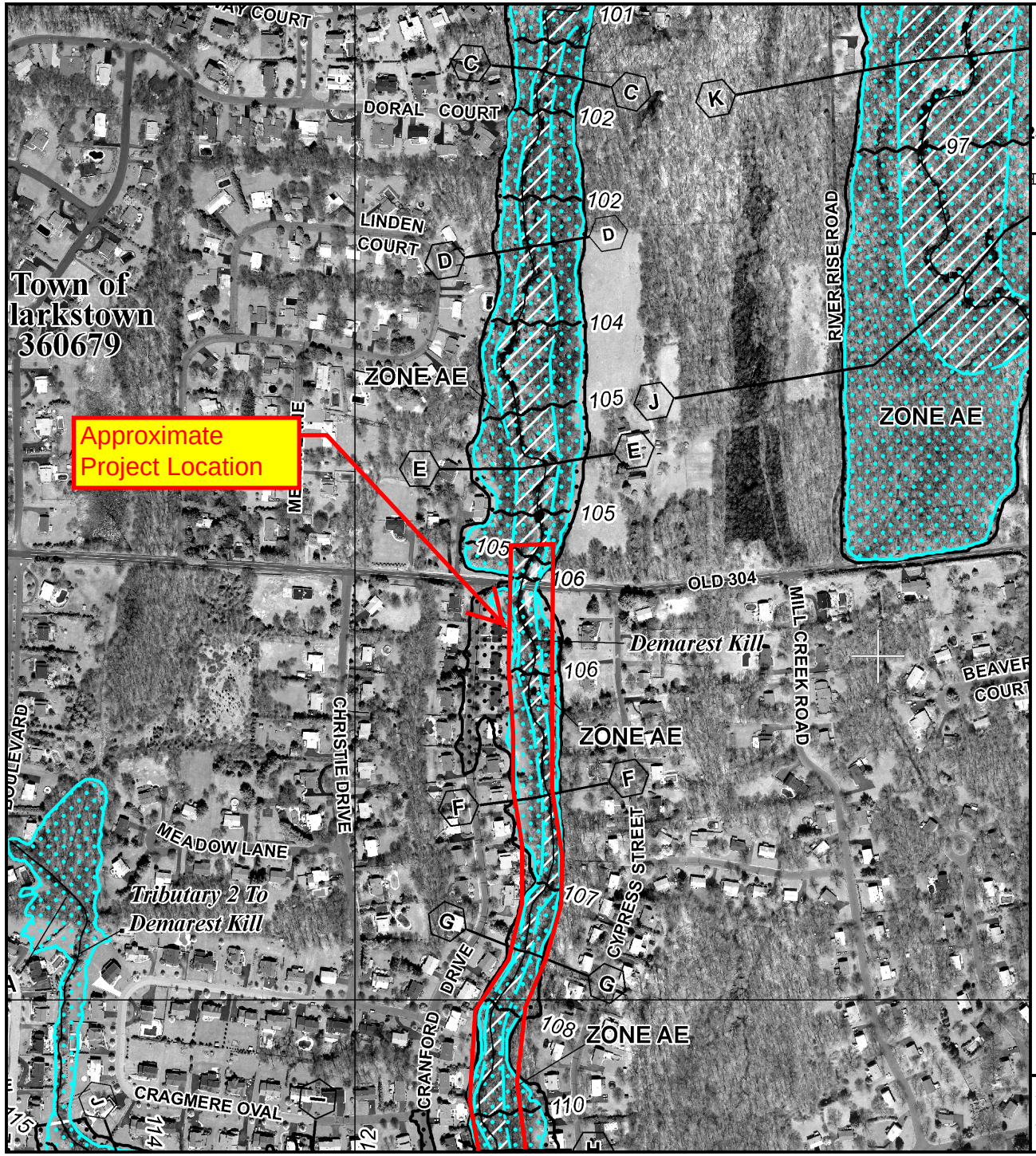
August 10, 2016

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

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.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper


CBRS Mapper
U.S. Fish and Wildlife Service
Coastal Barrier Resources System Mapper
Measure
Streets
Imagery/Labels
Topo
USGS Topo
d drive, clarkstown, NY
Find Location
CBRS
Enter CBRS unit number(e.g. Q01P)
Find CBRS
Zoom History
Approximate Area of Potential Disturbance
Available Layers
CBRS Buffer Zones
CBRS Units
CBRS Units
Otherwise Protected Area
System Unit
CBRS Buffer Zone
CBRS Buffer Zone
Brownsell Corner
Lake de Forest
Map Scale: 1:18056
Lat: 41.1588, Lng: -73.9539
County of Westchester, Westchester County GIS, State of New Jersey, ...



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0111G

FIRM

FLOOD INSURANCE RATE MAP

for ROCKLAND COUNTY, NEW YORK
(ALL JURISDICTIONS)

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER
CLARKSTOWN, TOWN OF	360679
HAVERSTRAW, VILLAGE OF	360682

PANEL 111 OF 207

MAP SUFFIX: G

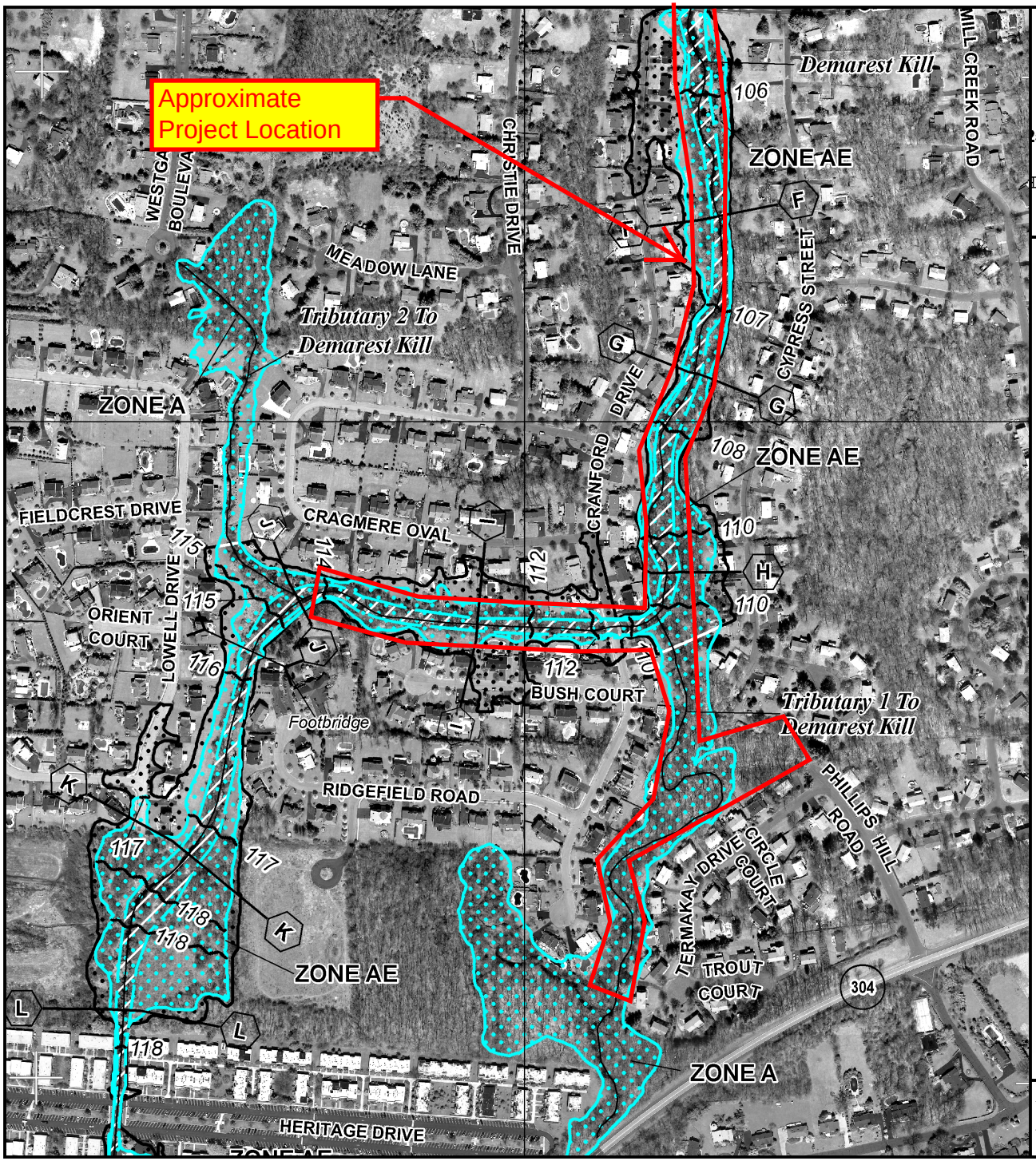
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36087C0111G

EFFECTIVE DATE
MARCH 3, 2014

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



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0111G

FIRM

FLOOD INSURANCE RATE MAP

for ROCKLAND COUNTY, NEW YORK
(ALL JURISDICTIONS)

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER
CLARKSTOWN, TOWN OF	360679
HAVERSTRAW, VILLAGE OF	360682

PANEL 111 OF 207

MAP SUFFIX: G

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
36087C0111G

EFFECTIVE DATE
MARCH 3, 2014

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

Welcome to the NYS Coastal Boundary Map

Help

Search

Address:

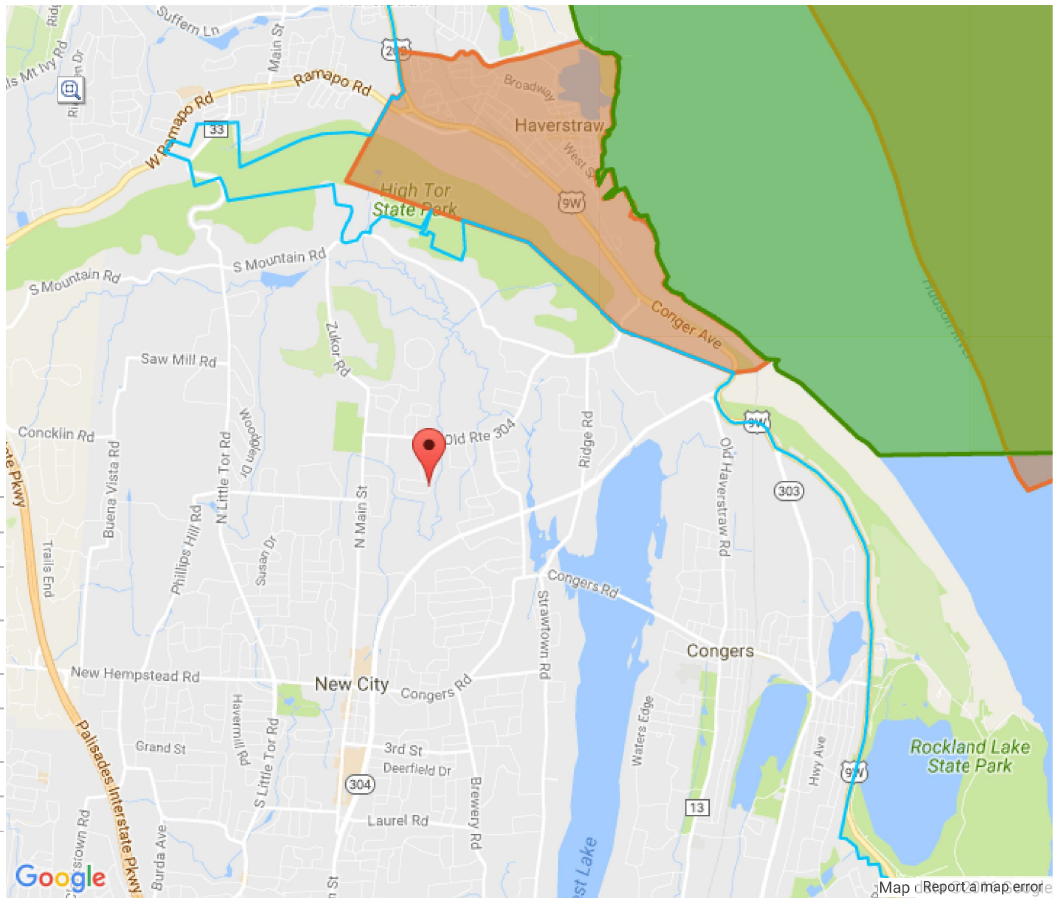
cranford drive, New City, NY

Find Address

Please note that the address marker is automatically placed along the street while certain activities may take place along the waterward property boundary. Please make sure to click and drag the marker to the exact location of the proposed activity for an accurate assessment of whether or not the activity would be located within any DOS Special Management Areas.

Layers

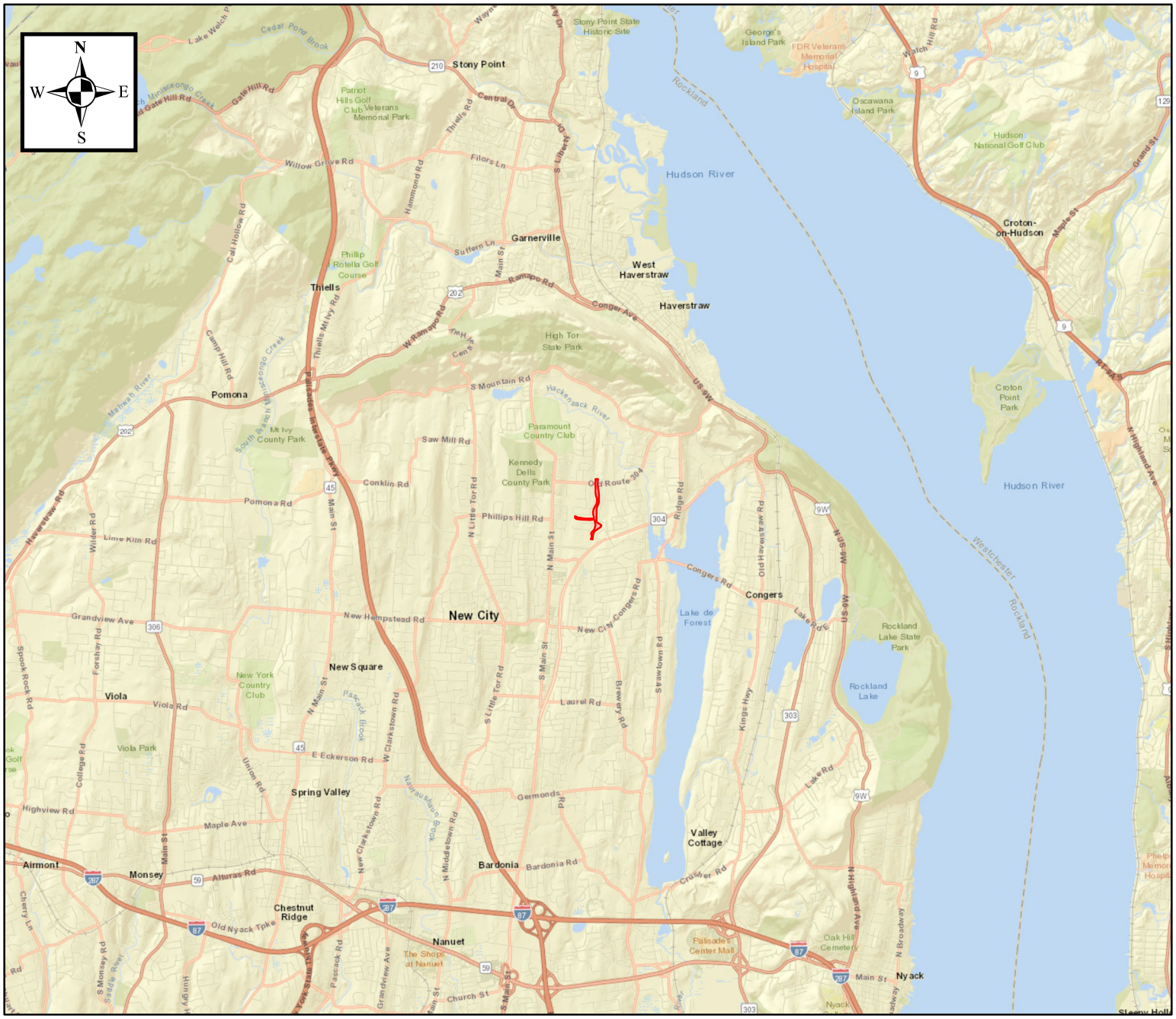
- Landward Coastal Boundary
- Scenic Areas
- Local Waterfront Revitalization Areas
- Local Waterfront Revitalization Program Communities
- Significant Coastal Fish and Wildlife Habitats
- DOS Identified Canals
- Long Island Sound CMP (excludes LWRP communities)
- Federally Owned Lands
- Native American Lands



Latitude: 42.803 Longitude: -75.399

The New York State Department of State makes every effort to post accurate and reliable information on this website. The Department of State does not guarantee or warrant that the information on this web site is complete, accurate or current. The information on this website is intended solely for the purpose of electronically providing the public with general coastal consistency-related information and convenient access to data resources. The Department of State neither assumes responsibility for the use or application of any material posted on this website nor responsibility for any error, omission or other discrepancy between the electronic and printed versions of documents.

National Wild and Scenic Rivers System



TECTONIC
Practical Solutions, Exceptional Service

0 6,250 12,500 25,000 Feet

1:100,000

CRANFORD DRIVE DRAINAGE IMPROVEMENTS
Cranford Drive
North of Old Route 304 to the intersection
of Cranford Drive with Route 304
New City Hamlet, Town of Clarkstown
Rockland County, New York

Legend

Cranford Project Area

National Wild and Scenic Rivers

Created: 11/11/2016
Source data: The National Wild and Scenic Rivers System database was provided by the USFWS.

Attachment 4

Executive Orders Compliance Analysis – Wetlands Protection (EO 11990) & Floodplain Management (EO 11988) Determination

Clarkstown: Cranford Drive Drainage Improvements
EO 11990 Wetland Protection & EO 11988 Floodplain Management Determination
Commercial & Economic Development Initiative within NY State Community Development Block Grant Disaster Recovery Program
January 5, 2017

Introduction & Overview
The purpose of Executive Order 11988, Floodplain Management, is "to avoid to the extent possible the long- and short-term adverse impacts associated with occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative." The purpose of Executive Order (EO) 11990, Protection of Wetlands, is "to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." This report contains the analysis prescribed by 24 CFR Part 55.

This project involves United States Department of Housing and Urban Development (HUD) Community Development Block Grant Program – Disaster Recovery (CDBG-DR) funding for redesigning the existing on-site drainage infrastructure, installing a new drainage system using green infrastructure practices, and streambed restoration, stabilization, and reinforcing within the Town of Clarkstown. The analysis that follows focuses on floodplain and wetland impacts, as there are direct wetland and floodplain impacts associated with this project. Based on the type of land use and facility and other case characteristics described herein, it is concluded that there is a reasonable basis to proceed with funding for this project/ activity within floodplain and wetland. The CDBG-DR funding is administered through the New York State Rising Community Reconstruction Program which is using bottom-up community participation and State-provided technical expertise to develop resilient and sustainable communities. Thus, alternatives preventing or impeding the development of resilient and sustainable communities are not considered reasonable alternatives.

Description of Proposed Action & Land Use
The proposed project is a stormwater management improvement and flood control measures project involving the modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to maintain future 100-year flood levels within the stream channel. The redesign of the stream channel incorporates a multi-channel design including a normal low flow channel (thalwag), a bank full channel, and the floodplain channel. Backflow preventers will be installed at all drainage pipes out letting into the stream channel to prevent backflow from the channel flooding onto the roadway.

The project designs include rock cross-vein, weirs, and strategic boulder placement as low flow diversion devices which create diverse stream channel habitat. Stream bank stabilization and restoration will be realized with the placement of armored channel lining, brush matting, fiber rolls, boulders, and retaining walls. As the stream stabilization and restoration work is completed, habitat improvement including complete forestation along the stream banks will be implemented.

Approximately 2,150 linear feet of the Demarest Kill between Old Route 304 and Cranford Drive, will be realigned. There will be channel widening along 1,200 feet of the channel along Bush Court, and there will be 1,550 linear feet of alignment of its tributary measured upstream from its confluence with Demarest Kill. Project plans do not call for piped sections and do not involve alterations of the bridges at Old Route 304 or at Cranford Drive.

The project will entail approximately 7,470 cubic yards (CY) of material removal at the site. Approximately 18,841 CY of top-soil will be stripped and stockpiled, and 11,140 CY of that stockpile will be respread on the site. Excavated boulders and stone will be reused in the channels for stabilization,

and the excess soils will be disposed of at New York State Department of Conservation (NYSDEC) approved locations.

Applicable Regulatory Procedure Per EO 11988
The proposed action corresponds with a noncritical action not excluded under 24 CFR §55.12(b) or (c). Funding is permissible for the use in the floodplain if the proposed action is processed under §55.20 and the findings of the determination are affirmative to suggest that the project may proceed.

Based on online data, including data managed and updated by the U.S. Fish & Wildlife Service (USFWS) and New York State Department of Environmental Conservation (NYSDEC), there will be direct construction within and immediately adjacent to mapped wetlands at the proposed project location. Thus, in accordance with the decision-making process set forth in 24 CFR Part 55, this analysis focuses on wetlands and floodplains.

According to 24 CFR §55, the activity planned to replace structures occurs in a community, Town of Clarkstown, that participates in the regular program of the National Flood Insurance Program (NFIP) and the community is currently in good standing. This project involves the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. Because the project involves new construction in wetland, the full eight-step floodplain determination process in §55.20 is required. The following analysis examines each step in a floodplain management determination process.

***Step 1.* Determine Whether the Proposed Action is Located in the 100-year Floodplain (500-year for Critical Actions) or results in New Construction in Wetlands.**
The location of the proposed action, per the applicable FEMA flood map Firmette, is within 100-year floodplain (SFHA - AE Zone). There is an established Base Flood Elevation (BFE) of approximately 105 to 115 feet across the proposed project area. This action requires a Section 404 permit under the Clean Water Act (see 55.20(a)(1)).

***Step 2.* Initiate Public Notice for Early Review of Proposal.**
Because the proposed project is located in floodplain and wetlands, the Governor's Office of Storm Recovery (GOSR) published an early notice that allowed for public and public agency input on the decision to provide funding for reconstruction and development activities. The early public notice and 15-day comment period is complete. No public comments were received.

The early notice and corresponding 15-day public comment period started on September 9, 2016 with the "Notice of Early Public Review of a Proposed Activity in Wetlands and 100-Year Floodplain" being published in Rockland Journal News newspaper, with the 15-day period expiring on September 26, 2016. The notice targeted local residents, including those in the floodplain. The notice was also sent to the following state and federal agencies on September 9, 2016: Federal Emergency Management Agency (FEMA); USFWS; U.S. Environmental Protection Agency (EPA); U.S. Fish and Wildlife Service; HUD; U.S. Army Corps of Engineers (USACE); NYSDEC; NYS Department of Transportation; and New York State Office of Emergency Management. The notice was also sent to Rockland County and the Town of Clarkstown. (See **Attachments 1** and **2** of this EO 11990 Wetlands Protection and EO 11988 Floodplain Management Determination for the letter distributed to these agencies and the associated newspaper notice affidavit).

***Step 3.* Identify and Evaluate Practicable Alternatives to Locating the Proposed Action in a 100-year Floodplain (or 500-year Floodplain if a Critical Action) or Wetland.**
The New York State Rising Community Reconstruction Program is structured to provide eligible communities resources and expertise to build resilience to future flooding events. This community was impacted by Hurricane Irene and Superstorm Sandy, during which flooding occurred along Cranford

Drive. This flooding forced road closures in the area due to floodwaters overwhelming the existing culverts and bridges. Given the scope of the proposed action to redesign existing onsite drainage infrastructure, install new drainage systems using green infrastructure practices, and to implement streambed restoration, stabilization, and reinforcing, potential alternatives must be considered in order to try and mitigate the amount of damage from future flood events.

One potential alternative is to construct a detention basin along the southern tributary of Demarest Kill. This alternative was analyzed to determine the potential of reducing peak flood flows by constructing a detention basin upstream from the crossing of the Demarest Kill with NYS Route 304. The potential detention basin considered had spatial limitations both in lateral extent and in depth by the existence of residences surrounding the potential site. These limitations have a direct influence on the available storage capacity that could be achieved. The HEC-1 calculations were computed and the results of the analysis were compared. The analysis revealed that the 15-, 25-, 50- and 100-year flood flows could only be reduced by less than 12 percent. The corresponding drop in flood stages at the proposed project site were modelled to be minimal and, thus, it was determined that the detention basin alternative would be ineffective.

A second alternative is to relocate the stream. The Town of Clarkstown has stated that changing the location of the stream is not feasible and would be cost prohibitive, especially because residential homes would have to be bought out in order to create space for relocating the stream.

A third alternative involves the buyout of residential homes along Cranford Drive. The Town of Clarkstown has stated that purchasing the homes at approximately $800,000 per dwelling would have a total cost in excess of $12 million. This alternative is not financially feasible and would displace current residents from the community.

A fourth alternative involves raising residential structures two feet above the 100-year BFE. This alternative would cost in excess of $200,000 per dwelling for a total cost of over $6 million, in addition to any temporary relocation fees. This alternative is not financially feasible and would not alleviate flooding of residential yards or urban waste deposited into the stream from surrounding yards during flood events.

A fifth alternative involves a reduced version of the project scope. The amended design would reduce the footprint of the project by not realigning the southern tributary portion of the project. The design was submitted to the USACE for review in 2011. The reduced design was also shown to the residents in the project area to get feedback on which project they preferred. The Town stated, as part of the alternatives analysis presented, that the reduced version, although having less impact on the channel, does not provide the proper mitigation to the flooding problems in the area.

The No Action alternative was considered and rejected by the Town of Clarkstown. No action would provide zero benefit to the residents and the Town. Flooding conditions in the areas of Cranford Drive and Bush Court, Termakay Drive and the end of Cypress Street have historically caused damage to residences and blocked access for emergency vehicles. Major storm events are likely to continue to occur. Thus, flooding of low lying areas and residences during major storm events would continue to occur if no action were taken causing costly property damage and potentially fatalities.

The above identified alternatives will be re-evaluated in response to public comments received.

Step 4. **Identify & Evaluate Potential Direct & Indirect Impacts Associated with Occupancy or Modification of 100-year Floodplain and Potential Direct & Indirect Support of Floodplain and Wetland Development that Could Result from Proposed Action.**

Floodplain Evaluation
The focus of floodplain evaluation should be on adverse impacts to lives and property, and on natural and beneficial floodplain values. Natural and beneficial values include consideration of potential for adverse impacts on water resources such as natural moderation of floods, water quality maintenance, and groundwater recharge.

According to the FEMA Report, A Unified National Program for Floodplain Management, two definitions commonly used in evaluating actions in floodplain are "structural" and "non-structural" activities. Per the report, structural activity is usually intended to mean adjustments that modify the behavior of floodwaters through the use of measures such as public works dams, levees and channel work. Non-structural is usually intended to include all other adjustments (e.g., regulations, insurance, etc.) in the way society acts when occupying or modifying a floodplain. These definitions are used in describing impacts that may arise in association with potential advancement of this case.

Natural moderation of floods
As the proposed project area borders developed parcels situated within the 100-year floodplain, the continued occupancy may potentially result in future direct impacts to property during certain severe floods and related natural disasters. However, the project is designed to alleviate the impacts from future severe floods.

Living resources such as flora and fauna
A potential impact that may arise is that during construction there could be disturbance in the stream and the adjacent wetlands during the stream realignment and reinforcement. However, construction best management practices, including an erosion control plan and compliance with federal, state and local permits, will be implemented during the construction period and afterward landscape restoration will be implemented in order to return disturbed areas to forested and vegetated space. A qualitative evaluation suggests the potential for long-term impacts would be relatively small as the proposed work includes restoring the project area to pre-existing conditions after construction using native foliage and trees.

Impacts to Property & Lives
The action does present potential to impact occupancy of floodplain as the project involves the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes the modification of existing drainage infrastructure and installation of new drainage controls in order to contain future 100-year flood levels within the stream channel. As such, while this project is expected to affect the floodplain, it is projected that the project will limit flooding to surrounding properties within floodplain.

Occupancy of the floodplain in this suburban and undeveloped area has taken place over an extended recent history. According to Rockland County's Multi-Jurisdictional Natural Hazard Mitigation Plan, 2010, the Town of Clarkstown has 11% of their land at high risk for frequent flooding (page 3a-55). Considering the context of the area, this action represents an activity in a developed area located partially within floodplain. Thus, funding this project/ activity does constitute indirect continued support of floodplain occupancy and development. However, the development is only for flood control measures and does not involve siting new commercial or residential infrastructure in floodplain.

The project involving the modification and realignment of the Demarest Kill sustains area property values and community character within a long settled district and neighborhood. It enables the continued functionality of the surrounding neighborhoods and roads, and without the proposed project, the surrounding communities would not have support in rehabilitating drainage and flood control infrastructure. If this project were not funded, there probably would be other undefined, undesirable indirect impacts to resident's quality of life, ease of accessibility to their homes, and access to emergency

services in the event they are needed.

Cultural resources such as archaeological, historic & recreational aspects
The project is located in an archaeologically sensitive landform. The New York State Historic Preservation Office (SHPO) recommended a Phase I Archaeological Survey for all portions of the project that would potentially involve ground disturbance, unless it could be proven prior ground disturbance had occurred. As such, a Phase I Archaeological and Geomorphological Survey was performed. Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Cranford Drive Drainage Improvements project (Report dated September 26, 2016). On October 18, 2016, SHPO determined that this project will have no adverse effects to historic properties in or eligible for inclusion in the State or National Register of Historic Places.

Agricultural, aquacultural, & forestry resources
The Town of Clarkstown is the most densely populated town in Rockland County, and the hamlet of New City is the county seat. The hamlet of New City is primarily commercial and residential, though a few small farms still exist in the hamlet. It is possible that if there is a materials release from the proposed project, it could potentially affect natural resources including agricultural and forestry. While it is conceivable that during the short-term construction activities the disturbance could impact water quality, the impact attributable to this use could not be quantitatively derived. However, a qualitative analysis suggests that the impact would be relatively small, as no ground disturbance is proposed on the immediate river bank. Moreover, the project scope aims at reducing and/ or eliminating flooding of residential properties and preventing debris from residential properties from washing into the Demarest Kill.

Wetland Evaluation
The purpose of wetland evaluation is to consider factors relevant to a proposal's effect on the survival and quality of the wetland. These factors should include public health (including water supply and water quality), maintenance of natural systems, cost increases attributed to construction in wetland, and other uses of wetland in the public interest.

Public health, safety, and welfare, including water supply, quality, recharge, and discharge; pollution; flood and storm hazards and hazard protection; and sediment and erosion.
The project location is in wetlands that are designated freshwater Forested/ Shrub wetland and riverine wetland (USFWS). These wetlands are freshwater wetlands, but are not directly used for water supply. However, Demarest Kill is a tributary of the western branch of the Hackensack River that ultimately leads to the Lake DeForest reservoir. The project is not suspected to pose a threat to public health and safety, or to increase flood and storm hazards. This is because while the proposed action includes reshaping and altering the existing wetland, it will not decrease the overall area of the wetland.

Maintenance of natural systems, including conservation and long-term productivity of existing flora and fauna; species and habitat diversity and stability; natural hydrologic function; wetland type; fish; wildlife; timber; and food and fiber resources.
The proposed action will affect the natural systems/ wetlands at this waterway. The proposed work is for the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. The Town shall comply with all best management practices and permit conditions that are set forth in the applicable federal, state, and local environmental permits for the project activities performed. As the work will not decrease the area of the existing wetlands, it is presumed that there will not be long-term adverse impacts on the existing flora/ fauna, habitat, natural hydrologic function, or natural resources at the location. Moreover, project plans call for re-vegetating stream banks once work is completed, and the design ensures that stream habitat will be diverse.

Cost increases attributed to wetland-required new construction and mitigation measures to minimize harm to wetlands that may result from such use.
The proposed scope of work does not involve changing the area of the wetland. It does involve realigning the stream (wetland) channel. Consequently, there are no cost increases attributed to necessary mitigation measures to minimize harm to wetlands that may result from such use.

Other uses of wetland in the public interest, including recreational, scientific, and cultural uses.
This area is a developed residential and commercial area that has abundant wooded acres, trees, lakes, and streams. Additionally, easy access is afforded to local public recreational access to the neighboring State Parks and Preserves and various other agricultural facilities such as farmers' markets and farms. According to the Outdoor Industry Association's two-page fact sheet New York The Outdoor Recreation Economy, outdoor recreation generates $338 billion in consumer spending and 305,000 direct jobs within the State. Due to the developed nature of the area, demand could not simply shift to other areas located in out of wetlands and floodplains because of finite supply.

***Step 5.* Where Practicable, Design or Modify the Proposed Action to Minimize the Potential Adverse Impacts To and From the 100-Year Floodplain and to Restore and Preserve its Natural and Beneficial Functions and Values.**
Given the scope to modify and realign the Demarest Kill and the proposed funding support, it is a direct policy requirement to specify standards that mitigate flood risk. There are mitigation measures in the form of significant landscaping proposed upon the completion of stream stabilization and restoration work, including the planting of: 674 new major (shade) trees; 156 minor (small) trees; 1,790 shrubs; and 4,010 ground cover plants. Additionally, stone weirs and rock cross-veins will be used to decrease water velocity and prevent erosion. These landscaping improvements will establish plant cover to limit erosion and provide habitat for local wildlife.

It is still reasonable to promote awareness of future risks of natural hazards, including flooding, plus the physical, social and economic impacts that potential events could convey, including through potential for future physical damage to the surrounding properties.

***Step 6.* Reevaluate the Alternatives and Proposed Action.**
One potential alternative is to construct a detention basin along the southern tributary of Demarest Kill. This alternative was analyzed to determine the potential of reducing peak flood flows by constructing a detention basin upstream from the crossing of the Demarest Kill with NYS Route 304. The potential detention basin considered had spatial limitations both in lateral extent and in depth by the existence of residences surrounding the potential site. These limitations have a direct influence on the available storage capacity that could be achieved. The HEC-1 calculations were computed and the results of the analysis were compared. The analysis revealed that the 15-, 25-, 50- and 100-year flood flows could only be reduced by less than 12 percent. The corresponding drop in flood stages at the proposed project site were modelled to be minimal and, thus, it was determined that the detention basin alternative would be ineffective.

A second alternative is to relocate the stream. The Town of Clarkstown has stated that changing the location of the stream is not feasible and would be cost prohibitive, especially because residential homes would have to be bought out in order to create space for relocating the stream.

A third alternative involves the buyout of residential homes along Cranford Drive. The Town of Clarkstown has stated that purchasing the homes at approximately $800,000 per dwelling would have a total cost in excess of $12 million. This alternative is not financially feasible and would displace current residents from the community.

A fourth alternative involves raising residential structures two feet above the 100-year BFE. This alternative would cost in excess of $200,000 per dwelling for a total cost of over $6 million, in addition to any temporary relocation fees. This alternative is not financially feasible and would not alleviate flooding of residential yards or urban waste deposited into the stream from surrounding yards during flood events.

A fifth alternative involves a reduced version of the project scope. The amended design would reduce the footprint of the project by not realigning the southern tributary portion of the project. The design was submitted to the USACE for review in 2011. The reduced design was also shown to the residents in the project area to get feedback on which project they preferred. The Town stated, as part of the alternatives analysis presented, that the reduced version, although having less impact on the channel, does not provide the proper mitigation to the flooding problems in the area.

The No Action alternative was considered and rejected by the Town of Clarkstown. No action would provide zero benefit to the residents and the Town. Flooding conditions in the areas of Cranford Drive and Bush Court, Termakay Drive and the end of Cypress Street have historically caused damage to residences and blocked access for emergency vehicles. Major storm events are likely to continue to occur. Thus, flooding of low lying areas and residences during major storm events would continue to occur if no action were taken causing costly property damage and potentially fatalities.

Therefore, the alternatives examined are not considered desirable and the proposed action to fund the modification and realignment of the Demarest Kill is still practicable in light of exposure to flood hazards in floodplain, possible adverse impacts on floodplain and wetlands, the extent to which it may aggravate current hazards to other floodplains, and the potential to disrupt natural and beneficial functions and values of floodplains. Furthermore, the Town will have to abide by applicable state and local codes for floodplain development. As such, the impact on a floodplain would be less with the proposed project than with the No Action or rehabilitation alternatives.

The impacts of these alternatives will be re-evaluated in response to any public comments received.

***Step 7.* Issue Findings and Public Explanation.**
It is the finding of this report that there is no better alternative than to provide funding for the Cranford Drive Drainage Improvements project. The location within floodplain cannot be avoided due to the stream and drainage features being within floodplain and wetland. However, not funding any actions would mean that this community would struggle to recover, and would be limited in its options to improve resilience to future storm events.

A final notice, formally known as "Notice of Policy Determination" was published in accordance with 24 CFR 55, for a 15-day comment period. (See **Attachment 3** of this EO 11990 Wetlands Protection and EO 11988 Floodplain Management Determination for the letter distributed to the associated agencies. **Attachment 4** will be appended with the associated newspaper notice affidavit). The 7-day comment period started with the Final Notice publishing in the Rockland Journal News newspaper on January 5, 2017 and the 15-day period expires January 20, 2017.

***Step 8.* Continuing Responsibility of Responsible Entity & Recipient.**
The Governor's Office of Storm Recovery (GOSR), operating under the auspices of the New York State Homes and Community Renewal's (NYSHCR) Housing Trust Fund Corporation, is the responsible entity. The responsible entity will make available educational materials regarding best practices in floodplains. It is acknowledged there is a continuing responsibility by the responsible entity, New York State Housing Trust Fund/ Division of Homes and Community Renewal, to ensure, to the extent feasible and necessary, compliance with Steps 5 through 7.

Attachment 1

Notice of Early Public Review
Wetlands Protection (EO 11990) & Floodplain Management (EO 11988) Determination

EARLY NOTICE OF A PROPOSED ACTIVITY
IN A 100-YEAR FLOODPLAIN AND WETLAND

CRANFORD DRIVE DRAINAGE IMPROVEMENTS
OLD ROUTE 304 BRIDGE AND SOUTH 4,650 LINEAR FEET DOWN THE DEMAREST KILL
ROCKLAND COUNTY, NEW YORK

September 9, 2016

To: All Interested Agencies, Groups, and Individuals

This is to give notice that the Governor's Office of Storm Recovery (GOSR), an office of the New York State Housing Trust Fund Corporation (HTFC), has received an application from Town of Clarkstown to use Community Development Block Grant – Disaster Recovery (CDBG-DR) funding from the NY Rising Community Reconstruction Program to implement the Cranford Drive Drainage Improvements Project (hereinafter, the "Proposed Activity") and is conducting an evaluation as required by Executive Order 11988 and Executive Order 11990 in accordance with U.S. Department of Housing and Urban Renewal (HUD) regulations (24 CFR Part 55). There are three primary purposes for this notice. First, to provide the public an opportunity to express their concerns and share information about the Proposed Activity, including alternative locations outside of the Floodplain and Wetland. Second, adequate public notice is an important public education tool. The dissemination of information about floodplains and wetlands facilitates and enhances governmental efforts to reduce the risks associated with the occupancy and modification of these special areas. Third, as a matter of fairness, when the government determines it will participate in actions taking place in floodplains or wetlands, it must inform those who may be put at greater or continued risk. Funding for the Proposed Activity will be provided by the HUD CDBG-DR program for storm recovery activities in New York State.

The Proposed Activity is needed to address repetitive intense flooding along Cranford Drive. During Hurricane Irene and Superstorm Sandy, the Demarest Kill rose about its banks and flowed into its floodplains throughout the residential area of Clarkstown. Intense flooding along Cranford Drive forced road closures in the area due to floodwaters overwhelming culverts and bridges. This proposed action will alleviate 100-year flooding in and around the houses and streets which are currently located within the flood prone areas and allow unrestricted emergency access to the area. The main objective is to protect the health, safety and welfare of the public in and around the surrounding area.

The Proposed Activity entails modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel. The work will be performed in six phases to reduce the potential for erosion. Phase 1 will begin at the Old Route 304 bridge, and the subsequent phases will move south down the Demarest Kill. Approximately 4,650 linear feet of the bed and banks of the Demarest Kill, located south of Old Route 304 and running approximately parallel to Cranford Drive, will be realigned and reinforced. The redesign of the stream channel incorporates a multi-channel design including a normal low flow channel (thalwag), a bank full channel, and the floodplain channel. Backflow preventers will be installed at all drainage pipes out letting into the stream channel to prevent backflow from the channel flooding onto the roadway.

The Proposed Activity will result in temporary and permanent impacts to approximately 18 acres of 100-Year Floodplain and approximately 10 acres of NWI-mapped wetlands. These impacts will consist of modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel. As the stream stabilization and restoration work is completed, habitat improvements including trees, shrubs, and ground-cover plants will be planted along the stream banks to replace the removed trees, shrubs, and grasses.

Floodplain maps based on the FEMA Flood Insurance Rate Maps and wetlands maps based on the National Wetland Inventory and New York State Department of Environmental Conservation (NYSDEC) data have been prepared and are available for review with additional information at http://www.stormrecovery.ny.gov/environmental-docs.

Any individual, group, or agency may submit written comments on the Proposed Activity or request further information by contacting Thomas King, Assistant General Counsel and Certifying Officer, Governor's Office of Storm Recovery, 99 Washington Avenue, Suite 1224, Albany, NY 12260; email: NYSCDBG_DR_ER@nyshcr.org. Standard office hours are 9:00 AM to 5:00 PM Monday through Friday. For more information, call 518-473-0015. All comments received by September 26, 2016 will be considered. 1561693

Attachment 2

Notice of Early Public Review Affidavit
Wetlands Protection (EO 11990) & Floodplain Management (EO 11988) Determination

Journal News
media group
A GANNETT COMPANY | lohud.com

AFFIDAVIT OF PUBLICATION
FROM

State of New York
County of Westchester, ss.:

CECILIA HERNANDEZ
_____ being duly sworn says that he/she is the principal clerk of **THE JOURNAL NEWS,** a newspaper published in the County of Westchester and the State of New York, and the notice of which the annexed is a printed copy, was published in the newspaper area(s) on the date (s) below:

Zone:	**Run Dates:**
Rockland	09/09/16

Cecilia Hernandez
Signature

Sworn to before me, this 14th day of September 2016

Vilma Avelar
Notary Signature

Vilma Avelar
Notary Public State of New York
NO. 01AV6318411
Qualified In Westchester County
Commission Expires January 26, 2019

Legend:

WESTCHESTER:
Amawalk, Ardsley, Ardsley on Hudson, Armonk, Baldwin Place, Bedford, Bedford Hills, Brewster, Briarcliff Manor,Bronxville, Buchanan, Carmel, Chappaqua, Cold Spring, Crompond, Cross River, Croton Falls, Croton on Hudson, Dobbs Ferry, Eastchester, Elmsford, Garrison, Goldens Bridge, Granite Springs, Greenburg, Harrison, Hartsdale, Hastings, Hastings on Hudson, Hawthorne, Irvington, Jefferson Valley, Katonah, Lake Peekskill, Larchmont, Lincolndale, Mahopac, Mahopac Falls, Mamaroneck, Millwood, Mohegan Lake, Montrose, Mount Kisco,Mount Vernon, New Rochelle, North Salem, Ossining, Patterson, Peekskill, Pelham, Pleasantville, Port Chester, Pound Ridge, Purchase, Purdys, Putnam Valley, Rye, Scarsdale, Shenorock, Shrub Oak, Somers, South Salem, Tarrytown, Thornwood, Tuckahoe, Valhalla, Verplanck, Waccabuc, White Plains, Yorktown Heights, Yonkers

ROCKLAND:
Blauvelt, Congers, Garnerville, Haverstraw, Hillburn, Monsey, Nanuet, New City, Nyack, Orangeburg, Palisades, Pearl River, Piermont, Pomona, Sloatsburg, Sparkill, Spring Valley, Stony Point, Suffern, Tallman, Tappan, Thiells, Tomkins Cove, Valley Cottage, West Haverstraw, West Nyack

Ad Number: 0001561693

Attachment 3

Final Notice
Wetlands Protection (EO 11990) & Floodplain Management (EO 11988) Determination

Governor's Office of Storm Recovery

ANDREW M. CUOMO
Governor

LISA BOVA-HIATT
Executive Director

PUBLIC NOTICE
COMBINED FINAL NOTICE AND PUBLIC REVIEW OF A PROPOSED ACTIVITY IN A 100-YEAR FLOODPLAIN AND WETLAND, NOTICE OF FINDING OF NO SIGNIFICANT IMPACT (FONSI), AND NOTICE OF INTENT TO REQUEST RELEASE OF FUNDS (NOI-RROF)

CRANFORD DRIVE DRAINAGE IMPROVEMENTS

January 5, 2017

Name of Responsible Entity and Recipient: New York State Homes and Community Renewal (HCR), 38-40 State Street, Hampton Plaza, Albany, NY 12207, in cooperation with the New York State Housing Trust Fund Corporation (HTFC), of the same address. Contact: Lori A. Shirley (518) 474-0755.

Pursuant to 24 CFR Section 58.43, this combined Notice of Finding of No Significant Impact (FONSI), Notice of Intent to Request Release of Funds (NOI-RROF), and Final Notice and Public Explanation of a Proposed Activity in a Floodplain and Wetland satisfies three separate procedural requirements for project activities proposed to be undertaken by HCR.

Project Description: The Governor's Office of Storm Recovery (GOSR), an office of HCR's HTFC, is responsible for the direct administration of the United States Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program in New York State. GOSR proposes to provide CDBG-DR funding to modify and realign the Demarest Kill, including modification of the onsite drainage infrastructure and the installation of new drainage controls. These project activities will be performed in six phases to reduce the potential for erosion, beginning at the Old Route 304 bridge, and the subsequent phases will move south down the Demarest Kill and on the tributary traveling west under Cranford Drive ("Proposed Project"). This Proposed Project is estimated to have a total cost of $3,500,000.00, with approximately $2,500,000.00 being provided by CDBG-CR and the remaining $1,000,000.00 to be provided by Rockland County.

PUBLIC EXPLANATION OF A PROPOSED ACTIVITY IN A 100-YEAR FLOODPLAIN AND WETLAND

This work will be located in 100-year floodplain (SHFA Zone AE) and within Federal wetlands. Approximately 10 acres of wetlands will be disturbed, and approximately 18 acres of floodway and floodplain will be disturbed during construction. Since the action will include new construction in wetland and floodplain, Executive Orders 11990 and 11988 require that the

project not be supported if there are practicable alternatives to development in floodplain and new construction in wetlands.

Applicable permits from the New York State Department of Environmental Conservation and the United States Army Corps of Engineers will be acquired before work is commenced. The Applicant will be bound by any permit stipulations or mitigation measures listed in permits acquired for this project. Additionally, ground disturbance will be minimized by placing fabric down in areas where temporary roads will be installed.

There are three primary purposes for this notice. First, people who may be affected by activities in floodplains/ wetlands and those who have an interest in the protection of the natural environment have an opportunity to express their concerns and provide information about these areas. Second, adequate public notice is an important public education tool. The dissemination of information and request for public comment about floodplains/ wetlands can facilitate and enhance federal efforts to reduce the risks associated with the occupancy and modification of these special areas. Third, as a matter of fairness, when the federal government determines it will participate in actions taking place in floodplains/ wetlands, it must inform those who may be put at greater or continued risk.

FINDING OF NO SIGNIFICANT IMPACT

An Environmental Assessment (EA) for the Proposed Project has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and HUD environmental review regulations at 24 CFR Part 58. The EA is incorporated by reference into this FONSI. Subject to public comments, no further review of the Proposed Project is anticipated. HCR has determined that the EA for the project identified herein complies with the requirements of HUD environmental review regulations at 24 CFR Part 58. HCR has determined that the Proposed Project will have no significant impact on the human environment and, therefore, does not require the preparation of an environmental impact statement under NEPA.

Public Review: Public viewing of the EA and Floodplain Management Documents are available online at http://stormrecovery.ny.gov/environmental-docs and are also available in person Monday – Friday, 9:00 AM – 5:00 PM at the following address: Governor's Office of Storm Recovery, 38-40 State Street, Hampton Plaza, Albany, NY 12207. Contact: Lori A. Shirley (518) 474-0755.

Further information may be requested by writing to the above address, emailing NYSCDBG_DR_ER@nyshcr.org or by calling (518) 474-0755. This combined notice is being sent to individuals and groups known to be interested in these activities, local news media, appropriate local, state and federal agencies, the regional office of the U.S. Environmental Protection Agency having jurisdiction, and to the HUD Field Office, and is being published in a newspaper of general circulation in the affected community.

Public Comments on the Proposed Activity within Floodplain and Wetland, FONSI and/or NOIRROF: Any individual, group or agency may submit written comments on the Project. The public is hereby advised to specify in their comments which "notice" their comments address. Comments should be submitted via email, in the proper format, on or before January

20, 2017 at NYSCDBG_DR_ER@nyshcr.org. Written comments may also be submitted at the following address, or by mail, in the proper format, to be received on or before January 20, 2017: Governor's Office of Storm Recovery, 38-40 State Street, Hampton Plaza, Albany, NY 12207. Comments may be received by telephone by contacting Lori A. Shirley at (518) 474-0755. All comments must be received on or before 5:00 pm on January 20, 2017 or they will not be considered. If modifications result from public comment, these will be made prior to proceeding with the expenditure of funds.

REQUEST FOR RELEASE OF FUNDS AND CERTIFICATION

On or about January 23, 2017, the HCR certifying officer will submit a request and certification to HUD for the release of CDBG-DR funds as authorized by related laws and policies for the purpose of implementing this part of the New York CDBG-DR program.

HCR certifies to HUD that Lori A. Shirley, in her capacity as Certifying Officer, consents to accept the jurisdiction of the U.S. federal courts if an action is brought to enforce responsibilities in relation to the environmental review process and that these responsibilities have been satisfied. HUD's approval of the certification satisfies its responsibilities under NEPA and related laws and authorities, and allows GOSR to use CDBG-DR program funds.

Objection to Release of Funds: HUD will accept objections to its release of funds and GOSR's certification for a period of fifteen days following the anticipated submission date or its actual receipt of the request (whichever is later). Potential objectors may contact HUD or the GOSR Certifying Officer to verify the actual last day of the objection period.

The only permissible grounds for objections claiming a responsible entity's non-compliance with 24 CFR Part 58 are: (a) Certification was not executed by HCR's Certifying Officer; (b) the responsible entity has omitted a step or failed to make a decision or finding required by HUD regulations at 24 CFR Part 58; (c) the responsible entity has committed funds or incurred costs not authorized by 24 CFR Part 58 before release of funds and approval of environmental certification; or (d) another Federal agency acting pursuant to 40 CFR Part 1504 has submitted a written finding that the project is unsatisfactory from the standpoint of environmental quality.

Objections must be prepared and submitted in accordance with the required procedures (24 CFR Part 58) and shall be addressed to Tennille Smith Parker, Director, Disaster Recovery and Special Issues Division, Office of Block Grant Assistance, U.S. Department of Housing & Urban Development, 451 7th Street SW, Washington, DC 20410, Phone: (202) 402-4649.

Lori A. Shirley
Certifying Officer
January 5, 2017

Attachment 5

HUD Environmental Standards Review

Cranford Drive Drainage Improvements

HUD Environmental Standards Review

Project Site: Cranford Drive – North of Old Route 304 to the intersection of Cranford Drive with Route 304 – in the New City Hamlet, Town of Clarkstown, Rockland County, New York

Introduction:

The purpose of this review is to ensure that the project complies with U.S. Department of Housing and Urban Development (HUD) environmental standards in relation to 24 CFR Part 58.5. Properties that are proposed for use in HUD programs "must be free of hazardous materials, contamination, toxic chemicals and gases, and radioactive substances, where a hazard could affect the health and safety of occupants or conflict with the intended utilization of the property."

A desktop review was performed to identify whether the Project Site referenced in the title of this document complies with the following criteria:

(i) is not Listed on an U.S. Environmental Protection Agency (EPA) Superfund National Priorities or Comprehensive Environmental Response Superfund National Priorities or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) List, or equivalent State list;
(ii) is not located within 3,000 feet of a toxic or solid waste landfill site;
(iii) does not have an underground storage tank; and
(iv) is not known or suspected to be contaminated by toxic chemicals or radioactive materials.

Summary of Findings

Project Site Records Review

EPA, New York State Department of Environmental Conservation (NYSDEC) Records, and Rockland County Records:

The Project Site is not located within 3,000 feet of a toxic or solid waste landfill site. The Project Site is not listed on an EPA Superfund National Priorities or CERCLA list or equivalent State list. A review of the EPA Facilities Database provides no indication of past uses of the Project Site that could have contaminated the Project Site, or potentially adversely affect the occupants of the Project Site. The Project Site is not listed on the NYSDEC Environmental Remediation or Bulk Storage databases.

Surrounding Properties Records Review

EPA Records:

There are two EPA facilities located within 3,000 feet of the Project Site. Both facilities are located at or over 2,500 feet from the Project Site. The two facilities are inactive Resource Conservation Recovery Act (RCRA) facilities: **Personal Touch Cleaners**, is an operating minor Air Emission facilities in unknown compliance for the past 6 quarters. However, there are no known formal or informal enforcement actions at this facility and there are no NYSDEC spill reports reported at this facility. As such, this site is not considered a hazard that could affect the health and safety of occupants or conflict with the intended utilization of the Project Site. **Exxon Div. of CFI #70202** has no documented non-compliance issues in the last three years. Facilities with no permit violations are not considered a hazard because the facilities are in compliance with permit conditions that are enforced and meet standards that protect public health and the environment by preventing releases to the environment.

NYSDEC Records:
Seven spills have been reported near the Project Site on Cranford Drive, Ridgefield Road and Termakay Drive. Of the seven spills, six have been closed by the NYSDEC. A spill being closed by the NYSDEC means that the records and data submitted indicate that the necessary cleanup and removal actions have been completed and no further remedial activities are necessary under this spill report number. Therefore, these six closed spills are not considered a hazard that could affect the health and safety of occupants or conflict with the intended utilization of the Project Site. The remaining spill, **spill #0612050**, occurred at 19 Cranford Drive in 2007. This spill is associated with an equipment failure at a private dwelling, where No. 2 fuel oil was released into the soil. However, this is a private residence located in a populated area, and cleanup would have occurred at the time of reporting even if the spill has not been closed. Additionally, the nature of No. 2 fuel oil as a Light Non-Aqueous Phase Liquid (LNAPL) means any potential free phase contaminate would be easily transported away from the site. As such, these spills are not considered a hazard that could affect the health and safety of occupants or conflict with the intended utilization of the Project Site due to the nature of the spill, characteristics of the contaminate, and length of time since the spill report.

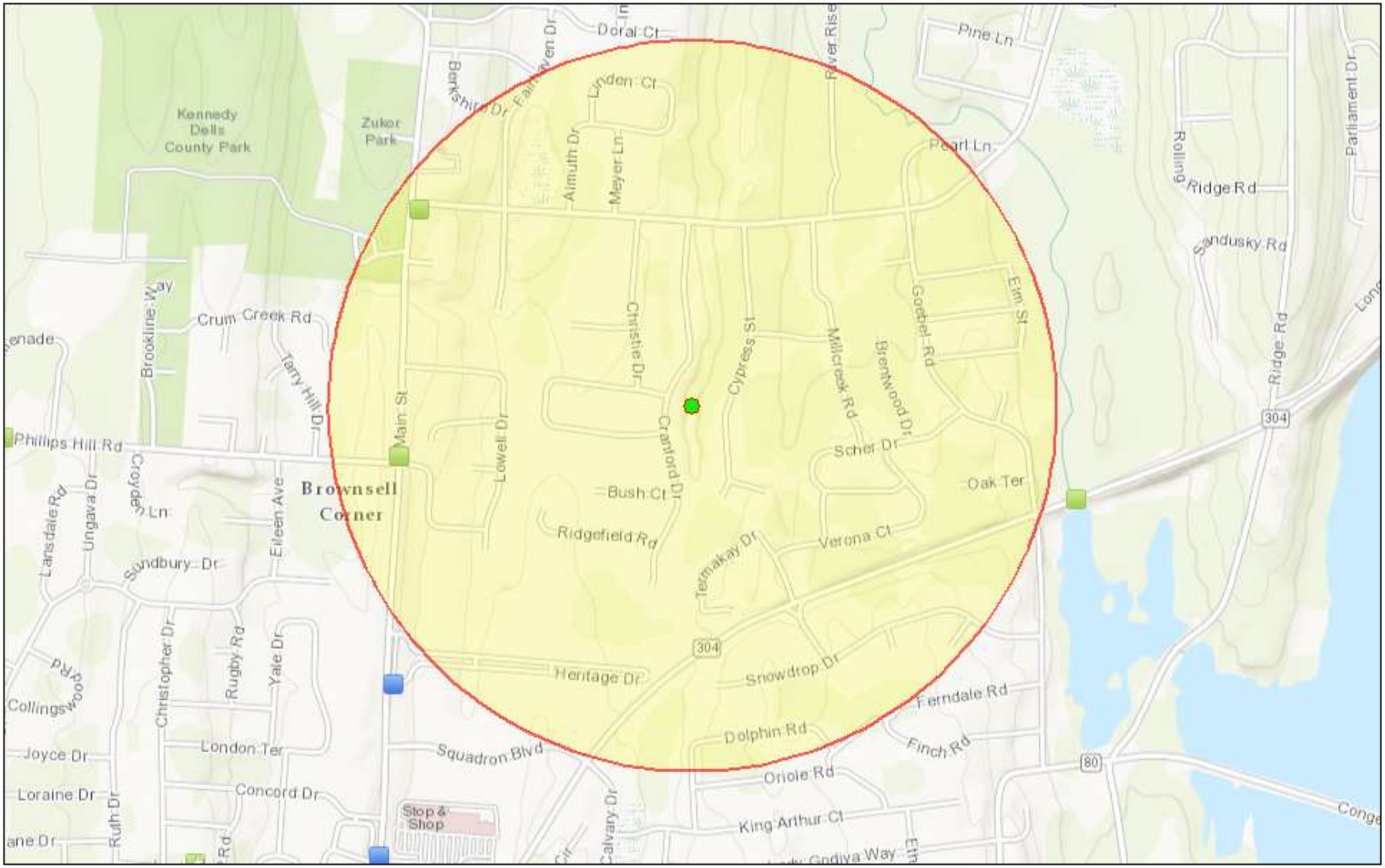
There are no mapped bulk storage facilities located within 3,000 feet of the Project Site.

Summary:
Based on a review of available environmental records for the Project Site and surrounding area, the Project Site is unlikely to contain hazardous materials, contamination, toxic chemicals and gases, and radioactive substances, where a hazard could affect the health and safety of occupants or conflict with the intended utilization of the Project Site. As a result, the funded activities do not involve actions that would involve potential recognized environmental conditions/ contamination. Therefore, a Phase I Environmental Site Assessment (ESA) or Phase II Investigation is not warranted. As such, no further action is required at this time. Maps, and NYSDEC and EPA reports are provided at the end of this report.

Data Sources:
Tectonic has reviewed the following sources to make the above determinations: Hazardous Waste records contained in the Resource Conservation and Recovery Act Information (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) for sites listed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA (otherwise known as Superfund)), EPA's Toxic Release Inventory database (TRI), and the EPA Radiation Information Database (RADInfo). Tectonic reviewed the NYS DEC Remedial Site Database to assess whether the site is registered as a NYS Superfund or Environmental Restoration site. The DEC Remedial Database includes records of sites that are part of the NYS Superfund, Brownfield Cleanup, Environmental Restoration, and Voluntary Cleanup Programs. The database also includes a Registry of Inactive Hazardous Waste Disposal Sites. Tectonic reviewed the Small Business Program Supplemental Environmental Checklist to determine if the Project Site has an underground storage tank (which is not a residential fuel tank), or any other storage tank. The NYSDEC Bulk Storage Database was reviewed for records of facilities that are or have been regulated according to one of the Bulk Storage Programs- Chemical Bulk Storage, or Major Oil Facility. The NYSDEC Spill Incident Database was used to determine the potential effects of spills on or near the Project Site. A desktop review of Google Earth was used in conjunction with a map of active municipal landfills (provided by the DEC) in determining whether there was a landfill within 3,000 feet of the Project Site.

Maps

Cranford Drive Drainage Improvements



November 18, 2016

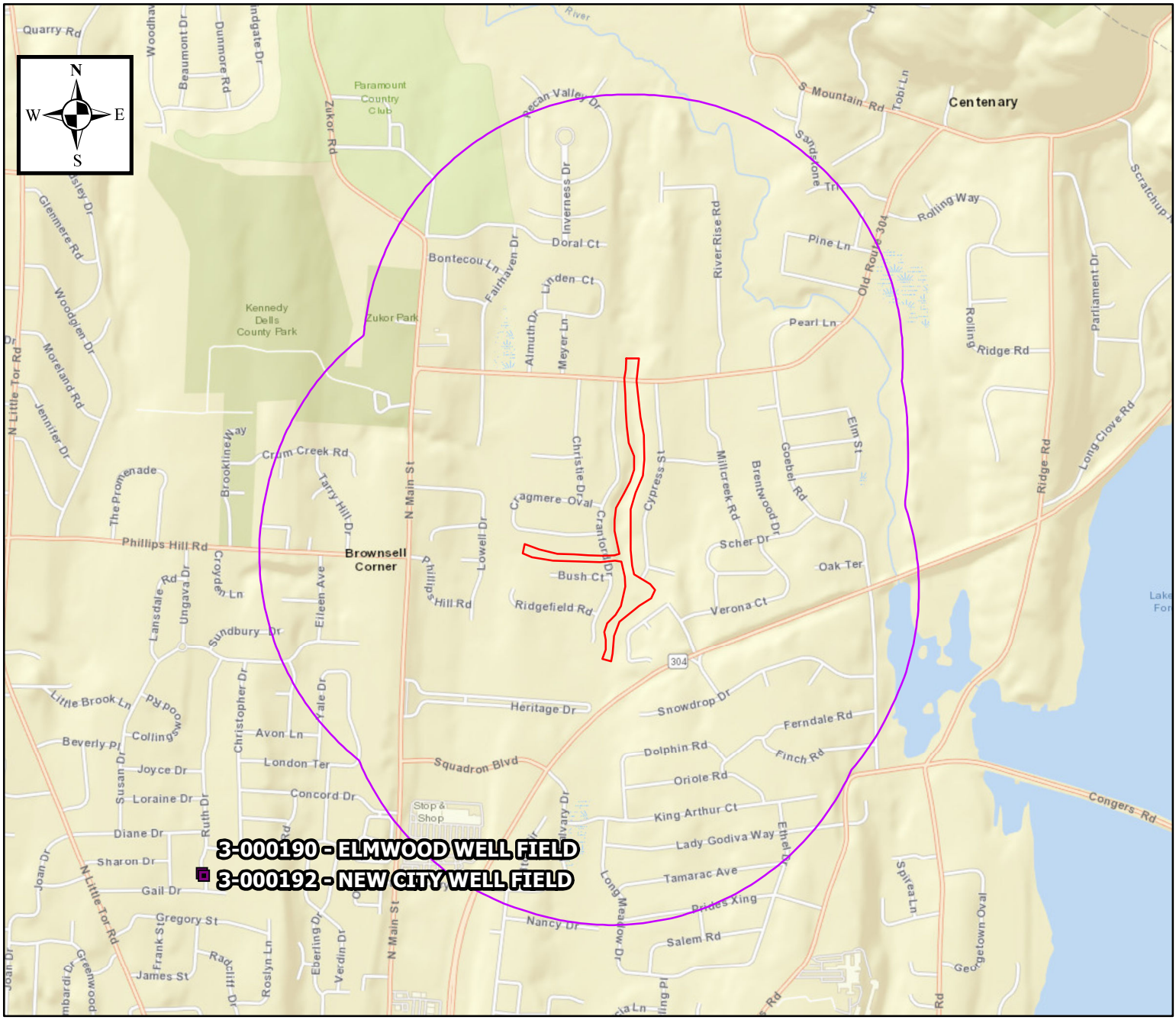
- Project 3
- RCRAINFO (clustered)
- RCRAINFO (single)
- AIRS (single)
- Buffer Area

1:18,056

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey,



TECTONIC
Practical Solutions, Exceptional Service

0 1,125 2,250 4,500 Feet

1:20,000

Legend

- Cranford Project Area
- Cranford Project Area Buffer (3000 ft)
- Petroleum Bulk Storage
- Chemical Bulk Storage
- Major Oil Storage
- NYS Superfund
- Brownfield Cleanup
- Environmental Restoration
- Voluntary Cleanup
- EPA RCRA
- NYSDEC Environmental Site Borders
- Active Municipal Solid Waste Landfills

CRANFORD DRIVE DRAINAGE IMPROVEMENTS
Cranford Drive
North of Old Route 304 to the intersection
of Cranford Drive with Route 304
New City Hamlet, Town of Clarkstown
Rockland County, New York

Created: 11/18/2016
Source data: Environmental remediation sites listed in the NYSDEC Environmental Remediation Database. Properties listed on the NYSDEC Bulk Storage Database. Solid waste landfill information provide by NYSDEC.

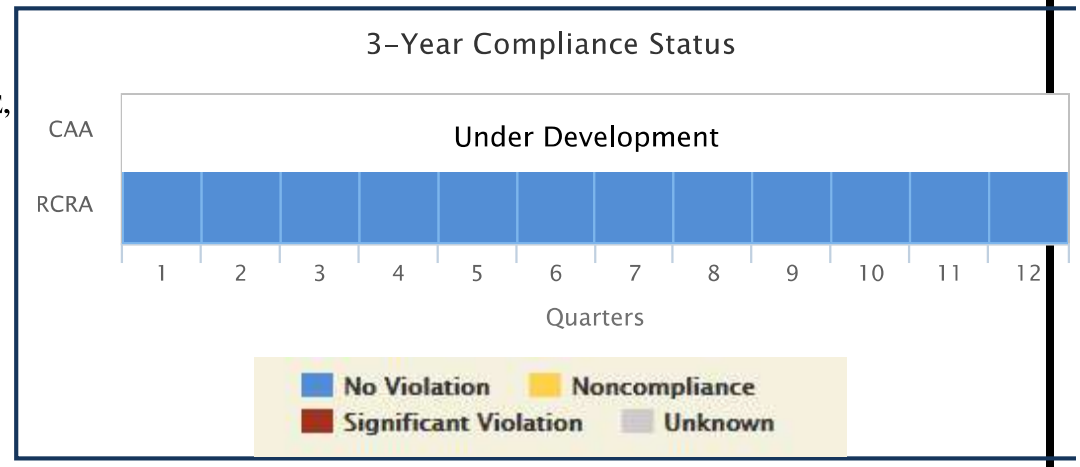
U.S. EPA Reports for Properties Contiguous to the Subject Property

Detailed Facility Report

Facility Summary

PERSONAL TOUCH CLEANERS
301A NORTH MAIN STREET - HILLCREST SHOPPING CENT E,
CLARKSTOWN, NY 10956

FRS (Facility Registry Service) ID: 110019680674
EPA Region: 02
Latitude: 41.16418
Longitude: -73.98818
Locational Data Source: FRS
Industry: Personal and Laundry Services
Indian Country: N



Enforcement and Compliance Summary

Statute	Insp (5 Years)	Date of Last Inspection	Compliance Status	Qtrs in NC (Non-Compliance) (of 12)	Qtrs in Significant Violation	Informal Enforcement Actions (5 years)	Formal Enforcement Actions (5 years)	Penalties from Formal Enforcement Actions (5 years)	EPA Cases (5 years)	Penalties from EPA Cases (5 years)
CAA	–	–		0	0	–	–	–	–	–
RCRA	–	–	No Violation	0	0	–	–	–	–	–

Regulatory Information

Clean Air Act (CAA): Operating Minor (NY0000003392000421)
Clean Water Act (CWA): No Information
Resource Conservation and Recovery Act (RCRA): Inactive ( )
Other (NYD982276248)
Safe Drinking Water Act (SDWA): No Information

Other Regulatory Reports

Air Emissions Inventory (EIS): No Information
Greenhouse Gas Emissions (eGGRT): No Information
Toxic Releases (TRI): No Information

Facility/System Characteristics

Facility/System Characteristics

System	Statute	Identifier	Universe	Status	Areas	Permit Expiration Date	Indian Country	Latitude	Longitude
FRS		110019680674					N	41.16418	-73.98818
AIR	CAA	NY0000003392000421	Minor Emissions	Operating	CAAMACT, CAASIP		N		
RCR	RCRA	NYD982276248	Other	Inactive ( )			N	41.164381	-73.98819

Facility Address

System	Statute	Identifier	Facility Name	Facility Address
FRS		110019680674	PERSONAL TOUCH CLEANERS	301A NORTH MAIN STREET - HILLCREST SHOPPING CENT E, CLARKSTOWN, NY 10956
AIR	CAA	NY0000003392000421	PERSONAL TOUCH CLEANERS	301A N MAIN ST¿HILLCREST SHOPP, SPRING VALLEY, NY 109772914
RCR	RCRA	NYD982276248	PERSONAL TOUCH CLEANERS	301A N MAIN ST, SPRING VALLEY, NY 10977

Facility SIC (Standard Industrial Classification) Codes

System	Identifier	SIC Code	SIC Desc
AIR	NY0000003392000421	7216	Drycleaning Plants, Except Rug

Facility NAICS (North American Industry Classification System) Codes

System	Identifier	NAICS Code	NAICS Description
AIR	NY0000003392000421	812320	Drycleaning and Laundry Services (except Coin-Operated)

Facility Tribe Information

Reservation Name	Tribe Name	EPA Tribal ID	Distance to Tribe (miles)
No data records returned			

Enforcement and Compliance

Compliance Monitoring History (5 years)

Statute	Source ID	System	Inspection Type	Lead Agency	Date	Finding
CAA	*NY0000003392000421*	*AIR*	*PCE On-Site Record/Report Review*	*State*	*08/28/2014*	

Entries in italics are not considered inspections in official counts.

Compliance Summary Data

Statute	Source ID	Current SNC (Significant Non-compliance)/HPV (High Priority Violation)	Description	Current As Of	Qtrs in NC (Non-Compliance) (of 12)
CAA	NY0000003392000421	No		11/12/2016	0
RCRA	NYD982276248	No		11/12/2016	0

Three Year Compliance Status by Quarter

Statute	Program/Pollutant/Violation Type				QTR 1	QTR 2	QTR 3	QTR 4	QTR 5	QTR 6	QTR 7	QTR 8	QTR 9	QTR 10	QTR 11	QTR 12
CAA (Source ID: NY0000003392000421)					01/01-03/31/14	04/01-06/30/14	07/01-09/30/14	10/01-12/31/14	01/01-03/31/15	04/01-06/30/15	07/01-09/30/15	10/01-12/31/15	01/01-03/31/16	04/01-06/30/16	07/01-09/30/16	10/01-12/31/16
	Facility-Level Status				**No Viol**	**No Viol**	**No Viol**	**No Viol**								
	HPV History															
	Violation Type	**Agency**	**Programs**	**Pollutants**												
Historic Violations																

Statute	Program/Pollutant/Violation Type	QTR 1	QTR 2	QTR 3	QTR 4	QTR 5	QTR 6	QTR 7	QTR 8	QTR 9	QTR 10	QTR 11	QTR 12
RCRA (Source ID: NYD982276248)		01/01-03/31/14	04/01-06/30/14	07/01-09/30/14	10/01-12/31/14	01/01-03/31/15	04/01-06/30/15	07/01-09/30/15	10/01-12/31/15	01/01-03/31/16	04/01-06/30/16	07/01-09/30/16	10/01-12/31/16
RCRA	**Facility-Level Status**												

Informal Enforcement Actions (5 Years)

Statute	Source ID	Type of Action	Lead Agency	Date
No data records returned				

Formal Enforcement Actions (5 Years)

Statute	Source ID	Type of Action	Lead Agency	Date	Penalty	Penalty Description
No data records returned						

ICIS (Integrated Compliance Information System) Case History (5 years)

Primary Law/Section	Case No.	Case Type	Lead Agency	Case Name	Issued/Filed Date	Settlement Date	Federal Penalty	State/Local Penalty	SEP (Supplemental Environmental Project) Cost	Comp Action Cost
No data records returned										

Environmental Conditions

Water Quality

Permit ID	Combined Sewer System?	Number of CSO (Combined Sewer Overflow) Outfalls	Watershed (HUC (Hydrologic Unit Code) 8)	Watershed Name (HUC (Hydrologic Unit Code) 8)	Watershed (HUC (Hydrologic Unit Code) 12)	Watershed Name (HUC (Hydrologic Unit Code) 12)	Receiving Waters	Impaired Waters	Impaired Class	Causes of Impairment(s) by Group(s)	Watershed with ESA (Endangered Species Act)-listed Aquatic Species?
No data records returned											

Waterbody Designated Uses

Reach Code	Waterbody Name	Exceptional Use	Recreational Use	Aquatic Life Use	Shellfish Use	Beach Closure Within Last Year	Beach Closure Within Last Two Years
No data records returned							

Air Quality

Non-Attainment Area?	Pollutant(s)
Yes	Ozone
No	Lead
Yes	Particulate Matter
No	Sulfur Dioxide

Pollutants

Toxics Release Inventory History of Reported Chemicals Released in Pounds per Year at Site

TRI Facility ID	Year	Total Air Emissions	Surface Water Discharges	Off-Site Transfers to POTWs (Publicly Owned Treatment Works)	Underground Injections	Releases to Land	Total On-site Releases	Total Off-site Releases
No data records returned								

Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

Chemical Name
No data records returned

Demographic Profile

Demographic Profile of Surrounding Area (3 Miles)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2010 US Census and American Community Survey data, and are accurate to the extent that the facility latitude and longitude listed below are correct. The latitude and longitude are obtained from the EPA Locational Reference Table (LRT) when available.

Radius of Area:	3	Land Area:	91%	Households in Area:	22,068
Center latitude:	41.16435	Water Area:	9%	Housing Units in Area:	22,862
Center Longitude:	-73.9888	Population Density:	2,747/sq.mi.	Households on Public Assistance:	239
Total Persons:	71,005	Percent Minority:	39%	Persons Below Poverty Level:	16,358

Race Breakdown	Persons (%)	Age Breakdown	Persons (%)
White:	51,219 (72.13%)	Child 5 years and younger:	5,100 (7.18%)
African-American:	6,472 (9.11%)	Minors 17 years and younger:	19,865 (27.98%)
Hispanic-Origin:	15,655 (22.05%)	Adults 18 years and older:	51,140 (72.02%)
Asian/Pacific Islander:	4,974 (7.01%)	Seniors 65 years and older:	9,177 (12.92%)
American Indian:	210 (.3%)		
Other/Multiracial:	8,130 (11.45%)		

Education Level (Persons 25 & older)	Persons (%)	Income Breakdown	Households (%)
Less than 9th Grade:	2,841 (6.48%)	Less than $15,000:	1,219 (5.51%)
9th through 12th Grade:	3,133 (7.15%)	$15,000 - $25,000:	1,648 (7.45%)
High School Diploma:	10,627 (24.24%)	$25,000 - $50,000:	3,485 (15.74%)
Some College/2-yr:	9,467 (21.59%)	$50,000 - $75,000:	3,341 (15.09%)
B.S./B.A. or More:	17,777 (40.55%)	Greater than $75,000:	12,442 (56.21%)

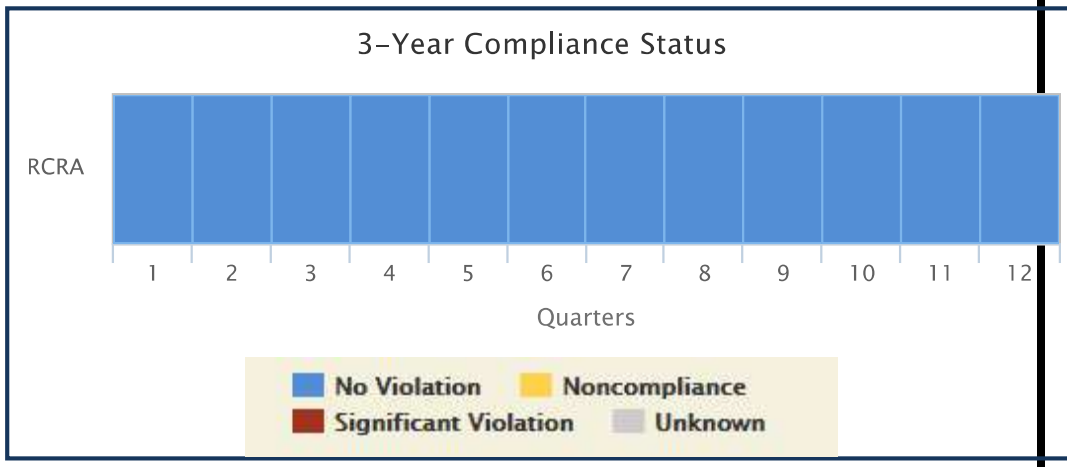
Detailed Facility Report

Facility Summary

EXXON DIV OF CFI #70202

16 RTE 304 & OLD N YACK TNPK, BARDONIA, NY 10954

FRS (Facility Registry Service) ID: 110008052294
EPA Region: 02
Latitude: 41.16975
Longitude: -73.9876
Locational Data Source: RCRAINFO
Industry: Gasoline Stations
Indian Country: N



Enforcement and Compliance Summary

Statute	Insp (5 Years)	Date of Last Inspection	Compliance Status	Qtrs in NC (Non-Compliance) (of 12)	Qtrs in Significant Violation	Informal Enforcement Actions (5 years)	Formal Enforcement Actions (5 years)	Penalties from Formal Enforcement Actions (5 years)	EPA Cases (5 years)	Penalties from EPA Cases (5 years)
RCRA	–	–	No Violation	0	0	–	–	–	–	–

Regulatory Information

Clean Air Act (CAA): No Information
Clean Water Act (CWA): No Information
Resource Conservation and Recovery Act (RCRA): Inactive ( )
Other (NYD986955714)
Safe Drinking Water Act (SDWA): No Information

Other Regulatory Reports

Air Emissions Inventory (EIS): No Information
Greenhouse Gas Emissions (eGGRT): No Information
Toxic Releases (TRI): No Information

Facility/System Characteristics

Facility/System Characteristics

System	Statute	Identifier	Universe	Status	Areas	Permit Expiration Date	Indian Country	Latitude	Longitude
FRS		110008052294					N	41.16975	-73.9876
RCR	RCRA	NYD986955714	Other	Inactive ( )			N	41.16975	-73.9876

Facility Address

System	Statute	Identifier	Facility Name	Facility Address
FRS		110008052294	EXXON DIV OF CFI #70202	16 RTE 304 & OLD N YACK TNPK, BARDONIA, NY 10954
RCR	RCRA	NYD986955714	EXXON DIV OF CFI #70202	16 RTE 304 & OLD N YACK TNPK, BARDONIA, NY 10954

Facility SIC (Standard Industrial Classification) Codes

System	Identifier	SIC Code	SIC Desc
No data records returned			

Facility NAICS (North American Industry Classification System) Codes

System	Identifier	NAICS Code	NAICS Description
RCR	NYD986955714	44711	

Facility Tribe Information

Reservation Name	Tribe Name	EPA Tribal ID	Distance to Tribe (miles)
No data records returned			

Enforcement and Compliance

Compliance Monitoring History (5 years)

Statute	Source ID	System	Inspection Type	Lead Agency	Date	Finding
No data records returned						

Entries in italics are not considered inspections in official counts.

Compliance Summary Data

Statute	Source ID	Current SNC (Significant Non-compliance)/HPV (High Priority Violation)	Description	Current As Of	Qtrs in NC (Non-Compliance) (of 12)
RCRA	NYD986955714	No		11/12/2016	0

Three Year Compliance Status by Quarter

Statute	Program/Pollutant/Violation Type	QTR 1	QTR 2	QTR 3	QTR 4	QTR 5	QTR 6	QTR 7	QTR 8	QTR 9	QTR 10	QTR 11	QTR 12
RCRA (Source ID: NYD986955714)		01/01-03/31/14	04/01-06/30/14	07/01-09/30/14	10/01-12/31/14	01/01-03/31/15	04/01-06/30/15	07/01-09/30/15	10/01-12/31/15	01/01-03/31/16	04/01-06/30/16	07/01-09/30/16	10/01-12/31/16
RCRA	**Facility-Level Status**												

Informal Enforcement Actions (5 Years)

Statute	Source ID	Type of Action	Lead Agency	Date
No data records returned				

Formal Enforcement Actions (5 Years)

Statute	Source ID	Type of Action	Lead Agency	Date	Penalty	Penalty Description
No data records returned						

ICIS (Integrated Compliance Information System) Case History (5 years)

Primary Law/Section	Case No.	Case Type	Lead Agency	Case Name	Issued/Filed Date	Settlement Date	Federal Penalty	State/Local Penalty	SEP (Supplemental Environmental Project) Cost	Comp Action Cost
No data records returned										

Environmental Conditions

Water Quality

Permit ID	Combined Sewer System?	Number of CSO (Combined Sewer Overflow) Outfalls	Watershed (HUC (Hydrologic Unit Code) 8)	Watershed Name (HUC (Hydrologic Unit Code) 8)	Watershed (HUC (Hydrologic Unit Code) 12)	Watershed Name (HUC (Hydrologic Unit Code) 12)	Receiving Waters	Impaired Waters	Impaired Class	Causes of Impairment(s) by Group(s)	Watershed with ESA (Endangered Species Act)-listed Aquatic Species?
No data records returned											

Waterbody Designated Uses

Reach Code	Waterbody Name	Exceptional Use	Recreational Use	Aquatic Life Use	Shellfish Use	Beach Closure Within Last Year	Beach Closure Within Last Two Years
No data records returned							

Air Quality

Non-Attainment Area?	Pollutant(s)
Yes	Ozone
No	Lead
Yes	Particulate Matter
No	Sulfur Dioxide

Pollutants

Toxics Release Inventory History of Reported Chemicals Released in Pounds per Year at Site

TRI Facility ID	Year	Total Air Emissions	Surface Water Discharges	Off-Site Transfers to POTWs (Publicly Owned Treatment Works)	Underground Injections	Releases to Land	Total On-site Releases	Total Off-site Releases
No data records returned								

Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

Chemical Name
No data records returned

Demographic Profile

Demographic Profile of Surrounding Area (3 Miles)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2010 US Census and American Community Survey data, and are accurate to the extent that the facility latitude and longitude listed below are correct. The latitude and longitude are obtained from the EPA Locational Reference Table (LRT) when available.

Radius of Area:	3	Land Area:	89%	Households in Area:	21,930
Center latitude:	41.16975	Water Area:	11%	Housing Units in Area:	22,796
Center Longitude:	-73.9876	Population Density:	2,713/sq.mi.	Households on Public Assistance:	212
Total Persons:	68,400	Percent Minority:	41%	Persons Below Poverty Level:	14,670

Race Breakdown	Persons (%)	Age Breakdown	Persons (%)
White:	48,506 (70.92%)	Child 5 years and younger:	4,487 (6.56%)
African-American:	6,310 (9.23%)	Minors 17 years and younger:	17,949 (26.24%)
Hispanic-Origin:	17,037 (24.91%)	Adults 18 years and older:	50,450 (73.76%)
Asian/Pacific Islander:	4,628 (6.77%)	Seniors 65 years and older:	9,163 (13.4%)
American Indian:	206 (.3%)		
Other/Multiracial:	8,750 (12.79%)		

Education Level (Persons 25 & older)	Persons (%)	Income Breakdown	Households (%)
Less than 9th Grade:	2,923 (6.76%)	Less than $15,000:	1,135 (5.17%)
9th through 12th Grade:	3,032 (7.01%)	$15,000 - $25,000:	1,591 (7.24%)
High School Diploma:	10,420 (24.1%)	$25,000 - $50,000:	3,418 (15.56%)
Some College/2-yr:	9,706 (22.45%)	$50,000 - $75,000:	3,502 (15.94%)
B.S./B.A. or More:	17,153 (39.67%)	Greater than $75,000:	12,317 (56.08%)

NYSDEC Reports for Spills, Environmental Remediation Sites, or Bulk Storage Sites Located on or Within Close Proximity to the Site

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Spill Incidents Database Search Results

Record Count: 5 Rows: 1 to 5

Export XLS Export CSV

	Spill Number	Date Spill Reported	Spill Name	County	City/Town	Address
1.	9708891	10/30/1997	RESIDENCE	Rockland	NEW CITY	4 CRANFORD DR
2.	9909881	11/15/1999	Spill Number 9909881	Rockland	NEW CITY	22 CRANFORD DR
3.	0212839	03/27/2003	RESIDENTS	Rockland	NEW CITY	7 CRANFORD DRIVE
4.	0612050	02/01/2007	RESIDENCE	Rockland	NEW CITY	19 CRANFORD DRIVE
5.	0612151	02/04/2007	DEMAREST	Rockland	NEW CITY	45 CRANFORD DR

Refine This Search

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Spill Incidents Database Search Results

Record Count: 1 Rows: 1 to 1

Export XLS Export CSV

	Spill Number	Date Spill Reported	Spill Name	County	City/Town	Address
1.	1303647	07/06/2013	PAD MOUNT 59654/42367	Rockland	NEW CITY	10 RIDGEFIELD RD

Refine This Search

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Spill Incidents Database Search Results

Record Count: 1 Rows: 1 to 1

Export XLS Export CSV

	Spill Number	Date Spill Reported	Spill Name	County	City/Town	Address
1.	1114452	03/28/2012	PAD MOUNT TRANS	Rockland	NEW CITY	7 TERMAKAY DRIVE

Refine This Search

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Spill Incidents Database Search Details

Spill Record

Administrative Information

DEC Region: 3
Spill Number: 0612050

Spill Date/Time

Spill Date: 02/01/2007 **Spill Time:** 10:53:00 AM
Call Received Date: 02/01/2007 **Call Received Time:** 10:53:00 AM

Location

Spill Name: RESIDENCE
Address: 19 CRANFORD DRIVE
City: NEW CITY **County:** Rockland

Spill Description

Material Spilled	Amount Spilled	Resource Affected
#2 fuel oil	UNKNOWN	Soil

Cause: Equipment Failure
Source: Private Dwelling
Waterbody:

Record Close

Date Spill Closed: Not closed

If you have questions about this reported incident, please contact the Regional Office where the incident occurred.

Refine This Search

Attachment 6

Section 7 Documents:
USACE & USFWS Concurrence,
USFWS Letter,
NHP Response and Update,
Official Species List,
Trust Resources List,
and NMFS Memorandum

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

To: U.S. Fish and Wildlife Service, New York Field Office **FAX:** 607-753-9699
Email: MaryEllen_VanDonsel@fws.gov and Megan_Patch@fws.gov
Request for review pursuant to:
☒ **Section 7(a) (2) of the Endangered Species Act of 1973 (ESA)**
☒ **Fish and Wildlife Coordination Act (FWCA)**

Date: APR 1 1 2016 **Permit Application Number:** NAN-2014-00305-ESW

Project Name: Cranford Drive Flood Amelioration **Location:** Lat. 41.169N° Long. -73.979W°

County: Rockland **Corps Contact**: Amanda Switzer **Phone:** (917) 790-8618

Date USFWS response due*: MAY 1 1 2016 **Email:** Amanda.M.Switzer@usace.army.mil
☒ **LOP/IP** ☐ **NWP/RGP**
*(for LOPs or IPs – length of LOC/PN, for NWP/RGP – 10 days). Pursuant to 50 CFR 402.13, the Corps shall not issue a permit prior to USFWS concurrence, unless No Effect determination.

Listed/proposed/candidate species and/or designated critical habitat with potential to occur in proposed project area:

☐Bog turtle (T) ☐Piping plover (T) ☒Northern long-eared bat (T)
☐Dwarf wedgemussel (E) ☐Roseate tern (E) ☐Red Knot (T)
☒Indiana bat (E) ☐Sandplain gerardia (E)
☐Karner blue butterfly (E) ☐Seabeach amaranth (T)
☐Northern wild monkshood (T)** ☐Small whorled pogonia (T)**

** No consultation required for plant species in counties where plants have only historically been present

The U.S. Army Corps of Engineers has determined that the proposed project:

☐ will result in no effect to _____

☐ may affect _____

☒ may affect, but is not likely to adversely affect the Indiana and Northern long-eared bat. To ensure that impacts to IB and NLEB are minimized, the applicant proposes tree removal only to be conducted during the periods between November and March. Also proposed, is the planting of 674 new major shade trees and 156 minor trees after removal of approximately 575 trees of varying DBH. All work will be conducted in phases.

☐ may affect and is likely to adversely affect _____

Please see attached drawings that include tree removal tables summarizing the removal quantities in phases. The public notice, photographs and the iPAC report is also enclosed for your reference.

The U.S. Army Corps of Engineers' requests:

☐USFWS concurrence with our determinations ☒Additional assistance to make our determination

Please provide the exact window that tree removal should be restricted and included as special condition in the permit.

The U.S. Fish and Wildlife Service: ☐ Requests additional time for review
☐Acknowledges no effect determination, no further ESA consultation/coordination is required***
☒Concurs with your determination, no further ESA consultation/coordination is required*** – NLEB + I-Bat
☐Has no objection pursuant to FWCA ☐Is taking no action pursuant to FWCA
☒Will provide FWCA comments separately ☐ Requests additional information ☐ See attached recommendations

USFWS Contact(s): Noelle Raymer Supervisor signature: Patricia Cole

Date: 4-26-16 Date: 4/26/16

***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 project is 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 project is current.

August 4, 2016

Ms. Robyn Niver
Endangered Species Biologist
U.S. Fish & Wildlife Service
New York Field Office (Region 5)
3817 Luker Rd.
Cortland, NY 13045

Re: ESA/MBTA/BGEPA consultation for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, NY – New York Rising Community Reconstruction Program

Dear Ms. Niver:

The Governor's Office of Storm Recovery (GOSR), operating under the auspices of the New York State Homes and Community Renewal's (NYSHCR) Housing Trust Fund Corporation, was established to aid the statewide recovery of disaster-affected communities in New York State. GOSR is administering a U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant for Disaster Recovery (CDBG-DR), including the New York Rising Community Reconstruction (NYRCR) Program. The environmental review for projects funded under the NYRCR Program are processed on a case by case basis in accordance with the United States Fish and Wildlife Service (USFWS), New York Field Office's online project review process. The project described herein was analyzed pursuant to Section 7 of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d); and the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat 755).

This letter provides a summary of protected species that may occur within the vicinity of the project, including the northern long-eared bat (*Myotis septentrionalis*) (NLEB), migratory birds, and the bald eagle. We are requesting concurrence from the U.S. Fish and Wildlife Service that the proposed Clarkstown Cranford Drainage Improvement Project may affect, but is not likely to adversely affect the northern long-eared bat.

Project Overview

The Clarkstown Cranford Drive Drainage Improvements Project (Project) is a stormwater management improvement project involving the modification and realignment of a tributary of the Hackensack River, also known as the Demarest Kill, located in the Town of Clarkstown, Rockland County, New York (**Attachment 1**). This work includes modification of existing on-site drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

The work will be performed in six phases to reduce the potential for erosion. (Project site plans are included in **Attachment 6**.) Tree clearing will take place from November 1 to March 31 to minimize potential effects to the northern long-eared bat and migratory birds. Phase 1 will begin at the Old Route 304 bridge, and the subsequent phases will move south down the Demarest Kill. Approximately 4,650 linear feet of the bed and banks of the Demarest Kill, located south of Old Route 304 and running approximately parallel to Cranford Drive, will be realigned and reinforced. The redesign of the stream channel incorporates a multi-channel design, including a normal low flow channel (thalwag), a bank full channel, and the floodplain channel. Backflow preventers will be installed at all drainage pipes out letting into the stream channel to prevent backflow from the channel flooding onto the roadway.

Phase 1 of the Project involves 3,240 square feet (SF) of riprap being installed on either side of the three (3) existing 16-foot x 8.5-foot concrete box culverts at Old Route 304. Modular block retaining walls will be located on the south side of the three culverts, with a 165-SF gabion check dam in place to divert low flow waters into a single culvert. The existing stream channel is to be realigned, with a 190-SF rock cross-vein and 145-SF "W" rock weir being located in the proposed stream channel. A temporary stream crossing will be constructed using three (3) 30-inch x 20-foot high-density polyethylene (HDPE) pipes covered by approximately 20 cubic yards (CY) of ¾-inch aggregate fill placed on a filter fabric. There will be approximately one (1) foot of the ¾-inch aggregate fill placed on both sides and on top of the 20-foot pipes. A total of 32 trees of 8-inch diameter or larger are proposed to be removed during Phase 1.

Phase 1A of the Project involves approximately a boulder cluster of approximately 6 to 10 CY to be placed next to 3,950 SF of riprap before the proposed stream alignment connects to the existing streambed. A 145-SF "W" rock weir will be placed on the south portion of this area, where the proposed streambed diverges from the existing streambed. A total of 44 trees of an 8-inch or larger diameter are proposed to be removed during Phase 1A.

Phase 2 and Phase 3 run approximately parallel with one another, with Phase 2 involving work to create the proposed stream channel on the eastern bank and Phase 3 work on the western bank to fill in the existing stream and reinforce the streambed. Phase 2 work involves a modular block retaining wall being placed on the northeastern edge of the streambank. A 145-SF "W" rock weir is located at the proposed streambed south of the retaining wall. Two (2) boulder clusters containing approximately 6 to 10 CY of rocks each will be placed along the proposed streambed during Phase 2, with brush matting being placed during Phase 3. An approximately 190-SF rock cross-vein is located north of a second temporary stream crossing, as described in Phase 1. Approximately 450 SF of brush matting will be placed on both sides of the streambed located north of the 18,900 SF of riprap reinforcing the junction of the tributary traveling west under Cranford Drive (See Phase 6 for the tributary work). The brush matting and riprap will be placed on the eastern side during Phase 2, and on the western side during Phase 3. The southern portion of the Phase 2 section includes placement of approximately 90 SF of riprap for a sewer crossing, a third temporary stream crossing as described in Phase 1, and 150 feet for a boulder revetment to reinforce the new streambed curve on the western bank of the z-curve. Approximately 270 trees with diameters 8" or greater will be removed during Phase 2, while approximately 64 trees with diameters 8 inches or greater will be removed during Phase 3.

Phase 4 and Phase 5 also run approximately parallel to one another, with Phase 4 occurring on the eastern bank and Phase 5 occurring on the western bank. Phase 5 also overlaps the southern tip of Phase 2. Phase 5 involves placement of a 150-foot boulder revetment to reinforce the new streambed curve on the eastern bank of the z-curve, with a 190-SF rock cross-vein located to the south of the boulder revetment. Approximately 175 SF of brush matting will be located on the eastern bank, north of approximately 2,800 SF of riprap for sewer crossings at the southern tip of the work area. Approximately 225 SF of brush matting will be placed on the western bank and approximately 65 feet of boulder revetment on the eastern bank, both located south of the sewer crossing riprap. Approximately 16 trees with diameters 8 inches or greater will be removed during Phase 4, while approximately 67 trees with diameters 8 inches or greater will be removed during Phase 5.

Phase 6 involves work on the tributary traveling west under Cranford Drive. The riprap from Phase 2 and Phase 3 ends at the eastern side of Cranford Drive. The western banks will have stabilized construction entrances from Cranford Drive. The stream will be staying in approximately the same footprint as the existing streambed, but it will be reinforced with two boulder clusters of approximately 6 to 10 CY, with a single 180-SF "W" rock weir and two (2) 210-SF rock cross-veins. Approximately 82 trees with diameters 8 inches or greater will be removed during Phase 6.

As the stream stabilization and restoration work is completed, habitat improvements including approximately 674 major trees, 156 minor trees, 1,790 shrubs, and 4,010 ground-cover plants will be planted along the stream banks to replace the removed trees, shrubs, and grasses.

The Project will involve approximately 8,000 cubic yards of excavation material at the site. The top-soil will be stripped, stockpiled, and re-spread on the site. Excavated boulders and stones will be reused in the channels for stabilization, and the excess soils will be disposed of at approved locations.

Endangered and Threatened Species Act Determination

According to the USFWS IPaC Trust Resource Report (**Attachment 2**) and Endangered Species Act Species List (**Attachment 3**), accessed July 7, 2016, there is one threatened species that may occur or could potentially be affected by activities in the Project area – the northern long-eared bat. The NLEB, listed as federally threatened, is a temperate, insectivorous bat. NLEB hibernate in caves or mines during winter and 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. Summer habitat of the NLEB generally includes upland and riparian forest within heavily forested landscapes (Ford et al. 2005, Henderson et al. 2008). The NLEB is sensitive to fragmentation and urbanization, and requires interior forest for both foraging and breeding (Foster and Kurta 1999, Broders et al. 2006, Henderson et al. 2008). Roost trees are usually in intact forest, close to the core and away from large clearings, roads, or other sharp edges (Menzel et al. 2002, Owen et al. 2003, Carter and Feldhammer 2005).

No caves or mines occur in the vicinity of the Project area. There are currently no known maternity roost trees or hibernacula known to be occupied by the NLEB in the vicinity of the Project area according to a record request response from the New York Natural Heritage Program (NYNHP) from August 14, 2015 (**Attachment 4**). There are currently no recorded occurrences of the northern long-eared bat in Rockland County, New York (**Attachment 5**). A request for an updated response was sent to the NYNHP on July 26, 2016 and we will submit a revised letter to USFWS if there are any changes that may affect this consultation.

To minimize impacts to the NLEB, tree clearing will take place from November 1 to March 31, which is outside of the active season of the NLEB. Any bats potentially living in the vicinity of the Project area would still be able to breed, feed, and find shelter. Similar habitat (forested stream corridor surrounded by residential development) is located nearby (see aerial map in **Attachment 1**). Bats would not have to fly much or go through open areas to get to foraging habitat, as a tract of forested habitat is located immediately north of the northern extent of the proposed Project. Also, High Tor State Park, a 691-acre tract of forested public land, is located 1.3 miles north of the Project area. Habitat improvements including the planting of approximately 674 major trees, 156 minor trees, 1,790 shrubs, and 4,010 ground-cover plants along the stream banks to replace the removed trees, shrubs, and grasses, will provide potential summer habitat for the NLEB in the future.

GOSR understands that the USFWS presumes that all activities are implemented as described herein. GOSR will promptly report any departures from the described activities to the New York Field Office. Involved parties will promptly notify the New York Field Office if a dead, injured, or sick NLEB is encountered.

Migratory Bird Treaty Act

According to the USFWS IPaC Trust Resource Report, accessed July 7, 2016 (**Attachment 2**), there are several migratory birds that could potentially be affected by the proposed Project. The primary nesting season for migratory birds is early April to mid-July. To minimize impacts to migratory birds, tree clearing will be performed from November 1 to March 31, which is outside of the primary nesting season. Precautions will be used to protect any migratory birds that may be found in or near the Project area. Such precautions include minimizing construction noise to the extent practicable, using care to avoid birds when operating machinery or vehicles near birds, and general contractor awareness of potential bird presence. Proposed tree plantings will mitigate potential loss of migratory bird habitat from Project activities. We anticipate these measures should avoid any take of migratory birds.

Bald and Golden Eagle Protection Act

The bald eagle (*Haliaeetus leucocephalus*) is a long-lived bird, with a life span of more than 30 years in the wild. Bald eagles prefer undisturbed areas near large lakes and reservoirs, marshes and swamps, or stretches along rivers where they can find open water and their primary food, fish. Bald eagles produce generally produce one or two, and rarely three, offspring per year. In New York, the young fledge by mid to late summer at about 12 weeks of age. A bald eagle nest is a large structure, usually located high in a tall, live white pine tree near water. The nest is re-used and added to each year, often becoming eight or more feet deep, six feet across, and weighing hundreds of pounds. Once a pair selects a nesting territory, they use it for the rest of their lives. Bald eagles mate for life, returning to nest in the

general area (within 250 miles) from which they fledged.

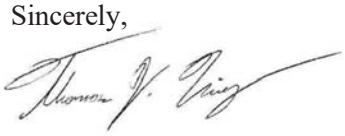
While bald eagle overwintering and nesting sites are found in Rockland County, particularly along the Hudson River corridor, NYNHP has no records of bald eagle nesting sites in the Project area. The Project area is comprised of a forested stream corridor surrounded by residences and residential yard habitats. The habitat in the Project area is not consistent with preferred habitat of the bald eagle. There are not anticipated to be any effects to bald eagles.

Conclusion

For these reasons, we conclude that the Clarkstown Cranford Drive Drainage Improvements Project may affect, but is not likely to adversely affect the northern long-eared bat. We request your concurrence with our determination. We do not anticipate any adverse effects to bald eagles or migratory birds.

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
Certifying Officer
Governor's Office of Storm Recovery
NYS Homes and Community Renewal

Attachments:

Attachment 1: Project Location Maps (Street Map, Topographic Map, and Aerial Map)
Attachment 2: IPaC Trust Resource Report
Attachment 3: USFWS Species List from New York Field Office and Long Island Field Office
Attachment 4: NYNHP Record Request Response, August 14, 2015
Attachment 5: Northern Long-Eared Bat Occurrences by Town in New York State
Attachment 6: Project Site Maps (included as part of the NYSDEC Permit)

Literature Cited

Broders, H.G., G.J. Forbes, S. Woodley, and I.D. Thompson. 2006. Range extent and stand selection for forest-dwelling northern long-eared and little brown bats in New Brunswick. Journal of Wildlife Management 70: 1174-1184.

Carter, T.C., and G.A. Feldhamer. 2005. Roost tree use by maternity colonies of Indiana bats and northern long-eared bats in southern Illinois. Forest Ecology and Management 219:259-268.

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.

Foster, R.W. and A. Kurta, A. 1999. Roosting ecology of the northern bat (Myotis septentrionalis) and comparisons with the endangered Indiana bat (Myotis sodalis). Journal of Mammalogy 80: 659-672.

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.

Menzel, M.A., S.F. Owen, W.M. Ford, J.W. Edwards, P.B. Wood, B.R. Chapman, and K.V. Miller. 2002. Roost tree selection by northern long-eared bat (Myotis septentrionalis) maternity colonies in an industrial forest of the central Appalachian mountains. Forest Ecology and Management 155:107-114.

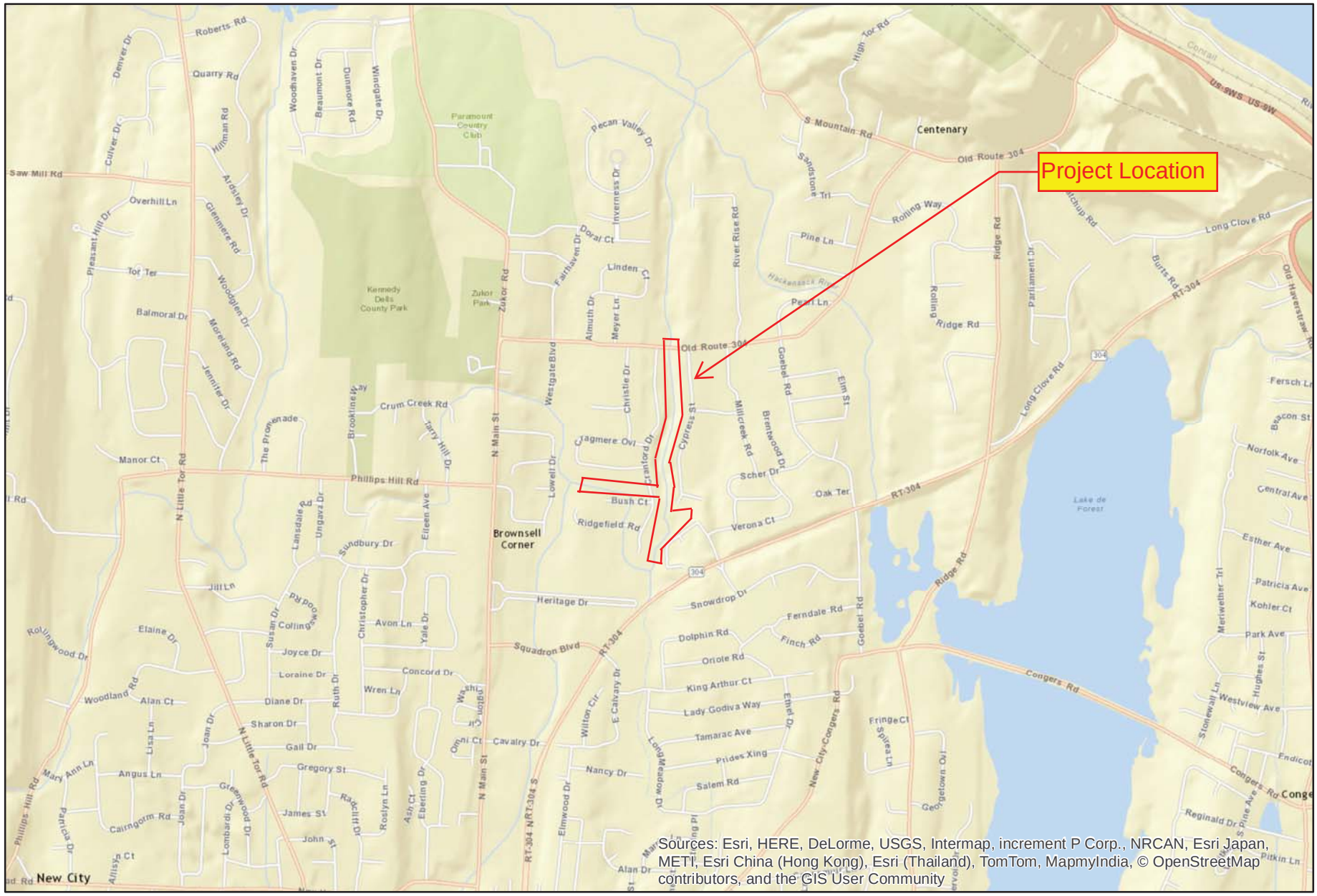
Owen, S.F., M.A. Menzel, W.M. Ford, B.R. Chapman, K.V. Miller, J.W. Edwards, and P.B. Wood. 2003. Home-

range size and habitat used by the northern myotis (Myotis septentrionalis). American Midland Naturalist 150:352-359.

CC: Amanda Switzer, USACE (email and USPS)

Attachment 1

Project Location Maps



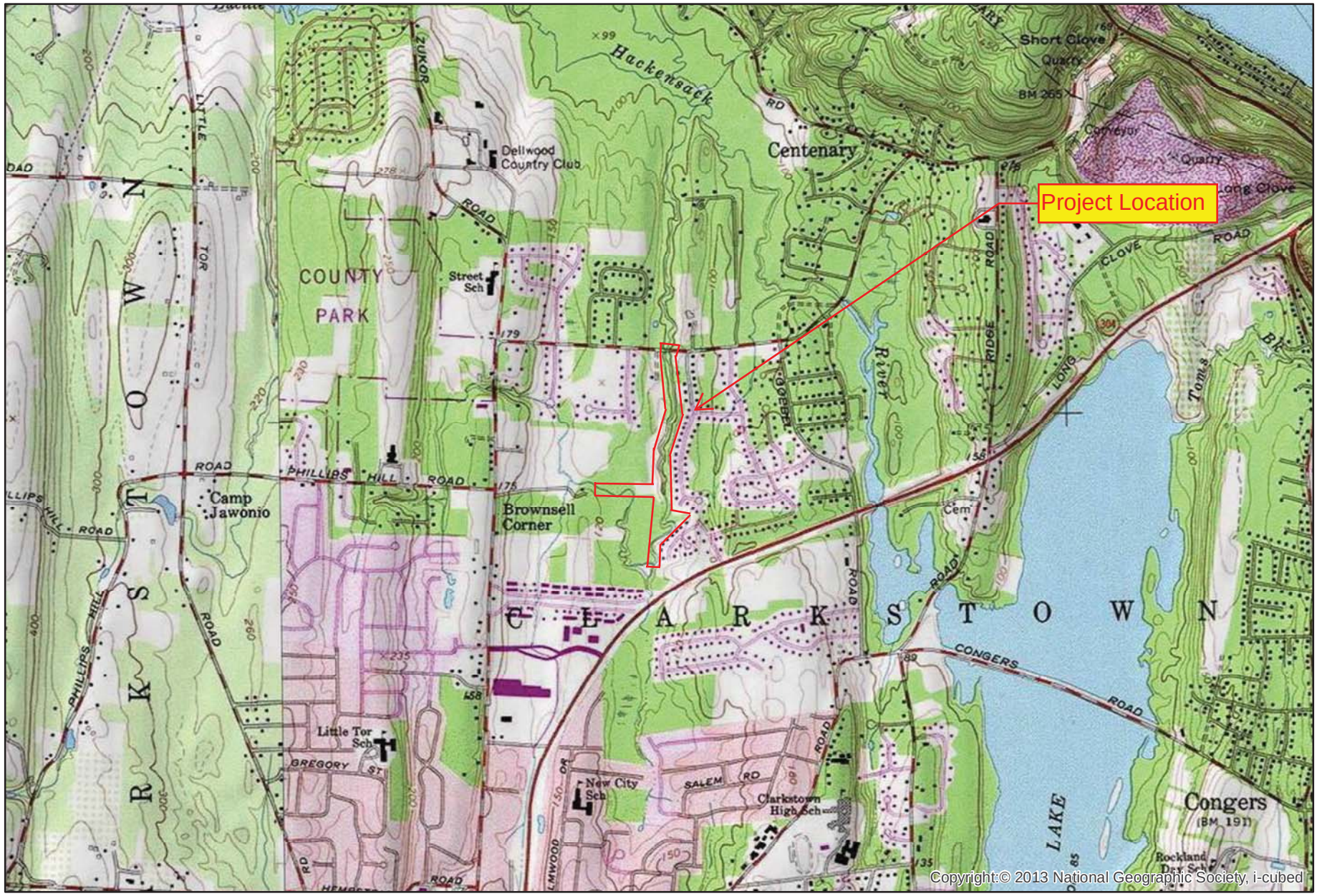
TECTONIC
Practical Solutions, Exceptional Service

0 0.25 0.5 1 Miles

1:24,000

Street Map
Cranford Drive Drainage Improvements
Clarkstown, NY 10956

N W E S



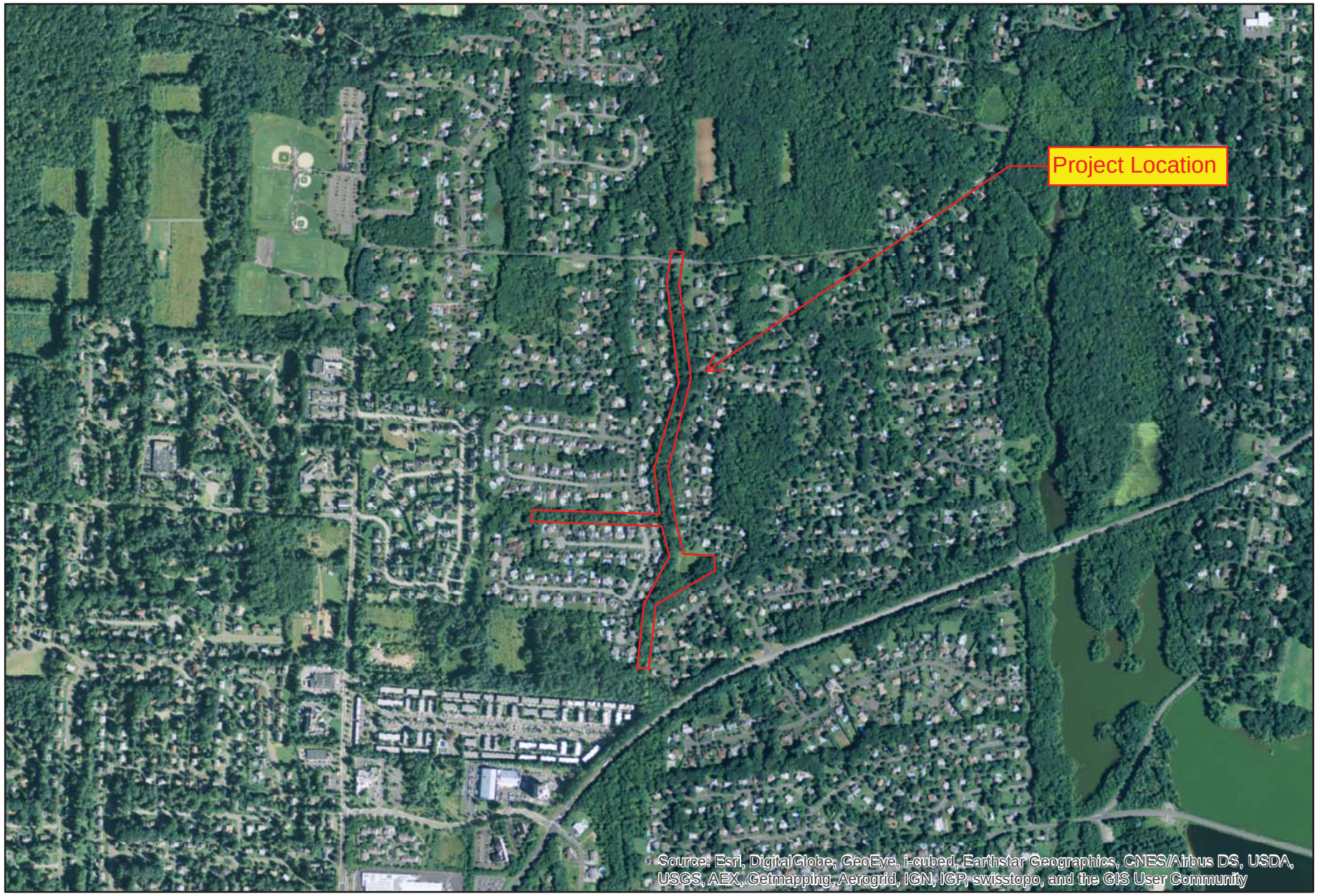
TECTONIC
Practical Solutions, Exceptional Service

0 0.25 0.5 1 Miles

1:24,000

Topographic Map
Cranford Drive Drainage Improvements
Clarkstown, NY 10956

N
W E
S



TECTONIC

Practical Solutions, Exceptional Service

0 0.125 0.25 0.5 Miles

1:13,000

Aerial Map
Cranford Drive Drainage Improvements
Clarkstown, NY 10956

N
W E
S

Attachment 2

IPaC Trust Resources Report

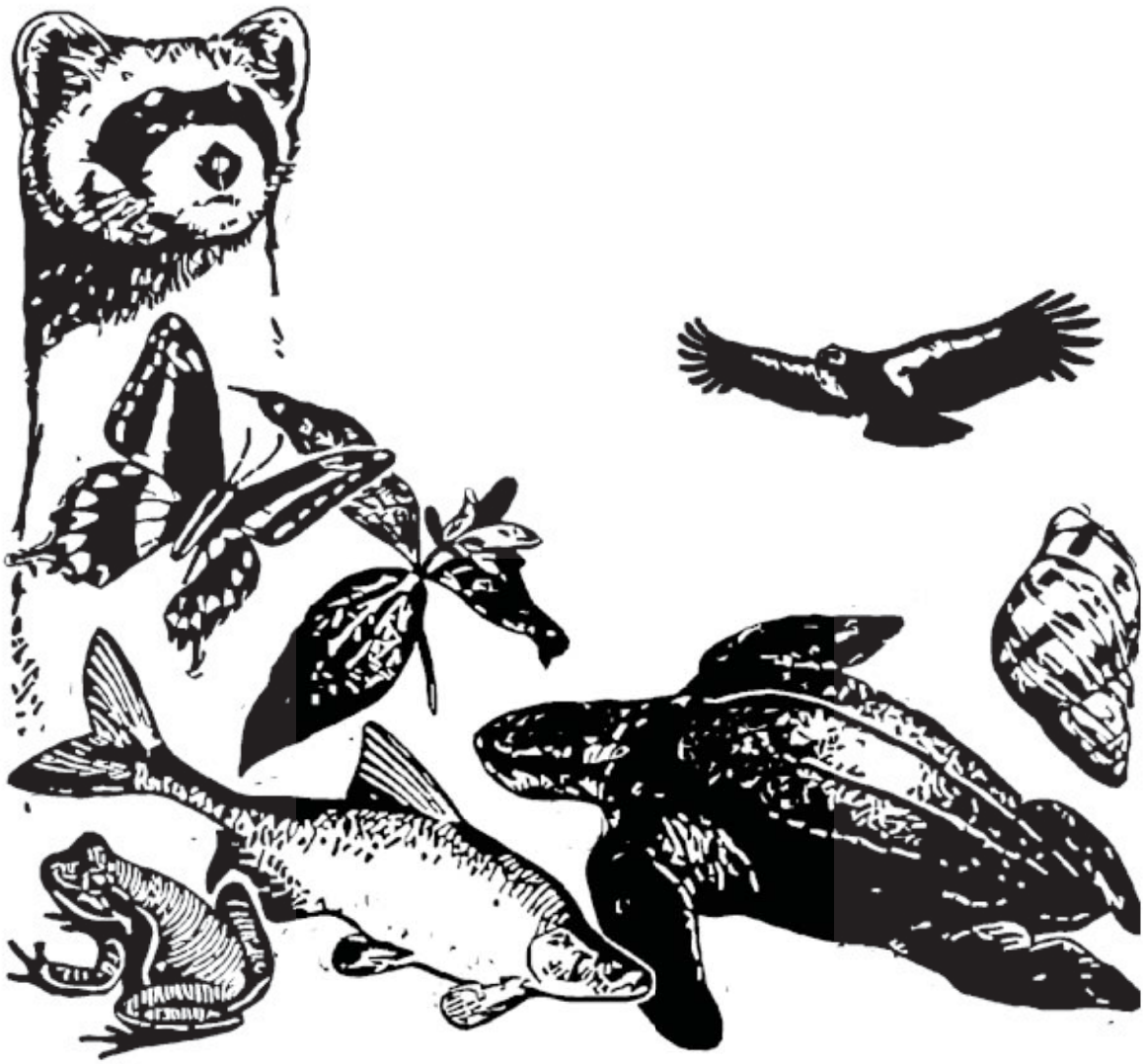
U.S. Fish & Wildlife Service

Clarkstown Cranford Drive Drainage Improvements

IPaC Trust Resources Report

Generated July 07, 2016 01:41 PM MDT, IPaC v3.0.8

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

Table of Contents

IPaC Trust Resources Report 1
Project Description 1
Endangered Species 2
Migratory Birds 3
Refuges & Hatcheries 6
Wetlands 7

U.S. Fish & Wildlife Service

IPaC Trust Resources Report

NAME

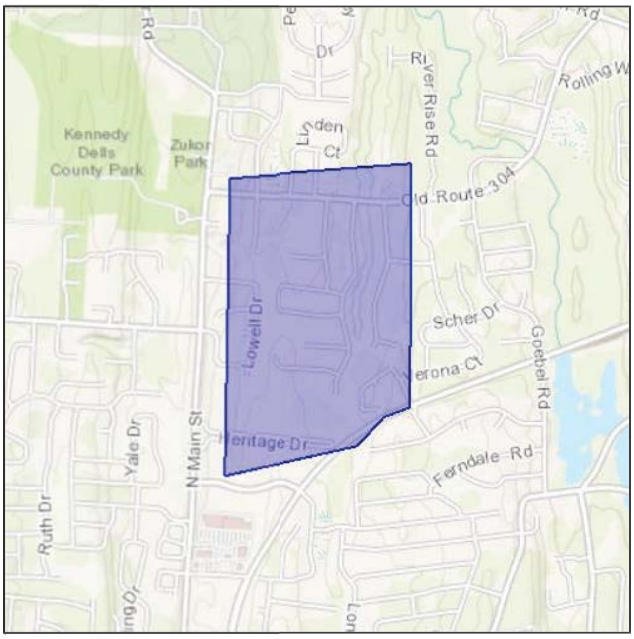
Clarkstown Cranford Drive Drainage Improvements

LOCATION

Rockland County, New York

IPAC LINK

https://ecos.fws.gov/ipac/project/2G2IZ-CLP2F-HBVMM-BR62R-4DUO3M



U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

Long Island Ecological Services Field Office
340 Smith Road
Shirley, NY 11967
(631) 286-0485

New York Ecological Services Field Office
3817 Luker Road
Cortland, NY 13045-9349
(607) 753-9334

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act requires Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Mammals

Northern Long-eared Bat Myotis septentrionalis — Threatened

MANAGED BY
New York Ecological Services Field Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0JE

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

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

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

---

1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The following species of migratory birds could potentially be affected by activities in this location:

American Bittern Botaurus lentiginosus — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F3

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
On Land Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Black-billed Cuckoo Coccyzus erythropthalmus — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HI

Blue-winged Warbler Vermivora pinus — Bird of conservation concern
On Land Season: Breeding

Canada Warbler Wilsonia canadensis — Bird of conservation concern
On Land Season: Breeding

Cerulean Warbler Dendroica cerulea — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B09I

Fox Sparrow Passerella iliaca — Bird of conservation concern
On Land Season: Wintering

Golden-winged Warbler Vermivora chrysoptera — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G4

Hudsonian Godwit Limosa haemastica — Bird of conservation concern
At Sea Season: Migrating

Least Bittern Ixobrychus exilis
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B092

Louisiana Waterthrush Parkesia motacilla — Bird of conservation concern
On Land Season: Breeding

Olive-sided Flycatcher Contopus cooperi — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0AN

Peregrine Falcon Falco peregrinus — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Pied-billed Grebe Podilymbus podiceps — Bird of conservation concern
On Land Season: Year-round

Prairie Warbler Dendroica discolor — Bird of conservation concern
On Land Season: Breeding

Purple Sandpiper Calidris maritima — Bird of conservation concern
On Land Season: Wintering

Rusty Blackbird Euphagus carolinus — Bird of conservation concern
On Land Season: Wintering

Short-eared Owl Asio flammeus — Bird of conservation concern
On Land Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Upland Sandpiper Bartramia longicauda — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HC

Willow Flycatcher Empidonax traillii — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6

Wood Thrush Hylocichla mustelina — Bird of conservation concern
On Land Season: Breeding

Worm Eating Warbler Helmitheros vermivorum

Bird of conservation concern

On Land Season: Breeding

Wildlife refuges and fish hatcheries

There are no refuges or fish hatcheries in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local 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 tuberficid 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.

Wetland data is unavailable at this time.

Attachment 3

USFWS Species List
from New York Field Office
and Long Island Field Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New York Ecological Services Field Office
3817 LUKER ROAD
CORTLAND, NY 13045
PHONE: (607)753-9334 FAX: (607)753-9699
URL: www.fws.gov/northeast/nyfo/es/section7.htm

Consultation Code: 05E1NY00-2016-SLI-2000 July 07, 2016
Event Code: 05E1NY00-2016-E-04488
Project Name: Clarkstown Cranford Drive Drainage Improvements

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). This list can also be used to determine whether listed species may be present for projects without federal agency involvement. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list.

Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC site at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list. If listed, proposed, or candidate species were identified as potentially occurring in the project area, coordination with our office is encouraged. Information on the steps involved with assessing potential impacts from projects can be found at: http://www.fws.gov/northeast/nyfo/es/section7.htm

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (

http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the Services wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the ESA. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Clarkstown Cranford Drive Drainage Improvements

Official Species List

Provided by:

New York Ecological Services Field Office
3817 LUKER ROAD
CORTLAND, NY 13045
(607) 753-9334
http://www.fws.gov/northeast/nyfo/es/section7.htm

Expect additional Species list documents from the following office(s):

Long Island Ecological Services Field Office
340 SMITH ROAD
SHIRLEY, NY 11967
(631) 286-0485

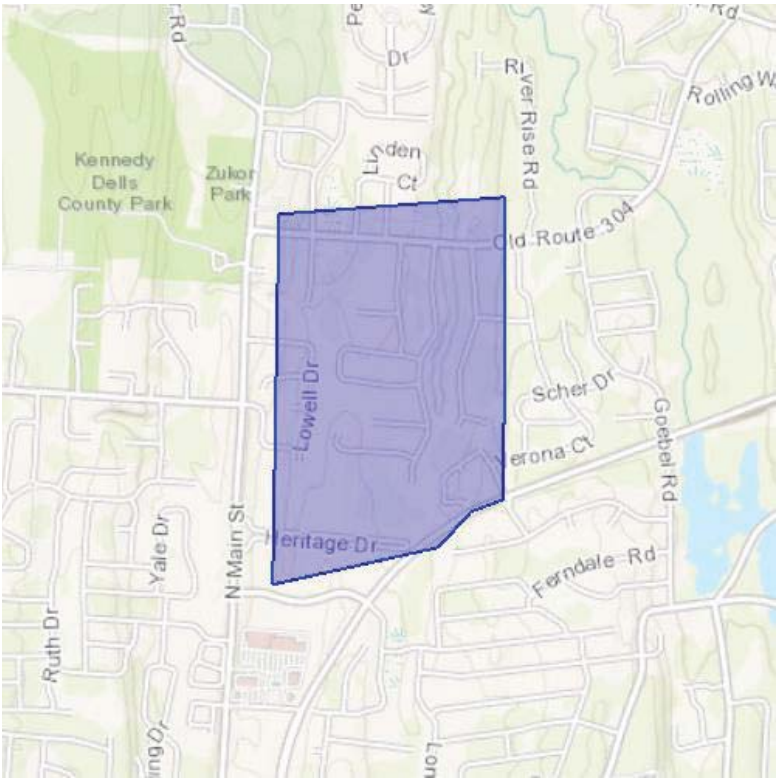
Consultation Code: 05E1NY00-2016-SLI-2000
Event Code: 05E1NY00-2016-E-04488

Project Type: Federal Grant / Loan Related

Project Name: Clarkstown Cranford Drive Drainage Improvements

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-73.9764404296875 41.16080541873828, -73.97637605667114 41.17103056966748, -73.98650407791138 41.170465239646035, -73.98684740066528 41.15792981241569, -73.97935867309569 41.15917376996048, -73.9778995513916 41.160369239379634, -73.9764404296875 41.16080541873828)))

Project Counties: Rockland, NY

Endangered Species Act Species List

There are a total of 1 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Mammals	Status	Has Critical Habitat	Condition(s)
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Long Island Ecological Services Field Office
340 SMITH ROAD
SHIRLEY, NY 11967
PHONE: (631)286-0485 FAX: (631)286-4003

Consultation Code: 05E1LI00-2016-SLI-0311 July 07, 2016
Event Code: 05E1LI00-2016-E-00302
Project Name: Clarkstown Cranford Drive Drainage Improvements

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Clarkstown Cranford Drive Drainage Improvements

Official Species List

Provided by:

Long Island Ecological Services Field Office
340 SMITH ROAD
SHIRLEY, NY 11967
(631) 286-0485

Expect additional Species list documents from the following office(s):

New York Ecological Services Field Office
3817 LUKER ROAD
CORTLAND, NY 13045
(607) 753-9334
http://www.fws.gov/northeast/nyfo/es/section7.htm

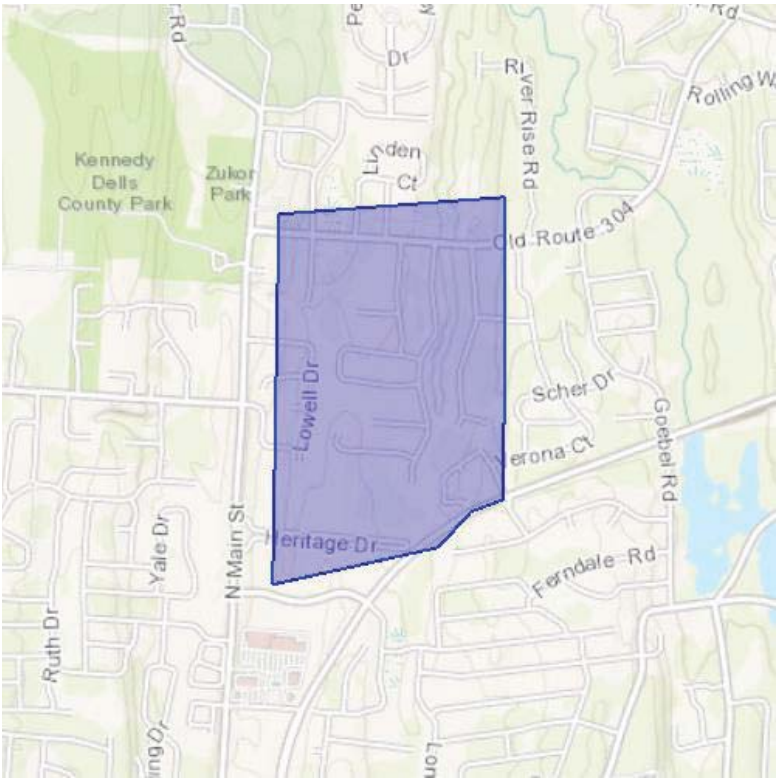
Consultation Code: 05E1LI00-2016-SLI-0311
Event Code: 05E1LI00-2016-E-00302

Project Type: Federal Grant / Loan Related

Project Name: Clarkstown Cranford Drive Drainage Improvements

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-73.9764404296875 41.16080541873828, -73.97637605667114 41.17103056966748, -73.98650407791138 41.170465239646035, -73.98684740066528 41.15792981241569, -73.97935867309569 41.15917376996048, -73.9778995513916 41.160369239379634, -73.9764404296875 41.16080541873828)))

Project Counties: Rockland, NY

Endangered Species Act Species List

There are a total of 0 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

Critical habitats that lie within your project area

There are no critical habitats within your project area.

Attachment 4

NYNHP Response

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, 5th Floor, Albany, New York 12233-4757
Phone: (518) 402-8935 • **Fax:** (518) 402-8925
Website: www.dec.ny.gov

Joe Martens
Commissioner

August 14, 2015

Travis Money
Tectonic
PO Box 37, 70 Pleasant Hill Road
Mountainville, NY 10953

Re: Clarkstown Cranford Drive Drainage Project (Tectonic WO #7463.12)
Town/City: Clarkstown. County: Rockland.

Dear Travis Money :

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

Enclosed is a report of rare or state-listed animals and plants, and significant natural communities, that our database indicates occur, or may occur, on your site or in the immediate vicinity of your site.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our database. We cannot provide a definitive statement as to 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 sources may be required to fully assess impacts on biological resources.

Our database is continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

The presence of the plants and animals identified in the enclosed report may result in this project requiring additional review or permit conditions. For further guidance, and 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,

Andrea Chaloux

Andrea Chaloux
Environmental Review Specialist
New York Natural Heritage Program

826

The following rare plants, rare animals, and significant natural communities have been documented at your project site, or in its vicinity.

We recommend that potential onsite and offsite impacts of the proposed project on these species or communities be addressed as part of any environmental assessment or review conducted as part of the planning, permitting and approval process, such as reviews conducted under SEQR. Field surveys of the project site may be necessary to determine the status of a species at the site, particularly for sites that are currently undeveloped and may still contain suitable habitat. Final requirements of the project to avoid, minimize, or mitigate potential impacts are determined by the lead permitting agency or the government body approving the project.

The following animals, while not listed by New York State as Endangered or Threatened, are of conservation concern to the state, and are considered rare by the New York Natural Heritage Program.

COMMON NAME	*SCIENTIFIC NAME*	*NY STATE LISTING*	*HERITAGE CONSERVATION STATUS*
Freshwater Mussels			
Eastern Pearlshell	*Margaritifera margaritifera*	Unlisted	Imperiled in NYS

Hackensack River Centenary, 1994-su-fa: The mussels were found in a small stream, 5 meters wide, which runs through woods and residential back yards. The stream is 0.25-0.5 meters deep, a little turbid, and runs over cobbles, gravel, and sand. A bridge crossing downstream is at the head of the slack water from Deforest Lake. There is some trash in the stream and intense development upstream; probably nutrient enrichment. Old dead shells were also found in a tributary. 341

This report only includes records from the NY Natural Heritage database. For most sites, comprehensive field surveys have not been conducted, and we cannot provide a definitive statement as to the presence or absence of all rare or state-listed species. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

If any rare plants or animals are documented during site visits, we request that information on the observations be provided to the New York Natural Heritage Program so that we may update our database.

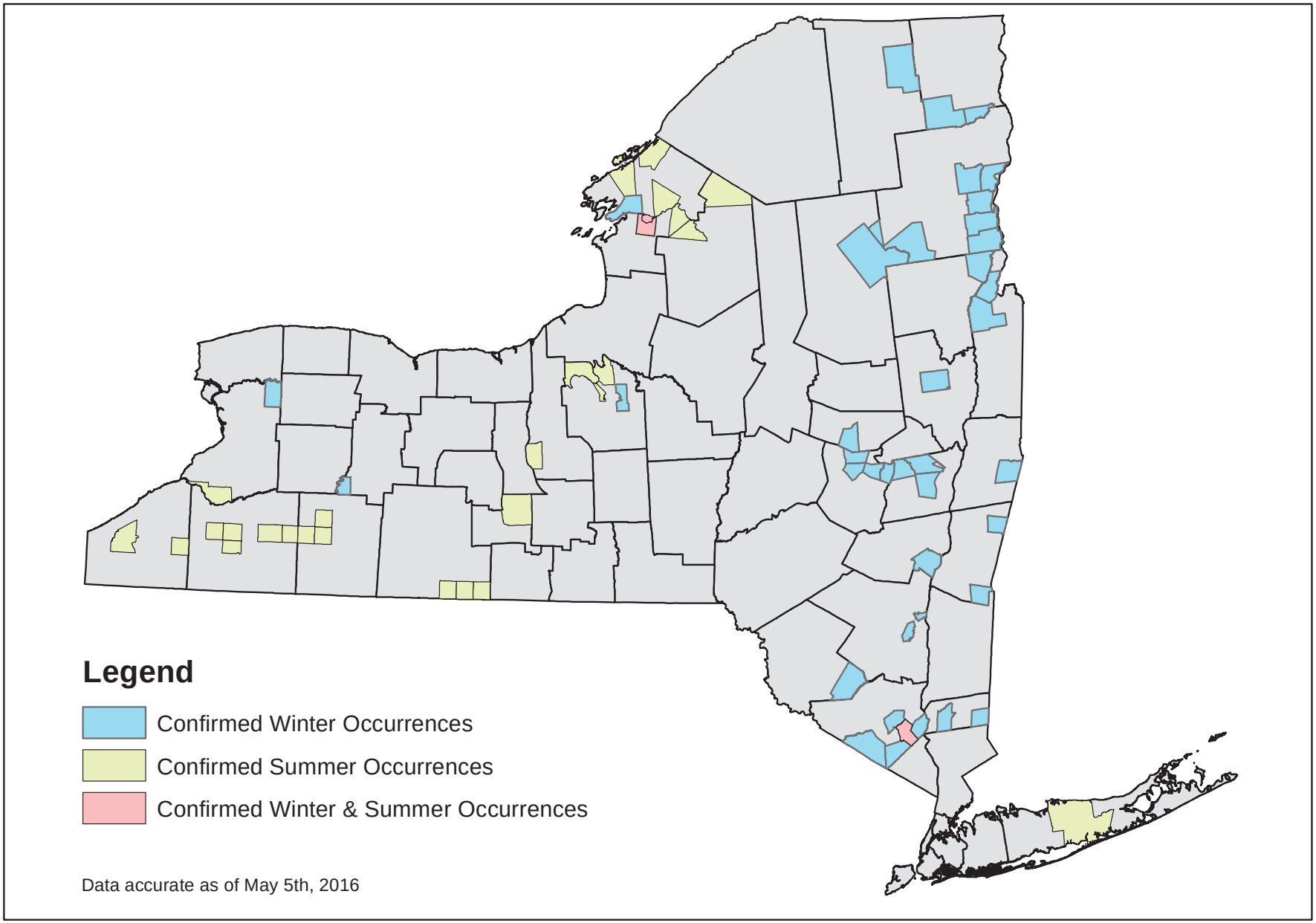
Information about many of the rare animals and plants in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, from NatureServe Explorer at www.natureserve.org/explorer, and from USDA's Plants Database at http://plants.usda.gov/index.html (for plants).

Information about many of the natural community types in New York, including identification, dominant and characteristic vegetation, distribution, conservation, and management, is available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org. For descriptions of all community types, go to www.dec.ny.gov/animals/97703.html for Ecological Communities of New York State.

Attachment 5

Northern Long-Eared Bat Occurrences
by Town in New York State

Northern Long-eared Bat Occurrences by Town



County	Town	Winter	Summer
Albany	Guilderland	Yes	
	Knox	Yes	
	New Scotland	Yes	
Allegany	Belfast		Yes
	Caneadea		Yes
	New Hudson		Yes
Cattaraugus	Franklinville		Yes
	Little Valley		Yes
	Lyndon		Yes
	Mansfield		Yes
	New Albion		Yes
Cayuga	Ledyard		Yes
Chautauqua	Chautauqua		Yes
	Ellington		Yes
Clinton	Ausable	Yes	
	Black Brook	Yes	
Columbia	Ancram	Yes	
	Canaan	Yes	
Erie	Collins		Yes
	Newstead	Yes	
Essex	Crown Point	Yes	
	Elizabethtown	Yes	
	Minerva	Yes	
	Moriah	Yes	
	Ticonderoga	Yes	
	Westport	Yes	
Franklin	Bellmont	Yes	
Greene	Catskill	Yes	
Hamilton	Indian Lake	Yes	
Jefferson	Alexandria		Yes
	Brownville	Yes	
	Champion		Yes
	Clayton		Yes
	Le Ray		Yes
	Watertown	Yes	Yes
Lewis	Denmark		Yes
	Diana		Yes
Livingston	Portage	Yes	
Montgomery	Root	Yes	

Onondaga	Clay		Yes
	De Witt	Yes	
	Geddes		Yes
	Lysander		Yes
Orange	Blooming Grove	Yes	
	Highlands	Yes	
	Tuxedo	Yes	
	Warwick	Yes	
	Woodbury	Yes	Yes
Putnam	Putnam Valley	Yes	
	Southeast	Yes	
Rensselaer	Berlin	Yes	
Saratoga	Greenfield	Yes	
Schoharie	Carlisle	Yes	
	Cobleskill	Yes	
	Schoharie	Yes	
	Wright	Yes	
Schulyer	Hector		Yes
Steuben	Caton		Yes
	Lindley		Yes
	Tuscarora		Yes
Suffolk	Brookhaven		Yes
Sullivan	Manmakating	Yes	
Ulster	Kingston	Yes	
	Rosendale	Yes	
Warren	Hague	Yes	
Washington	Dresden	Yes	
	Fort Ann	Yes	

Attachment 6

Project Site Maps
(included as part of NYSDEC permit)

PERMIT

Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
TOWN OF CLARKSTOWN
10 MAPLE AVE
NEW CITY, NY 10956-5013
(845) 639-6200

Facility:
DEMAREST KILL FLOOD CONTROL
CRANFORD DR
CLARKSTOWN, NY 10956

Facility Location: in CLARKSTOWN in ROCKLAND COUNTY
Facility Principal Reference Point: NYTM-E: 585.638 NYTM-N: 4557.648
Latitude: 41°09'56.3" Longitude: 73°58'45.0"

Authorized Activity: Modification and realignment of approximately 4,650 linear feet of the bed and banks of a tributary of West Branch Hankensack [Water Index No. NJ-1-12-3, Class C(T)], also known as the Demarest Kill, in accordance with project plans referenced in Natural Resource Condition #1 and as conditioned by this permit. The authorized activities are associated with the Town's Cranford Drive Flood Amelioration Project.

Permit Authorizations

Stream Disturbance - Under Article 15, Title 5
Permit ID 3-3920-00297/00010
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020
Water Quality Certification - Under Section 401 - Clean Water Act
Permit ID 3-3920-00297/00011
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: JOHN W PETRONELLA, Deputy Regional Permit Administrator
Address: NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY 12561

Authorized Signature: John W. Petronella Date 7 / 19 / 2016

JRM

Distribution List

US ARMY CORPS OF ENGINEERS - NY DISTRICT
BRIAN DRUMM
DENNIS LETSON, DEPT. OF ENVIRONMENTAL CONTROL, TOWN OF CLAKSON

Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

WATER QUALITY CERTIFICATION SPECIFIC CONDITION

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Permit Attachments

Project Location Map (Attachment I)
Site Plan (Attachment II)
Permit Sign

NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: STREAM DISTURBANCE; WATER QUALITY CERTIFICATION

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by Town of Clarkstown's Department of Environmental Control, titled "Cranford Drive Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets) (Attachment II) .

2. **Post Permit Sign** The permit sign enclosed with this permit shall be posted in a conspicuous location on the worksite and adequately protected from the weather.

3. **Notice of Intent to Commence Work** The permittee shall notify Brian Drumm, DEC Bureau of Habitat, via electronic mail (brian.drumm@dec.ny.gov) at least 48 hours in advance of the time of commencement of each phase described in plans referenced in Natural Resource Condition No. 1.

4. **Floodplain Regulations** The project must meet all local and federal floodplain regulations.

5. Phase Project to Reduce Erosion To reduce the potential for erosion, the project shall be constructed in six phases as defined in the plans approved by this permit and provided as an enclosure to the US Army Corps of Engineers New York District's Public Notice issued April 11, 2016 (Public Notice Number: NAN-2014-00305-ESW). Such plans are titled "Cranford Drive, Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets).

All activities within the phase must be fully completed and stablized prior to commencing project activities for the next phase.

6. Maintain Water Flow During Work During periods of work activity, sufficient flow of water shall be maintained at all times to sustain aquatic life downstream.

7. Temporary Diversion Channel A temporary diversion channel, culvert or pump-around shall be constructed to prevent running water in the work area. The area of temporary diversion must be restored to its original condition following completion of the work. If a diversion channel is used, its sides and bottom shall be protected by rock riprap or other suitable non-erodible materials to prevent scour and erosion.

8. No Impedance to Aquatic Organisms Structures must not impede upstream and downstream migration of aquatic organisms.

9. No Turbidity from Dewatering No turbid water resulting from dewatering operations shall be discharged directly to or allowed to enter the stream. Such water shall be pumped to settling basins or to an upland vegetated area prior to any discharge to the stream. All other necessary measures shall be implemented to prevent any visible increase in turbidity or sedimentation downstream of the work site.

10. Straw Bales or Other Downslope of Work Area Bales of straw or other effective means to control erosion are to be used on the downslope edge of any disturbed areas. This barrier to sediments is to be put in place before any disturbance of the ground occurs and is to be maintained in good condition until all disturbed land is heavily vegetated.

11. Temporary Seeding of Disturbed/ Stockpiled Soils All disturbed areas where soil is temporarily exposed or stockpiled for more than one month shall be stabilized with a temporary seeding or ground cover.

12. Clean Fill Only All fill material utilized for this project shall consist of uncontaminated earthen materials only. Acceptable fill materials include gravel, rock, overburden, topsoil and similar natural mineral resources.

13. Work During Low Flows All work shall be performed during low flow conditions.

14. Materials Removed from Bed and Banks Any debris or excess materials from construction of this project shall be immediately and completely removed from the bed and banks of all water areas to an appropriate upland area for disposal.

15. Dredgings Disposed at Upland Site All dredged and excavated material shall be disposed of on an upland site and be suitably stabilized so that it cannot reasonably re-enter any water body or wetland area.

16. **Seed, Mulch Disturbed Soils** All areas of soil disturbance resulting from this project (above the mean high water line) shall be seeded with an appropriate perennial grass seed and mulched with straw within one week of final grading. Mulch shall be maintained until a suitable vegetative cover is established.

17. **Temporary Mulch, Final Seeding** If seeding is impracticable due to the time of year, a temporary mulch shall be applied and final seeding shall be performed at the earliest opportunity when weather conditions favor germination and growth but not more than six months after project completion.

18. **Precautions Against Contamination of Waters** All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

19. **State May Order Removal or Alteration of Work** If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

20. **State May Require Site Restoration** If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

21. **State Not Liable for Damage** The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

WATER QUALITY CERTIFICATION SPECIFIC CONDITIONS

1. Water Quality Certification The authorized project, as conditioned pursuant to the Certificate, complies with Section 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act, as amended and as implemented by the limitations, standards, and criteria of state statutory and regulatory requirements set forth in 6 NYCRR Section 608.9(a). The authorized project, as conditioned, will also comply with applicable New York State water quality standards, including but not limited to effluent limitations, best usages and thermal discharge criteria, as applicable, as set forth in 6 NYCRR Parts 701, 702, 703, and 704.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. Facility Inspection by The Department The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. Relationship of this Permit to Other Department Orders and Determinations Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. Applications For Permit Renewals, Modifications or Transfers The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY12561

4. Submission of Renewal Application The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Stream Disturbance, Water Quality Certification.

5. **Permit Modifications, Suspensions and Revocations by the Department** The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. **Permit Transfer** Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

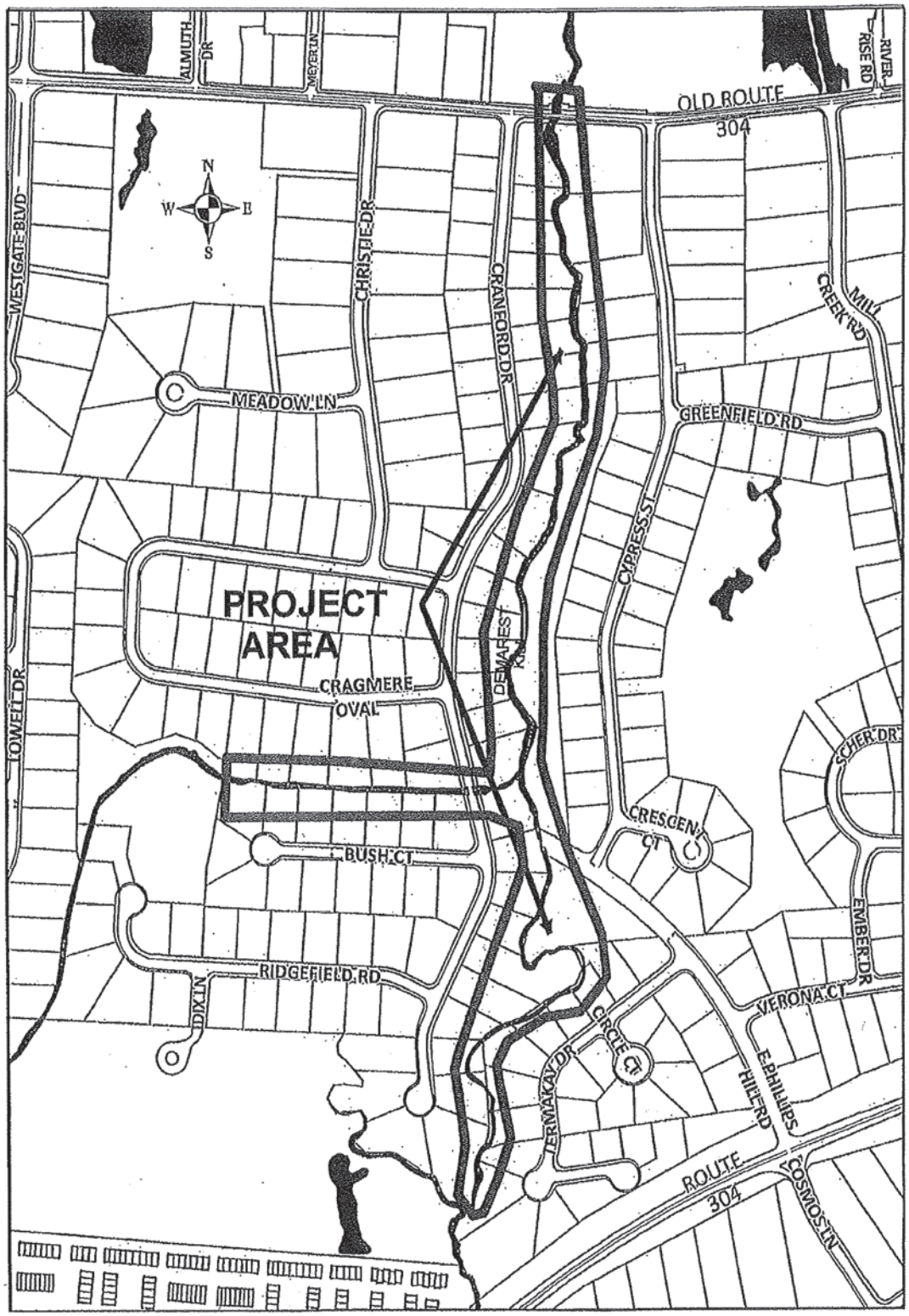
Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

Item E: SEQR Type I Action, No Significant Impact Under the State Environmental Quality Review Act (SEQR), the project associated with this permit is classified as a Type I Action with Clarkson Town Board designated as the lead agency. It has been determined that the project will not have a significant effect on the environment.

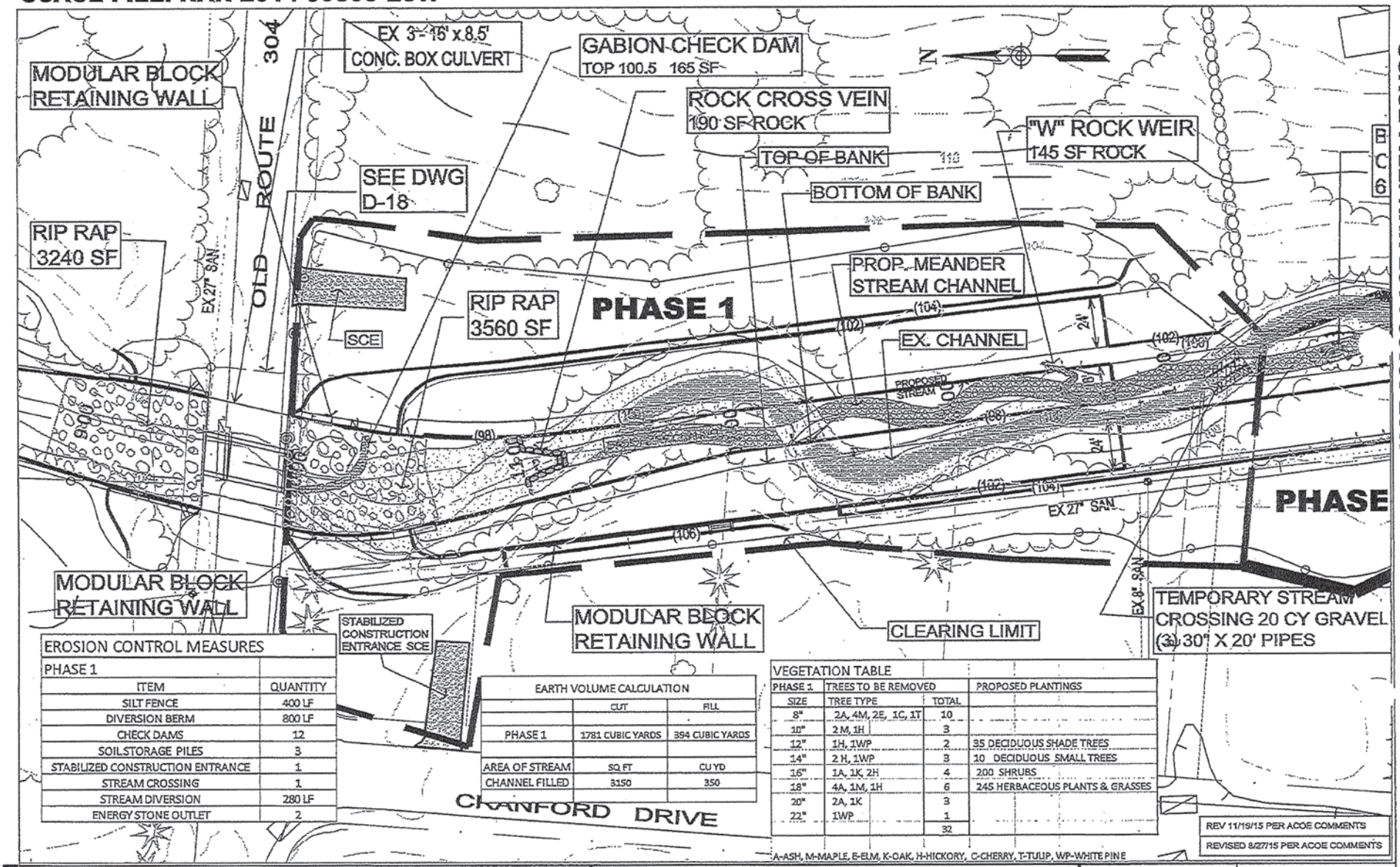
Project Location Map (Attachment I)

USACE FILE: NAN-2014-00305-ESW



500 250 0 500 Feet

CRANFORD DRIVE
FLOOD AMELIORATION PROJECT
TOWN OF CLARKSTOWN
NEW CITY, NEW YORK



EROSION CONTROL MEASURES	
PHASE 1	
ITEM	QUANTITY
SILT FENCE	400 LF
DIVERSION BERM	800 LF
CHECK DAMS	12
SOIL STORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	280 LF
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1	1781 CUBIC YARDS	394 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT	CU YD
	3150	350

VEGETATION TABLE			
PHASE 1	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	2A, 4M, 2E, 1C, 1T	10	
10"	2 M, 1H	3	
12"	1H, 1WP	2	35 DECIDUOUS SHADE TREES
14"	2 H, 1WP	3	10 DECIDUOUS SMALL TREES
16"	1A, 1K, 2H	4	200 SHRUBS
18"	4A, 1M, 1H	6	245 HERBACEOUS PLANTS & GRASSES
20"	2A, 1K	3	
22"	1WP	1	
		32	

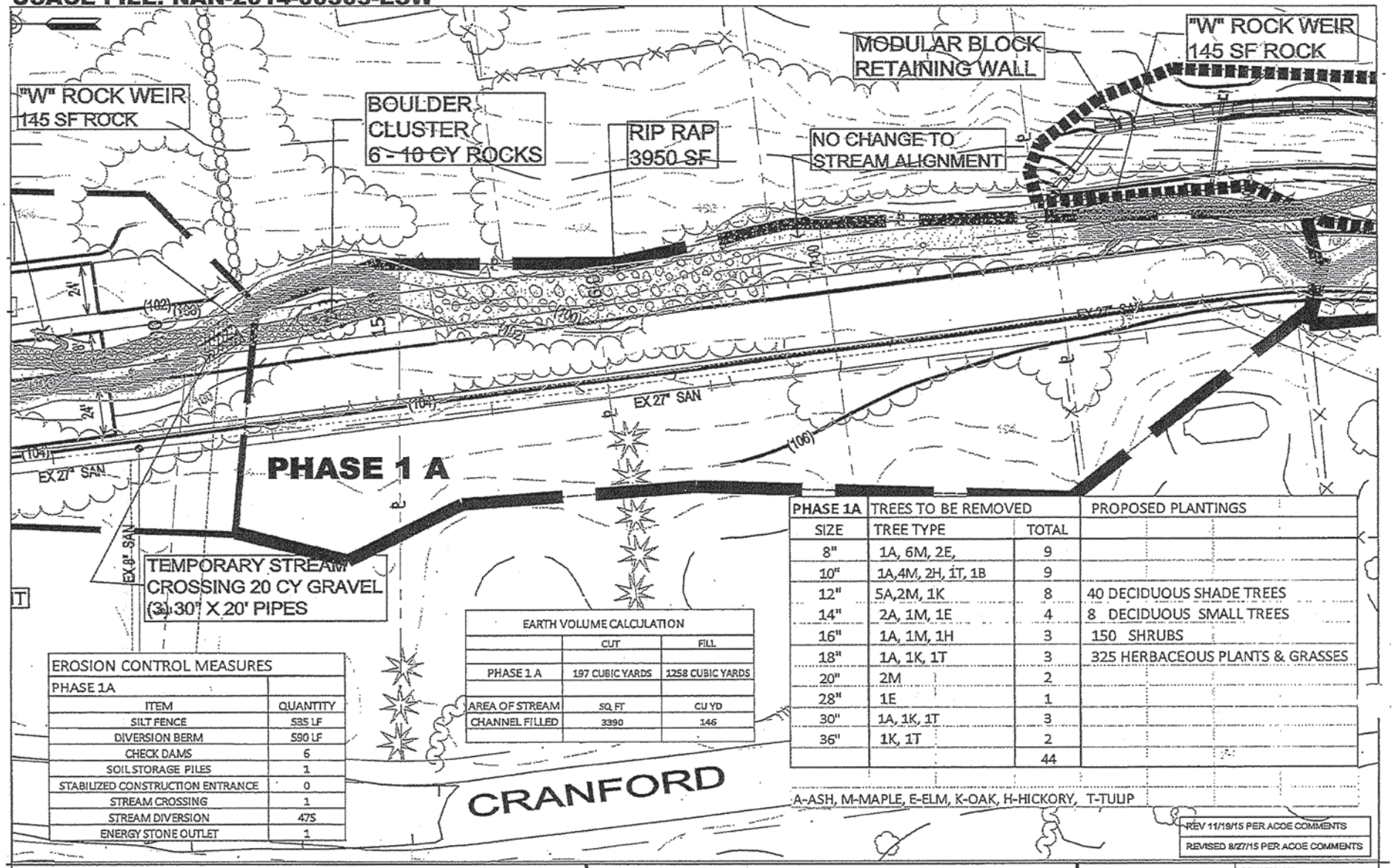
A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY, T-TULIP, WP-WHITE PINE

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	SITE LAYOUT PLAN	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: S-1 SHEET _1_ OF _31_ SHTS. DRAWING FILE: z:\engineering\cranford \drive\permits\acoe
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		

USACE FILE: NAN-2014-00305-ESW

Site Plan (Attachment 1)



EROSION CONTROL MEASURES	
PHASE 1A	
ITEM	QUANTITY
SILT FENCE	535 LF
DIVERSION BERM	590 LF
CHECK DAMS	6
SOIL STORAGE PILES	1
STABILIZED CONSTRUCTION ENTRANCE	0
STREAM CROSSING	1
STREAM DIVERSION	475
ENERGY STONE OUTLET	1

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1 A	197 CUBIC YARDS	1258 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ. FT	CU YD
	3390	146

PHASE 1A	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1A, 6M, 2E,	9	
10"	1A,4M, 2H, 1T, 1B	9	
12"	5A,2M, 1K	8	40 DECIDUOUS SHADE TREES
14"	2A, 1M, 1E	4	8 DECIDUOUS SMALL TREES
16"	1A, 1M, 1H	3	150 SHRUBS
18"	1A, 1K, 1T	3	325 HERBACEOUS PLANTS & GRASSES
20"	2M	2	
28"	1E	1	
30"	1A, 1K, 1T	3	
36"	1K, 1T	2	
		44	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

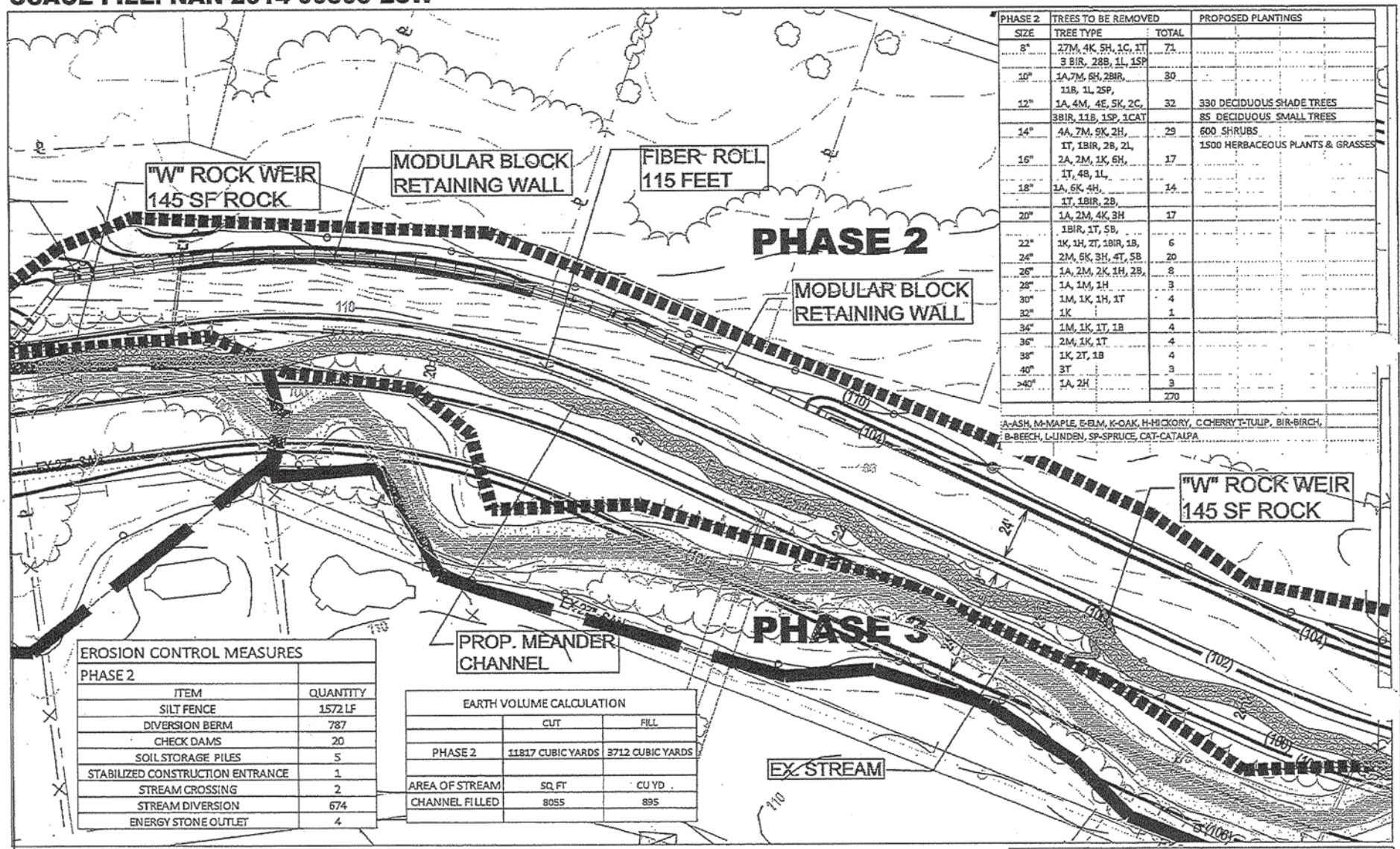
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-2
SHEET 2 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 2	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	27M, 4K, 5H, 1C, 1T 3 BIR, 28B, 1L, 1SP	71	
10"	1A,7M, 6H, 2BIR, 11B, 1L, 2SP,	30	
12"	1A, 4M, 4E, 5K, 2C, 3BIR, 11B, 1SP, 1CAT	32	330 DECIDUOUS SHADE TREES
			85 DECIDUOUS SMALL TREES
14"	4A, 7M, 9K, 2H, 1T, 1BIR, 2B, 2L,	29	600 SHRUBS
16"	2A, 2M, 1K, 6H, 1T, 4B, 1L,	17	1500 HERBACEOUS PLANTS & GRASSES
18"	1A, 6K, 4H, 1T, 1BIR, 2B,	14	
20"	1A, 2M, 4K, 3H 1BIR, 1T, 5B,	17	
22"	1K, 1H, 2T, 1BIR, 1B,	6	
24"	2M, 6K, 3H, 4T, 5B	20	
26"	1A, 2M, 2K, 1H, 2B,	8	
28"	1A, 1M, 1H	3	
30"	1M, 1K, 1H, 1T	4	
32"	1K	1	
34"	1M, 1K, 1T, 1B	4	
36"	2M, 1K, 1T	4	
38"	1K, 2T, 1B	4	
40"	3T	3	
>40"	1A, 2H	3	
		270	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY T-TULIP, BIR-BIRCH, B-BEECH, L-LINDEN, SP-SPRUCE, CAT-CATALPA.

EROSION CONTROL MEASURES	
PHASE 2	
ITEM	QUANTITY
SILT FENCE	1572 LF
DIVERSION BERM	787
CHECK DAMS	20
SOIL STORAGE PILES	5
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	2
STREAM DIVERSION	674
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 2	11817 CUBIC YARDS	3712 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT 8055	CU YD 895

REV 11/19/15 PER ACOE COMMENTS | REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

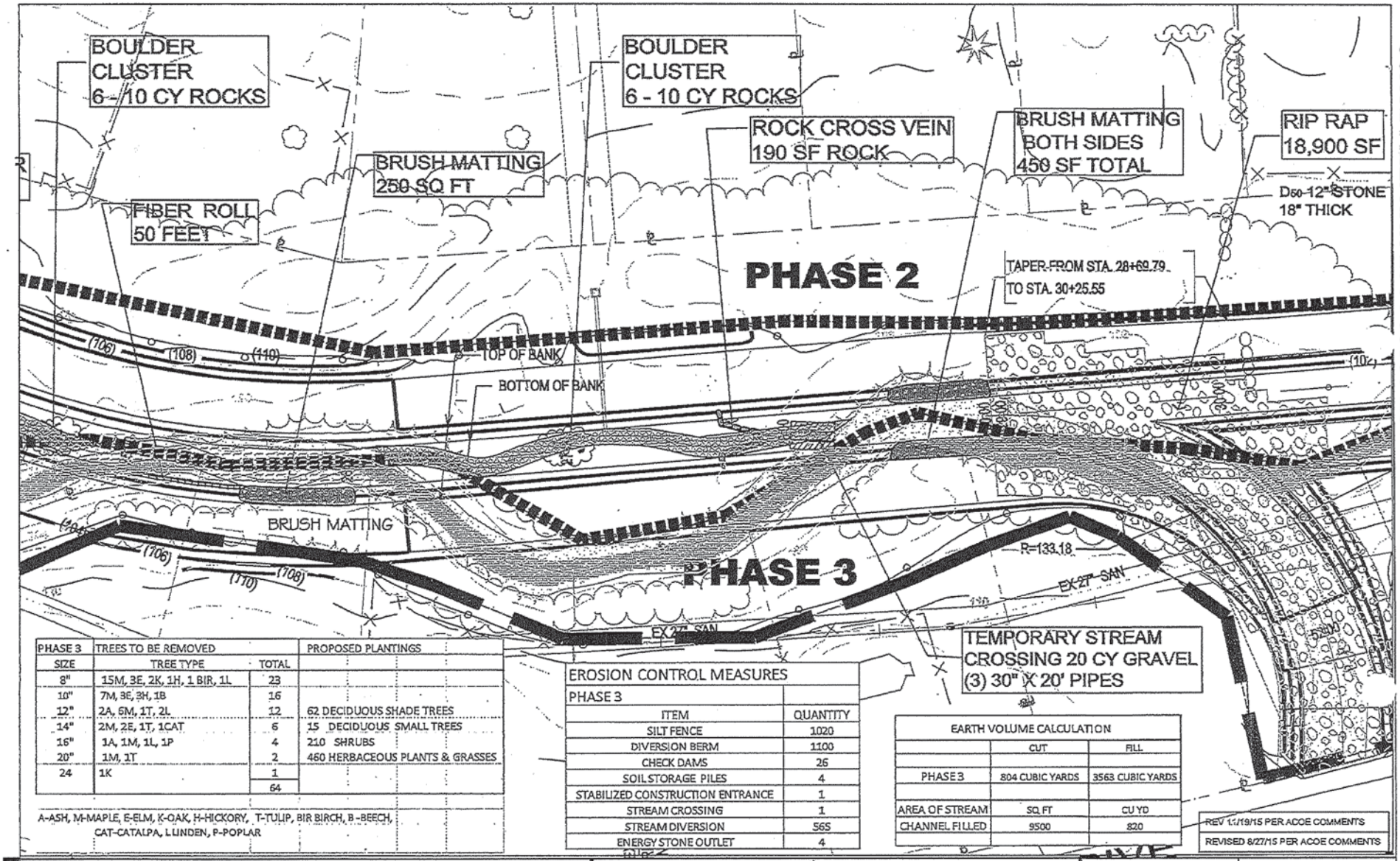
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-3
SHEET 3 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 3	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	15M, 3E, 2K, 1H, 1 BIR, 1L	23	
10"	7M, 3E, 3H, 1B	16	
12"	2A, 6M, 1T, 2L	12	62 DECIDUOUS SHADE TREES
14"	2M, 2E, 1T, 1CAT	6	15 DECIDUOUS SMALL TREES
16"	1A, 1M, 1L, 1P	4	210 SHRUBS
20"	1M, 1T	2	460 HERBACEOUS PLANTS & GRASSES
24	1K	1	
		64	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, CAT-CATALPA, L LINDEN, P-POPLAR

EROSION CONTROL MEASURES	
PHASE 3	
ITEM	QUANTITY
SILT FENCE	1020
DIVERSION BERM	1100
CHECK DAMS	26
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	565
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 3	804 CUBIC YARDS	3563 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	9500	820

REV 1: 1/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

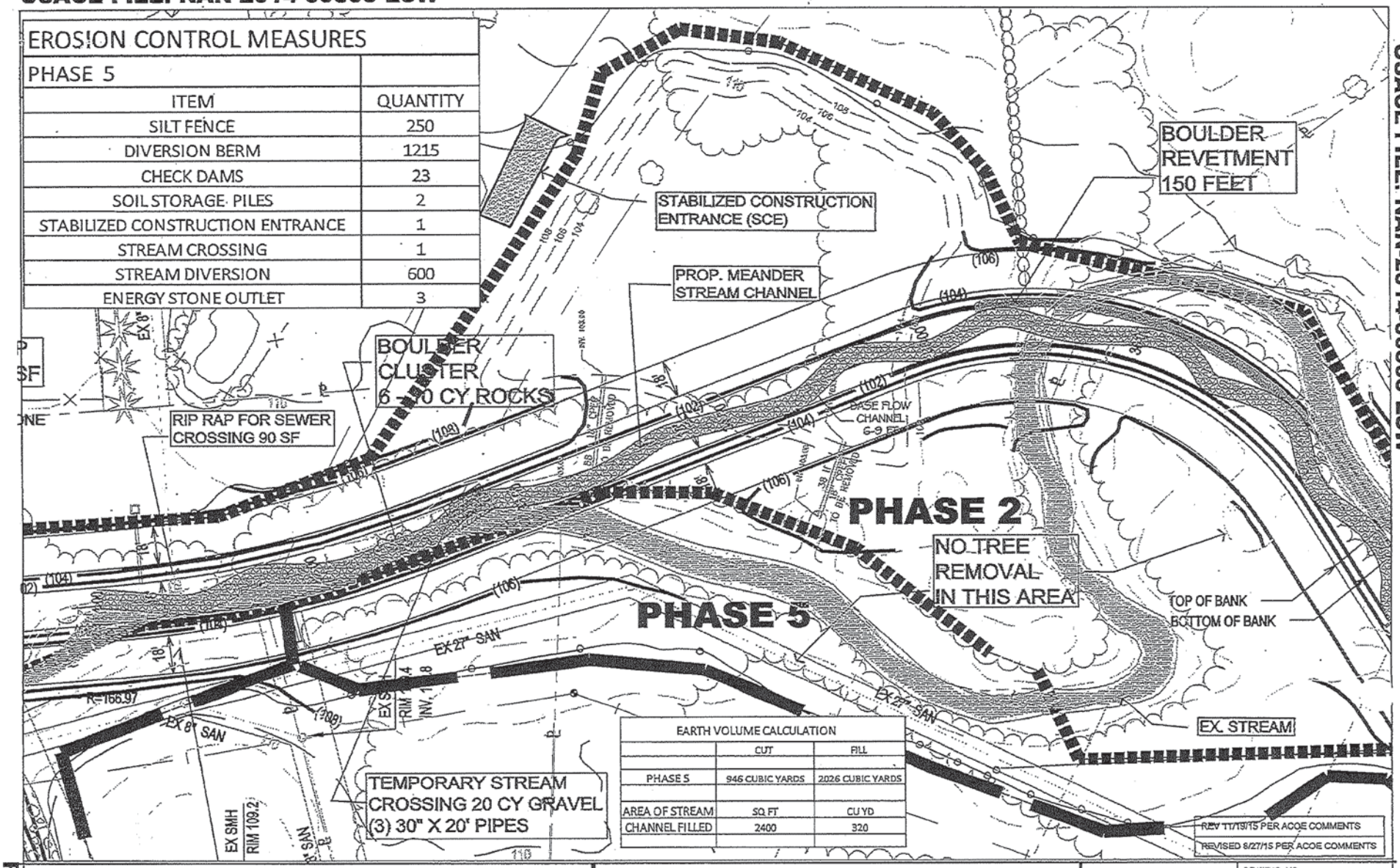
SITE LAYOUT PLAN
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-4
SHEET 4 OF 31 SHTS.
DRAWING FILE: e:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

EROSION CONTROL MEASURES	
PHASE 5	
ITEM	QUANTITY
SILT FENCE	250
DIVERSION BERM	1215
CHECK DAMS	23
SOIL STORAGE PILES	2
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	600
ENERGY STONE OUTLET	3



EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 5	946 CUBIC YARDS	2026 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT	CU YD
	2400	320

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

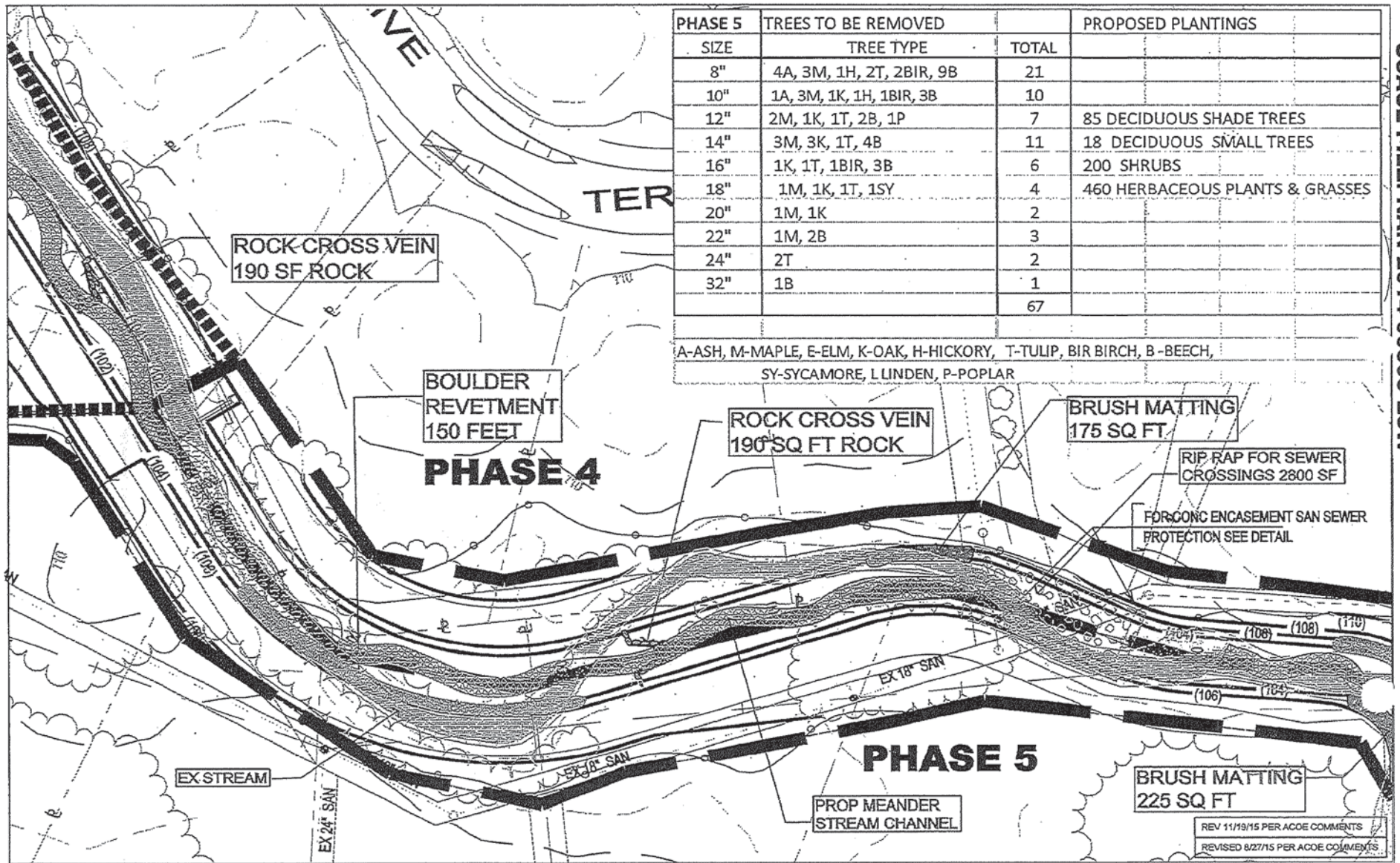
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	KOZ
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-5
SHEET 5 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

PHASE 5	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	4A, 3M, 1H, 2T, 2BIR, 9B	21	
10"	1A, 3M, 1K, 1H, 1BIR, 3B	10	
12"	2M, 1K, 1T, 2B, 1P	7	85 DECIDUOUS SHADE TREES
14"	3M, 3K, 1T, 4B	11	18 DECIDUOUS SMALL TREES
16"	1K, 1T, 1BIR, 3B	6	200 SHRUBS
18"	1M, 1K, 1T, 1SY	4	460 HERBACEOUS PLANTS & GRASSES
20"	1M, 1K	2	
22"	1M, 2B	3	
24"	2T	2	
32"	1B	1	
		67	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, SY-SYCAMORE, L LINDEN, P-POPLAR



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

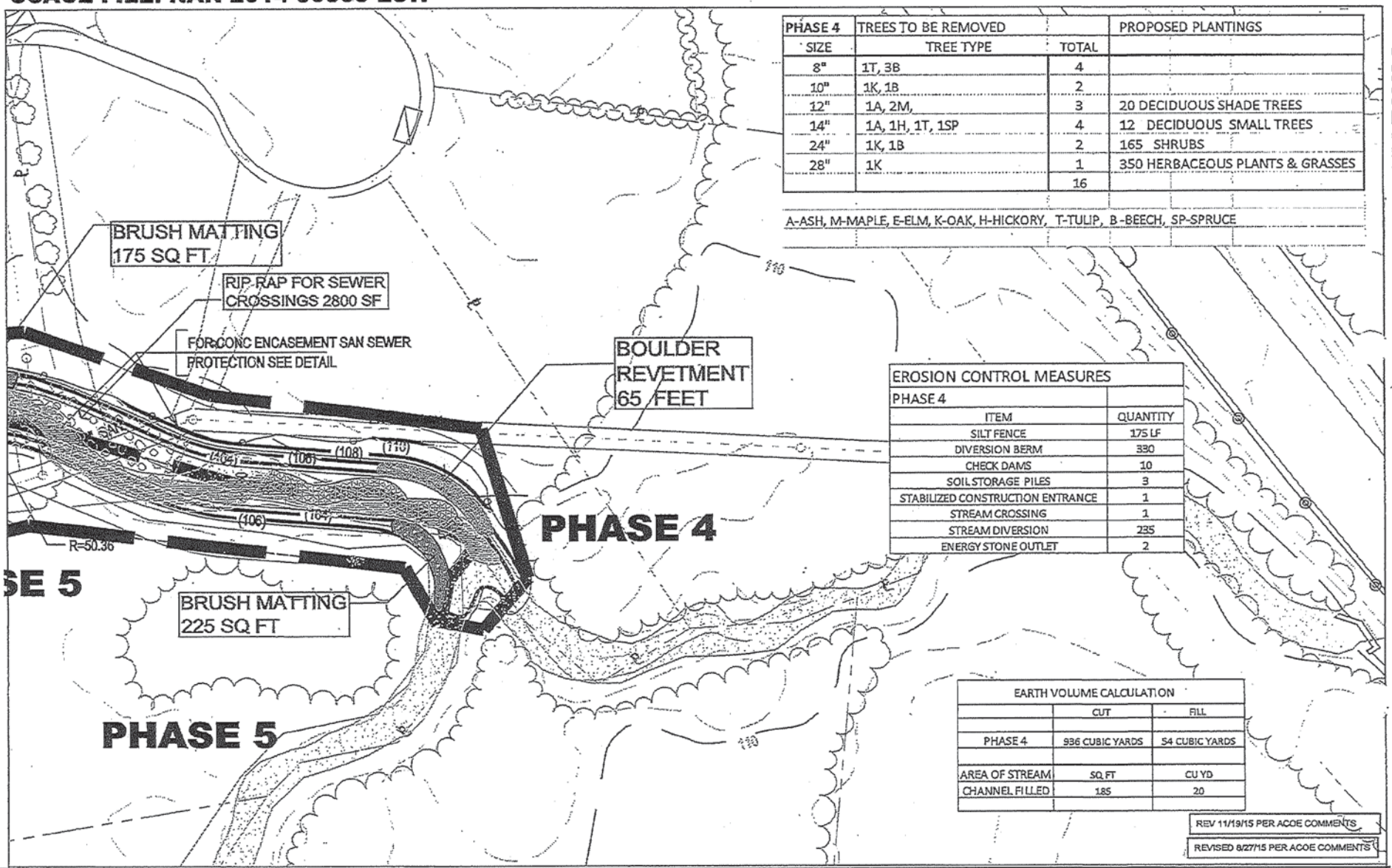
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-6

SHEET _6_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



PHASE 4	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1T, 3B	4	
10"	1K, 1B	2	
12"	1A, 2M,	3	20 DECIDUOUS SHADE TREES
14"	1A, 1H, 1T, 1SP	4	12 DECIDUOUS SMALL TREES
24"	1K, 1B	2	165 SHRUBS
28"	1K	1	350 HERBACEOUS PLANTS & GRASSES
		16	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, B-BEECH, SP-SPRUCE

EROSION CONTROL MEASURES	
PHASE 4	
ITEM	QUANTITY
SILT FENCE	175 LF
DIVERSION BERM	330
CHECK DAMS	10
SOIL STORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	235
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 4	936 CUBIC YARDS	54 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	185	20

REV 11/19/15 PER ACOE COMMENTS

REVISED 8/27/15 PER ACOE COMMENTS

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

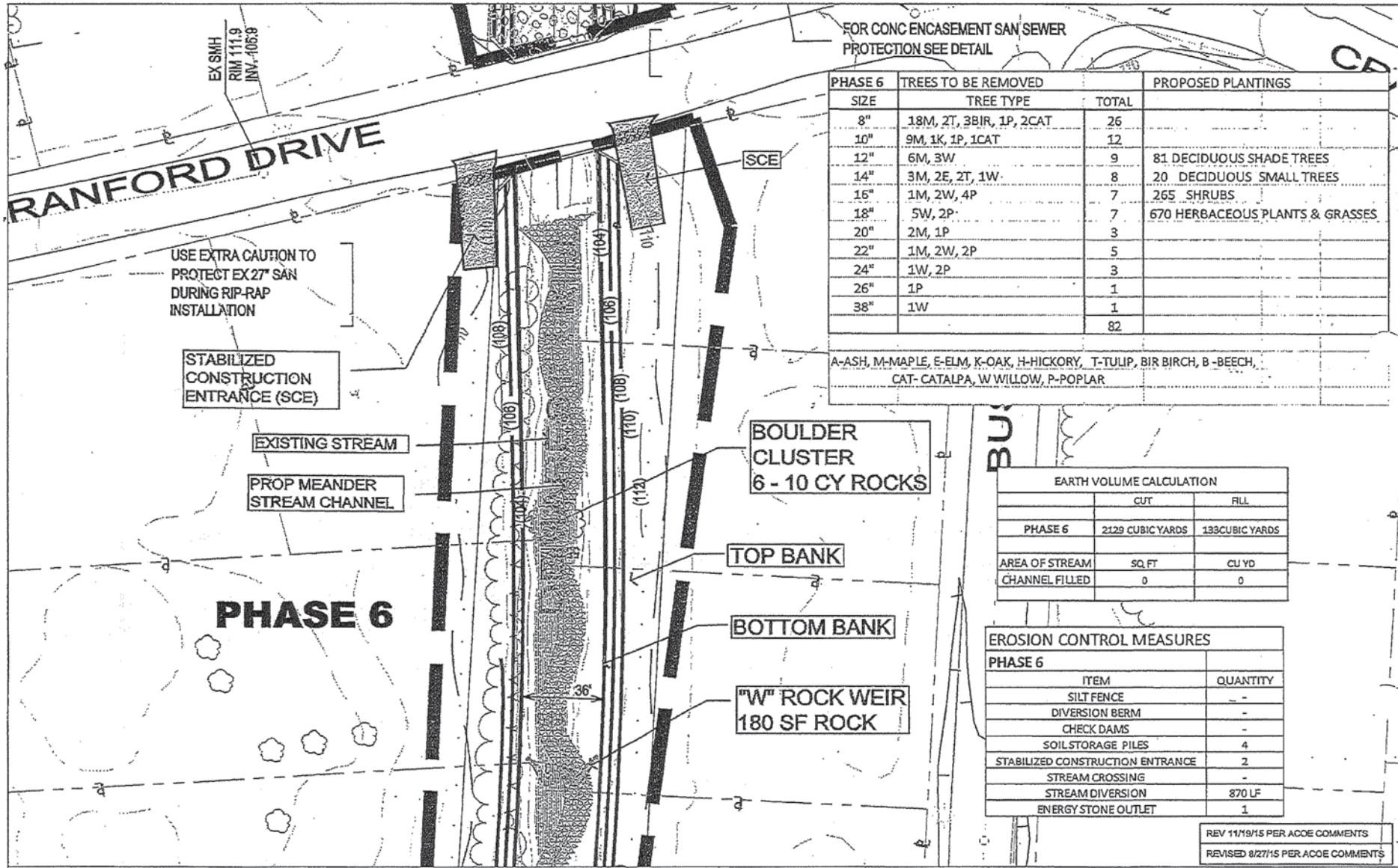
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-7

SHEET _7_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe



PHASE 6	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	18M, 2T, 3BIR, 1P, 2CAT	26	
10"	9M, 1K, 1P, 1CAT	12	
12"	6M, 3W	9	81 DECIDUOUS SHADE TREES
14"	3M, 2E, 2T, 1W	8	20 DECIDUOUS SMALL TREES
16"	1M, 2W, 4P	7	265 SHRUBS
18"	5W, 2P	7	670 HERBACEOUS PLANTS & GRASSES
20"	2M, 1P	3	
22"	1M, 2W, 2P	5	
24"	1W, 2P	3	
26"	1P	1	
38"	1W	1	
		82	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B -BEECH, CAT- CATALPA, W WILLOW, P-POPLAR

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 6	2129 CUBIC YARDS	133CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	0	0

EROSION CONTROL MEASURES	
PHASE 6	
ITEM	QUANTITY
SILT FENCE	-
DIVERSION BERM	-
CHECK DAMS	-
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	2
STREAM CROSSING	-
STREAM DIVERSION	870 LF
ENERGY STONE OUTLET	1

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

USACE FILE: NAN-2014-00305-ESW

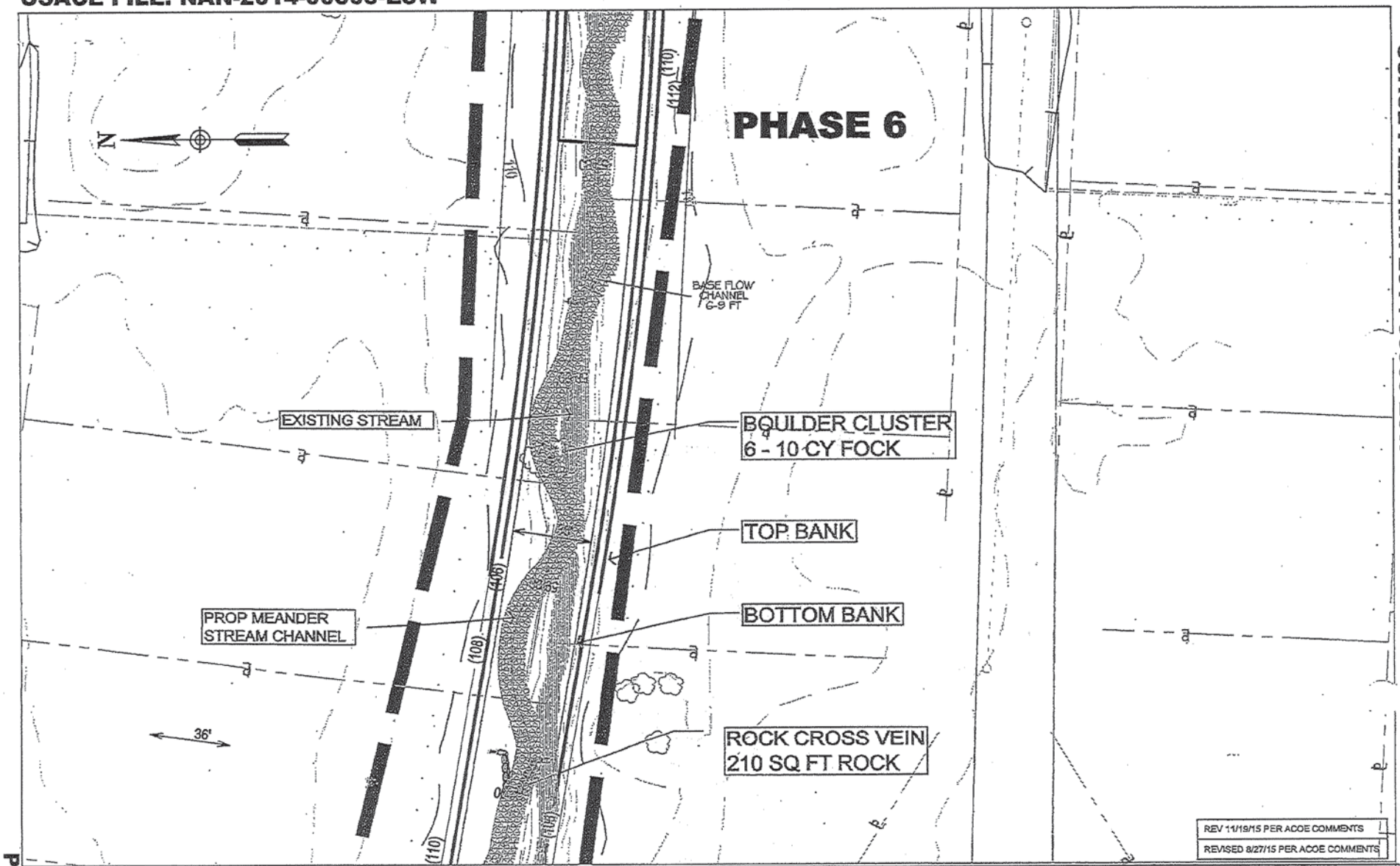
TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

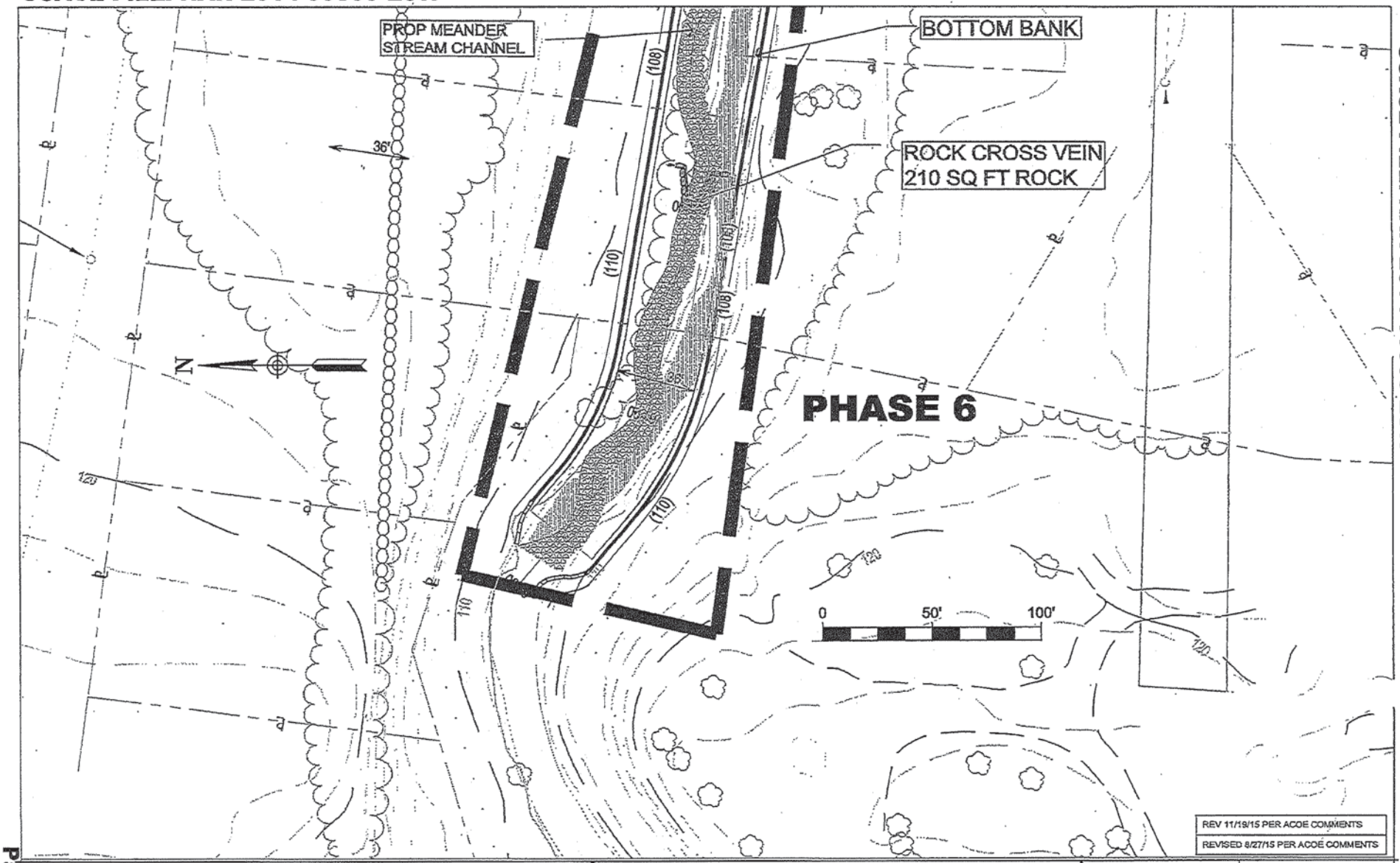
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-8
SHEET _8_ OF _31_ SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe



USACE FILE: NAN-2014-00305-ESW

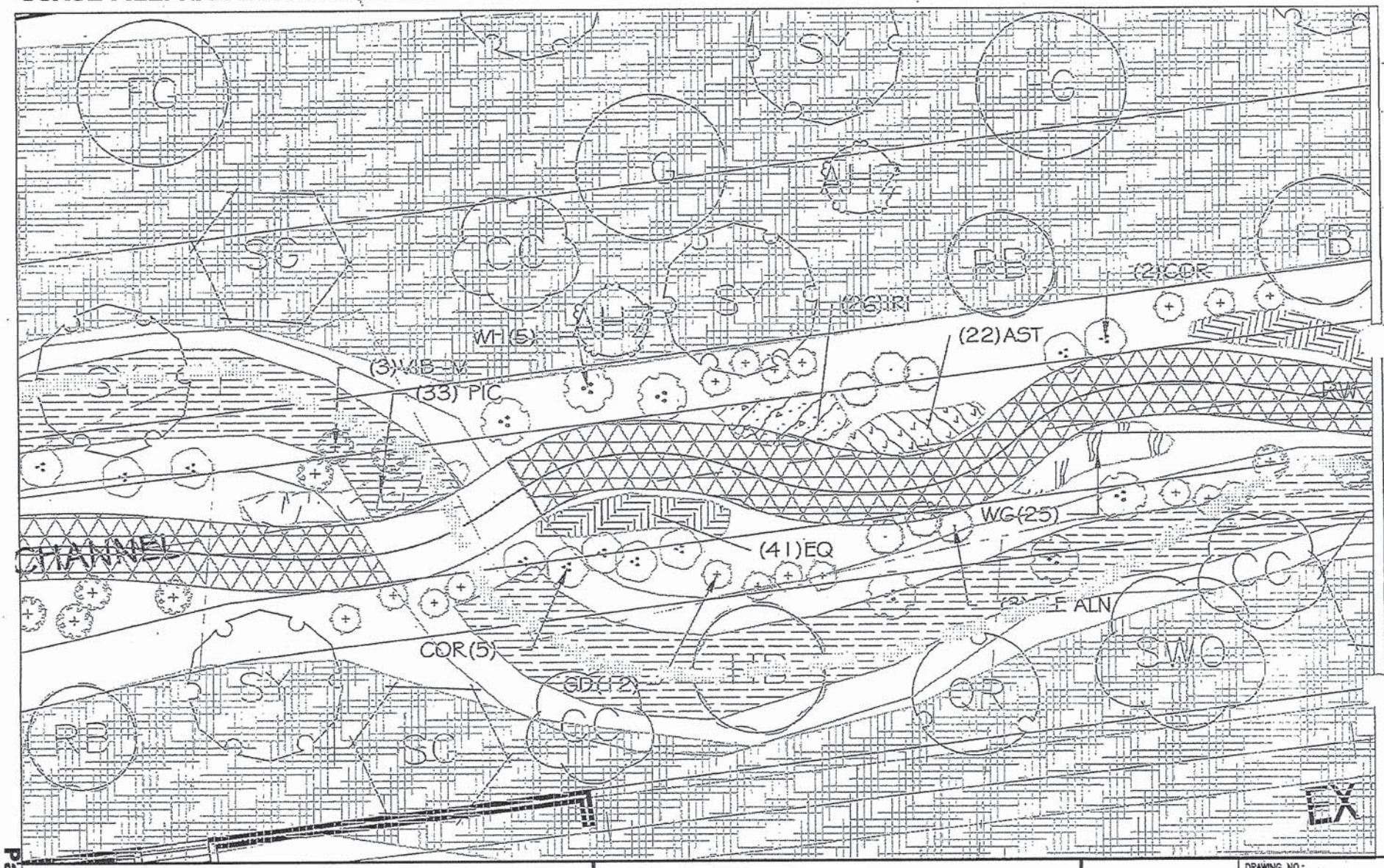
TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL 10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	SITE LAYOUT PLAN CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: S-9 SHEET _9_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	SITE LAYOUT PLAN	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: S-10 SHEET 10 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	**TYPICAL CHANNEL PLANTING**	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60'	DRAWING NO.: **L-1**
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET _11_ OF _31_ SHTS. DRAWING FILE: z:\engineering\cranford drive\permits\acoe

PLANT SCHEDULE

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
RM	18	Red Maple / Acer rubrum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
SM	18	Sugar Maple / Acer saccharum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AML	10	Allegheny Serviceberry / Amelanchier laevis		7 gal	6-8` HT
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
CAR	15	Shagbark Hickory / Carya ovata	B & B	2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
RB	9	River Birch / Betula nigra	B & B	10` ht
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
PP	9	Paper Birch / Betula papynfera	B & B	2" CAL
	9			7 GAL	1/2" CAL
	9			3 GAL	3-4' HT
HB	8	American Hornbeam / Carpinus caroliniana		B & B	2" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
CC	9	Eastern Redbud / Cercis canadensis	B & B	2" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AHZ	24	American Hazelnut / Corylus americana		7 gal	4-5` HT
FG	19	Green Ash / Fraxinus pennsylvanica	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
HL	15	Sunburst Honey Locust / Gleditsia triacanthos `Sunburst`	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
SG	17	Sweet Gum / Liquidambar styraciflua	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
LT	10	Tulip Tree / Liriodendron tulipifera	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
N	15	Sour Gum / Nyssa sylvatica	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
BE	10	Box Elder / Acer negundo		6-8` HT
	10			7 GAL	4-5' HT
	10			3 GAL	3-4' HT
PA	5	Norway Spruce / Picea abies	B & B	6-8` HT
	15			7 GAL	4-5' HT
	15			3 GAL	3-4' HT
WP	11	White Pine / Pinus strobus	B & B	6-7` HT
	15			B & B	4-5' HT
	15			3 GAL	3-4' HT
SY	18	American Sycamore / Platanus occidentalis		B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
SWO	10	Swamp White Oak / Quercus bicolor		B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
PO	18	Pin Oak / Quercus palustris	B & B	2 1/2-3" CAL
	18			7 GAL	1/2" CAL
	18			3 GAL	3-4' HT
QR	10	Red Oak / Quercus rubra	B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	18		3 GAL	3-4' HT
TD	6	Bald Cypress / Taxodium distichum		B & B	5-6` HT
	5			B & B	3-4' HT
	15			3 GAL	2-3' HT

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-2
SHEET 12 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

SHRUB AREAS

QTY		COMMON NAME / BOTANICAL NAME	CON	SPACING
AM3	122	Chokeberry / Aronia melanocarpa	2 gal	72"
CLE	110	Summersweet Clethra / Clethra alnifolia	2 gal	60"
CAM	155	Silky Dogwood / Cornus amonum	2 gal	72"
CG	168	Gray Dogwood / Cornus racemosa	2 gal	60"
HV	165	Common Witch Hazel / Hamamelis virginiana	2 gal	84"
ITE	65	Virginia Sweetspire / Itea virginica `Virginia`	2 gal	68"
IX	160	Winterberry Ilex verticillata	2 gal	60"
LIN	132	Spicebush / Lindera benzoin	2 gal	60"
ELD	60	Elderberry / Sambucus canadensis	2 gal	58"
VAC	188	Highbush Blueberry / Vaccinium corymbosum	2 gal	72"
VW	180	Arrowwood Viburnum / Viburnum dentatum	1 gal	72"
VA	130	Alleghany Viburnum Viburnum x rhytidophylloides	2 gal	72"
LEN	155	NANNYBERRY / VIBURNUM LENTAGO	2 gal	80"

GROUND COVERS

	QTY	COMMON NAME / BOTANICAL NAME		
AST	950	New York Aster / Aster novi-belgii	2 1/4" pots	24"
EQ	680	Dwarf Horsetail / Equisetum scirpoides	flat	20"
IRI	880	Blue Flag / Iris versicolor	2 1/4" pots	24"
PIC	680	Pickerel Weed / Pontederia cordata	2 1/4" pots	24"
WG	820	Wool Grass / Scirpus cyperinus	2 1/4" pots	24"

SUMMARY OF PLANTINGS

MAJOR TREES	674
MINOR TREES	156
SHRUBS	1790
GROUND COVER	4010

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

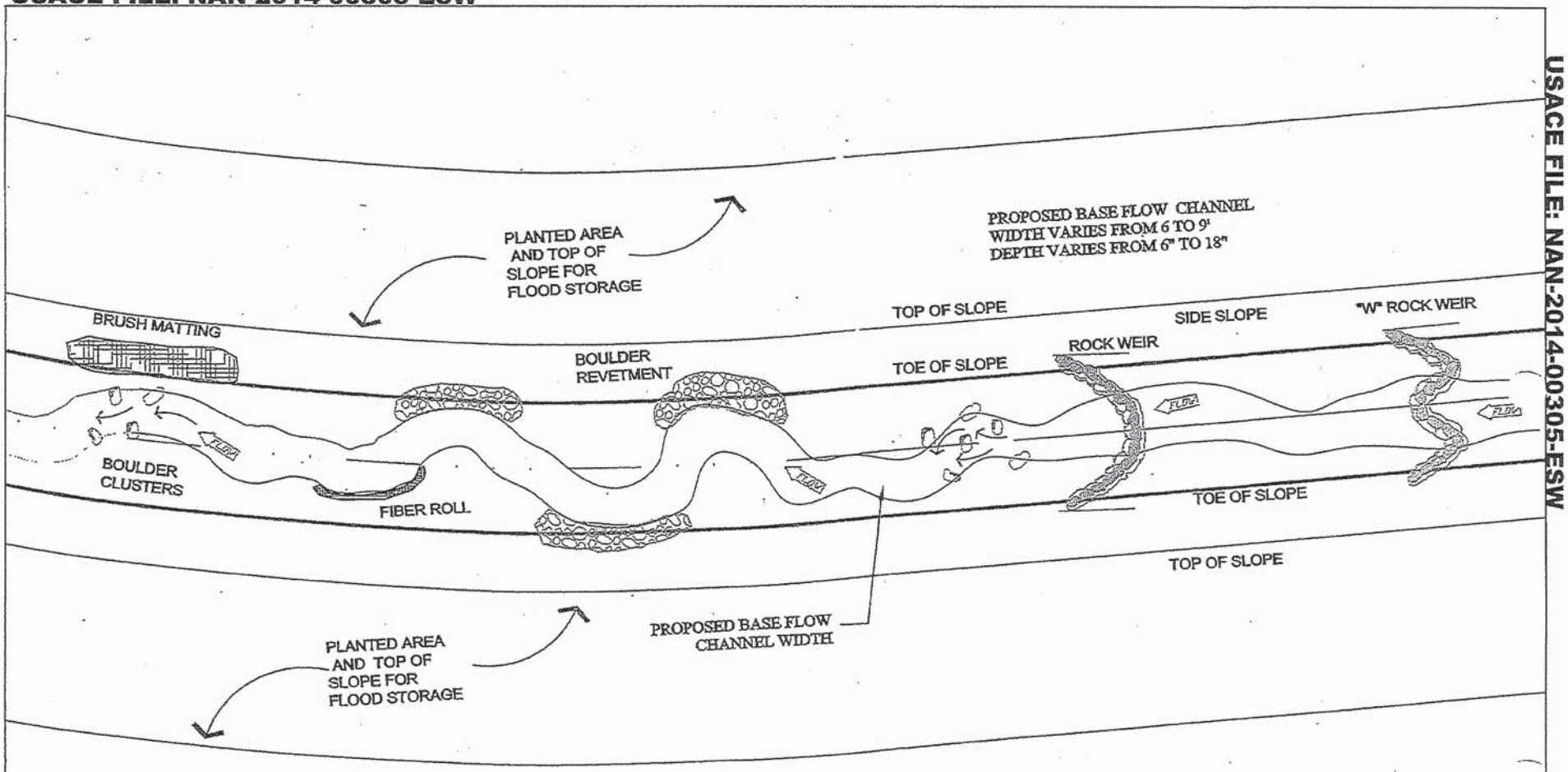
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-3

SHEET 13 OF 31 SHTS.

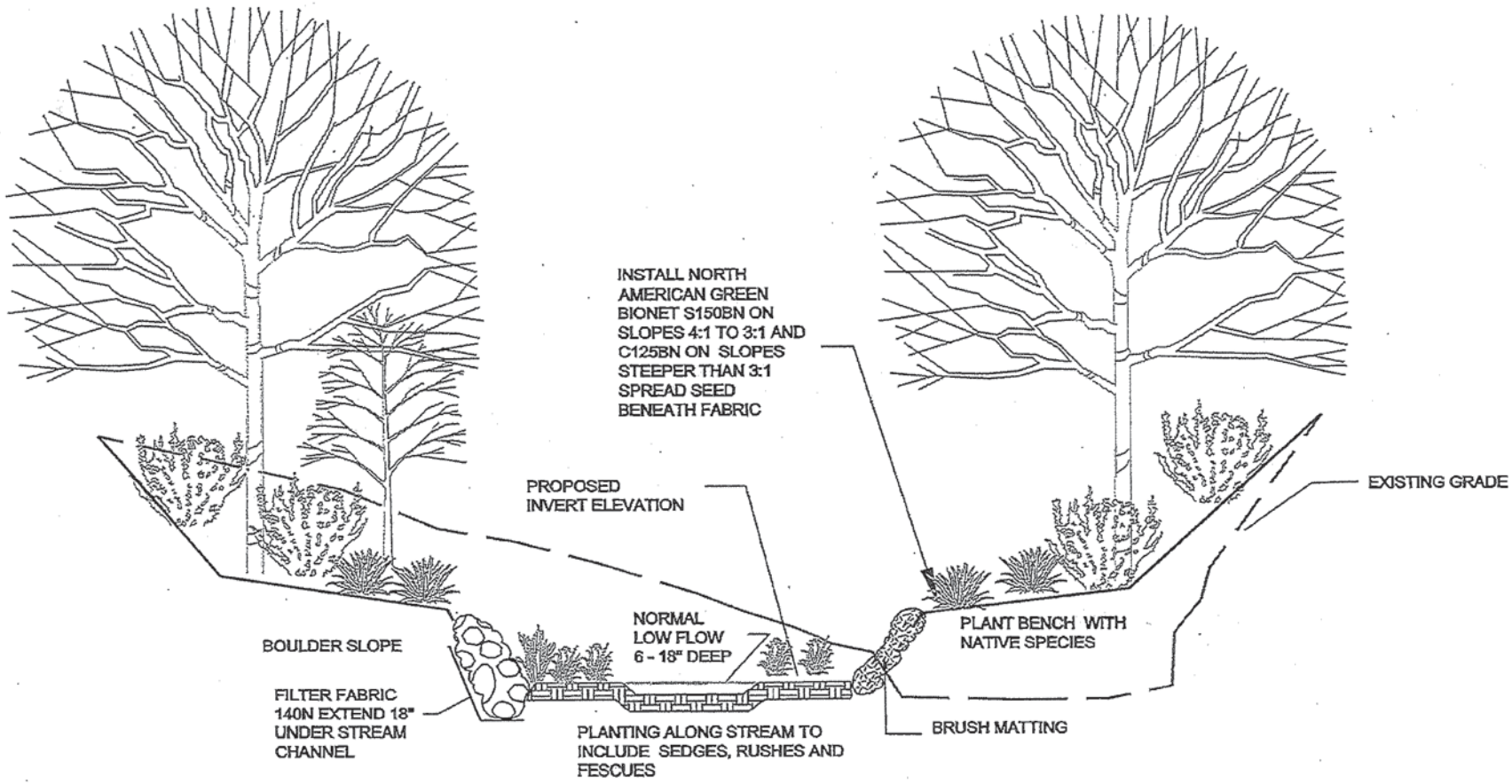
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe



CHANNEL TREATMENT MEASURES
SEE SITE PLAN AND DETAIL SHEETS
FOR LOCATIONS OF EACH TREATMENT

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-1 SHEET 14 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: x:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TYPICAL CHANNEL SECTION & STABILIZATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

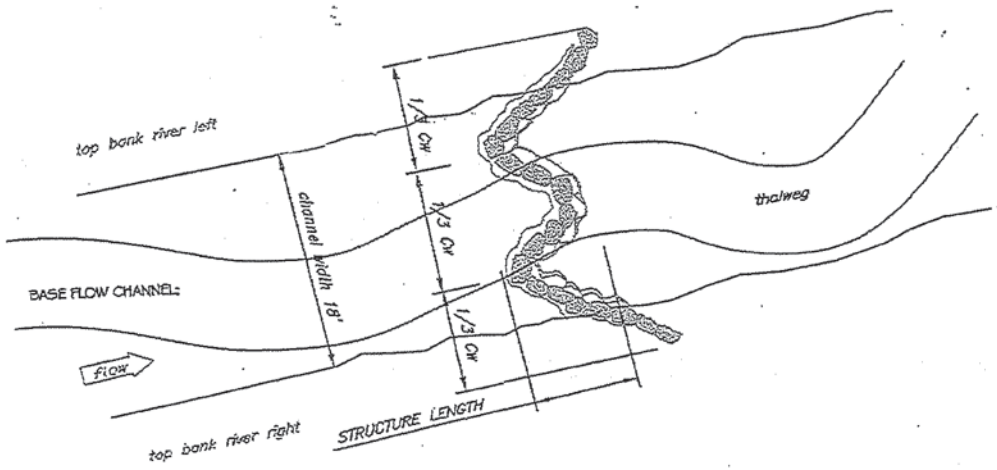
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-2

SHEET _15_ OF _31_ SHTS.

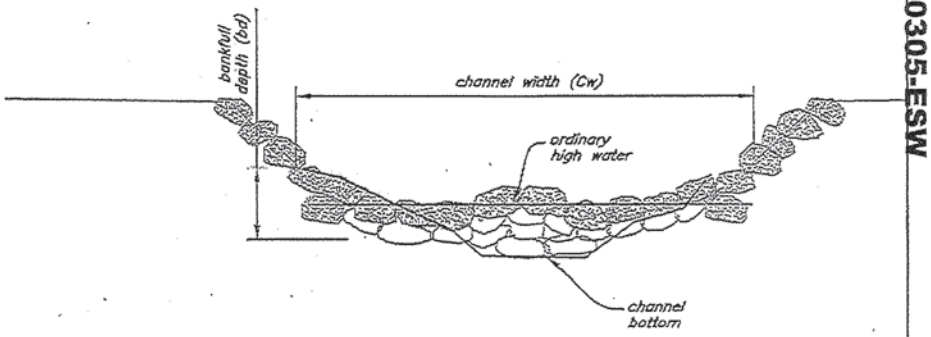
DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



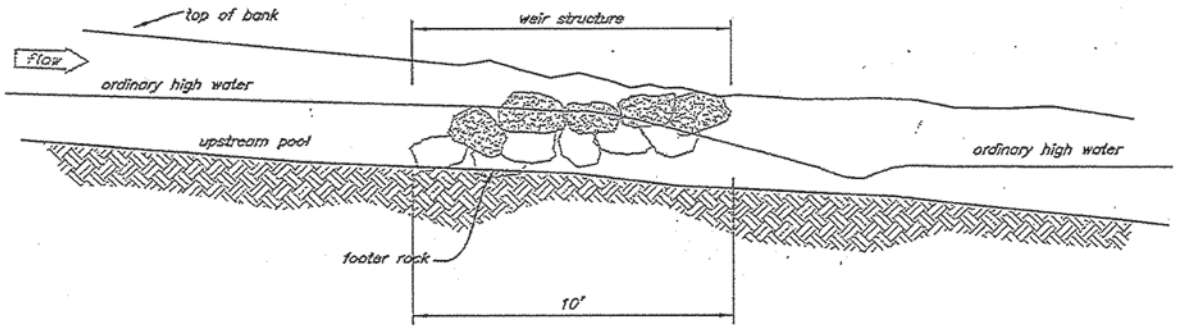
PLAN VIEW

W ROCK WEIR SCHEDULE

STRUCTURE ID	STATION	ELEVATION	Cw	L
WRW # 1	13+50	98.6	24'	12'
WRW # 2	18+19	99.36	24'	12'
WRW # 3	23+25	100.2	24'	12'
WRW # 4	37+00	102.15	24'	12'
WRW # 5	56+00	104.4	41'	18'



SECTION



PROFILE

ROCK WEIR

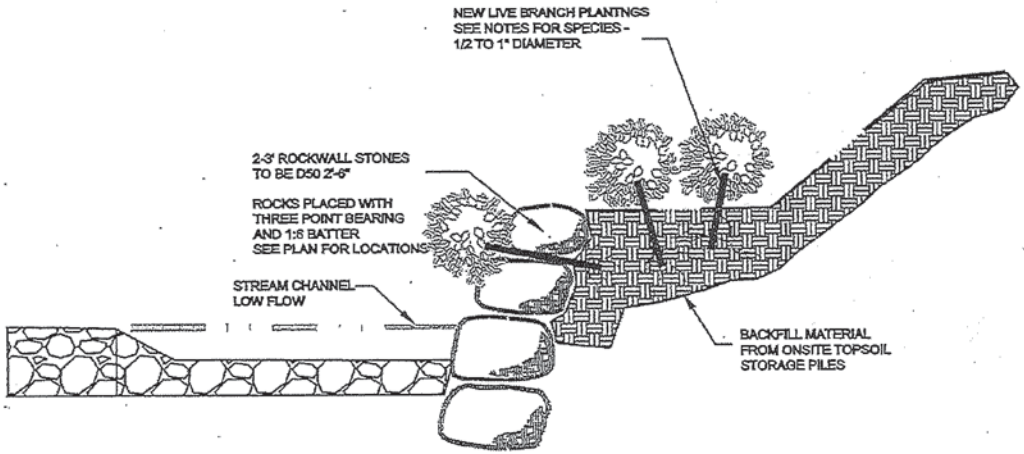
N.T.S.

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-3 SHEET 16 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

SCHEDULE

STRUCTURE ID	STATION	TO	LOC
BR #1	35+25	36+75	E
BR #2	39+50	41+00	W
BR #3	44+60	45+20	E



BOULDER REVETMENT

N.T.S.

NOTES
1. INSTALL SEDIMENT CONTROL MEASURES AS DIRECTED.
2 INSTALL NEW ROCKWALL BENCHES AS DETAILED AND SHOWN ON THE PLANS.
3 SPREAD STOCKPILED TOPSOIL BEHIND ROCKWALL BENCH AS DETAILED OR DIRECTED BY TOWN.

4. PLANTING LIVE FASCNES

ALL MATERIAL SHALL CONSIST OF MIXTURE OF STREAMCO WILLOW (SALIX PURPUREA) BANKERS WILLOW
SALIX COTTRTI, PRAIRIE WILLOW (SALIX HUMILIS), GRAY DOGWOOD (CORNUS RACEMOSES AND/OR RED-OISER DOGWOOD (CORNUS SERVICEA.

A. SPACE BRANCHES 4 FT ON CENTER ALTERNATING ROWS WITH ONE FOOT VERITICAL SEPARATION.

B, LIVE BRANCHES TO BE TO ½" TO 1" DIAMETER 4 TO 6 FT LENGTH. TOPS OF LIVE BRANCHES TO PROTRUDE MINIMUM 6" BEYOND FACE OF WALL.

C, BACKFILL BEHIND WALL HAND TAMPED IN 6 IN LIFTS.

D. CUTTING SHALL BE PLACED ON THE BACKFILL AND COVER WITH MINIMUM OF 3" OF CLEAN FILL BETWEEN LAYER AND ROCK.

F. ALL PLANT MATERIAL SHALL BE INSTALLED WITHIN 8 (EIGHT) HOURS OF CUTTING UNLESS PROVISIONS FOR PROPER STORAGE IS MADE.

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

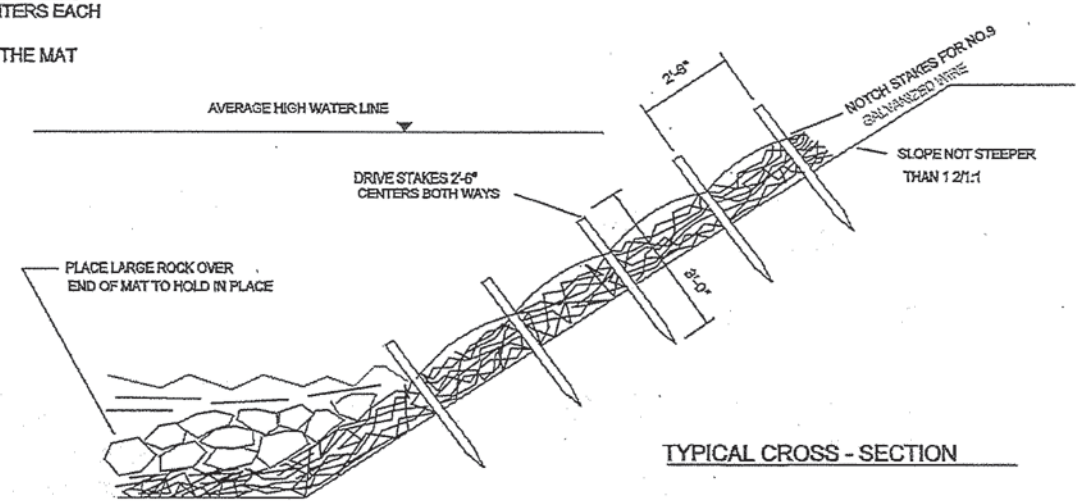
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-4
SHEET 17 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

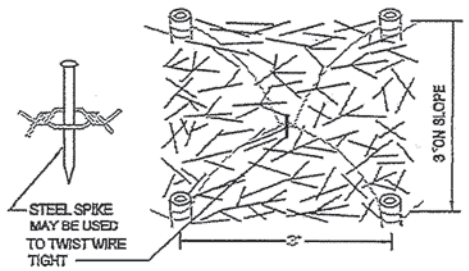
USACE FILE: NAN-2014-00305-ESW

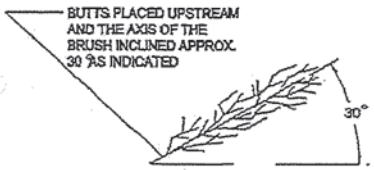
CONSTRUCTION SPECIFICATIONS

1. PREPARE SLOPE SURFACE BY GRADING TO A UNIFORM, SMOOTH SURFACE.
2. LAY HARDWOOD BRUSH IN AN UPSTREAM DIRECTION BEGINNING AT THE DOWN-STREAM END. THE TOE SHOULD BE ESTABLISHED FIRST.
3. THE BUTT END OF THE BRUSH WILL BE PLACED UPSTREAM AND THE PLANT MATERIALS INCLINED APPROXIMATELY 30 DEGREES.
4. THE UPSTREAM EDGE OF THE MAT WILL BE KEYED INTO THE SLOPE 2 FEET. STAKES WILL BE DRIVEN THROUGHOUT THE MATTING ON 3 FOOT CENTERS EACH WAY BEGINNING ALONG THE TOE OF THE MAT.
5. NO. 9 GALVANIZED WIRE WILL BE ATTACHED TO THE STAKES OVER THE MAT AND TIGHTENED TO SECURE THE MAT.
6. SLOPE AREAS ABOVE THE MAT WILL BE SLOPED AND SEEDED.



TYPICAL CROSS - SECTION



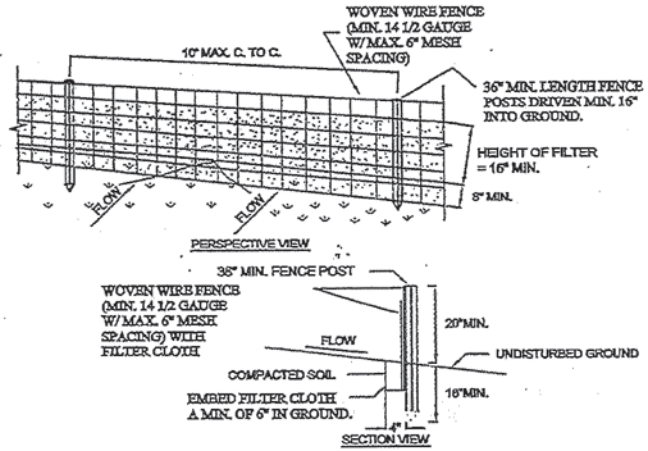


STATION	TO
25+50	26+00 W
28+50	28+95 E
28+50	28+95 W
42+50	42+89 E
44+80	45+25 W

BRUSH MATTING

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-5 SHEET 18 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



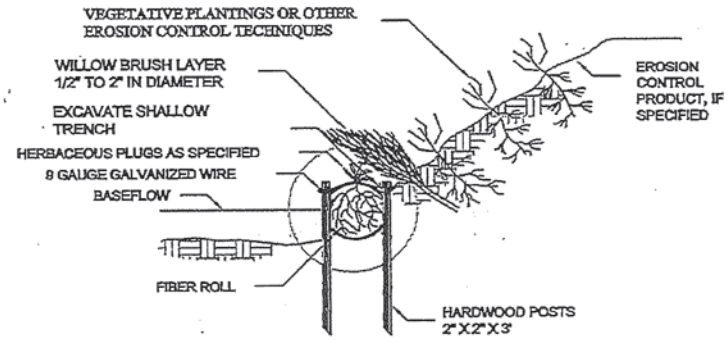
CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

SILT FENCE

FIBER ROLL SCHEDULE

STATION	TO
19+50 EAST	20+65
25+10 WEST	25+60



CROSS SECTION
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. EXCAVATE A SHALLOW TRENCH AT THE TOE OF SLOPE TO SLIGHTLY BELOW BASEFLOW.
2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" x 2" POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IF NECESSARY.
3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR 1/8" DIAMETER BRAIDED NYLON ROPE.
4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

FIBER ROLL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

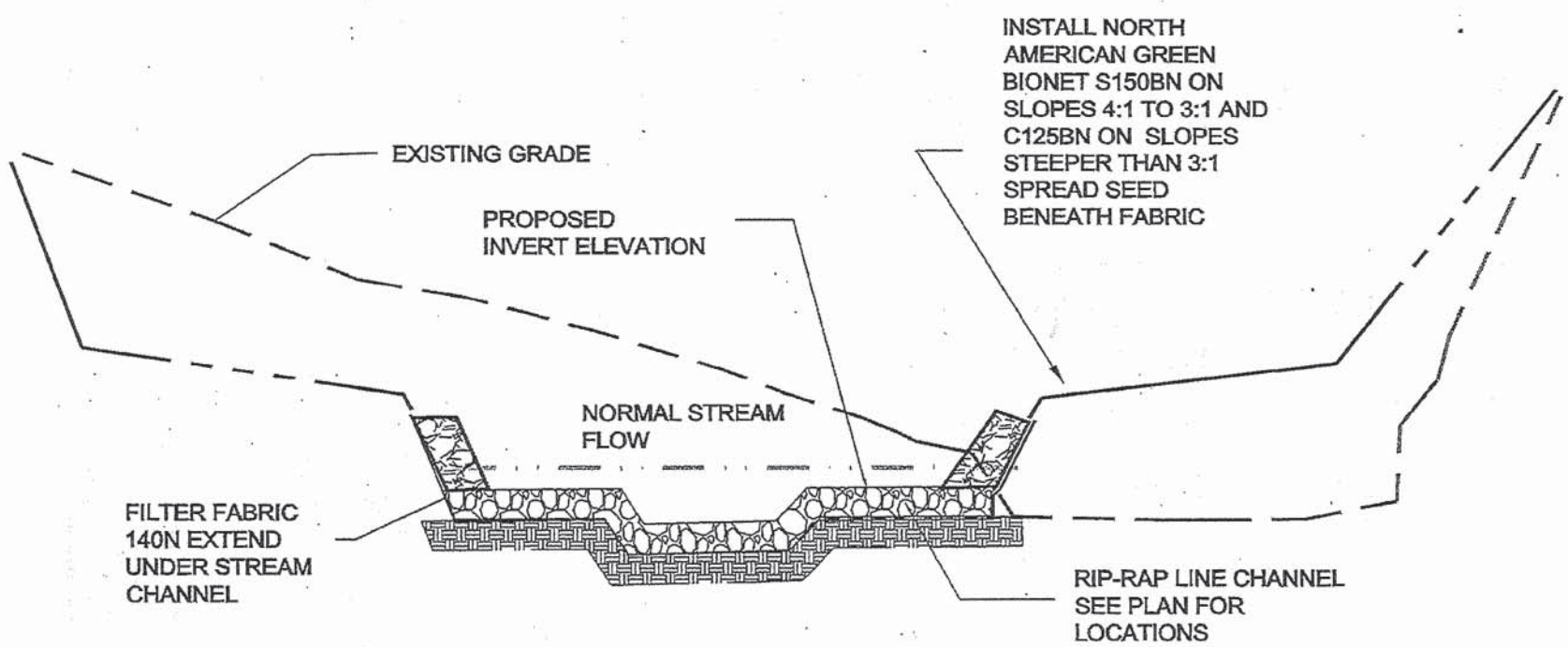
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-6

SHEET _19_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



ARMORED CHANNEL

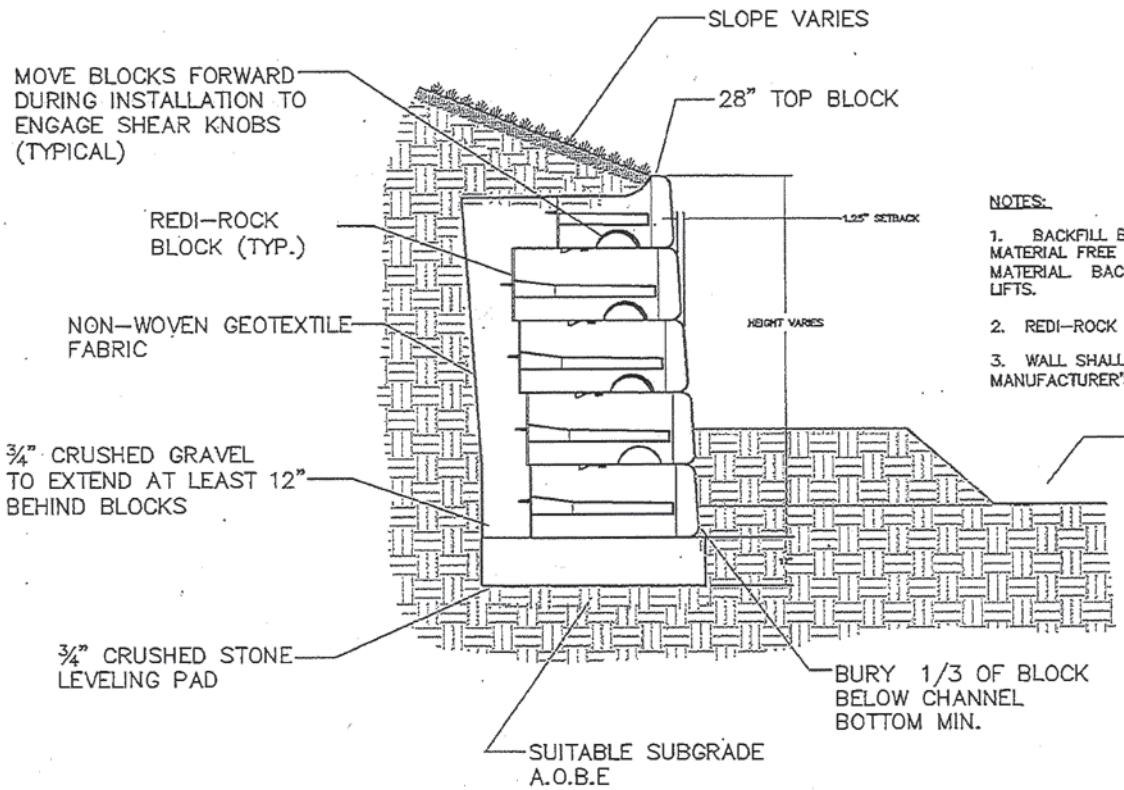
SEE PLAN FOR LOCATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DWL / KLK	DRAWING NO.: D-7 SHEET _20_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: z:\engineering\cranford \drive\permits\acoe



NOTES:

1. BACKFILL BEHIND WALL SHALL BE SUITABLE FILL MATERIAL FREE FROM LARGE ROCKS, DEBRIS, AND ORGANIC MATERIAL. BACKFILL SHALL BE COMPACTED IN 8" MAXIMUM LIFTS.
2. REDI-ROCK WALL FINISH SHALL BE "LEDGESTONE".
3. WALL SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

SCHEDULE

STATION	TO
9+08	9+54.5 E
9+08	9+54.5 W
9+98	10+47 E
9+98	10+57.5 W
10+75	12+43.5W
18+75	19+87.8 E

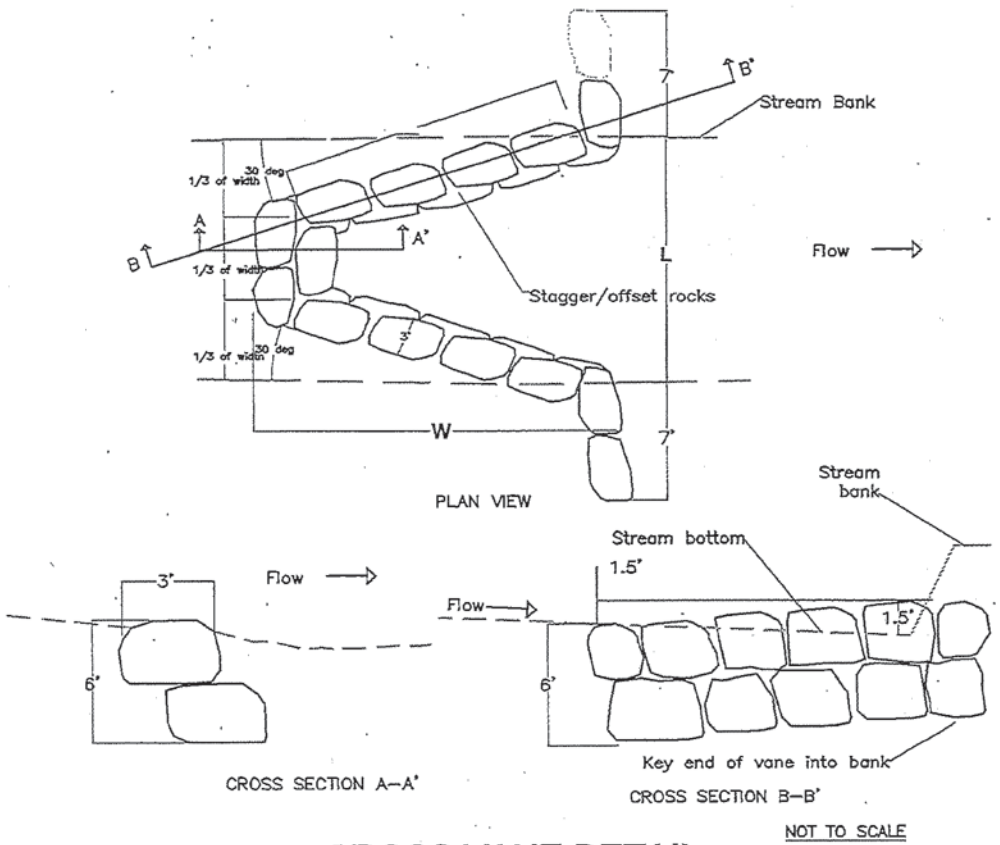
MODULAR RETAINING WALL

N.T.S.

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-8 SHEET 21 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



NOT TO SCALE

CROSS VANE DETAIL

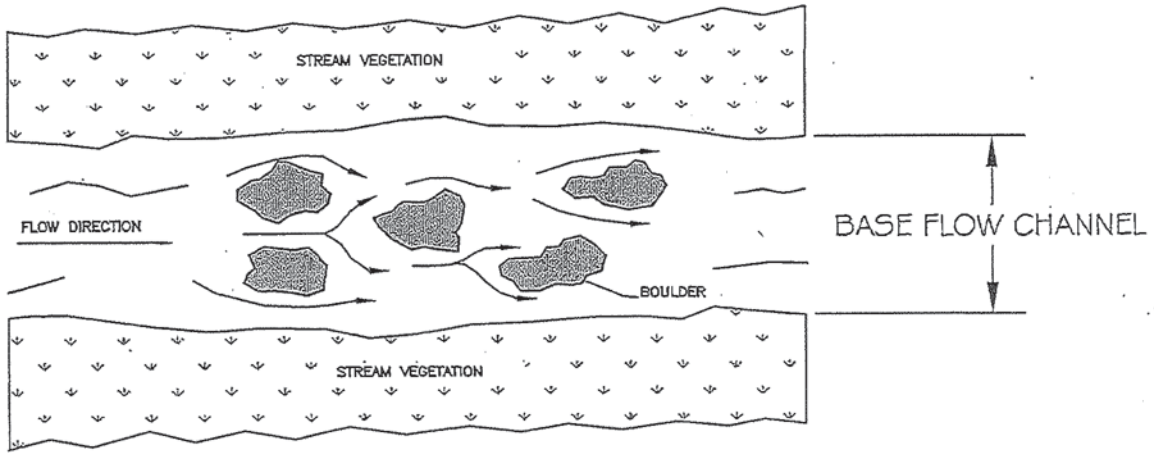
CROSS VANE SCHEDULE

STRUCTURE ID	STATION	ELEVATION	W	L
CV # 1	11+25	97.6	24'	16'
CV # 2	28+15	100.9	24'	16'
CV # 3	38+00	102.6	24'	16'
CV # 4	41+50	102.9	24'	16'
CV # 5	60+00	105.2	44'	20'

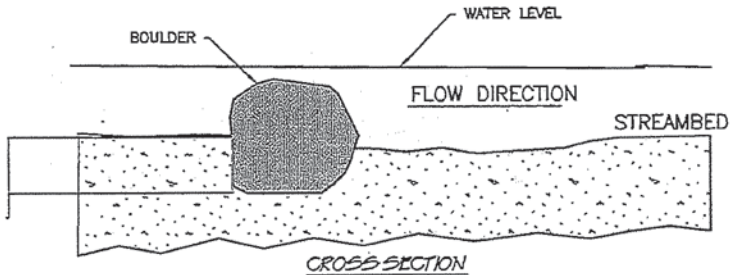
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-9 SHEET 32 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		

USACE FILE: NAN-2014-00305-ESW



PLAN VIEW



CROSS SECTION

SCHEDULE

STATION
14+75
24+65
27+00
32+40
54+80
58+35

- AVERAGE ROCK SIZE- 2.5'-3.5' DIA.-ROCK, SIZE IS SITE DEPENDENT.
- A MINIMUM OF ONE BOULDER PER SET OF BOULDERS SHOULD PROTRUDE FROM WATER SURFACE DURING TIMES OF ORDINARY FLOW TO ACT AS MID-STREAM PERCHING/LOAFING SITES.
- USE BOULDERS WITH IRREGULARITIES OR MULITPLE BOULDERS TOGETHER TO PROVIDE SLIGHT OVERHANGING COVER.
- PLACE BOULDERS SO CURRENT WILL NOT BE DEFLECTED INTO UNPROTECTED STREAM BANKS.

BOULDER CLUSTERS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

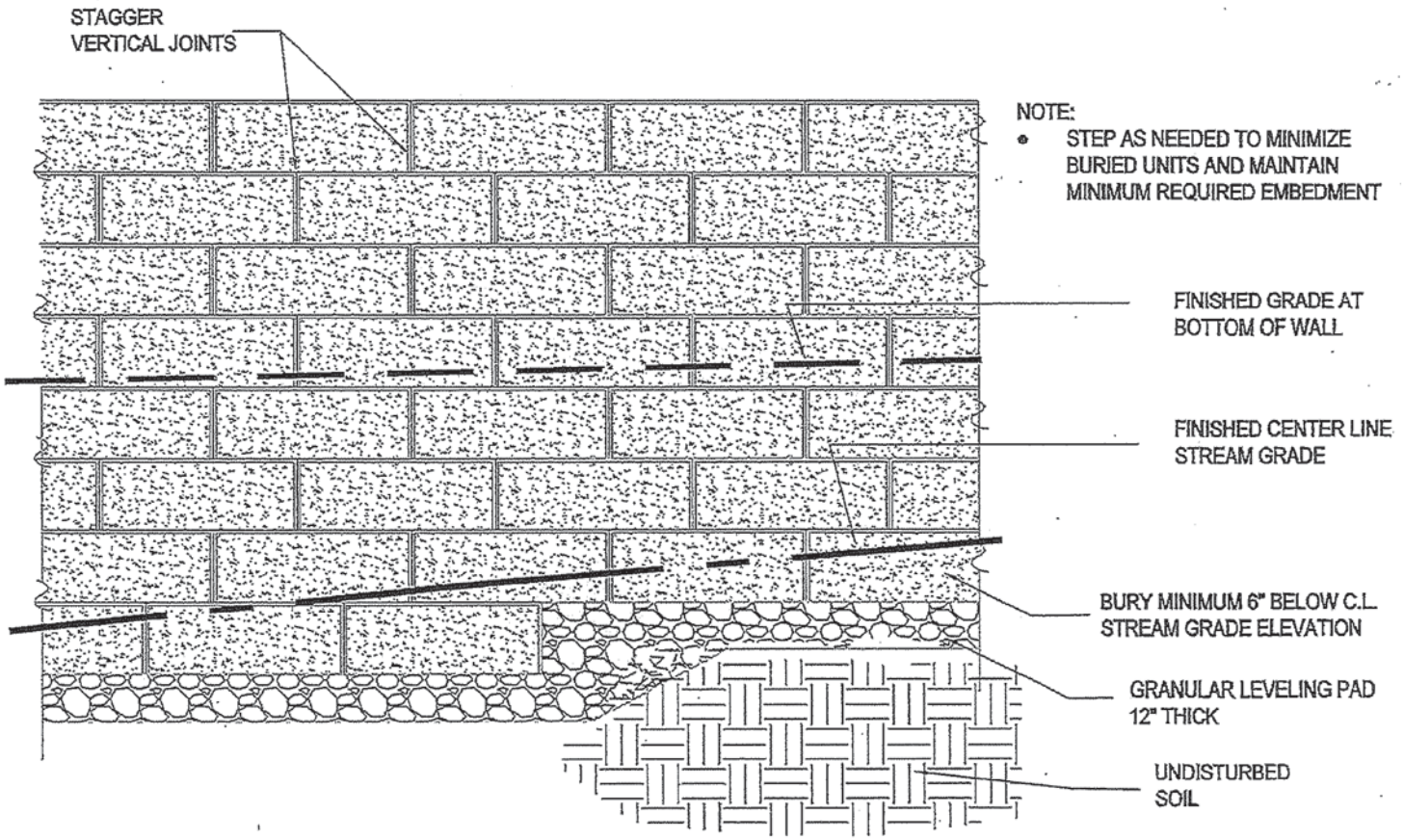
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-10

SHEET 23 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

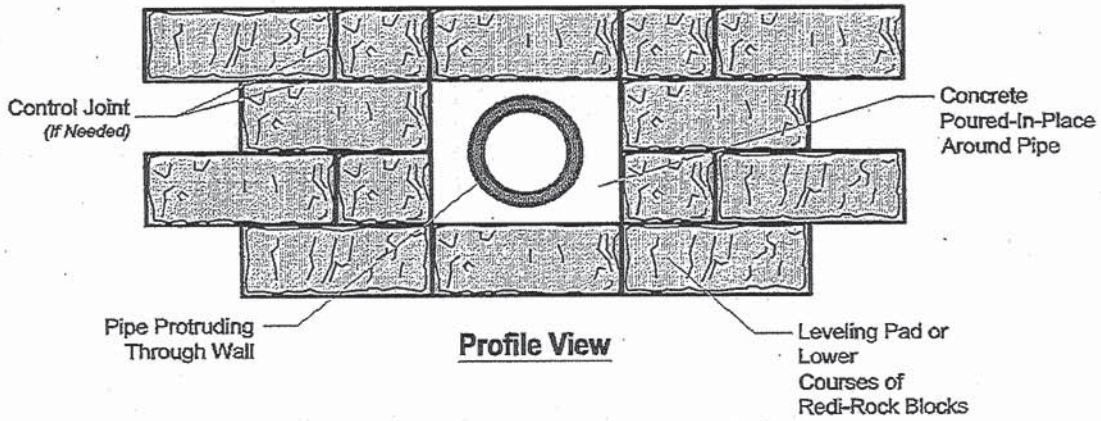
USACE FILE: NAN-2014-00305-ESW



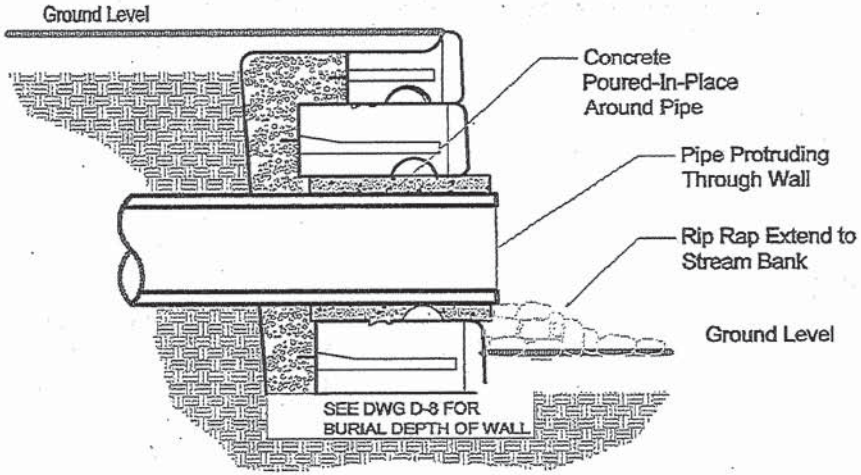
REDI ROCK RETAINING WALL

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30–2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-11 SHEET 24 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



Profile View



Section View

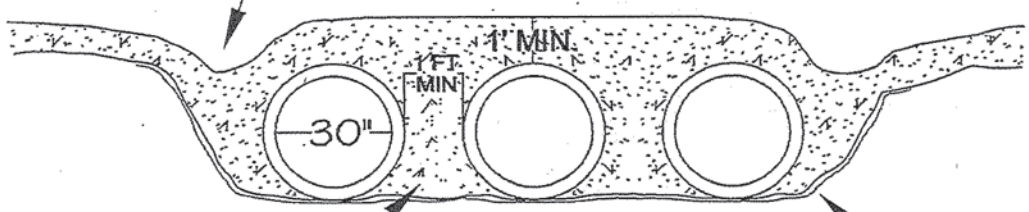
Pipe Through Wall Detail

NTS

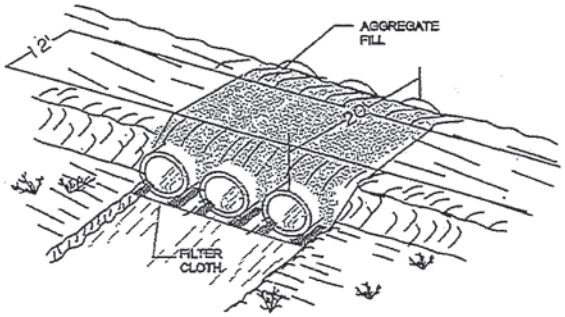
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY:	DRAWING NO.: D-12
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWN BY: RH CHECKED BY: DML / KLK	SHEET 25 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



INSTALL (3) 30" HDPE PIPES - 20' LENGTH EACH



MULTIPLE PIPES

LOCATIONS

STA 4+25
STA 28+10
STA 32+75

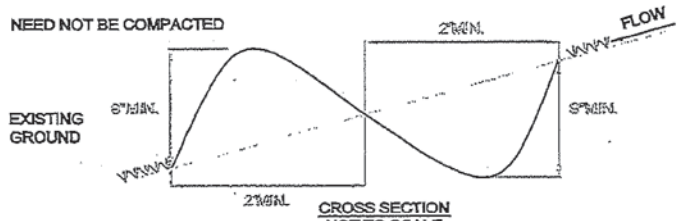
TEMPORARY STREAM CROSSING DETAIL

NOT TO SCALE

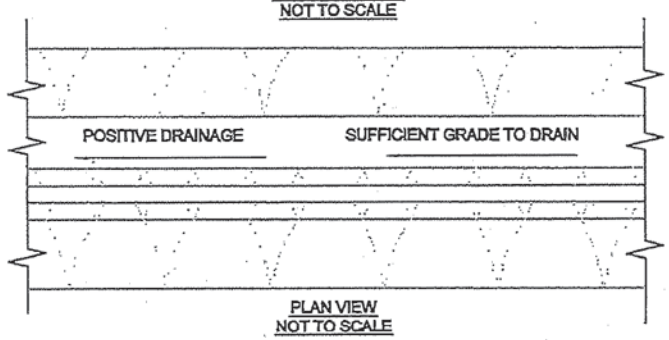
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-13 SHEET 26 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL..(845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

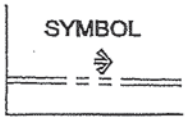
USACE FILE: NAN-2014-00305-ESW



CROSS SECTION
NOT TO SCALE



PLAN VIEW
NOT TO SCALE



CONSTRUCTION SPECIFICATIONS

1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATIONS FOR TEMPORARY SEEDING AND MULCHING, AND SHALL BE DONE WITHIN 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

MAX. DRAINAGE AREA LIMIT: 2 ACRES

PERIMETER DIKE OR SWALE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

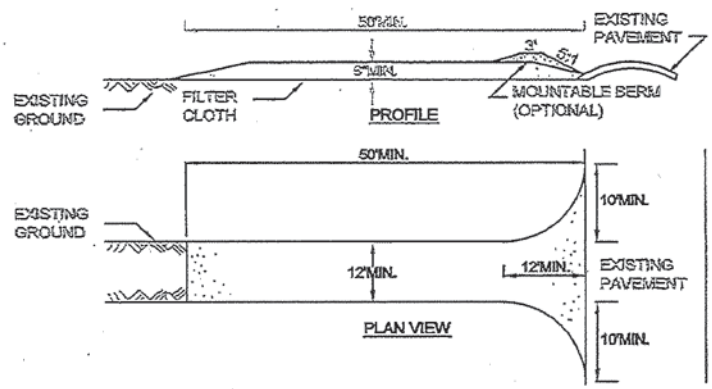
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-14

SHEET 27 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



SYMBOL

CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – USE 2" CLEAN STONE
2. LENGTH – NOT LESS THAN 50 FEET
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY–FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ENTRANCE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

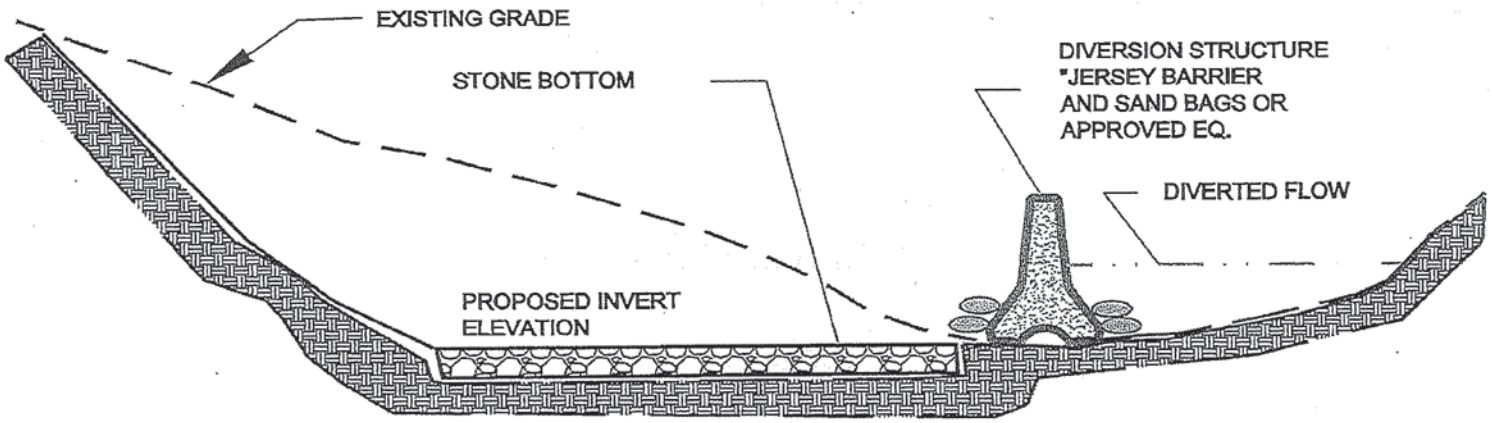
PROJECT NO.:	30–2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-15

SHEET 28 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TYPICAL TEMPORARY CHANNEL DIVERSION

N.T.S.

NOTE
SEE CROSS SECTION DRAWINGS
FOR STREAM CONFIGURATION
AND LOCATION OF NORMAL LOW
FLOW CHANNEL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

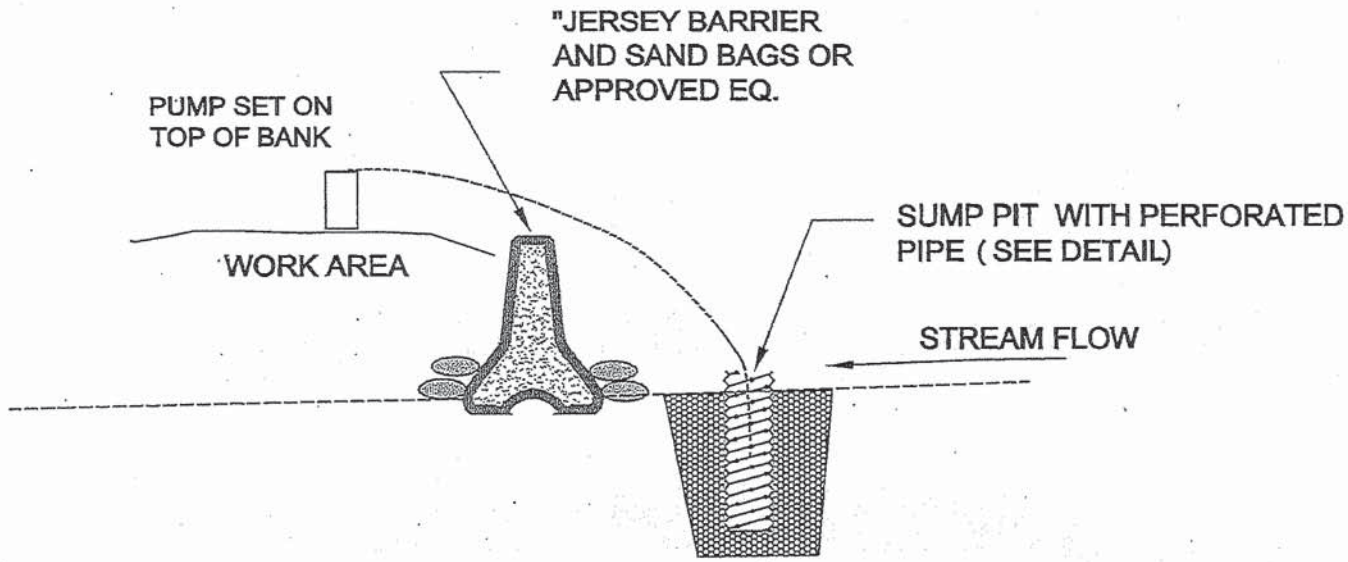
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-16

SHEET 29 OF 31 SHTS.

DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



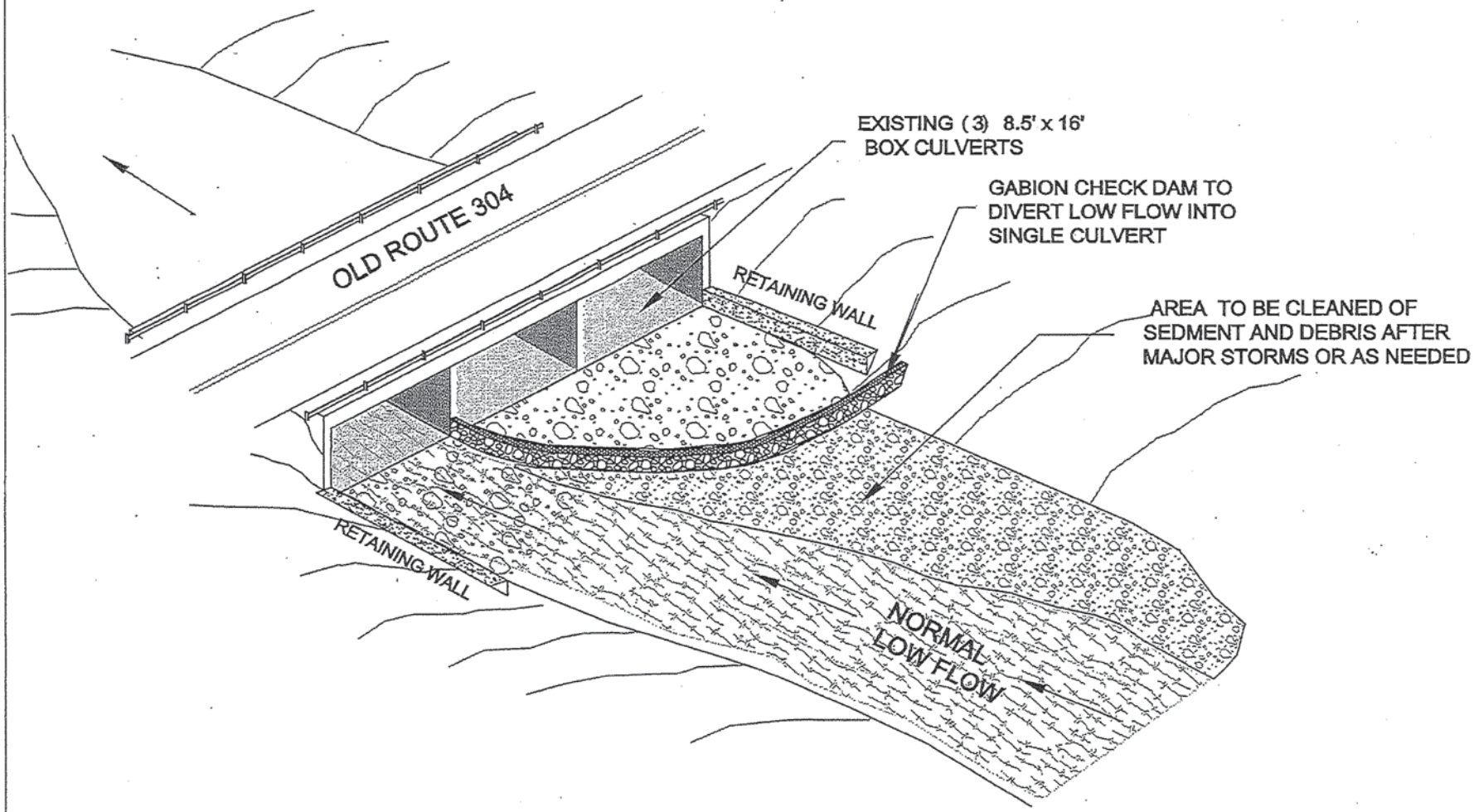
TEMPORARY COFFER DAM

N.T.S

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-17 SHEET 30 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	GABION WEIR AT BOX CULVERT	PROJECT NO.: 30-2005 DATE: 05/14/15 SCALE: NONE DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-18
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		SHEET _31_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

New York State
Department of Environmental Conservation

NOTICE

The Department of Environmental Conservation (DEC) has issued permit(s) pursuant to the Environmental Conservation Law for work being conducted at this site. For further information regarding the nature and extent of work approved and any Department conditions on it, contact the DEC at 845/256-3054. Please refer to the permit number shown when contacting the DEC.

Permittee: (T) Clarkstown Permit No. 3- 3920-00297/00010,11

Effective Date: 7/20/2016 Expiration date: 12/31/2020

☐ Applicable if checked. No instream work allowed between October 1 & April 30

NOTE: This notice is **NOT** a permit.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 3
21 South Putt Corners Road, New Paltz, NY 12561-1620
P: (845) 256-3054 I F: (845) 255-4659
www.dec.ny.gov

IMPORTANT NOTICE TO ALL PERMITTEES

The permit you requested is enclosed. Please read it carefully and note the conditions that are included in it. The permit is valid for only that activity expressly authorized therein; work beyond the scope of the permit may be considered a violation of law and be subject to appropriate enforcement action. Granting of this permit does not relieve the permittee of the responsibility of obtaining any other permission, consent or approval from any other federal, state, or local government which may be required.

Please note the expiration date of the permit. Applications for permit renewal should be made well in advance of the expiration date (minimum of 30 days) and submitted to the Regional Permit Administrator at the above address. For SPDES, Solid Waste and Hazardous Waste Permits, renewals must be made at least 180 days prior to the expiration date.

The DEC permit number & program ID number noted on page 1 under "Permit Authorization" of the permit are important and should be retained for your records. These numbers should be referenced on all correspondence related to the permit, and on any future applications for permits associated with this facility/project area.

If a permit notice sign is enclosed, you must post it at the work site with appropriate weather protection, as well as a copy of the permit per General Condition 1.

If the permit is associated with a project that will entail construction of new water pollution control facilities or modifications to existing facilities, plan approval for the system design will be required from the appropriate Department's regional Division of Water or delegated local Health Department, as specified in the State Pollutant Discharge Elimination System (SPDES) permit.

If you have any questions on the extent of work authorized or your obligations under the permit, please contact the staff person indicated below or the Division of Environmental Permits at the above address.

Joseph A Murray
Division of Environmental Permits, Region 3
Telephone (845) 256-3040

☐ Applicable only if checked. Please note all work authorized under this permit is prohibited during trout spawning season commencing October 1 and ending April 30.

☑ Applicable only if checked for STORMWATER SPDES INFORMATION: We have determined that your project requires coverage under the General Stormwater SPDES Permit. You must file a Notice of Intent to obtain coverage under the General Permit. This form can be downloaded at: http://www.dec.ny.gov/chemical/43133.html

☑ Applicable only if checked - MS4 Areas: This site is within an MS4 area (Municipal Separate Storm Sewer System), therefore the SWPPP must be reviewed and accepted by the municipality. The MS-4 Acceptance Form must be submitted in addition to the Notice of Intent.

Send the completed form(s) to: NYS DEC, Stormwater Permitting, Division of Water, 625 Broadway, Albany, New York 12233-3505; in addition, DEC requests that you provide one electronic copy of the approved SWPPP directly to NYS DEC, 100 Hillside Avenue - Suite 1W, White Plains, NY 10603-2860.

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, 5th Floor, Albany, New York 12233-4757
Phone: (518) 402-8935 • **Fax:** (518) 402-8925
Website: www.dec.ny.gov

Joe Martens
Commissioner

August 14, 2015

Travis Money
Tectonic
PO Box 37, 70 Pleasant Hill Road
Mountainville, NY 10953

Re: Clarkstown Cranford Drive Drainage Project (Tectonic WO #7463.12)
Town/City: Clarkstown. County: Rockland.

Dear Travis Money :

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

Enclosed is a report of rare or state-listed animals and plants, and significant natural communities, that our database indicates occur, or may occur, on your site or in the immediate vicinity of your site.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our database. We cannot provide a definitive statement as to 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 sources may be required to fully assess impacts on biological resources.

Our database is continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

The presence of the plants and animals identified in the enclosed report may result in this project requiring additional review or permit conditions. For further guidance, and 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,

Andrea Chaloux

Andrea Chaloux
Environmental Review Specialist
New York Natural Heritage Program

826

The following rare plants, rare animals, and significant natural communities have been documented at your project site, or in its vicinity.

We recommend that potential onsite and offsite impacts of the proposed project on these species or communities be addressed as part of any environmental assessment or review conducted as part of the planning, permitting and approval process, such as reviews conducted under SEQR. Field surveys of the project site may be necessary to determine the status of a species at the site, particularly for sites that are currently undeveloped and may still contain suitable habitat. Final requirements of the project to avoid, minimize, or mitigate potential impacts are determined by the lead permitting agency or the government body approving the project.

The following animals, while not listed by New York State as Endangered or Threatened, are of conservation concern to the state, and are considered rare by the New York Natural Heritage Program.

COMMON NAME	*SCIENTIFIC NAME*	*NY STATE LISTING*	*HERITAGE CONSERVATION STATUS*
Freshwater Mussels			
Eastern Pearlshell	*Margaritifera margaritifera*	Unlisted	Imperiled in NYS

Hackensack River Centenary, 1994-su-fa: The mussels were found in a small stream, 5 meters wide, which runs through woods and residential back yards. The stream is 0.25-0.5 meters deep, a little turbid, and runs over cobbles, gravel, and sand. A bridge crossing downstream is at the head of the slack water from Deforest Lake. There is some trash in the stream and intense development upstream; probably nutrient enrichment. Old dead shells were also found in a tributary. 341

This report only includes records from the NY Natural Heritage database. For most sites, comprehensive field surveys have not been conducted, and we cannot provide a definitive statement as to the presence or absence of all rare or state-listed species. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

If any rare plants or animals are documented during site visits, we request that information on the observations be provided to the New York Natural Heritage Program so that we may update our database.

Information about many of the rare animals and plants in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, from NatureServe Explorer at www.natureserve.org/explorer, and from USDA's Plants Database at http://plants.usda.gov/index.html (for plants).

Information about many of the natural community types in New York, including identification, dominant and characteristic vegetation, distribution, conservation, and management, is available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org. For descriptions of all community types, go to www.dec.ny.gov/animals/97703.html for Ecological Communities of New York State.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, 5th Floor, Albany, New York 12233-4757
Phone: (518) 402-8935 • **Fax:** (518) 402-8925
Website: www.dec.ny.gov

August 24, 2016

Chris Camacho
Tectonic Engineering
70 Pleasant Hill Road
Mountainville, NY 10953

Re: Clarkstown Cranford Drive Drainage Project
Town/City: Clarkstown County: Rockland

Dear Chris Camacho:

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

Enclosed is a report of rare or state-listed animals and plants, and significant natural communities that our database indicates occur, or may occur, on your site or in the immediate vicinity of your site.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our database. We cannot provide a definitive statement as to 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 sources may be required to fully assess impacts on biological resources.

Our database is continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

The presence of the plants and animals identified in the enclosed report may result in this project requiring additional review or permit conditions. For further guidance, and 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,

Andrea Chaloux

Andrea Chaloux
Environmental Review Specialist
New York Natural Heritage Program

910

The following rare plants, rare animals, and significant natural communities have been documented in the vicinity of your project site.

We recommend that potential onsite and offsite impacts of the proposed project on these species or communities be addressed as part of any environmental assessment or review conducted as part of the planning, permitting and approval process, such as reviews conducted under SEQR. Field surveys of the project site may be necessary to determine the status of a species at the site, particularly for sites that are currently undeveloped and may still contain suitable habitat. Final requirements of the project to avoid, minimize, or mitigate potential impacts are determined by the lead permitting agency or the government body approving the project.

The following animals, while not listed by New York State as Endangered or Threatened, are of conservation concern to the state, and are considered rare by the New York Natural Heritage Program.

COMMON NAME	*SCIENTIFIC NAME*	*NY STATE LISTING*	*HERITAGE CONSERVATION STATUS*
Freshwater Mussels			
Eastern Pearlshell	*Margaritifera margaritifera*	Unlisted	Imperiled in NYS

Hackensack River Centenary, east of your project site, 1994-summer-fall: The mussels were found in a small stream, 5 meters wide, which runs through woods and residential back yards. The stream is 0.25-0.5 meters deep, a little turbid, and runs over cobbles, gravel, and sand. A bridge crossing downstream is at the head of the slack water from Deforest Lake. There is some trash in the stream and intense development upstream; probably nutrient enrichment. Old dead shells were also found in a tributary. 341

This report only includes records from the NY Natural Heritage database. For most sites, comprehensive field surveys have not been conducted, and we cannot provide a definitive statement as to the presence or absence of all rare or state-listed species. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

If any rare plants or animals are documented during site visits, we request that information on the observations be provided to the New York Natural Heritage Program so that we may update our database.

Information about many of the rare animals and plants in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, from NatureServe Explorer at www.natureserve.org/explorer, and from USDA's Plants Database at http://plants.usda.gov/index.html (for plants).

Information about many of the natural community types in New York, including identification, dominant and characteristic vegetation, distribution, conservation, and management, is available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org. For descriptions of all community types, go to www.dec.ny.gov/animals/97703.html for Ecological Communities of New York State.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New York Ecological Services Field Office
3817 LUKER ROAD
CORTLAND, NY 13045
PHONE: (607)753-9334 FAX: (607)753-9699
URL: www.fws.gov/northeast/nyfo/es/section7.htm

Consultation Code: 05E1NY00-2016-SLI-2000 July 07, 2016
Event Code: 05E1NY00-2016-E-04488
Project Name: Clarkstown Cranford Drive Drainage Improvements

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). This list can also be used to determine whether listed species may be present for projects without federal agency involvement. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list.

Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC site at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list. If listed, proposed, or candidate species were identified as potentially occurring in the project area, coordination with our office is encouraged. Information on the steps involved with assessing potential impacts from projects can be found at: http://www.fws.gov/northeast/nyfo/es/section7.htm

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (

http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the Services wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the ESA. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Clarkstown Cranford Drive Drainage Improvements

Official Species List

Provided by:

New York Ecological Services Field Office
3817 LUKER ROAD
CORTLAND, NY 13045
(607) 753-9334
http://www.fws.gov/northeast/nyfo/es/section7.htm

Expect additional Species list documents from the following office(s):

Long Island Ecological Services Field Office
340 SMITH ROAD
SHIRLEY, NY 11967
(631) 286-0485

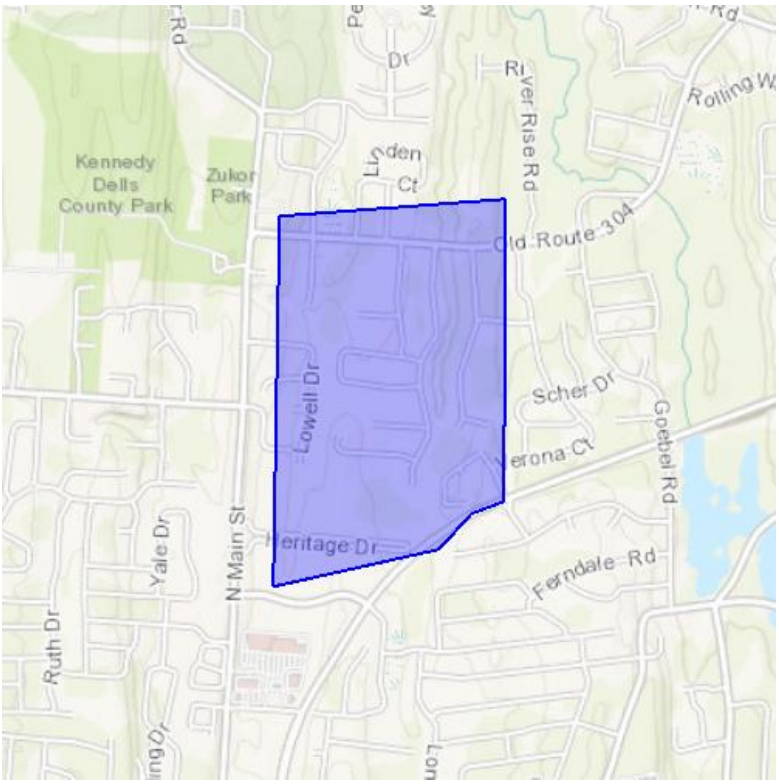
Consultation Code: 05E1NY00-2016-SLI-2000
Event Code: 05E1NY00-2016-E-04488

Project Type: Federal Grant / Loan Related

Project Name: Clarkstown Cranford Drive Drainage Improvements

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-73.9764404296875 41.16080541873828, -73.97637605667114 41.17103056966748, -73.98650407791138 41.170465239646035, -73.98684740066528 41.15792981241569, -73.97935867309569 41.15917376996048, -73.9778995513916 41.160369239379634, -73.9764404296875 41.16080541873828)))

Project Counties: Rockland, NY

Endangered Species Act Species List

There are a total of 1 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Mammals	Status	Has Critical Habitat	Condition(s)
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

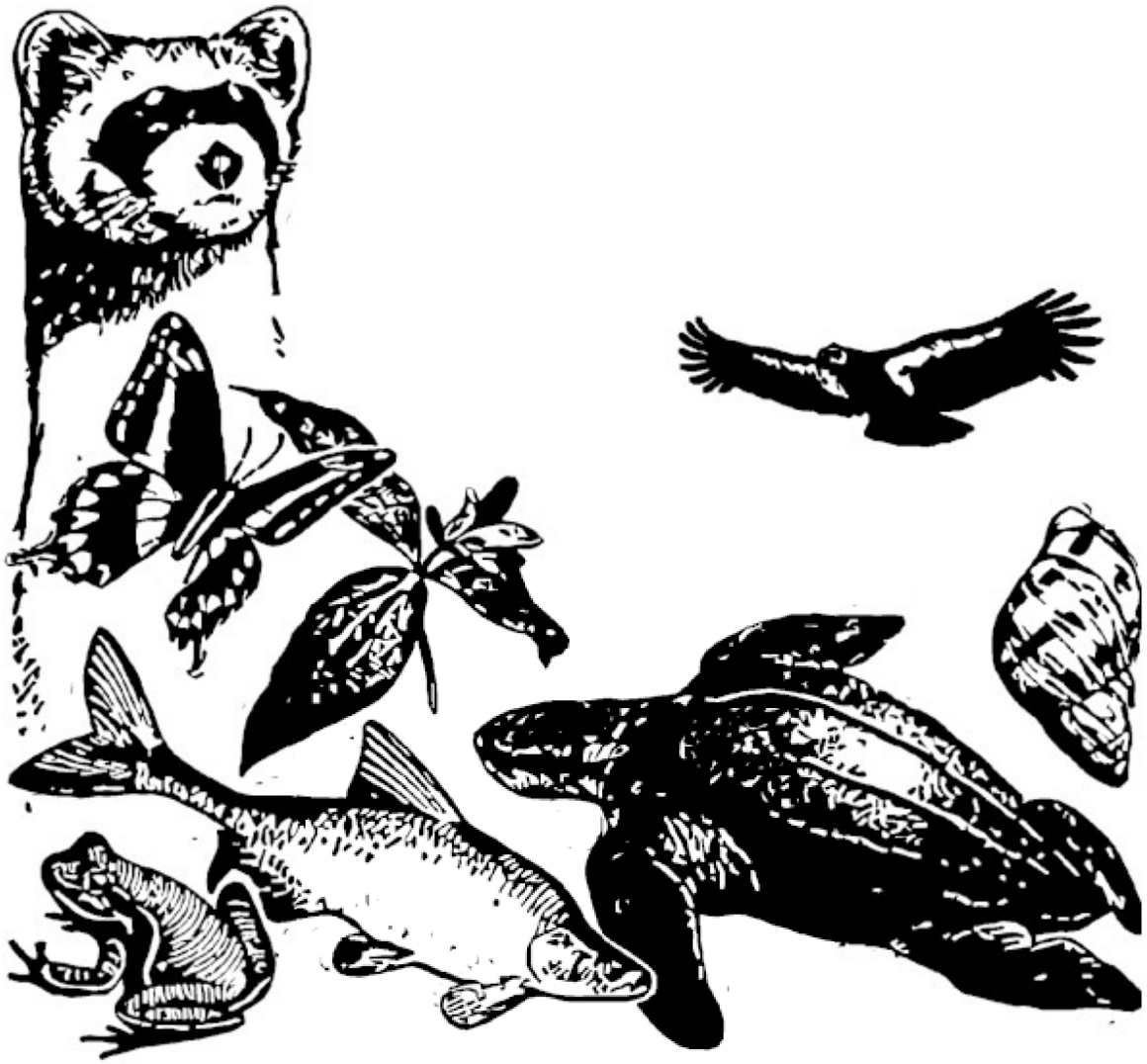
U.S. Fish & Wildlife Service

Clarkstown Cranford Drive Drainage Improvements

IPaC Trust Resources Report

Generated July 07, 2016 01:41 PM MDT, IPaC v3.0.8

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

Table of Contents

IPaC Trust Resources Report 1
Project Description 1
Endangered Species 2
Migratory Birds 3
Refuges & Hatcheries 6
Wetlands 7

U.S. Fish & Wildlife Service

IPaC Trust Resources Report

NAME

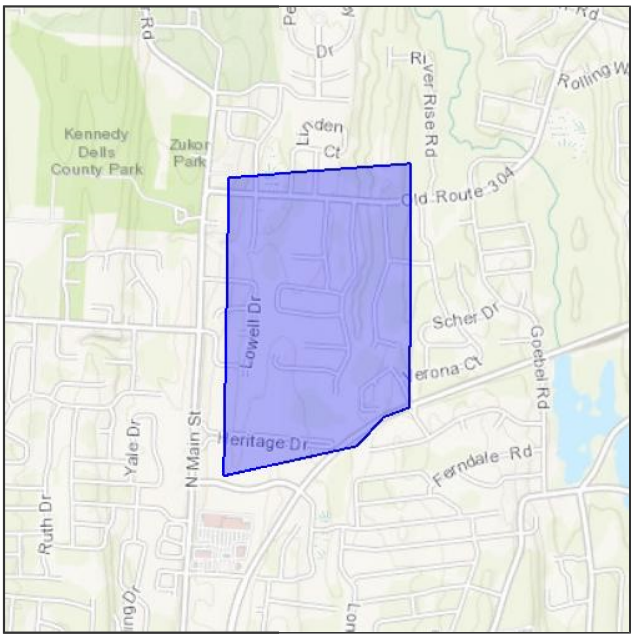
Clarkstown Cranford Drive Drainage Improvements

LOCATION

Rockland County, New York

IPAC LINK

https://ecos.fws.gov/ipac/project/2G2IZ-CLP2F-HBVMM-BR62R-4DUO3M



U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

Long Island Ecological Services Field Office
340 Smith Road
Shirley, NY 11967
(631) 286-0485

New York Ecological Services Field Office
3817 Luker Road
Cortland, NY 13045-9349
(607) 753-9334

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Mammals

Northern Long-eared Bat Myotis septentrionalis — Threatened

MANAGED BY
New York Ecological Services Field Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0JE

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

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

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

---

1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The following species of migratory birds could potentially be affected by activities in this location:

American Bittern Botaurus lentiginosus — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F3

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
On Land Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Black-billed Cuckoo Coccyzus erythropthalmus — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HI

Blue-winged Warbler Vermivora pinus — Bird of conservation concern
On Land Season: Breeding

Canada Warbler Wilsonia canadensis — Bird of conservation concern
On Land Season: Breeding

Cerulean Warbler Dendroica cerulea — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B09I

Fox Sparrow Passerella iliaca — Bird of conservation concern
On Land Season: Wintering

Golden-winged Warbler Vermivora chrysoptera — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G4

Hudsonian Godwit Limosa haemastica — Bird of conservation concern
At Sea Season: Migrating

Least Bittern Ixobrychus exilis
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B092

Louisiana Waterthrush Parkesia motacilla — Bird of conservation concern
On Land Season: Breeding

Olive-sided Flycatcher Contopus cooperi — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0AN

Peregrine Falcon Falco peregrinus — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Pied-billed Grebe Podilymbus podiceps — Bird of conservation concern
On Land Season: Year-round

Prairie Warbler Dendroica discolor — Bird of conservation concern
On Land Season: Breeding

Purple Sandpiper Calidris maritima — Bird of conservation concern
On Land Season: Wintering

Rusty Blackbird Euphagus carolinus — Bird of conservation concern
On Land Season: Wintering

Short-eared Owl Asio flammeus — Bird of conservation concern
On Land Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Upland Sandpiper Bartramia longicauda — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HC

Willow Flycatcher Empidonax traillii — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6

Wood Thrush Hylocichla mustelina — Bird of conservation concern
On Land Season: Breeding

Worm Eating Warbler Helmitheros vermivorum

Bird of conservation concern

On Land Season: Breeding

Wildlife refuges and fish hatcheries

There are no refuges or fish hatcheries in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local 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 tuberficid 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.

Wetland data is unavailable at this time.

MEMORANDUM FOR THE RECORD

July 26, 2016

RE: Clarkstown Cranford Drive Drainage Project, Town of Clarkstown, Rockland County, New York

The Governor's Office of Storm Recovery (GOSR), operating under the auspices of the New York State Homes and Community Renewal's (NYSHCR) Housing Trust Fund Corporation, was established to aid the statewide recovery of disaster-affected communities in New York State. GOSR is administering a U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant for Disaster Recovery (CDBG-DR), including the New York Rising Community Reconstruction (NYRCR) Program. This letter serves to document the review of species protected by the National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NMFS) for a single project proposed to receive CDBG-DR assistance, pursuant to section 7 of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.) and the Marine Mammal Protection Act (MMPA). Our supporting analysis is provided below.

Proposed Project

Both Hurricane Irene (August 28, 2011), and Superstorm Sandy (October 29, 2012) resulted in widespread flooding, wind damage, and prolonged power outages throughout the Town of Clarkstown, Rockland County, New York. The physical damage to roads, homes and Town infrastructure, caused by Superstorm Sandy and Hurricane Irene, combined with the economic impacts of displaced and closed businesses, continue to affect Clarkstown today.

It is not only the named storm events that impact the Town, but also flash flooding that accompanies summer storms, the spring thaw, and power outages that occur during high wind events. Since 1999, ten (10) serious flooding events have impacted the residents, businesses, roads, critical infrastructure systems, and natural resources throughout the Town.

The Clarkstown Cranford Drive Drainage Improvements Project (Project) is a stormwater management improvement project involving the modification and realignment of a tributary of the West Branch Hackensack, also known as the Demarest Kill located in the Town of Clarkstown, Rockland County, New York (Project location maps are included in **Attachment 1**). This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

The work will be performed in six phases to reduce the potential for erosion (Project site plans are included in **Attachment 2**). Phase 1 will begin at the Old Route 304 bridge, and the subsequent phases will move south down the Demarest Kill. Approximately 4,650 linear feet of the bed and banks of the Demarest Kill, located south of Old Route 304 and running approximately parallel to Cranford Drive, will be realigned and reinforced. The redesign of the stream channel incorporates a multi-channel design, including a normal low flow channel (thalwag), a bank full channel, and the floodplain channel. Backflow preventers will be installed at all drainage pipes out letting into the stream channel to prevent backflow from the channel flooding onto the roadway.

Phase 1 of the proposed Project involves 3,240 square feet (SF) of riprap being installed on either side of the three (3) existing 16-foot x 8.5-foot concrete box culverts at Old Route 304. Modular block retaining walls will be located on the south side of the three culverts, with a 165-SF gabion check dam in place to divert low flow waters into a single culvert. The existing stream channel is to be realigned, with a 190-SF rock cross-vein and 145-SF "W" rock weir being located in the proposed stream channel. A temporary stream crossing will be constructed using three (3) 30-inch x 20-foot high-density polyethylene (HDPE) pipes covered by approximately 20 cubic yards (CY) of ¾-inch aggregate fill placed on a filter fabric. There will be approximately one (1) foot of the ¾-inch aggregate fill placed on both sides and on top of the 20-foot pipes. A total of 32 trees of 8-inch diameter or larger are proposed to be removed during Phase 1.

Phase 1A of the proposed Project involves approximately a boulder cluster of approximately 6 to 10 CY to be placed next to 3,950 SF of riprap before the proposed stream alignment connects to the existing streambed. A 145-SF "W" rock weir will be placed on the south portion of this area, where the proposed streambed diverges from the existing streambed. A total of 44 trees of an 8-inch or larger diameter are proposed to be removed during Phase 1A.

Phase 2 and Phase 3 run approximately parallel with one another, with Phase 2 involving work to create the proposed stream channel on the eastern bank and Phase 3 work on the western bank to fill in the existing stream and reinforce the streambed. Phase 2 work involves a modular block retaining wall being placed on the northeastern edge of the streambank. A 145-SF "W" rock weir is located at the proposed streambed south of the retaining wall. Two (2) boulder clusters containing approximately 6 to 10 CY of rocks each will be placed along the proposed streambed during Phase 2, with brush matting being

placed during Phase 3. An approximately 190-SF rock cross-vein is located north of a second temporary stream crossing, as described in Phase 1. Approximately 450 SF of brush matting will be placed on both sides of the streambed located north of the 18,900 SF of riprap reinforcing the junction of the tributary traveling west under Cranford Drive (See Phase 6 for the tributary work). The brush matting and riprap will be placed on the eastern side during Phase 2, and on the western side during Phase 3. The southern portion of the Phase 2 section includes placement of approximately 90 SF of riprap for a sewer crossing, a third temporary stream crossing as described in Phase 1, and 150 feet for a boulder revetment to reinforce the new streambed curve on the western bank of the z-curve. Approximately 270 trees with diameters 8" or greater will be removed during Phase 2, while approximately 64 trees with diameters 8 inches or greater will be removed during Phase 3.

Phase 4 and Phase 5 also run approximately parallel to one another, with Phase 4 occurring on the eastern bank and Phase 5 occurring on the western bank. Phase 5 also overlaps the southern tip of Phase 2. Phase 5 involves placement of a 150-foot boulder revetment to reinforce the new streambed curve on the eastern bank of the z-curve, with a 190-SF rock cross-vein located to the south of the boulder revetment. Approximately 175 SF of brush matting will be located on the eastern bank, north of approximately 2,800 SF of riprap for sewer crossings at the southern tip of the work area. Approximately 225 SF of brush matting will be placed on the western bank and approximately 65 feet of boulder revetment on the eastern bank, both located south of the sewer crossing riprap. Approximately 16 trees with diameters 8 inches or greater will be removed during Phase 4, while approximately 67 trees with diameters 8 inches or greater will be removed during Phase 5.

Phase 6 involves work on the tributary traveling west under Cranford Drive. The riprap from Phase 2 and Phase 3 ends at the eastern side of Cranford Drive. The western banks will have stabilized construction entrances from Cranford Drive. The stream will be staying in approximately the same footprint as the existing streambed, but it will be reinforced with two boulder clusters of approximately 6 to 10 CY, with a single 180-SF "W" rock weir and two (2) 210-SF rock cross-veins. Approximately 82 trees with diameters 8 inches or greater will be removed during Phase 6.

As the stream stabilization and restoration work is completed, habitat improvements including approximately 674 major trees, 156 minor trees, 1,790 shrubs, and 4,010 ground-cover plants will be planted along the stream banks to replace the removed trees, shrubs, and grasses.

The Project will involve approximately 8,000 cubic yards of excavation material at the site. The top-soil will be stripped, stockpiled, and re-spread on the site. Excavated boulders and stones will be reused in the channels for stabilization, and the excess soils will be disposed of at approved locations.

All work will be conducted in accordance with necessary permits from the New York State Department of Environmental Conservation (NYSDEC) (**Attachment 2**), United States Army Corps of Engineers, and the Town of Clarkstown.

Description of the Action Area

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50CFR§402.02). For this Project, located at approximately 41.16501° N 73.97910° W, the action area includes the bed and banks of the Demarest Kill, as well as adjacent areas that may be impacted by turbidity. The Demarest Kill is a shallow, forested freshwater stream that is located above the high tide line. It is classified as a Class A stream by the NYSDEC. The Demarest Kill is surrounded by residential development (see aerial map in **Attachment 1**).

In order to reduce erosion and turbidity, the project will be completed in six phases (Project site plans are included in **Attachment 2**). To prevent running water in the work area and to minimize turbidity, a temporary diversion channel will be constructed. Also, no turbid water resulting from dewatering operations will be discharge directly to or allowed to enter the stream.

NMFS Listed Species in the Action Area

There are two species of fish listed under the Endangered Species Act that have the potential to occur in the action area and may be adversely affected by the proposed action. ESA species include:

<u>Fish</u>

Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) (32 FR 4001; Recovery plan: NMFS 1998)
Shortnose Sturgeon (*Acipenser brevirostrum*) (32 FR 4001; Recovery plan: NMFS 1998)

<u>Atlantic Sturgeon</u>

The Atlantic sturgeon is a long-lived and highly migratory species that spends most of its adult life at sea along the Atlantic coastline from Labrador to Florida. Atlantic sturgeon reach maturity between 12 and 15 years of age before migrating into coastal rivers to spawn every 2-5 years. Mature males typically enter the Hudson-Raritan estuary starting in April and at least some may remain as late as November. Adult females enter the estuary in mid-May and migrate directly to the spawning grounds, which are often deep channel or off-channel habitats, before quickly returning to marine waters. In the Hudson River, spawning occurs upstream of the salt-front as larvae are thought to be intolerant of saline environments. Atlantic sturgeon eggs are demersal and adhesive, and the larvae remain

close to the river bottom for some time. After spending up to seven years of life in freshwater, Atlantic sturgeon migrate out to sea to spend the rest of their lives. Only during spawning season do adult sturgeons return to large coastal rivers and estuaries. In New York, Atlantic sturgeon are generally found in the deeper portions of the Hudson River, and while occasionally found as far upriver as Albany, young fish are rarely seen upstream of Hudson.

The Project area does not provide suitable habitat for the Atlantic sturgeon. While the Project is potentially located in the inland range of the Atlantic sturgeon (**Attachment 3**), the project is located above the high tide line and therefore, is not considered accessible habitat. Moreover, a dam located 4.1 miles southeast of the Project on the south end of DeForest Lake would prevent any sturgeon from travelling upstream to the Project area.

Shortnose Sturgeon

The shortnose sturgeon is a long-lived, bottom feeding, anadromous fish that move up the Hudson River in April-May to spawn in freshwater sites north of Coxsackie. Males spawn every other year and females every third year. Newly-hatched fry are poor swimmers and drift with the currents along the bottom. As they grow and mature, the fish move downriver into the most brackish parts of the lower Hudson. After spawning, adults distribute throughout the deepest channels of the estuary to forage on benthic invertebrates. As water temperatures decline in the late fall, adults typically concentrate in a few over-wintering areas near Kingston and Haverstraw Bay. Shortnose sturgeons occur from the Saint John's River in New Brunswick to the Saint John River in Florida. In New York State, the shortnose sturgeon is only found in the lower portion of the Hudson River from the southern tip of Manhattan upriver to the Federal dam at Troy

The Project area does not provide suitable habitat for the shortnose sturgeon. The shortnose sturgeon prefers the deeper, freshwater tidal reaches of the Hudson River Estuary (see NYSDEC Shortnose Sturgeon Sighting Map in **Attachment 4**). Moreover, a dam located 4.1 miles southeast of the Project on the south end of DeForest Lake would prevent any sturgeon from travelling upstream to the Project area.

Effects Determination

No sturgeon habitat is located in the action area. While the Project area is potentially located in the inland range of the Atlantic sturgeon (see **Attachment 3**), the Demarest Kill is not a marine or estuarine area located below the high tide line, so is therefore not an accessible waterway for the Atlantic sturgeon. Moreover, a dam located 4.1 miles southeast of the Project on the south end of DeForest Lake would prevent any sturgeon from travelling upstream to the Project area.

Conclusions

We have made the determination that the proposed activity will have "No Effect" on any species listed as threatened or endangered by NMFS under the ESA of 1973, as amended. The action area does not provide suitable habitat for the Atlantic sturgeon or shortnose sturgeon and sturgeon are unable to travel upstream to the Project area because of the presence of a dam several miles downstream of the Project area. We certify that we have used the best scientific data available to complete this analysis.

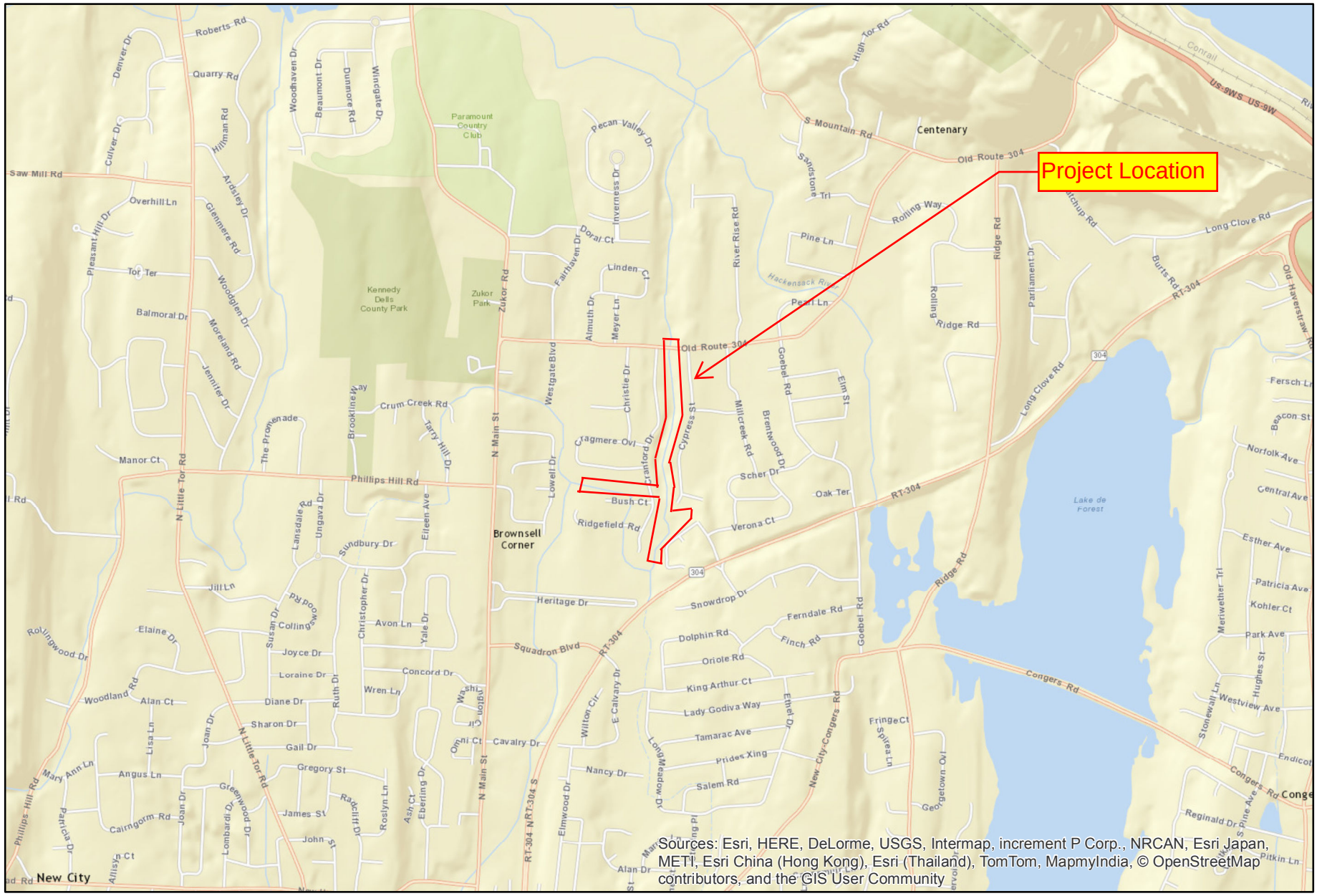
Sincerely,

Alicia Shultz
Community Developer – Environmental Services
New York State Homes and Community Renewal
38-40 State Street, Hampton Plaza
Albany, NY 12207

Attachments:

1) Project Location Maps
2) NYSDEC Permit with Project Site Plans
3) Atlantic Sturgeon Distinct Population Segment (DPS) Map
4) NYSDEC Shortnose Sturgeon Sighting Map

Attachment 1



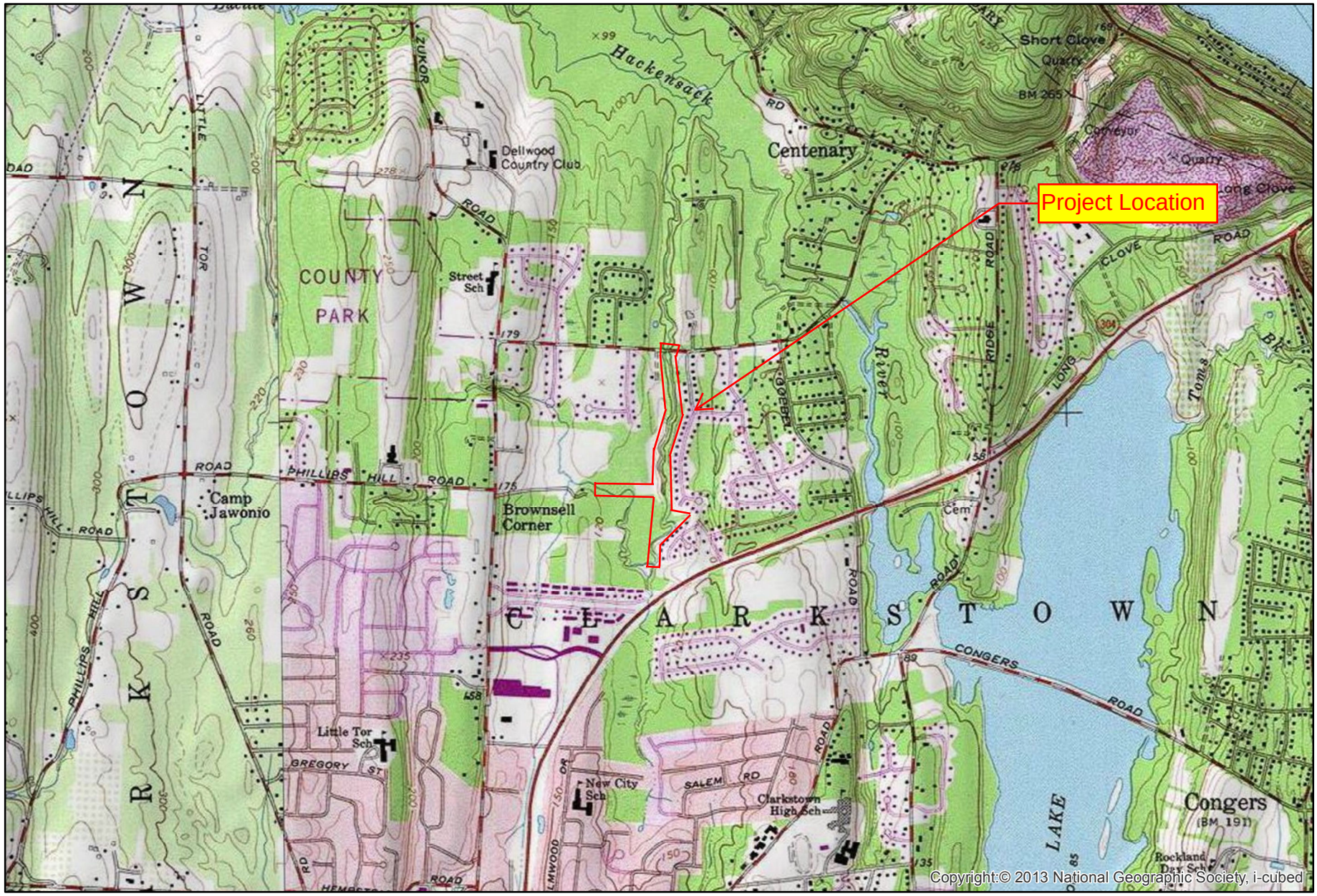
TECTONIC
Practical Solutions, Exceptional Service

0 0.25 0.5 1 Miles

1:24,000

Street Map
Cranford Drive Drainage Improvements
Clarkstown, NY 10956

N
W E
S



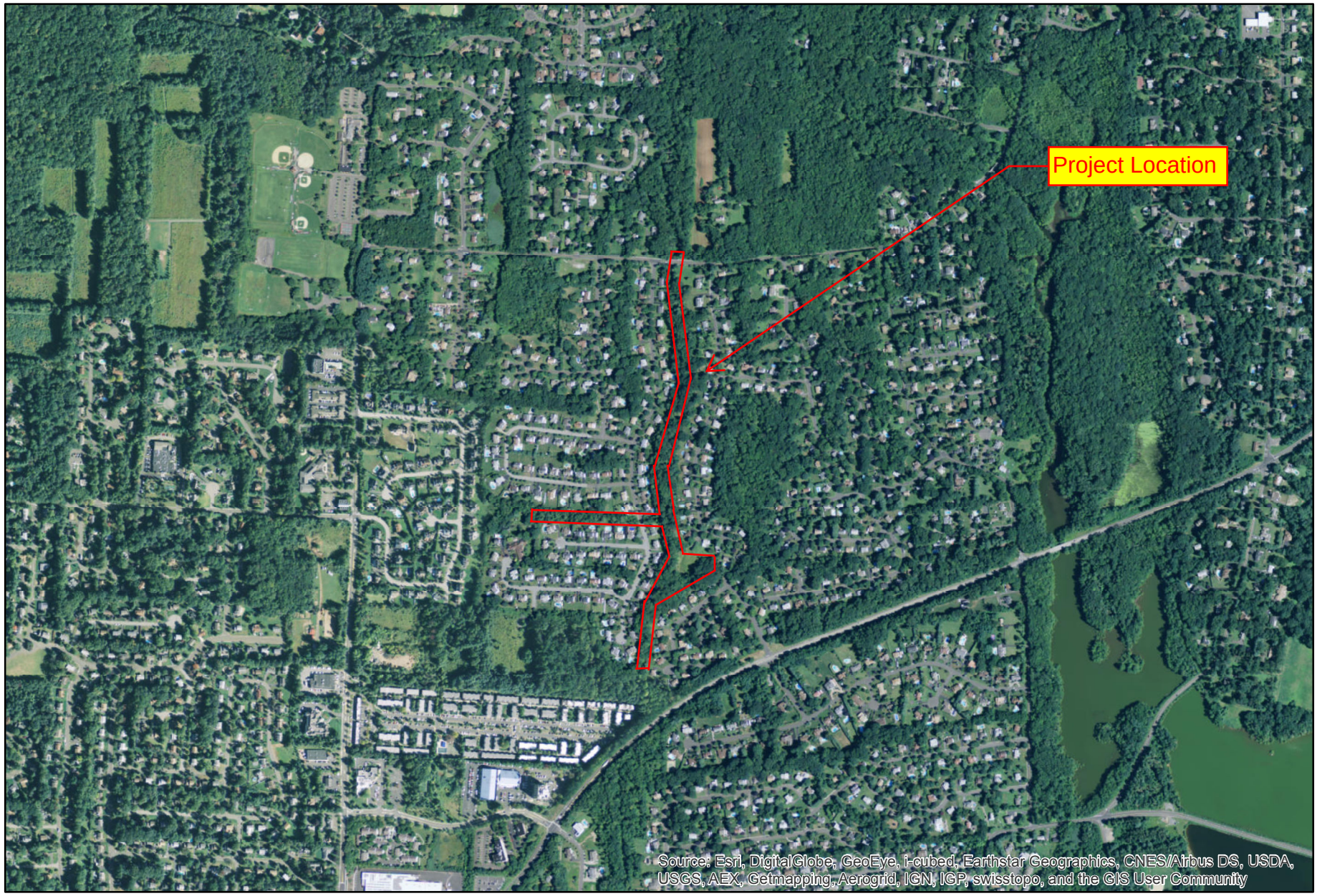
TECTONIC
Practical Solutions, Exceptional Service

0 0.25 0.5 1 Miles

1:24,000

Topographic Map
Cranford Drive Drainage Improvements
Clarkstown, NY 10956

N
W E
S



TECTONIC

Practical Solutions, Exceptional Service

0 0.125 0.25 0.5 Miles

1:13,000

Aerial Map
Cranford Drive Drainage Improvements
Clarkstown, NY 10956

N
W E
S

Attachment 2

PERMIT

Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
TOWN OF CLARKSTOWN
10 MAPLE AVE
NEW CITY, NY 10956-5013
(845) 639-6200

Facility:
DEMAREST KILL FLOOD CONTROL
CRANFORD DR
CLARKSTOWN, NY 10956

Facility Location: in CLARKSTOWN in ROCKLAND COUNTY
Facility Principal Reference Point: NYTM-E: 585.638 NYTM-N: 4557.648
Latitude: 41°09'56.3" Longitude: 73°58'45.0"

Authorized Activity: Modification and realignment of approximately 4,650 linear feet of the bed and banks of a tributary of West Branch Hankensack [Water Index No. NJ-1-12-3, Class C(T)], also known as the Demarest Kill, in accordance with project plans referenced in Natural Resource Condition #1 and as conditioned by this permit. The authorized activities are associated with the Town's Cranford Drive Flood Amelioration Project.

Permit Authorizations

Stream Disturbance - Under Article 15, Title 5
Permit ID 3-3920-00297/00010
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

Water Quality Certification - Under Section 401 - Clean Water Act
Permit ID 3-3920-00297/00011
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: JOHN W PETRONELLA, Deputy Regional Permit Administrator
Address: NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY 12561

Authorized Signature: John W. Petronella Date 7 / 19 / 2016

JRM

Distribution List

US ARMY CORPS OF ENGINEERS - NY DISTRICT
BRIAN DRUMM
DENNIS LETSON, DEPT. OF ENVIRONMENTAL CONTROL, TOWN OF CLAKSON

Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

WATER QUALITY CERTIFICATION SPECIFIC CONDITION

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Permit Attachments

Project Location Map (Attachment I)
Site Plan (Attachment II)
Permit Sign

NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: STREAM DISTURBANCE; WATER QUALITY CERTIFICATION

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by Town of Clarkstown's Department of Environmental Control, titled "Cranford Drive Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets) (Attachment II) .

2. **Post Permit Sign** The permit sign enclosed with this permit shall be posted in a conspicuous location on the worksite and adequately protected from the weather.

3. **Notice of Intent to Commence Work** The permittee shall notify Brian Drumm, DEC Bureau of Habitat, via electronic mail (brian.drumm@dec.ny.gov) at least 48 hours in advance of the time of commencement of each phase described in plans referenced in Natural Resource Condition No. 1.

4. **Floodplain Regulations** The project must meet all local and federal floodplain regulations.

5. **Phase Project to Reduce Erosion** To reduce the potential for erosion, the project shall be constructed in six phases as defined in the plans approved by this permit and provided as an enclosure to the US Army Corps of Engineers New York District's Public Notice issued April 11, 2016 (Public Notice Number: NAN-2014-00305-ESW). Such plans are titled "Cranford Drive, Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets).

All activities within the phase must be fully completed and stablized prior to commencing project activities for the next phase.

6. **Maintain Water Flow During Work** During periods of work activity, sufficient flow of water shall be maintained at all times to sustain aquatic life downstream.

7. **Temporary Diversion Channel** A temporary diversion channel, culvert or pump-around shall be constructed to prevent running water in the work area. The area of temporary diversion must be restored to its original condition following completion of the work. If a diversion channel is used, its sides and bottom shall be protected by rock riprap or other suitable non-erodible materials to prevent scour and erosion.

8. **No Impedance to Aquatic Organisms** Structures must not impede upstream and downstream migration of aquatic organisms.

9. **No Turbidity from Dewatering** No turbid water resulting from dewatering operations shall be discharged directly to or allowed to enter the stream. Such water shall be pumped to settling basins or to an upland vegetated area prior to any discharge to the stream. All other necessary measures shall be implemented to prevent any visible increase in turbidity or sedimentation downstream of the work site.

10. **Straw Bales or Other Downslope of Work Area** Bales of straw or other effective means to control erosion are to be used on the downslope edge of any disturbed areas. This barrier to sediments is to be put in place before any disturbance of the ground occurs and is to be maintained in good condition until all disturbed land is heavily vegetated.

11. **Temporary Seeding of Disturbed/ Stockpiled Soils** All disturbed areas where soil is temporarily exposed or stockpiled for more than one month shall be stabilized with a temporary seeding or ground cover.

12. **Clean Fill Only** All fill material utilized for this project shall consist of uncontaminated earthen materials only. Acceptable fill materials include gravel, rock, overburden, topsoil and similar natural mineral resources.

13. **Work During Low Flows** All work shall be performed during low flow conditions.

14. **Materials Removed from Bed and Banks** Any debris or excess materials from construction of this project shall be immediately and completely removed from the bed and banks of all water areas to an appropriate upland area for disposal.

15. **Dredgings Disposed at Upland Site** All dredged and excavated material shall be disposed of on an upland site and be suitably stabilized so that it cannot reasonably re-enter any water body or wetland area.

16. **Seed, Mulch Disturbed Soils** All areas of soil disturbance resulting from this project (above the mean high water line) shall be seeded with an appropriate perennial grass seed and mulched with straw within one week of final grading. Mulch shall be maintained until a suitable vegetative cover is established.

17. **Temporary Mulch, Final Seeding** If seeding is impracticable due to the time of year, a temporary mulch shall be applied and final seeding shall be performed at the earliest opportunity when weather conditions favor germination and growth but not more than six months after project completion.

18. **Precautions Against Contamination of Waters** All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

19. **State May Order Removal or Alteration of Work** If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

20. **State May Require Site Restoration** If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

21. **State Not Liable for Damage** The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

WATER QUALITY CERTIFICATION SPECIFIC CONDITIONS

1. Water Quality Certification The authorized project, as conditioned pursuant to the Certificate, complies with Section 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act, as amended and as implemented by the limitations, standards, and criteria of state statutory and regulatory requirements set forth in 6 NYCRR Section 608.9(a). The authorized project, as conditioned, will also comply with applicable New York State water quality standards, including but not limited to effluent limitations, best usages and thermal discharge criteria, as applicable, as set forth in 6 NYCRR Parts 701, 702, 703, and 704.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. Facility Inspection by The Department The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. Relationship of this Permit to Other Department Orders and Determinations Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. Applications For Permit Renewals, Modifications or Transfers The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY12561

4. Submission of Renewal Application The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Stream Disturbance, Water Quality Certification.

5. Permit Modifications, Suspensions and Revocations by the Department The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. Permit Transfer Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

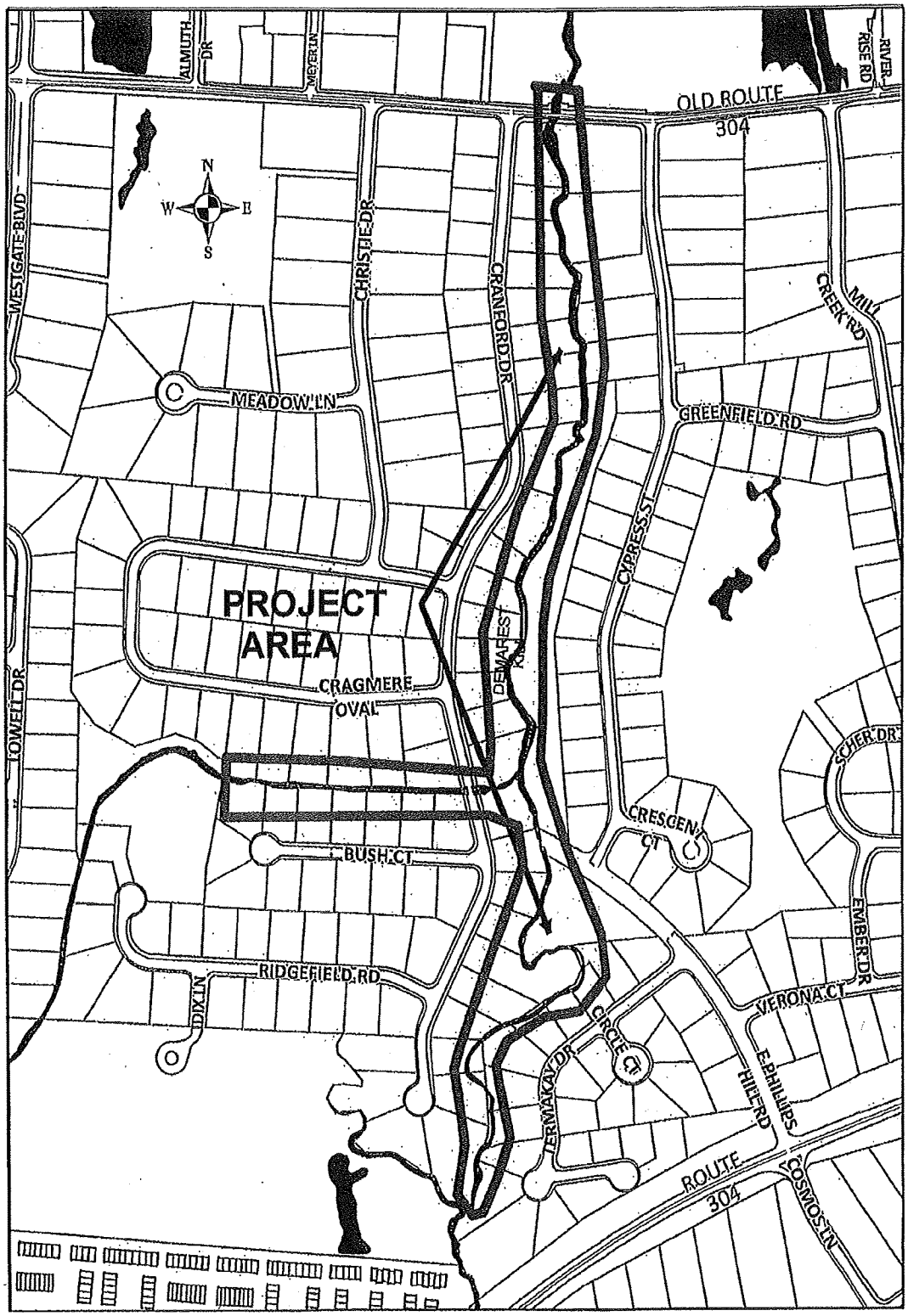
Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

Item E: SEQR Type I Action, No Significant Impact Under the State Environmental Quality Review Act (SEQR), the project associated with this permit is classified as a Type I Action with Clarkson Town Board designated as the lead agency. It has been determined that the project will not have a significant effect on the environment.

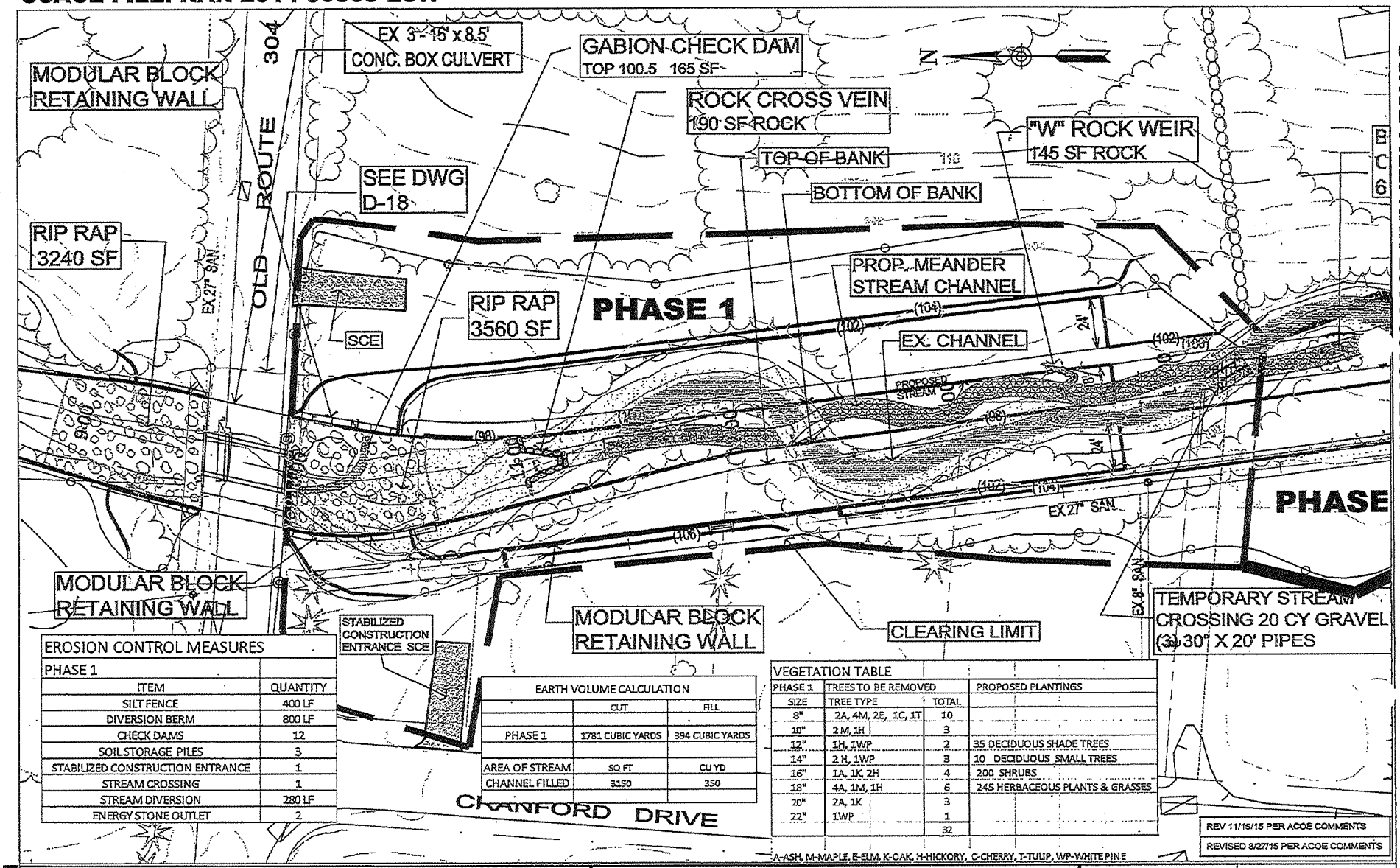
Project Location Map (Attachment I)

USACE FILE: NAN-2014-00305-ESW



500 250 0 500 Feet

CRANFORD DRIVE
FLOOD AMELIORATION PROJECT
TOWN OF CLARKSTOWN
NEW CITY, NEW YORK



EROSION CONTROL MEASURES	
PHASE 1	
ITEM	QUANTITY
SILT FENCE	400 LF
DIVERSION BERM	800 LF
CHECK DAMS	12
SOILSTORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	280 LF
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1	1781 CUBIC YARDS	394 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT 3150	CU YD 350

VEGETATION TABLE			
PHASE 1	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	2A, 4M, 2E, 1C, 1T	10	
10"	2 M, 1H	3	
12"	1H, 1WP	2	35 DECIDUOUS SHADE TREES
14"	2 H, 1WP	3	10 DECIDUOUS SMALL TREES
16"	1A, 1K, 2H	4	200 SHRUBS
18"	4A, 1M, 1H	6	245 HERBACEOUS PLANTS & GRASSES
20"	2A, 1K	3	
22"	1WP	1	
		32	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY, T-TULIP, WP-WHITE PINE

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

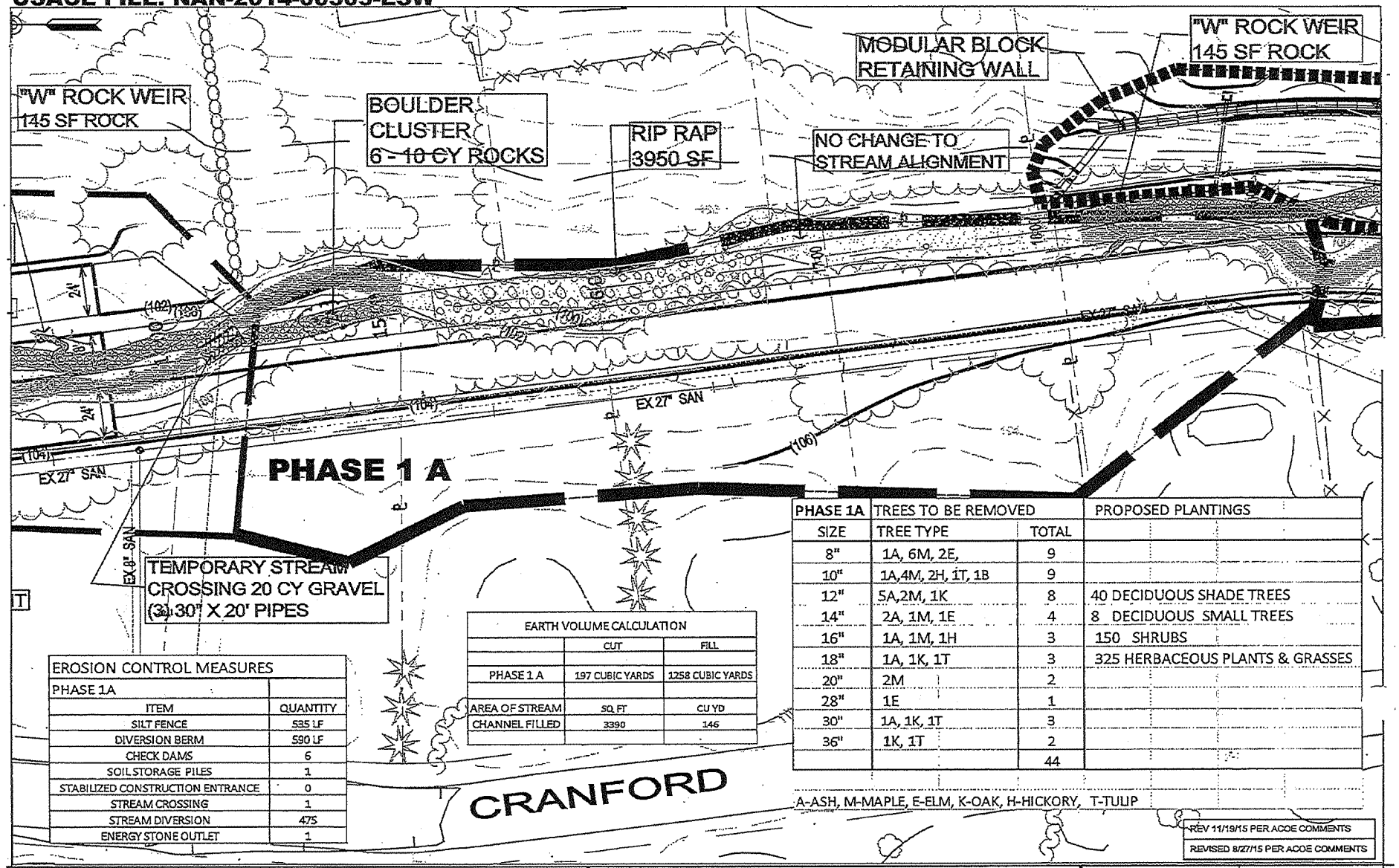
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-1
SHEET _1_ OF _31_ SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

Site Plan (Attachment 1)



EROSION CONTROL MEASURES	
PHASE 1A	
ITEM	QUANTITY
SILT FENCE	535 LF
DIVERSION BERM	590 LF
CHECK DAMS	6
SOIL STORAGE PILES	1
STABILIZED CONSTRUCTION ENTRANCE	0
STREAM CROSSING	1
STREAM DIVERSION	475
ENERGY STONE OUTLET	1

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1 A	197 CUBIC YARDS	1258 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ. FT	CU YD
	3390	146

PHASE 1A	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1A, 6M, 2E,	9	
10"	1A,4M, 2H, 1T, 1B	9	
12"	5A,2M, 1K	8	40 DECIDUOUS SHADE TREES
14"	2A, 1M, 1E	4	8 DECIDUOUS SMALL TREES
16"	1A, 1M, 1H	3	150 SHRUBS
18"	1A, 1K, 1T	3	325 HERBACEOUS PLANTS & GRASSES
20"	2M	2	
28"	1E	1	
30"	1A, 1K, 1T	3	
36"	1K, 1T	2	
		44	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

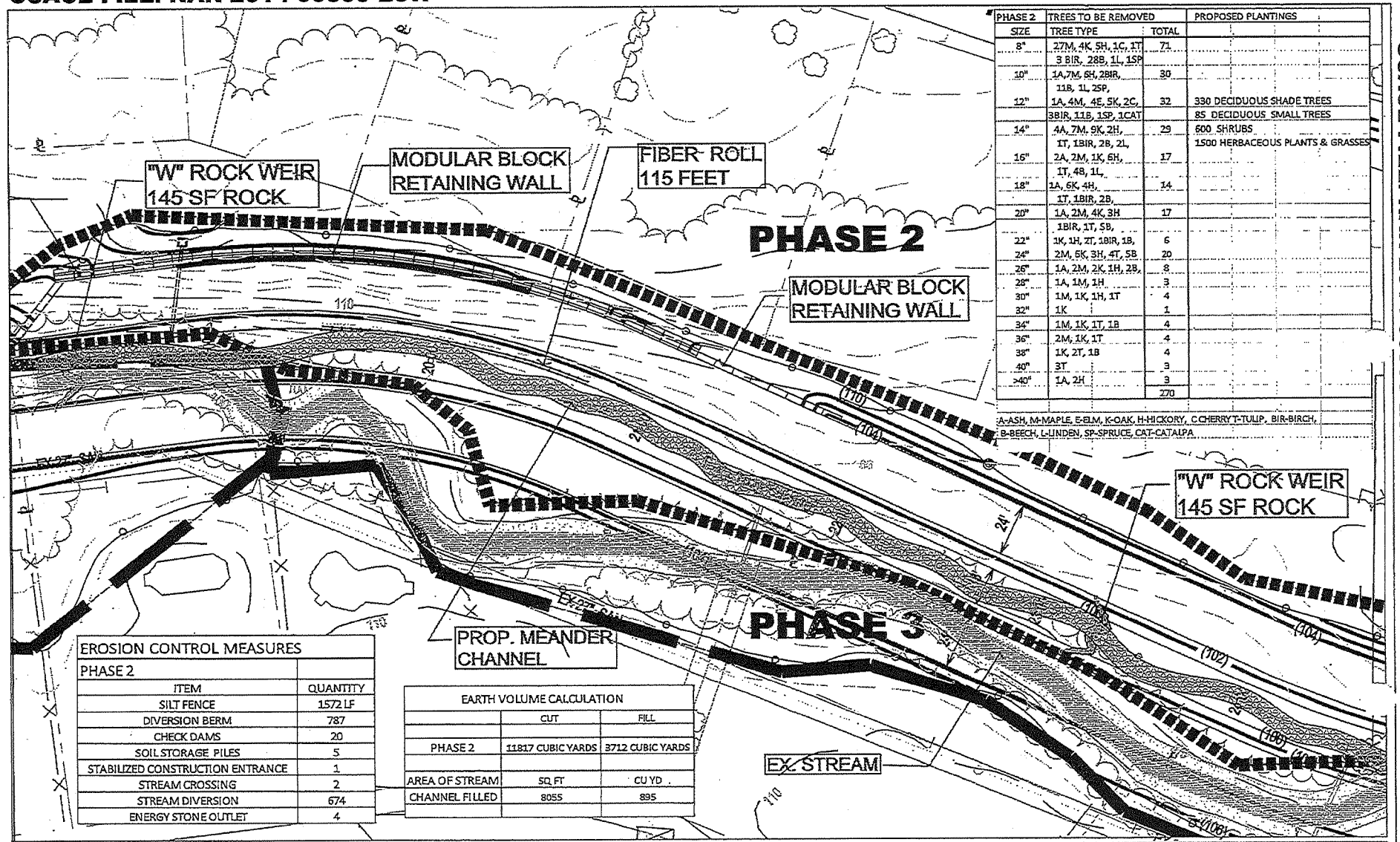
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-2
SHEET 2 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 2	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	27M, 4K, 5H, 1C, 1T 3 BIR, 28B, 1L, 1SP	71	
10"	1A,7M, 6H, 2BIR, 11B, 1L, 2SP,	30	
12"	1A, 4M, 4E, 5K, 2C, 3BIR, 11B, 1SP, 1CAT	32	330 DECIDUOUS SHADE TREES
			85 DECIDUOUS SMALL TREES
14"	4A, 7M, 9K, 2H, 1T, 1BIR, 2B, 2L,	29	600 SHRUBS
16"	2A, 2M, 1K, 6H, 1T, 4B, 1L,	17	1500 HERBACEOUS PLANTS & GRASSES
18"	1A, 6K, 4H, 1T, 1BIR, 2B,	14	
20"	1A, 2M, 4K, 3H 1BIR, 1T, 5B,	17	
22"	1K, 1H, 2T, 1BIR, 1B,	6	
24"	2M, 6K, 3H, 4T, 5B	20	
26"	1A, 2M, 2K, 1H, 2B,	8	
28"	1A, 1M, 1H	3	
30"	1M, 1K, 1H, 1T	4	
32"	1K	1	
34"	1M, 1K, 1T, 1B	4	
36"	2M, 1K, 1T	4	
38"	1K, 2T, 1B	4	
40"	3T	3	
>40"	1A, 2H	3	
		270	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY T-TULIP, BIR-BIRCH, B-BEECH, L-LINDEN, SP-SPRUCE, CAT-CATALPA

EROSION CONTROL MEASURES	
PHASE 2	
ITEM	QUANTITY
SILT FENCE	1572 LF
DIVERSION BERM	787
CHECK DAMS	20
SOIL STORAGE PILES	5
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	2
STREAM DIVERSION	674
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 2	11817 CUBIC YARDS	3712 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	8055	895

REV 11/19/15 PER ACOE COMMENTS | REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

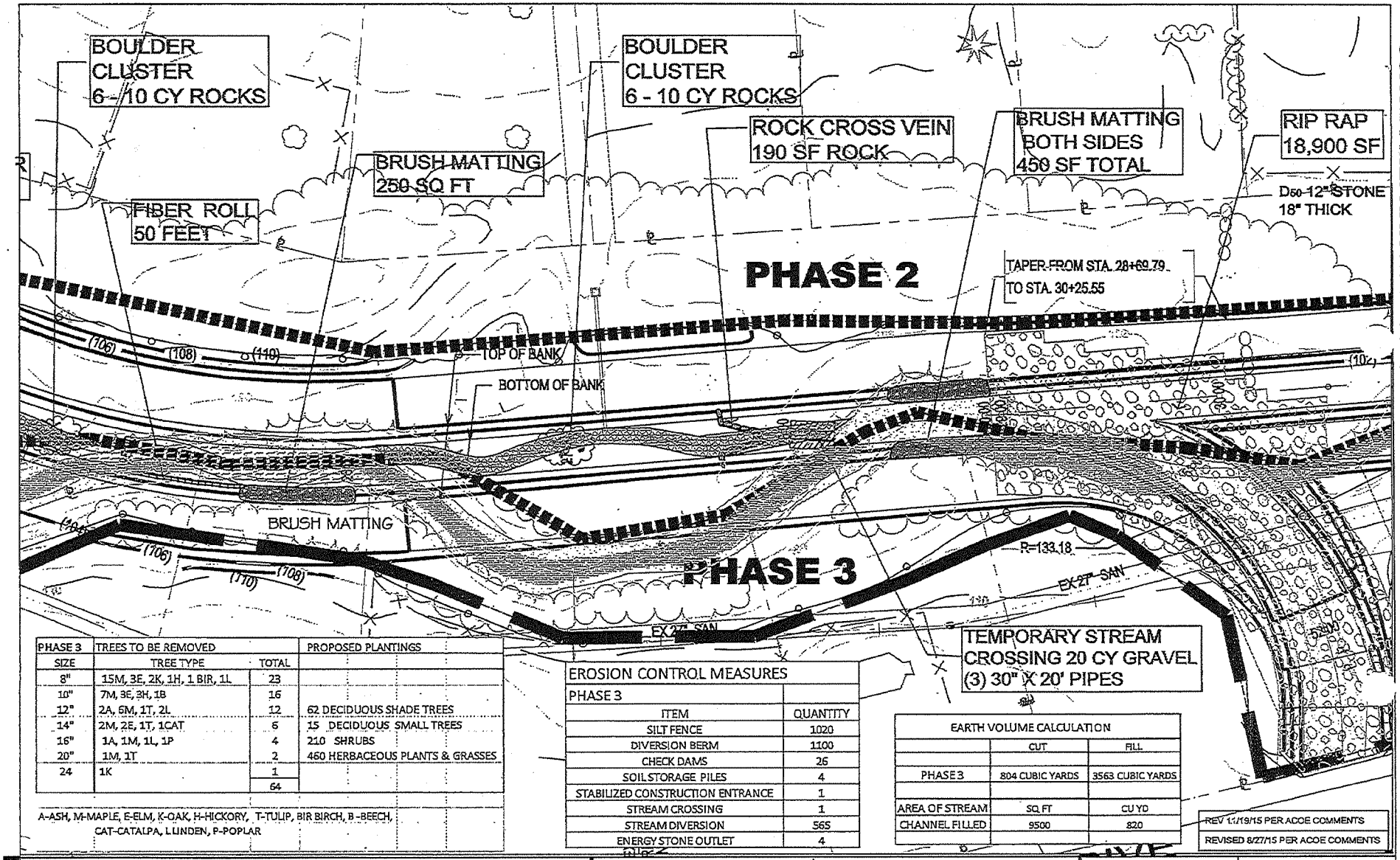
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-3

SHEET _3_ OF _31 SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 3	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	15M, 3E, 2K, 1H, 1 BIR, 1L	23	
10"	7M, 3E, 3H, 1B	16	
12"	2A, 6M, 1T, 2L	12	62 DECIDUOUS SHADE TREES
14"	2M, 2E, 1T, 1CAT	6	15 DECIDUOUS SMALL TREES
16"	1A, 1M, 1L, 1P	4	210 SHRUBS
20"	1M, 1T	2	460 HERBACEOUS PLANTS & GRASSES
24	1K	1	
		64	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, CAT-CATALPA, L LINDEN, P-POPLAR

EROSION CONTROL MEASURES	
PHASE 3	
ITEM	QUANTITY
SILT FENCE	1020
DIVERSION BERM	1100
CHECK DAMS	26
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	565
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 3	804 CUBIC YARDS	3563 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	9500	820

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

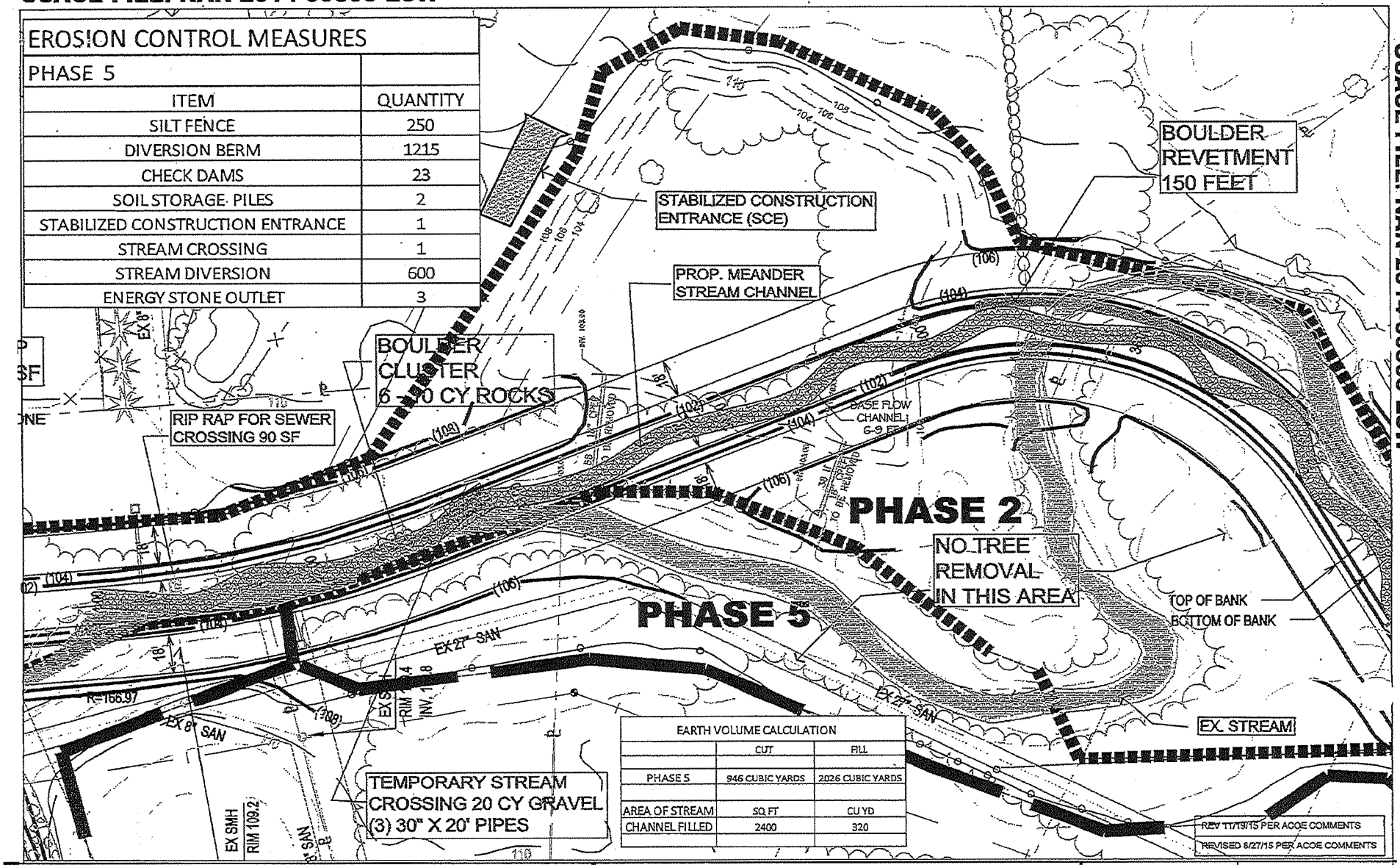
SITE LAYOUT PLAN
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-4
SHEET 4 OF 31 SHTS.
DRAWING FILE: e:\engineering\cranford drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

EROSION CONTROL MEASURES	
PHASE 5	
ITEM	QUANTITY
SILT FENCE	250
DIVERSION BERM	1215
CHECK DAMS	23
SOIL STORAGE PILES	2
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	600
ENERGY STONE OUTLET	3



EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 5	946 CUBIC YARDS	2026 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT	CU YD
	2400	320

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

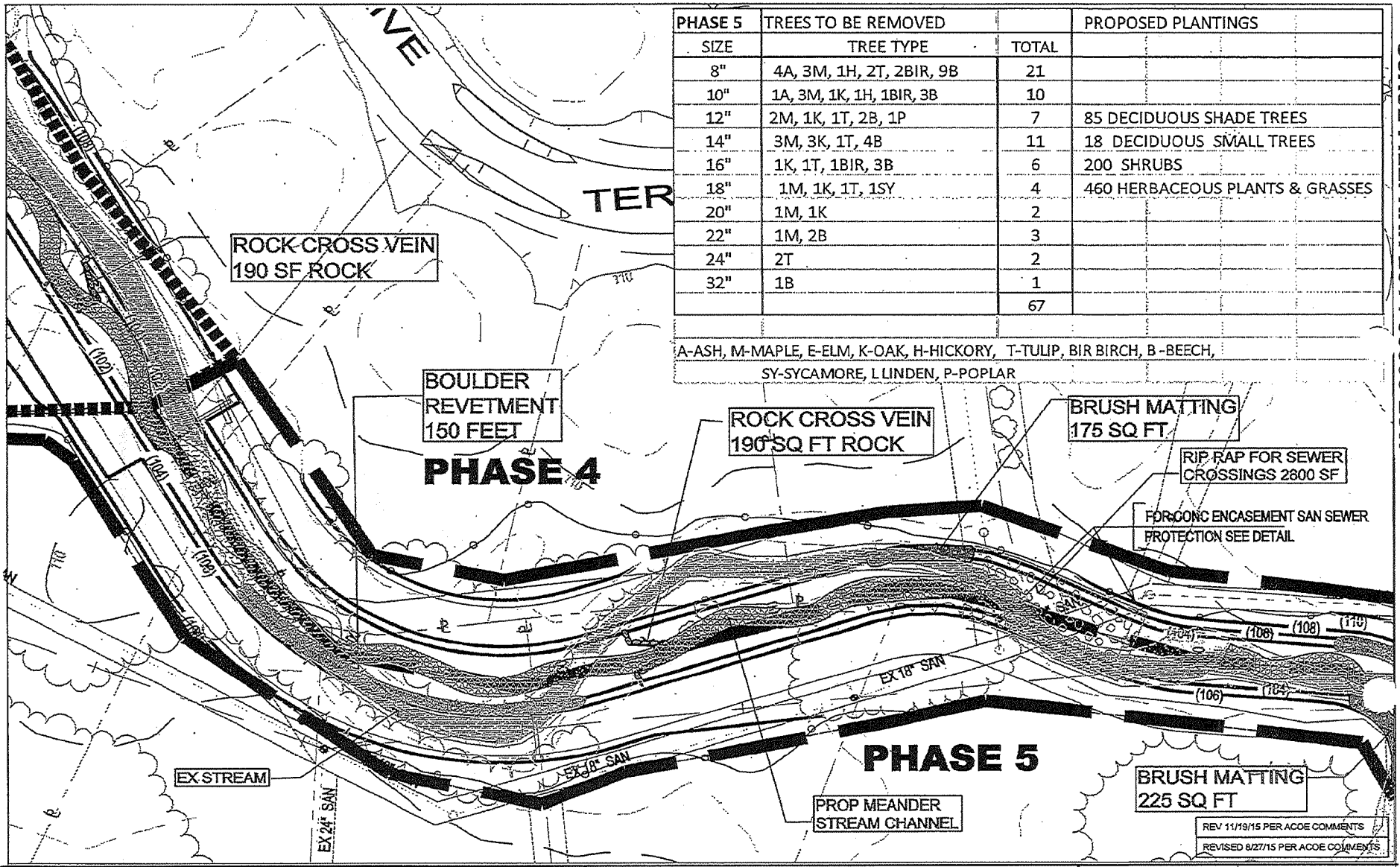
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	KOZ
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-5
SHEET 5 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

PHASE 5	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	4A, 3M, 1H, 2T, 2BIR, 9B	21	
10"	1A, 3M, 1K, 1H, 1BIR, 3B	10	
12"	2M, 1K, 1T, 2B, 1P	7	85 DECIDUOUS SHADE TREES
14"	3M, 3K, 1T, 4B	11	18 DECIDUOUS SMALL TREES
16"	1K, 1T, 1BIR, 3B	6	200 SHRUBS
18"	1M, 1K, 1T, 1SY	4	460 HERBACEOUS PLANTS & GRASSES
20"	1M, 1K	2	
22"	1M, 2B	3	
24"	2T	2	
32"	1B	1	
		67	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, SY-SYCAMORE, L LINDEN, P-POPLAR



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

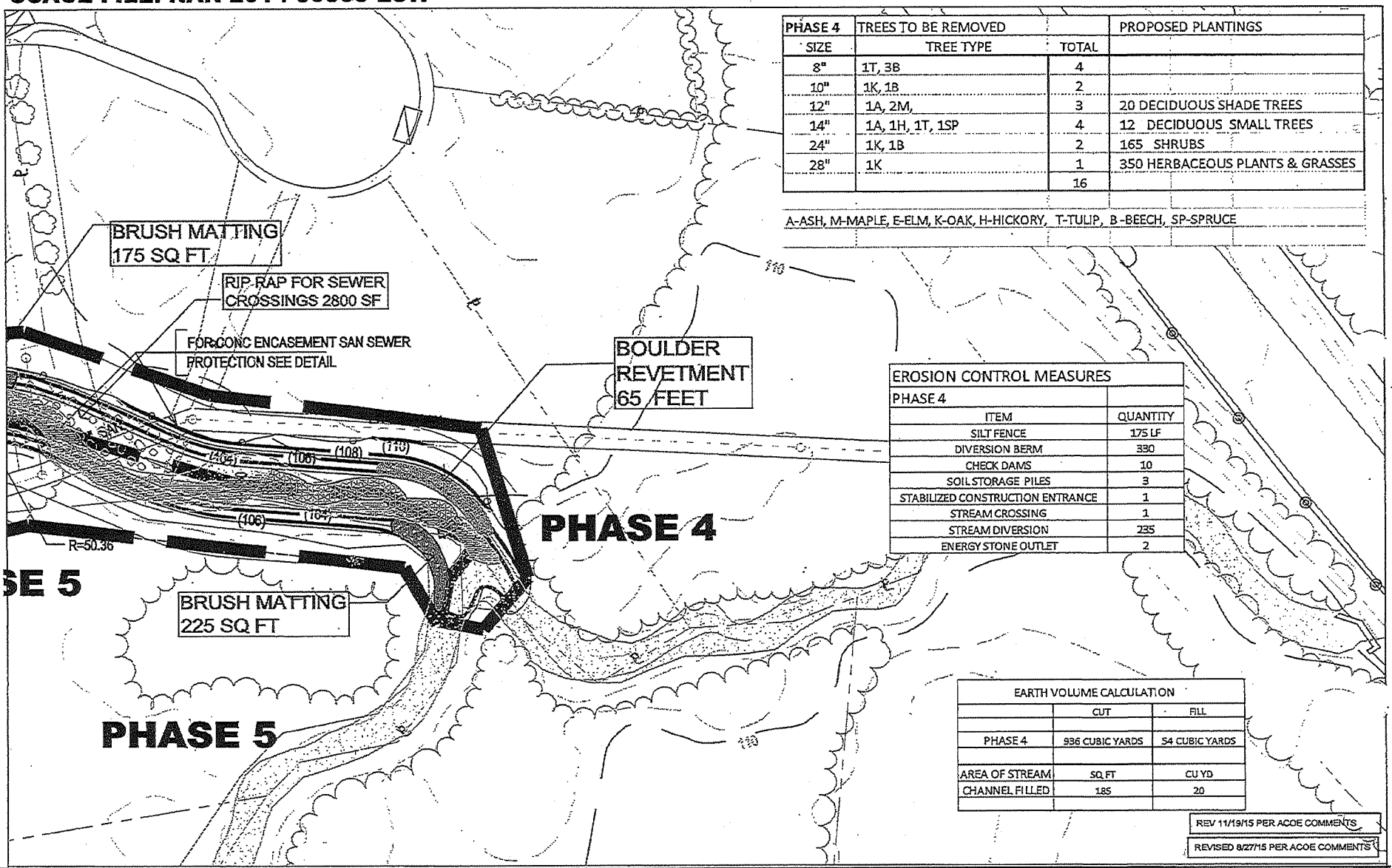
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-6

SHEET _6_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe



PHASE 4	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1T, 3B	4	
10"	1K, 1B	2	
12"	1A, 2M,	3	20 DECIDUOUS SHADE TREES
14"	1A, 1H, 1T, 1SP	4	12 DECIDUOUS SMALL TREES
24"	1K, 1B	2	165 SHRUBS
28"	1K	1	350 HERBACEOUS PLANTS & GRASSES
		16	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, B-BEECH, SP-SPRUCE

EROSION CONTROL MEASURES	
PHASE 4	
ITEM	QUANTITY
SILT FENCE	175 LF
DIVERSION BERM	330
CHECK DAMS	10
SOIL STORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	235
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 4	936 CUBIC YARDS	54 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	185	20

REV 11/19/15 PER ACOE COMMENTS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

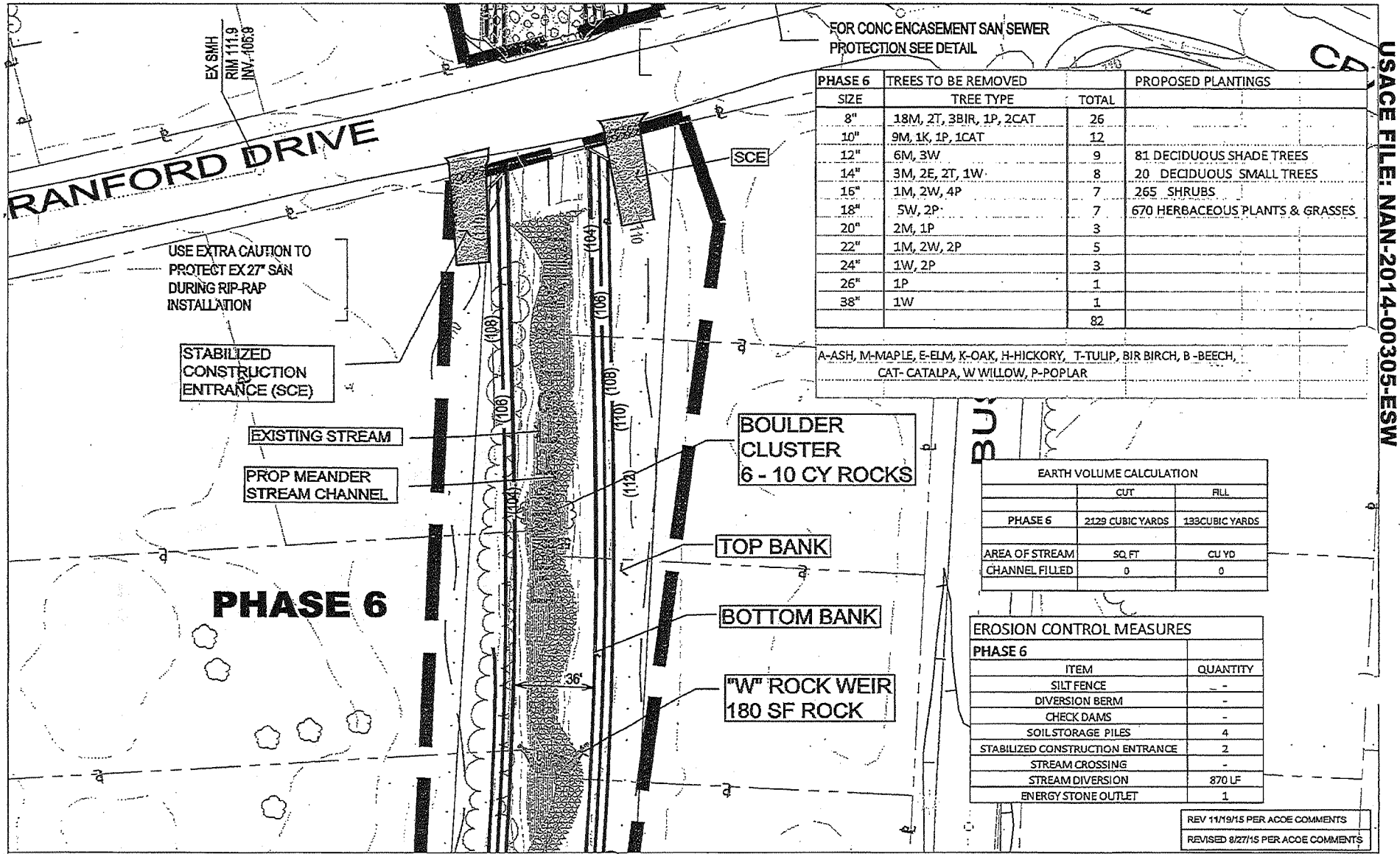
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-7

SHEET _7_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 6	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	18M, 2T, 3BIR, 1P, 2CAT	26	
10"	9M, 1K, 1P, 1CAT	12	
12"	6M, 3W	9	81 DECIDUOUS SHADE TREES
14"	3M, 2E, 2T, 1W	8	20 DECIDUOUS SMALL TREES
16"	1M, 2W, 4P	7	265 SHRUBS
18"	5W, 2P	7	670 HERBACEOUS PLANTS & GRASSES
20"	2M, 1P	3	
22"	1M, 2W, 2P	5	
24"	1W, 2P	3	
26"	1P	1	
38"	1W	1	
		82	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B -BEECH, CAT- CATALPA, W WILLOW, P-POPLAR

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 6	2129 CUBIC YARDS	133CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	0	0

EROSION CONTROL MEASURES	
PHASE 6	
ITEM	QUANTITY
SILT FENCE	-
DIVERSION BERM	-
CHECK DAMS	-
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	2
STREAM CROSSING	-
STREAM DIVERSION	870 LF
ENERGY STONE OUTLET	1

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

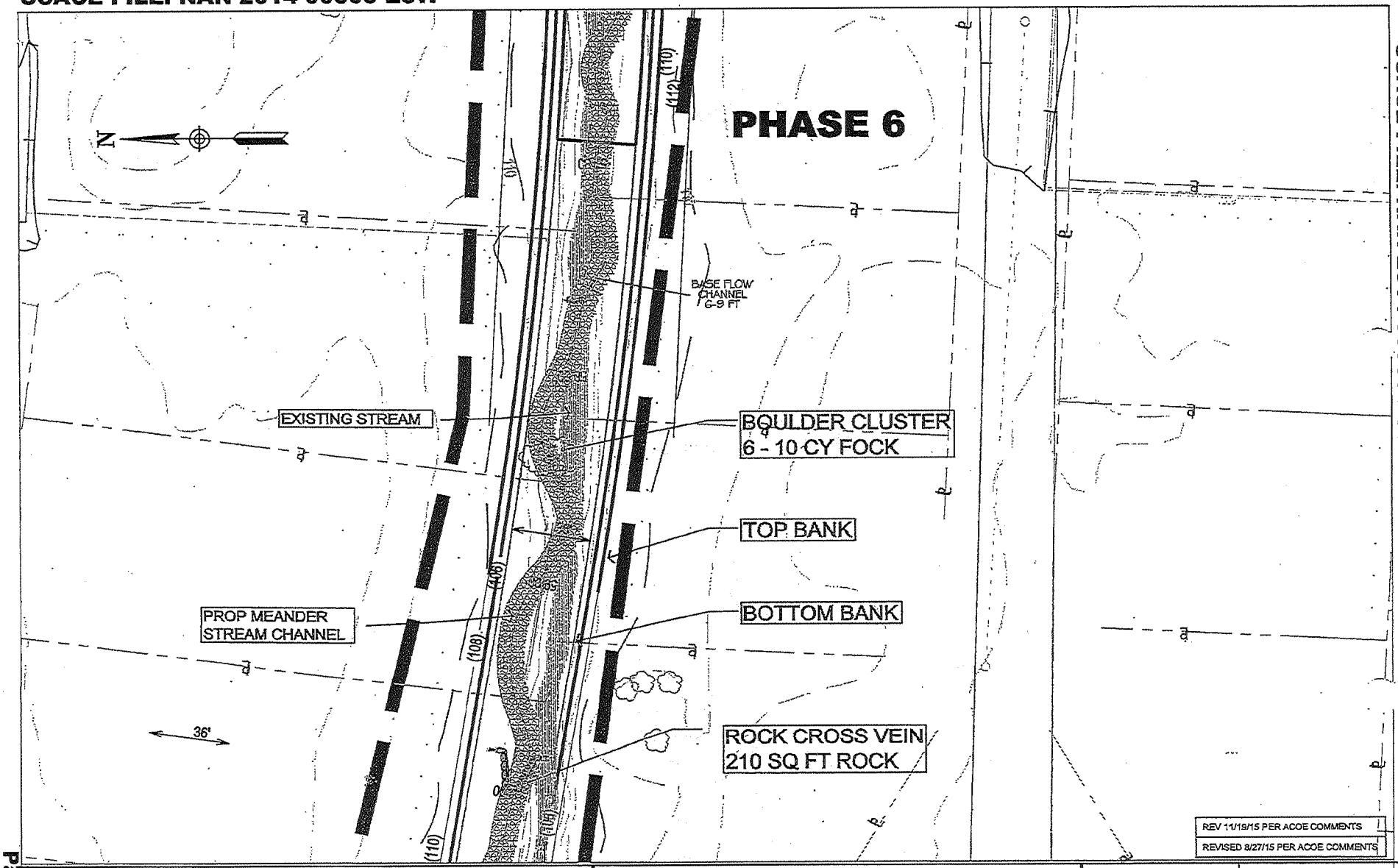
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-8
SHEET 8 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

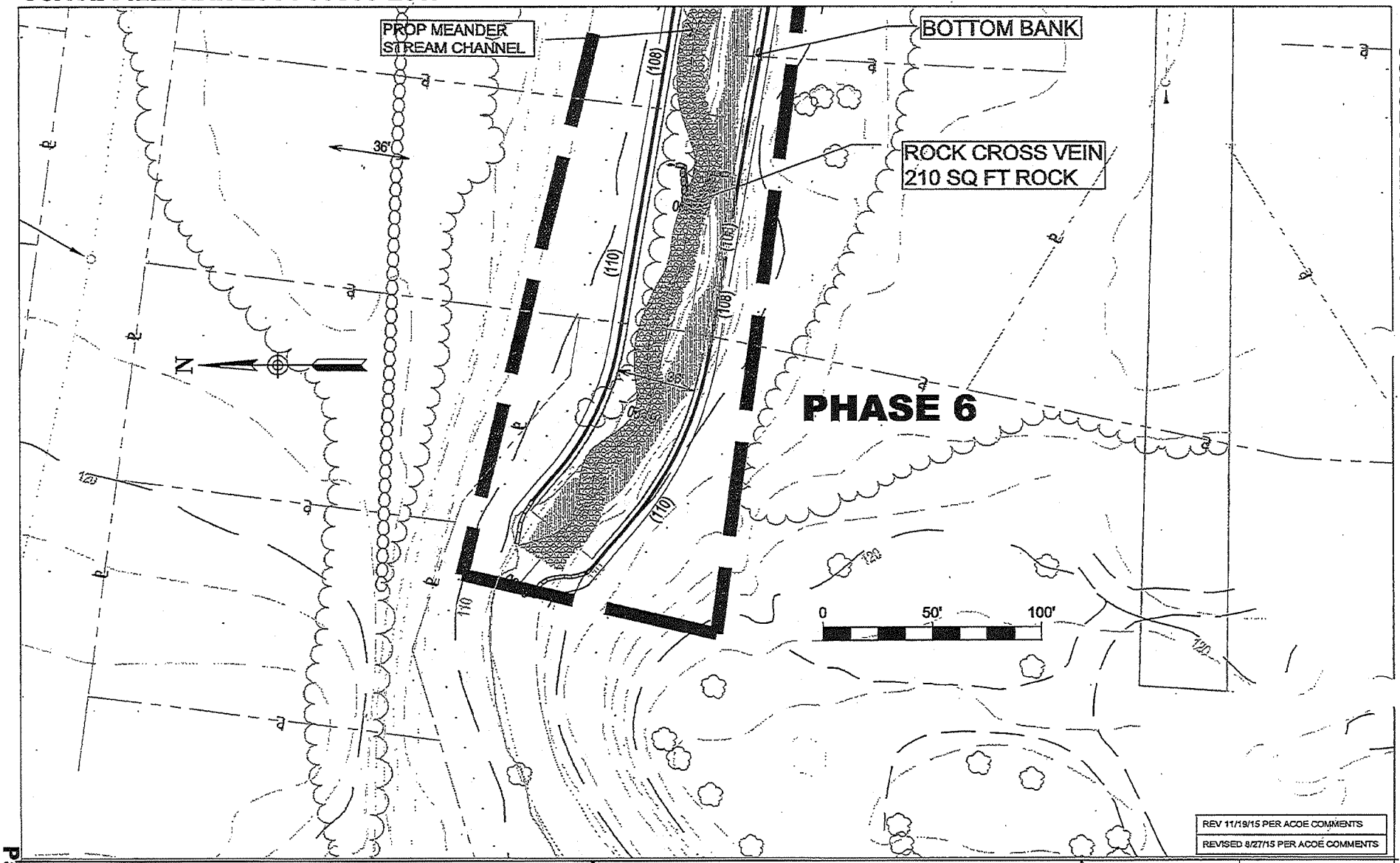
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-9

SHEET _9_ OF _31_ SHTS.

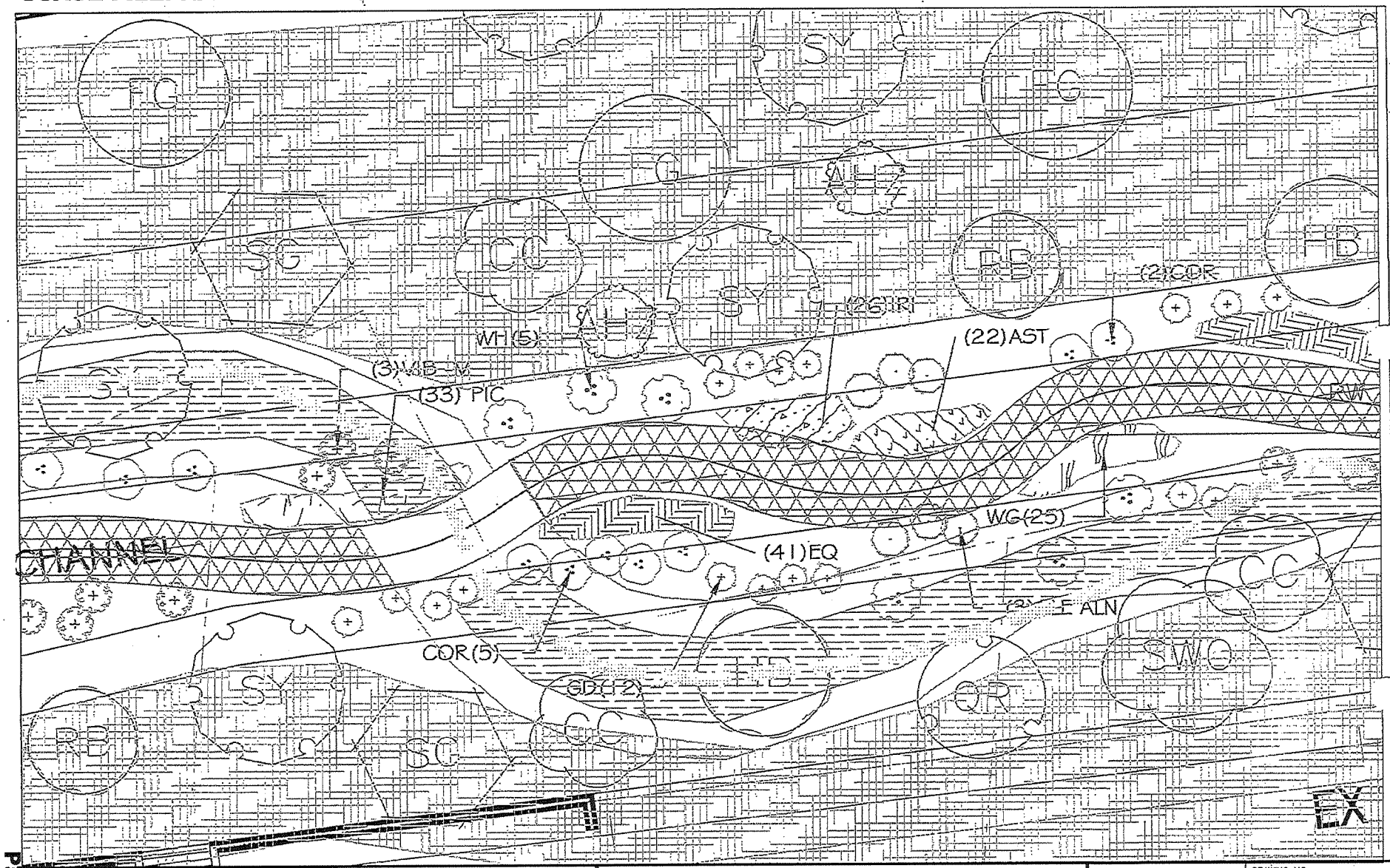
DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	SITE LAYOUT PLAN	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWING NO.: S-10 SHEET 10 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	**TYPICAL CHANNEL PLANTING**	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: **L-1** SHEET _11_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
RM	18	Red Maple / Acer rubrum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
SM	18	Sugar Maple / Acer saccharum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AML	10	Allegheny Serviceberry / Amelanchier laevis		7 gal	6-8` HT
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
CAR	15	Shagbark Hickory / Carya ovata	B & B	2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
RB	9	River Birch / Betula nigra	B & B	10` ht
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
PP	9	Paper Birch / Betula papynfera	B & B	2" CAL
	9			7 GAL	1/2" CAL
	9			3 GAL	3-4' HT
HB	8	American Hornbeam / Carpinus caroliniana		B & B	2" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
CC	9	Eastern Redbud / Cercis canadensis	B & B	2" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AHZ	24	American Hazelnut / Corylus americana		7 gal	4-5` HT
FG	19	Green Ash / Fraxinus pennsylvanica	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
HL	15	Sunburst Honey Locust / Gleditsia triacanthos `Sunburst`	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
SG	17	Sweet Gum / Liquidambar styraciflua	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
LT	10	Tulip Tree / Liriodendron tulipifera	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
N	15	Sour Gum / Nyssa sylvatica	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
BE	10	Box Elder / Acer negundo		6-8` HT
	10			7 GAL	4-5' HT
	10			3 GAL	3-4' HT
PA	5	Norway Spruce / Picea abies	B & B	6-8` HT
	15			7 GAL	4-5' HT
	15			3 GAL	3-4' HT
WP	11	White Pine / Pinus strobus	B & B	6-7` HT
	15			B & B	4-5' HT
	15			3 GAL	3-4' HT
SY	18	American Sycamore / Platanus occidentalis		B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
SWO	10	Swamp White Oak / Quercus bicolor		B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
PO	18	Pin Oak / Quercus palustris	B & B	2 1/2-3" CAL
	18			7 GAL	1/2" CAL
	18			3 GAL	3-4' HT
QR	10	Red Oak / Quercus rubra	B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	18		3 GAL	3-4' HT
TD	6	Bald Cypress / Taxodium distichum		B & B	5-6` HT
	5			B & B	3-4' HT
	15			3 GAL	2-3' HT

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-2
SHEET _12 OF _31_ SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

SHRUB AREAS

QTY		COMMON NAME / BOTANICAL NAME	CON	SPACING
AM3	122	Chokeberry / Aronia melanocarpa	2 gal	72"
CLE	110	Summersweet Clethra / Clethra alnifolia	2 gal	60"
CAM	155	Silky Dogwood / Cornus amonum	2 gal	72"
CG	168	Gray Dogwood / Cornus racemosa	2 gal	60"
HV	165	Common Witch Hazel / Hamamelis virginiana	2 gal	84"
ITE	65	Virginia Sweetspire / Itea virginica `Virginia`	2 gal	68"
IX	160	Winterberry Ilex verticillata	2 gal	60"
LIN	132	Spicebush / Lindera benzoin	2 gal	60"
ELD	60	Elderberry / Sambucus canadensis	2 gal	58"
VAC	188	Highbush Blueberry / Vaccinium corymbosum	2 gal	72"
VW	180	Arrowwood Viburnum / Viburnum dentatum	1 gal	72"
VA	130	Alleghany Viburnum Viburnum x rhytidophylloides	2 gal	72"
LEN	155	NANNYBERRY / VIBURNUM LENTAGO	2 gal	80"

GROUND COVERS

	QTY	COMMON NAME / BOTANICAL NAME		
AST	950	New York Aster / Aster novi-belgii	2 1/4" pots	24"
EQ	680	Dwarf Horsetail / Equisetum scirpoides	flat	20"
IRI	880	Blue Flag / Iris versicolor	2 1/4" pots	24"
PIC	680	Pickerel Weed / Pontederia cordata	2 1/4" pots	24"
WG	820	Wool Grass / Scirpus cyperinus	2 1/4" pots	24"

SUMMARY OF PLANTINGS

MAJOR TREES	674
MINOR TREES	156
SHRUBS	1790
GROUND COVER	4010

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

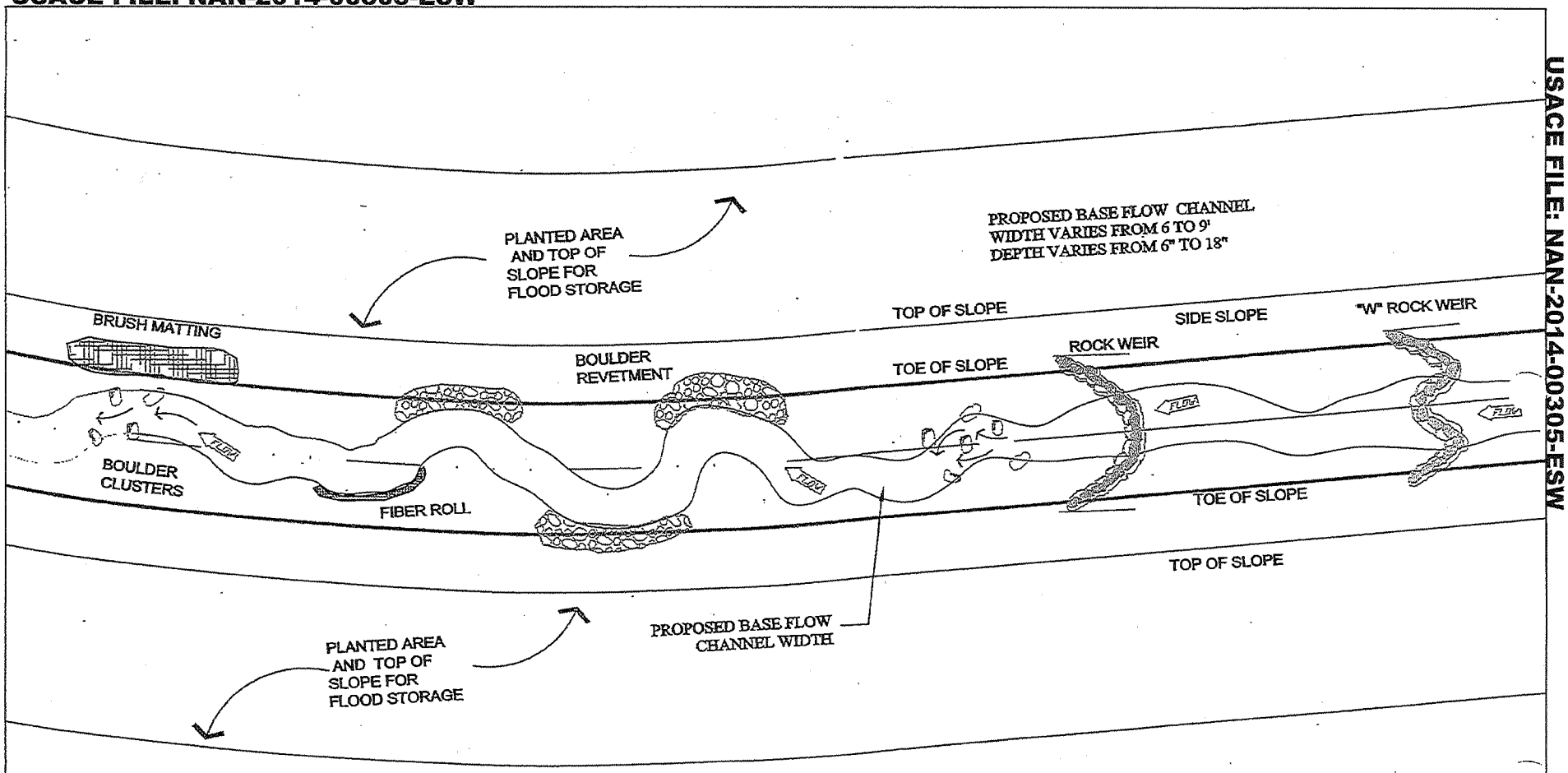
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-3

SHEET 13 OF 31 SHTS.

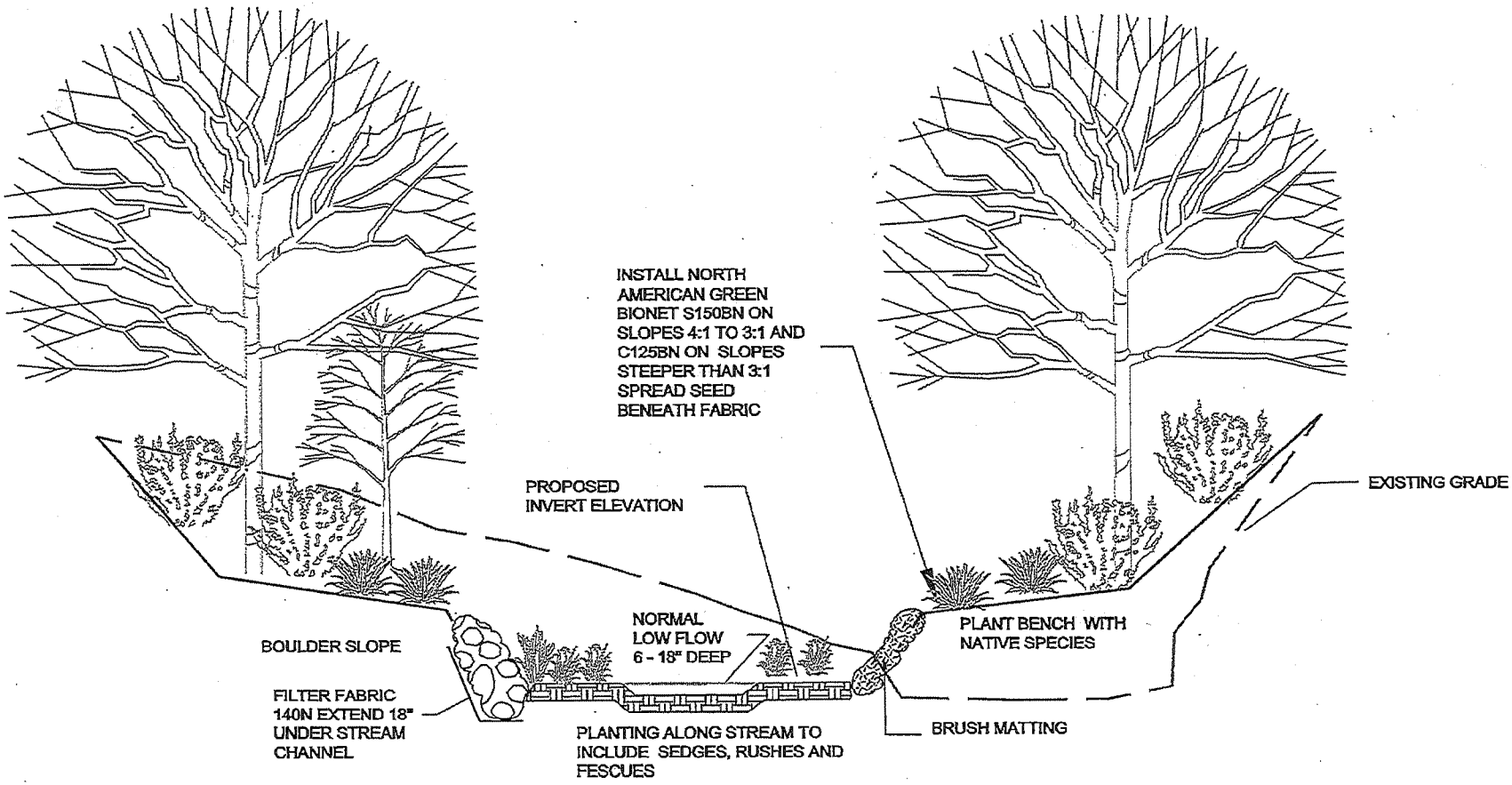
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe



CHANNEL TREATMENT MEASURES
SEE SITE PLAN AND DETAIL SHEETS
FOR LOCATIONS OF EACH TREATMENT

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-1 SHEET 14 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: x:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

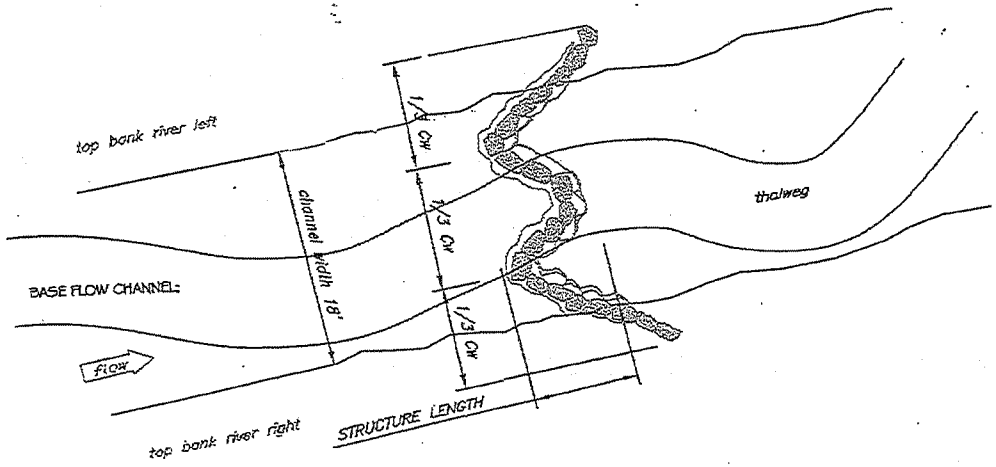


TYPICAL CHANNEL SECTION & STABILIZATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

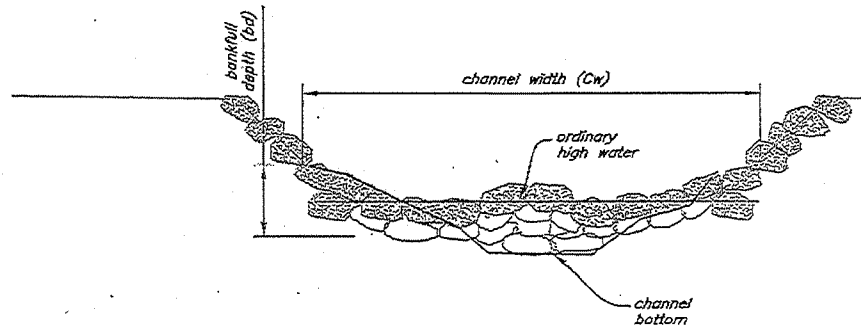
TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-2 SHEET _15_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



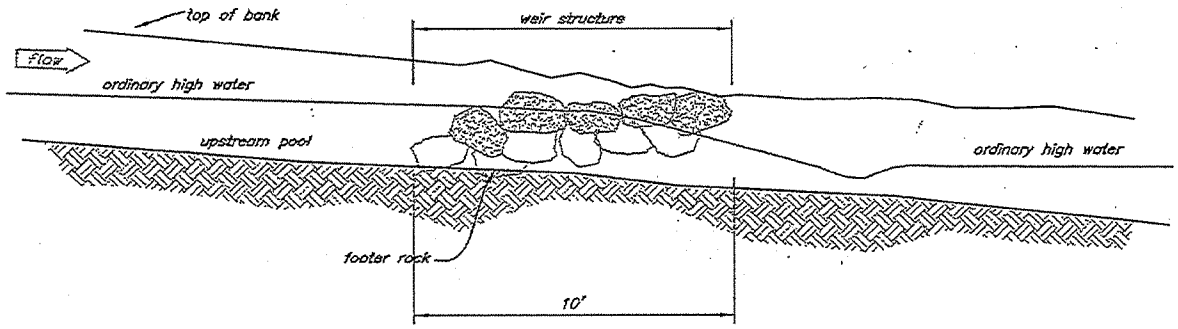
PLAN VIEW

W ROCK WEIR SCHEDULE

STRUCTURE ID	STATION	ELEVATION	Cw	L
WRW # 1	13+50	98.6	24'	12'
WRW # 2	18+19	99.36	24'	12'
WRW # 3	23+25	100.2	24'	12'
WRW # 4	37+00	102.15	24'	12'
WRW # 5	56+00	104.4	41'	18'



SECTION



PROFILE

ROCK WEIR

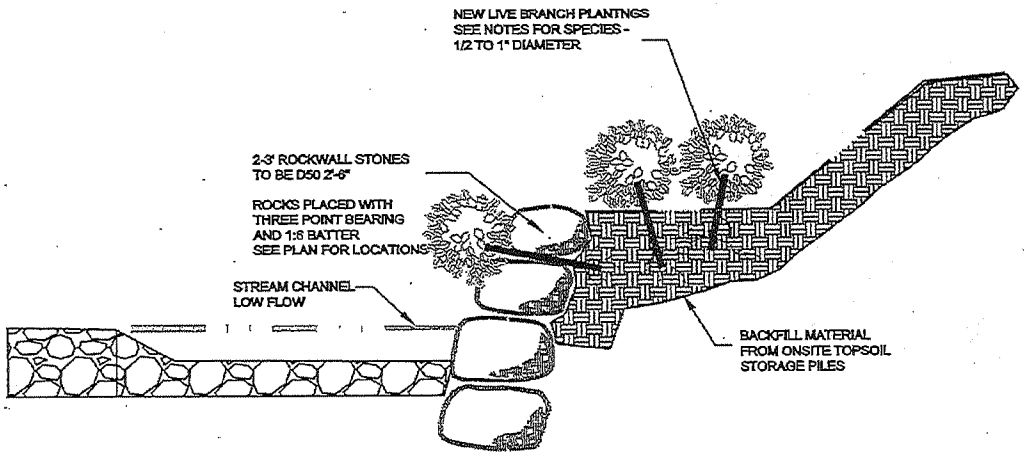
N.T.S.

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN	DRAWING NO.: D-3
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET 16 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

SCHEDULE

STRUCTURE ID	STATION	TO	LOC
BR #1	35+25	36+75	E
BR #2	39+50	41+00	W
BR #3	44+60	45+20	E



BOULDER REVETMENT

N.T.S.

NOTES
1. INSTALL SEDIMENT CONTROL MEASURES AS DIRECTED.
2 INSTALL NEW ROCKWALL BENCHES AS DETAILED AND SHOWN ON THE PLANS.
3 SPREAD STOCKPILED TOPSOIL BEHIND ROCKWALL BENCH AS DETAILED OR DIRECTED BY TOWN.

4. PLANTING LIVE FASCNES

ALL MATERIAL SHALL CONSIST OF MIXTURE OF STREAMCO WILLOW (SALIX PURPUREA) BANKERS WILLOW
SALIX COTTIRTI, PRAIRIE WILLOW (SALIX HUMILIS), GRAY DOGWOOD (CORNUS RACEMOSES AND/OR RED-OISER DOGWOOD (CORNUS SERVICEA.

A. SPACE BRANCHES 4 FT ON CENTER ALTERNATING ROWS WITH ONE FOOT VERITICAL SEPARATION.

B, LIVE BRANCHES TO BE TO ½" TO 1" DIAMETER 4 TO 6 FT LENGTH. TOPS OF LIVE BRANCHES TO PROTRUDE MINIMUM 6" BEYOND FACE OF WALL.

C, BACKFILL BEHIND WALL HAND TAMPED IN 6 IN LIFTS.

D. CUTTING SHALL BE PLACED ON THE BACKFILL AND COVER WITH MINIMUM OF 3" OF CLEAN FILL BETWEEN LAYER AND ROCK.

F. ALL PLANT MATERIAL SHALL BE INSTALLED WITHIN 8 (EIGHT) HOURS OF CUTTING UNLESS PROVISIONS FOR PROPER STORAGE IS MADE.

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

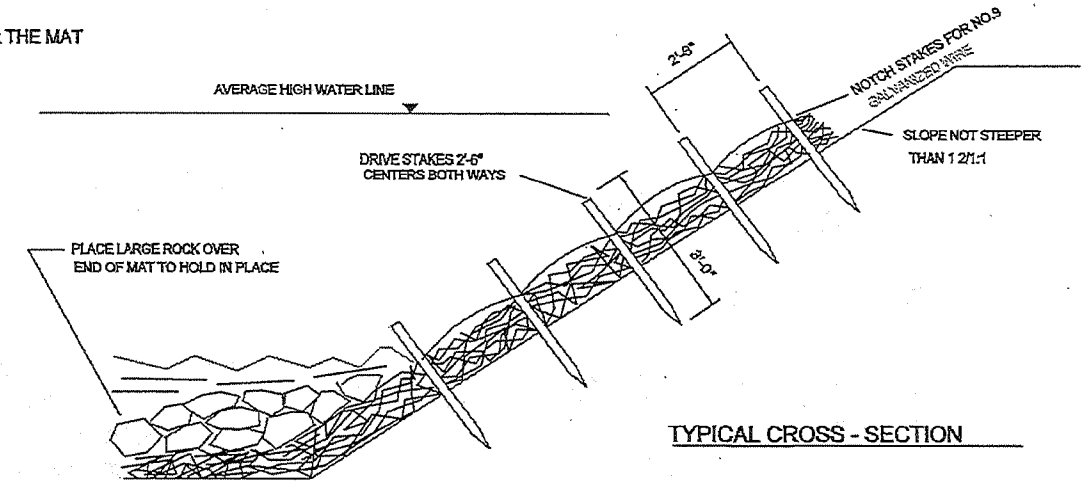
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-4
SHEET 17 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

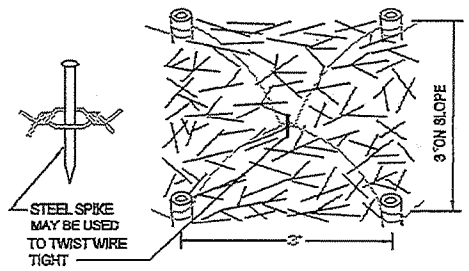
USACE FILE: NAN-2014-00305-ESW

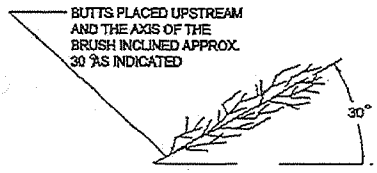
CONSTRUCTION SPECIFICATIONS

1. PREPARE SLOPE SURFACE BY GRADING TO A UNIFORM, SMOOTH SURFACE.
2. LAY HARDWOOD BRUSH IN AN UPSTREAM DIRECTION BEGINNING AT THE DOWN-STREAM END. THE TOE SHOULD BE ESTABLISHED FIRST.
3. THE BUTT END OF THE BRUSH WILL BE PLACED UPSTREAM AND THE PLANT MATERIALS INCLINED APPROXIMATELY 30 DEGREES.
4. THE UPSTREAM EDGE OF THE MAT WILL BE KEYED INTO THE SLOPE 2 FEET. STAKES WILL BE DRIVEN THROUGHOUT THE MATTING ON 3 FOOT CENTERS EACH WAY BEGINNING ALONG THE TOE OF THE MAT.
5. NO. 9 GALVANIZED WIRE WILL BE ATTACHED TO THE STAKES OVER THE MAT AND TIGHTENED TO SECURE THE MAT.
6. SLOPE AREAS ABOVE THE MAT WILL BE SLOPED AND SEEDED.



TYPICAL CROSS - SECTION



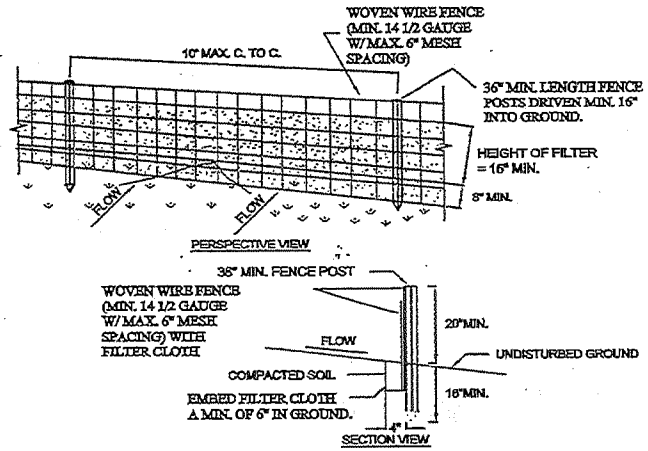


STATION	TO
25+50	26+00 W
28+50	28+95 E
28+50	28+95 W
42+50	42+89 E
44+80	45+25 W

BRUSH MATTING

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-5 SHEET _18_ OF __31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



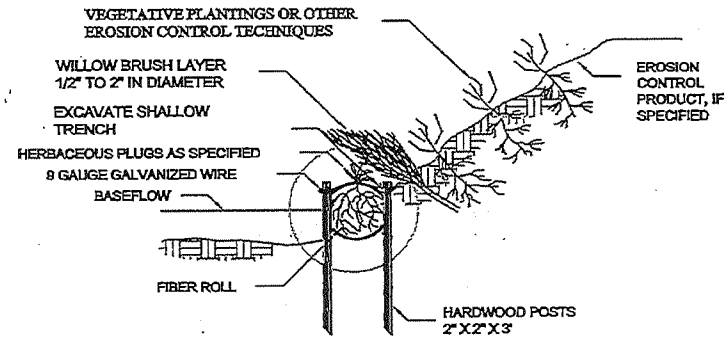
CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

SILT FENCE

FIBER ROLL SCHEDULE

STATION	TO
19+50 EAST	20+65
25+10 WEST	25+60



CROSS SECTION
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. EXCAVATE A SHALLOW TRENCH AT THE TOE OF SLOPE TO SLIGHTLY BELOW BASEFLOW.
2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" x 2" POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IF NECESSARY.
3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR 1/8" DIAMETER BRAIDED NYLON ROPE.
4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

FIBER ROLL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

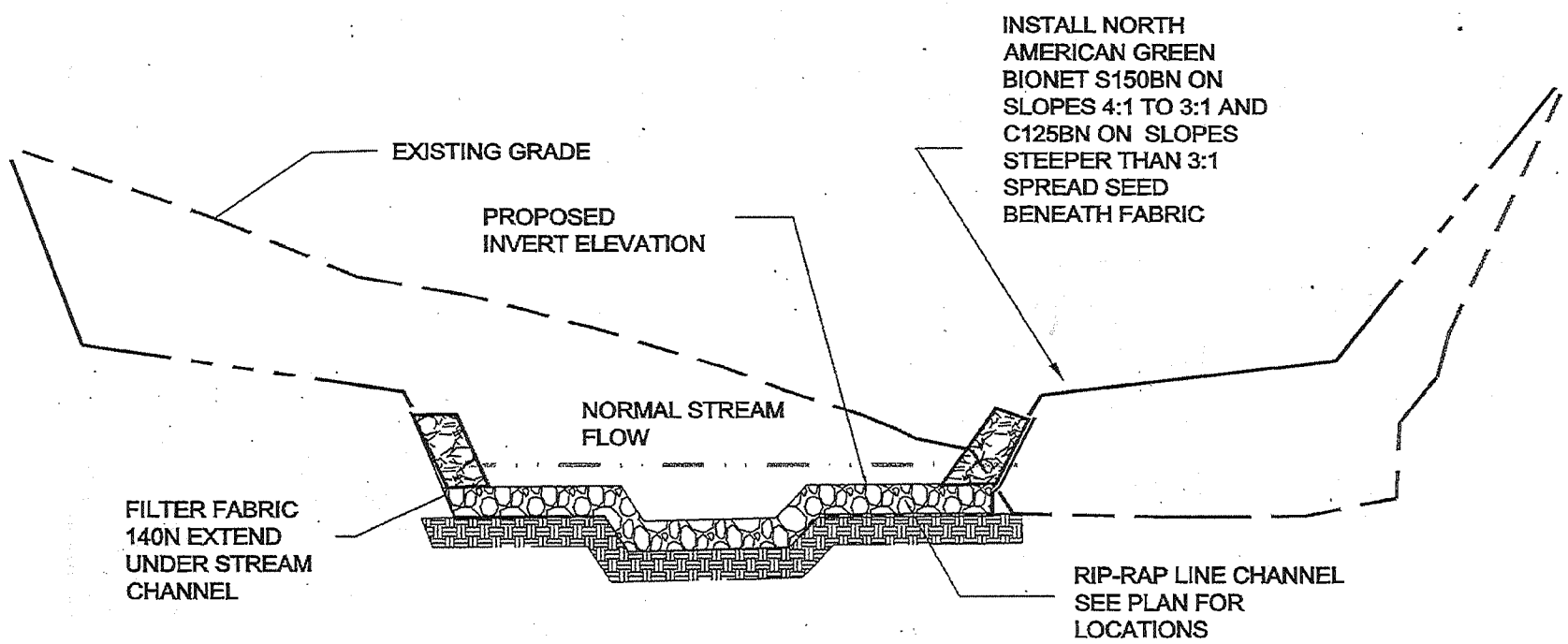
PROJECT NO.:	30--2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-6

SHEET 19 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



ARMORED CHANNEL

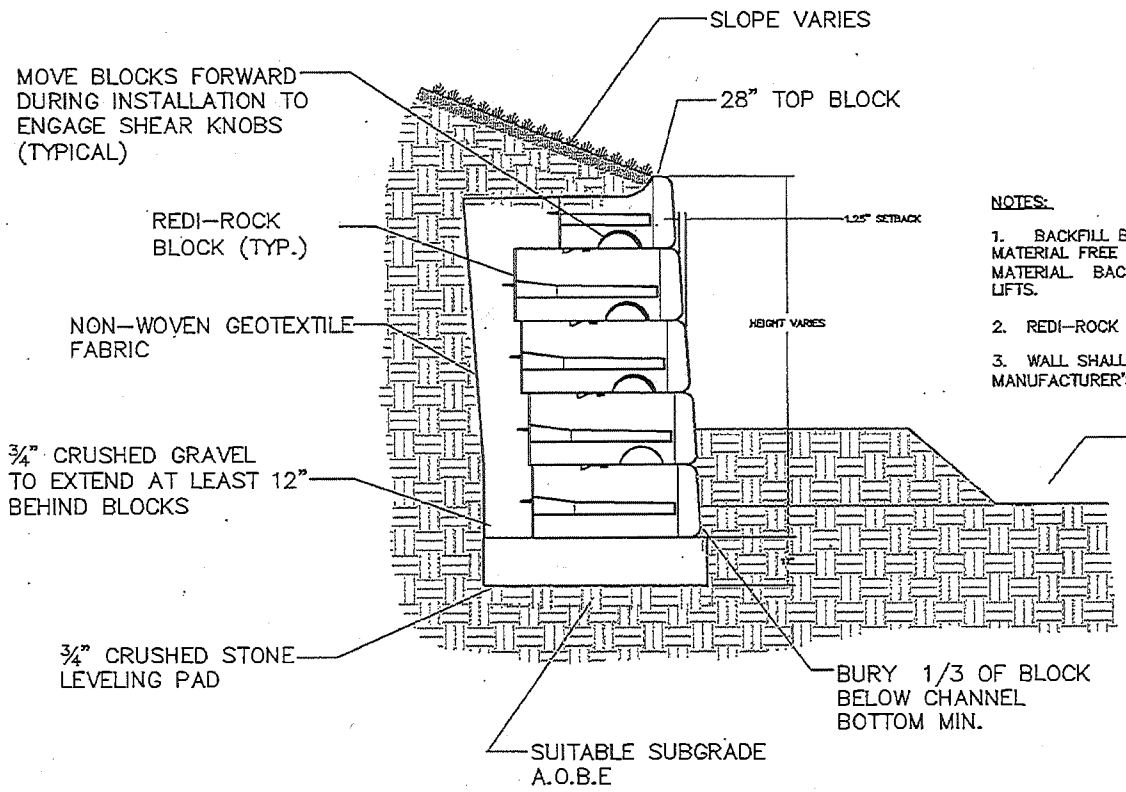
SEE PLAN FOR LOCATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN	DRAWING NO.: D-7
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET _20_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



NOTES:

1. BACKFILL BEHIND WALL SHALL BE SUITABLE FILL MATERIAL FREE FROM LARGE ROCKS, DEBRIS, AND ORGANIC MATERIAL. BACKFILL SHALL BE COMPACTED IN 8" MAXIMUM LIFTS.
2. REDI-ROCK WALL FINISH SHALL BE "LEDGESTONE".
3. WALL SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

SCHEDULE

STATION	TO
9+08	9+54.5 E
9+08	9+54.5 W
9+98	10+47 E
9+98	10+57.5 W
10+75	12+43.5W
18+75	19+87.8 E

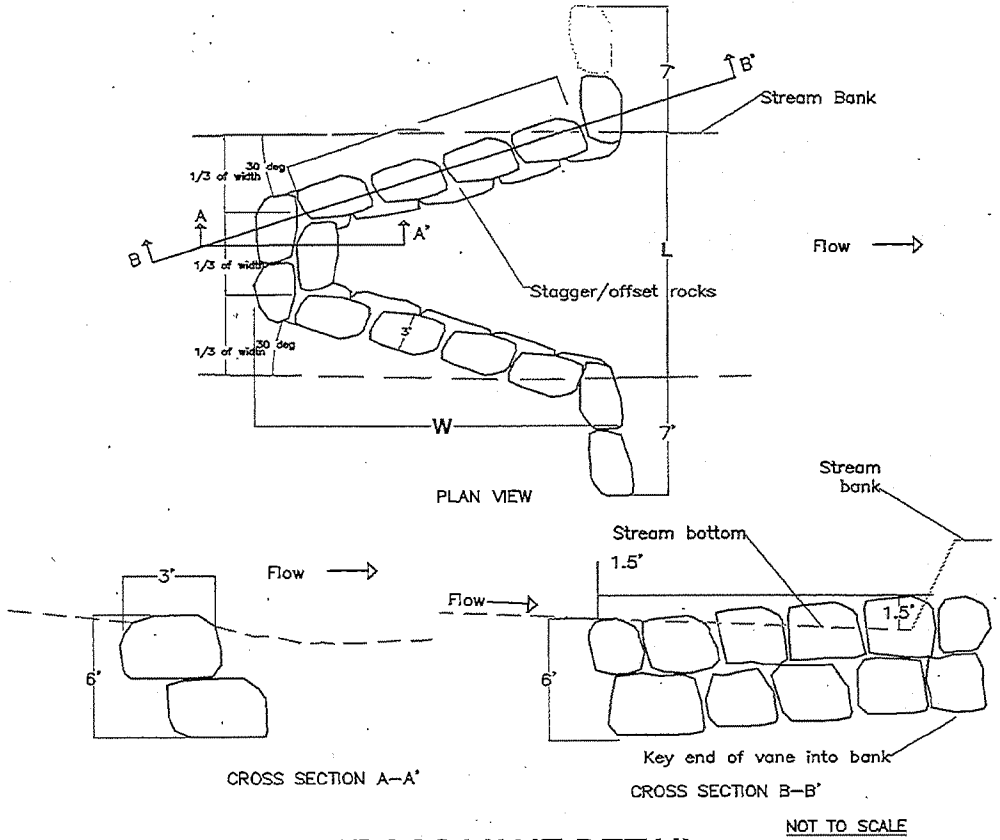
MODULAR RETAINING WALL

N.T.S.

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-8 SHEET _21_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



NOT TO SCALE

CROSS VANE DETAIL

CROSS VANE SCHEDULE

STRUCTURE ID	STATION	ELEVATION	W	L
CV # 1	11+25	97.6	24'	16'
CV # 2	28+15	100.9	24'	16'
CV # 3	38+00	102.6	24'	16'
CV # 4	41+50	102.9	24'	16'
CV # 5	60+00	105.2	44'	20'

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

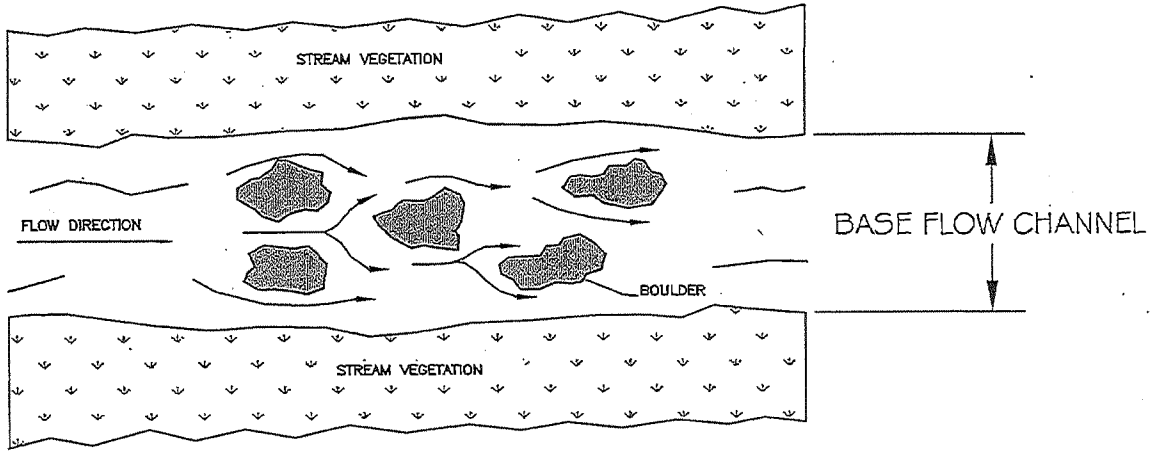
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-9

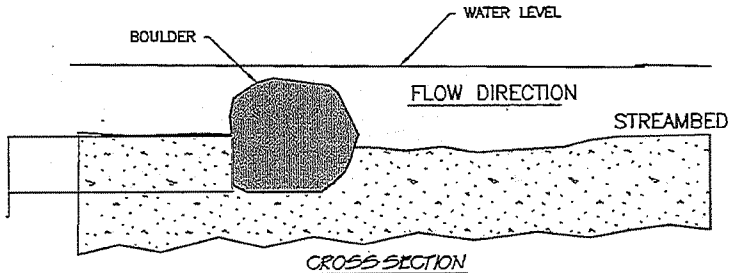
SHEET 32 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PLAN VIEW



CROSS SECTION

SCHEDULE

STATION
14+75
24+65
27+00
32+40
54+80
58+35

- AVERAGE ROCK SIZE- 2.5'-3.5' DIA.-ROCK, SIZE IS SITE DEPENDENT.
- A MINIMUM OF ONE BOULDER PER SET OF BOULDERS SHOULD PROTRUDE FROM WATER SURFACE DURING TIMES OF ORDINARY FLOW TO ACT AS MID-STREAM PERCHING/LOAFING SITES.
- USE BOULDERS WITH IRREGULARITIES OR MULITPLE BOULDERS TOGETHER TO PROVIDE SLIGHT OVERHANGING COVER.
- PLACE BOULDERS SO CURRENT WILL NOT BE DEFLECTED INTO UNPROTECTED STREAM BANKS.

BOULDER CLUSTERS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

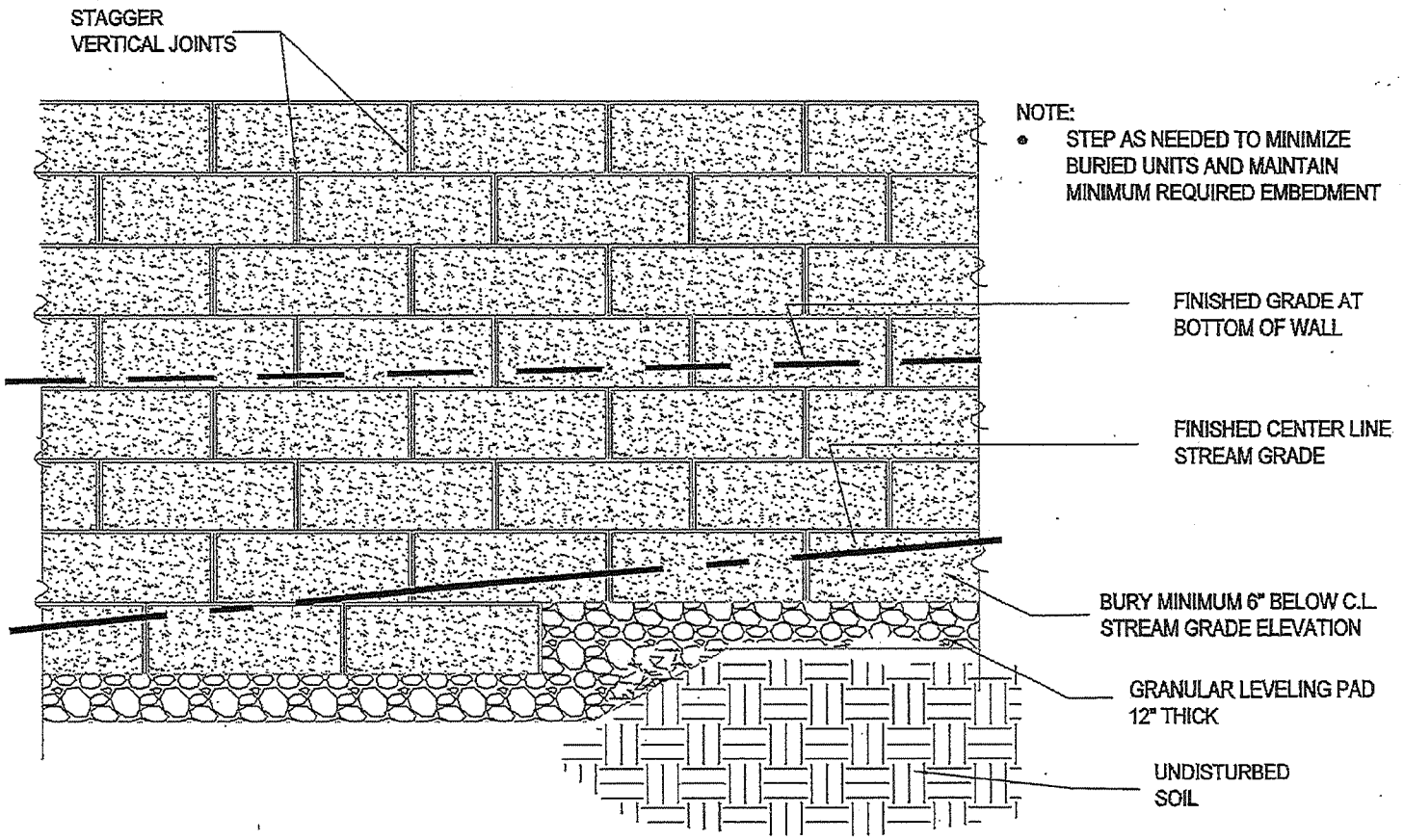
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-10

SHEET 23 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

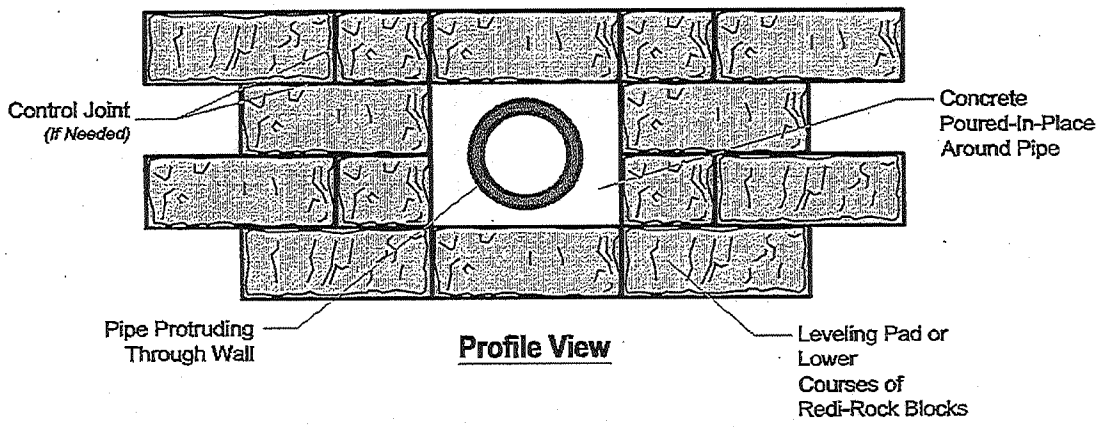
USACE FILE: NAN-2014-00305-ESW



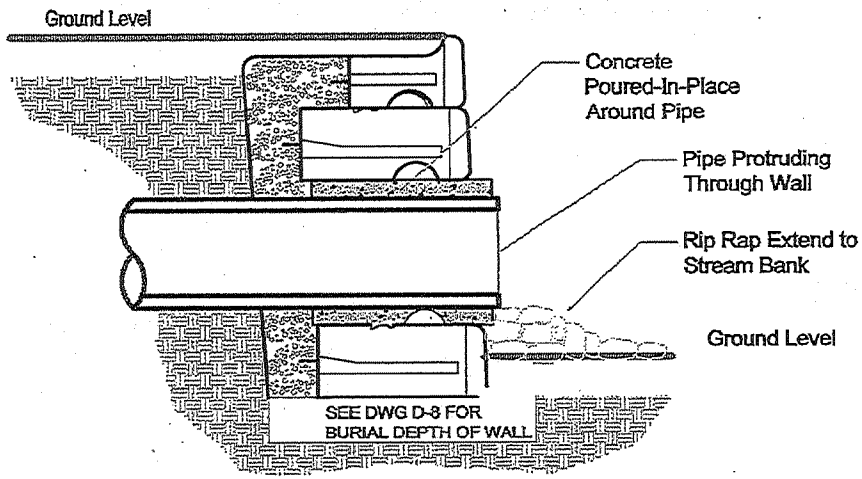
REDI ROCK RETAINING WALL

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL 10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	DETAIL CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-11 SHEET 24 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



Profile View



Section View

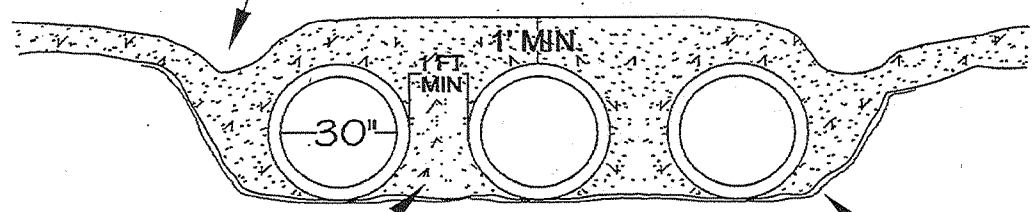
Pipe Through Wall Detail

NTS

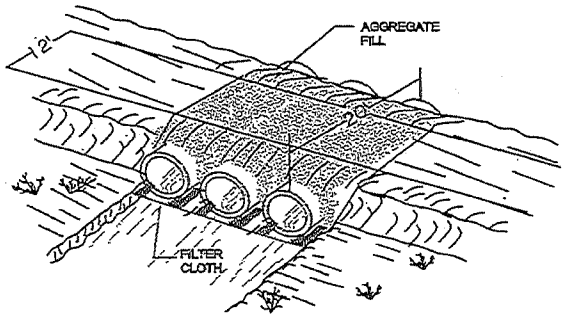
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30–2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-12 SHEET _25_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



INSTALL (3) 30" HDPE PIPES - 20' LENGTH EACH



MULTIPLE PIPES

LOCATIONS

STA 4+25
STA 28+10
STA 32+75

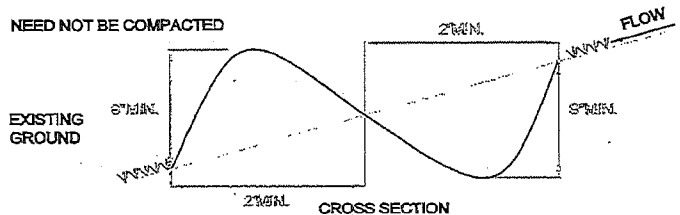
TEMPORARY STREAM CROSSING DETAIL

NOT TO SCALE

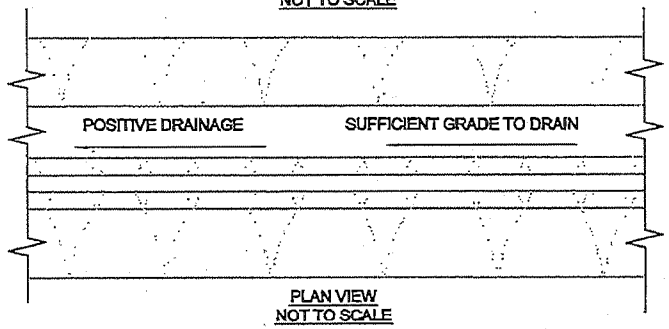
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-13 SHEET 26 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

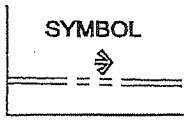
USACE FILE: NAN-2014-00305-ESW



CROSS SECTION
NOT TO SCALE



PLAN VIEW
NOT TO SCALE



CONSTRUCTION SPECIFICATIONS

1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATIONS FOR TEMPORARY SEEDING AND MULCHING, AND SHALL BE DONE WITHIN 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

MAX. DRAINAGE AREA LIMIT: 2 ACRES

PERIMETER DIKE OR SWALE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

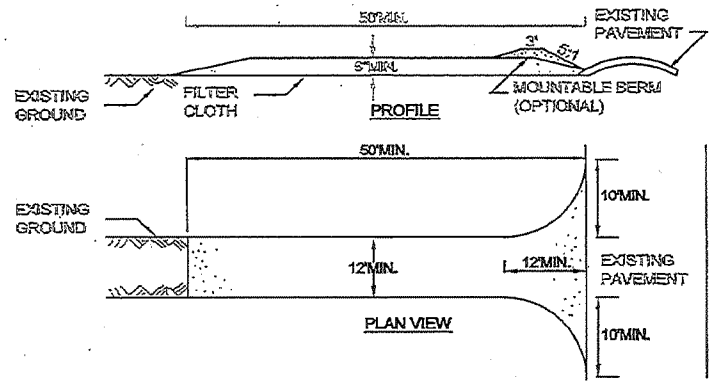
DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-14
SHEET 27 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



SYMBOL

CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – USE 2" CLEAN STONE
2. LENGTH – NOT LESS THAN 50 FEET
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY–FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ENTRANCE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

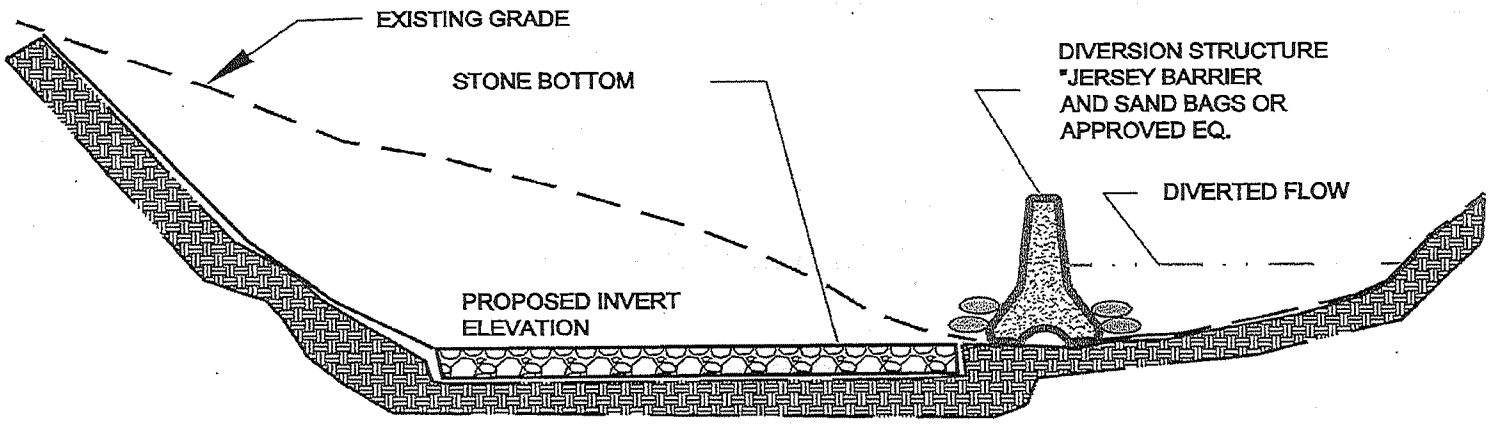
PROJECT NO.:	30–2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-15

SHEET 28 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TYPICAL TEMPORARY CHANNEL DIVERSION

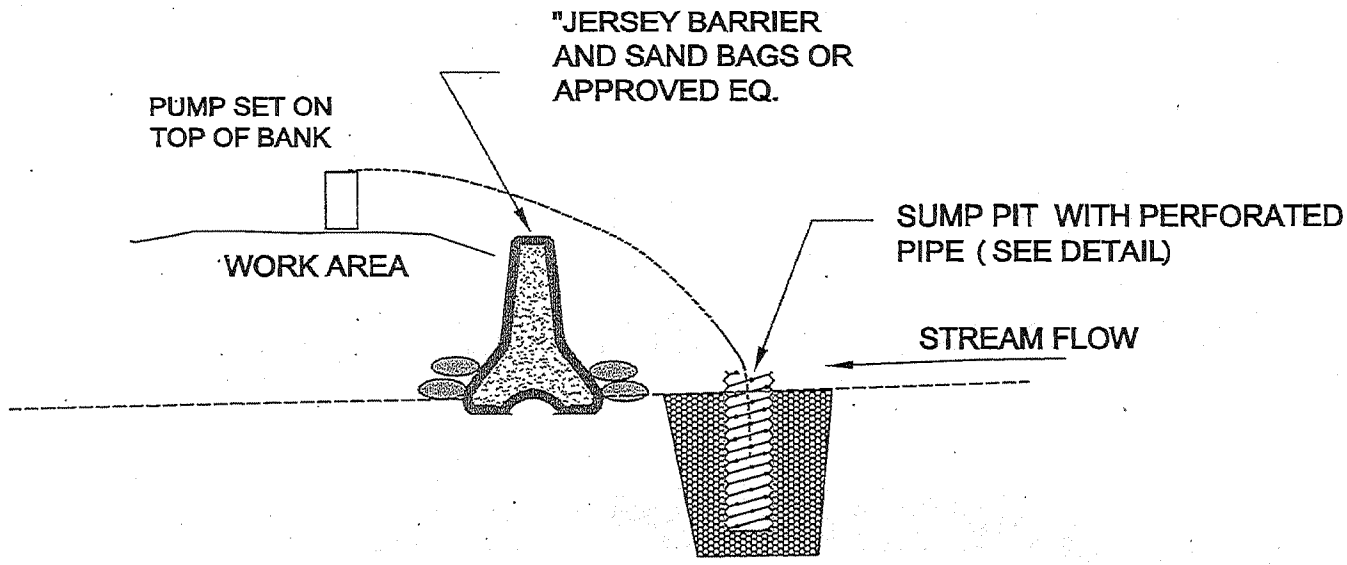
N.T.S.

NOTE
SEE CROSS SECTION DRAWINGS
FOR STREAM CONFIGURATION
AND LOCATION OF NORMAL LOW
FLOW CHANNEL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-16 SHEET 29 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



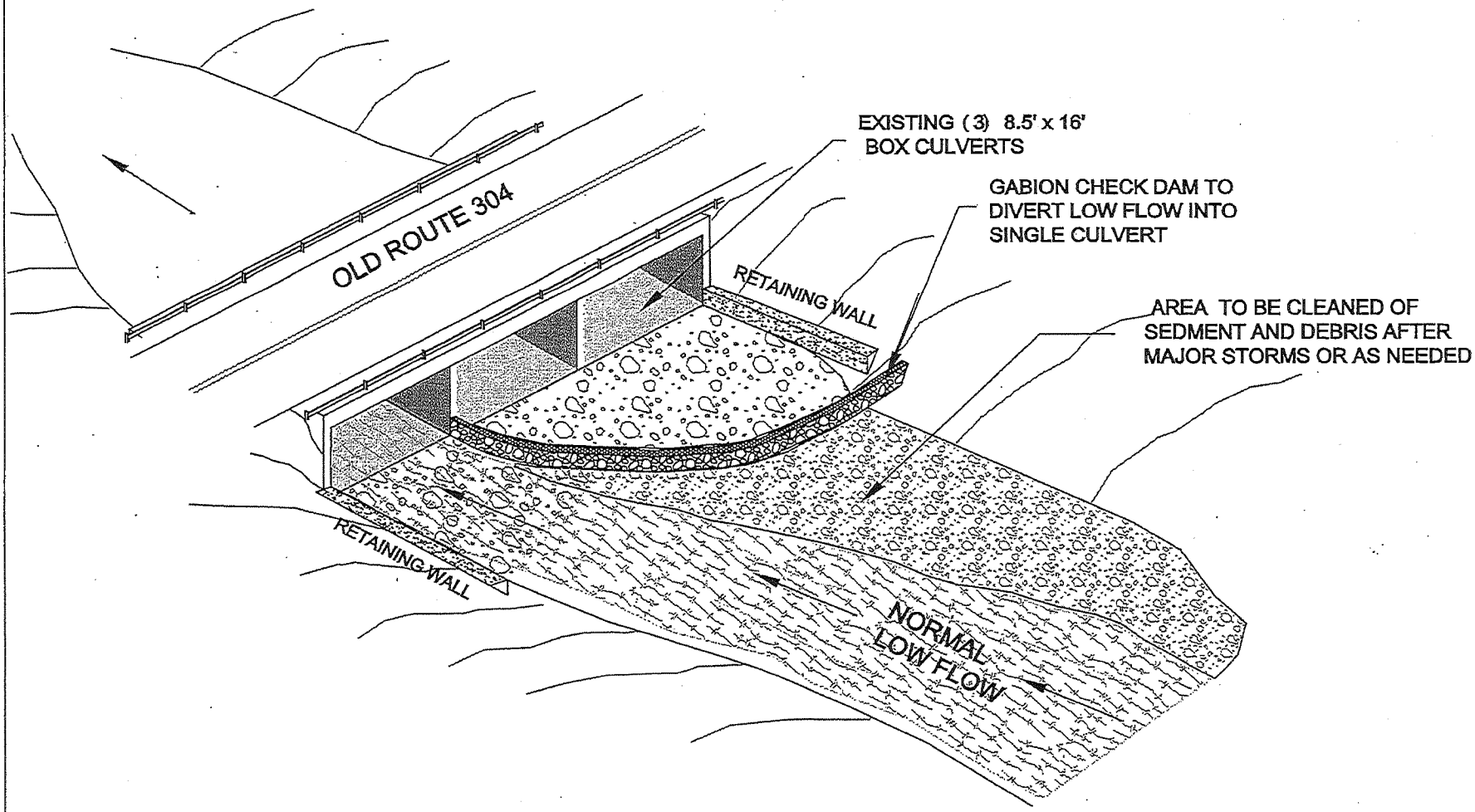
TEMPORARY COFFER DAM

N.T.S

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWING NO.: D-17 SHEET _30_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	GABION WEIR AT BOX CULVERT	PROJECT NO.: 30–2005 DATE: 05/14/15 SCALE: NONE DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-18 SHEET _31_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

New York State
Department of Environmental Conservation

NOTICE

The Department of Environmental Conservation (DEC) has issued permit(s) pursuant to the Environmental Conservation Law for work being conducted at this site. For further information regarding the nature and extent of work approved and any Department conditions on it, contact the DEC at 845/256-3054. Please refer to the permit number shown when contacting the DEC.

Permittee: (T) Clarkstown Permit No. 3- 3920-00297/00010,11

Effective Date: 7/20/2016 Expiration date: 12/31/2020

☐ Applicable if checked. No instream work allowed between October 1 & April 30

NOTE: This notice is **NOT** a permit.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 3
21 South Putt Corners Road, New Paltz, NY 12561-1620
P: (845) 256-3054 I F: (845) 255-4659
www.dec.ny.gov

IMPORTANT NOTICE TO ALL PERMITTEES

The permit you requested is enclosed. Please read it carefully and note the conditions that are included in it. The permit is valid for only that activity expressly authorized therein; work beyond the scope of the permit may be considered a violation of law and be subject to appropriate enforcement action. Granting of this permit does not relieve the permittee of the responsibility of obtaining any other permission, consent or approval from any other federal, state, or local government which may be required.

Please note the expiration date of the permit. Applications for permit renewal should be made well in advance of the expiration date (minimum of 30 days) and submitted to the Regional Permit Administrator at the above address. For SPDES, Solid Waste and Hazardous Waste Permits, renewals must be made at least 180 days prior to the expiration date.

The DEC permit number & program ID number noted on page 1 under "Permit Authorization" of the permit are important and should be retained for your records. These numbers should be referenced on all correspondence related to the permit, and on any future applications for permits associated with this facility/project area.

If a permit notice sign is enclosed, you must post it at the work site with appropriate weather protection, as well as a copy of the permit per General Condition 1.

If the permit is associated with a project that will entail construction of new water pollution control facilities or modifications to existing facilities, plan approval for the system design will be required from the appropriate Department's regional Division of Water or delegated local Health Department, as specified in the State Pollutant Discharge Elimination System (SPDES) permit.

If you have any questions on the extent of work authorized or your obligations under the permit, please contact the staff person indicated below or the Division of Environmental Permits at the above address.

Joseph A Murray
Division of Environmental Permits, Region 3
Telephone (845) 256-3040

☐ Applicable only if checked. Please note all work authorized under this permit is prohibited during trout spawning season commencing October 1 and ending April 30.

☑ Applicable only if checked for STORMWATER SPDES INFORMATION: We have determined that your project requires coverage under the General Stormwater SPDES Permit. You must file a Notice of Intent to obtain coverage under the General Permit. This form can be downloaded at: http://www.dec.ny.gov/chemical/43133.html

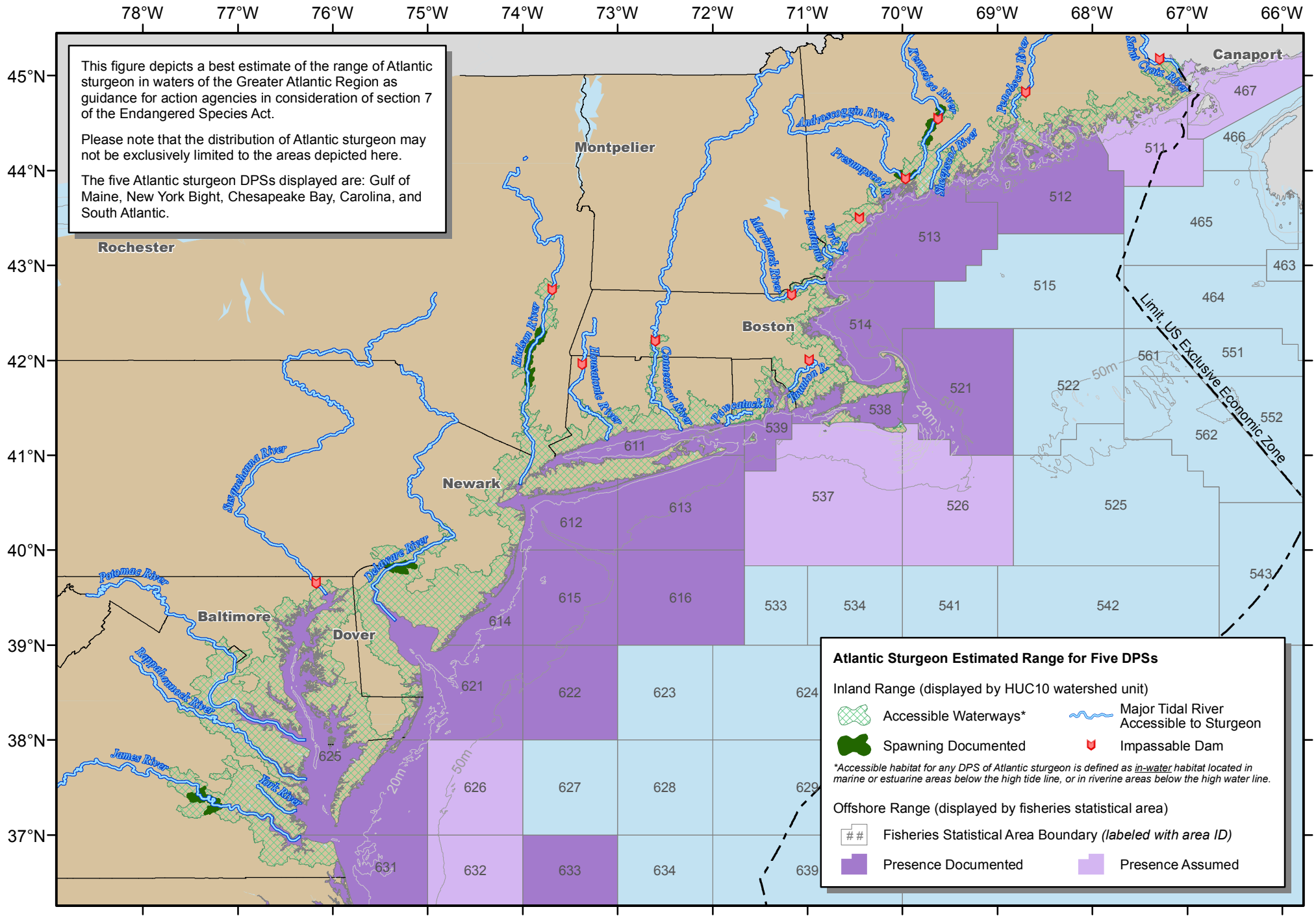
☑ Applicable only if checked - MS4 Areas: This site is within an MS4 area (Municipal Separate Storm Sewer System), therefore the SWPPP must be reviewed and accepted by the municipality. The MS-4 Acceptance Form must be submitted in addition to the Notice of Intent.

Send the completed form(s) to: NYS DEC, Stormwater Permitting, Division of Water, 625 Broadway, Albany, New York 12233-3505; in addition, DEC requests that you provide one electronic copy of the approved SWPPP directly to NYS DEC, 100 Hillside Avenue - Suite 1W, White Plains, NY 10603-2860.

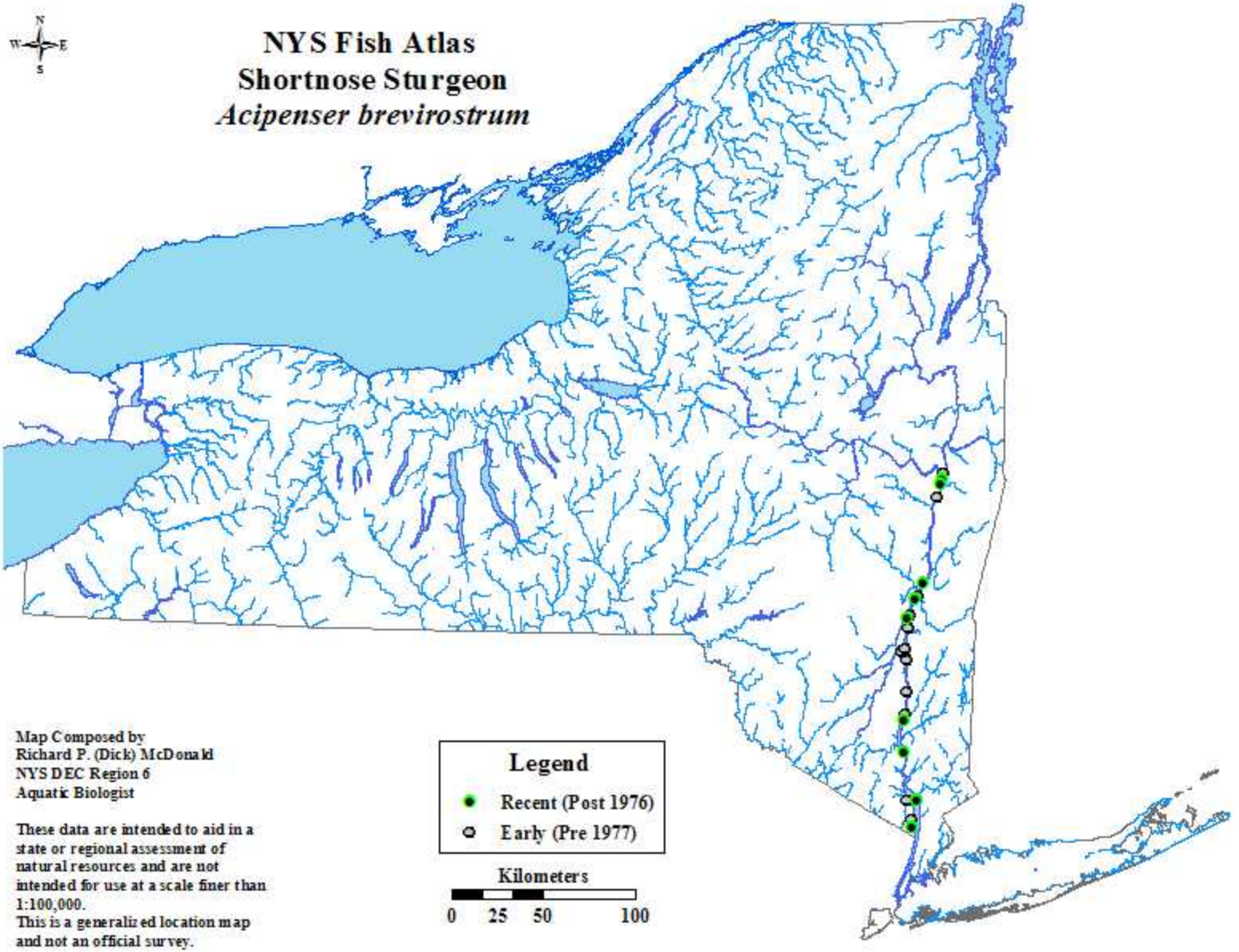
NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Attachment 3

Estimated Range of Atlantic Sturgeon Distinct Population Segments (DPSs)



Attachment 4



Map Composed by
Richard P. (Dick) McDonald
NYS DEC Region 6
Aquatic Biologist

These data are intended to aid in a state or regional assessment of natural resources and are not intended for use at a scale finer than 1:100,000.
This is a generalized location map and not an official survey.

Attachment 7

NRCS Soil Resource Map and Farmland Classification Map

United States Department of Agriculture

NRCS

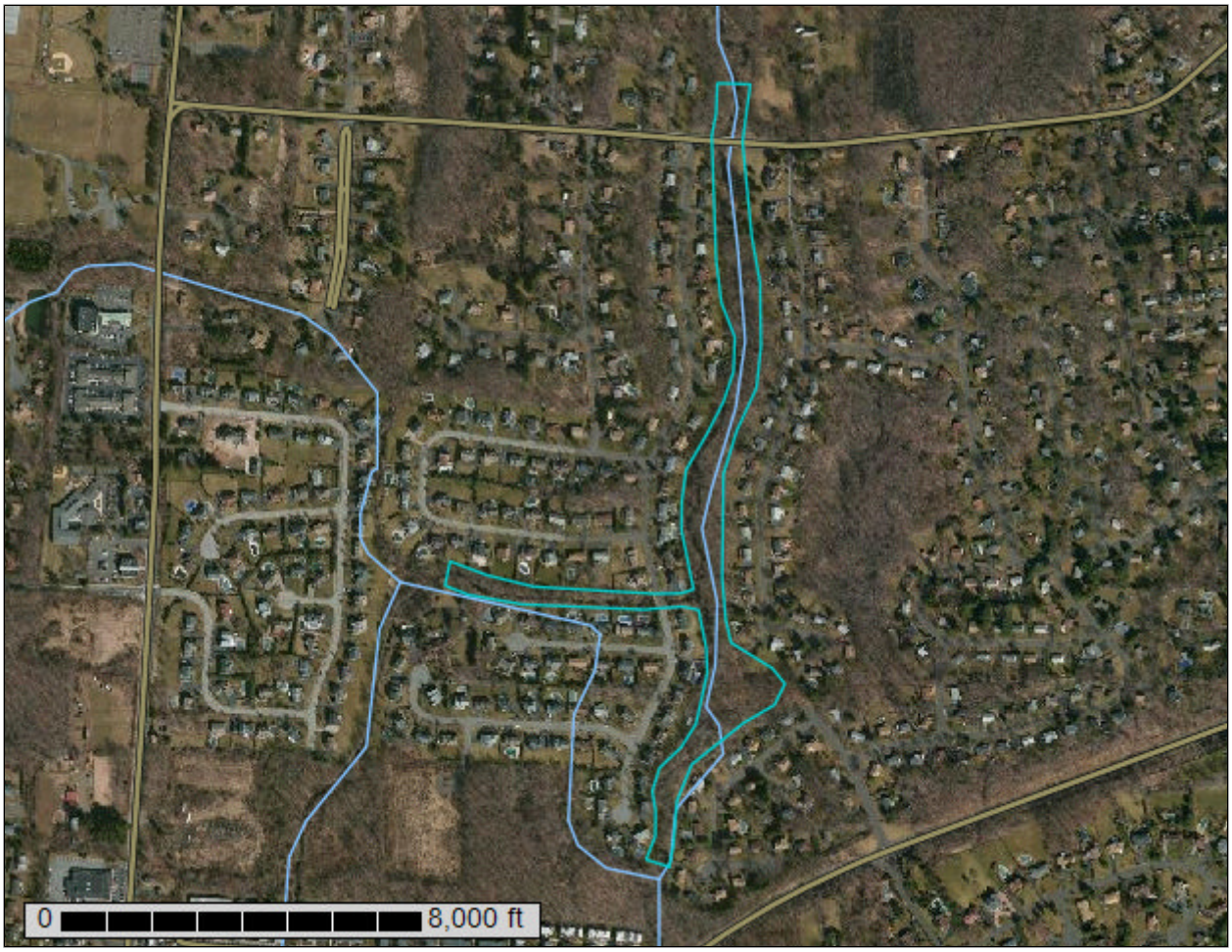
Natural Resources Conservation Service

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

Rockland County, New York

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS



November 18, 2016

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....7
Soil Map (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS).....8
Legend.....9
Map Unit Legend (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS).....10
Map Unit Descriptions (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS).....10
Rockland County, New York.....12
Ra—Rippowam sandy loam.....12
WeB—Wethersfield gravelly silt loam, 3 to 8 percent slopes.....13
YaB—Yalesville sandy loam, 2 to 8 percent slopes.....14
Soil Information for All Uses.....16
Suitabilities and Limitations for Use.....16
Land Classifications.....16
Farmland Classification (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS).....16
References.....21

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

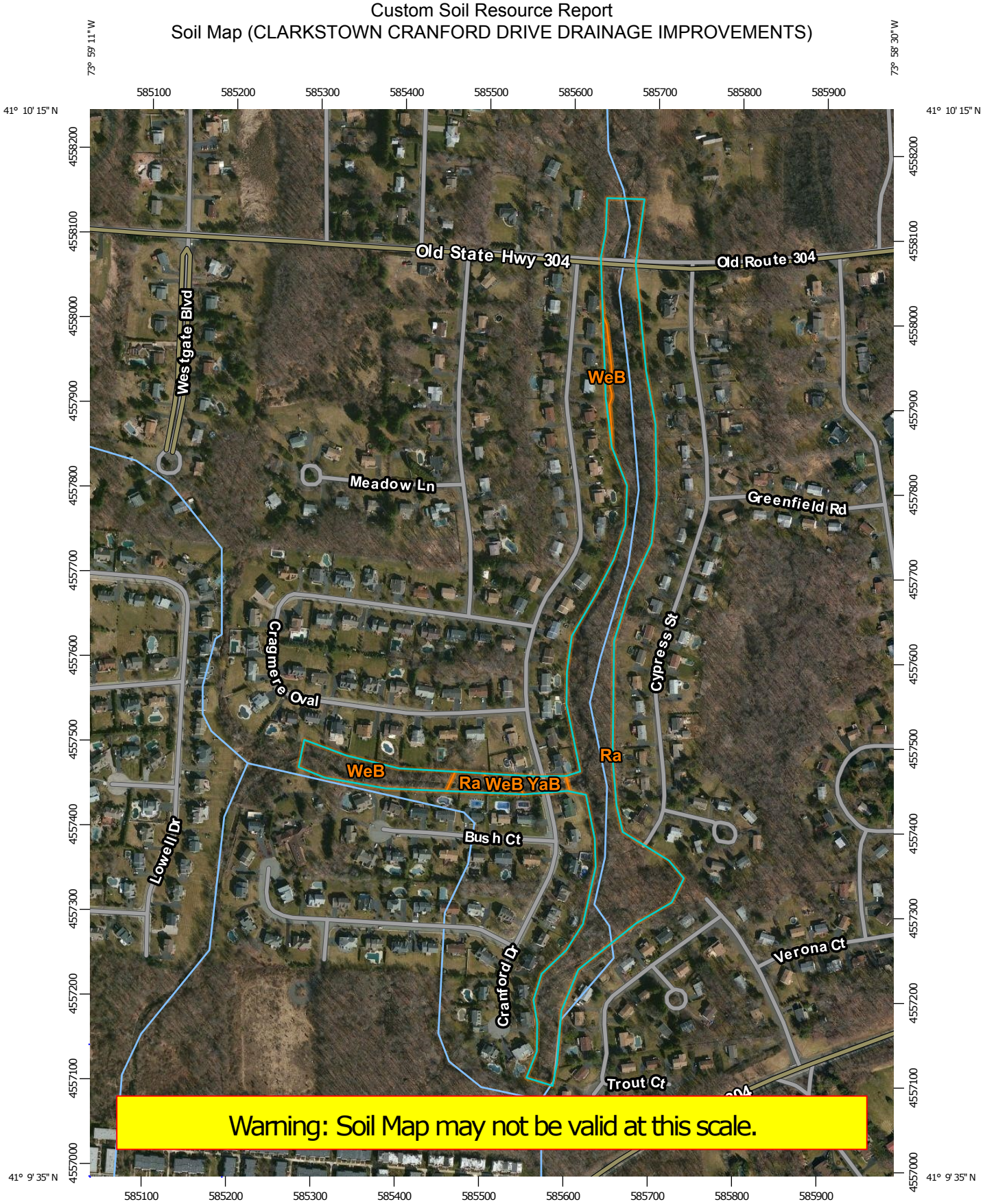
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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.

Soil Map (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS)



Map Scale: 1:6,140 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Rockland County, New York
Survey Area Data: Version 14, Sep 24, 2016

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

Date(s) aerial images were photographed: Mar 26, 2011—Apr 16, 2012

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 (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS)

Rockland County, New York (NY087)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Ra	Rippowam sandy loam	12.3	86.5%
WeB	Wethersfield gravelly silt loam, 3 to 8 percent slopes	1.6	11.5%
YaB	Yalesville sandy loam, 2 to 8 percent slopes	0.3	1.9%
Totals for Area of Interest		**14.3**	**100.0%**

Map Unit Descriptions (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS)

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 class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially

where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Rockland County, New York

Ra—Rippowam sandy loam

Map Unit Setting

National map unit symbol: 9v52
Mean annual precipitation: 47 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rippowam and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rippowam

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy over sandy alluvium derived mainly from crystalline rock

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 35 inches: fine sandy loam
H3 - 35 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Haven

Percent of map unit: 5 percent
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent

Hydric soil rating: No

Sloan

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Watchaug

Percent of map unit: 5 percent
Hydric soil rating: No

WeB—Wethersfield gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9v5l
Mean annual precipitation: 47 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Wethersfield and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wethersfield

Setting

Landform: Hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy acid till derived mainly from reddish sandstone, shale, and conglomerate, with some basalt

Typical profile

H1 - 0 to 13 inches: gravelly silt loam
H2 - 13 to 22 inches: gravelly loam
H3 - 22 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 38 inches to densic material
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 5 percent
Hydric soil rating: No

Cheshire

Percent of map unit: 5 percent
Hydric soil rating: No

Riverhead

Percent of map unit: 5 percent
Hydric soil rating: No

Wallington

Percent of map unit: 5 percent
Hydric soil rating: No

YaB—Yalesville sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9v5t
Mean annual precipitation: 47 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Yalesville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yalesville

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy acid till derived mainly from reddish sandstone, shale, and conglomerate, with some basalt

Typical profile

H1 - 0 to 10 inches: sandy loam

H2 - 10 to 27 inches: gravelly loam
H3 - 27 to 30 inches: extremely channery loam
H4 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Cheshire

Percent of map unit: 5 percent
Hydric soil rating: No

Holyoke

Percent of map unit: 5 percent
Hydric soil rating: No

Wethersfield

Percent of map unit: 5 percent
Hydric soil rating: No

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

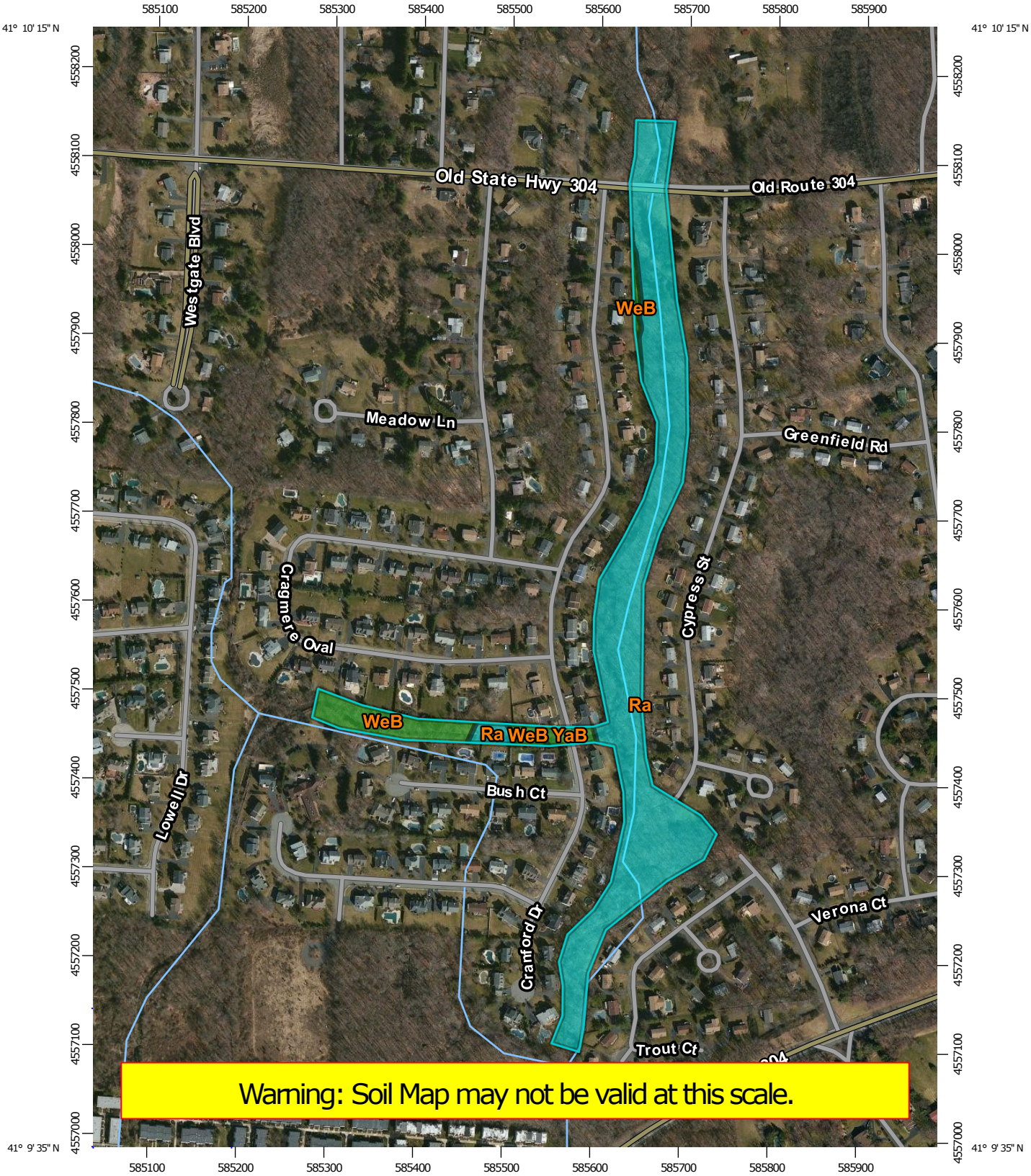
Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Farmland Classification (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS)

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Map—Farmland Classification (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS)



Map Scale: 1:6,140 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Rockland County, New York
Survey Area Data: Version 14, Sep 24, 2016

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

Date(s) aerial images were photographed: Mar 26, 2011—Apr 16, 2012

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.

Table—Farmland Classification (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS)

Farmland Classification— Summary by Map Unit — Rockland County, New York (NY087)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Ra	Rippowam sandy loam	Farmland of statewide importance	12.3	86.5%
WeB	Wethersfield gravelly silt loam, 3 to 8 percent slopes	All areas are prime farmland	1.6	11.5%
YaB	Yalesville sandy loam, 2 to 8 percent slopes	All areas are prime farmland	0.3	1.9%
Totals for Area of Interest			**14.3**	**100.0%**

Rating Options—Farmland Classification (CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS)

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Attachment 8

State Historic Preservation Office Documentation, Phase I Archeological Report, and Tribal Historic Preservation Office Documentation

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation and Historic Preservation

ANDREW M. CUOMO
Governor

ROSE HARVEY
Commissioner

ARCHAEOLOGY COMMENTS

Phase I Archaeological Survey Recommendation
16PR05212 – Clarkstown Cranford Drive Drainage Improvements

The project is located in on archaeologically sensitive landform. Therefore, the Office of Parks, Recreation and Historic Preservation (OPRHP) recommends a Phase I archaeological survey for all portions of the project that will involve ground disturbance, unless substantial prior ground disturbance can be documented. OPRHP anticipates that some portions of the project area have experienced extensive prior soil disturbance and that no archaeological testing will be needed in those areas. If you consider the entire project area to be disturbed, documentation of the disturbance will need to be reviewed by OPRHP. Examples of disturbance include mining activities and multiple episodes of building construction and demolition.

Documentation of ground disturbance should include a description of the disturbance with confirming evidence. Confirmation can include current photographs and/or older photographs of the project area which illustrate the disturbance (approximately keyed to a project area map), past maps or site plans that accurately record previous disturbances, or current soil borings that verify past disruptions to the land. Agricultural activity is not considered to be substantial ground disturbance.

Please note that in areas with alluvial soils or fill archaeological deposits may exist below the depth of superficial disturbances such as pavement or even deeper disturbances, depending on the thickness of the alluvium or fill. Evaluation of the possible impact of prior disturbance on archaeological sites must consider the depth of potentially culture-bearing deposits and the depth of planned disturbance by the proposed project.

A Phase I survey is designed to determine the presence or absence of archaeological sites or other cultural resources in the project's area of potential effect. The OPRHP can provide standards for conducting cultural resource investigations upon request. Cultural resource surveys and survey reports that meet these standards will be accepted and approved by the OPRHP.

Our office does not conduct archaeological surveys. A 36 CFR 61 qualified archaeologist should be retained to conduct the Phase I survey. Many archaeological consulting firms advertise their availability in the yellow pages. The services of qualified archaeologists can also be obtained by contacting local, regional, or statewide professional archaeological organizations. Phase I surveys can be expected to vary in cost per mile of right-of-way or by the number of acres impacted. We encourage you to contact a number of consulting firms and compare examples of each firm's work to obtain the best product.

Please also be aware that a Section 233 permit from the New York State Education Department (SED) may be necessary before archaeological fieldwork is conducted on State-owned land. If any portion of the project includes the lands of New York State you should contact the SED before initiating survey activities. The SED contact is Christina B. Rieth and she can be reached at (518) 402-5975. Section 233 permits are not required for projects on private land.

If you have any questions concerning archaeology, please contact Tim Lloyd at 518-268-2186 or Timothy.Lloyd@parks.ny.gov

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS

NY Rising Community Reconstruction Program

Phase I
Archaeological and Geomorphological Survey

Town of Clarkstown
Rockland County
New York 12304

TECTONIC
Practical Solutions, Exceptional Service

Prepared for: **Governor's Office of Storm Recovery**

38-40 State Street, 408N Hampton Plaza

Albany, New York 12207

Prepared by: **Tectonic Engineering & Surveying Consultants P.C.**

70 Pleasant Hill Road

Mountainville , New York 10953

September 2016

Job No.: 7463.23

Governor's Office of Storm Recovery
New York State Homes & Community Renewal
38-40 State Street, 408N Hampton Plaza
Albany, New York 12207

Attn: Alicia Shultz
Via email (Alicia.Shultz@nyshcr.org)

September 26, 2016

RE: WO 7363.23
PHASE I ARCHAEOLGICAL AND GEOMORPHOLOGICAL SURVEY FOR
CLARKSTOWN DRAINAGE IMPROVEMENTS
NY RISING COMMUNITY RECONSTRUCTION PROGRAM
TOWN OF CLARKSTOWN,
ROCKLAND COUNTY, NEW YORK

Dear Ms. Shultz,

Tectonic Engineering & Surveying's (Tectonic) subcontractor, Christine Davis Consultants, Inc. (CDC), has completed a Phase I Archaeological and Geomorphological Survey for the above referenced site. As part of the environmental review process, the New York SHPO required a cultural resource survey of the subject property. This report presents the findings of a Phase I Archeological Survey conducted on behalf of the Town of Clarkstown (Subrecipient) for the Cranford Drive Drainage Improvements Project in the Town of Clarkstown, Rockland County, New York. The Governor's Office of Storm Recovery (GOSR), operating under auspices of New York State Homes and Community Renewal's Housing Trust Fund Corporation, is the Responsible Entity for direct administration of the U.S. Dept. of Housing & Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) funds. The Project is part of the New York Rising Community Reconstruction Program and is receiving funding for a stormwater management improvement project involving the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

The Phase I Archaeological and Geomorphological Survey included archival research, a reconnaissance survey, and Phase I archaeological and geomorphological subsurface testing in order to evaluate the subject properties potential to contain significant cultural resources. No significant cultural resources were identified during the Phase I survey. No further archaeological work is recommended for the Clarkstown Drainage Improvements project. The final reports have been submitted for agency review. This work was performed in accordance with Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* and the *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New*

York State published by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) in 2005.

Attached please find the following documentation:

1.) Combined Phase IA/1B Archaeological Survey Report for the Clarkstown Drainage Improvements project

2.) Geomorphological Survey for the Clarkstown Drainage Improvements project

Feel free to contact the undersigned if you have any questions.

Sincerely,
TECTONIC ENGINEERING AND SURVEYING CONSULTANTS P.C.

Peter T. Sutherland

Peter T. Sutherland, P.E., L.E.P., C.P.G.
Vice President Environmental Services

PHASE I ARCHAEOLOGICAL AND GEOMORPHOLOGICAL SURVEYS

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS TOWN OF CLARKSTOWN, ROCKLAND COUNTY, NEW YORK

16PR05212

A Cultural Resource Management Report Prepared for:

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

September 2016

CHRISTINE DAVIS CONSULTANTS, INC.
560 Penn Street, Verona, Pennsylvania 15147
Phone: 412/826-0443 Fax: 412/826-0458

PHASE I ARCHAEOLOGICAL AND GEOMORPHOLOGICAL SURVEYS

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS
TOWN OF CLARKSTOWN,
ROCKLAND COUNTY, NEW YORK

16PR05212

BY:

CHRISTINE E. DAVIS
Principal Investigator

For final submission to:

New York State Office of Parks, Recreation and Historic Preservation
P.O. Box 189, Waterford, New York 12188-0189

ABSTRACT

Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering & Surveying Consultants P.C. to conduct a Phase I Archaeological and Geomorphological Survey for the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York. The agency for this project is the Governor's Office of Storm Recovery (GOSR).

The area of potential effect (APE) involves of approximately 3,666 linear feet (ft) (1,117 linear meters (m)) with a right-of-way (ROW) width of 100 ft or approximately 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)). It is topographically situated within a floodplain/terrace and lower hillslope environment setting associated with Demarest Kill and its unnamed tributary streams within the Piedmont Lowlands section of the Piedmont physiographic province.

The Phase I field survey was conducted in summer of 2016. Phase I field methodology included surface surveillance and the hand excavation of shovel tests (STs). A portion of the APE, involving approximately 19,031 sq m (204,845 sq ft or 4.7 ac), was not tested due to the presence of slopes greater than 15 percent and disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond. The total tested area within the APE measured approximately 29,155 sq m (313,821 sq ft or 7.2 ac). A total of 134 STs at 15 m intervals were excavated during the Phase I Survey. A total of 134 STs were negative. Based on the results of the Phase I Survey no cultural resources were recorded.

Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Canford Drive Drainage Improvements project.

MANAGEMENT SUMMARY

State Historic Preservation Office (SHPO) Project Review Number: 16PR05212

Agency:
Governor's Office of Storm Recovery (GOSR)

Phase of Survey:
Phase I Archaeological and Geomorphological Surveys

Location Information:

Location:	Brownswell Corner
Minor Civil Division:	Town of Clarkstown
County:	Rockland

Survey Area:

Length:	1,117 m (3,666 ft)
Width:	50 m (100 ft)
Depth:	n/a
# of Acres Surveyed:	48,186 sq m (518,666 sq ft or 11.9 ac)

USGS 7.5 Minute Quadrangle Map:
Haverstraw, NY 2016
Thiells, NY 2016

Archaeological Survey Overview:

Number and Interval of Shovel Tests:	134 tests at 15 m (50 ft) intervals
Number and Size of Units:	n/a
Width of Plowed Strips:	n/a
Surface Survey Transect Interval:	n/a

Results of Archaeological Survey:

Number and Name of Prehistoric Sites Identified:	0
Number and Name of Historic Sites Identified:	0
Number and Name of Sites Recommended for Phase II/Avoidance:	0

Results of Architectural Survey:

Number of Buildings/ Structures/ Cemeteries within Project Area:	n/a
Number of Buildings/ Structures/ Cemeteries Adjacent to Project Area:	n/a
Number of Previously Determined NR Listed or Eligible Buildings/ Structures/Cemeteries/ Districts:	n/a
Number of Identified Eligible Buildings/ Structures/ Cemeteries/ Districts:	n/a

Report Authors
Christine E. Davis

Date of Report
September 2016

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 PROPOSED UNDERTAKING 1
1.2 AREA OF POTENTIAL EFFECT (APE) 4
1.3 DISPOSITION OF MATERIALS 4
1.4 AGENCY COORDINATION 4

2.0 ENVIRONMENTAL BACKGROUND 8

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY 8
2.2 CLIMATE 8

3.0 BACKGROUND RESEARCH 9

3.1 CULTURAL PREHISTORIC OVERVIEW 9
3.2 OVERVIEW OF ROCKLAND COUNTY AND THE TOWN OF CLARKSTOWN 11
3.3 SOILS 11

4.0 SENSITIVITY ASSESSMENT 13

5.0 DISTURBANCE 14

6.0 TESTING RECOMMENDATIONS 17

6.1 GEOMORPHOLOGICAL SURVEY RESULTS 17

7.0 PHASE I FIELD SURVEY 18

7.1 FIELD METHODOLOGY 18
7.2 FIELD SURVEY RESULTS 18

8.0 SUMMARY 23

8.1 CONCLUSIONS 23

9.0 REFERENCES 24

APPENDICES:

I AGENCY COORESPONDENCE
II GEOMORPHOLOGICAL REPORT
III SHOVEL TEST RECORDS

FIGURES

1 GENERAL PROJECT LOCATION, NEW YORK TRANSPORTATION MAP 2

2 ARCHAEOLOGICAL AREA OF POTENTIAL EFFECT (APE), HAVERSTRAW AND THIELLS, NY 7.5' USGS MAP 3

3 APE, PROJECT MAPPING 5

4 APE INDICATING TESTED, WET, AND DISTURBED, PROJECT MAPPING 16

5 AREA A 22

PHOTOGRAPHS

1 APE, LOOKING NORTHEAST 6

2 APE, LOOKING NORTHEAST 6

3 APE, LOOKING SOUTHEAST 7

4 EROSION CONTROL AREAS INCLUDED THE USE OF LARGE STONES ALONG THE FLOODPLAIN AND TERRACES, LOOKING SOUTHEAST 14

5 EROSION CONTROL AREAS INCLUDED THE USE OF LARGE STONES ALONG THE FLOODPLAIN AND TERRACES, LOOKING WEST 14

6 MAN-MADE RETENTION POND, LOOKING SOUTHWEST 15

7 ARTIFICIALLY CONSTRUCTED DRAINAGE, LOOKING WEST 15

8 AREA A, LOOKING SOUTH 19

9 AREA A, LOOKING SOUTH 19

10 AREA A, LOOKING NORTHEAST 20

11 AREA A, LOOKING NORTHEAST 20

TABLES

1 PREVIOUSLY RECORDED HISTORIC PROPERTIES WITHIN A ONE-MILE RADIUS 13

1.0 INTRODUCTION

Historic and cultural resources are protected under Federal law through Section 106 of the National Historic Preservation Act of 1966, as amended, and implementing regulation 36 CFR 800 as revised in January of 2001; the Archaeological and Historic Preservation Act of 1974; Section 101(b)(4) of the National Environmental Policy Act of 1969; Executive Orders 11593 and 12362; 18 CFR Part 380.14; 23 CFR 771, as amended, August 28, 1987; 36 CFR 60; the guidelines developed by the Advisory Council on Historic Preservation (ACHP) published November, 26, 1980; and the amended procedures for the Protection of Historic and Cultural Properties, as set forth in 36 CFR 800.

The regulations developed under Section 106 of the National Historic Preservation Act require that prior to approval of federal funding, agencies should consider the impact of a project on any district, site, building, structure, or object that is included on, or eligible for inclusion on, the National Register of Historic Places (NRHP), and the ACHP must be given an opportunity to comment on such an undertaking. The Historic and Archeological Data Preservation Act directs Federal agencies to preserve historic and archeological data that would otherwise be lost as a result of a Federal action. A project is considered to have an adverse effect on such sensitive resources if it changes the quality of cultural characteristics that render them eligible for listing on the NRHP.

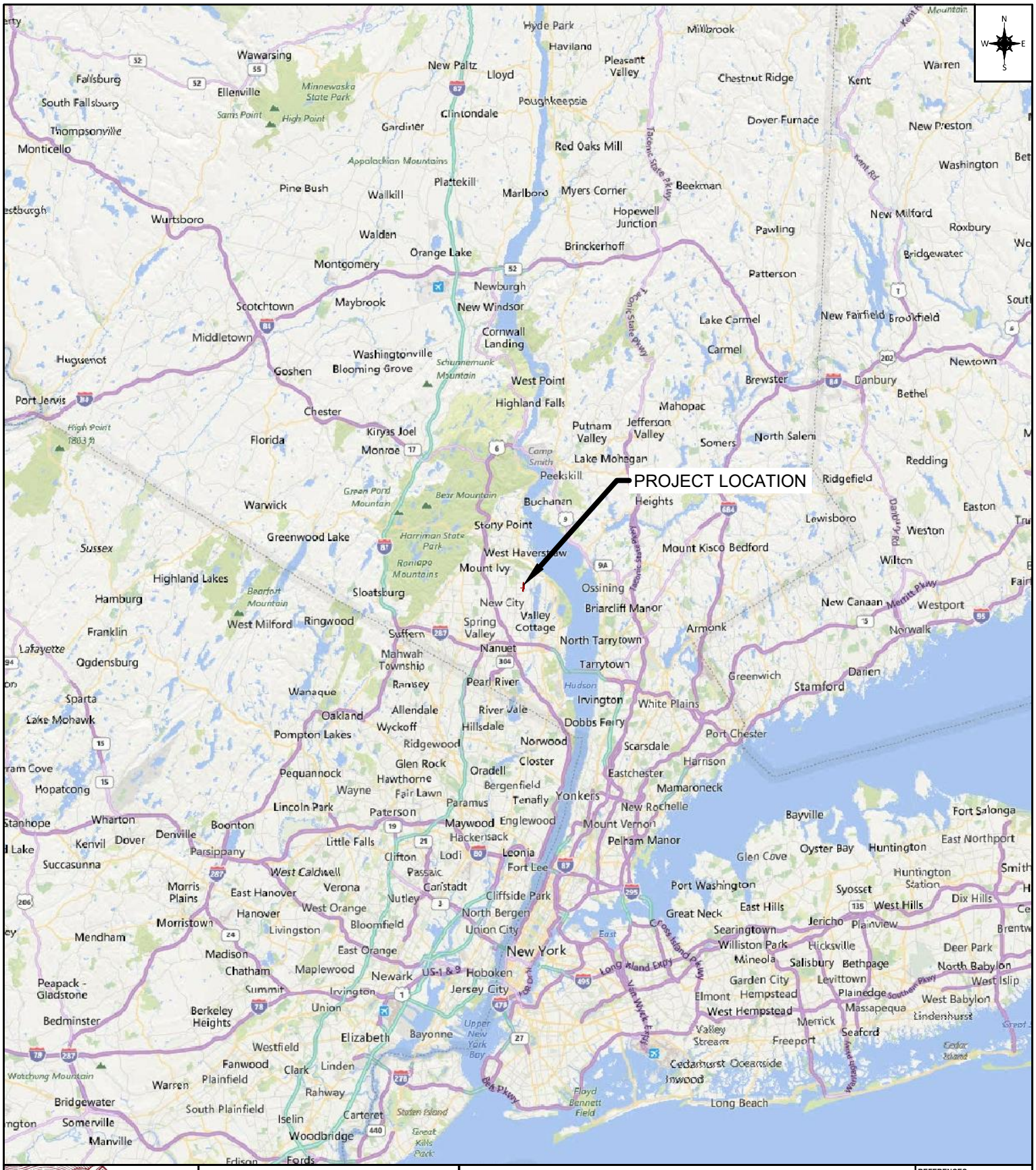
Historic properties of national, state and local significance may be nominated to the NRHP following an evaluation in accordance with an established set of criteria. The evaluation process is conducted at the state level by the New York State Historic Preservation Officer (SHPO) and at the federal level by the NRHP staff of the Department of the Interior. The National Park Service administers the National Register and has established four criteria for the evaluation of the potential significance of historic and archeological properties. These criteria are described in Title 36, Part 60 of the Code of Federal Regulations and are summarized as follows:

- Criterion A: A property is associated with historically significant events that have made a significant contribution to the broad patterns of our history. To meet this criterion, a historic property needs to have existed at the time of the important event and be associated in a significant way with the event.
- Criterion B: A property is associated with the lives of persons significant in our past.
- Criterion C: A property that embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D: A property that has yielded, or may be likely to yield, information important in prehistory or history.

Archaeological studies are completed under Section 106 of the National Historic Preservation Act of 1966 as amended; the National Environmental Policy Act of 1969; the Archaeological and Historic Preservation Act of 1974; and the regulations of the ACHP 36 CFR 63 and 36 CFR 800. This technical scope of work was developed in accordance with the *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State* published by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) in 2005.

1.1 PROPOSED UNDERTAKING

Christine Davis Consultants, Inc. (*CDC*) was retained by Tectonic Engineering & Surveying Consultants P.C. to conduct a Phase I Archaeological and Geomorphological Survey for the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York (Figures 1 and 2). The proposed drainage improvements are located north of the town of New City and west of De Forest Lake primarily between Cranford Drive and Cypress Street.



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

0 — 1 INCH = 10 MILES — 20 MILES

REFERENCES:
NAVTEQ - 2010
Road Map

Project Location
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 1

Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDaviesConsultants.com
412-826-0443

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

REFERENCES:

TECTONIC
Erosion Control Plan 5-30-13

USGS 7.5 MINUTE QUADRANGLES
HAVERSTRAW, NY 2016
THIELLS, NY 2016

Area of Potential Effect
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 2

The Clarkstown Cranford Drive Drainage Improvements project is part of the New York Rising Community Reconstruction Program and is receiving funding for a stormwater management improvement project involving the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

1.2 AREA OF POTENTIAL EFFECT (APE)

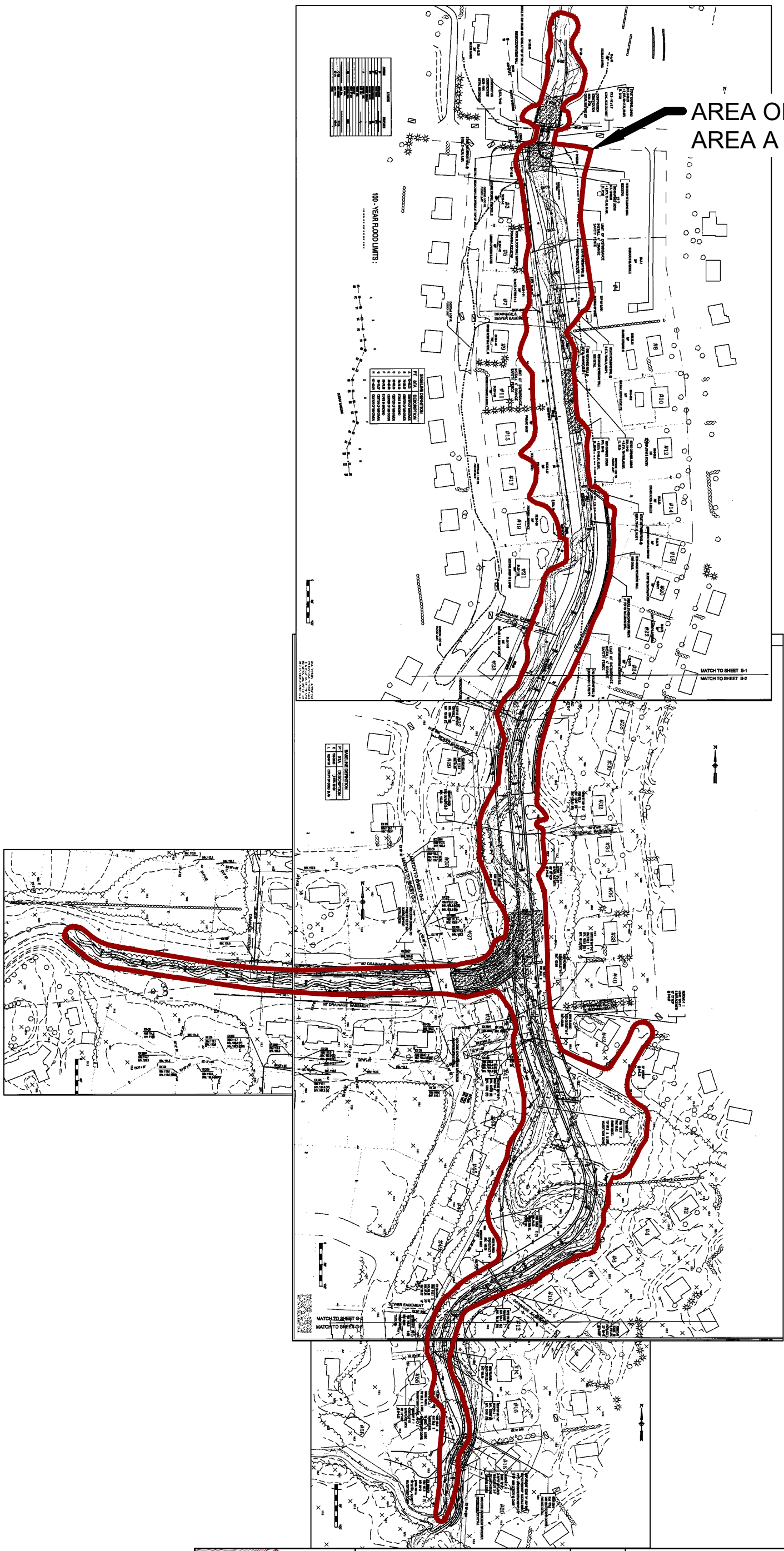
The area of potential effect (APE) consists 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)) topographically situated in a floodplain/terrace and lower hillslope environment associated with Demarest Kill and its unnamed tributary streams (Figure 3). The APE is characterized by deciduous hardwoods interspersed with herb/shrub communities. The APE is generally located west of the Hudson River and north of New City, New York between S.R. 304 and Old Route 304 within Clarkstown (Photos 1 to 3).

1.3 DISPOSITION OF MATERIALS

CDC will supply copies of this document to Tectonic Engineering & Surveying Consultants P.C. and the OPRHP.

1.4 AGENCY COORDINATION

In their response letter, the OPRHP required a Phase I Archaeological Survey to locate potentially significant archaeological resources within areas that will involve ground disturbance and cannot be documented as disturbed (Appendix I).



APE / AREA A

N
W E
S

0 1 CM = 30 METERS 120 METERS

Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

Project Mapping
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

REFERENCES:

TECTONIC
Erosion Control Plan 5-30-13

USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 3

Photo 1: APE, looking northeast

Photo 2: APE, looking northeast

Photo 3: APE, looking southeast

2.0 ENVIRONMENTAL BACKGROUND

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY

The bedrock of Rockland County is composed of sedimentary rock formations of Upper Triassic age such as the Newark group (USGS 2016). The arkose, mudstone, shale, and sandstone of the Brunswick Formation have been greatly altered by the advance and retreat of continental ice sheets of the late Pleistocene Epoch. The retreat of the glaciers of this period has resulted in the deposition of glacial till over the ground surface of the region (NYSM 2016; USFWS 2016).

The Phase IA study area is situated in the Triassic Lowland section of the Northern Piedmont physiographic province. This section is characterized by broad, gently sloping valleys with a moderate pattern of ridges (USDA 1990). Elevations in the vicinity of the APE range from approximately 80 to 150 ft above mean sea level (amsl).

2.2 CLIMATE

Climatic conditions in Rockland County include cold and snowy winters and warm to hot summers. Precipitation is adequate and well distributed. The average winter temperature for most of the county is 28 degrees Fahrenheit (F) (-2.2 degrees Celsius (C)). The average summer temperature is 70 degrees F (21.1 degrees C). The total annual precipitation is 119.4 centimeters (cm) (47 inches (in)) of which approximately 50 percent falls from April through September. Prevailing winds are out of the south (USDA 1990).

3.0 BACKGROUND RESEARCH

The sequence of archival maps, aerial photographs, and other basic historical research relating specifically to the project area was evaluated. Background research for this project was conducted using information from CDC's library, the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) Cultural Resource Information System (CRIS), and other online resources. Important archival maps included the County Atlas of Rockland from 1875 (Beers 1875) along with archival USGS Tarrytown, NY maps from 1892 and 1902 provided information about land-use at the turn of the twentieth century. The Gazetteer of the State of New York along with a volume of Rockland County History were valuable additions to the research conducted (French 1860; Green 1886).

3.1 CULTURAL PREHISTORIC OVERVIEW

An examination of the cultural prehistory of the project area provides relevant background data for characterizing and predicting the area's prehistoric settlement system. This data contributes to the ability of archaeologists to identify and establish the probability of archaeological sites in a specific area.

The **Paleoindian** occupation originated between 9500 and 9000 B.C. and marked the first undisputed evidence of man's entry into the northeast. However, based on radiocarbon dates from Meadowcroft Rock Shelter near Avella in Washington County, Pennsylvania it can be suggested that a pre-Paleoindian occupation employing polyhedral-core and blade-based lithic technology may have been present as early as 14000 B.C. (Adovasio 1993:207). Paleoindian fluted projectile lanceolates, distinguished by elongated channel scars, are sometimes found in association with extinct Pleistocene megafauna such as mammoth and mastodon. The geographical distribution of these distinctive points and other tool forms from this period includes most of the New World (Ritchie 1980).

The majority of Paleoindian sites in the northeast are recognized by fluted points, keeled unifacial tools, gravers, and blades fabricated from a variety of cherts and jaspers. Site types include kill sites with single projectile points; upland and waterside camps with varied tool kits; trail camps associated with Indian paths and natural trails; and specialized quarry and tool manufacturing sites where raw materials were procured and worked into tools. An average of 72 percent of Paleoindian sites in the northeast are located less than 200 m from second or higher-order streams. These riverine environments would have provided Paleoindian groups with a wide variety of important resources. (Carr 1998; Ritchie 1980)

The **Early Archaic** period (8000-6000 B.C.) roughly correlates with a time of notable environmental changes that began during the Pleistocene with episodes of glacial retreat; however, late Paleoindians lived within essentially the same environment as subsequent Archaic groups. Continuity between the Paleoindian and Early Archaic periods has been recognized, particularly through their subsistence regimes and mobility patterns. By the Early Archaic, Pleistocene megafauna became extinct and were replaced by modern species such as caribou and elk. Evidence for resource availability is poorly known, but it is believed that Early Archaic cultures were generalized hunters and gatherers living in small ephemeral sites located in a diversity of geographical settings. The Paleoindian preference for floodplain settings was replaced with an increase in upland site locations. The Early Archaic period is recognized by classic projectile tool types such as Kirk, Palmer, Big Sandy, and Thebes found at a relatively small number of localities. Continuity with Paleoindian populations can be suggested by Early Archaic tool attributes such as basal grinding (Ritchie 1980).

Bifurcated points mark the end of the Early Archaic period and the gradual emergence of the **Middle Archaic** cultures. By the Middle Archaic period (6500-3000 B.C.), some archaeologists suggest that a major economic shift toward increased specialization in hunting and gathering resources had

occurred perhaps in response to continued Early Holocene environmental changes. Human populations responded to these climatic fluctuations either by abandoning traditional exploitative strategies in one zone and continuing them in another or by exploiting new resources. The adaptive responses in place during the Middle Archaic period were coupled with a significant increase in population. Population increase also may be correlated with the trend toward territoriality and more sedentary lifeways as observed in the subsequent Late Archaic period (Ritchie 1980; Stewart 1989).

Hallmarks for the **Late Archaic** period include an emerging widespread interaction sphere in which objects such as copper, marine shell and chert were traded vis a vis long distance networks. Woodworking, weaving and hideworking tools are evident on larger base camps and settlement camps where ceremonial and domestic activities were likely to have occurred. Base camps were located on major rivers and may have at least partially functioned to take advantage of riverine links with cultures outside of the river valleys for the purpose of trade, group hunting activities, ceremonies, and/or the exchange of ritual and marriage partners. Specialized subsistence practices such as the collection of mussel shell and hickory nuts as well as an increased use of fish and avian resources seem to have intensified during the Late Archaic, although data for an increase in subsistence diversity is difficult to assess because of the scarcity of archaeological findings for this period. A diversity of topographic situations in the uplands and major riverine areas were utilized during the Late Archaic.

The **Early Woodland** period (1000 B.C.-100 B.C.) is characterized by a shift to ceramic production, the introduction of cultivated plants, and a more sedentary settlement system. However, data from some Early Woodland sites suggest a persistence of the Archaic hunting, gathering and fishing lifeway. The presence of both Early Woodland and Late Archaic artifacts on the same sites suggests a continuation of Late Archaic subsistence and procurement patterns. Preferred habitation locales included major floodplains and terraces where high yields of seed plants and riverine resources could be obtained. Gradually, cultigens such as squash, pumpkin, gourd, and corn were introduced. Of particular importance in the subsistence strategies during the **Middle Woodland** period (100 B.C.-A.D. 900) was the use of aquatic resources. Although deer provided the most significant part of the subsistence system, other components included fish, birds, turtles, and amphibians. Evidence for domesticated plants is not impressive during the Middle Woodland; instead, there seems to have been more of a reliance on a broad spectrum subsistence pattern including the harvesting of wild or quasi-domesticated crops near rich hunting and gathering sites (Ritchie 1980).

The **Late Woodland**/ **Late Prehistoric** period (A.D. 800-1600), subsistence strategies shifted to a reliance on domesticated plants including corn, beans and squash, which were cultivated primarily on the large floodplains and terraces of major rivers. During the Late Woodland period, a climatic episode known as the NeoBoreal brought cool, moist conditions to the general region. The effect of such climatic changes on the growing season for Late Woodland crops is difficult to assess without additional studies and particularly data relating to the significance of cultigens during this period. Continued occupation of upland sites included hunting and gathering stations, winter campsites, small farmsteads and villages. At the time of European Contact, the Munsee-Delaware occupied lands within Rockland County (Ritchie 1980; Salomon 1982:36).

3.2 OVERVIEW OF ROCKLAND COUNTY AND THE TOWN OF CLARKSTOWN

Situated 10 miles north of New York City, the triangular-shaped Rockland County is bound by the Hudson River, Orange County, New York, and the State of New Jersey. The county is watered by the Hackensack River, Ramapo River, and tributaries of the Hudson River, including Minisceongo Creek, Minas Fall Creek, and Spar Kil. The Ramapo Mountains occupy the western third of the county with steep rocky peaks and narrow valleys. Mountains also separate the northern portion of the township from the Hudson River and were an early barrier to the growth and development of the area. Today, the county is made up of 17 villages and five towns: Clarkstown, Haverstraw, Orangetown, Ramapo, and Stony Point.

The first settlers arrived in 1690 and were Dutch. At that time, Rockland County was part of the Kakiat Patent, which was later sold to a group of five men in 1716, one of whom was Daniel De Clark. When his land was sold in 1764, it became known as Clarke's Town. After the original courthouse in Tappan burned in 1774, a more central location was selected for the new courthouse and the area was named New City. Clarkstown was officially established in 1791 from part of Haverstraw to the north and contains the county seat of New City. Rockland County was then established in 1798 from parts of Orange County (Green 1886).

During this time, the area remained rural in spite of its close proximity to New York City. In 1800, the population was 1,806 persons and by 1880 it had only increased to 4,382. The economy focused on fruit growing and milk production, along with the manufacturing of lime, brick, shoes, wooden ware, and woolen yarn (French 1860).

Two early transportation systems impacted the economic growth of the county: the Nyack Turnpike and the New York and Erie Railroad. The Nyack Turnpike was constructed in the 1830s to connect the port at Nyack with the interior village of Suffern at the base of the Ramapo Mountains. The route is located in the south central portion of the county and still exists today as S. R. 0059. The New York and Erie Railroad was constructed between 1832 and 1861 to connect Piermont on the Hudson River to Lake Erie.

By the 1920's, artists, sculptors, composers, actors, and playwrights began moving to the area from New York City. However, it wasn't until the 1950s with the construction of the New York State Thruway from Suffern to Yonkers and the opening of the Tappan Zee Bridge that the population of Rockland County significantly boomed; the population more than doubled between 1950 and 1960 from 15,674 to 33,196 (Casey 2016). The Tappan Zee Bridge carries seven lanes of motor traffic over the Hudson River. Today, the population has burgeoned to 87,059 with the economy focused on professional, scientific, and technical services, retail, and health care (U.S. Census Bureau 2012).

3.3 SOILS

Soils in the project area derived from the Weathersfield-Cheshire-Urban Land association general soil unit. This soil association consists of very deep, nearly level to moderately steep, well drained soils formed on acidic glacial till derived from reddish sandstone on till plains. The soils within the study geomorphology study area are mapped as Cheshire-Urban land complex (CuB), Rippowam sandy loam (Ra), and Yalesville sandy loam (YaB) (USDA 1990; NRCS 2016).

Cheshire-Urban land complex soils consist of very deep, gently sloping, well drained Cheshire soils and areas covered by urban development. These soils are typically formed in glacial till derived from red Triassic sandstone ridges with slopes of 2 to 8 percent. A representative soil profile for Cheshire soils consists of a very dark grayish brown gravelly fine sandy loam A horizon, a reddish brown gravelly fine sandy loam Bw horizon, and a dark reddish brown gravelly sandy loam C horizon.

Rippowam sandy loam consists of very deep, nearly level, and poorly drained soil located on floodplains with slopes of 0 to 3 percent. These soils formed in alluvium mainly derived from granite and sandstone. A representative soil profile for Rippowam sandy loam consists of a very dark grayish brown sandy loam A horizon, a series of dark grayish brown to grayish brown sandy loam Bw horizons, a dark gray and grayish brown fine sandy loam BC horizon, and a dark brown loamy sand C horizon.

Yalesville sandy loam consists of moderately deep, well-drained soil located on uplands with slopes of 0 to 3 percent. These soils formed in glacial till derived from red Triassic sandstone. A representative soil profile for Yalesville sandy loam consists of a dark brown to dark reddish brown sandy loam A horizon, a series of reddish brown to red gravelly loam Bw horizons, and a red extremely channery loam C horizon.

4.0 SENSITIVITY ASSESSMENT

To aid in the prediction of prehistoric and historic archaeological site probability within the APE, a literature search was conducted. The literature search included an examination of the data bases in the New York Office of Parks, Recreation, and Historic Preservation's (OPRHP) Cultural Resource Information System (CRIS).

According to the OPRHP letter (see Appendix I), the APE is considered to be located on an Archaeological Sensitive landform. One archaeological survey project has been conducted within a 1.6 kilometers (km) (1 mi) radius of the the Clarkstown Canford Drive Drainage Improvements. Currently, an Archaeological Sensitivity Assessment for the Buckley Farms Subdivision project (16PR04923) is taking place southwest of the current APE. No other projects were completed in the general area of the APE.

No previously recorded archaeological sites have been documented near the vicinity of the APE or within a 1.6 km (1 mile) radius. Eight previously documented properties over 50 years of age have been documented within a one-mile radius of the APE, including four properties listed on the National Register, two which are considered not eligible, and two which are undetermined (Table 1).

Table 1
Previously Recorded Historic Properties within a One-Mile Radius

Number	Name	Status
90NR02398	Jacob Abramse Blauvelt House, Carriage House, and Barn - 20 Zukor Rd	Listed
07NR05796	Peter DePew House - 101 Old Route 304	Listed
04NR05229	H.R. Stevens House - 234 Congers Rd	Listed
91NR00049	Rockland County Courthouse and Dutch Gardens	Listed
	New City Free Library - 220 North Main St	Not Eligible
	Zachar - 311 Old NY 304	Not Eligible
	Clarkstown North High School - 151 Congers Rd	Undetermined
	Unidentified Federal House - South Mountain Rd	Undetermined

One of the National Register listed historic resources, Peter DePew House (07NR05796), is located adjacent but not within the APE. The Peter DePew House is located northeast of the APE. The property was originally constructed ca. 1750 and consists of three buildings and six structures. The property was listed on the National Register in July of 2008.

5.0 DISTURBANCE

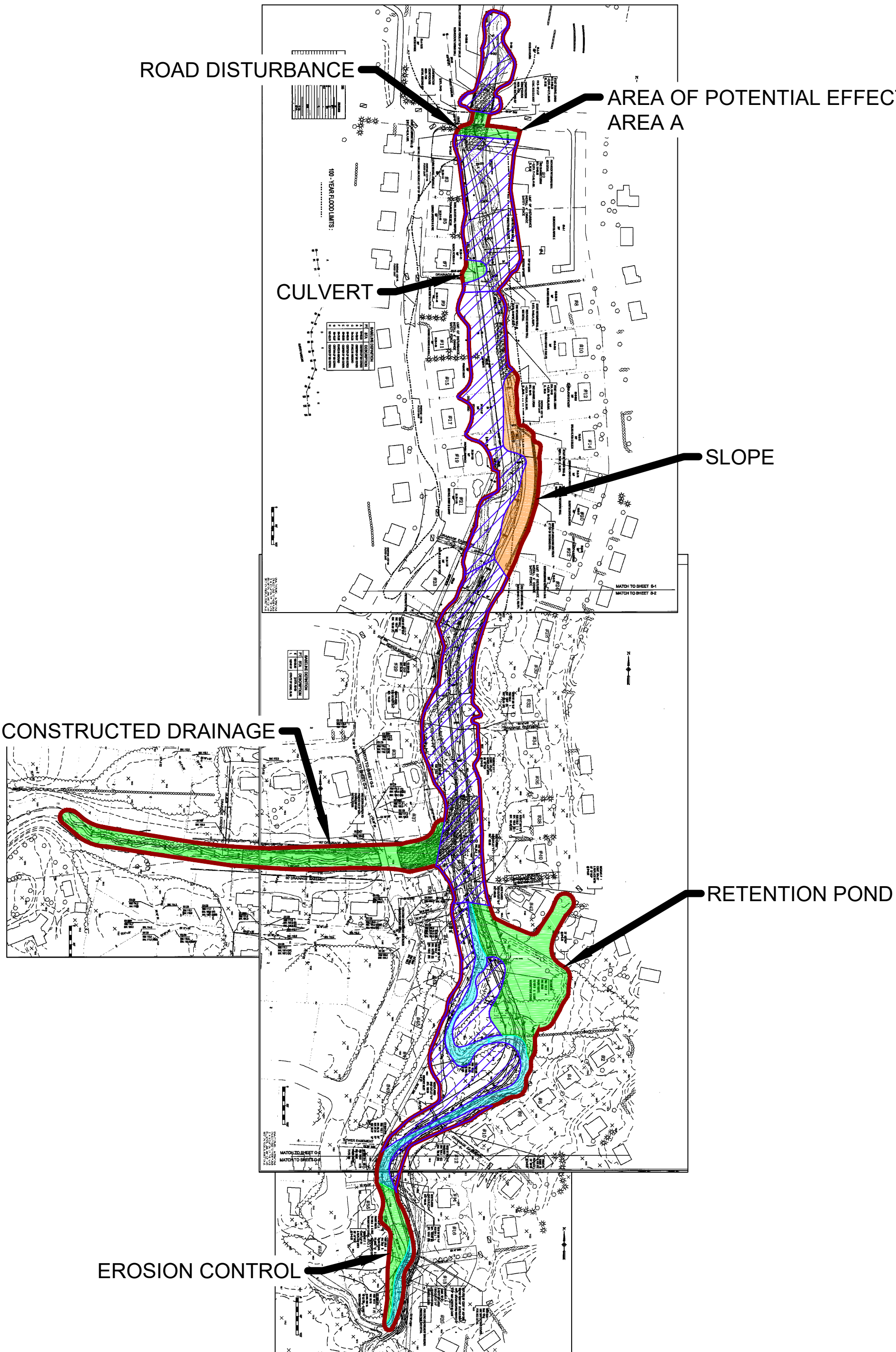
Portions of the APE contained slopes greater than 15 percent and could not be tested. In addition, disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond were noted within the APE (Photos 4 through 7; Figure 4).

Photo 4: Erosion control areas included the use of large stones along the floodplain and terraces, looking southeast

Photo 5: Erosion control areas included the use of large stones along the floodplain and terraces, looking west

Photo 6: Man-made retention pond, looking southwest

Photo 7: Artificially constructed drainage, looking west



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

APE / AREA A
TESTED
WET
STEEP
DISTURBED

N W E S

0 1 CM = 30 METERS 120 METERS

REFERENCES:
TECTONIC
Erosion Control Plan 5-30-13
USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

Tested, Wet, Steep and Disturbed Areas
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 4

6.0 TESTING RECOMMENDATIONS

The factors described below are specific to Clarkstown Canford Drive Drainage Improvements APE and provide pertinent information to predict the location of sites. Well drained soils in nearly level to gently sloping topographic settings generally are the highest probability areas for archaeological sites. The APE is situated within a wet floodplain/terrace associated with Demarest Kill but the potential for archaeological remains, particularly in buried contexts, is higher in floodplain areas.

A tributary of the West Branch of Hackensack River (Demarest Kill) and its tributary streams lies within the APE. This stream had been artificially diverted to its current course in the recent past. No intact alluvial soils with any potential for significant buried cultural material are present within this portion of the APE. Due to the presence of alluvial soils and the potential for buried living surfaces, a geomorphology study was conducted for this project. Joshua Pfarr conducted the Geomorphological Survey, which consisted of an examination of the stratigraphy within auger probes. The results are presented in *Section 6.1 Geomorphological Survey Results*.

A recent examination of CRIS revealed no previously recorded archaeological sites within the APE. No previously recorded archaeological sites were documented near the vicinity of the APE or within a 1.6 km (1 mile) radius; however, according to the OPRHP letter the APE is considered to be located on an Archaeological Sensitive landform. The APE was designated as having moderate to high probability for the discovery of archaeological sites based on the geomorphological results, soil survey, and examination of the CRIS system.

6.1 GEOMORPHOLOGICAL SURVEY RESULTS

A total of four auger probes were excavated within the APE to identify the representative soil and sediment profiles present along the West Branch of Hackensack River (Demarest Kill). A T0 floodplain zone comprises a majority of the APE. Narrow T00 floodplains/active stream channel zones consisting of recent coarse sand and gravel alluvium were also visually identified within the APE. These T00 floodplains represent areas of extremely low probability for containing in situ historic or prehistoric cultural material. The lower portions of upland hillslopes were also identified within the APE containing relatively shallow soils developed on colluvium or partially altered glacial till. The T0 floodplain zone will be the focus of this geomorphology survey.

The auger probes excavated on the T0 floodplain zones of the West Branch of Hackensack River (Demarest Kill) revealed soil development on sandy stream channel and flood deposits. On much of the T0 floodplain relatively recent sandy flood deposits are present at or just below the ground surface. Archaeological testing on these landforms is recommended to extend to the top of the fine to coarse sand C horizons located beneath the A and Bw horizons. These massive, sandy C horizons represent sterile, partially altered, sedimentary parent material. This testing can be accomplished by the hand excavation of shovel tests (STs) to depths of approximately 40 to 90 cm (15.7 to 35.4 in) bgs. The geomorphological report is presented in its entirety in Appendix II.

7.0 PHASE I FIELD SURVEY

7.1 FIELD METHODOLOGY

The Phase I field methodology conforms to the approach developed by the New York Archaeological Council (NYAC) (2005). Field work began with a systematic ground surface inspection of the APE for the purpose of defining any surface evidence of archaeological sites such as foundations or other extant features; of detecting any variability in topographic and soil maps; and finally to note any impact to the archaeological integrity of the APE. There was no ground surface evidence for historic sites identified during the pedestrian inspection.

Based on the results of the geomorphological survey, in potentially undisturbed areas of less than 15 percent slopes where ground surface visibility was not adequate for surface collection, the hand excavation of .5-by-.5 m (1.6 ft x 1.6 ft) shovel tests were conducted at 15 m (50 ft) intervals. Shovel tests were excavated to undisturbed soil levels. Once sterile subsoil was reached, a minimum of ten additional cm (3.9 in) of subsoil was excavated to confirm the natural stratigraphy of the horizon. Auger probes were conducted to verify soil profiles in areas of potentially disturbed soil horizons. Wetland environments were tested unless standing water was present.

All subsurface units were numbered sequentially, and soil profiles were cleaned and documented by a pedological description. All hand-excavated soils were screened through quarter-inch hardware mesh and returned to original ground surface condition.

7.2 FIELD SURVEY RESULTS

The Phase I field survey was conducted in August of 2016. The APE involves approximately 48,186 sq m (518,666 sq ft or 11.9 ac). During the ground surface inspection, the entire APE was examined to determine the potential for archaeological resources. Portions of the APE were designated as having low to no probability for the discovery of archaeological sites based on previous impacts and wetland environments. Previous impacts to the APE included disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond. A total of 29,155 sq m (313,821 sq ft or 7.2 ac) were tested within the APE.

Area A

Description: Area A encompasses approximately 48,186 sq m (518,666 sq ft or 11.9 ac), located adjacent to Cranford Drive and Cypress Street (see Figure 4; Photos 8 through 11). It is topographically situated within a floodplain/terrace and lower hillslope environment associated with Demarest Kill and is bound by the limits of the APE on all sides. The area is characterized by deciduous hardwoods interspersed with herb/shrub communities. Elevations range from 100 ft to 116 ft amsl.

Approximately 29,155 sq m (313,821 sq ft or 7.2 ac) within Area A was subjected to Phase I testing; the remaining 19,031 sq m (204,845 sq ft or 4.7 ac) did not require testing due to the disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond

Methodology: Field methodology consisted of the hand-excavation of shovel tests at 15 m (50 ft) intervals.

Photo 8: Area A, looking south

Photo 9: Area A, looking south

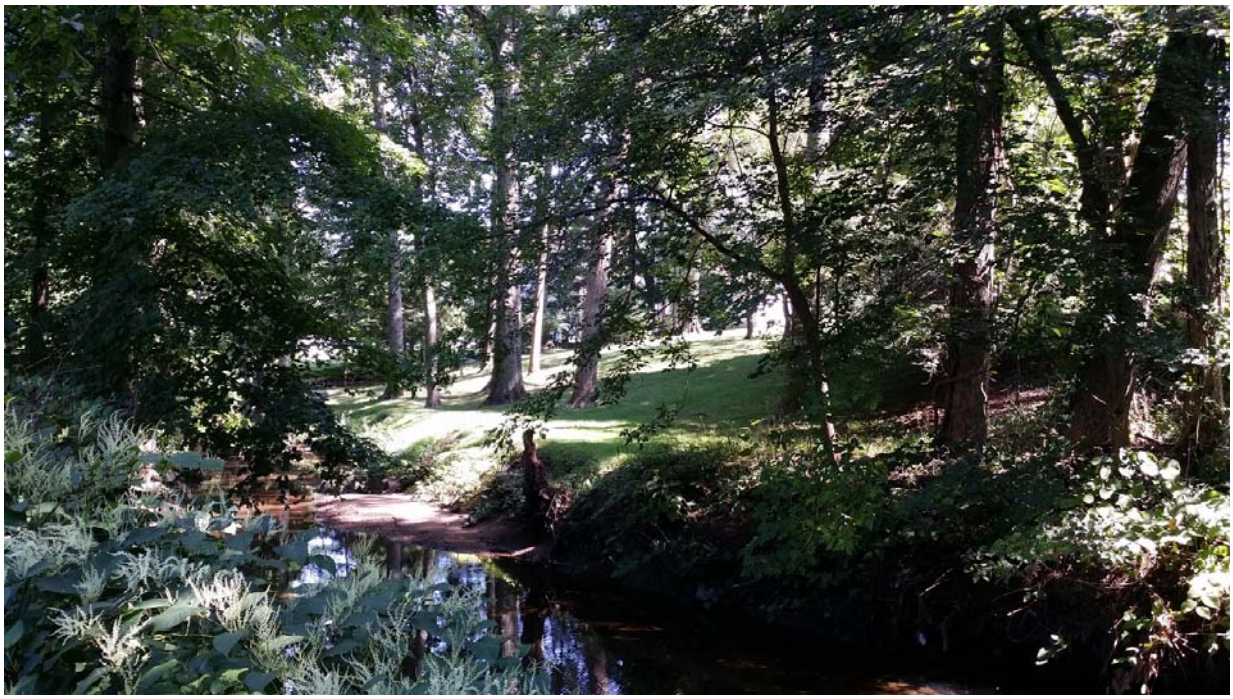


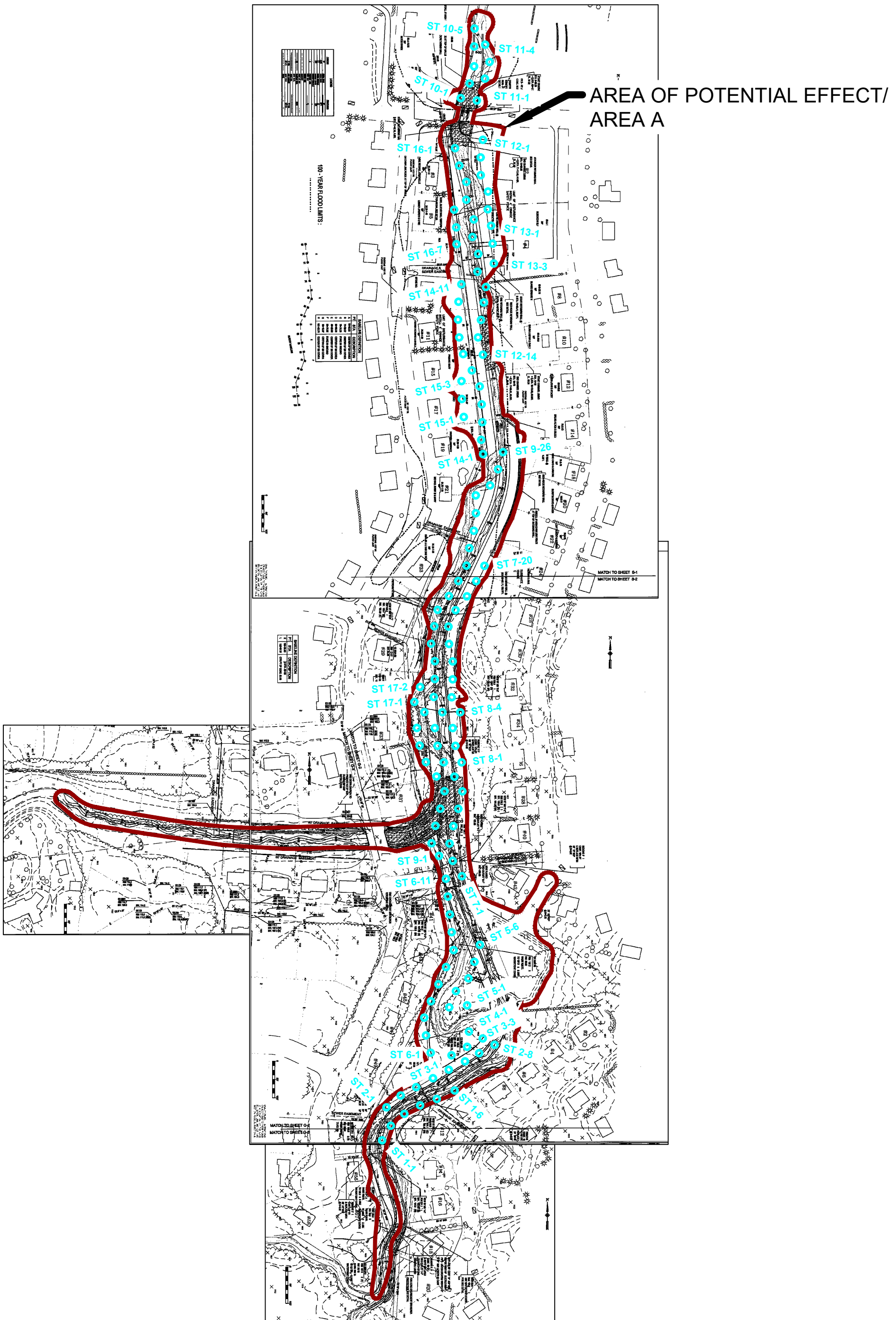
Photo 10: Area A, looking northeast

Photo 11: Area A, looking northeast

Results: A total of 134 STs were hand-excavated in Area A at 15 m (50 ft) intervals along 17 transects and all 134 STs were negative (Figure 5). The majority of soil profiles ranged from 14 to 56 cm of light brown to brown sandy silt loam over yellow brown sand to sandy silt loam. Some profiles terminated in a rock impasse. Other profiles consisted of light brown to brown or dark brown sandy silt loam over yellow brown sand to brown sandy loam and terminated in light yellow brown to grey brown sand to sandy loam. Representative soil profiles are presented below. ST records are presented in their entirety in Appendix III. Based on the results of the Phase I Survey, no evidence of prehistoric or historic archaeological sites were identified.

Soil Profile: Area A Shovel Test 5-3 Description	**Strata and Artifact Description**
Medium Brown Sandy Silt Loam	0-23 cm bgs A Horizon 10YR 3/3 No Cultural Material
Yellow Brown Sand	23-33 cm bgs Bw Horizon 10YR 5/3

Soil Profile: Area A Shovel Test 9-12 Description	**Strata and Artifact Description**
Dark Brown Sandy Loam	0-20 cm bgs Ao Horizon 10YR 3/3 No Cultural Material
Brown Sandy Loam	20-80 cm bgs Bw Horizon 10YR 4/3
Light Yellow and Brown Sandy Loam	80-90 cm bgs C1 Horizon 10YR 7/3



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

APE / AREA A

NEGATIVE SHOVEL TEST

N W E S

0 1 CM = 30 METERS 120 METERS

REFERENCES:
TECTONIC
Erosion Control Plan 5-30-13
USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

Area A
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 5

8.0 SUMMARY

8.1 CONCLUSIONS

The proposed project involves the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York. CDC was retained by retained by Tectonic Engineering & Surveying Consultants P.C.to perform cultural resource investigations for this project. The sponsoring agency for this project is Governor's Office of Storm Recovery (GOSR).

The Phase I field survey was conducted for this project in summer of 2016. Phase I field methodology involved surface surveillance and the hand excavation of STs at 15 m intervals. A portion of the APE, involving approximately 48,186 sq m (518,666 sq ft or 11.9 ac), was not tested due to the presence of slopes greater than 15 percent and wet areas and disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond

The total tested area within the APE measured approximately 29,155 sq m (313,821 sq ft or 7.2 ac). A total of 134 STs were excavated within the APE at 15 m intervals and all 134 STs were negative. No artifacts were recovered during the survey and no evidence of archaeological resources was identified during the Phase I Archaeological testing.

Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Canford Drive Drainage Improvements project.

9.0 REFERENCES

Adovasio, J. M.
1993 The Ones That Will Not Go Away: A Biased View of Pre-Clovis Populations in the New World. In *From Kostenki to Clovis: Upper Paleolithic-Paleo-Indian Adaptations*, edited by O. Soffer and N. D. Praslov. Plenum Press, New York.

Beers, F. W.
1875 *County Atlas of Rockland, New York.* Walker & Jewett, New York.

Carr, K. W.
1998 The Early Archaic Period in Pennsylvania. *Pennsylvania Archaeologist* 68(2):42-69.

Casey, Thomas F. X.
2016 A Brief History of Rockland. RocklandHistory.org

French, J. H.
1860 *Historical and Statistical Gazetteer of New York State.* Heart of the Lakes Publishing, Interlaken, New York.

Green, Frank Bertangue
1886 *History of Rockland County, New York.* A. S. Barnes & Co., New York.

Independence Hall Association
2013 "Major John Andre". http://www.ushistory.org/march/bio/andre.htm (accessed on September 9, 2016).

Natural Resources Conservation Service
2016 The Web Soil Survey http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx (accessed on August 24, 2016).

New York State Archaeological Council
2000 *Cultural Resource Standards Handbook-Guidance for Understanding and Applying the New York State Standards for Cultural Resource Investigations.*

2005 *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State.*

New York State Museum
2016 Geology-Geographic Information System http://www.nysm.nysed.gov/research-collections/geology/gis (accessed on August 24, 2016)

Ritchie, William A.
1980 *The Archaeology of New York State.* Harbor Hill Books, Harrison, New York. Revised edition.

Stewart, Michael
1989 The Middle Archaic of Western Maryland. Paper presented at the 56th Annual Meeting of the Eastern States Archaeological Federation, East Windsor, Connecticut.

Salomon, Julian H.
1982 *Indians of the Lower Hudson Region, The Munsee*. Historical Society of Rockland County, New City, New York.

Town of Clarkstown
2016 "History" <http://www.town.clarkstown.ny.us/html/history_profile.html> (accessed on September 9, 2016).

United States Census Bureau
2012 American Fact Finder. Accessed electronically at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF . Accessed on September 9, 2016.

United States Department of Agriculture, Soil Conservation Service
1990 *Soil Survey of Rockland County, New York.* Prepared in cooperation with Cornell University Agricultural Experiment.

United States Fish and Wildlife Service
2016 *Geomorphic Provinces and Sections of the New York Bight Watershed*. National Conservation Training Center https://nctc.fws.gov/pubs5/web_link/text/geolsect.htm (accessed on August 24, 2016).

United States Geological Survey
1892 Tarrytown Quadrangle, New York 15' series.

1902 Tarrytown Quadrangle, New York 15' series.

2016 Mineral Resources Online Spatial Data http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NYTRba;3 (accessed on August 24, 2016).

Web Soil Survey NRCS
2008 *Web Soil Survey.* < http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx> (accessed on August 5, 2008).

APPENDIX I
AGENCY COORDINATION

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation and Historic Preservation

ANDREW M. CUOMO
Governor

ROSE HARVEY
Commissioner

ARCHAEOLOGY COMMENTS

Phase I Archaeological Survey Recommendation
16PR05212 – Clarkstown Cranford Drive Drainage Improvements

The project is located in on archaeologically sensitive landform. Therefore, the Office of Parks, Recreation and Historic Preservation (OPRHP) recommends a Phase I archaeological survey for all portions of the project that will involve ground disturbance, unless substantial prior ground disturbance can be documented. OPRHP anticipates that some portions of the project area have experienced extensive prior soil disturbance and that no archaeological testing will be needed in those areas. If you consider the entire project area to be disturbed, documentation of the disturbance will need to be reviewed by OPRHP. Examples of disturbance include mining activities and multiple episodes of building construction and demolition.

Documentation of ground disturbance should include a description of the disturbance with confirming evidence. Confirmation can include current photographs and/or older photographs of the project area which illustrate the disturbance (approximately keyed to a project area map), past maps or site plans that accurately record previous disturbances, or current soil borings that verify past disruptions to the land. Agricultural activity is not considered to be substantial ground disturbance.

Please note that in areas with alluvial soils or fill archaeological deposits may exist below the depth of superficial disturbances such as pavement or even deeper disturbances, depending on the thickness of the alluvium or fill. Evaluation of the possible impact of prior disturbance on archaeological sites must consider the depth of potentially culture-bearing deposits and the depth of planned disturbance by the proposed project.

A Phase I survey is designed to determine the presence or absence of archaeological sites or other cultural resources in the project's area of potential effect. The OPRHP can provide standards for conducting cultural resource investigations upon request. Cultural resource surveys and survey reports that meet these standards will be accepted and approved by the OPRHP.

Our office does not conduct archaeological surveys. A 36 CFR 61 qualified archaeologist should be retained to conduct the Phase I survey. Many archaeological consulting firms advertise their availability in the yellow pages. The services of qualified archaeologists can also be obtained by contacting local, regional, or statewide professional archaeological organizations. Phase I surveys can be expected to vary in cost per mile of right-of-way or by the number of acres impacted. We encourage you to contact a number of consulting firms and compare examples of each firm's work to obtain the best product.

Please also be aware that a Section 233 permit from the New York State Education Department (SED) may be necessary before archaeological fieldwork is conducted on State-owned land. If any portion of the project includes the lands of New York State you should contact the SED before initiating survey activities. The SED contact is Christina B. Rieth and she can be reached at (518) 402-5975. Section 233 permits are not required for projects on private land.

If you have any questions concerning archaeology, please contact Tim Lloyd at 518-268-2186 or Timothy.Lloyd@parks.ny.gov

APPENDIX II
GEOMPRPHOLOGICAL REPORT

CHRISTINE DAVIS CONSULTANTS, INC.
560 Penn Street, Verona, Pennsylvania 15147
Phone: 412/826-0443 Fax: 412/826-0458

PHASE IA GEOMORPHOLOGICAL SURVEY

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS

TOWN OF CLARKSTOWN, ROCKLAND COUNTY, NEW YORK

BY:

JOSHUA M. PFARR
Principal Investigator/Geomorphologist
Christine Davis Consultants, Inc.

ABSTRACT

A Phase IA Geomorphological Survey was conducted for the proposed Clarkstown Cranford Drive Drainage Improvements project in Town of Clarkstown, Rockland County, New York. Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering & Surveying Consultants, P.C. to perform cultural resource investigations for this project which include geomorphology evaluation. The sponsoring agency for this project is the Army Corps of Engineers (COE).

The area of potential effect (APE) consists of approximately 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)) of stream modification and realignment. It is topographically situated within floodplain/terrace settings associated with a tributary of the West Branch Hackensack River known as Demarest Kill within the Triassic Lowland Section of the Northern Piedmont physiographic province.

The field survey was conducted in August of 2016. Geomorphological field methodology involved the evaluation of soils and sediments within hand excavated auger probes. The excavation of auger probes revealed intact soils located on the T0 floodplain of the West Branch of Hackensack River also known as Demarest Kill.

Based on the results of the Phase IA Geomorphological Survey, shovel test probes on the T0 floodplain extending through any A and Bw horizons to the depth of the C horizon sands will be sufficient for a Phase I Archaeological Survey.

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 PROPOSED UNDERTAKING 1
1.2 AREA OF POTENTIAL EFFECT (APE) 1
1.3 PURPOSE OF INVESTIGATION 1

2.0 ENVIRONMENTAL BACKGROUND 4

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY 4
2.2 CLIMATE 4
2.3 SOILS 4

3.0 GEOMORPHOLOGICAL FIELD SURVEY 6

3.1 FIELD METHODOLOGY 6
3.2 FIELD SURVEY RESULTS 6

4.0 CONCLUSIONS AND RECOMMENDATIONS 13

5.0 REFERENCES 14

FIGURES

1	PROJECT LOCATION, HAVERSTRAW, NY 7.5' USGS MAPS	2
2	AREA OF POTENTIAL EFFECT (APE)	3
3	SOIL MAP OF APE	5
7	AUGER PROBE LOCATIONS	8
11	REPRESENTATIVE SOIL & SEDIMENT PROFILES	11-12

PHOTOGRAPHS

1	WEST BRANCH OF HACKENSACK RIVER (DEMAREST KILL) CHANNEL AND T00 FLOODPLAIN LOOKING SOUTHWEST	7
2	T0 FLOODPLAIN AT SOUTH END OF APE INCLUDING ABANDONED STREAM CHANNEL LOOKING NORTH	9
3	ARTIFICIAL RETENTION POND WEST OF STREAM NEAR SOUTH END OF APE LOOKING SOUTHWEST	9
4	AP 3 LOCATION NEAR CENTER OF APE LOOKING SOUTHEAST	10
5	NORTH END OF APE LOOKING SOUTH	10

1.0 INTRODUCTION

1.1 PROPOSED UNDERTAKING

The proposed undertaking involves the Clarkstown Cranford Drive Drainage Improvements project in the Town of Clarkstown, Rockland County, New York. Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering and Surveying Consultants, P.C. to perform cultural resource investigations for this project. The sponsoring agency for this project is the Army Corps of Engineers (COE).

1.2 AREA OF POTENTIAL EFFECT (APE)

The proposed project includes portions of the floodplain zones associated with the West Branch of Hackensack River, also known as Demarest Kill. The APE for this project encompasses a total size of 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)). The APE includes the areas where potential ground surface impacts will occur as part of the proposed undertaking. The APE is generally located west of the Hudson River and north of New City, New York between S.R. 304 and Old Route 304 within Clarkstown (Figures 1 and 2).

The West Branch of Hackensack River (Demarest Kill) flows north towards its confluence with the Hackensack River approximately 1 kilometer (km) (3,281 ft) away. It is fed by an artificially rerouted tributary that flows east between Cragmere Oval and Bush Ct. The landforms within the APE along the West Branch of Hackensack River (Demarest Kill) include T00 and T0 floodplain zones located at a nominal elevation of 30.5 to 36.6 m (100 to 120 ft) above sea level (asl).

A tributary of the West Branch of Hackensack River (Demarest Kill) also lies within the APE. This stream had been artificially diverted to its current course in the recent past. No intact alluvial soils with any potential for significant buried cultural material are present within this portion of the APE.

1.3 PURPOSE OF INVESTIGATION

The objectives of the geomorphological survey are to determine the relative age of the landforms and soils within the APE and to determine the maximum depth of excavation required for the recovery of cultural material during the Phase I Archaeological Survey. The floodplain zones of the West Branch of Hackensack River (Demarest Kill) and their associated soils will be the focus of the study.

FIGURE 1: PROJECT LOCATION, HAVERSTRAW, NY 7.5' USGS MAPS

FIGURE 2: AREA OF POTENTIAL EFFECT (APE) (NRCS 2016)

2.0 ENVIRONMENTAL BACKGROUND

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY

The bedrock of Rockland County is composed of sedimentary rock formations of Upper Triassic age such as the Newark group (USGS 2016). The conglomerate, mudstone, shale, and sandstone of the Brunswick Formation have been greatly altered by the advance and retreat of continental ice sheets of the late Pleistocene Epoch. The retreat of the glaciers of this period has resulted in the deposition of glacial till over the ground surface of the region (NYSM 2016; USFWS 2016; Van Diver 1985).

The Phase IA study area is situated in the Triassic Lowland section of the Northern Piedmont physiographic province. This section is characterized by broad, gently sloping valleys with a moderate pattern of ridges (USDA 1990). Elevations in the vicinity of the APE range from approximately 80 to 150 ft asl.

2.2 CLIMATE

Climatic conditions in Rockland County include cold and snowy winters and warm to hot summers. Precipitation is adequate and well distributed. The average winter temperature for most of the county is 28 degrees Fahrenheit (F)(-2.2 degrees Celsius (C)). The average summer temperature is 70 degrees F (21.1 degrees C). The total annual precipitation is 119.4 centimeters (cm) (47 inches (in)) of which approximately 50% falls from April through September. Prevailing winds are out of the south (USDA 1990).

2.3 SOILS

Soils in the project area derived from the Weathersfield-Cheshire-Urban Land association general soil unit. This soil association consists of very deep, nearly level to moderately steep, well drained soils formed on acidic glacial till derived from reddish sandstone on till plains. The soils within the study geomorphology study area are mapped as Cheshire-Urban land complex (CuB), Rippowam sandy loam (Ra), and Yalesville sandy loam (YaB) (Figure 3) (USDA 1990; NRCS 2016).

Cheshire-Urban land complex soils consist of very deep, gently sloping, well drained Cheshire soils and areas covered by urban development. These soils are typically formed in glacial till derived from red Triassic sandstone ridges with slopes of 2 to 8 percent. A representative soil profile for Cheshire soils consists of a very dark grayish brown gravelly fine sandy loam A horizon, a reddish brown gravelly fine sandy loam Bw horizon, and a dark reddish brown gravelly sandy loam C horizon.

Rippowam sandy loam consists of very deep, nearly level, and poorly drained soil located on floodplains with slopes of 0 to 3 percent. These soils formed in alluvium mainly derived from granite and sandstone. A representative soil profile for Rippowam sandy loam consists of a very dark grayish brown sandy loam A horizon, a series of dark grayish brown to grayish brown sandy loam Bw horizons, a dark gray and grayish brown fine sandy loam BC horizon, and a dark brown loamy sand C horizon.

Yalesville sandy loam consists of moderately deep, well drained soil located on uplands with slopes of 0 to 3 percent. These soils formed in glacial till derived from red Triassic sandstone. A representative soil profile for Yalesville sandy loam consists of a dark brown to dark reddish brown sandy loam A horizon, a series of reddish brown to red gravelly loam Bw horizons, and a red extremely channery loam C horizon.

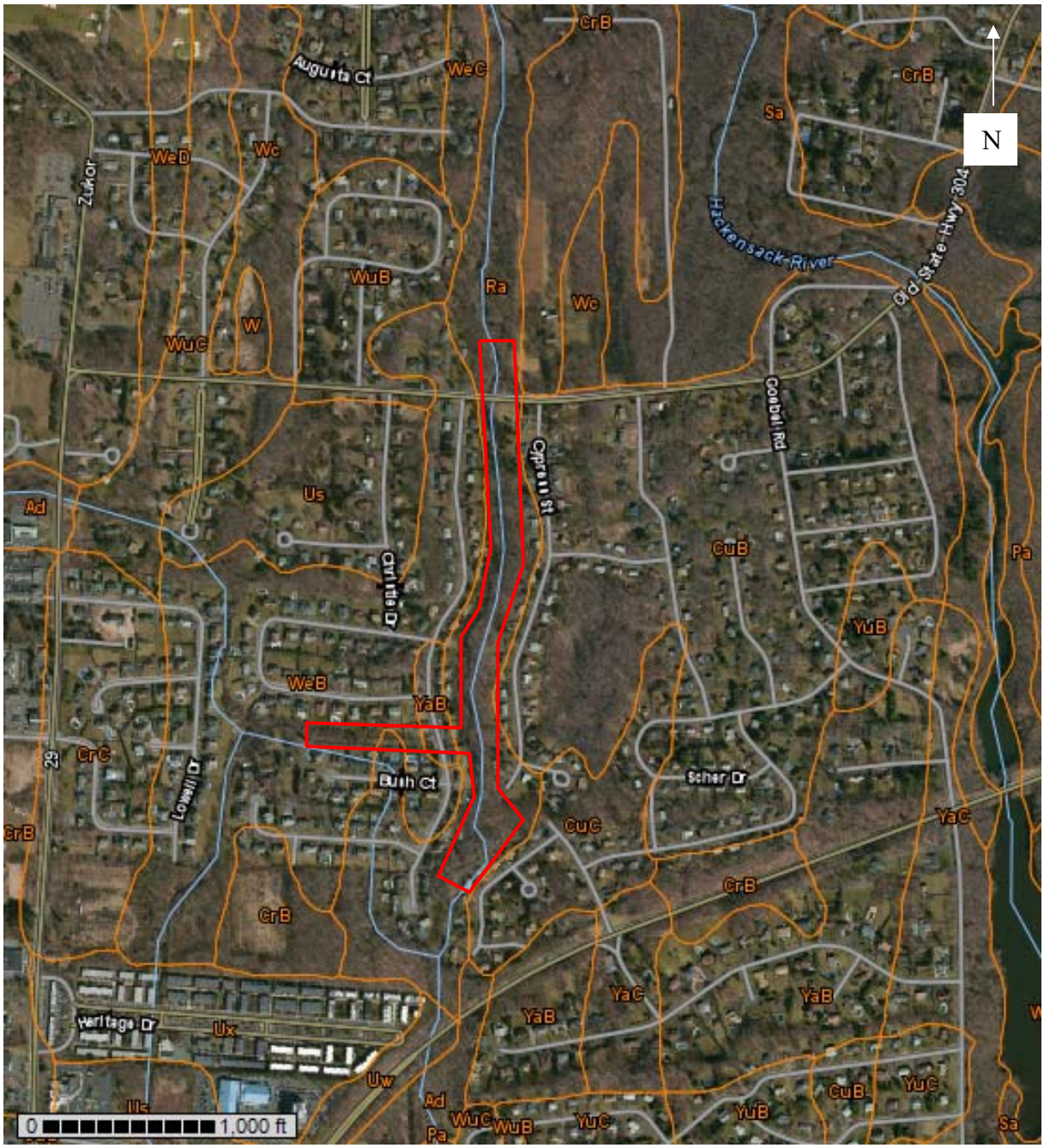


FIGURE 3: SOIL MAP OF THE APE (NRCS 2016)

3.0 GEOMORPHOLOGICAL FIELD SURVEY

3.1 FIELD METHODOLOGY

A total of four auger probes were excavated within the APE to identify the representative soil and sediment profiles present along the West Branch of Hackensack River (Demarest Kill). A T0 floodplain zone comprises a majority of the APE. Narrow T00 floodplains/active stream channel zones consisting of recent coarse sand and gravel alluvium were also visually identified within the APE (Photo 1). These T00 floodplains represent areas of extremely low probability for containing in situ historic or prehistoric cultural material. The lower portions of upland hillslopes were also identified within the APE containing relatively shallow soils developed on colluvium or partially altered glacial till. The T0 floodplain zone will be the focus of this geomorphology survey.

3.2 FIELD SURVEY RESULTS

The first and second auger probes (AP 1 & 2) were placed on the T0 floodplain on the west and east banks, respectively, of the West Branch of Hackensack River (Demarest Kill) near the south end of the APE at a height of approximately 80 cm (31.5 in) above the active stream channel. The profile of AP 1 included an 18 cm (7.1 in) thick dark brown sandy loam A horizon with a weak granular structure. The Bw horizon located beneath the A horizon consisted of a 22 cm (8.7 in) brown to yellowish brown sandy loam with a moderate granular structure. The Bw horizon was underlain by a series of massive loamy fine to coarse sand C horizons beginning at a depth of 40 cm (15.7 in) below ground surface (bgs) and extending to channel lag gravels at 150 cm (59.1 in) bgs (Figure 4; Photos 2 and 3).

The third auger probe (AP 3) was placed on the T0 floodplain on the east bank of the West Branch of Hackensack River (Demarest Kill) near the center of the APE located at a height of approximately 100 cm (39.4 in) above the active stream channel. The soil and sediment profile included a 10 cm (3.9 in) thick dark brown sandy loam Ao horizon with a weak to moderate granular structure. The Ao horizon was underlain by a 60 cm (23.6 in) thick brown sandy loam Bw horizon with a moderate granular structure. The Bw horizon was underlain by a 20 cm (7.9 in) thick grayish brown and yellowish brown massive loamy sand C horizon. A gray and dark gray medium to coarse sand C2 horizon was encountered at a depth of 90 cm (35.4 in) bgs (see Figure 4; Photo 4).

The fourth auger probe (AP 4) was placed on the T0 terrace on the east bank of the stream near the north end of the APE at a height of approximately 130 cm (51.2 in) above the active stream channel. The soil and sediment profile included a 10 cm (3.9 in) thick dark brown loamy sand Ao horizon. The Ao horizon was underlain by a 30 cm (11.8 in) thick brown and gray sand C horizon representing a relatively recent, massive flooding. The C horizon was underlain by a 25 cm (9.8 in) thick dark brown sandy loam 2Ab horizon with a moderate granular structure. This 2Ab horizon represents a former ground surface that was buried rapidly beneath the flood sands of the overlying C horizon. This buried ground surface has the highest potential for containing in situ cultural material. However, it is likely of relatively young age given the lack of soil development in the overlying matrix. Beneath the 2Ab horizon was a 25 cm (9.8 in) thick brown sandy loam 2Bw horizon with a moderate granular structure. A dark gray and brown mottled massive loamy sand 2C horizon was encountered at a depth of 90 cm (35.4 in) bgs followed by a massive gray and yellowish brown sandy clay 3C horizon at 120 cm (47.2 in) bgs (see Figure 4; Photo 5).

Figure 5 contains representative soil and sediment profiles for each area tested within the APE (south, center, and north).

PHOTO 1: WEST BRANCH OF HACKENSACK RIVER (DEMAREST KILL) CHANNEL AND T00 FLOODPLAIN LOOKING SOUTHWEST

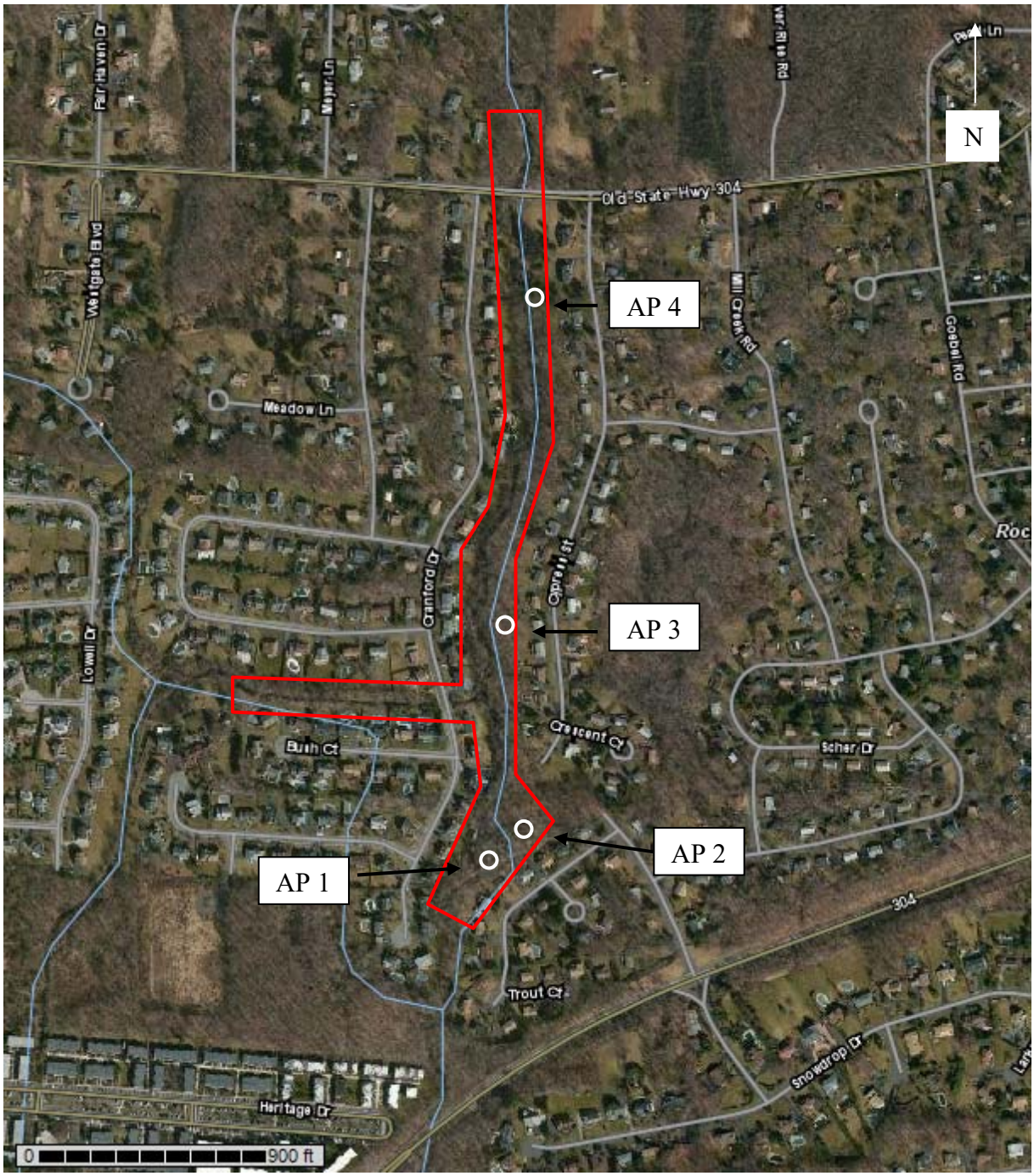


FIGURE 4: AUGER PROBE LOCATIONS

PHOTO 2: T0 FLOODPLAIN AT SOUTH END OF APE INCLUDING ABANDONED STREAM CHANNEL LOOKING NORTH

PHOTO 3: ARTIFICIAL RETENTION POND WEST OF STREAM NEAR SOUTH END OF APE LOOKING SOUTHWEST

PHOTO 4: AP 3 LOCATION NEAR CENTER OF APE LOOKING SOUTHEAST

PHOTO 5: NORTH END OF APE LOOKING SOUTH

Soil & Sediment Profile: AP 1	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-18 cm Ao Horizon 10YR 3/3
Brown & Yellowish Brown Sandy Loam	18-40 cm Bw Horizon 10YR 5/3 & 5/8
Very Pale Brown Loamy Fine Sand	40-79 cm C1 Horizon 10YR 7/3
Gray & Brownish Yellow Medium Sand	79-116 cm C2 Horizon 10YR 5/1 & 6/6
Gray Coarse Sand	116-150 cm C3 Horizon 10YR 6/1
Gray Gravel	150+ cm 2C Horizon 10YR 6/1

Soil & Sediment Profile: AP 3	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-10 cm Ao Horizon 10YR 3/3
Brown Sandy Loam	10-70 cm Bw Horizon 10YR 4/3
Gray Brown & Yellowish Brown Loamy Sand	70-90 cm C1 Horizon 10YR 5/2 & 5/8
Gray & Dark Gray Medium to Coarse Sands	90+ cm C2 Horizon 10YR 5/2 & 4/1

FIGURE 5: REPRESENTATIVE SOIL AND SEDIMENT PROFILES

Soil & Sediment Profile: AP 4	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-10 cm Ao Horizon 10YR 3/3
Brown & Gray Sand	10-40 cm C Horizon 10YR 5/3 & 5/1
Dark Brown Sandy Loam	40-65 cm 2Ab Horizon 10YR 3/3
Brown Sandy Loam	65-90 cm 2Bw Horizon 10YR 5/3
Dark Gray & Brown Loamy Sand	90-120 cm 2C Horizon 10YR 4/1 & 4/3
Gray & Yellowish Brown Sandy Clay	120+ cm 3C Horizon 10YR 6/1 & 5/6

FIGURE 5 continued: REPRESENTATIVE SOIL AND SEDIMENT PROFILES

4.0 CONCLUSIONS AND RECOMMENDATIONS

The Phase IA Geomorphological field survey was conducted for the Clarkstown Cranford Drive Drainage Improvements project in August of 2016. Field methodology involved the hand excavation of auger probes in alluvial environments across an APE of approximately 48,186 sq m (518,666 sq ft or 11.9 ac). The geomorphological survey involved the stream the floodplain zones of the West Branch of Hackensack River (Demarest Kill) and an unnamed tributary within the APE.

The auger probes excavated on the T0 floodplain zones of the West Branch of Hackensack River (Demarest Kill) revealed soil development on sandy stream channel and flood deposits. On much of the T0 floodplain relatively recent sandy flood deposits are present at or just below the ground surface. Archaeological testing on these landforms is recommended to extend to the top of the fine to coarse sand C horizons located beneath the A and Bw horizons. These massive, sandy C horizons represent sterile, partially altered, sedimentary parent material. This testing can be accomplished by the hand excavation of shovel test probes (STPs) to depths of approximately 40 to 90 cm (15.7 to 35.4 in) bgs.

5.0 REFERENCES

Natural Resources Conservation Service
2016 The Web Soil Survey http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx (accessed on August 24, 2016).

New York State Museum
2016 Geology-Geographic Information System http://www.nysm.nysed.gov/research-collections/geology/gis (accessed on August 24, 2016)

United States Department of Agriculture, Soil Conservation Service
1990 *Soil Survey of Rockland County, New York.* Prepared in cooperation with Cornell University Agricultural Experiment.

United States Fish and Wildlife Service
2016 *Geomorphic Provinces and Sections of the New York Bight Watershed*. National Conservation Training Center https://nctc.fws.gov/pubs5/web_link/text/geolsect.htm (accessed on August 24, 2016).

United States Geological Survey
2016 Mineral Resources Online Spatial Data http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NYTRba;3 (accessed on August 24, 2016).

Van Diver, Bradford B.
1985 *Roadside Geology of New York*. Mountain Press Publishing Company, Missoula.

APPENDIX III
SHOVEL TEST RECORDS

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 1-1	0-36	Medium Brown Sandy Clay Loam	NCM
	36-46	Brown and Gray Sand	NCM
ST 1-2	0-28	Dark Brown Sandy Silt Loam	NCM
	28-41	Gray Brown Sandy Loam	NCM
	41-51	Gray Sand	NCM
ST 1-3	0-29	Dark Brown Sandy Silt Loam	NCM
	29-42	Gray Brown Sandy Clay Loam	NCM
	42-52	Gray Brown Sand and Rocks	NCM
ST 1-4	0-10	Reddish Brown Silt Loam	NCM
	10-50	Grey Organic Lense	NCM
	50-62	Sandy Clay Loam	NCM
	62+	Grey Brown Sand	NCM
ST 1-5	0-46	Brown Sandy Silt Loam	NCM
	46-56	Brown Sand	NCM
ST 1-6	0-47	Brown Sandy Silt Loam	NCM
	47-57	Brown Sand	NCM
ST 2-1	0-21	Brown Sandy Silt Loam	NCM
	21-31	Brown Sand	NCM
ST 2-2	0-19	Brown Sandy Silt Loam	NCM
	19-42	Yellow Brown Sandy Silt Loam	NCM
	42	Rock Impasse	
ST 2-3	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 2-4	0-29	Brown Sandy Silt Loam	NCM
	29-39	Brown Sand	NCM
ST 2-5	0-34	Brown Sandy Silt Loam	NCM
	34-44	Brown Sand	NCM
ST 2-6	0-43	Brown Sandy Silt Loam	NCM
	43-53	Brown Sand	NCM
ST 2-7	0-48	Brown Sandy Silt Loam	NCM
	48-58	Brown Sand	NCM
ST 2-8	0-39	Brown Sandy Silt Loam	NCM
	39-49	Brown Sand	NCM
ST 3-1	0-51	Brown Sandy Silt Loam	NCM
	51-61	Brown Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 3-2	0-44	Brown Sandy Silt Loam	NCM
	44-54	Brown Sand	NCM
ST 3-3	0-47	Brown Sandy Silt Loam	NCM
	47-57	Brown Sand	NCM
ST 4-1	0-43	Brown Sandy Silt Loam	NCM
	43-53	Brown Sand	NCM
ST 5-1	0-40	Brown Sandy Silt Loam	NCM
	40-50	Brown Sand	NCM
ST 5-2	0-14	Brown Silt Loam	NCM
	14-47	Light Yellow Brown Sandy Silt Loam	NCM
	47-57	Pale Yellow Sand	NCM
ST 5-3	0-23	Brown Sandy Silt Loam	NCM
	23-33	Yellow Brown Sand	NCM
ST 5-4	0-19	Brown Sandy Silt Loam	NCM
	19-29	Brown Sand	NCM
ST 5-5	0-30	Brown Sandy Silt Loam	NCM
	30-40	Brown Sand	NCM
ST 5-6	0-31	Brown Sandy Silt Loam	NCM
	31-41	Brown Sand	NCM
ST 6-1	0-6		NCM
	6	Brown Sandy Silt Loam	NCM
		Rock Impasse	
ST 6-2	0-8		NCM
	8	Brown Sandy Silt Loam	NCM
		Rock Impasse	
ST 6-3	0-32		NCM
	32-42	Brown Sandy Silt Loam	NCM
		Brown Sand	
ST 6-4	0-36		NCM
	36-46	Brown Sandy Silt Loam	NCM
		Brown Sand	
ST 6-5	0-38	Brown Sandy Silt Loam	NCM
	38-48	Brown Sand	NCM
ST 6-6	0-30	Brown Sandy Silt Loam	NCM
	30-40	Brown Sand	NCM
ST 6-7	0-20	Brown Sandy Silt Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	20-30	Brown Sand	NCM
ST 6-8	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 6-9	0-46	Brown Sandy Silt Loam	NCM
	46-56	Brown Sand	NCM
ST 6-10	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 6-11	0-37	Brown Sandy Silt Loam	NCM
	37-47	Brown Sand	NCM
ST 7-1	0-12	Brown Sandy Silt Loam	NCM
	12-37	Light Brown Sandy Silt Loam	NCM
	37	Rock Impasse	NCM
ST 7-2	0-51	Brown Sandy Silt Loam	NCM
	51	Rock Impasse	NCM
ST 7-3	0-43	Brown Sandy Silt Loam	NCM
	43-53	Yellow Brown Sand	NCM
ST 7-4	0-32	Brown Sandy Silt Loam	NCM
	32-42	Yellow Brown Sand	NCM
ST 7-5	0-31	Brown Sandy Silt Loam	NCM
	31-41	Yellow Brown Sand	NCM
ST 7-6	0-28	Dark Brown Sandy Loam	NCM
	28-70	Brown Sandy Loam	NCM
	70-80	Light Yellow Brown Loamy Sand	NCM
ST 7-7	0-36	Brown Sandy Silt Loam	NCM
	36-46	Yellow Brown Sand	NCM
ST 7-8	0-34	Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 7-9	0-31	Brown Sandy Silt Loam	NCM
	31-41	Yellow Brown Sand	NCM
ST 7-10	0-29	Brown Sandy Silt Loam	NCM
	29-39	Yellow Brown Sand	NCM
ST 7-11	0-27	Rocky Brown Silt Loam	NCM
	27	Rock Impasse	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 7-12	0-25	Rocky Brown Silt Loam	NCM
	25	Rock Impasse	NCM
ST 7-13	0-24	Brown Sandy Silt Loam	NCM
	24-39	Red Brown Sandy Silt Loam	NCM
	39049	Yellow Brown Sand	NCM
ST 7-14	0-17	Brown Sandy Silt Loam	NCM
	17-34	Red Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 7-15	0-19	Brown Sandy Silt Loam	NCM
	19	Rock Impasse	NCM
ST 7-16	0-14	Brown Sandy Silt Loam	NCM
	14	Rock Impasse	NCM
ST 7-17	0-32	Brown Sandy Silt Loam	NCM
	32-42	Yellow Brown Sand	NCM
ST 7-18	0-19	Brown Sandy Silt Loam	NCM
	19-29	Yellow Brown Sand	NCM
ST 7-19	0-23	Brown Sandy Silt Loam	NCM
	23-33	Yellow Brown Sand	NCM
ST 7-20	0-47	Brown Sandy Silt Loam	NCM
	47	Rock Impasse	NCM
ST 8-1	0-34	Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 8-2	0-24	Brown Sandy Silt Loam	NCM
	24-60	Red Brown Sandy Silt Loam	NCM
	60-70	Yellow Brown Sand	NCM
ST 8-3	0-40	Brown Sandy Silt Loam	NCM
	40-50	Yellow Brown Sand	NCM
ST 8-4	0-5	Mottled Brown and Gray Sandy Silt Loam and Gravel	NCM
	5	Gravel Disturbance	NCM
ST 9-1	0-36	Brown Sandy Silt Loam	NCM
	36-46	Brown Sand	NCM
ST 9-2	0-39	Brown Sandy Silt Loam	NCM
	39-49	Brown Sand	NCM
ST 9-3	0-34	Brown Sandy Silt Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	34-44	Brown Sand	NCM
ST 9-4	0-49	Brown Sandy Silt Loam	NCM
	49-59	Brown Sand	NCM
ST 9-5	0-40	Brown Sandy Silt Loam	NCM
	40-50	Brown Sand	NCM
ST 9-6	0-19	Brown Sandy Silt Loam	NCM
	19-39	Light Brown Sandy Silt Loam	NCM
	39	Rock Impasse	NCM
ST 9-7	0-17	Mottled Brown and Yellow Sandy Silt Loam	NCM
	17	Rock Impasse	NCM
ST 9-8	0-47	Brown Sandy Silt Loam	NCM
	47	Rock Impasse	NCM
ST 9-9	0-11	Brown Sandy Silt Loam	NCM
	11-30	Light Brown Sandy Silt Loam	NCM
	30-40	Pale Yellow Brown Sand	NCM
ST 9-10	0-42	Brown Sandy Silt Loam	NCM
	42-44	Yellow Brown Sandy Silt	NCM
	44	Rock Impasse	NCM
ST 9-11	0-33	Brown Sandy Silt Loam	NCM
	33-43	Yellow Brown Sand	NCM
ST 9-12	0-20	Dark Brown Sandy Loam	NCM
	20-80	Brown Sandy Loam	NCM
	80-90	Light Yellow Brown Loamy Sand	NCM
ST 9-13	0-20	Medium Brown Silt Loam	NCM
	20-80	Med Brown Sand	NCM
	80-90	Gray Brown Sand	NCM
ST 9-14	0-23	Dark Brown Sandy Silt Loam	NCM
	23-60	Brown Silt Loam	NCM
	60-70	Gray Brown Sand Loam	NCM
ST 9-15	0-15	Dark Brown Sandy Silt Loam	NCM
	15-30	Brown Sandy Loam	NCM
	30-45	Gray Brown Sandy Loam	NCM
	45-65	Light Gray and Yellow Brown Sandy Clay Loam	NCM
	65-75	Light Gray and Yellow Brown Loamy Sand	NCM
ST 9-16	0-11	Dark Brown Sandy Silt Loam	NCM
	11-40	Brown Sand Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	40	Rock Impasse	NCM
ST 9-17	0-23	Dark Brown Sandy Silt Loam	NCM
	23-33	Brown Sand Loam	NCM
ST 9-18	0-31	Brown Sand	NCM
	31-57	Dark Brown Sandy Silt Loam	NCM
	57-67	Light Brown Sand	NCM
ST 9-19	0-25	Brown Sand	NCM
	25-42	Gray Brown Sandy Loam	NCM
	42-55	Light Brown Sandy Loam	NCM
	55-65	Yellow Brown Sand	NCM
ST 9-20	0-22	Brown Sand	NCM
	22-56	Brown Sandy Loam	NCM
	56-80	Yellow Brown Sandy Loam	NCM
	80-90	Yellow and Gray Loamy Sand	NCM
ST 9-21	0-27	Brown Sand	NCM
	27-75	Brown Sandy Silt Loam	NCM
	75-85	Yellow and Gray Loamy Sand	NCM
ST 9-22	0-36	Dark Brown Sandy Silt Loam	NCM
	36-46	Yellow Brown Sand	NCM
ST 9-23	0-21	Brown Sand	NCM
	21-35	Brown Sandy Loam	NCM
	35-40	Yellow Brown Sandy Loam	NCM
	40	Rock Impassse	NCM
ST 9-24	0-30	Brown Sand	NCM
	30-55	Brown Sandy Loam	NCM
	55-65	Yellow Brown Sandy Loam	NCM
ST 9-25	0-31	Brown Sand	NCM
	31-66	Brown Sandy Loam	NCM
	66-76	Yellow Brown Sandy Loam	NCM
ST 9-26	0-30	Brown Sand	NCM
	30-70	Dark Brown Sandy Loam	NCM
	70-100	Yellow Brown Sandy Loam	NCM
	100-110	Yellow and Gray Loamy Sand	NCM
ST 10-1	0-23	Brown Sand	NCM
	23-80	Brown Silty Clay Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 10-2	0-21	Brown Sandy Silt Loam	NCM
	21-72	Gray Brown Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	72-82	Yellow Brown Sand	NCM
ST 10-3	0-20	Dark Brown Silt Loam	NCM
	20-48	Gray Brown Sand	NCM
	48-82	Brown Sandy Loam	NCM
	82-92	Dark Gray Sand	NCM
ST 10-4	0-37	Dark Brown Silt Loam	NCM
	37-64	Gray Brown Silty Clay Loam	NCM
	64-74	Light Gray Clay Loam	NCM
ST 10-5	0-12	Dark Brown Silt Loam	NCM
	12-52	Brown Sand	NCM
	52-90	Dark Gray Brown Sandy Loam	NCM
	90-105	Dark Gray and Dark Yellow Brown Sandy Clay Loam	NCM
	105	Rock Impasse	NCM
ST 11-1	0-17	Dark Brown Sandy Silt Loam	NCM
	17-60	Brown Sand Loam	NCM
	60-70	Gray Sand	NCM
ST 11-2	0-10	Brown Silt Loam	NCM
	10	Buried Pipe	NCM
ST 11-3	0-19	Dark Brown Sandy Silt Loam	NCM
	19-81	Brown Sand Loam	NCM
	81-92	Brown and Gray Sandy Silt Loam	NCM
	92-102	Gray Sand	NCM
ST 11-4	0-53	Brown Sandy Silt Loam	NCM
	53-63	Dark Gray Brown Sand	NCM
ST 12-1	0-10	Brown Silt Loam	NCM
	10-38	Yellow Brown Sandy Clay Loam	NCM
	38-48	Yellow Brown Sand	NCM
ST 12-2	0-20	Brown Silt Loam	NCM
	20-65	Brown Sandy Silt Loam	NCM
	65-75	Rock and Sand	NCM
ST 12-3	0-41	Brown Silt Loam	NCM
	41-80	Brown Sandy Silt Loam	NCM
	80-90	Rock and Sand	NCM
ST 12-4	0-17	Dark Brown Sandy Silt Loam	NCM
	17-50	Brown Sandy Loam	NCM
	50-75	Light Brown Sandy Silt	NCM
	75-85	Light Brown Gravelly Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 12-5	0-9	Dark Brown Sandy Silt Loam	NCM
	9-61	Brown Sandy Loam	NCM
	61-82	Light Brown Sandy Silt	NCM
	82	Rock Impasse	NCM
ST 12-6	0-18	Brown Sandy Loam	NCM
	18-62	Brown Sand	NCM
	62-72	Gray Brown Loamy Sand	NCM
ST 12-7	0-31	Brown Sand	NCM
	31-86	Gray Brown Sandy Silt Loam	NCM
	86-96	Brown Sand	NCM
ST 12-8	0-29	Rocky Brown Sand	NCM
	29-71	Gray Brown Sandy Silt Loam	NCM
	71-81	Gray Brown Sand	NCM
ST 12-9	0-30	Dark Brown Silt Loam	NCM
	30	Rock Impasse	NCM
ST 12-10	0-58	Brown Sandy Silt Loam	NCM
	58-68	Yellow Brown Sandy Loam	NCM
ST 12-11	0-24	Medium Brown Silt Loam	NCM
	24-40	Yellow Brown Sandy Silt Loam	NCM
	40-50	Gray Brown Sand	NCM
ST 12-12	0-22	Brown Silt Loam	NCM
	22-53	Brown Sandy Silt Loam	NCM
	53	Rock Impasse	NCM
ST 12-13	0-14	Dark Brown Silt Loam	NCM
	14-28	Yellow Brown Sandy Silt Loam	NCM
	28	Rock Impasse	NCM
ST 12-14	0-38	Brown Sandy Silt Loam	NCM
	38	Rock Impasse	NCM
ST 13-1	0-12	Dark Brown Sandy Silt Loam	NCM
	12-48	Brown Sandy Silt Loam	NCM
	48	Rock Impasse	NCM
ST 13-2	0-53	Dark Brown Sandy Silt Loam	NCM
	53-69	Brown Sandy Silt Loam	NCM
	69-79	Brown Sand	NCM
ST 13-3	0-20	Brown Sandy Loam	NCM
	20-35	Brown Sand	NCM
	35-45	Gray Brown Loamy Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 14-1	0-24	Brown Silt Loam	NCM
	24-80	Brown Sandy Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 14-2	0-21	Brown Sandy Silt Loam	NCM
	21-65	Gray Brown Sandy Silt Loam	NCM
	65-75	Yellow Brown Sand	NCM
ST 14-3	0-14	Dark Brown Sandy Loam	NCM
	14-43	Light Brown Sandy Silt Loam	NCM
	43-90	Gray Brown Sandy Loam	NCM
	90	Light Gray Sand	NCM
ST 14-4	0-39	Brown Sandy Silt Loam	NCM
	39-92	Dark Brown Sandy Silt Loam	NCM
	92-106	Gray Brown Sandy Loam	NCM
	106-126	Light Gray Sand	NCM
ST 14-5	0-38	Brown Silt Loam	NCM
	38-80	Yellow Brown Sandy Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 14-6	0-34	Dark Brown Sandy Loam	NCM
	34-108	Gray Brown Sandy Silt Loam	NCM
	108-118	Light Gray Clay Loam	NCM
ST 14-7	0-15	Dark Brown Sandy Silt Loam	NCM
	15-35	Brown Sandy Loam	NCM
	35-57	Brown Sand	NCM
	57-75	Dark Gray Brown Silt Loam	NCM
	75-102	Brown Silt Loam	NCM
	102-112	Gravelly Loam	NCM
ST 14-8	0-53	Brown Sandy Silt Loam	NCM
	53-63	Gray Sand	NCM
ST 14-9	0-60	Brown Sandy Silt Loam	NCM
	60-70	Brown Sand	NCM
ST 14-10	0-51	Brown Sandy Silt Loam	NCM
	51-90	Gray Brown Sandy Loam	NCM
	90-100	Gray Sand	NCM
ST 14-11	0-59	Brown Sandy Silt Loam	NCM
	59-69	Gray Sand	NCM
ST 15-1	0-43	Brown Sandy Silt Loam	NCM
	43	Rock Impasse	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 15-2	0-37	Dark Brown Sandy Silt Loam	NCM
	37-44	Gravelly Red Brown Silty Clay Loam	NCM
	44	Rock Impasse	NCM
ST 15-3	0-29	Brown Sandy Silt Loam	NCM
	29-42	Light Brown Sandy Silt Loam	NCM
	42	Rock Impasse	NCM
ST 16-1	0-11	Dark Brown Sandy Silt Loam	NCM
	11	Rock Impasse	NCM
ST 16-2	0-20	Dark Brown Sandy Silt Loam	NCM
	20	Rock Impasse	NCM
ST 16-3	0-31	Brown Sandy Silt Loam	NCM
	31	Rock Impasse	NCM
ST 16-4	0-37	Brown Sandy Silt Loam	NCM
	37-47	Red Brown Sand	NCM
ST 16-5	0-35	Brown Sandy Silt Loam	NCM
	35	Rock Impasse	NCM
ST 16-6	0-21	Brown Sandy Silt Loam	NCM
	21-33	Gravelly Dark Yellow Brown Loamy Sand	NCM
	33-43	Dark Yellow Brown Sandy Gravel	NCM
ST 16-7	0-36	Brown Sandy Silt Loam	NCM
	36-46	Light Gray Brown Sandy Gravel	NCM
ST 17-1	0-35	Brown Sandy Loam	NCM
	35	Rock Impasse	NCM
ST 17-2	0-34	Brown Sandy Loam	NCM
	34	Rock Impasse	NCM

Civil Engineering

Environmental Services

Geotechnical Engineering

Structural Engineering

Land Surveying

Homeland Security

Site Acquisition

Program/Construction Management

Construction Inspection & Materials Testing

TECTONIC

Practical Solutions, Exceptional Service

Corporate Headquarters:

70 Pleasant Hill Road, P.O.Box 37

Mountainville, New York 10953

Phone: (800) 829-6531

Additional Office Locations:

Albany, New York
Albuquerque, New Mexico
Boca Raton, Florida
Charlotte, North Carolina
Hartford, Connecticut
New York, New York
Short Hills, New Jesey
Newburgh, New York
Phoenix, Arizona
Pittsburgh, Pennsylvania
Rochester, New York
Richmond, Virginia
Tampa, Florida

www.tectonicengineering.com

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation, and Historic Preservation

ANDREW M. CUOMO
Governor

ROSE HARVEY
Commissioner

October 18, 2016

Thomas King
Governor's Office of Storm Recovery
99 Washington Ave, Suite 1224
Albany, NY 12231

Re: HTF/ GOSR/ NY Rising
Cranford Drive Drainage Improvements Project
Clarkstown/ Rockland County
16PR05210

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 Title 54, Section 306108 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, it is the opinion of SHPO 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,

L Moss

Larry K Moss, Historic Preservation Technical Specialist
CC: Mary Barthelme
Andrea Gievers, Tectonic Engineering

July 27, 2016

Shannon Holsey, President
Stockbridge-Munsee Community, Band of the Mohicans
N8476 Moh He Con Nuck Road
Bowler, WI 54416

Re: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, NY – New York Rising Community Reconstruction Program

Dear Shannon Holsey:

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), an office 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"), is serving as the entity responsible for compliance with the HUD environmental review procedures set forth in 24 CFR Part 58. GOSR is acting on behalf of HUD in providing the enclosed project information and inviting this discussion with your Community to respond with any concerns or comments.

GOSR processes environmental reviews for projects funded with HUD CDBG-DR on a case by case basis. GOSR proposes to provide funding for a stormwater management improvements project in Clarkstown, New York. In accordance with Section 101(d)(6)(B) of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 302706(b)), and its implementing regulations, 36 Code of Federal Regulations (CFR) Part 800, this letter serves as notification of the proposed action. This consultation is being sent to the Delaware Nation, the Delaware Tribe of Indians and the Stockbridge-Munsee Community Band of Mohicans.

Area of Potential Effect: The Clarkstown Cranford Drive Drainage Improvements Project is a stormwater management improvement project involving the modification and realignment of a tributary of the West Branch Hackensack, also known as the Demarest Kill, located in the Town of Clarkstown, Rockland County, New York (Project location maps are included in **Attachment 1**). This work includes modification of existing on-site drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

Proposed Project Description: The proposed work will be performed in six phases to reduce the potential for erosion (Project site plans are included in Attachment 2). Phase 1 will begin at the Old Route 304 bridge, and the subsequent phases will move south down the Demarest Kill. Approximately 4,650 linear feet of the bed and banks of the Demarest Kill, located south of Old Route 304 and running approximately parallel to Cranford Drive, will be realigned and reinforced. The redesign of the stream channel incorporates a multi-channel design, including a normal low flow channel (thalwag), a bank full channel, and the floodplain channel. Backflow preventers will be installed at all drainage pipes out letting into the stream channel to prevent backflow from the channel flooding onto the roadway.

A drainage study of the Demarest Kill was commissioned by the Rockland County Drainage Agency in 1991, where a survey elevation error was discovered as presented in the 1983 Flood Insurance Study (FIS). An elevation difference of approximately five (5) feet was noted in the vicinity of Old Route 304 and Cranford Drive. As such, the Base Flood Elevations (BFE's), established from the 100-year flood level, were approximately five feet lower in this area than what they should have been. Subsequently, a number of homes built before and around 1991 were located within the 100-year flood zone on the 2000 revision of the FIS for Rockland County. As such, the proposed project's objectives are to alleviate flooding in and around the houses and streets currently within the 100-year flood zone by modifying the Demarest Kill channel and floodplain to appropriate dimensions to contain a one-percent flood within the channel banks.

Phase 1 of the proposed project involves 3,240 square feet (SF) of riprap being installed on either side of the three (3) existing 16-foot x 8.5-foot concrete box culverts at Old Route 304 (Project site plans are included in **Attachment 2**). Modular block retaining walls will be located on the south side of the three culverts, with a 165-SF gabion check dam in place to divert low flow waters into a single culvert. The existing stream channel is to be realigned, with a 190-SF rock cross-vein and 145-SF "W" rock weir being located in the proposed stream channel. A temporary stream crossing will be constructed using three (3) 30-inch x 20-foot high-density polyethylene (HDPE) pipes covered by approximately 20 cubic yards (CY) of ¾-inch aggregate fill placed on a filter fabric. There will be approximately one (1) foot of the ¾-inch aggregate fill placed on both sides and on top of the 20-foot pipes. A total of 32 trees of 8-inch diameter or larger are proposed to be removed during Phase 1.

Phase 1A of the proposed project involves approximately a boulder cluster of approximately 6 to 10 CY to be placed next to 3,950 SF of riprap before the proposed stream alignment connects to the existing streambed. A 145-SF "W" rock weir will be placed on the south portion of this area, where the proposed streambed diverges from the existing streambed. A total of 44 trees of an 8-inch or larger diameter are proposed to be removed during Phase 1A.

Phase 2 and Phase 3 run approximately parallel with one another, with Phase 2 involving work to create the proposed stream channel on the eastern bank and Phase 3 work on the western bank to fill in the existing stream and reinforce the streambed. Phase 2 work involves a modular block retaining wall being placed on the northeastern edge of the streambank. A 145-SF "W" rock weir is located at the proposed streambed south of the retaining wall. Two (2) boulder clusters containing approximately 6 to 10 CY of rocks each will be placed along the proposed streambed during Phase 2, with brush matting being placed during Phase 3. An approximately 190-SF rock cross-vein is located north of a second temporary stream crossing, as described in Phase 1. Approximately 450 SF of brush matting will be placed on both sides of the streambed located north of the 18,900 SF of riprap reinforcing the junction of the tributary traveling west under Cranford Drive (See Phase 6 for the tributary work). The brush matting and riprap will be placed on the eastern side during Phase 2, and on the western side during Phase 3. The southern portion of the Phase 2 section includes placement of approximately 90 SF of riprap for a sewer crossing, a third temporary stream crossing as described in Phase 1, and 150 feet for a boulder revetment to reinforce the new streambed curve on the western bank of the z-curve. Approximately 270 trees with diameters 8" or greater will be removed during Phase 2, while approximately 64 trees with diameters 8 inches or greater will be removed during Phase 3.

Phase 4 and Phase 5 also run approximately parallel to one another, with Phase 4 occurring on the eastern bank and Phase 5 occurring on the western bank. Phase 5 also overlaps the southern tip of Phase 2. Phase 5 involves placement of a 150-foot boulder revetment to reinforce the new streambed curve on the eastern bank of the z-curve, with a 190-SF rock cross-vein located to the south of the boulder revetment. Approximately 175 SF of brush matting will be located on the eastern bank, north of approximately 2,800

SF of riprap for sewer crossings at the southern tip of the work area. Approximately 225 SF of brush matting will be placed on the western bank and approximately 65 feet of boulder revetment on the eastern bank, both located south of the sewer crossing riprap. Approximately 16 trees with diameters 8 inches or greater will be removed during Phase 4, while approximately 67 trees with diameters 8 inches or greater will be removed during Phase 5.

Phase 6 involves work on the tributary traveling west under Cranford Drive. The riprap from Phase 2 and Phase 3 ends at the eastern side of Cranford Drive. The western banks will have stabilized construction entrances from Cranford Drive. The stream will be staying in approximately the same footprint as the existing streambed, but it will be reinforced with two boulder clusters of approximately 6 to 10 CY, with a single 180-SF "W" rock weir and two (2) 210-SF rock cross-veins. Approximately 82 trees with diameters 8 inches or greater will be removed during Phase 6. As the stream stabilization and restoration work is completed, habitat improvements including approximately 674 major trees, 156 minor trees, 1,790 shrubs, and 4,010 ground-cover plants will be planted along the stream banks to replace the removed trees, shrubs, and grasses.

The project will involve approximately 8,000 cubic yards of excavation material at the site. The top-soil will be stripped, stockpiled, and respread on the site. Excavated boulders and stones will be reused in the channels for stabilization, and the excess soils will be disposed of at approved locations. The project is not located in a defined archaeological sensitive buffer zone.

Pursuant to NHPA Section 106, GOSR has initiated consultation with the State Historic Preservation Office (SHPO) concerning this Project and its potential to affect historic resources that are listed on or eligible for listing on the NRHP. No determination has been received from SHPO to date. GOSR is completing an environmental review for this project pursuant to HUD NEPA regulations. If the Area of Potential Effect encompasses historic properties of religious or cultural significance to your Community please respond within 30 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.

Sincerely,

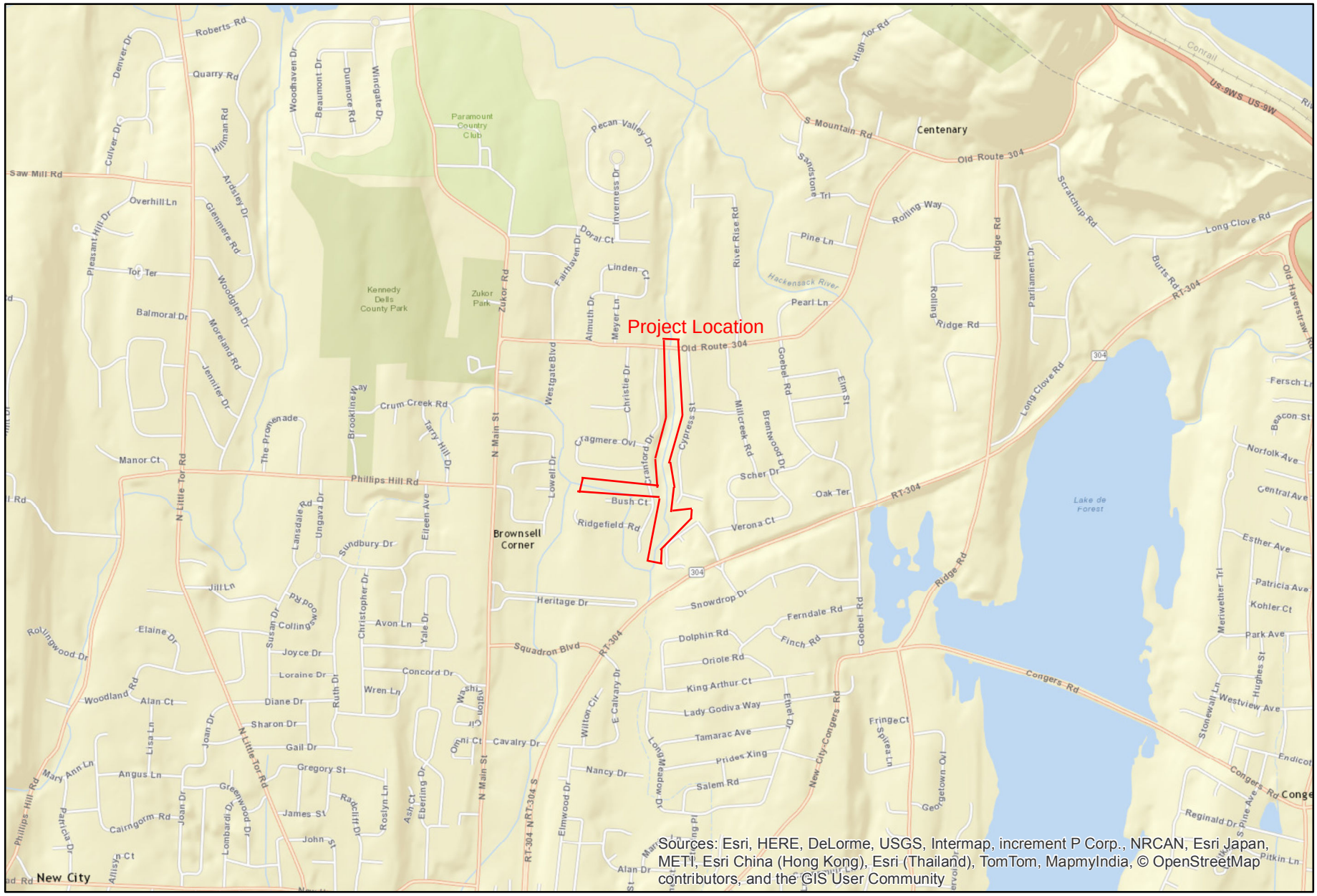
Thomas J. King
Assistant General Counsel and Certifying Officer
Governor's Office of Storm Recovery

Enclosures:
Attachment 1: Project Location Maps
Attachment 2: Project Site Plans (included as part of the NYSDEC Permit)

Electronic letter sent to:
Bonney Hartley
THPO, New York Office
Stockbridge-Munsee Community, Band of the Mohicans
65 1st Street
Troy, NY 12180

Attachment 1

Project Location Maps



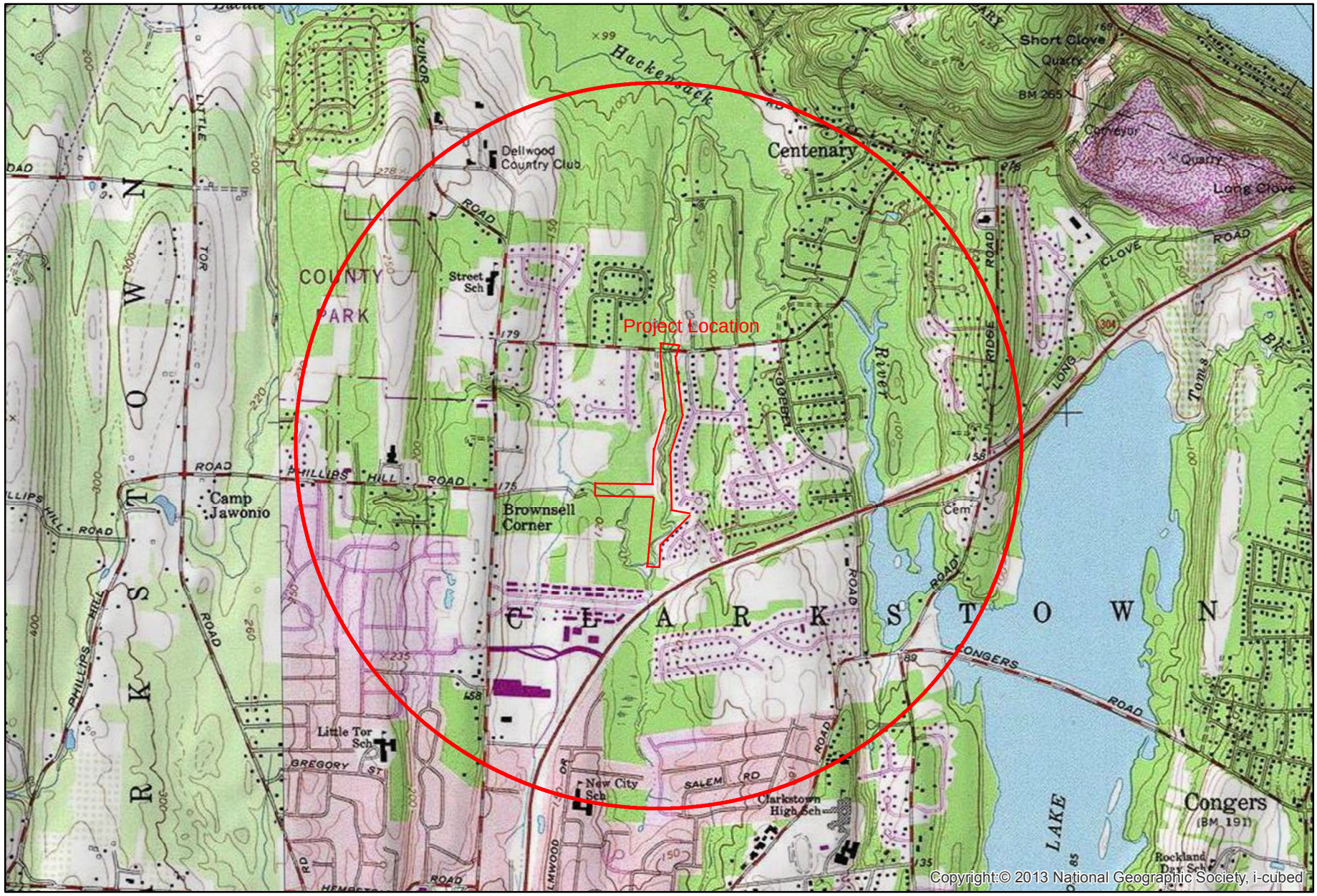
TECTONIC
Practical Solutions, Exceptional Service

0 0.25 0.5 1 Miles

1:24,000

STREET MAP
CRANFORD DRIVE
CLARKSTOWN, NY 10956
ROCKLAND COUNTY

N
W E
S



TECTONIC

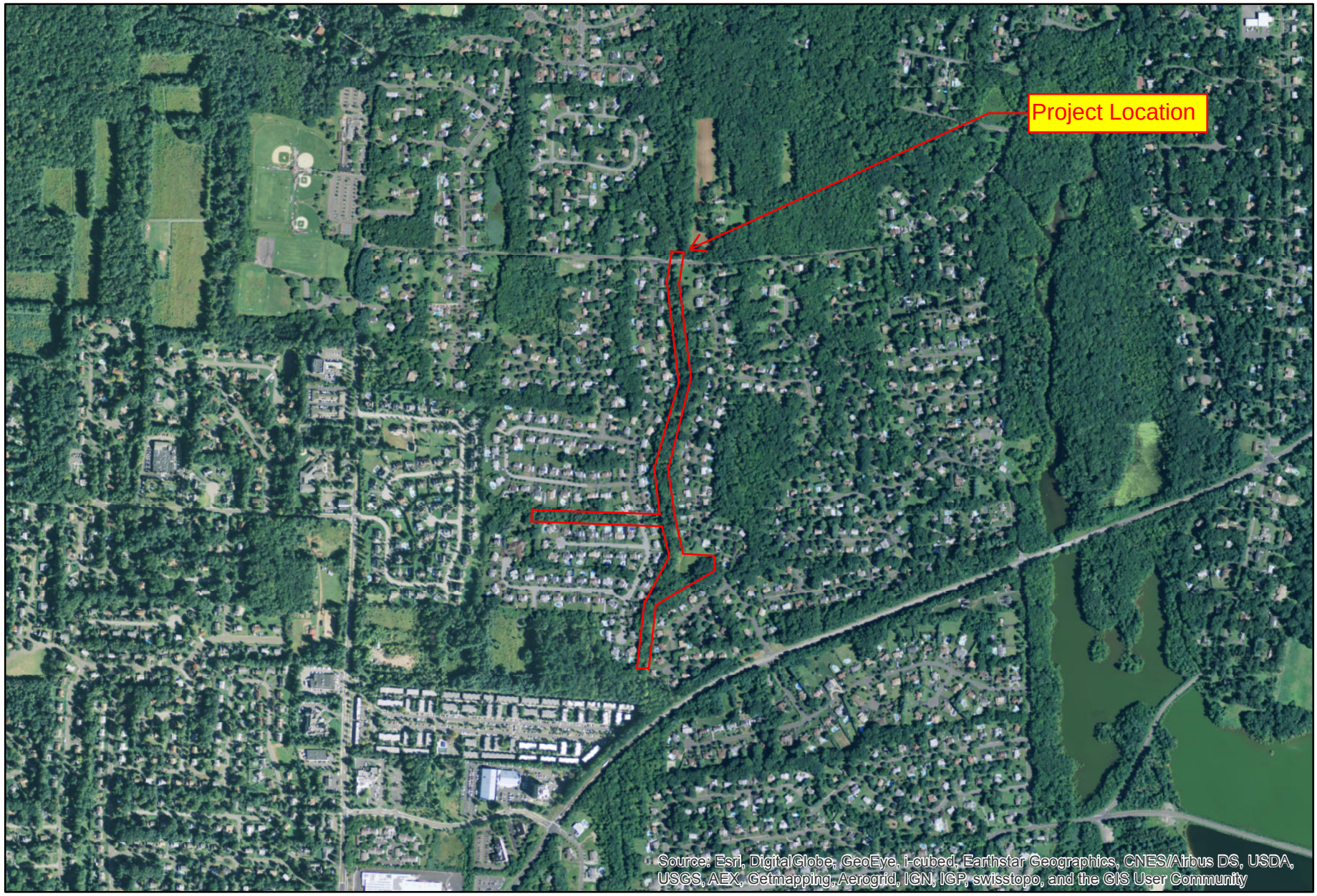
Practical Solutions, Exceptional Service

0 0.25 0.5 1 Miles

1:24,000

TOPOGRAPHIC MAP
CRANFORD DRIVE
CLARKSTOWN, NY 10956
ROCKLAND COUNTY

N
W E
S



TECTONIC

Practical Solutions, Exceptional Service

0 0.125 0.25 0.5 Miles

1:13,000

AERIAL IMAGERY
CRANFORD DRIVE
CLARKSTOWN, NY 10956
ROCKLAND COUNTY

N
W E
S

Attachment 2

Project Site Plans
(included as part of the NYSDEC Permit)

PERMIT

Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
TOWN OF CLARKSTOWN
10 MAPLE AVE
NEW CITY, NY 10956-5013
(845) 639-6200

Facility:
DEMAREST KILL FLOOD CONTROL
CRANFORD DR
CLARKSTOWN, NY 10956

Facility Location: in CLARKSTOWN in ROCKLAND COUNTY
Facility Principal Reference Point: NYTM-E: 585.638 NYTM-N: 4557.648
Latitude: 41°09'56.3" Longitude: 73°58'45.0"

Authorized Activity: Modification and realignment of approximately 4,650 linear feet of the bed and banks of a tributary of West Branch Hankensack [Water Index No. NJ-1-12-3, Class C(T)], also known as the Demarest Kill, in accordance with project plans referenced in Natural Resource Condition #1 and as conditioned by this permit. The authorized activities are associated with the Town's Cranford Drive Flood Amelioration Project.

Permit Authorizations

Stream Disturbance - Under Article 15, Title 5
Permit ID 3-3920-00297/00010
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

Water Quality Certification - Under Section 401 - Clean Water Act
Permit ID 3-3920-00297/00011
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: JOHN W PETRONELLA, Deputy Regional Permit Administrator
Address: NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY 12561

Authorized Signature: John W. Petronella Date 7 / 19 / 2016

JRM

Distribution List

US ARMY CORPS OF ENGINEERS - NY DISTRICT
BRIAN DRUMM
DENNIS LETSON, DEPT. OF ENVIRONMENTAL CONTROL, TOWN OF CLAKSON

Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

WATER QUALITY CERTIFICATION SPECIFIC CONDITION

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Permit Attachments

Project Location Map (Attachment I)
Site Plan (Attachment II)
Permit Sign

NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: STREAM DISTURBANCE; WATER QUALITY CERTIFICATION

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by Town of Clarkstown's Department of Environmental Control, titled "Cranford Drive Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets) (Attachment II) .

2. **Post Permit Sign** The permit sign enclosed with this permit shall be posted in a conspicuous location on the worksite and adequately protected from the weather.

3. **Notice of Intent to Commence Work** The permittee shall notify Brian Drumm, DEC Bureau of Habitat, via electronic mail (brian.drumm@dec.ny.gov) at least 48 hours in advance of the time of commencement of each phase described in plans referenced in Natural Resource Condition No. 1.

4. **Floodplain Regulations** The project must meet all local and federal floodplain regulations.

5. **Phase Project to Reduce Erosion** To reduce the potential for erosion, the project shall be constructed in six phases as defined in the plans approved by this permit and provided as an enclosure to the US Army Corps of Engineers New York District's Public Notice issued April 11, 2016 (Public Notice Number: NAN-2014-00305-ESW). Such plans are titled "Cranford Drive, Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets).

All activities within the phase must be fully completed and stablized prior to commencing project activities for the next phase.

6. **Maintain Water Flow During Work** During periods of work activity, sufficient flow of water shall be maintained at all times to sustain aquatic life downstream.

7. **Temporary Diversion Channel** A temporary diversion channel, culvert or pump-around shall be constructed to prevent running water in the work area. The area of temporary diversion must be restored to its original condition following completion of the work. If a diversion channel is used, its sides and bottom shall be protected by rock riprap or other suitable non-erodible materials to prevent scour and erosion.

8. **No Impedance to Aquatic Organisms** Structures must not impede upstream and downstream migration of aquatic organisms.

9. **No Turbidity from Dewatering** No turbid water resulting from dewatering operations shall be discharged directly to or allowed to enter the stream. Such water shall be pumped to settling basins or to an upland vegetated area prior to any discharge to the stream. All other necessary measures shall be implemented to prevent any visible increase in turbidity or sedimentation downstream of the work site.

10. **Straw Bales or Other Downslope of Work Area** Bales of straw or other effective means to control erosion are to be used on the downslope edge of any disturbed areas. This barrier to sediments is to be put in place before any disturbance of the ground occurs and is to be maintained in good condition until all disturbed land is heavily vegetated.

11. **Temporary Seeding of Disturbed/ Stockpiled Soils** All disturbed areas where soil is temporarily exposed or stockpiled for more than one month shall be stabilized with a temporary seeding or ground cover.

12. **Clean Fill Only** All fill material utilized for this project shall consist of uncontaminated earthen materials only. Acceptable fill materials include gravel, rock, overburden, topsoil and similar natural mineral resources.

13. **Work During Low Flows** All work shall be performed during low flow conditions.

14. **Materials Removed from Bed and Banks** Any debris or excess materials from construction of this project shall be immediately and completely removed from the bed and banks of all water areas to an appropriate upland area for disposal.

15. **Dredgings Disposed at Upland Site** All dredged and excavated material shall be disposed of on an upland site and be suitably stabilized so that it cannot reasonably re-enter any water body or wetland area.

16. **Seed, Mulch Disturbed Soils** All areas of soil disturbance resulting from this project (above the mean high water line) shall be seeded with an appropriate perennial grass seed and mulched with straw within one week of final grading. Mulch shall be maintained until a suitable vegetative cover is established.

17. **Temporary Mulch, Final Seeding** If seeding is impracticable due to the time of year, a temporary mulch shall be applied and final seeding shall be performed at the earliest opportunity when weather conditions favor germination and growth but not more than six months after project completion.

18. **Precautions Against Contamination of Waters** All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

19. **State May Order Removal or Alteration of Work** If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

20. **State May Require Site Restoration** If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

21. **State Not Liable for Damage** The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

WATER QUALITY CERTIFICATION SPECIFIC CONDITIONS

1. Water Quality Certification The authorized project, as conditioned pursuant to the Certificate, complies with Section 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act, as amended and as implemented by the limitations, standards, and criteria of state statutory and regulatory requirements set forth in 6 NYCRR Section 608.9(a). The authorized project, as conditioned, will also comply with applicable New York State water quality standards, including but not limited to effluent limitations, best usages and thermal discharge criteria, as applicable, as set forth in 6 NYCRR Parts 701, 702, 703, and 704.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. Facility Inspection by The Department The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. Relationship of this Permit to Other Department Orders and Determinations Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. Applications For Permit Renewals, Modifications or Transfers The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY12561

4. Submission of Renewal Application The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Stream Disturbance, Water Quality Certification.

5. Permit Modifications, Suspensions and Revocations by the Department The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. Permit Transfer Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

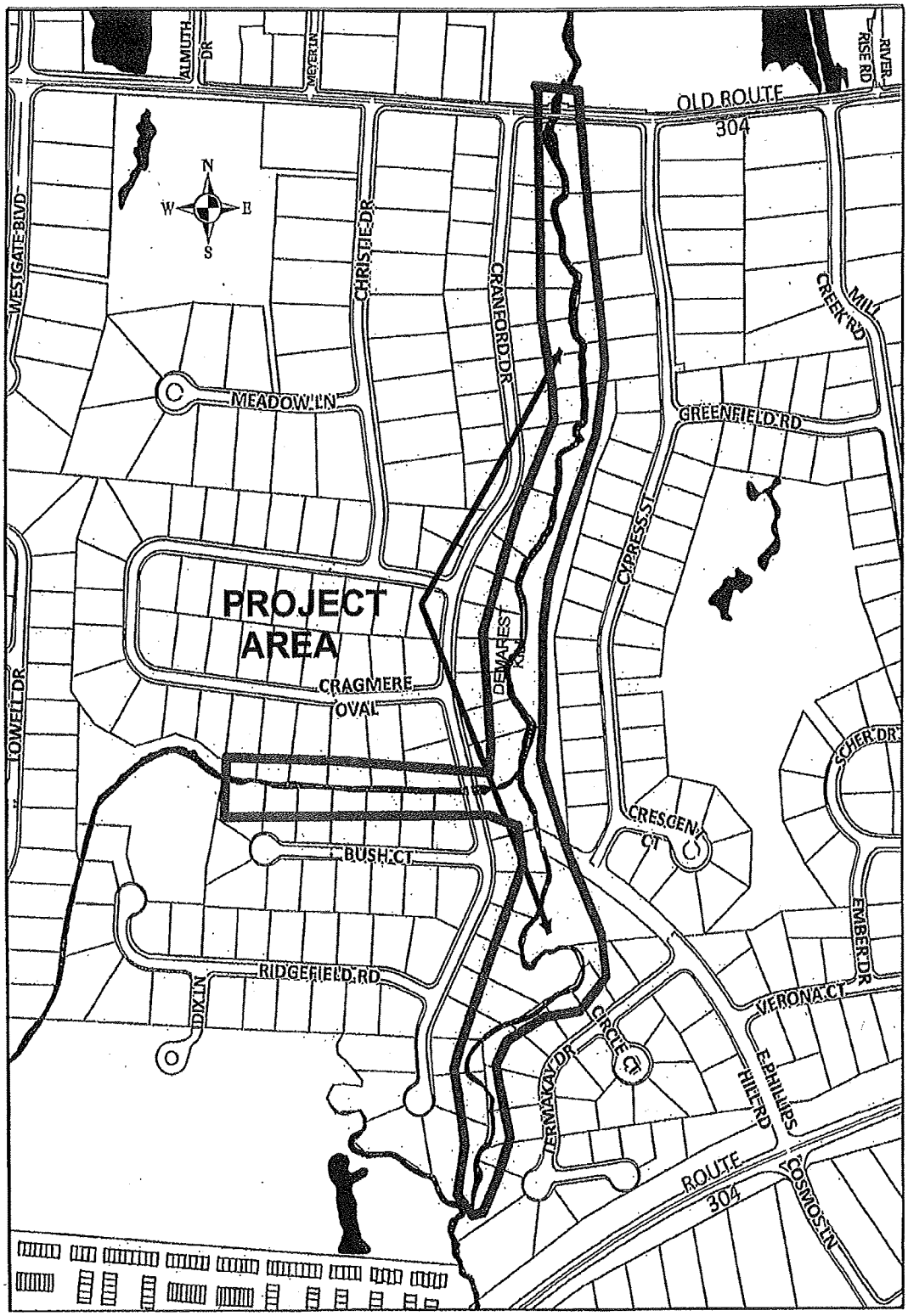
Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

Item E: SEQR Type I Action, No Significant Impact Under the State Environmental Quality Review Act (SEQR), the project associated with this permit is classified as a Type I Action with Clarkson Town Board designated as the lead agency. It has been determined that the project will not have a significant effect on the environment.

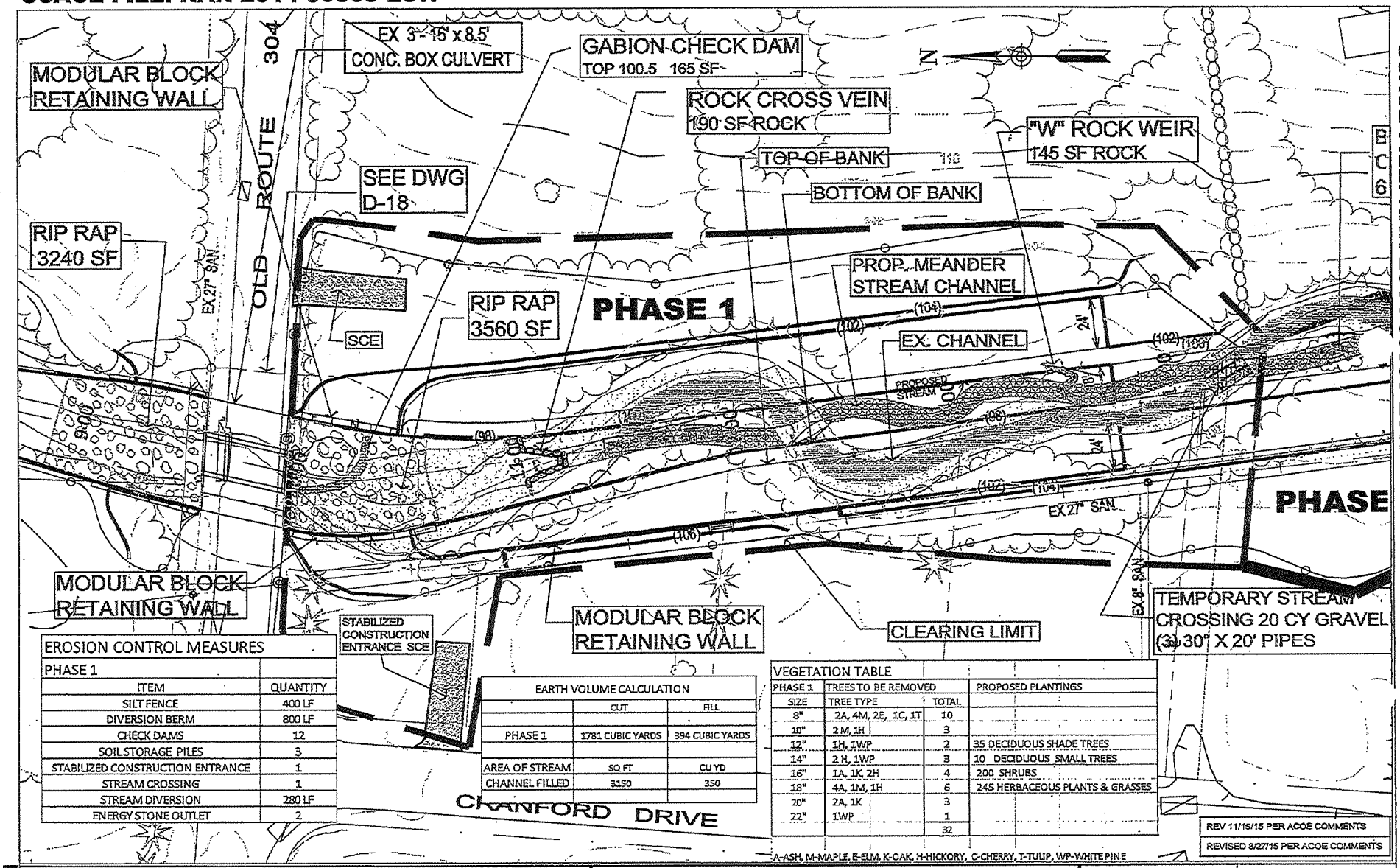
Project Location Map (Attachment I)

USACE FILE: NAN-2014-00305-ESW



500 250 0 500 Feet

CRANFORD DRIVE
FLOOD AMELIORATION PROJECT
TOWN OF CLARKSTOWN
NEW CITY, NEW YORK



EROSION CONTROL MEASURES	
PHASE 1	
ITEM	QUANTITY
SILT FENCE	400 LF
DIVERSION BERM	800 LF
CHECK DAMS	12
SOILSTORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	280 LF
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1	1781 CUBIC YARDS	394 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT 3150	CU YD 350

VEGETATION TABLE			
PHASE 1	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	2A, 4M, 2E, 1C, 1T	10	
10"	2 M, 1H	3	
12"	1H, 1WP	2	35 DECIDUOUS SHADE TREES
14"	2 H, 1WP	3	10 DECIDUOUS SMALL TREES
16"	1A, 1K, 2H	4	200 SHRUBS
18"	4A, 1M, 1H	6	245 HERBACEOUS PLANTS & GRASSES
20"	2A, 1K	3	
22"	1WP	1	
		32	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY, T-TULIP, WP-WHITE PINE

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

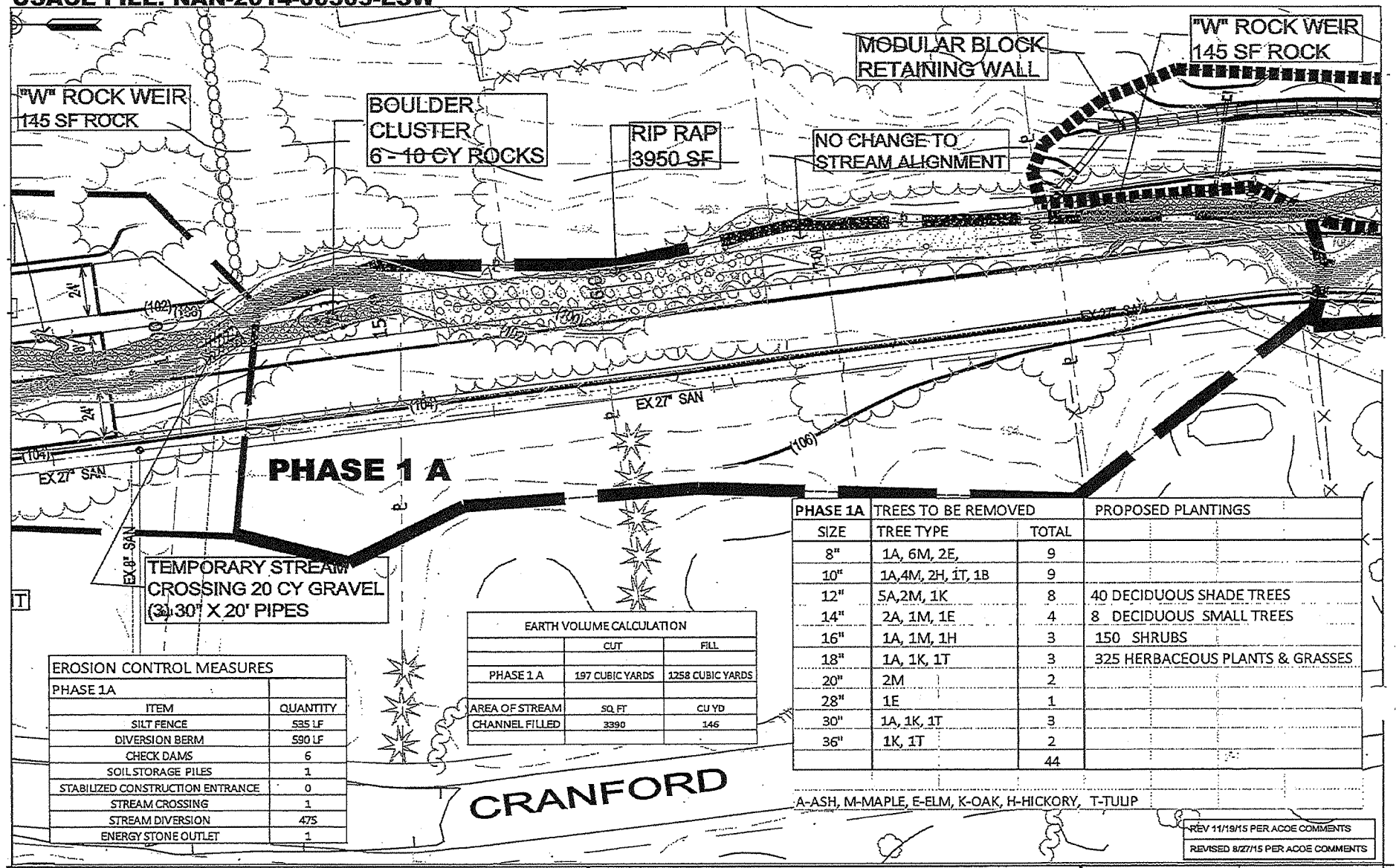
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-1
SHEET _1_ OF _31_ SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

Site Plan (Attachment 1)



EROSION CONTROL MEASURES	
PHASE 1A	
ITEM	QUANTITY
SILT FENCE	535 LF
DIVERSION BERM	590 LF
CHECK DAMS	6
SOIL STORAGE PILES	1
STABILIZED CONSTRUCTION ENTRANCE	0
STREAM CROSSING	1
STREAM DIVERSION	475
ENERGY STONE OUTLET	1

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1 A	197 CUBIC YARDS	1258 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ. FT	CU YD
	3390	146

PHASE 1A	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1A, 6M, 2E,	9	
10"	1A,4M, 2H, 1T, 1B	9	
12"	5A,2M, 1K	8	40 DECIDUOUS SHADE TREES
14"	2A, 1M, 1E	4	8 DECIDUOUS SMALL TREES
16"	1A, 1M, 1H	3	150 SHRUBS
18"	1A, 1K, 1T	3	325 HERBACEOUS PLANTS & GRASSES
20"	2M	2	
28"	1E	1	
30"	1A, 1K, 1T	3	
36"	1K, 1T	2	
		44	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

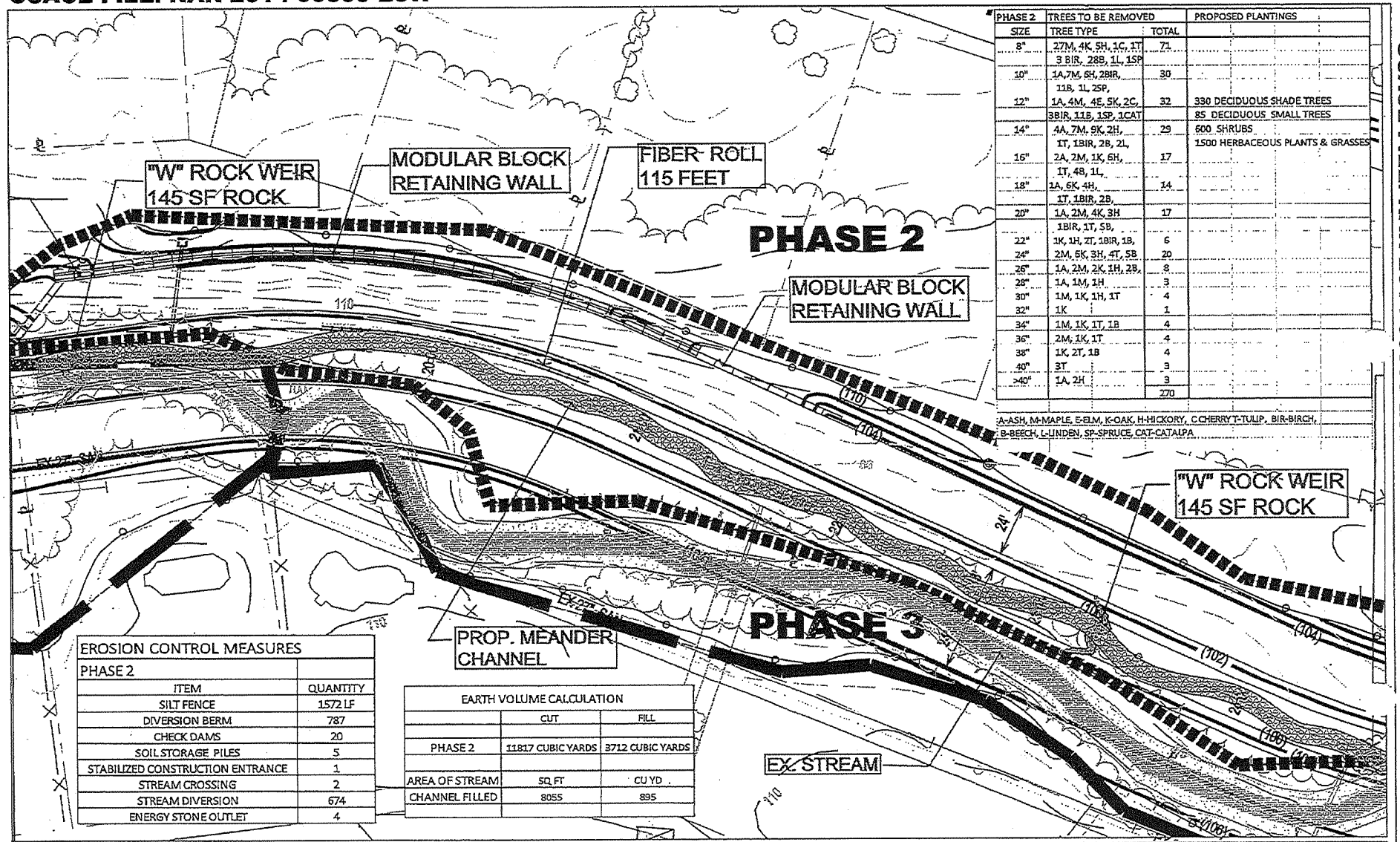
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-2
SHEET 2 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 2	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	27M, 4K, 5H, 1C, 1T 3 BIR, 28B, 1L, 1SP	71	
10"	1A,7M, 6H, 2BIR, 11B, 1L, 2SP,	30	
12"	1A, 4M, 4E, 5K, 2C, 3BIR, 11B, 1SP, 1CAT	32	330 DECIDUOUS SHADE TREES
			85 DECIDUOUS SMALL TREES
14"	4A, 7M, 9K, 2H, 1T, 1BIR, 2B, 2L,	29	600 SHRUBS
16"	2A, 2M, 1K, 6H, 1T, 4B, 1L,	17	1500 HERBACEOUS PLANTS & GRASSES
18"	1A, 6K, 4H, 1T, 1BIR, 2B,	14	
20"	1A, 2M, 4K, 3H 1BIR, 1T, 5B,	17	
22"	1K, 1H, 2T, 1BIR, 1B,	6	
24"	2M, 6K, 3H, 4T, 5B	20	
26"	1A, 2M, 2K, 1H, 2B,	8	
28"	1A, 1M, 1H	3	
30"	1M, 1K, 1H, 1T	4	
32"	1K	1	
34"	1M, 1K, 1T, 1B	4	
36"	2M, 1K, 1T	4	
38"	1K, 2T, 1B	4	
40"	3T	3	
>40"	1A, 2H	3	
		270	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY T-TULIP, BIR-BIRCH, B-BEECH, L-LINDEN, SP-SPRUCE, CAT-CATALPA

EROSION CONTROL MEASURES	
PHASE 2	
ITEM	QUANTITY
SILT FENCE	1572 LF
DIVERSION BERM	787
CHECK DAMS	20
SOIL STORAGE PILES	5
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	2
STREAM DIVERSION	674
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 2	11817 CUBIC YARDS	3712 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	8055	895

REV 11/19/15 PER ACOE COMMENTS | REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

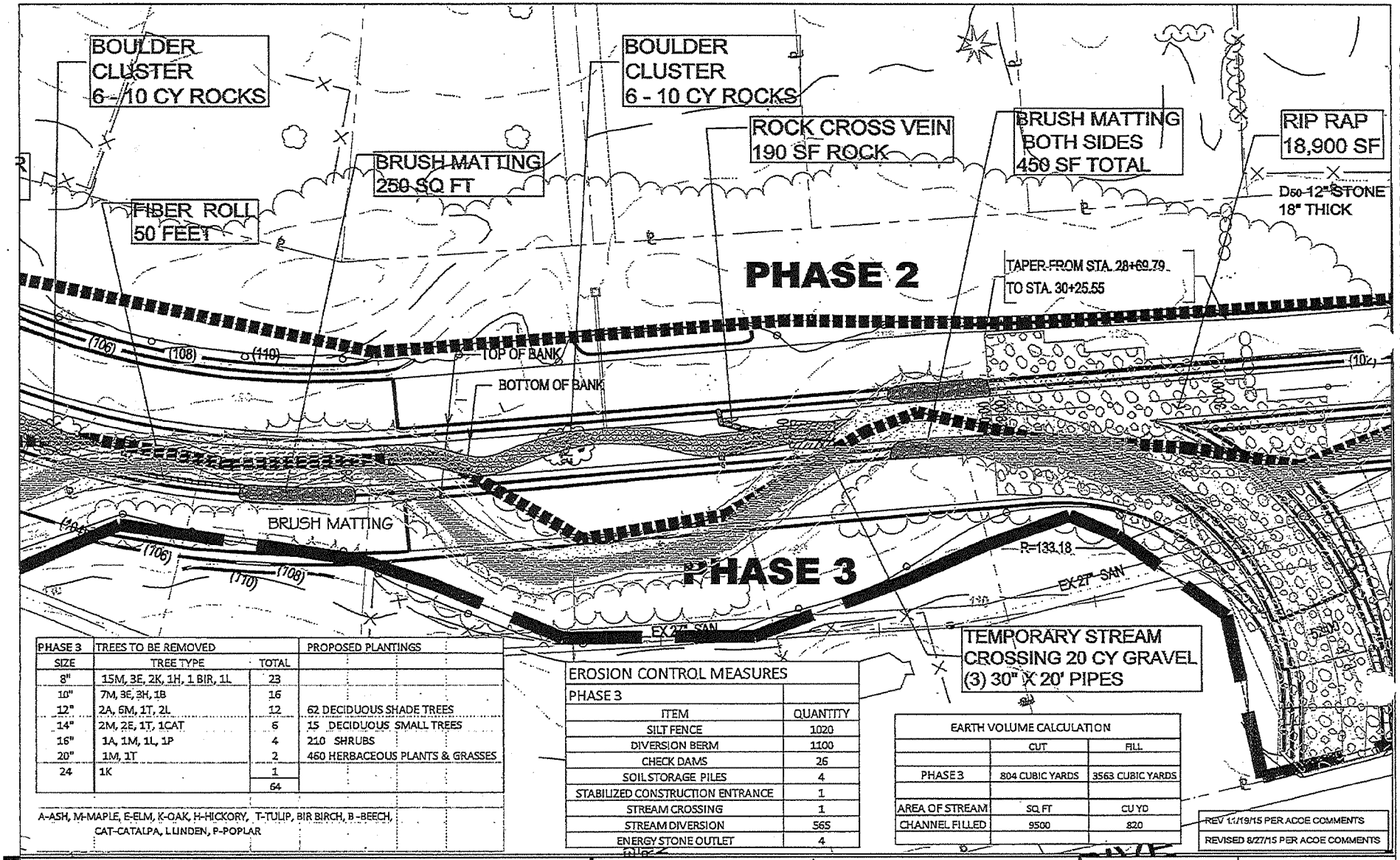
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-3

SHEET _3_ OF _31 SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 3	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	15M, 3E, 2K, 1H, 1 BIR, 1L	23	
10"	7M, 3E, 3H, 1B	16	
12"	2A, 6M, 1T, 2L	12	62 DECIDUOUS SHADE TREES
14"	2M, 2E, 1T, 1CAT	6	15 DECIDUOUS SMALL TREES
16"	1A, 1M, 1L, 1P	4	210 SHRUBS
20"	1M, 1T	2	460 HERBACEOUS PLANTS & GRASSES
24	1K	1	
		64	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, CAT-CATALPA, L LINDEN, P-POPLAR

EROSION CONTROL MEASURES	
PHASE 3	
ITEM	QUANTITY
SILT FENCE	1020
DIVERSION BERM	1100
CHECK DAMS	26
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	565
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 3	804 CUBIC YARDS	3563 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	9500	820

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

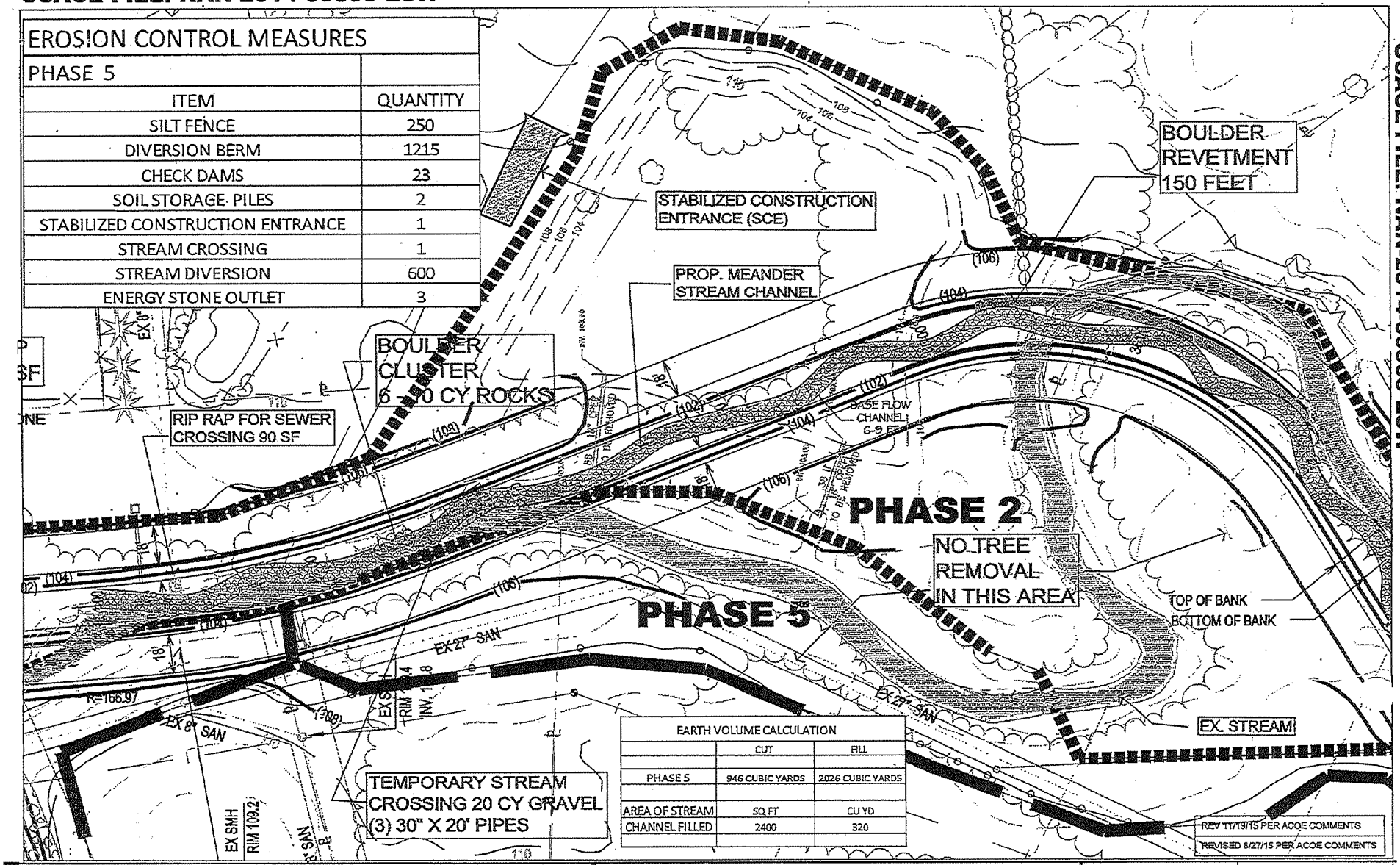
SITE LAYOUT PLAN
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-4
SHEET 4 OF 31 SHTS.
DRAWING FILE: e:\engineering\cranford drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

EROSION CONTROL MEASURES	
PHASE 5	
ITEM	QUANTITY
SILT FENCE	250
DIVERSION BERM	1215
CHECK DAMS	23
SOIL STORAGE PILES	2
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	600
ENERGY STONE OUTLET	3



EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 5	946 CUBIC YARDS	2026 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT	CU YD
	2400	320

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

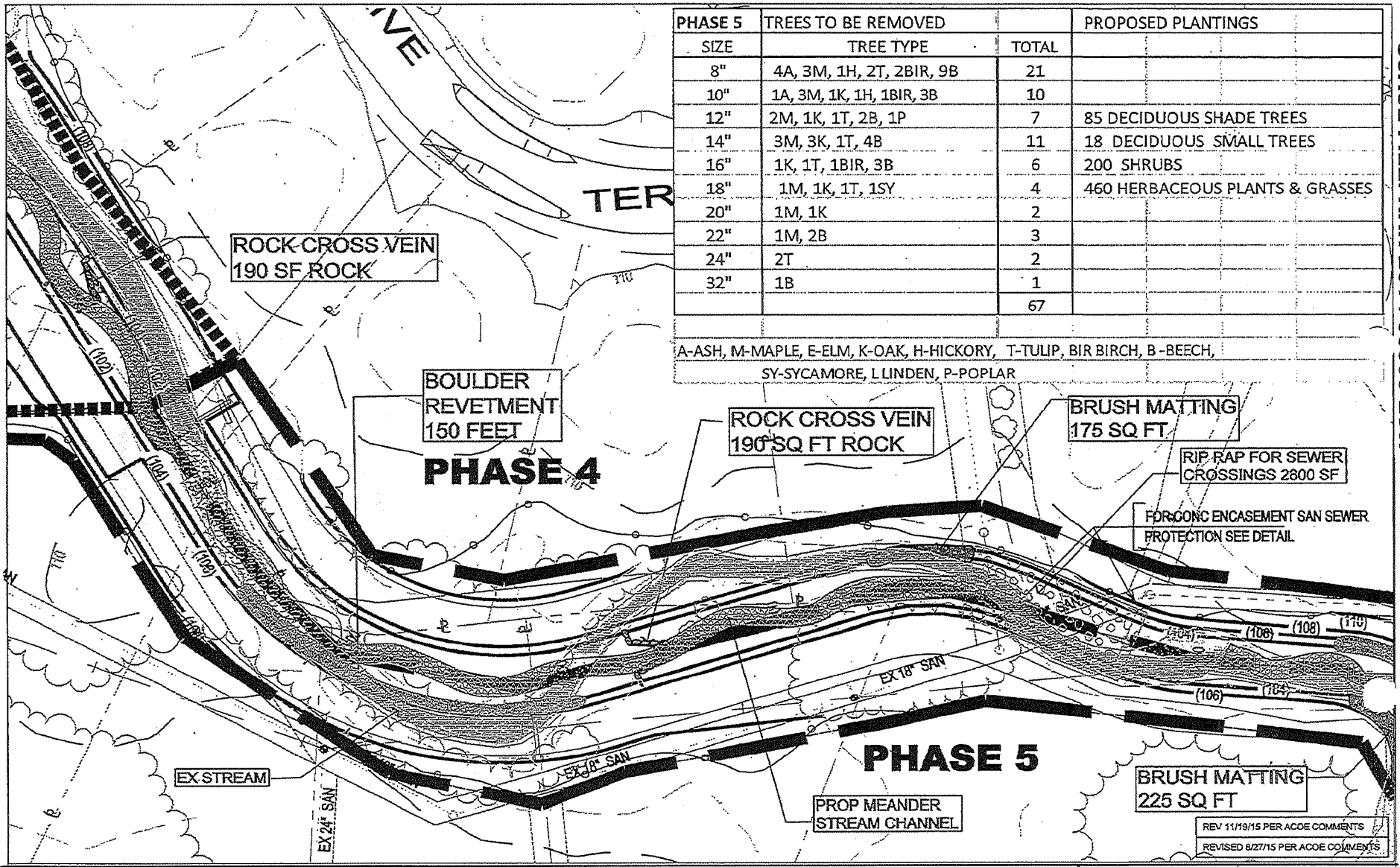
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	KOZ
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-5
SHEET 5 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

PHASE 5	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	4A, 3M, 1H, 2T, 2BIR, 9B	21	
10"	1A, 3M, 1K, 1H, 1BIR, 3B	10	
12"	2M, 1K, 1T, 2B, 1P	7	85 DECIDUOUS SHADE TREES
14"	3M, 3K, 1T, 4B	11	18 DECIDUOUS SMALL TREES
16"	1K, 1T, 1BIR, 3B	6	200 SHRUBS
18"	1M, 1K, 1T, 1SY	4	460 HERBACEOUS PLANTS & GRASSES
20"	1M, 1K	2	
22"	1M, 2B	3	
24"	2T	2	
32"	1B	1	
		67	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, SY-SYCAMORE, L LINDEN, P-POPLAR



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

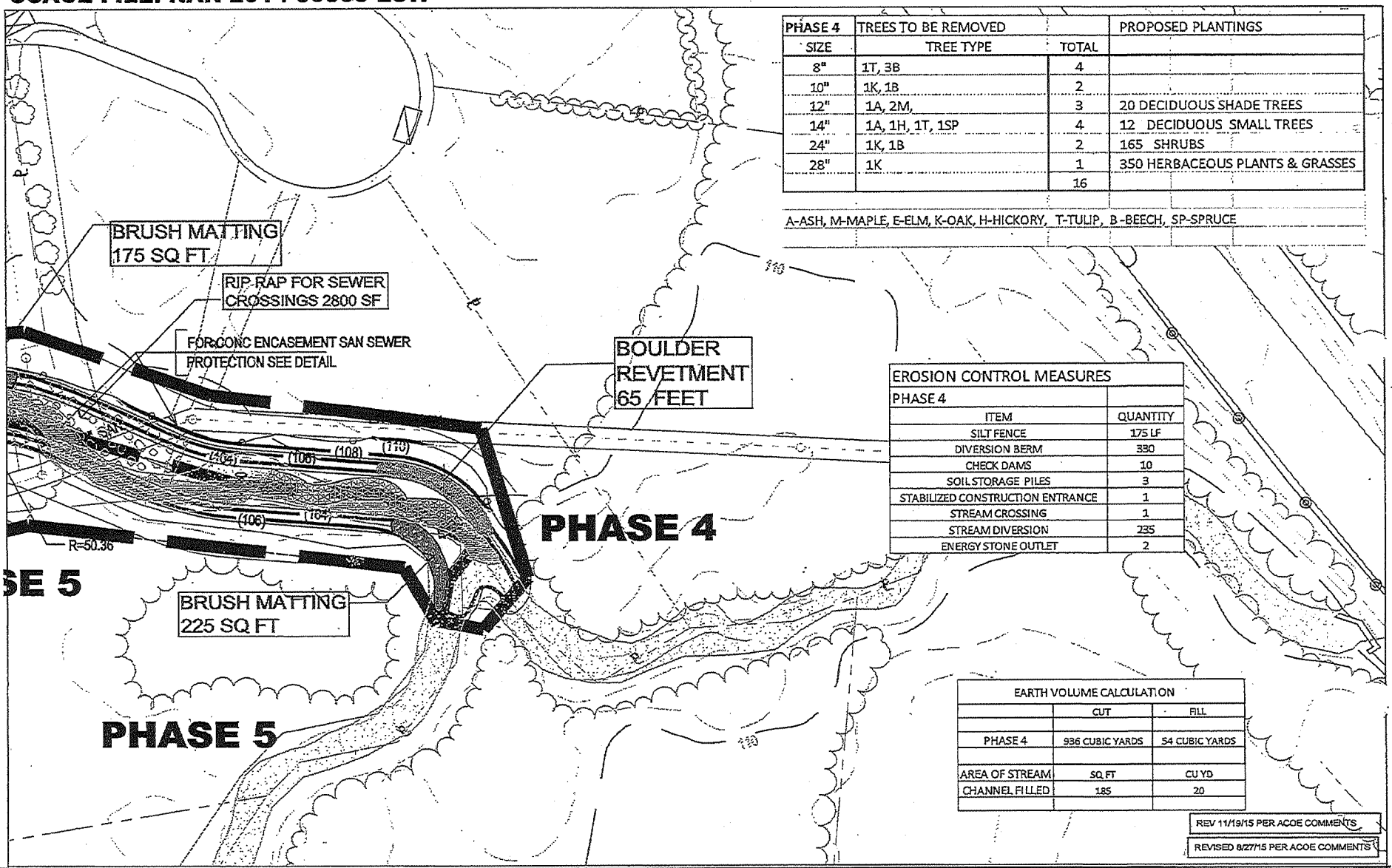
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-6

SHEET _6_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe



PHASE 4	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1T, 3B	4	
10"	1K, 1B	2	
12"	1A, 2M,	3	20 DECIDUOUS SHADE TREES
14"	1A, 1H, 1T, 1SP	4	12 DECIDUOUS SMALL TREES
24"	1K, 1B	2	165 SHRUBS
28"	1K	1	350 HERBACEOUS PLANTS & GRASSES
		16	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, B-BEECH, SP-SPRUCE

EROSION CONTROL MEASURES	
PHASE 4	
ITEM	QUANTITY
SILT FENCE	175 LF
DIVERSION BERM	330
CHECK DAMS	10
SOIL STORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	235
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 4	936 CUBIC YARDS	54 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	185	20

REV 11/19/15 PER ACOE COMMENTS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

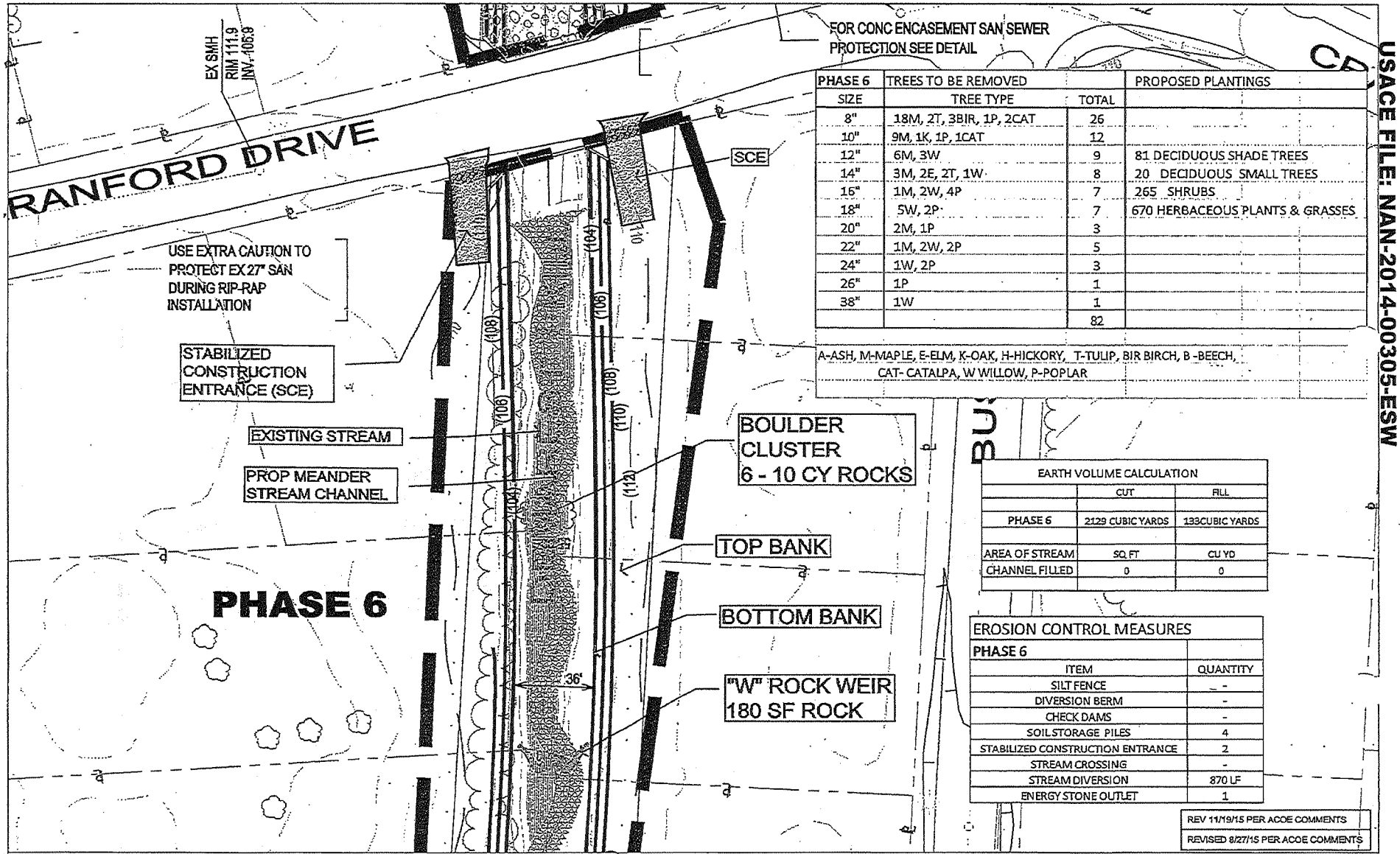
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-7

SHEET _7_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 6	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	18M, 2T, 3BIR, 1P, 2CAT	26	
10"	9M, 1K, 1P, 1CAT	12	
12"	6M, 3W	9	81 DECIDUOUS SHADE TREES
14"	3M, 2E, 2T, 1W	8	20 DECIDUOUS SMALL TREES
16"	1M, 2W, 4P	7	265 SHRUBS
18"	5W, 2P	7	670 HERBACEOUS PLANTS & GRASSES
20"	2M, 1P	3	
22"	1M, 2W, 2P	5	
24"	1W, 2P	3	
26"	1P	1	
38"	1W	1	
		82	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B -BEECH, CAT- CATALPA, W WILLOW, P-POPLAR

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 6	2129 CUBIC YARDS	133CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	0	0

EROSION CONTROL MEASURES	
PHASE 6	
ITEM	QUANTITY
SILT FENCE	-
DIVERSION BERM	-
CHECK DAMS	-
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	2
STREAM CROSSING	-
STREAM DIVERSION	870 LF
ENERGY STONE OUTLET	1

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

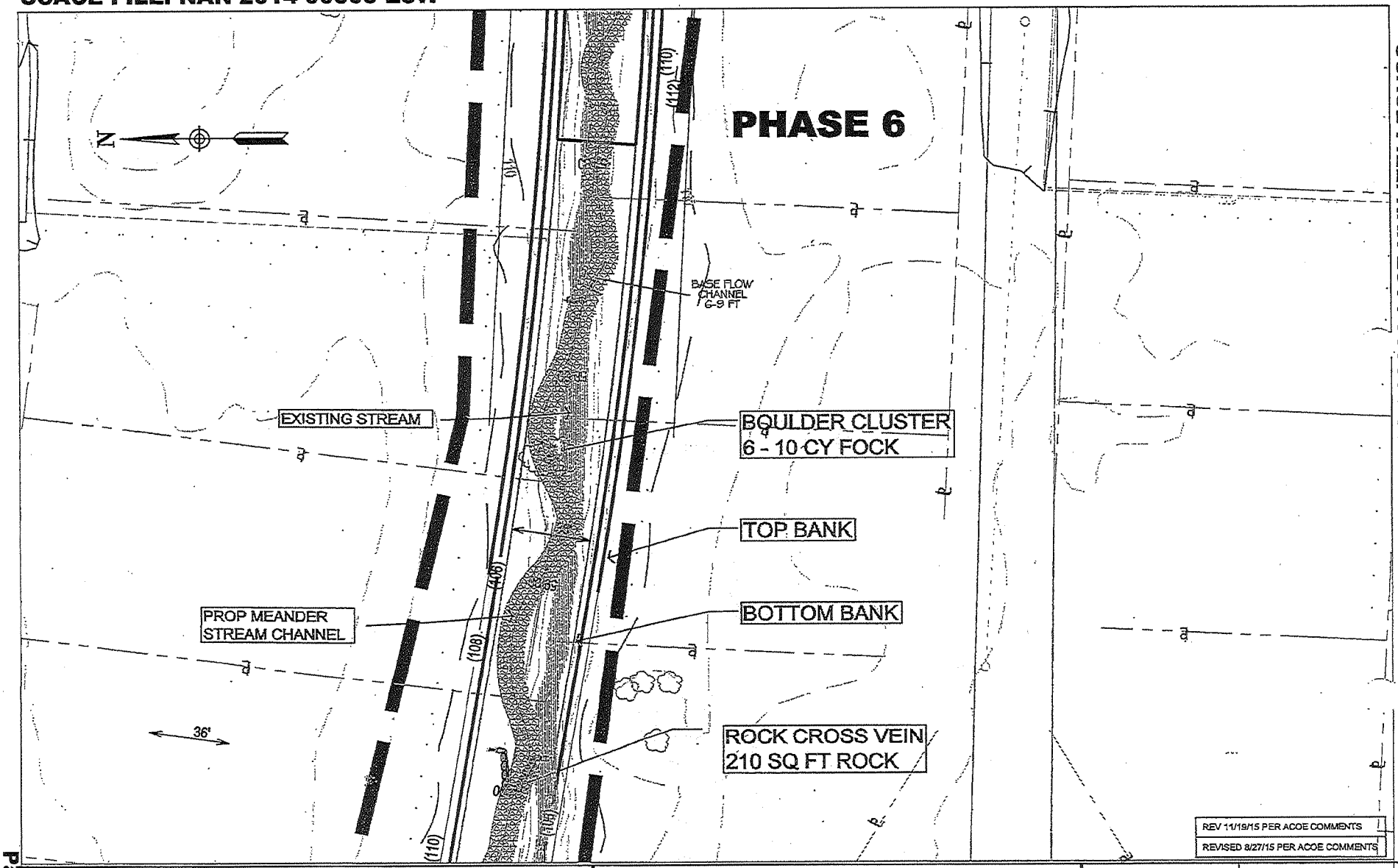
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-8
SHEET 8 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

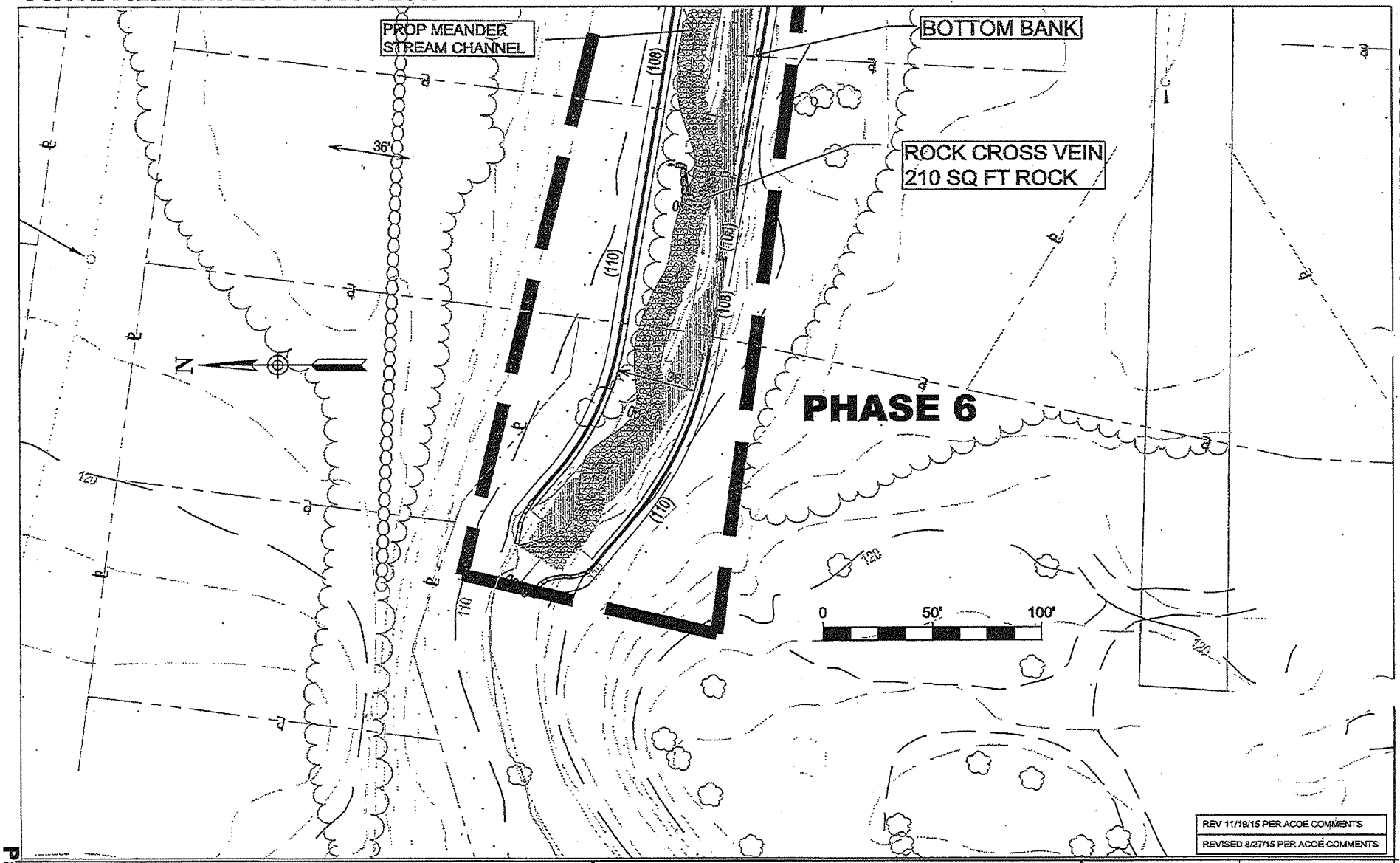
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-9

SHEET _9_ OF _31_ SHTS.

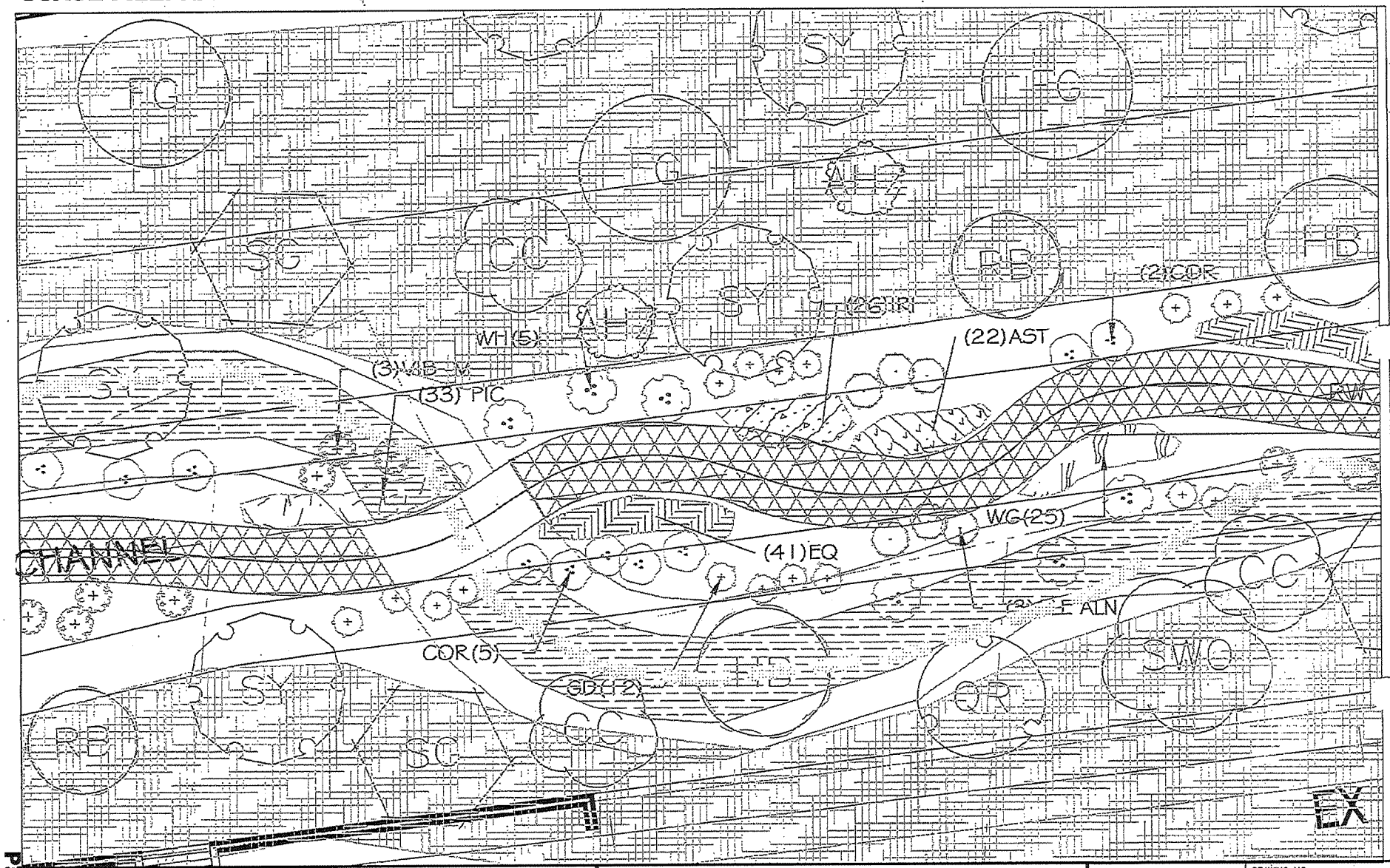
DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	SITE LAYOUT PLAN	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWING NO.: S-10 SHEET 10 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	**TYPICAL CHANNEL PLANTING**	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: **L-1** SHEET _11_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
RM	18	Red Maple / Acer rubrum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
SM	18	Sugar Maple / Acer saccharum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AML	10	Allegheny Serviceberry / Amelanchier laevis		7 gal	6-8` HT
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
CAR	15	Shagbark Hickory / Carya ovata	B & B	2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
RB	9	River Birch / Betula nigra	B & B	10` ht
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
PP	9	Paper Birch / Betula papynfera	B & B	2" CAL
	9			7 GAL	1/2" CAL
	9			3 GAL	3-4' HT
HB	8	American Hornbeam / Carpinus caroliniana		B & B	2" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
CC	9	Eastern Redbud / Cercis canadensis	B & B	2" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AHZ	24	American Hazelnut / Corylus americana		7 gal	4-5` HT
FG	19	Green Ash / Fraxinus pennsylvanica	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
HL	15	Sunburst Honey Locust / Gleditsia triacanthos `Sunburst`	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
SG	17	Sweet Gum / Liquidambar styraciflua	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
LT	10	Tulip Tree / Liriodendron tulipifera	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
N	15	Sour Gum / Nyssa sylvatica	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
BE	10	Box Elder / Acer negundo		6-8` HT
	10			7 GAL	4-5' HT
	10			3 GAL	3-4' HT
PA	5	Norway Spruce / Picea abies	B & B	6-8` HT
	15			7 GAL	4-5' HT
	15			3 GAL	3-4' HT
WP	11	White Pine / Pinus strobus	B & B	6-7` HT
	15			B & B	4-5' HT
	15			3 GAL	3-4' HT
SY	18	American Sycamore / Platanus occidentalis		B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
SWO	10	Swamp White Oak / Quercus bicolor		B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
PO	18	Pin Oak / Quercus palustris	B & B	2 1/2-3" CAL
	18			7 GAL	1/2" CAL
	18			3 GAL	3-4' HT
QR	10	Red Oak / Quercus rubra	B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	18		3 GAL	3-4' HT
TD	6	Bald Cypress / Taxodium distichum		B & B	5-6` HT
	5			B & B	3-4' HT
	15			3 GAL	2-3' HT

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-2
SHEET _12 OF _31_ SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

SHRUB AREAS

QTY		COMMON NAME / BOTANICAL NAME	CON	SPACING
AM3	122	Chokeberry / Aronia melanocarpa	2 gal	72"
CLE	110	Summersweet Clethra / Clethra alnifolia	2 gal	60"
CAM	155	Silky Dogwood / Cornus amonum	2 gal	72"
CG	168	Gray Dogwood / Cornus racemosa	2 gal	60"
HV	165	Common Witch Hazel / Hamamelis virginiana	2 gal	84"
ITE	65	Virginia Sweetspire / Itea virginica `Virginia`	2 gal	68"
IX	160	Winterberry Ilex verticillata	2 gal	60"
LIN	132	Spicebush / Lindera benzoin	2 gal	60"
ELD	60	Elderberry / Sambucus canadensis	2 gal	58"
VAC	188	Highbush Blueberry / Vaccinium corymbosum	2 gal	72"
VW	180	Arrowwood Viburnum / Viburnum dentatum	1 gal	72"
VA	130	Alleghany Viburnum Viburnum x rhytidophylloides	2 gal	72"
LEN	155	NANNYBERRY / VIBURNUM LENTAGO	2 gal	80"

GROUND COVERS

	QTY	COMMON NAME / BOTANICAL NAME		
AST	950	New York Aster / Aster novi-belgii	2 1/4" pots	24"
EQ	680	Dwarf Horsetail / Equisetum scirpoides	flat	20"
IRI	880	Blue Flag / Iris versicolor	2 1/4" pots	24"
PIC	680	Pickerel Weed / Pontederia cordata	2 1/4" pots	24"
WG	820	Wool Grass / Scirpus cyperinus	2 1/4" pots	24"

SUMMARY OF PLANTINGS

MAJOR TREES	674
MINOR TREES	156
SHRUBS	1790
GROUND COVER	4010

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

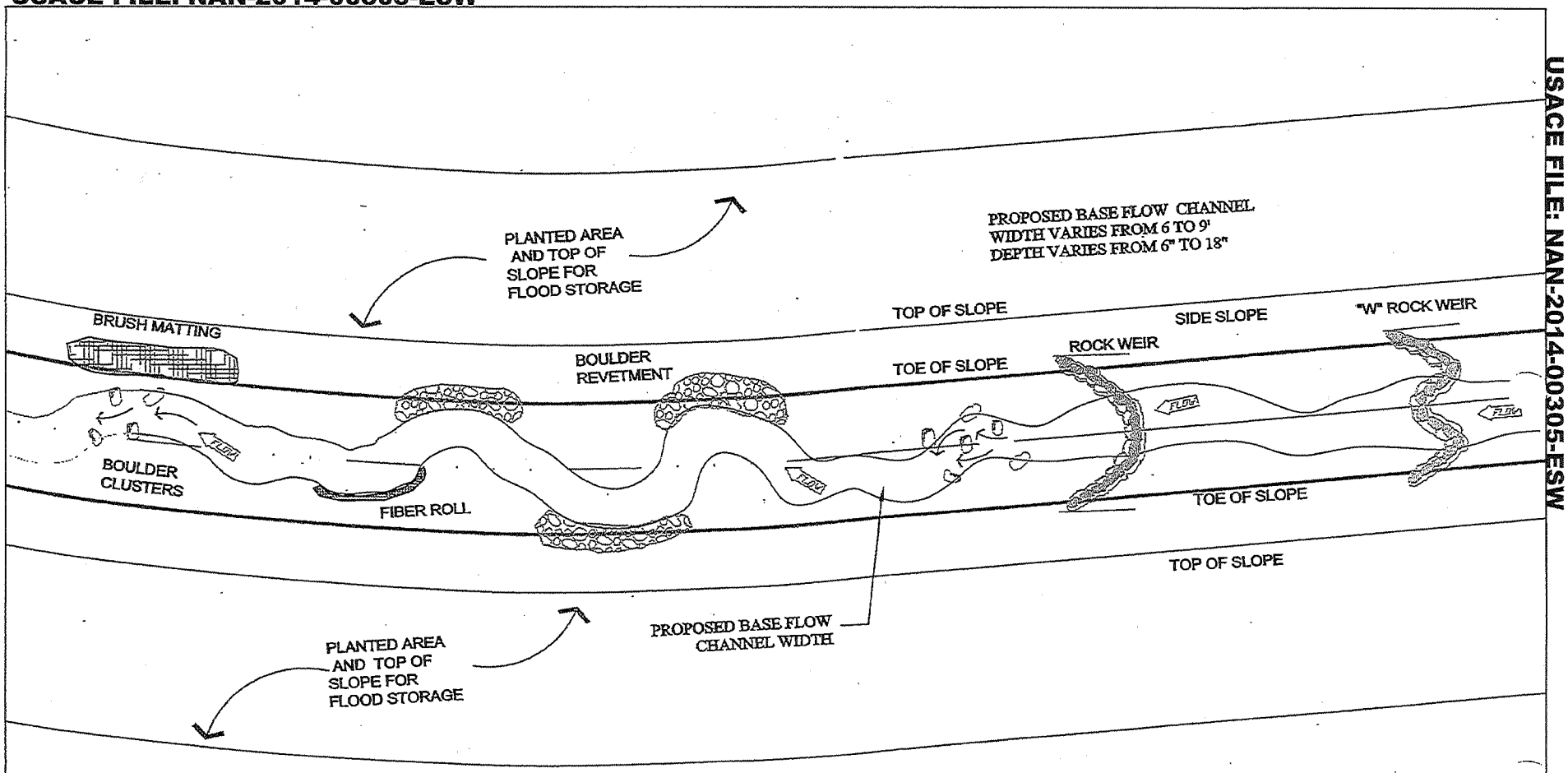
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-3

SHEET 13 OF 31 SHTS.

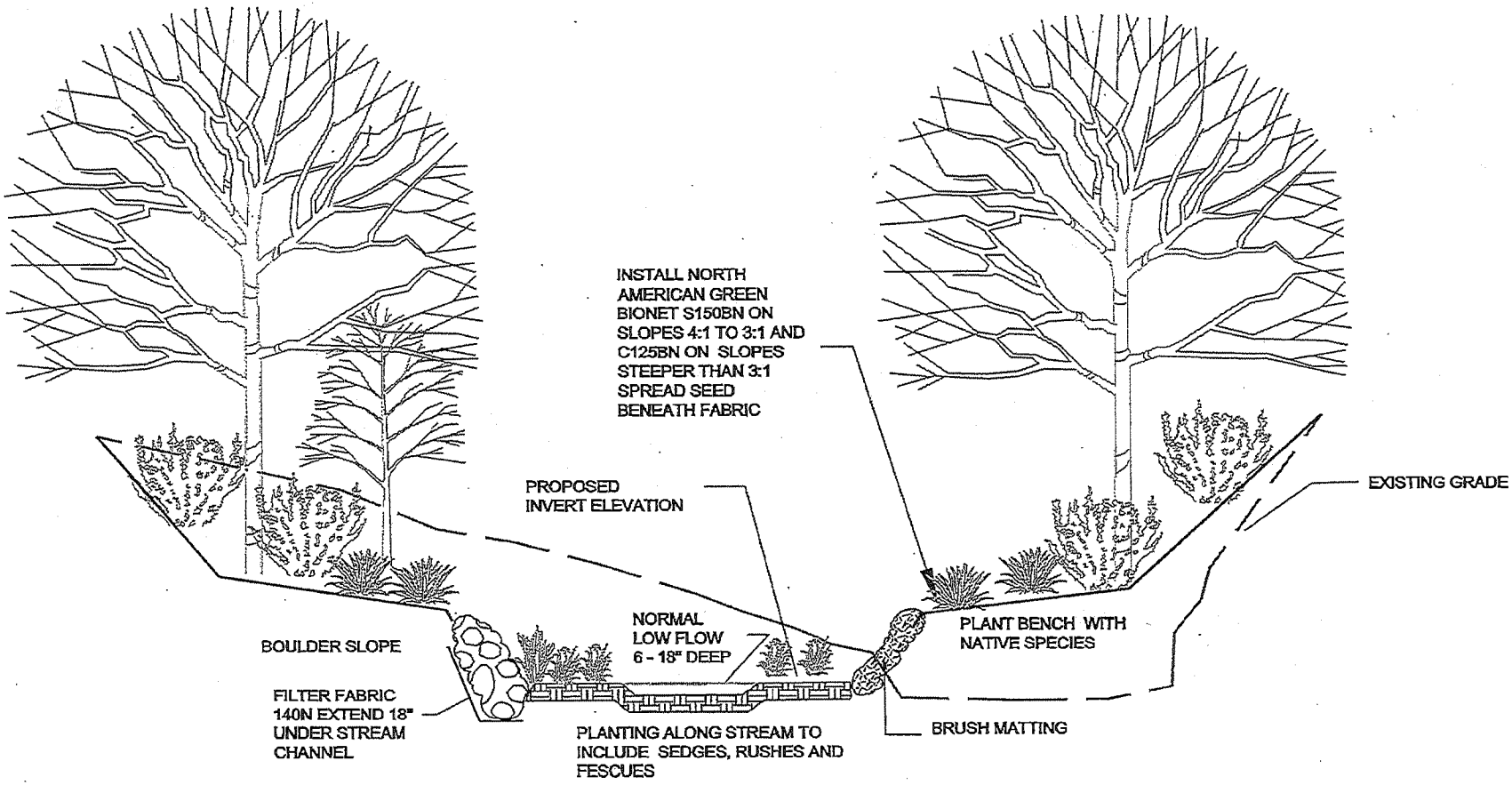
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe



CHANNEL TREATMENT MEASURES
SEE SITE PLAN AND DETAIL SHEETS
FOR LOCATIONS OF EACH TREATMENT

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-1 SHEET 14 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: x:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

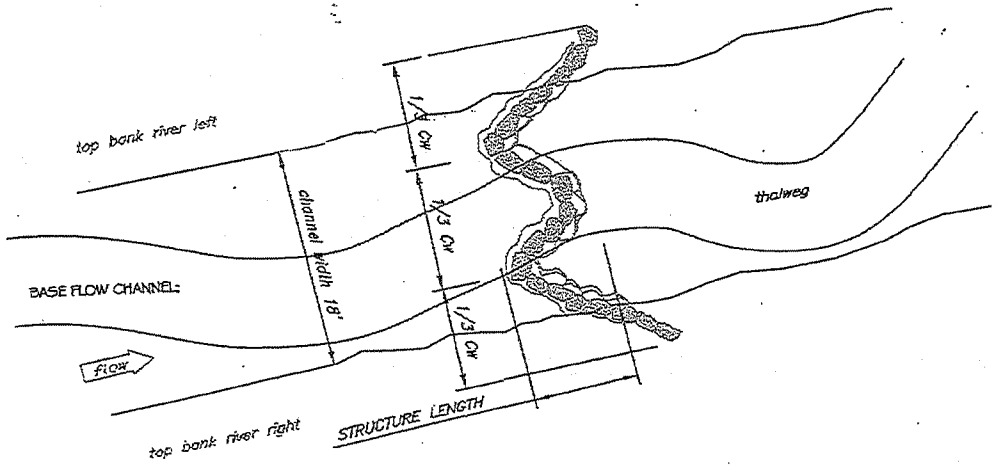


TYPICAL CHANNEL SECTION & STABILIZATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

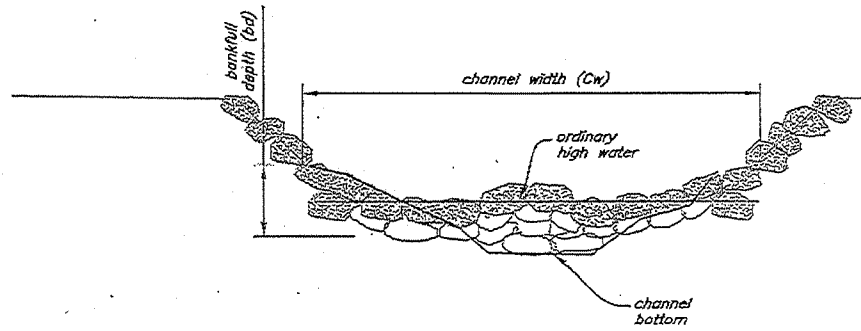
TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-2 SHEET _15_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



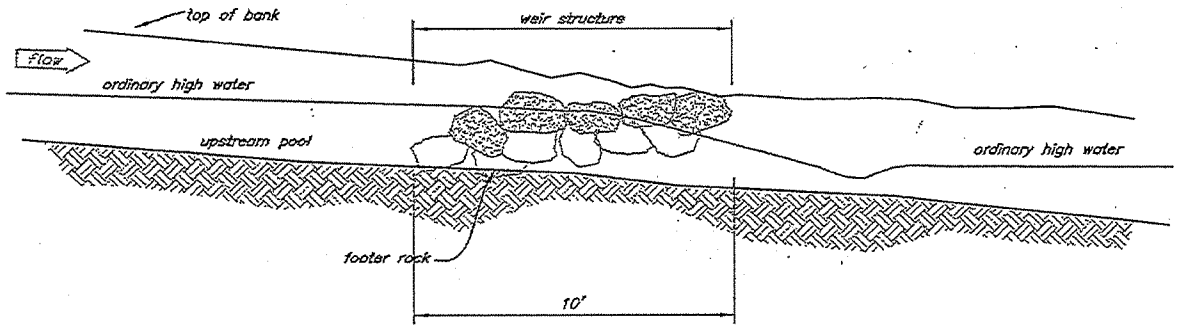
PLAN VIEW

W ROCK WEIR SCHEDULE

STRUCTURE ID	STATION	ELEVATION	Cw	L
WRW # 1	13+50	98.6	24'	12'
WRW # 2	18+19	99.36	24'	12'
WRW # 3	23+25	100.2	24'	12'
WRW # 4	37+00	102.15	24'	12'
WRW # 5	56+00	104.4	41'	18'



SECTION



PROFILE

ROCK WEIR

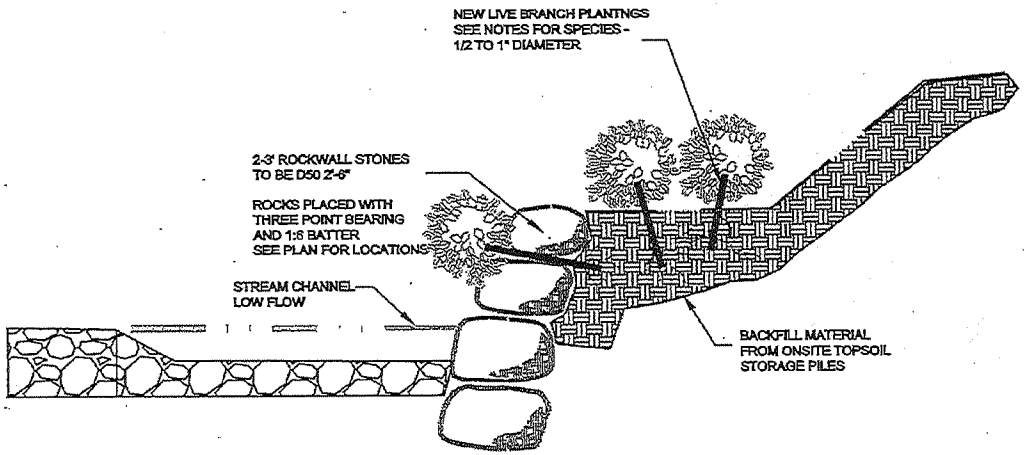
N.T.S.

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN	DRAWING NO.: D-3
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET 16 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

SCHEDULE

STRUCTURE ID	STATION	TO	LOC
BR #1	35+25	36+75	E
BR #2	39+50	41+00	W
BR #3	44+60	45+20	E



BOULDER REVETMENT

N.T.S.

NOTES
1. INSTALL SEDIMENT CONTROL MEASURES AS DIRECTED.
2 INSTALL NEW ROCKWALL BENCHES AS DETAILED AND SHOWN ON THE PLANS.
3 SPREAD STOCKPILED TOPSOIL BEHIND ROCKWALL BENCH AS DETAILED OR DIRECTED BY TOWN.

4. PLANTING LIVE FASCNES

ALL MATERIAL SHALL CONSIST OF MIXTURE OF STREAMCO WILLOW (SALIX PURPUREA) BANKERS WILLOW
SALIX COTTIRTI, PRAIRIE WILLOW (SALIX HUMILIS), GRAY DOGWOOD (CORNUS RACEMOSES AND/OR RED-OISER DOGWOOD (CORNUS SERVICEA.

A. SPACE BRANCHES 4 FT ON CENTER ALTERNATING ROWS WITH ONE FOOT VERITICAL SEPARATION.

B, LIVE BRANCHES TO BE TO ½" TO 1" DIAMETER 4 TO 6 FT LENGTH. TOPS OF LIVE BRANCHES TO PROTRUDE MINIMUM 6" BEYOND FACE OF WALL.

C, BACKFILL BEHIND WALL HAND TAMPED IN 6 IN LIFTS.

D. CUTTING SHALL BE PLACED ON THE BACKFILL AND COVER WITH MINIMUM OF 3" OF CLEAN FILL BETWEEN LAYER AND ROCK.

F. ALL PLANT MATERIAL SHALL BE INSTALLED WITHIN 8 (EIGHT) HOURS OF CUTTING UNLESS PROVISIONS FOR PROPER STORAGE IS MADE.

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

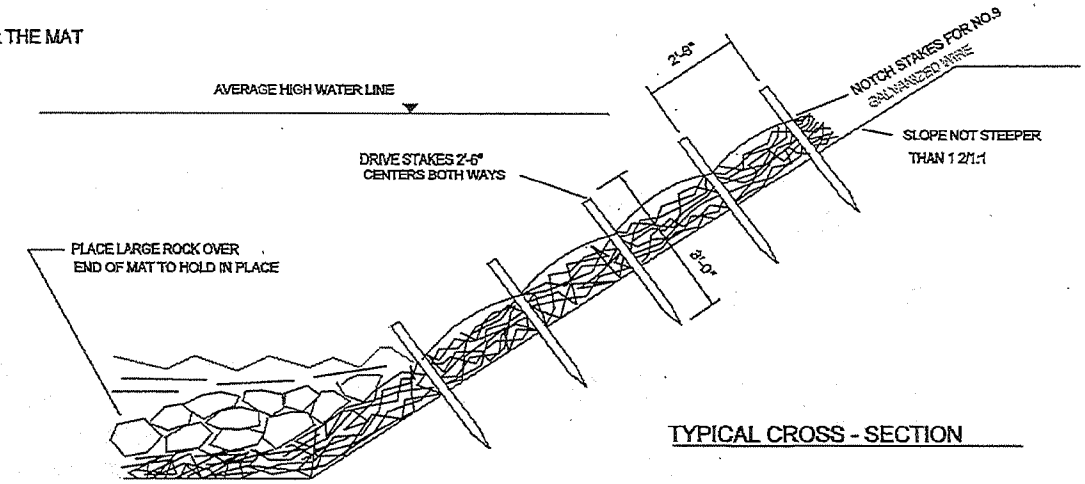
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-4
SHEET 17 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

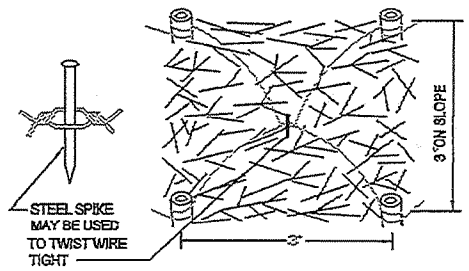
USACE FILE: NAN-2014-00305-ESW

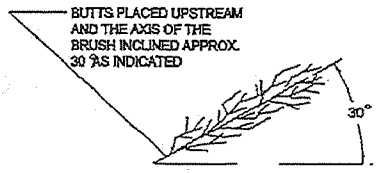
CONSTRUCTION SPECIFICATIONS

1. PREPARE SLOPE SURFACE BY GRADING TO A UNIFORM, SMOOTH SURFACE.
2. LAY HARDWOOD BRUSH IN AN UPSTREAM DIRECTION BEGINNING AT THE DOWN-STREAM END. THE TOE SHOULD BE ESTABLISHED FIRST.
3. THE BUTT END OF THE BRUSH WILL BE PLACED UPSTREAM AND THE PLANT MATERIALS INCLINED APPROXIMATELY 30 DEGREES.
4. THE UPSTREAM EDGE OF THE MAT WILL BE KEYED INTO THE SLOPE 2 FEET. STAKES WILL BE DRIVEN THROUGHOUT THE MATTING ON 3 FOOT CENTERS EACH WAY BEGINNING ALONG THE TOE OF THE MAT.
5. NO. 9 GALVANIZED WIRE WILL BE ATTACHED TO THE STAKES OVER THE MAT AND TIGHTENED TO SECURE THE MAT.
6. SLOPE AREAS ABOVE THE MAT WILL BE SLOPED AND SEEDED.



TYPICAL CROSS - SECTION



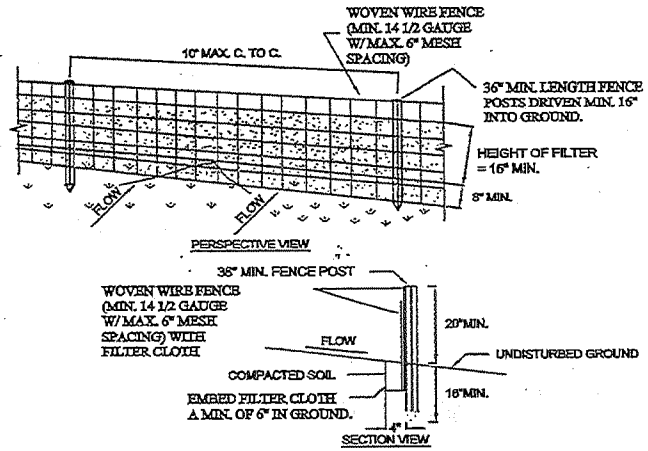


STATION	TO
25+50	26+00 W
28+50	28+95 E
28+50	28+95 W
42+50	42+89 E
44+80	45+25 W

BRUSH MATTING

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-5 SHEET _18_ OF __31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



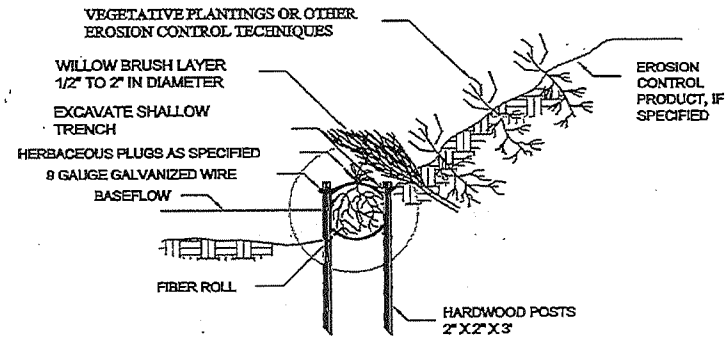
CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

SILT FENCE

FIBER ROLL SCHEDULE

STATION	TO
19+50 EAST	20+65
25+10 WEST	25+60



CROSS SECTION
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. EXCAVATE A SHALLOW TRENCH AT THE TOE OF SLOPE TO SLIGHTLY BELOW BASEFLOW.
2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" x 2" POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IF NECESSARY.
3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR 1/8" DIAMETER BRAIDED NYLON ROPE.
4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

FIBER ROLL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

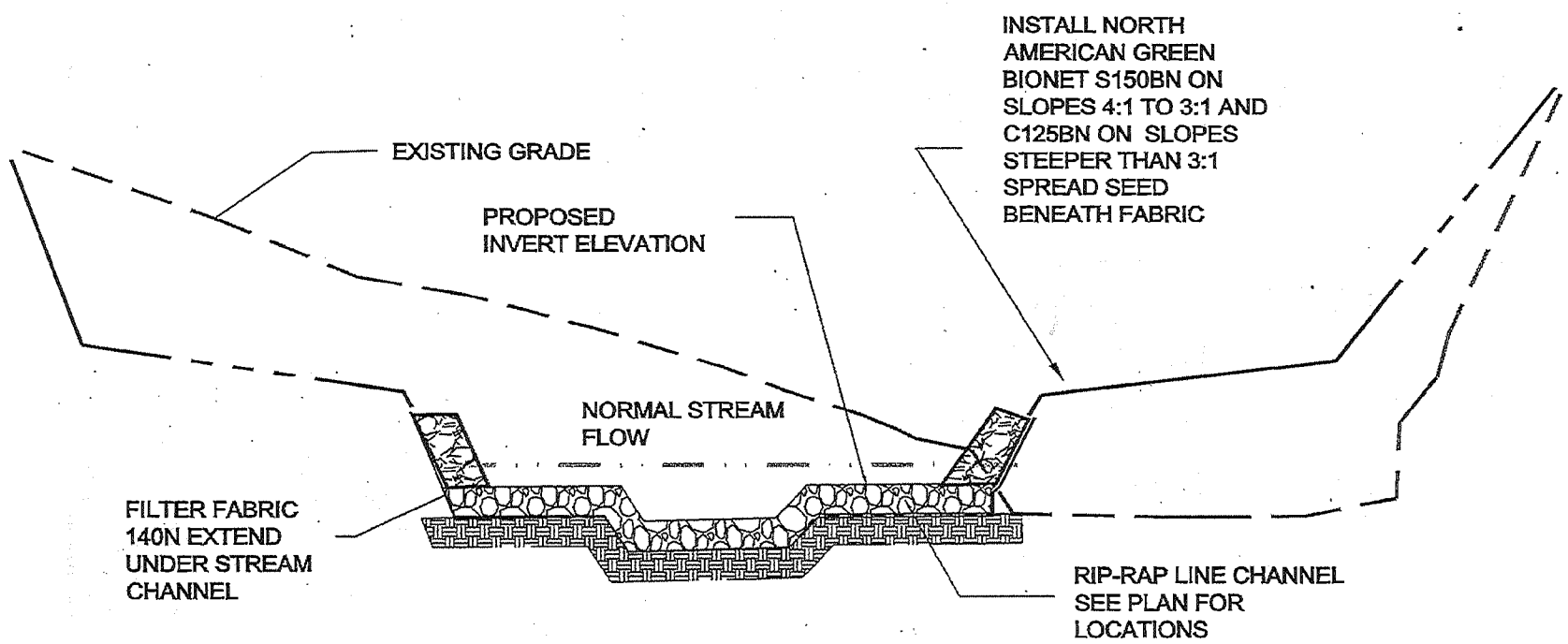
PROJECT NO.:	30--2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-6

SHEET 19 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



ARMORED CHANNEL

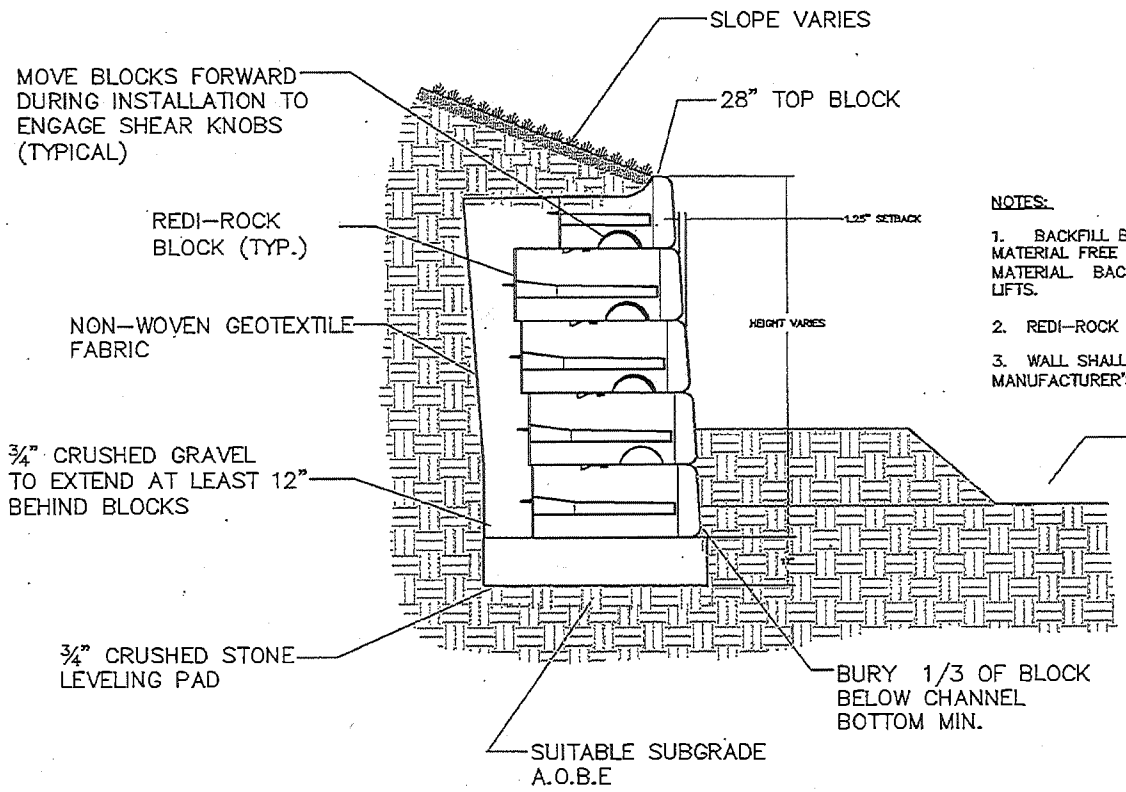
SEE PLAN FOR LOCATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN	DRAWING NO.: D-7
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET _20_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



NOTES:

1. BACKFILL BEHIND WALL SHALL BE SUITABLE FILL MATERIAL FREE FROM LARGE ROCKS, DEBRIS, AND ORGANIC MATERIAL. BACKFILL SHALL BE COMPACTED IN 8" MAXIMUM LIFTS.
2. REDI-ROCK WALL FINISH SHALL BE "LEDGESTONE".
3. WALL SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

SCHEDULE

STATION	TO
9+08	9+54.5 E
9+08	9+54.5 W
9+98	10+47 E
9+98	10+57.5 W
10+75	12+43.5W
18+75	19+87.8 E

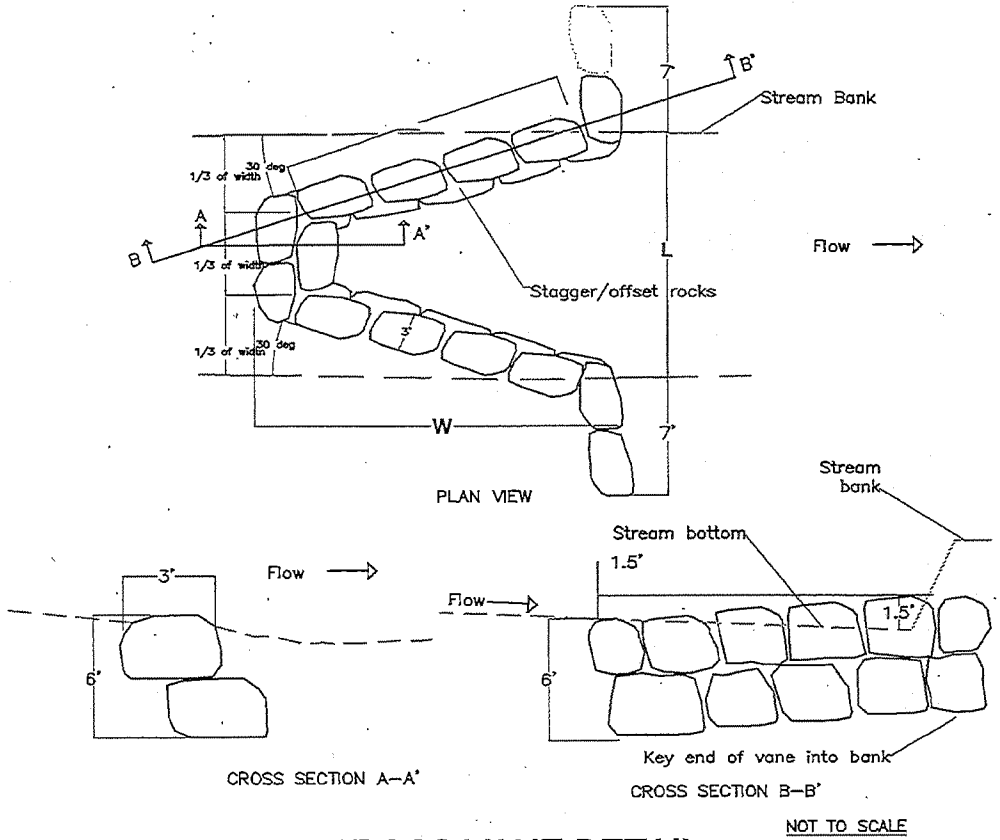
MODULAR RETAINING WALL

N.T.S.

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-8 SHEET _21_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



NOT TO SCALE

CROSS VANE DETAIL

CROSS VANE SCHEDULE

STRUCTURE ID	STATION	ELEVATION	W	L
CV # 1	11+25	97.6	24'	16'
CV # 2	28+15	100.9	24'	16'
CV # 3	38+00	102.6	24'	16'
CV # 4	41+50	102.9	24'	16'
CV # 5	60+00	105.2	44'	20'

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

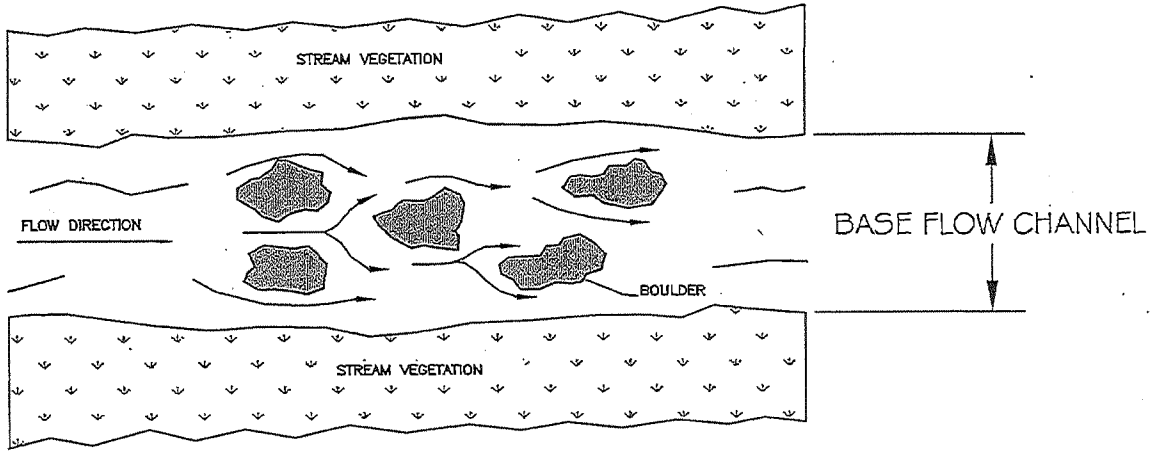
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-9

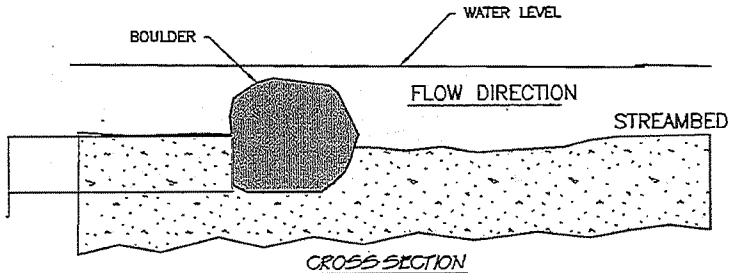
SHEET 32 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PLAN VIEW



CROSS SECTION

SCHEDULE

STATION
14+75
24+65
27+00
32+40
54+80
58+35

- AVERAGE ROCK SIZE- 2.5'-3.5' DIA.-ROCK, SIZE IS SITE DEPENDENT.
- A MINIMUM OF ONE BOULDER PER SET OF BOULDERS SHOULD PROTRUDE FROM WATER SURFACE DURING TIMES OF ORDINARY FLOW TO ACT AS MID-STREAM PERCHING/LOAFING SITES.
- USE BOULDERS WITH IRREGULARITIES OR MULITPLE BOULDERS TOGETHER TO PROVIDE SLIGHT OVERHANGING COVER.
- PLACE BOULDERS SO CURRENT WILL NOT BE DEFLECTED INTO UNPROTECTED STREAM BANKS.

BOULDER CLUSTERS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

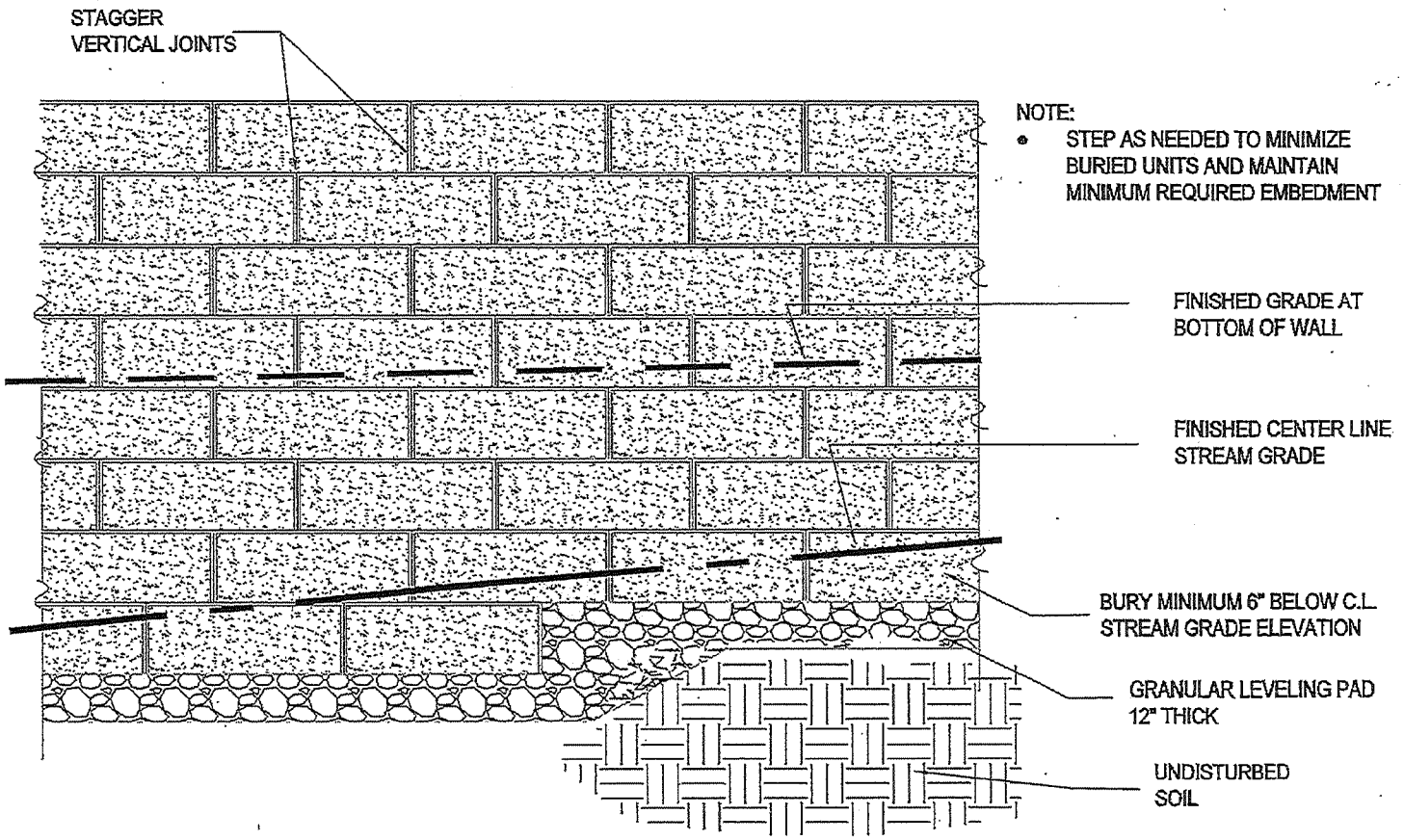
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-10

SHEET 23 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

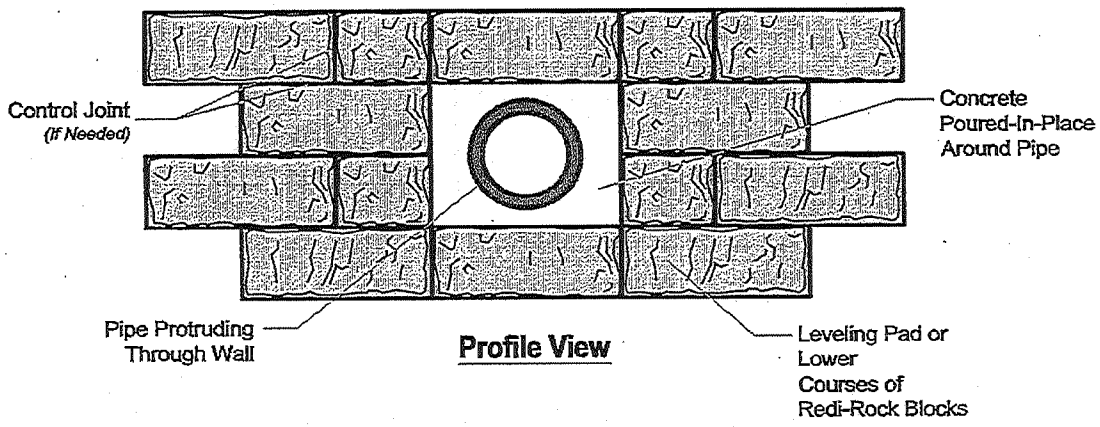
USACE FILE: NAN-2014-00305-ESW



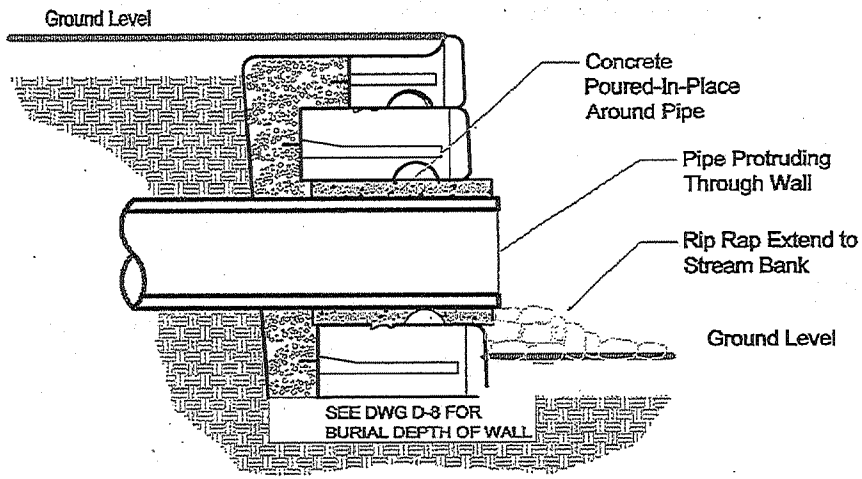
REDI ROCK RETAINING WALL

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL 10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	DETAIL CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-11 SHEET 24 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



Profile View



Section View

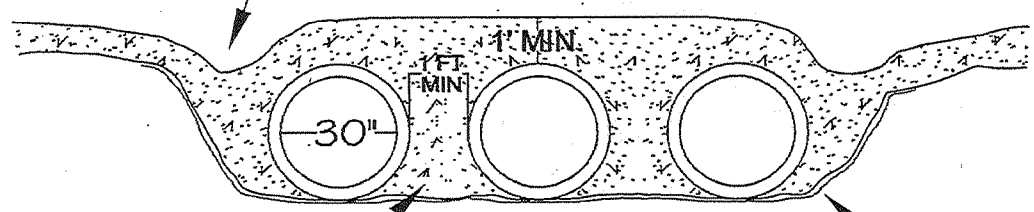
Pipe Through Wall Detail

NTS

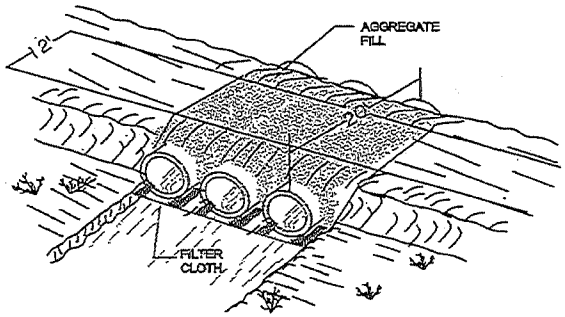
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30–2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-12 SHEET _25_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



INSTALL (3) 30" HDPE PIPES - 20' LENGTH EACH



MULTIPLE PIPES

LOCATIONS

STA 4+25
STA 28+10
STA 32+75

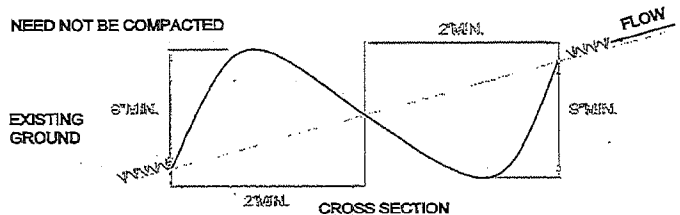
TEMPORARY STREAM CROSSING DETAIL

NOT TO SCALE

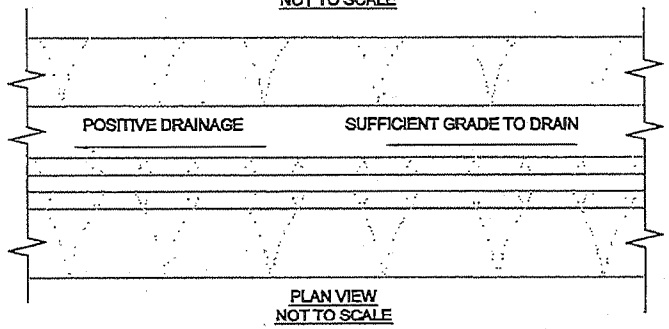
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-13 SHEET 26 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

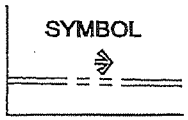
USACE FILE: NAN-2014-00305-ESW



CROSS SECTION
NOT TO SCALE



PLAN VIEW
NOT TO SCALE



CONSTRUCTION SPECIFICATIONS

1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATIONS FOR TEMPORARY SEEDING AND MULCHING, AND SHALL BE DONE WITHIN 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

MAX. DRAINAGE AREA LIMIT: 2 ACRES

PERIMETER DIKE OR SWALE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

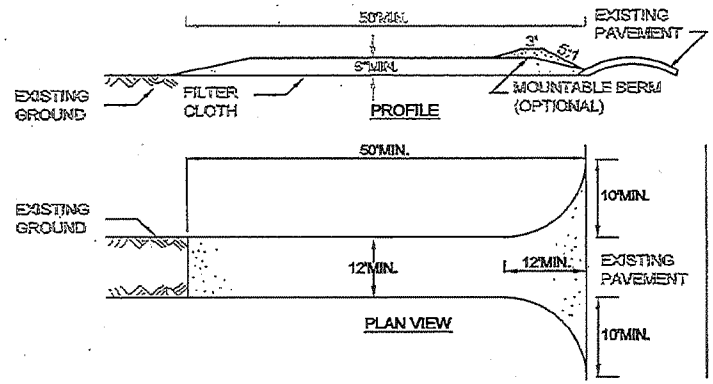
DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-14
SHEET 27 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



SYMBOL

CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – USE 2" CLEAN STONE
2. LENGTH – NOT LESS THAN 50 FEET
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY–FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ENTRANCE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

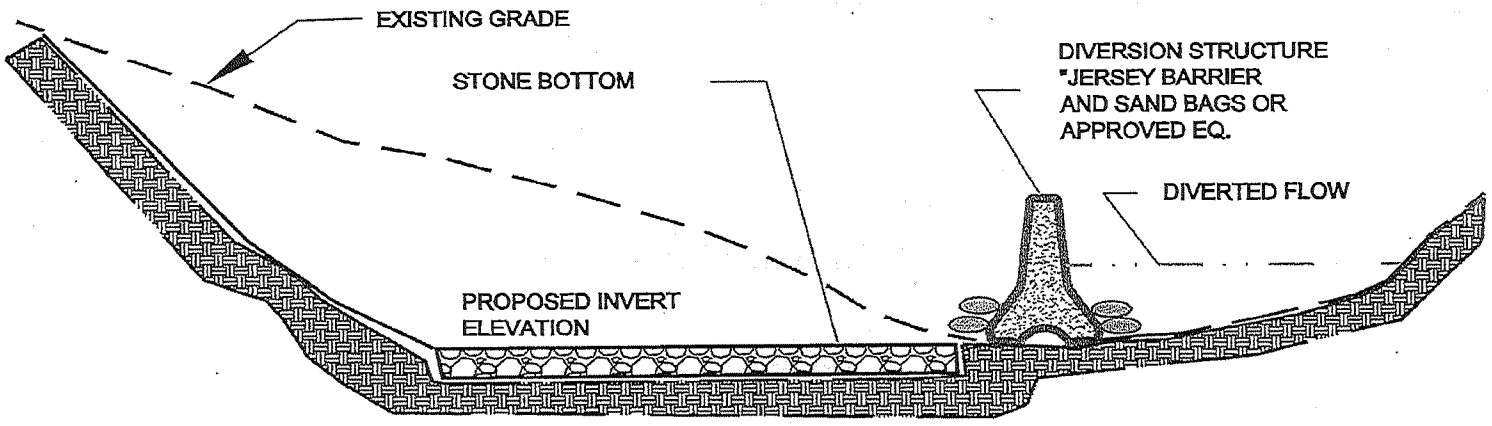
PROJECT NO.:	30–2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-15

SHEET 28 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TYPICAL TEMPORARY CHANNEL DIVERSION

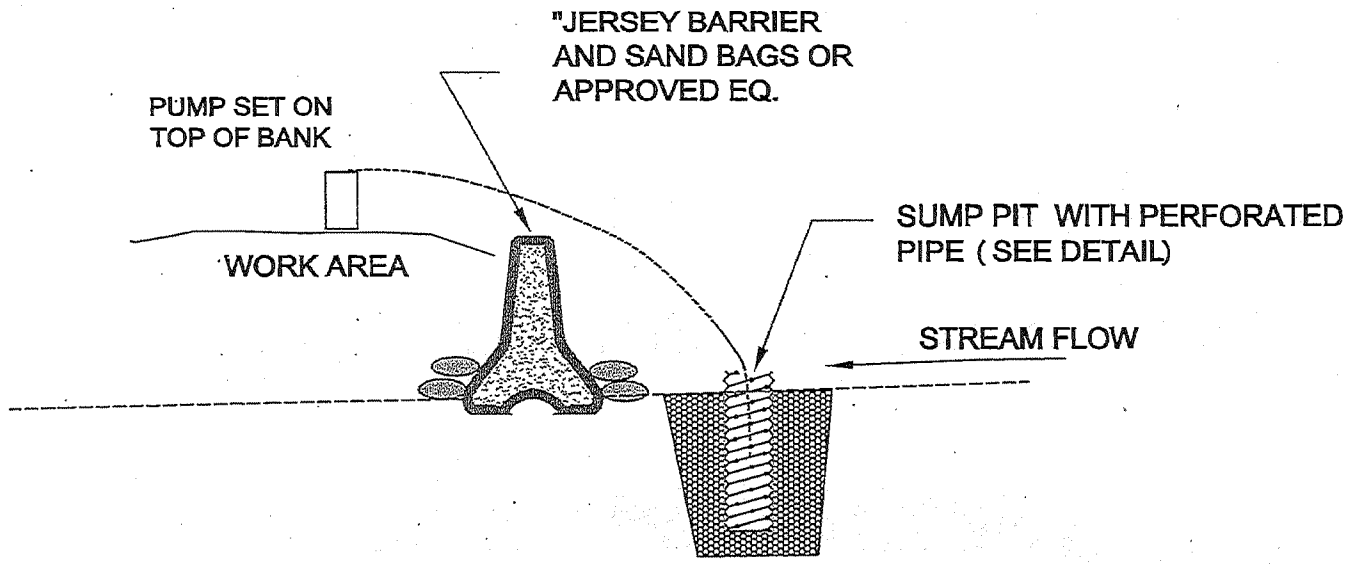
N.T.S.

NOTE
SEE CROSS SECTION DRAWINGS
FOR STREAM CONFIGURATION
AND LOCATION OF NORMAL LOW
FLOW CHANNEL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-16 SHEET 29 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



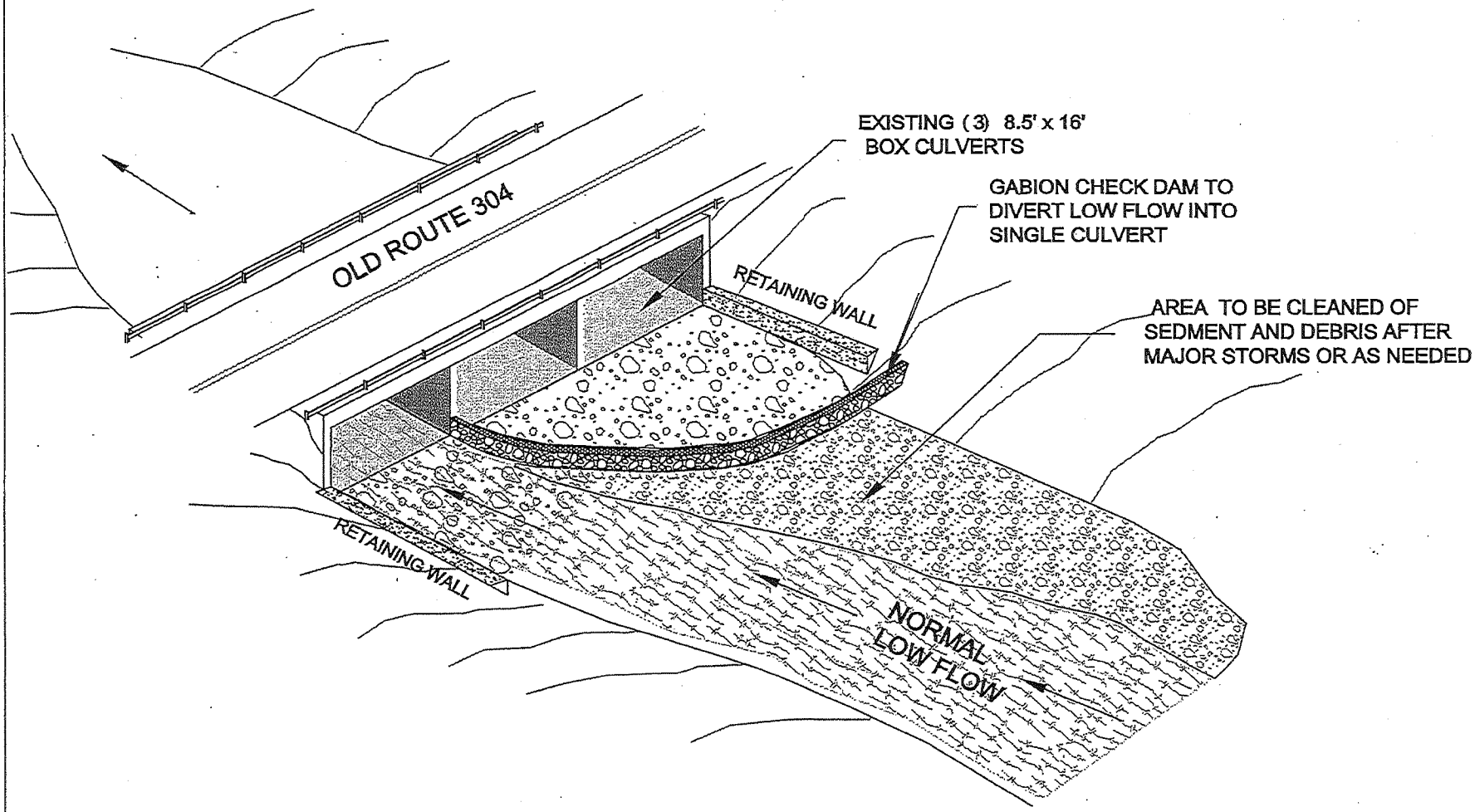
TEMPORARY COFFER DAM

N.T.S

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWING NO.: D-17 SHEET _30_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	GABION WEIR AT BOX CULVERT	PROJECT NO.: 30–2005 DATE: 05/14/15 SCALE: NONE DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-18 SHEET _31_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

New York State
Department of Environmental Conservation

NOTICE

The Department of Environmental Conservation (DEC) has issued permit(s) pursuant to the Environmental Conservation Law for work being conducted at this site. For further information regarding the nature and extent of work approved and any Department conditions on it, contact the DEC at 845/256-3054. Please refer to the permit number shown when contacting the DEC.

Permittee: (T) Clarkstown Permit No. 3- 3920-00297/00010,11

Effective Date: 7/20/2016 Expiration date: 12/31/2020

☐ Applicable if checked. No instream work allowed between October 1 & April 30

NOTE: This notice is **NOT** a permit.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 3
21 South Putt Corners Road, New Paltz, NY 12561-1620
P: (845) 256-3054 I F: (845) 255-4659
www.dec.ny.gov

IMPORTANT NOTICE TO ALL PERMITTEES

The permit you requested is enclosed. Please read it carefully and note the conditions that are included in it. The permit is valid for only that activity expressly authorized therein; work beyond the scope of the permit may be considered a violation of law and be subject to appropriate enforcement action. Granting of this permit does not relieve the permittee of the responsibility of obtaining any other permission, consent or approval from any other federal, state, or local government which may be required.

Please note the expiration date of the permit. Applications for permit renewal should be made well in advance of the expiration date (minimum of 30 days) and submitted to the Regional Permit Administrator at the above address. For SPDES, Solid Waste and Hazardous Waste Permits, renewals must be made at least 180 days prior to the expiration date.

The DEC permit number & program ID number noted on page 1 under "Permit Authorization" of the permit are important and should be retained for your records. These numbers should be referenced on all correspondence related to the permit, and on any future applications for permits associated with this facility/project area.

If a permit notice sign is enclosed, you must post it at the work site with appropriate weather protection, as well as a copy of the permit per General Condition 1.

If the permit is associated with a project that will entail construction of new water pollution control facilities or modifications to existing facilities, plan approval for the system design will be required from the appropriate Department's regional Division of Water or delegated local Health Department, as specified in the State Pollutant Discharge Elimination System (SPDES) permit.

If you have any questions on the extent of work authorized or your obligations under the permit, please contact the staff person indicated below or the Division of Environmental Permits at the above address.

Joseph A Murray
Division of Environmental Permits, Region 3
Telephone (845) 256-3040

☐ Applicable only if checked. Please note all work authorized under this permit is prohibited during trout spawning season commencing October 1 and ending April 30.

☑ Applicable only if checked for STORMWATER SPDES INFORMATION: We have determined that your project requires coverage under the General Stormwater SPDES Permit. You must file a Notice of Intent to obtain coverage under the General Permit. This form can be downloaded at: http://www.dec.ny.gov/chemical/43133.html

☑ Applicable only if checked - MS4 Areas: This site is within an MS4 area (Municipal Separate Storm Sewer System), therefore the SWPPP must be reviewed and accepted by the municipality. The MS-4 Acceptance Form must be submitted in addition to the Notice of Intent.

Send the completed form(s) to: NYS DEC, Stormwater Permitting, Division of Water, 625 Broadway, Albany, New York 12233-3505; in addition, DEC requests that you provide one electronic copy of the approved SWPPP directly to NYS DEC, 100 Hillside Avenue - Suite 1W, White Plains, NY 10603-2860.

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

September 27, 2016

Shannon Holsey, President
Stockbridge-Munsee Community, Band of the Mohicans
N8476 Moh He Con Nuck Road
Bowler, WI 54416

Re: Update related to Section 106 Compliance for Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, NY – New York Rising Community Reconstruction Program

Dear President Shannon Holsey:

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). GOSR is the entity responsible for compliance with the HUD environmental review procedures set forth in 24 CFR Part 58. GOSR is acting on behalf of HUD in providing the enclosed project information and inviting this discussion with your Community to respond with any concerns or comments.

GOSR processes environmental reviews for projects funded with HUD CDBG-DR on a case-by-case basis. 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.

Update and Request for Comment: GOSR has completed the Phase 1 survey and geomorphological analysis of the area of potential effect. The archeological survey and geomorphological analysis report has been provided to you. GOSR has also submitted the Phase I report to SHPO and no comments have been received from SHPO to date. GOSR respectfully submits for your review the attached documentation for the proposed project(s) described herein. If the Area of Potential Effect encompasses historic properties of religious or cultural significance to your Community, 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.

Mrs. Alicia Shultz
Community Developer - Environmental Services
New York State Homes & Community Renewal
38-40 State St.,408N, Hampton Plaza
Albany, NY 12207

Sincerely,

Alicia Shultz
Community Developer – Environmental Services
New York State Homes and Community Renewal

Enclosures: Phase I Archeology Report

Electronic letter sent to:
Bonney Hartley
THPO, New York Office
Stockbridge-Munsee Community, Band of the Mohicans
65 1st Street
Troy, NY 12180

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS

NY Rising Community Reconstruction Program

Phase I
Archaeological and Geomorphological Survey

Town of Clarkstown
Rockland County
New York 12304

TECTONIC
Practical Solutions, Exceptional Service

Prepared for: **Governor's Office of Storm Recovery**

[illegible]-[illegible]0 State Street, [illegible]0[illegible]N Hampton Pla[illegible]a
[illegible]lbany, New York 1[illegible]0[illegible]

Prepared by: **Tectonic Engineering & Surveying Consultants P.C.**

[illegible]0 Pleasant Hill Road
Mountainville , New York 10[illegible]

September [illegible]01[illegible]
Job No. [illegible]

Governor's Office of Storm Recovery
New York State Homes & Community Renewal
38-40 State Street, 408N Hampton Plaza
Albany, New York 12207

Attn: Alicia Shultz
Via email (Alicia.Shultz@nyshcr.org)

September 26, 2016

RE: WO 7363.23
PHASE I ARCHAEOLGICAL AND GEOMORPHOLOGICAL SURVEY FOR
CLARKSTOWN DRAINAGE IMPROVEMENTS
NY RISING COMMUNITY RECONSTRUCTION PROGRAM
TOWN OF CLARKSTOWN,
ROCKLAND COUNTY, NEW YORK

Dear Ms. Shultz,

Tectonic Engineering & Surveying's (Tectonic) subcontractor, Christine Davis Consultants, Inc. (CDC), has completed a Phase I Archaeological and Geomorphological Survey for the above referenced site. As part of the environmental review process, the New York SHPO required a cultural resource survey of the subject property. This report presents the findings of a Phase I Archeological Survey conducted on behalf of the Town of Clarkstown (Subrecipient) for the Cranford Drive Drainage Improvements Project in the Town of Clarkstown, Rockland County, New York. The Governor's Office of Storm Recovery (GOSR), operating under auspices of New York State Homes and Community Renewal's Housing Trust Fund Corporation, is the Responsible Entity for direct administration of the U.S. Dept. of Housing & Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) funds. The Project is part of the New York Rising Community Reconstruction Program and is receiving funding for a stormwater management improvement project involving the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

The Phase I Archaeological and Geomorphological Survey included archival research, a reconnaissance survey, and Phase I archaeological and geomorphological subsurface testing in order to evaluate the subject properties potential to contain significant cultural resources. No significant cultural resources were identified during the Phase I survey. No further archaeological work is recommended for the Clarkstown Drainage Improvements project. The final reports have been submitted for agency review. This work was performed in accordance with Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* and the *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New*

York State published by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) in 2005.

Attached please find the following documentation:

1.) Combined Phase IA/1B Archaeological Survey Report for the Clarkstown Drainage Improvements project

2.) Geomorphological Survey for the Clarkstown Drainage Improvements project

Feel free to contact the undersigned if you have any questions.

Sincerely,
TECTONIC ENGINEERING AND SURVEYING CONSULTANTS P.C.

Peter T. Sutherland

Peter T. Sutherland, P.E., L.E.P., C.P.G.
Vice President Environmental Services

PHASE I ARCHAEOLOGICAL AND GEOMORPHOLOGICAL SURVEYS

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS TOWN OF CLARKSTOWN, ROCKLAND COUNTY, NEW YORK

16PR05212

A Cultural Resource Management Report Prepared for:

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

September 2016

CHRISTINE DAVIS CONSULTANTS, INC.
560 Penn Street, Verona, Pennsylvania 15147
Phone: 412/826-0443 Fax: 412/826-0458

PHASE I ARCHAEOLOGICAL AND GEOMORPHOLOGICAL SURVEYS

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS
TOWN OF CLARKSTOWN,
ROCKLAND COUNTY, NEW YORK

16PR05212

BY:

CHRISTINE E. DAVIS
Principal Investigator

For final submission to:

New York State Office of Parks, Recreation and Historic Preservation
P.O. Box 189, Waterford, New York 12188-0189

ABSTRACT

Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering & Surveying Consultants P.C. to conduct a Phase I Archaeological and Geomorphological Survey for the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York. The agency for this project is the Governor's Office of Storm Recovery (GOSR).

The area of potential effect (APE) involves of approximately 3,666 linear feet (ft) (1,117 linear meters (m)) with a right-of-way (ROW) width of 100 ft or approximately 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)). It is topographically situated within a floodplain/terrace and lower hillslope environment setting associated with Demarest Kill and its unnamed tributary streams within the Piedmont Lowlands section of the Piedmont physiographic province.

The Phase I field survey was conducted in summer of 2016. Phase I field methodology included surface surveillance and the hand excavation of shovel tests (STs). A portion of the APE, involving approximately 19,031 sq m (204,845 sq ft or 4.7 ac), was not tested due to the presence of slopes greater than 15 percent and disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond. The total tested area within the APE measured approximately 29,155 sq m (313,821 sq ft or 7.2 ac). A total of 134 STs at 15 m intervals were excavated during the Phase I Survey. A total of 134 STs were negative. Based on the results of the Phase I Survey no cultural resources were recorded.

Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Canford Drive Drainage Improvements project.

MANAGEMENT SUMMARY

State Historic Preservation Office (SHPO) Project Review Number: 16PR05212

Agency:
Governor's Office of Storm Recovery (GOSR)

Phase of Survey:
Phase I Archaeological and Geomorphological Surveys

Location Information:

Location:	Brownswell Corner
Minor Civil Division:	Town of Clarkstown
County:	Rockland

Survey Area:

Length:	1,117 m (3,666 ft)
Width:	50 m (100 ft)
Depth:	n/a
# of Acres Surveyed:	48,186 sq m (518,666 sq ft or 11.9 ac)

USGS 7.5 Minute Quadrangle Map:
Haverstraw, NY 2016
Thiells, NY 2016

Archaeological Survey Overview:

Number and Interval of Shovel Tests:	134 tests at 15 m (50 ft) intervals
Number and Size of Units:	n/a
Width of Plowed Strips:	n/a
Surface Survey Transect Interval:	n/a

Results of Archaeological Survey:

Number and Name of Prehistoric Sites Identified:	0
Number and Name of Historic Sites Identified:	0
Number and Name of Sites Recommended for Phase II/Avoidance:	0

Results of Architectural Survey:

Number of Buildings/ Structures/ Cemeteries within Project Area:	n/a
Number of Buildings/ Structures/ Cemeteries Adjacent to Project Area:	n/a
Number of Previously Determined NR Listed or Eligible Buildings/ Structures/Cemeteries/ Districts:	n/a
Number of Identified Eligible Buildings/ Structures/ Cemeteries/ Districts:	n/a

Report Authors
Christine E. Davis

Date of Report
September 2016

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 PROPOSED UNDERTAKING 1
1.2 AREA OF POTENTIAL EFFECT (APE) 4
1.3 DISPOSITION OF MATERIALS 4
1.4 AGENCY COORDINATION 4

2.0 ENVIRONMENTAL BACKGROUND 8

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY 8
2.2 CLIMATE 8

3.0 BACKGROUND RESEARCH 9

3.1 CULTURAL PREHISTORIC OVERVIEW 9
3.2 OVERVIEW OF ROCKLAND COUNTY AND THE TOWN OF CLARKSTOWN 11
3.3 SOILS 11

4.0 SENSITIVITY ASSESSMENT 13

5.0 DISTURBANCE 14

6.0 TESTING RECOMMENDATIONS 17

6.1 GEOMORPHOLOGICAL SURVEY RESULTS 17

7.0 PHASE I FIELD SURVEY 18

7.1 FIELD METHODOLOGY 18
7.2 FIELD SURVEY RESULTS 18

8.0 SUMMARY 23

8.1 CONCLUSIONS 23

9.0 REFERENCES 24

APPENDICES:

I AGENCY COORESPONDENCE
II GEOMORPHOLOGICAL REPORT
III SHOVEL TEST RECORDS

FIGURES

1 GENERAL PROJECT LOCATION, NEW YORK TRANSPORTATION MAP 2

2 ARCHAEOLOGICAL AREA OF POTENTIAL EFFECT (APE), HAVERSTRAW AND THIELLS, NY 7.5' USGS MAP 3

3 APE, PROJECT MAPPING 5

4 APE INDICATING TESTED, WET, AND DISTURBED, PROJECT MAPPING 16

5 AREA A 22

PHOTOGRAPHS

1 APE, LOOKING NORTHEAST 6

2 APE, LOOKING NORTHEAST 6

3 APE, LOOKING SOUTHEAST 7

4 EROSION CONTROL AREAS INCLUDED THE USE OF LARGE STONES ALONG THE FLOODPLAIN AND TERRACES, LOOKING SOUTHEAST 14

5 EROSION CONTROL AREAS INCLUDED THE USE OF LARGE STONES ALONG THE FLOODPLAIN AND TERRACES, LOOKING WEST 14

6 MAN-MADE RETENTION POND, LOOKING SOUTHWEST 15

7 ARTIFICIALLY CONSTRUCTED DRAINAGE, LOOKING WEST 15

8 AREA A, LOOKING SOUTH 19

9 AREA A, LOOKING SOUTH 19

10 AREA A, LOOKING NORTHEAST 20

11 AREA A, LOOKING NORTHEAST 20

TABLES

1 PREVIOUSLY RECORDED HISTORIC PROPERTIES WITHIN A ONE-MILE RADIUS 13

1.0 INTRODUCTION

Historic and cultural resources are protected under Federal law through Section 106 of the National Historic Preservation Act of 1966, as amended, and implementing regulation 36 CFR 800 as revised in January of 2001; the Archaeological and Historic Preservation Act of 1974; Section 101(b)(4) of the National Environmental Policy Act of 1969; Executive Orders 11593 and 12362; 18 CFR Part 380.14; 23 CFR 771, as amended, August 28, 1987; 36 CFR 60; the guidelines developed by the Advisory Council on Historic Preservation (ACHP) published November, 26, 1980; and the amended procedures for the Protection of Historic and Cultural Properties, as set forth in 36 CFR 800.

The regulations developed under Section 106 of the National Historic Preservation Act require that prior to approval of federal funding, agencies should consider the impact of a project on any district, site, building, structure, or object that is included on, or eligible for inclusion on, the National Register of Historic Places (NRHP), and the ACHP must be given an opportunity to comment on such an undertaking. The Historic and Archeological Data Preservation Act directs Federal agencies to preserve historic and archeological data that would otherwise be lost as a result of a Federal action. A project is considered to have an adverse effect on such sensitive resources if it changes the quality of cultural characteristics that render them eligible for listing on the NRHP.

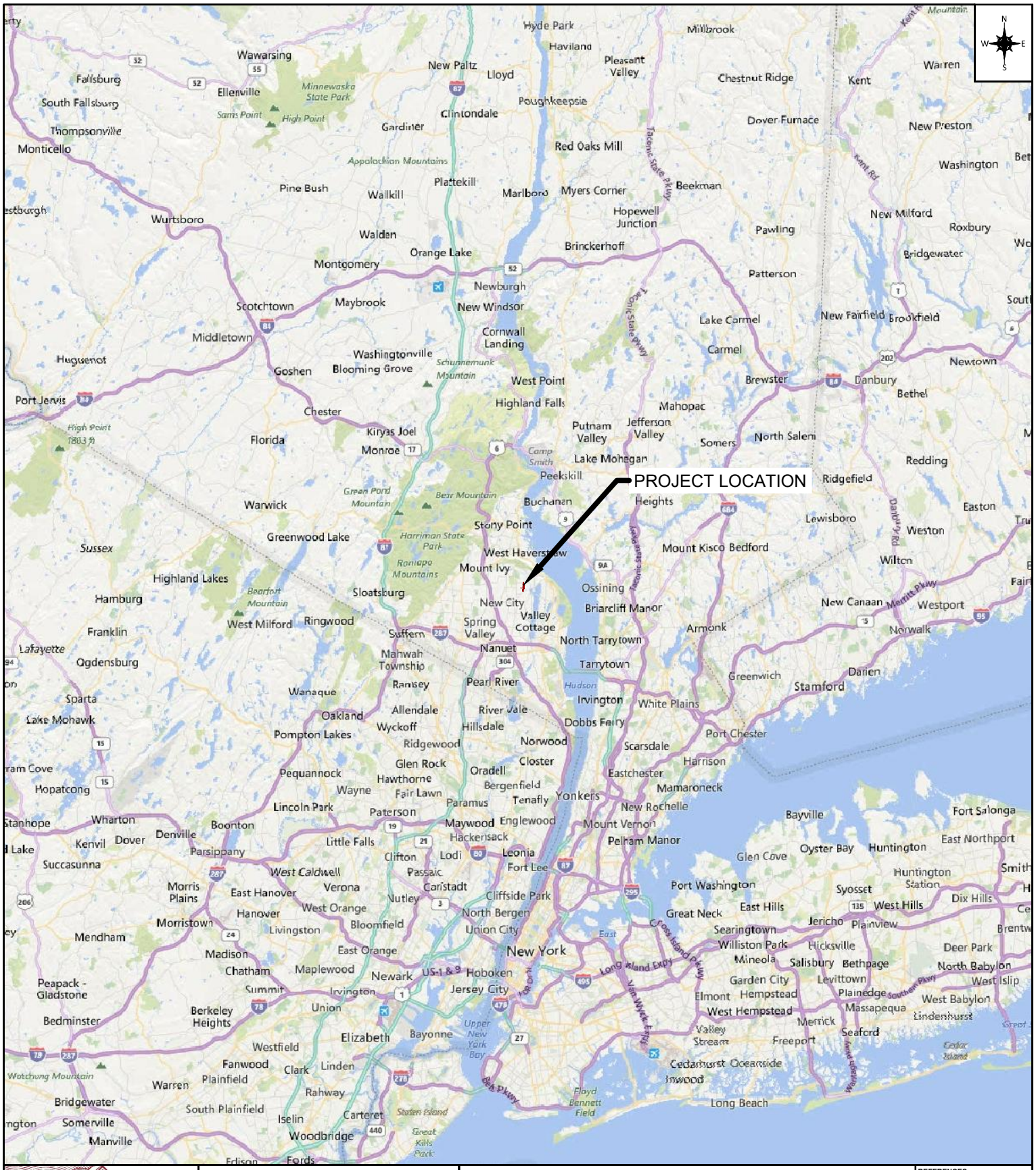
Historic properties of national, state and local significance may be nominated to the NRHP following an evaluation in accordance with an established set of criteria. The evaluation process is conducted at the state level by the New York State Historic Preservation Officer (SHPO) and at the federal level by the NRHP staff of the Department of the Interior. The National Park Service administers the National Register and has established four criteria for the evaluation of the potential significance of historic and archeological properties. These criteria are described in Title 36, Part 60 of the Code of Federal Regulations and are summarized as follows:

- Criterion A: A property is associated with historically significant events that have made a significant contribution to the broad patterns of our history. To meet this criterion, a historic property needs to have existed at the time of the important event and be associated in a significant way with the event.
- Criterion B: A property is associated with the lives of persons significant in our past.
- Criterion C: A property that embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D: A property that has yielded, or may be likely to yield, information important in prehistory or history.

Archaeological studies are completed under Section 106 of the National Historic Preservation Act of 1966 as amended; the National Environmental Policy Act of 1969; the Archaeological and Historic Preservation Act of 1974; and the regulations of the ACHP 36 CFR 63 and 36 CFR 800. This technical scope of work was developed in accordance with the *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State* published by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) in 2005.

1.1 PROPOSED UNDERTAKING

Christine Davis Consultants, Inc. (*CDC*) was retained by Tectonic Engineering & Surveying Consultants P.C. to conduct a Phase I Archaeological and Geomorphological Survey for the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York (Figures 1 and 2). The proposed drainage improvements are located north of the town of New City and west of De Forest Lake primarily between Cranford Drive and Cypress Street.



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

0 — 1 INCH = 10 MILES — 20 MILES

REFERENCES:
NAVTEQ - 2010
Road Map

Project Location
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 1

Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDaviesConsultants.com
412-826-0443

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

REFERENCES:

TECTONIC
Erosion Control Plan 5-30-13

USGS 7.5 MINUTE QUADRANGLES
HAVERSTRAW, NY 2016
THIELLS, NY 2016

Area of Potential Effect
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 2

The Clarkstown Cranford Drive Drainage Improvements project is part of the New York Rising Community Reconstruction Program and is receiving funding for a stormwater management improvement project involving the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

1.2 AREA OF POTENTIAL EFFECT (APE)

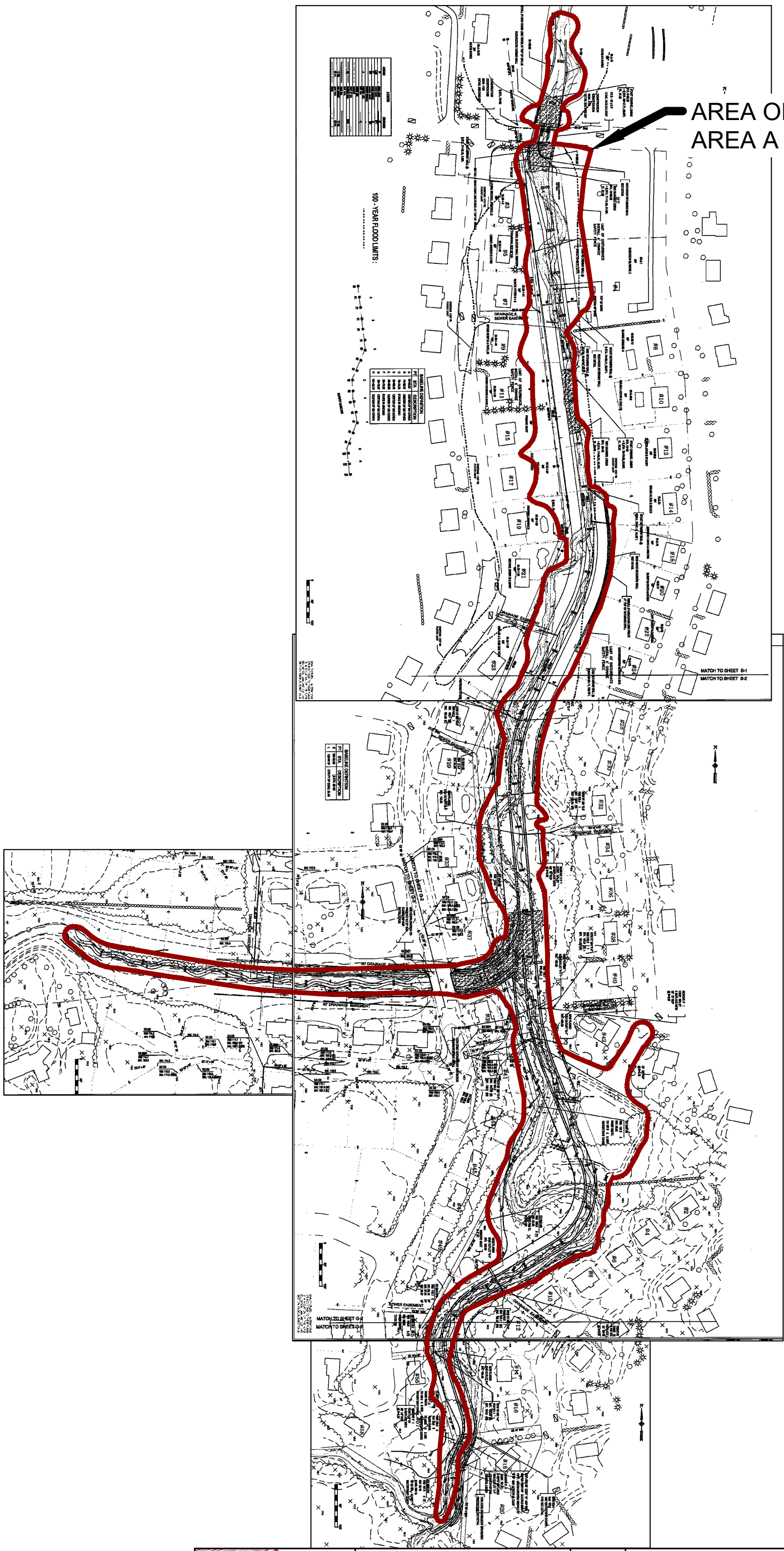
The area of potential effect (APE) consists 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)) topographically situated in a floodplain/terrace and lower hillslope environment associated with Demarest Kill and its unnamed tributary streams (Figure 3). The APE is characterized by deciduous hardwoods interspersed with herb/shrub communities. The APE is generally located west of the Hudson River and north of New City, New York between S.R. 304 and Old Route 304 within Clarkstown (Photos 1 to 3).

1.3 DISPOSITION OF MATERIALS

CDC will supply copies of this document to Tectonic Engineering & Surveying Consultants P.C. and the OPRHP.

1.4 AGENCY COORDINATION

In their response letter, the OPRHP required a Phase I Archaeological Survey to locate potentially significant archaeological resources within areas that will involve ground disturbance and cannot be documented as disturbed (Appendix I).



APE / AREA A

N
W E
S

0 1 CM = 30 METERS 120 METERS

Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

Project Mapping
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

REFERENCES:

TECTONIC
Erosion Control Plan 5-30-13

USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 3

Photo 1: APE, looking northeast

Photo 2: APE, looking northeast

Photo 3: APE, looking southeast

2.0 ENVIRONMENTAL BACKGROUND

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY

The bedrock of Rockland County is composed of sedimentary rock formations of Upper Triassic age such as the Newark group (USGS 2016). The arkose, mudstone, shale, and sandstone of the Brunswick Formation have been greatly altered by the advance and retreat of continental ice sheets of the late Pleistocene Epoch. The retreat of the glaciers of this period has resulted in the deposition of glacial till over the ground surface of the region (NYSM 2016; USFWS 2016).

The Phase IA study area is situated in the Triassic Lowland section of the Northern Piedmont physiographic province. This section is characterized by broad, gently sloping valleys with a moderate pattern of ridges (USDA 1990). Elevations in the vicinity of the APE range from approximately 80 to 150 ft above mean sea level (amsl).

2.2 CLIMATE

Climatic conditions in Rockland County include cold and snowy winters and warm to hot summers. Precipitation is adequate and well distributed. The average winter temperature for most of the county is 28 degrees Fahrenheit (F) (-2.2 degrees Celsius (C)). The average summer temperature is 70 degrees F (21.1 degrees C). The total annual precipitation is 119.4 centimeters (cm) (47 inches (in)) of which approximately 50 percent falls from April through September. Prevailing winds are out of the south (USDA 1990).

3.0 BACKGROUND RESEARCH

The sequence of archival maps, aerial photographs, and other basic historical research relating specifically to the project area was evaluated. Background research for this project was conducted using information from CDC's library, the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) Cultural Resource Information System (CRIS), and other online resources. Important archival maps included the County Atlas of Rockland from 1875 (Beers 1875) along with archival USGS Tarrytown, NY maps from 1892 and 1902 provided information about land-use at the turn of the twentieth century. The Gazetteer of the State of New York along with a volume of Rockland County History were valuable additions to the research conducted (French 1860; Green 1886).

3.1 CULTURAL PREHISTORIC OVERVIEW

An examination of the cultural prehistory of the project area provides relevant background data for characterizing and predicting the area's prehistoric settlement system. This data contributes to the ability of archaeologists to identify and establish the probability of archaeological sites in a specific area.

The **Paleoindian** occupation originated between 9500 and 9000 B.C. and marked the first undisputed evidence of man's entry into the northeast. However, based on radiocarbon dates from Meadowcroft Rock Shelter near Avella in Washington County, Pennsylvania it can be suggested that a pre-Paleoindian occupation employing polyhedral-core and blade-based lithic technology may have been present as early as 14000 B.C. (Adovasio 1993:207). Paleoindian fluted projectile lanceolates, distinguished by elongated channel scars, are sometimes found in association with extinct Pleistocene megafauna such as mammoth and mastodon. The geographical distribution of these distinctive points and other tool forms from this period includes most of the New World (Ritchie 1980).

The majority of Paleoindian sites in the northeast are recognized by fluted points, keeled unifacial tools, gravers, and blades fabricated from a variety of cherts and jaspers. Site types include kill sites with single projectile points; upland and waterside camps with varied tool kits; trail camps associated with Indian paths and natural trails; and specialized quarry and tool manufacturing sites where raw materials were procured and worked into tools. An average of 72 percent of Paleoindian sites in the northeast are located less than 200 m from second or higher-order streams. These riverine environments would have provided Paleoindian groups with a wide variety of important resources. (Carr 1998; Ritchie 1980)

The **Early Archaic** period (8000-6000 B.C.) roughly correlates with a time of notable environmental changes that began during the Pleistocene with episodes of glacial retreat; however, late Paleoindians lived within essentially the same environment as subsequent Archaic groups. Continuity between the Paleoindian and Early Archaic periods has been recognized, particularly through their subsistence regimes and mobility patterns. By the Early Archaic, Pleistocene megafauna became extinct and were replaced by modern species such as caribou and elk. Evidence for resource availability is poorly known, but it is believed that Early Archaic cultures were generalized hunters and gatherers living in small ephemeral sites located in a diversity of geographical settings. The Paleoindian preference for floodplain settings was replaced with an increase in upland site locations. The Early Archaic period is recognized by classic projectile tool types such as Kirk, Palmer, Big Sandy, and Thebes found at a relatively small number of localities. Continuity with Paleoindian populations can be suggested by Early Archaic tool attributes such as basal grinding (Ritchie 1980).

Bifurcated points mark the end of the Early Archaic period and the gradual emergence of the **Middle Archaic** cultures. By the Middle Archaic period (6500-3000 B.C.), some archaeologists suggest that a major economic shift toward increased specialization in hunting and gathering resources had

occurred perhaps in response to continued Early Holocene environmental changes. Human populations responded to these climatic fluctuations either by abandoning traditional exploitative strategies in one zone and continuing them in another or by exploiting new resources. The adaptive responses in place during the Middle Archaic period were coupled with a significant increase in population. Population increase also may be correlated with the trend toward territoriality and more sedentary lifeways as observed in the subsequent Late Archaic period (Ritchie 1980; Stewart 1989).

Hallmarks for the **Late Archaic** period include an emerging widespread interaction sphere in which objects such as copper, marine shell and chert were traded vis a vis long distance networks. Woodworking, weaving and hideworking tools are evident on larger base camps and settlement camps where ceremonial and domestic activities were likely to have occurred. Base camps were located on major rivers and may have at least partially functioned to take advantage of riverine links with cultures outside of the river valleys for the purpose of trade, group hunting activities, ceremonies, and/or the exchange of ritual and marriage partners. Specialized subsistence practices such as the collection of mussel shell and hickory nuts as well as an increased use of fish and avian resources seem to have intensified during the Late Archaic, although data for an increase in subsistence diversity is difficult to assess because of the scarcity of archaeological findings for this period. A diversity of topographic situations in the uplands and major riverine areas were utilized during the Late Archaic.

The **Early Woodland** period (1000 B.C.-100 B.C.) is characterized by a shift to ceramic production, the introduction of cultivated plants, and a more sedentary settlement system. However, data from some Early Woodland sites suggest a persistence of the Archaic hunting, gathering and fishing lifeway. The presence of both Early Woodland and Late Archaic artifacts on the same sites suggests a continuation of Late Archaic subsistence and procurement patterns. Preferred habitation locales included major floodplains and terraces where high yields of seed plants and riverine resources could be obtained. Gradually, cultigens such as squash, pumpkin, gourd, and corn were introduced. Of particular importance in the subsistence strategies during the **Middle Woodland** period (100 B.C.-A.D. 900) was the use of aquatic resources. Although deer provided the most significant part of the subsistence system, other components included fish, birds, turtles, and amphibians. Evidence for domesticated plants is not impressive during the Middle Woodland; instead, there seems to have been more of a reliance on a broad spectrum subsistence pattern including the harvesting of wild or quasi-domesticated crops near rich hunting and gathering sites (Ritchie 1980).

The **Late Woodland**/ **Late Prehistoric** period (A.D. 800-1600), subsistence strategies shifted to a reliance on domesticated plants including corn, beans and squash, which were cultivated primarily on the large floodplains and terraces of major rivers. During the Late Woodland period, a climatic episode known as the NeoBoreal brought cool, moist conditions to the general region. The effect of such climatic changes on the growing season for Late Woodland crops is difficult to assess without additional studies and particularly data relating to the significance of cultigens during this period. Continued occupation of upland sites included hunting and gathering stations, winter campsites, small farmsteads and villages. At the time of European Contact, the Munsee-Delaware occupied lands within Rockland County (Ritchie 1980; Salomon 1982:36).

3.2 OVERVIEW OF ROCKLAND COUNTY AND THE TOWN OF CLARKSTOWN

Situated 10 miles north of New York City, the triangular-shaped Rockland County is bound by the Hudson River, Orange County, New York, and the State of New Jersey. The county is watered by the Hackensack River, Ramapo River, and tributaries of the Hudson River, including Minisceongo Creek, Minas Fall Creek, and Spar Kil. The Ramapo Mountains occupy the western third of the county with steep rocky peaks and narrow valleys. Mountains also separate the northern portion of the township from the Hudson River and were an early barrier to the growth and development of the area. Today, the county is made up of 17 villages and five towns: Clarkstown, Haverstraw, Orangetown, Ramapo, and Stony Point.

The first settlers arrived in 1690 and were Dutch. At that time, Rockland County was part of the Kakiat Patent, which was later sold to a group of five men in 1716, one of whom was Daniel De Clark. When his land was sold in 1764, it became known as Clarke's Town. After the original courthouse in Tappan burned in 1774, a more central location was selected for the new courthouse and the area was named New City. Clarkstown was officially established in 1791 from part of Haverstraw to the north and contains the county seat of New City. Rockland County was then established in 1798 from parts of Orange County (Green 1886).

During this time, the area remained rural in spite of its close proximity to New York City. In 1800, the population was 1,806 persons and by 1880 it had only increased to 4,382. The economy focused on fruit growing and milk production, along with the manufacturing of lime, brick, shoes, wooden ware, and woolen yarn (French 1860).

Two early transportation systems impacted the economic growth of the county: the Nyack Turnpike and the New York and Erie Railroad. The Nyack Turnpike was constructed in the 1830s to connect the port at Nyack with the interior village of Suffern at the base of the Ramapo Mountains. The route is located in the south central portion of the county and still exists today as S. R. 0059. The New York and Erie Railroad was constructed between 1832 and 1861 to connect Piermont on the Hudson River to Lake Erie.

By the 1920's, artists, sculptors, composers, actors, and playwrights began moving to the area from New York City. However, it wasn't until the 1950s with the construction of the New York State Thruway from Suffern to Yonkers and the opening of the Tappan Zee Bridge that the population of Rockland County significantly boomed; the population more than doubled between 1950 and 1960 from 15,674 to 33,196 (Casey 2016). The Tappan Zee Bridge carries seven lanes of motor traffic over the Hudson River. Today, the population has burgeoned to 87,059 with the economy focused on professional, scientific, and technical services, retail, and health care (U.S. Census Bureau 2012).

3.3 SOILS

Soils in the project area derived from the Weathersfield-Cheshire-Urban Land association general soil unit. This soil association consists of very deep, nearly level to moderately steep, well drained soils formed on acidic glacial till derived from reddish sandstone on till plains. The soils within the study geomorphology study area are mapped as Cheshire-Urban land complex (CuB), Rippowam sandy loam (Ra), and Yalesville sandy loam (YaB) (USDA 1990; NRCS 2016).

Cheshire-Urban land complex soils consist of very deep, gently sloping, well drained Cheshire soils and areas covered by urban development. These soils are typically formed in glacial till derived from red Triassic sandstone ridges with slopes of 2 to 8 percent. A representative soil profile for Cheshire soils consists of a very dark grayish brown gravelly fine sandy loam A horizon, a reddish brown gravelly fine sandy loam Bw horizon, and a dark reddish brown gravelly sandy loam C horizon.

Rippowam sandy loam consists of very deep, nearly level, and poorly drained soil located on floodplains with slopes of 0 to 3 percent. These soils formed in alluvium mainly derived from granite and sandstone. A representative soil profile for Rippowam sandy loam consists of a very dark grayish brown sandy loam A horizon, a series of dark grayish brown to grayish brown sandy loam Bw horizons, a dark gray and grayish brown fine sandy loam BC horizon, and a dark brown loamy sand C horizon.

Yalesville sandy loam consists of moderately deep, well-drained soil located on uplands with slopes of 0 to 3 percent. These soils formed in glacial till derived from red Triassic sandstone. A representative soil profile for Yalesville sandy loam consists of a dark brown to dark reddish brown sandy loam A horizon, a series of reddish brown to red gravelly loam Bw horizons, and a red extremely channery loam C horizon.

4.0 SENSITIVITY ASSESSMENT

To aid in the prediction of prehistoric and historic archaeological site probability within the APE, a literature search was conducted. The literature search included an examination of the data bases in the New York Office of Parks, Recreation, and Historic Preservation's (OPRHP) Cultural Resource Information System (CRIS).

According to the OPRHP letter (see Appendix I), the APE is considered to be located on an Archaeological Sensitive landform. One archaeological survey project has been conducted within a 1.6 kilometers (km) (1 mi) radius of the the Clarkstown Canford Drive Drainage Improvements. Currently, an Archaeological Sensitivity Assessment for the Buckley Farms Subdivision project (16PR04923) is taking place southwest of the current APE. No other projects were completed in the general area of the APE.

No previously recorded archaeological sites have been documented near the vicinity of the APE or within a 1.6 km (1 mile) radius. Eight previously documented properties over 50 years of age have been documented within a one-mile radius of the APE, including four properties listed on the National Register, two which are considered not eligible, and two which are undetermined (Table 1).

Table 1
Previously Recorded Historic Properties within a One-Mile Radius

Number	Name	Status
90NR02398	Jacob Abramse Blauvelt House, Carriage House, and Barn - 20 Zukor Rd	Listed
07NR05796	Peter DePew House - 101 Old Route 304	Listed
04NR05229	H.R. Stevens House - 234 Congers Rd	Listed
91NR00049	Rockland County Courthouse and Dutch Gardens	Listed
	New City Free Library - 220 North Main St	Not Eligible
	Zachar - 311 Old NY 304	Not Eligible
	Clarkstown North High School - 151 Congers Rd	Undetermined
	Unidentified Federal House - South Mountain Rd	Undetermined

One of the National Register listed historic resources, Peter DePew House (07NR05796), is located adjacent but not within the APE. The Peter DePew House is located northeast of the APE. The property was originally constructed ca. 1750 and consists of three buildings and six structures. The property was listed on the National Register in July of 2008.

5.0 DISTURBANCE

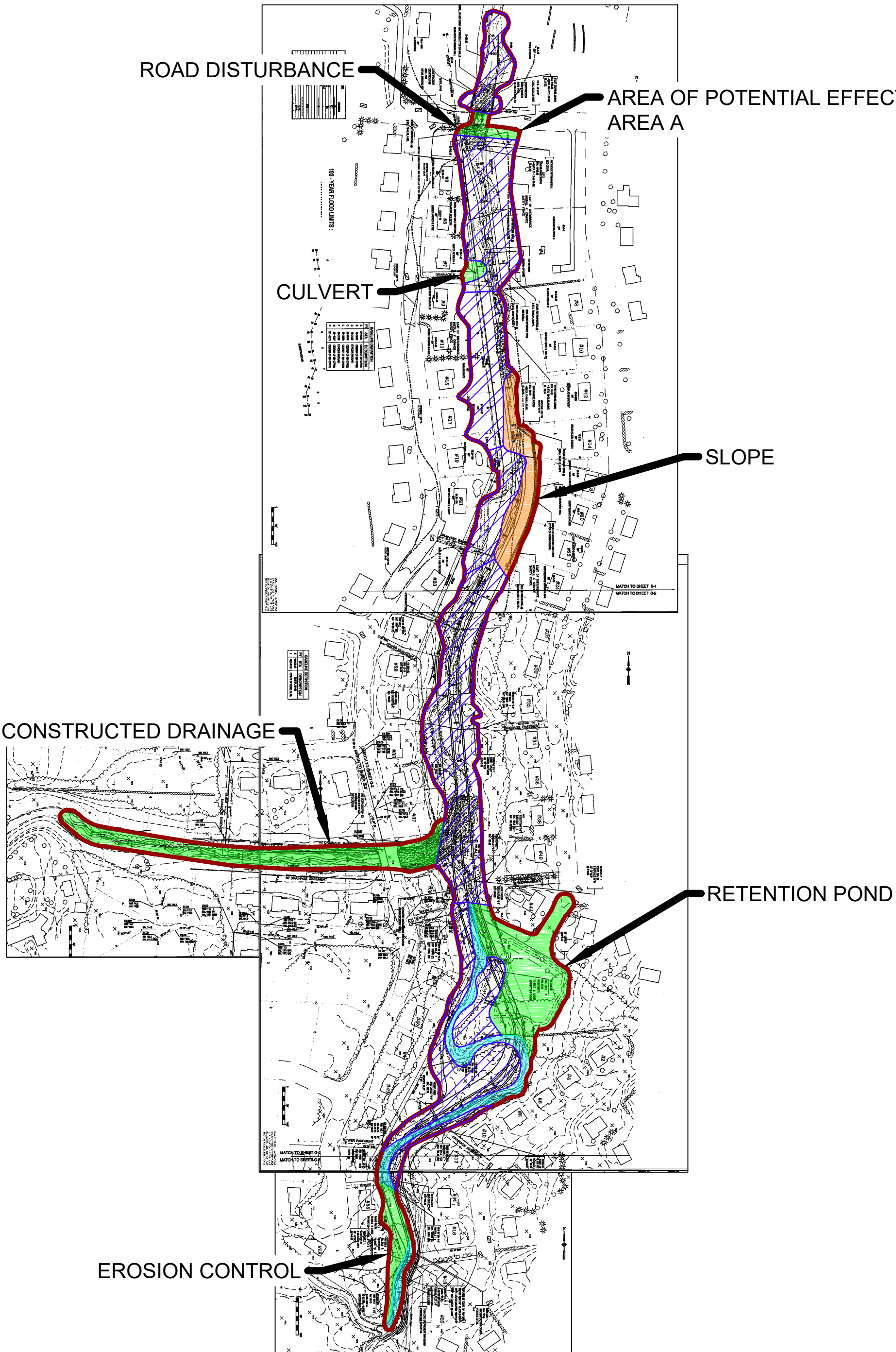
Portions of the APE contained slopes greater than 15 percent and could not be tested. In addition, disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond were noted within the APE (Photos 4 through 7; Figure 4).

Photo 4: Erosion control areas included the use of large stones along the floodplain and terraces, looking southeast

Photo 5: Erosion control areas included the use of large stones along the floodplain and terraces, looking west

Photo 6: Man-made retention pond, looking southwest

Photo 7: Artificially constructed drainage, looking west



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

APE / AREA A
TESTED
WET
STEEP
DISTURBED

N W E S

0 1 CM = 30 METERS 120 METERS

REFERENCES:
TECTONIC
Erosion Control Plan 5-30-13
USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

Tested, Wet, Steep and Disturbed Areas
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 4

6.0 TESTING RECOMMENDATIONS

The factors described below are specific to Clarkstown Canford Drive Drainage Improvements APE and provide pertinent information to predict the location of sites. Well drained soils in nearly level to gently sloping topographic settings generally are the highest probability areas for archaeological sites. The APE is situated within a wet floodplain/terrace associated with Demarest Kill but the potential for archaeological remains, particularly in buried contexts, is higher in floodplain areas.

A tributary of the West Branch of Hackensack River (Demarest Kill) and its tributary streams lies within the APE. This stream had been artificially diverted to its current course in the recent past. No intact alluvial soils with any potential for significant buried cultural material are present within this portion of the APE. Due to the presence of alluvial soils and the potential for buried living surfaces, a geomorphology study was conducted for this project. Joshua Pfarr conducted the Geomorphological Survey, which consisted of an examination of the stratigraphy within auger probes. The results are presented in *Section 6.1 Geomorphological Survey Results*.

A recent examination of CRIS revealed no previously recorded archaeological sites within the APE. No previously recorded archaeological sites were documented near the vicinity of the APE or within a 1.6 km (1 mile) radius; however, according to the OPRHP letter the APE is considered to be located on an Archaeological Sensitive landform. The APE was designated as having moderate to high probability for the discovery of archaeological sites based on the geomorphological results, soil survey, and examination of the CRIS system.

6.1 GEOMORPHOLOGICAL SURVEY RESULTS

A total of four auger probes were excavated within the APE to identify the representative soil and sediment profiles present along the West Branch of Hackensack River (Demarest Kill). A T0 floodplain zone comprises a majority of the APE. Narrow T00 floodplains/active stream channel zones consisting of recent coarse sand and gravel alluvium were also visually identified within the APE. These T00 floodplains represent areas of extremely low probability for containing in situ historic or prehistoric cultural material. The lower portions of upland hillslopes were also identified within the APE containing relatively shallow soils developed on colluvium or partially altered glacial till. The T0 floodplain zone will be the focus of this geomorphology survey.

The auger probes excavated on the T0 floodplain zones of the West Branch of Hackensack River (Demarest Kill) revealed soil development on sandy stream channel and flood deposits. On much of the T0 floodplain relatively recent sandy flood deposits are present at or just below the ground surface. Archaeological testing on these landforms is recommended to extend to the top of the fine to coarse sand C horizons located beneath the A and Bw horizons. These massive, sandy C horizons represent sterile, partially altered, sedimentary parent material. This testing can be accomplished by the hand excavation of shovel tests (STs) to depths of approximately 40 to 90 cm (15.7 to 35.4 in) bgs. The geomorphological report is presented in its entirety in Appendix II.

7.0 PHASE I FIELD SURVEY

7.1 FIELD METHODOLOGY

The Phase I field methodology conforms to the approach developed by the New York Archaeological Council (NYAC) (2005). Field work began with a systematic ground surface inspection of the APE for the purpose of defining any surface evidence of archaeological sites such as foundations or other extant features; of detecting any variability in topographic and soil maps; and finally to note any impact to the archaeological integrity of the APE. There was no ground surface evidence for historic sites identified during the pedestrian inspection.

Based on the results of the geomorphological survey, in potentially undisturbed areas of less than 15 percent slopes where ground surface visibility was not adequate for surface collection, the hand excavation of .5-by-.5 m (1.6 ft x 1.6 ft) shovel tests were conducted at 15 m (50 ft) intervals. Shovel tests were excavated to undisturbed soil levels. Once sterile subsoil was reached, a minimum of ten additional cm (3.9 in) of subsoil was excavated to confirm the natural stratigraphy of the horizon. Auger probes were conducted to verify soil profiles in areas of potentially disturbed soil horizons. Wetland environments were tested unless standing water was present.

All subsurface units were numbered sequentially, and soil profiles were cleaned and documented by a pedological description. All hand-excavated soils were screened through quarter-inch hardware mesh and returned to original ground surface condition.

7.2 FIELD SURVEY RESULTS

The Phase I field survey was conducted in August of 2016. The APE involves approximately 48,186 sq m (518,666 sq ft or 11.9 ac). During the ground surface inspection, the entire APE was examined to determine the potential for archaeological resources. Portions of the APE were designated as having low to no probability for the discovery of archaeological sites based on previous impacts and wetland environments. Previous impacts to the APE included disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond. A total of 29,155 sq m (313,821 sq ft or 7.2 ac) were tested within the APE.

Area A

Description: Area A encompasses approximately 48,186 sq m (518,666 sq ft or 11.9 ac), located adjacent to Cranford Drive and Cypress Street (see Figure 4; Photos 8 through 11). It is topographically situated within a floodplain/terrace and lower hillslope environment associated with Demarest Kill and is bound by the limits of the APE on all sides. The area is characterized by deciduous hardwoods interspersed with herb/shrub communities. Elevations range from 100 ft to 116 ft amsl.

Approximately 29,155 sq m (313,821 sq ft or 7.2 ac) within Area A was subjected to Phase I testing; the remaining 19,031 sq m (204,845 sq ft or 4.7 ac) did not require testing due to the disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond

Methodology: Field methodology consisted of the hand-excavation of shovel tests at 15 m (50 ft) intervals.

Photo 8: Area A, looking south

Photo 9: Area A, looking south

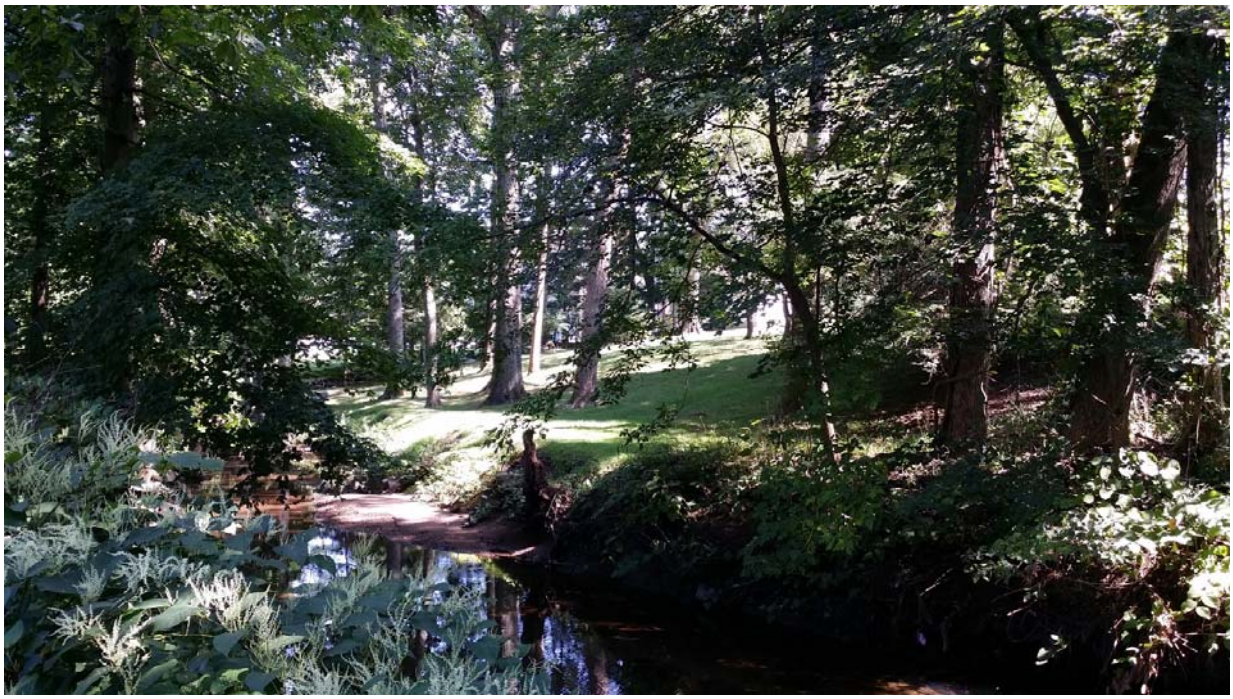


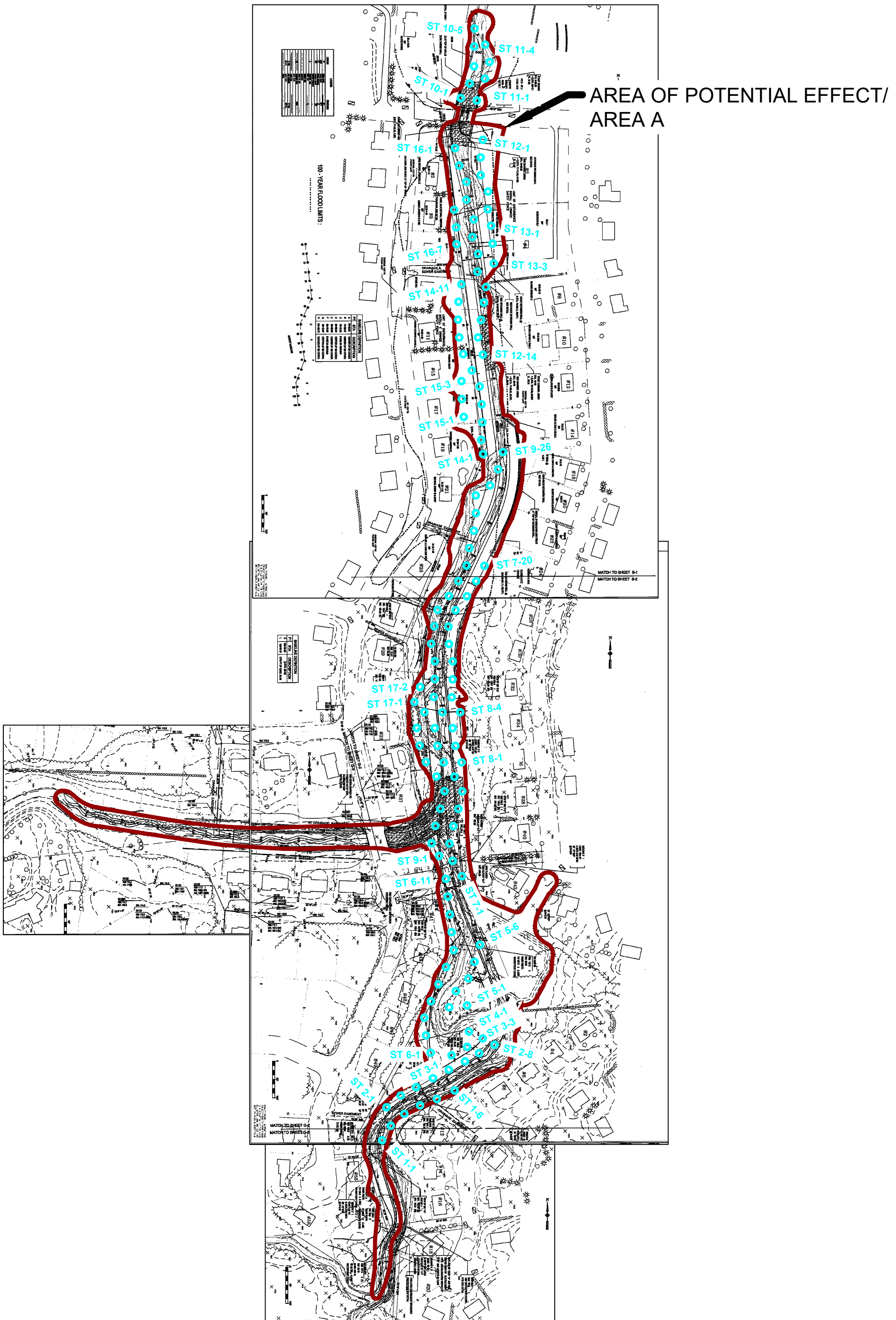
Photo 10: Area A, looking northeast

Photo 11: Area A, looking northeast

Results: A total of 134 STs were hand-excavated in Area A at 15 m (50 ft) intervals along 17 transects and all 134 STs were negative (Figure 5). The majority of soil profiles ranged from 14 to 56 cm of light brown to brown sandy silt loam over yellow brown sand to sandy silt loam. Some profiles terminated in a rock impasse. Other profiles consisted of light brown to brown or dark brown sandy silt loam over yellow brown sand to brown sandy loam and terminated in light yellow brown to grey brown sand to sandy loam. Representative soil profiles are presented below. ST records are presented in their entirety in Appendix III. Based on the results of the Phase I Survey, no evidence of prehistoric or historic archaeological sites were identified.

Soil Profile: Area A Shovel Test 5-3 Description	**Strata and Artifact Description**
Medium Brown Sandy Silt Loam	0-23 cm bgs A Horizon 10YR 3/3 No Cultural Material
Yellow Brown Sand	23-33 cm bgs Bw Horizon 10YR 5/3

Soil Profile: Area A Shovel Test 9-12 Description	**Strata and Artifact Description**
Dark Brown Sandy Loam	0-20 cm bgs Ao Horizon 10YR 3/3 No Cultural Material
Brown Sandy Loam	20-80 cm bgs Bw Horizon 10YR 4/3
Light Yellow and Brown Sandy Loam	80-90 cm bgs C1 Horizon 10YR 7/3



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

APE / AREA A

NEGATIVE SHOVEL TEST

N W E S

0 1 CM = 30 METERS 120 METERS

REFERENCES:
TECTONIC
Erosion Control Plan 5-30-13
USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

Area A
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 5

8.0 SUMMARY

8.1 CONCLUSIONS

The proposed project involves the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York. CDC was retained by retained by Tectonic Engineering & Surveying Consultants P.C.to perform cultural resource investigations for this project. The sponsoring agency for this project is Governor's Office of Storm Recovery (GOSR).

The Phase I field survey was conducted for this project in summer of 2016. Phase I field methodology involved surface surveillance and the hand excavation of STs at 15 m intervals. A portion of the APE, involving approximately 48,186 sq m (518,666 sq ft or 11.9 ac), was not tested due to the presence of slopes greater than 15 percent and wet areas and disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond

The total tested area within the APE measured approximately 29,155 sq m (313,821 sq ft or 7.2 ac). A total of 134 STs were excavated within the APE at 15 m intervals and all 134 STs were negative. No artifacts were recovered during the survey and no evidence of archaeological resources was identified during the Phase I Archaeological testing.

Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Canford Drive Drainage Improvements project.

9.0 REFERENCES

Adovasio, J. M.
1993 The Ones That Will Not Go Away: A Biased View of Pre-Clovis Populations in the New World. In *From Kostenki to Clovis: Upper Paleolithic-Paleo-Indian Adaptations*, edited by O. Soffer and N. D. Praslov. Plenum Press, New York.

Beers, F. W.
1875 *County Atlas of Rockland, New York.* Walker & Jewett, New York.

Carr, K. W.
1998 The Early Archaic Period in Pennsylvania. *Pennsylvania Archaeologist* 68(2):42-69.

Casey, Thomas F. X.
2016 A Brief History of Rockland. RocklandHistory.org

French, J. H.
1860 *Historical and Statistical Gazetteer of New York State.* Heart of the Lakes Publishing, Interlaken, New York.

Green, Frank Bertangue
1886 *History of Rockland County, New York.* A. S. Barnes & Co., New York.

Independence Hall Association
2013 "Major John Andre". http://www.ushistory.org/march/bio/andre.htm (accessed on September 9, 2016).

Natural Resources Conservation Service
2016 The Web Soil Survey http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx (accessed on August 24, 2016).

New York State Archaeological Council
2000 *Cultural Resource Standards Handbook-Guidance for Understanding and Applying the New York State Standards for Cultural Resource Investigations.*

2005 *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State.*

New York State Museum
2016 Geology-Geographic Information System http://www.nysm.nysed.gov/research-collections/geology/gis (accessed on August 24, 2016)

Ritchie, William A.
1980 *The Archaeology of New York State.* Harbor Hill Books, Harrison, New York. Revised edition.

Stewart, Michael
1989 The Middle Archaic of Western Maryland. Paper presented at the 56th Annual Meeting of the Eastern States Archaeological Federation, East Windsor, Connecticut.

Salomon, Julian H.
1982 *Indians of the Lower Hudson Region, The Munsee*. Historical Society of Rockland County, New City, New York.

Town of Clarkstown
2016 "History" <http://www.town.clarkstown.ny.us/html/history_profile.html> (accessed on September 9, 2016).

United States Census Bureau
2012 American Fact Finder. Accessed electronically at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF . Accessed on September 9, 2016.

United States Department of Agriculture, Soil Conservation Service
1990 *Soil Survey of Rockland County, New York.* Prepared in cooperation with Cornell University Agricultural Experiment.

United States Fish and Wildlife Service
2016 *Geomorphic Provinces and Sections of the New York Bight Watershed*. National Conservation Training Center https://nctc.fws.gov/pubs5/web_link/text/geolsect.htm (accessed on August 24, 2016).

United States Geological Survey
1892 Tarrytown Quadrangle, New York 15' series.

1902 Tarrytown Quadrangle, New York 15' series.

2016 Mineral Resources Online Spatial Data http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NYTRba;3 (accessed on August 24, 2016).

Web Soil Survey NRCS
2008 *Web Soil Survey.* < http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx> (accessed on August 5, 2008).

APPENDIX I
AGENCY COORDINATION

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation and Historic Preservation

ANDREW M. CUOMO
Governor

ROSE HARVEY
Commissioner

ARCHAEOLOGY COMMENTS

Phase I Archaeological Survey Recommendation
16PR05212 – Clarkstown Cranford Drive Drainage Improvements

The project is located in on archaeologically sensitive landform. Therefore, the Office of Parks, Recreation and Historic Preservation (OPRHP) recommends a Phase I archaeological survey for all portions of the project that will involve ground disturbance, unless substantial prior ground disturbance can be documented. OPRHP anticipates that some portions of the project area have experienced extensive prior soil disturbance and that no archaeological testing will be needed in those areas. If you consider the entire project area to be disturbed, documentation of the disturbance will need to be reviewed by OPRHP. Examples of disturbance include mining activities and multiple episodes of building construction and demolition.

Documentation of ground disturbance should include a description of the disturbance with confirming evidence. Confirmation can include current photographs and/or older photographs of the project area which illustrate the disturbance (approximately keyed to a project area map), past maps or site plans that accurately record previous disturbances, or current soil borings that verify past disruptions to the land. Agricultural activity is not considered to be substantial ground disturbance.

Please note that in areas with alluvial soils or fill archaeological deposits may exist below the depth of superficial disturbances such as pavement or even deeper disturbances, depending on the thickness of the alluvium or fill. Evaluation of the possible impact of prior disturbance on archaeological sites must consider the depth of potentially culture-bearing deposits and the depth of planned disturbance by the proposed project.

A Phase I survey is designed to determine the presence or absence of archaeological sites or other cultural resources in the project's area of potential effect. The OPRHP can provide standards for conducting cultural resource investigations upon request. Cultural resource surveys and survey reports that meet these standards will be accepted and approved by the OPRHP.

Our office does not conduct archaeological surveys. A 36 CFR 61 qualified archaeologist should be retained to conduct the Phase I survey. Many archaeological consulting firms advertise their availability in the yellow pages. The services of qualified archaeologists can also be obtained by contacting local, regional, or statewide professional archaeological organizations. Phase I surveys can be expected to vary in cost per mile of right-of-way or by the number of acres impacted. We encourage you to contact a number of consulting firms and compare examples of each firm's work to obtain the best product.

Please also be aware that a Section 233 permit from the New York State Education Department (SED) may be necessary before archaeological fieldwork is conducted on State-owned land. If any portion of the project includes the lands of New York State you should contact the SED before initiating survey activities. The SED contact is Christina B. Rieth and she can be reached at (518) 402-5975. Section 233 permits are not required for projects on private land.

If you have any questions concerning archaeology, please contact Tim Lloyd at 518-268-2186 or Timothy.Lloyd@parks.ny.gov

APPENDIX II
GEOMPRPHOLOGICAL REPORT

CHRISTINE DAVIS CONSULTANTS, INC.
560 Penn Street, Verona, Pennsylvania 15147
Phone: 412/826-0443 Fax: 412/826-0458

PHASE IA GEOMORPHOLOGICAL SURVEY

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS

TOWN OF CLARKSTOWN, ROCKLAND COUNTY, NEW YORK

BY:

JOSHUA M. PFARR
Principal Investigator/Geomorphologist
Christine Davis Consultants, Inc.

ABSTRACT

A Phase IA Geomorphological Survey was conducted for the proposed Clarkstown Cranford Drive Drainage Improvements project in Town of Clarkstown, Rockland County, New York. Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering & Surveying Consultants, P.C. to perform cultural resource investigations for this project which include geomorphology evaluation. The sponsoring agency for this project is the Army Corps of Engineers (COE).

The area of potential effect (APE) consists of approximately 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)) of stream modification and realignment. It is topographically situated within floodplain/terrace settings associated with a tributary of the West Branch Hackensack River known as Demarest Kill within the Triassic Lowland Section of the Northern Piedmont physiographic province.

The field survey was conducted in August of 2016. Geomorphological field methodology involved the evaluation of soils and sediments within hand excavated auger probes. The excavation of auger probes revealed intact soils located on the T0 floodplain of the West Branch of Hackensack River also known as Demarest Kill.

Based on the results of the Phase IA Geomorphological Survey, shovel test probes on the T0 floodplain extending through any A and Bw horizons to the depth of the C horizon sands will be sufficient for a Phase I Archaeological Survey.

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 PROPOSED UNDERTAKING 1
1.2 AREA OF POTENTIAL EFFECT (APE) 1
1.3 PURPOSE OF INVESTIGATION 1

2.0 ENVIRONMENTAL BACKGROUND 4

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY 4
2.2 CLIMATE 4
2.3 SOILS 4

3.0 GEOMORPHOLOGICAL FIELD SURVEY 6

3.1 FIELD METHODOLOGY 6
3.2 FIELD SURVEY RESULTS 6

4.0 CONCLUSIONS AND RECOMMENDATIONS 13

5.0 REFERENCES 14

FIGURES

1	PROJECT LOCATION, HAVERSTRAW, NY 7.5' USGS MAPS	2
2	AREA OF POTENTIAL EFFECT (APE)	3
3	SOIL MAP OF APE	5
7	AUGER PROBE LOCATIONS	8
11	REPRESENTATIVE SOIL & SEDIMENT PROFILES	11-12

PHOTOGRAPHS

1	WEST BRANCH OF HACKENSACK RIVER (DEMAREST KILL) CHANNEL AND T00 FLOODPLAIN LOOKING SOUTHWEST	7
2	T0 FLOODPLAIN AT SOUTH END OF APE INCLUDING ABANDONED STREAM CHANNEL LOOKING NORTH	9
3	ARTIFICIAL RETENTION POND WEST OF STREAM NEAR SOUTH END OF APE LOOKING SOUTHWEST	9
4	AP 3 LOCATION NEAR CENTER OF APE LOOKING SOUTHEAST	10
5	NORTH END OF APE LOOKING SOUTH	10

1.0 INTRODUCTION

1.1 PROPOSED UNDERTAKING

The proposed undertaking involves the Clarkstown Cranford Drive Drainage Improvements project in the Town of Clarkstown, Rockland County, New York. Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering and Surveying Consultants, P.C. to perform cultural resource investigations for this project. The sponsoring agency for this project is the Army Corps of Engineers (COE).

1.2 AREA OF POTENTIAL EFFECT (APE)

The proposed project includes portions of the floodplain zones associated with the West Branch of Hackensack River, also known as Demarest Kill. The APE for this project encompasses a total size of 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)). The APE includes the areas where potential ground surface impacts will occur as part of the proposed undertaking. The APE is generally located west of the Hudson River and north of New City, New York between S.R. 304 and Old Route 304 within Clarkstown (Figures 1 and 2).

The West Branch of Hackensack River (Demarest Kill) flows north towards its confluence with the Hackensack River approximately 1 kilometer (km) (3,281 ft) away. It is fed by an artificially rerouted tributary that flows east between Cragmere Oval and Bush Ct. The landforms within the APE along the West Branch of Hackensack River (Demarest Kill) include T00 and T0 floodplain zones located at a nominal elevation of 30.5 to 36.6 m (100 to 120 ft) above sea level (asl).

A tributary of the West Branch of Hackensack River (Demarest Kill) also lies within the APE. This stream had been artificially diverted to its current course in the recent past. No intact alluvial soils with any potential for significant buried cultural material are present within this portion of the APE.

1.3 PURPOSE OF INVESTIGATION

The objectives of the geomorphological survey are to determine the relative age of the landforms and soils within the APE and to determine the maximum depth of excavation required for the recovery of cultural material during the Phase I Archaeological Survey. The floodplain zones of the West Branch of Hackensack River (Demarest Kill) and their associated soils will be the focus of the study.

FIGURE 1: PROJECT LOCATION, HAVERSTRAW, NY 7.5' USGS MAPS

FIGURE 2: AREA OF POTENTIAL EFFECT (APE) (NRCS 2016)

2.0 ENVIRONMENTAL BACKGROUND

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY

The bedrock of Rockland County is composed of sedimentary rock formations of Upper Triassic age such as the Newark group (USGS 2016). The conglomerate, mudstone, shale, and sandstone of the Brunswick Formation have been greatly altered by the advance and retreat of continental ice sheets of the late Pleistocene Epoch. The retreat of the glaciers of this period has resulted in the deposition of glacial till over the ground surface of the region (NYSM 2016; USFWS 2016; Van Diver 1985).

The Phase IA study area is situated in the Triassic Lowland section of the Northern Piedmont physiographic province. This section is characterized by broad, gently sloping valleys with a moderate pattern of ridges (USDA 1990). Elevations in the vicinity of the APE range from approximately 80 to 150 ft asl.

2.2 CLIMATE

Climatic conditions in Rockland County include cold and snowy winters and warm to hot summers. Precipitation is adequate and well distributed. The average winter temperature for most of the county is 28 degrees Fahrenheit (F)(-2.2 degrees Celsius (C)). The average summer temperature is 70 degrees F (21.1 degrees C). The total annual precipitation is 119.4 centimeters (cm) (47 inches (in)) of which approximately 50% falls from April through September. Prevailing winds are out of the south (USDA 1990).

2.3 SOILS

Soils in the project area derived from the Weathersfield-Cheshire-Urban Land association general soil unit. This soil association consists of very deep, nearly level to moderately steep, well drained soils formed on acidic glacial till derived from reddish sandstone on till plains. The soils within the study geomorphology study area are mapped as Cheshire-Urban land complex (CuB), Rippowam sandy loam (Ra), and Yalesville sandy loam (YaB) (Figure 3) (USDA 1990; NRCS 2016).

Cheshire-Urban land complex soils consist of very deep, gently sloping, well drained Cheshire soils and areas covered by urban development. These soils are typically formed in glacial till derived from red Triassic sandstone ridges with slopes of 2 to 8 percent. A representative soil profile for Cheshire soils consists of a very dark grayish brown gravelly fine sandy loam A horizon, a reddish brown gravelly fine sandy loam Bw horizon, and a dark reddish brown gravelly sandy loam C horizon.

Rippowam sandy loam consists of very deep, nearly level, and poorly drained soil located on floodplains with slopes of 0 to 3 percent. These soils formed in alluvium mainly derived from granite and sandstone. A representative soil profile for Rippowam sandy loam consists of a very dark grayish brown sandy loam A horizon, a series of dark grayish brown to grayish brown sandy loam Bw horizons, a dark gray and grayish brown fine sandy loam BC horizon, and a dark brown loamy sand C horizon.

Yalesville sandy loam consists of moderately deep, well drained soil located on uplands with slopes of 0 to 3 percent. These soils formed in glacial till derived from red Triassic sandstone. A representative soil profile for Yalesville sandy loam consists of a dark brown to dark reddish brown sandy loam A horizon, a series of reddish brown to red gravelly loam Bw horizons, and a red extremely channery loam C horizon.

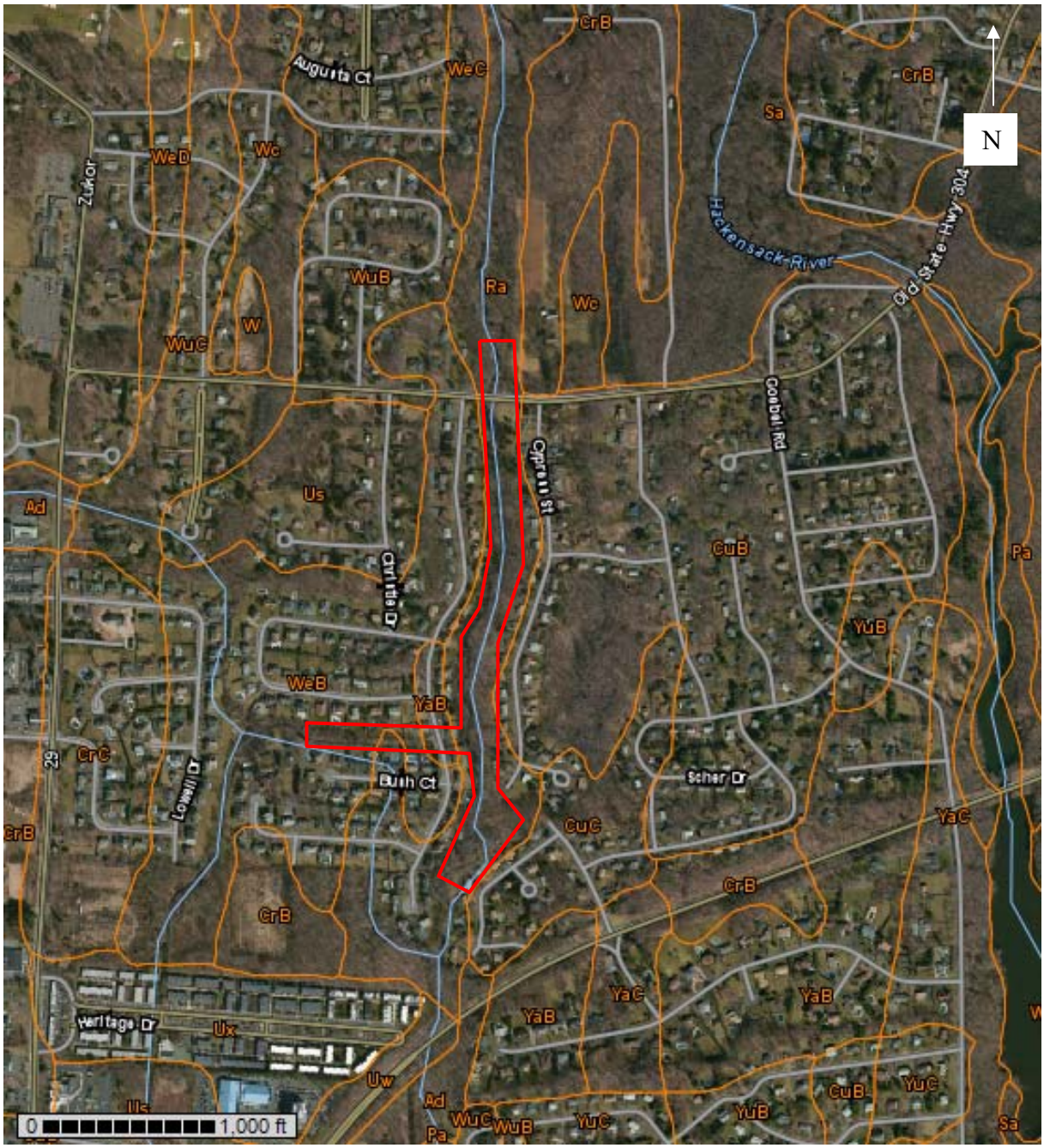


FIGURE 3: SOIL MAP OF THE APE (NRCS 2016)

3.0 GEOMORPHOLOGICAL FIELD SURVEY

3.1 FIELD METHODOLOGY

A total of four auger probes were excavated within the APE to identify the representative soil and sediment profiles present along the West Branch of Hackensack River (Demarest Kill). A T0 floodplain zone comprises a majority of the APE. Narrow T00 floodplains/active stream channel zones consisting of recent coarse sand and gravel alluvium were also visually identified within the APE (Photo 1). These T00 floodplains represent areas of extremely low probability for containing in situ historic or prehistoric cultural material. The lower portions of upland hillslopes were also identified within the APE containing relatively shallow soils developed on colluvium or partially altered glacial till. The T0 floodplain zone will be the focus of this geomorphology survey.

3.2 FIELD SURVEY RESULTS

The first and second auger probes (AP 1 & 2) were placed on the T0 floodplain on the west and east banks, respectively, of the West Branch of Hackensack River (Demarest Kill) near the south end of the APE at a height of approximately 80 cm (31.5 in) above the active stream channel. The profile of AP 1 included an 18 cm (7.1 in) thick dark brown sandy loam A horizon with a weak granular structure. The Bw horizon located beneath the A horizon consisted of a 22 cm (8.7 in) brown to yellowish brown sandy loam with a moderate granular structure. The Bw horizon was underlain by a series of massive loamy fine to coarse sand C horizons beginning at a depth of 40 cm (15.7 in) below ground surface (bgs) and extending to channel lag gravels at 150 cm (59.1 in) bgs (Figure 4; Photos 2 and 3).

The third auger probe (AP 3) was placed on the T0 floodplain on the east bank of the West Branch of Hackensack River (Demarest Kill) near the center of the APE located at a height of approximately 100 cm (39.4 in) above the active stream channel. The soil and sediment profile included a 10 cm (3.9 in) thick dark brown sandy loam Ao horizon with a weak to moderate granular structure. The Ao horizon was underlain by a 60 cm (23.6 in) thick brown sandy loam Bw horizon with a moderate granular structure. The Bw horizon was underlain by a 20 cm (7.9 in) thick grayish brown and yellowish brown massive loamy sand C horizon. A gray and dark gray medium to coarse sand C2 horizon was encountered at a depth of 90 cm (35.4 in) bgs (see Figure 4; Photo 4).

The fourth auger probe (AP 4) was placed on the T0 terrace on the east bank of the stream near the north end of the APE at a height of approximately 130 cm (51.2 in) above the active stream channel. The soil and sediment profile included a 10 cm (3.9 in) thick dark brown loamy sand Ao horizon. The Ao horizon was underlain by a 30 cm (11.8 in) thick brown and gray sand C horizon representing a relatively recent, massive flooding. The C horizon was underlain by a 25 cm (9.8 in) thick dark brown sandy loam 2Ab horizon with a moderate granular structure. This 2Ab horizon represents a former ground surface that was buried rapidly beneath the flood sands of the overlying C horizon. This buried ground surface has the highest potential for containing in situ cultural material. However, it is likely of relatively young age given the lack of soil development in the overlying matrix. Beneath the 2Ab horizon was a 25 cm (9.8 in) thick brown sandy loam 2Bw horizon with a moderate granular structure. A dark gray and brown mottled massive loamy sand 2C horizon was encountered at a depth of 90 cm (35.4 in) bgs followed by a massive gray and yellowish brown sandy clay 3C horizon at 120 cm (47.2 in) bgs (see Figure 4; Photo 5).

Figure 5 contains representative soil and sediment profiles for each area tested within the APE (south, center, and north).

PHOTO 1: WEST BRANCH OF HACKENSACK RIVER (DEMAREST KILL) CHANNEL AND T00 FLOODPLAIN LOOKING SOUTHWEST

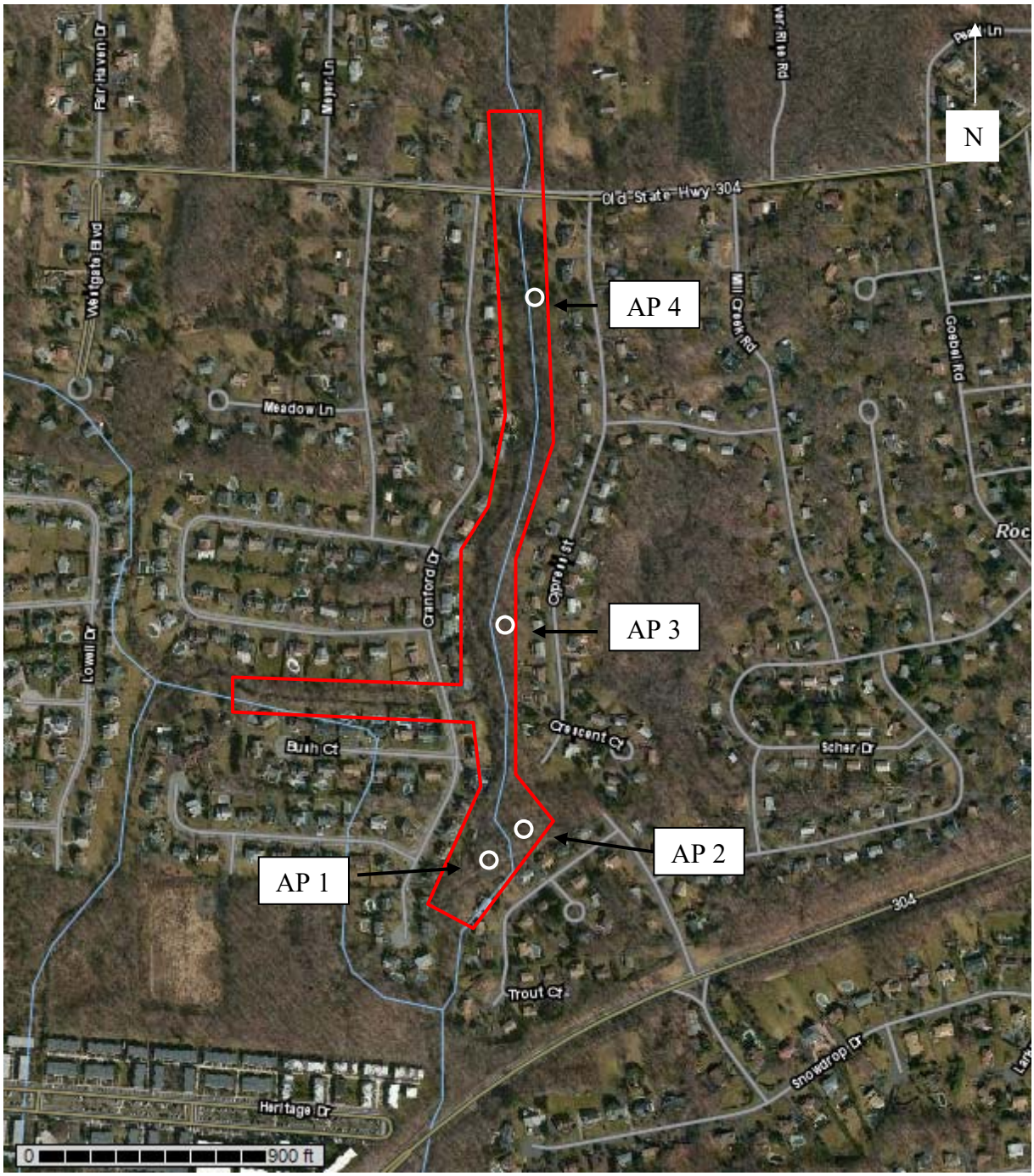


FIGURE 4: AUGER PROBE LOCATIONS

PHOTO 2: T0 FLOODPLAIN AT SOUTH END OF APE INCLUDING ABANDONED STREAM CHANNEL LOOKING NORTH

PHOTO 3: ARTIFICIAL RETENTION POND WEST OF STREAM NEAR SOUTH END OF APE LOOKING SOUTHWEST

PHOTO 4: AP 3 LOCATION NEAR CENTER OF APE LOOKING SOUTHEAST

PHOTO 5: NORTH END OF APE LOOKING SOUTH

Soil & Sediment Profile: AP 1	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-18 cm Ao Horizon 10YR 3/3
Brown & Yellowish Brown Sandy Loam	18-40 cm Bw Horizon 10YR 5/3 & 5/8
Very Pale Brown Loamy Fine Sand	40-79 cm C1 Horizon 10YR 7/3
Gray & Brownish Yellow Medium Sand	79-116 cm C2 Horizon 10YR 5/1 & 6/6
Gray Coarse Sand	116-150 cm C3 Horizon 10YR 6/1
Gray Gravel	150+ cm 2C Horizon 10YR 6/1

Soil & Sediment Profile: AP 3	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-10 cm Ao Horizon 10YR 3/3
Brown Sandy Loam	10-70 cm Bw Horizon 10YR 4/3
Gray Brown & Yellowish Brown Loamy Sand	70-90 cm C1 Horizon 10YR 5/2 & 5/8
Gray & Dark Gray Medium to Coarse Sands	90+ cm C2 Horizon 10YR 5/2 & 4/1

FIGURE 5: REPRESENTATIVE SOIL AND SEDIMENT PROFILES

Soil & Sediment Profile: AP 4	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-10 cm Ao Horizon 10YR 3/3
Brown & Gray Sand	10-40 cm C Horizon 10YR 5/3 & 5/1
Dark Brown Sandy Loam	40-65 cm 2Ab Horizon 10YR 3/3
Brown Sandy Loam	65-90 cm 2Bw Horizon 10YR 5/3
Dark Gray & Brown Loamy Sand	90-120 cm 2C Horizon 10YR 4/1 & 4/3
Gray & Yellowish Brown Sandy Clay	120+ cm 3C Horizon 10YR 6/1 & 5/6

FIGURE 5 continued: REPRESENTATIVE SOIL AND SEDIMENT PROFILES

4.0 CONCLUSIONS AND RECOMMENDATIONS

The Phase IA Geomorphological field survey was conducted for the Clarkstown Cranford Drive Drainage Improvements project in August of 2016. Field methodology involved the hand excavation of auger probes in alluvial environments across an APE of approximately 48,186 sq m (518,666 sq ft or 11.9 ac). The geomorphological survey involved the stream the floodplain zones of the West Branch of Hackensack River (Demarest Kill) and an unnamed tributary within the APE.

The auger probes excavated on the T0 floodplain zones of the West Branch of Hackensack River (Demarest Kill) revealed soil development on sandy stream channel and flood deposits. On much of the T0 floodplain relatively recent sandy flood deposits are present at or just below the ground surface. Archaeological testing on these landforms is recommended to extend to the top of the fine to coarse sand C horizons located beneath the A and Bw horizons. These massive, sandy C horizons represent sterile, partially altered, sedimentary parent material. This testing can be accomplished by the hand excavation of shovel test probes (STPs) to depths of approximately 40 to 90 cm (15.7 to 35.4 in) bgs.

5.0 REFERENCES

Natural Resources Conservation Service
2016 The Web Soil Survey http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx (accessed on August 24, 2016).

New York State Museum
2016 Geology-Geographic Information System http://www.nysm.nysed.gov/research-collections/geology/gis (accessed on August 24, 2016)

United States Department of Agriculture, Soil Conservation Service
1990 *Soil Survey of Rockland County, New York.* Prepared in cooperation with Cornell University Agricultural Experiment.

United States Fish and Wildlife Service
2016 *Geomorphic Provinces and Sections of the New York Bight Watershed*. National Conservation Training Center https://nctc.fws.gov/pubs5/web_link/text/geolsect.htm (accessed on August 24, 2016).

United States Geological Survey
2016 Mineral Resources Online Spatial Data http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NYTRba;3 (accessed on August 24, 2016).

Van Diver, Bradford B.
1985 *Roadside Geology of New York*. Mountain Press Publishing Company, Missoula.

APPENDIX III
SHOVEL TEST RECORDS

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 1-1	0-36	Medium Brown Sandy Clay Loam	NCM
	36-46	Brown and Gray Sand	NCM
ST 1-2	0-28	Dark Brown Sandy Silt Loam	NCM
	28-41	Gray Brown Sandy Loam	NCM
	41-51	Gray Sand	NCM
ST 1-3	0-29	Dark Brown Sandy Silt Loam	NCM
	29-42	Gray Brown Sandy Clay Loam	NCM
	42-52	Gray Brown Sand and Rocks	NCM
ST 1-4	0-10	Reddish Brown Silt Loam	NCM
	10-50	Grey Organic Lense	NCM
	50-62	Sandy Clay Loam	NCM
	62+	Grey Brown Sand	NCM
ST 1-5	0-46	Brown Sandy Silt Loam	NCM
	46-56	Brown Sand	NCM
ST 1-6	0-47	Brown Sandy Silt Loam	NCM
	47-57	Brown Sand	NCM
ST 2-1	0-21	Brown Sandy Silt Loam	NCM
	21-31	Brown Sand	NCM
ST 2-2	0-19	Brown Sandy Silt Loam	NCM
	19-42	Yellow Brown Sandy Silt Loam	NCM
	42	Rock Impasse	
ST 2-3	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 2-4	0-29	Brown Sandy Silt Loam	NCM
	29-39	Brown Sand	NCM
ST 2-5	0-34	Brown Sandy Silt Loam	NCM
	34-44	Brown Sand	NCM
ST 2-6	0-43	Brown Sandy Silt Loam	NCM
	43-53	Brown Sand	NCM
ST 2-7	0-48	Brown Sandy Silt Loam	NCM
	48-58	Brown Sand	NCM
ST 2-8	0-39	Brown Sandy Silt Loam	NCM
	39-49	Brown Sand	NCM
ST 3-1	0-51	Brown Sandy Silt Loam	NCM
	51-61	Brown Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 3-2	0-44	Brown Sandy Silt Loam	NCM
	44-54	Brown Sand	NCM
ST 3-3	0-47	Brown Sandy Silt Loam	NCM
	47-57	Brown Sand	NCM
ST 4-1	0-43	Brown Sandy Silt Loam	NCM
	43-53	Brown Sand	NCM
ST 5-1	0-40	Brown Sandy Silt Loam	NCM
	40-50	Brown Sand	NCM
ST 5-2	0-14	Brown Silt Loam	NCM
	14-47	Light Yellow Brown Sandy Silt Loam	NCM
	47-57	Pale Yellow Sand	NCM
ST 5-3	0-23	Brown Sandy Silt Loam	NCM
	23-33	Yellow Brown Sand	NCM
ST 5-4	0-19	Brown Sandy Silt Loam	NCM
	19-29	Brown Sand	NCM
ST 5-5	0-30	Brown Sandy Silt Loam	NCM
	30-40	Brown Sand	NCM
ST 5-6	0-31	Brown Sandy Silt Loam	NCM
	31-41	Brown Sand	NCM
ST 6-1	0-6		NCM
	6	Brown Sandy Silt Loam	NCM
		Rock Impasse	
ST 6-2	0-8		NCM
	8	Brown Sandy Silt Loam	NCM
		Rock Impasse	
ST 6-3	0-32		NCM
	32-42	Brown Sandy Silt Loam	NCM
		Brown Sand	
ST 6-4	0-36		NCM
	36-46	Brown Sandy Silt Loam	NCM
		Brown Sand	
ST 6-5	0-38	Brown Sandy Silt Loam	NCM
	38-48	Brown Sand	NCM
ST 6-6	0-30	Brown Sandy Silt Loam	NCM
	30-40	Brown Sand	NCM
ST 6-7	0-20	Brown Sandy Silt Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	20-30	Brown Sand	NCM
ST 6-8	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 6-9	0-46	Brown Sandy Silt Loam	NCM
	46-56	Brown Sand	NCM
ST 6-10	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 6-11	0-37	Brown Sandy Silt Loam	NCM
	37-47	Brown Sand	NCM
ST 7-1	0-12	Brown Sandy Silt Loam	NCM
	12-37	Light Brown Sandy Silt Loam	NCM
	37	Rock Impasse	NCM
ST 7-2	0-51	Brown Sandy Silt Loam	NCM
	51	Rock Impasse	NCM
ST 7-3	0-43	Brown Sandy Silt Loam	NCM
	43-53	Yellow Brown Sand	NCM
ST 7-4	0-32	Brown Sandy Silt Loam	NCM
	32-42	Yellow Brown Sand	NCM
ST 7-5	0-31	Brown Sandy Silt Loam	NCM
	31-41	Yellow Brown Sand	NCM
ST 7-6	0-28	Dark Brown Sandy Loam	NCM
	28-70	Brown Sandy Loam	NCM
	70-80	Light Yellow Brown Loamy Sand	NCM
ST 7-7	0-36	Brown Sandy Silt Loam	NCM
	36-46	Yellow Brown Sand	NCM
ST 7-8	0-34	Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 7-9	0-31	Brown Sandy Silt Loam	NCM
	31-41	Yellow Brown Sand	NCM
ST 7-10	0-29	Brown Sandy Silt Loam	NCM
	29-39	Yellow Brown Sand	NCM
ST 7-11	0-27	Rocky Brown Silt Loam	NCM
	27	Rock Impasse	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 7-12	0-25	Rocky Brown Silt Loam	NCM
	25	Rock Impasse	NCM
ST 7-13	0-24	Brown Sandy Silt Loam	NCM
	24-39	Red Brown Sandy Silt Loam	NCM
	39049	Yellow Brown Sand	NCM
ST 7-14	0-17	Brown Sandy Silt Loam	NCM
	17-34	Red Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 7-15	0-19	Brown Sandy Silt Loam	NCM
	19	Rock Impasse	NCM
ST 7-16	0-14	Brown Sandy Silt Loam	NCM
	14	Rock Impasse	NCM
ST 7-17	0-32	Brown Sandy Silt Loam	NCM
	32-42	Yellow Brown Sand	NCM
ST 7-18	0-19	Brown Sandy Silt Loam	NCM
	19-29	Yellow Brown Sand	NCM
ST 7-19	0-23	Brown Sandy Silt Loam	NCM
	23-33	Yellow Brown Sand	NCM
ST 7-20	0-47	Brown Sandy Silt Loam	NCM
	47	Rock Impasse	NCM
ST 8-1	0-34	Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 8-2	0-24	Brown Sandy Silt Loam	NCM
	24-60	Red Brown Sandy Silt Loam	NCM
	60-70	Yellow Brown Sand	NCM
ST 8-3	0-40	Brown Sandy Silt Loam	NCM
	40-50	Yellow Brown Sand	NCM
ST 8-4	0-5	Mottled Brown and Gray Sandy Silt Loam and Gravel	NCM
	5	Gravel Disturbance	NCM
ST 9-1	0-36	Brown Sandy Silt Loam	NCM
	36-46	Brown Sand	NCM
ST 9-2	0-39	Brown Sandy Silt Loam	NCM
	39-49	Brown Sand	NCM
ST 9-3	0-34	Brown Sandy Silt Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	34-44	Brown Sand	NCM
ST 9-4	0-49	Brown Sandy Silt Loam	NCM
	49-59	Brown Sand	NCM
ST 9-5	0-40	Brown Sandy Silt Loam	NCM
	40-50	Brown Sand	NCM
ST 9-6	0-19	Brown Sandy Silt Loam	NCM
	19-39	Light Brown Sandy Silt Loam	NCM
	39	Rock Impasse	NCM
ST 9-7	0-17	Mottled Brown and Yellow Sandy Silt Loam	NCM
	17	Rock Impasse	NCM
ST 9-8	0-47	Brown Sandy Silt Loam	NCM
	47	Rock Impasse	NCM
ST 9-9	0-11	Brown Sandy Silt Loam	NCM
	11-30	Light Brown Sandy Silt Loam	NCM
	30-40	Pale Yellow Brown Sand	NCM
ST 9-10	0-42	Brown Sandy Silt Loam	NCM
	42-44	Yellow Brown Sandy Silt	NCM
	44	Rock Impasse	NCM
ST 9-11	0-33	Brown Sandy Silt Loam	NCM
	33-43	Yellow Brown Sand	NCM
ST 9-12	0-20	Dark Brown Sandy Loam	NCM
	20-80	Brown Sandy Loam	NCM
	80-90	Light Yellow Brown Loamy Sand	NCM
ST 9-13	0-20	Medium Brown Silt Loam	NCM
	20-80	Med Brown Sand	NCM
	80-90	Gray Brown Sand	NCM
ST 9-14	0-23	Dark Brown Sandy Silt Loam	NCM
	23-60	Brown Silt Loam	NCM
	60-70	Gray Brown Sand Loam	NCM
ST 9-15	0-15	Dark Brown Sandy Silt Loam	NCM
	15-30	Brown Sandy Loam	NCM
	30-45	Gray Brown Sandy Loam	NCM
	45-65	Light Gray and Yellow Brown Sandy Clay Loam	NCM
	65-75	Light Gray and Yellow Brown Loamy Sand	NCM
ST 9-16	0-11	Dark Brown Sandy Silt Loam	NCM
	11-40	Brown Sand Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	40	Rock Impasse	NCM
ST 9-17	0-23	Dark Brown Sandy Silt Loam	NCM
	23-33	Brown Sand Loam	NCM
ST 9-18	0-31	Brown Sand	NCM
	31-57	Dark Brown Sandy Silt Loam	NCM
	57-67	Light Brown Sand	NCM
ST 9-19	0-25	Brown Sand	NCM
	25-42	Gray Brown Sandy Loam	NCM
	42-55	Light Brown Sandy Loam	NCM
	55-65	Yellow Brown Sand	NCM
ST 9-20	0-22	Brown Sand	NCM
	22-56	Brown Sandy Loam	NCM
	56-80	Yellow Brown Sandy Loam	NCM
	80-90	Yellow and Gray Loamy Sand	NCM
ST 9-21	0-27	Brown Sand	NCM
	27-75	Brown Sandy Silt Loam	NCM
	75-85	Yellow and Gray Loamy Sand	NCM
ST 9-22	0-36	Dark Brown Sandy Silt Loam	NCM
	36-46	Yellow Brown Sand	NCM
ST 9-23	0-21	Brown Sand	NCM
	21-35	Brown Sandy Loam	NCM
	35-40	Yellow Brown Sandy Loam	NCM
	40	Rock Impassse	NCM
ST 9-24	0-30	Brown Sand	NCM
	30-55	Brown Sandy Loam	NCM
	55-65	Yellow Brown Sandy Loam	NCM
ST 9-25	0-31	Brown Sand	NCM
	31-66	Brown Sandy Loam	NCM
	66-76	Yellow Brown Sandy Loam	NCM
ST 9-26	0-30	Brown Sand	NCM
	30-70	Dark Brown Sandy Loam	NCM
	70-100	Yellow Brown Sandy Loam	NCM
	100-110	Yellow and Gray Loamy Sand	NCM
ST 10-1	0-23	Brown Sand	NCM
	23-80	Brown Silty Clay Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 10-2	0-21	Brown Sandy Silt Loam	NCM
	21-72	Gray Brown Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	72-82	Yellow Brown Sand	NCM
ST 10-3	0-20	Dark Brown Silt Loam	NCM
	20-48	Gray Brown Sand	NCM
	48-82	Brown Sandy Loam	NCM
	82-92	Dark Gray Sand	NCM
ST 10-4	0-37	Dark Brown Silt Loam	NCM
	37-64	Gray Brown Silty Clay Loam	NCM
	64-74	Light Gray Clay Loam	NCM
ST 10-5	0-12	Dark Brown Silt Loam	NCM
	12-52	Brown Sand	NCM
	52-90	Dark Gray Brown Sandy Loam	NCM
	90-105	Dark Gray and Dark Yellow Brown Sandy Clay Loam	NCM
	105	Rock Impasse	NCM
ST 11-1	0-17	Dark Brown Sandy Silt Loam	NCM
	17-60	Brown Sand Loam	NCM
	60-70	Gray Sand	NCM
ST 11-2	0-10	Brown Silt Loam	NCM
	10	Buried Pipe	NCM
ST 11-3	0-19	Dark Brown Sandy Silt Loam	NCM
	19-81	Brown Sand Loam	NCM
	81-92	Brown and Gray Sandy Silt Loam	NCM
	92-102	Gray Sand	NCM
ST 11-4	0-53	Brown Sandy Silt Loam	NCM
	53-63	Dark Gray Brown Sand	NCM
ST 12-1	0-10	Brown Silt Loam	NCM
	10-38	Yellow Brown Sandy Clay Loam	NCM
	38-48	Yellow Brown Sand	NCM
ST 12-2	0-20	Brown Silt Loam	NCM
	20-65	Brown Sandy Silt Loam	NCM
	65-75	Rock and Sand	NCM
ST 12-3	0-41	Brown Silt Loam	NCM
	41-80	Brown Sandy Silt Loam	NCM
	80-90	Rock and Sand	NCM
ST 12-4	0-17	Dark Brown Sandy Silt Loam	NCM
	17-50	Brown Sandy Loam	NCM
	50-75	Light Brown Sandy Silt	NCM
	75-85	Light Brown Gravelly Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 12-5	0-9	Dark Brown Sandy Silt Loam	NCM
	9-61	Brown Sandy Loam	NCM
	61-82	Light Brown Sandy Silt	NCM
	82	Rock Impasse	NCM
ST 12-6	0-18	Brown Sandy Loam	NCM
	18-62	Brown Sand	NCM
	62-72	Gray Brown Loamy Sand	NCM
ST 12-7	0-31	Brown Sand	NCM
	31-86	Gray Brown Sandy Silt Loam	NCM
	86-96	Brown Sand	NCM
ST 12-8	0-29	Rocky Brown Sand	NCM
	29-71	Gray Brown Sandy Silt Loam	NCM
	71-81	Gray Brown Sand	NCM
ST 12-9	0-30	Dark Brown Silt Loam	NCM
	30	Rock Impasse	NCM
ST 12-10	0-58	Brown Sandy Silt Loam	NCM
	58-68	Yellow Brown Sandy Loam	NCM
ST 12-11	0-24	Medium Brown Silt Loam	NCM
	24-40	Yellow Brown Sandy Silt Loam	NCM
	40-50	Gray Brown Sand	NCM
ST 12-12	0-22	Brown Silt Loam	NCM
	22-53	Brown Sandy Silt Loam	NCM
	53	Rock Impasse	NCM
ST 12-13	0-14	Dark Brown Silt Loam	NCM
	14-28	Yellow Brown Sandy Silt Loam	NCM
	28	Rock Impasse	NCM
ST 12-14	0-38	Brown Sandy Silt Loam	NCM
	38	Rock Impasse	NCM
ST 13-1	0-12	Dark Brown Sandy Silt Loam	NCM
	12-48	Brown Sandy Silt Loam	NCM
	48	Rock Impasse	NCM
ST 13-2	0-53	Dark Brown Sandy Silt Loam	NCM
	53-69	Brown Sandy Silt Loam	NCM
	69-79	Brown Sand	NCM
ST 13-3	0-20	Brown Sandy Loam	NCM
	20-35	Brown Sand	NCM
	35-45	Gray Brown Loamy Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 14-1	0-24	Brown Silt Loam	NCM
	24-80	Brown Sandy Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 14-2	0-21	Brown Sandy Silt Loam	NCM
	21-65	Gray Brown Sandy Silt Loam	NCM
	65-75	Yellow Brown Sand	NCM
ST 14-3	0-14	Dark Brown Sandy Loam	NCM
	14-43	Light Brown Sandy Silt Loam	NCM
	43-90	Gray Brown Sandy Loam	NCM
	90	Light Gray Sand	NCM
ST 14-4	0-39	Brown Sandy Silt Loam	NCM
	39-92	Dark Brown Sandy Silt Loam	NCM
	92-106	Gray Brown Sandy Loam	NCM
	106-126	Light Gray Sand	NCM
ST 14-5	0-38	Brown Silt Loam	NCM
	38-80	Yellow Brown Sandy Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 14-6	0-34	Dark Brown Sandy Loam	NCM
	34-108	Gray Brown Sandy Silt Loam	NCM
	108-118	Light Gray Clay Loam	NCM
ST 14-7	0-15	Dark Brown Sandy Silt Loam	NCM
	15-35	Brown Sandy Loam	NCM
	35-57	Brown Sand	NCM
	57-75	Dark Gray Brown Silt Loam	NCM
	75-102	Brown Silt Loam	NCM
	102-112	Gravelly Loam	NCM
ST 14-8	0-53	Brown Sandy Silt Loam	NCM
	53-63	Gray Sand	NCM
ST 14-9	0-60	Brown Sandy Silt Loam	NCM
	60-70	Brown Sand	NCM
ST 14-10	0-51	Brown Sandy Silt Loam	NCM
	51-90	Gray Brown Sandy Loam	NCM
	90-100	Gray Sand	NCM
ST 14-11	0-59	Brown Sandy Silt Loam	NCM
	59-69	Gray Sand	NCM
ST 15-1	0-43	Brown Sandy Silt Loam	NCM
	43	Rock Impasse	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 15-2	0-37	Dark Brown Sandy Silt Loam	NCM
	37-44	Gravelly Red Brown Silty Clay Loam	NCM
	44	Rock Impasse	NCM
ST 15-3	0-29	Brown Sandy Silt Loam	NCM
	29-42	Light Brown Sandy Silt Loam	NCM
	42	Rock Impasse	NCM
ST 16-1	0-11	Dark Brown Sandy Silt Loam	NCM
	11	Rock Impasse	NCM
ST 16-2	0-20	Dark Brown Sandy Silt Loam	NCM
	20	Rock Impasse	NCM
ST 16-3	0-31	Brown Sandy Silt Loam	NCM
	31	Rock Impasse	NCM
ST 16-4	0-37	Brown Sandy Silt Loam	NCM
	37-47	Red Brown Sand	NCM
ST 16-5	0-35	Brown Sandy Silt Loam	NCM
	35	Rock Impasse	NCM
ST 16-6	0-21	Brown Sandy Silt Loam	NCM
	21-33	Gravelly Dark Yellow Brown Loamy Sand	NCM
	33-43	Dark Yellow Brown Sandy Gravel	NCM
ST 16-7	0-36	Brown Sandy Silt Loam	NCM
	36-46	Light Gray Brown Sandy Gravel	NCM
ST 17-1	0-35	Brown Sandy Loam	NCM
	35	Rock Impasse	NCM
ST 17-2	0-34	Brown Sandy Loam	NCM
	34	Rock Impasse	NCM

Civil Engineering

Environmental Services

Geotechnical Engineering

Structural Engineering

Land Surveying

Homeland Security

Site Acquisition

Program/Construction Management

Construction Inspection & Materials Testing

TECTONIC

Practical Solutions, Exceptional Service

Corporate Headquarters:

□0 Pleasant Hill Road, P.O.Box □□

Mountainville, New York 10□□□

Phone□□□00□□□□-□□□1

Additional Office Locations:

□lbany, New York

□lbu□uer□ue, New Mexico

Boca Raton, Florida

Charlotte, North Carolina

Hartford, Connecticut

New York, New York

Short Hills, New Jesey

Newburgh, New York

Phoenix, □ri□ona

Pittsburgh, Pennsylvania

Rochester, New York

Richmond, Virginia

Tampa, Florida

www.tectonicengineering.com

From: Bonney Hartley
To: Barthelme, Mary (STORMRECOVERY)
Subject: RE: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, New York
Date: Tuesday, October 11, 2016 3:53:26 PM

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Dear Mary:

I have completed review of the Phase 1 archeological survey for the Clarkstown Cranford Drive project and confirm that Stockbridge-Munsee Community has no further concerns due to the lack of findings in the survey.

Thank you,
Bonney

From: Bonney Hartley
Sent: Tuesday, August 09, 2016 10:47 AM
To: Barthelme, Mary (STORMRECOVERY)
Subject: RE: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, New York

Hi Mary,
Thank you for letting me know that the archeological work is planned. I don't have issues with the testing and will review the results when ready.
Thanks,
Bonney

From: Barthelme, Mary (STORMRECOVERY) [mailto:Mary.Barthelme@stormrecovery.ny.gov]
Sent: Monday, August 08, 2016 11:59 AM
To: Bonney Hartley
Subject: RE: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, New York

Hello Bonney,

The SHPO has requested a Phase I be performed for this project. The scope has been defined as, "Both Phase IA/B are required due to nature of project. Work to be done on North/South portion of the project area (see enclosed Project Map). The proposed scope for project is shovel test pits along each bank of the North/South portion of the project area at 50ft intervals.) The East/West section near Bush Court does not warrant investigation as this diversion is a manmade part and SHPO has indicated that they do not need to see investigation in this part of the project area."

This scope of work is being sent to you for review and request for any comments. If possible, please respond by the end of the week, ending August 12,2016.

Thank you,

Mary

Mary Barthelme
Environmental and Historic Preservation Specialist
Bureau of Environmental Review and Assessment
Governor's Office of Storm Recovery
99 Washington Avenue Suite 1224
Albany, New York 12260
Office: (518) 473-0154
Cell: (646) 706-6748
Mary.Barthelme@stormrecovery.ny.gov

From: Barthelme, Mary (STORMRECOVERY)
Sent: Friday, July 29, 2016 2:08 PM
To: 'Bonney Hartley' <Bonney.Hartley@mohican-nsn.gov>
Subject: RE: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, New York

Thank you Bonney for your response!

From: Bonney Hartley [mailto:Bonney.Hartley@mohican-nsn.gov]
Sent: Friday, July 29, 2016 2:05 PM
To: Barthelme, Mary (STORMRECOVERY) <Mary.Barthelme@stormrecovery.ny.gov>
Subject: RE: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, New York

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Dear Mary:

Thank you for sending the Clarkstown Cranford Drive Drainage Improvements Project for review. I have completed review and on behalf of Stockbridge-Munsee Mohican Tribe I confirm that we do not know of cultural sites in the area of potential effect. We do not have significant concerns but as always ask that if any cultural resources are inadvertently discovered during construction that we are notified.

Thank you.
Best,
Bonney

Bonney Hartley

Tribal Historic Preservation Officer
Stockbridge-Munsee Mohican Tribal Historic Preservation
New York Office
65 1st Street
Troy, NY 12180
(518) 244-3164
Bonney.Hartley@mohican-nsn.gov
www.mohican-nsn.gov

From: Barthelme, Mary (STORMRECOVERY) [mailto:Mary.Barthelme@stormrecovery.ny.gov]
Sent: Wednesday, July 27, 2016 5:14 PM
To: Bonney Hartley
Subject: RE: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, New York

2 of 2 emails for the consult.

From: Barthelme, Mary (STORMRECOVERY)
Sent: Wednesday, July 27, 2016 5:15 PM
To: 'Bonney Hartley' <Bonney.Hartley@mohican-nsn.gov>
Subject: RE: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, New York

Hello Bonney,

I tried to send this consult to you but I believe it is too large for your system. I am going to send 2 email messages to you to hopefully make it go through.

Thanks,

Mary

From: Barthelme, Mary (STORMRECOVERY)
Sent: Wednesday, July 27, 2016 5:09 PM
To: 'Bonney Hartley' <Bonney.Hartley@mohican-nsn.gov>
Cc: 'Gievers, Andrea' <AGievers@tectonicengineering.com>; King, Thomas J (STORMRECOVERY) <Thomas.King@stormrecovery.ny.gov>
Subject: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, New York

Dear Bonney,

Please see the attached consultation for the above-mentioned project.

A hard copy is being sent today by mail. Please let me know if you have any questions.

Thank you,

Mary Barthelme

Mary Barthelme
Environmental and Historic Preservation Specialist
Bureau of Environmental Review and Assessment
Governor's Office of Storm Recovery
99 Washington Avenue Suite 1224
Albany, New York 12260
Office: (518) 473-0154
Cell: (646) 706-6748
Mary.Barthelme@stormrecovery.ny.gov

July 27, 2016

Kerry Holton, President
Delaware Nation
P.O. Box 825
Anadarko, OK 73005

Re: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, NY – New York Rising Community Reconstruction Program

Dear President Kerry Holton::

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), an office 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"), is serving as the entity responsible for compliance with the HUD environmental review procedures set forth in 24 CFR Part 58. 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. GOSR proposes to provide funding for a stormwater management improvements project in Clarkstown, New York. In accordance with Section 101(d)(6)(B) of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 302706(b)), and its implementing regulations, 36 Code of Federal Regulations (CFR) Part 800, this letter serves as notification of the proposed action. This consultation is being sent to the Delaware Nation, the Delaware Tribe of Indians and the Stockbridge-Munsee Community Band of Mohicans.

Area of Potential Effect: The Clarkstown Cranford Drive Drainage Improvements Project is a stormwater management improvement project involving the modification and realignment of a tributary of the West Branch Hackensack, also known as the Demarest Kill, located in the Town of Clarkstown, Rockland County, New York (Project location maps are included in **Attachment 1**). This work includes modification of existing on-site drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

Proposed Project Description: The proposed work will be performed in six phases to reduce the potential for erosion (Project site plans are included in Attachment 2). Phase 1 will begin at the Old Route 304 bridge, and the subsequent phases will move south down the Demarest Kill. Approximately 4,650 linear feet of the bed and banks of the Demarest Kill, located south of Old Route 304 and running approximately parallel to Cranford Drive, will be realigned and reinforced. The redesign of the stream channel incorporates a multi-channel design, including a normal low flow channel (thalwag), a bank full channel, and the floodplain channel. Backflow preventers will be installed at all drainage pipes out letting into the stream channel to prevent backflow from the channel flooding onto the roadway.

A drainage study of the Demarest Kill was commissioned by the Rockland County Drainage Agency in 1991, where a survey elevation error was discovered as presented in the 1983 Flood Insurance Study (FIS). An elevation difference of approximately five (5) feet was noted in the vicinity of Old Route 304 and Cranford Drive. As such, the Base Flood Elevations (BFE's), established from the 100-year flood level, were approximately five feet lower in this area than what they should have been. Subsequently, a number of homes built before and around 1991 were located within the 100-year flood zone on the 2000 revision of the FIS for Rockland County. As such, the proposed project's objectives are to alleviate flooding in and around the houses and streets currently within the 100-year flood zone by modifying the Demarest Kill channel and floodplain to appropriate dimensions to contain a one-percent flood within the channel banks.

Phase 1 of the proposed project involves 3,240 square feet (SF) of riprap being installed on either side of the three (3) existing 16-foot x 8.5-foot concrete box culverts at Old Route 304 (Project site plans are included in **Attachment 2**). Modular block retaining walls will be located on the south side of the three culverts, with a 165-SF gabion check dam in place to divert low flow waters into a single culvert. The existing stream channel is to be realigned, with a 190-SF rock cross-vein and 145-SF "W" rock weir being located in the proposed stream channel. A temporary stream crossing will be constructed using three (3) 30-inch x 20-foot high-density polyethylene (HDPE) pipes covered by approximately 20 cubic yards (CY) of ¾-inch aggregate fill placed on a filter fabric. There will be approximately one (1) foot of the ¾-inch aggregate fill placed on both sides and on top of the 20-foot pipes. A total of 32 trees of 8-inch diameter or larger are proposed to be removed during Phase 1.

Phase 1A of the proposed project involves approximately a boulder cluster of approximately 6 to 10 CY to be placed next to 3,950 SF of riprap before the proposed stream alignment connects to the existing streambed. A 145-SF "W" rock weir will be placed on the south portion of this area, where the proposed streambed diverges from the existing streambed. A total of 44 trees of an 8-inch or larger diameter are proposed to be removed during Phase 1A.

Phase 2 and Phase 3 run approximately parallel with one another, with Phase 2 involving work to create the proposed stream channel on the eastern bank and Phase 3 work on the western bank to fill in the existing stream and reinforce the streambed. Phase 2 work involves a modular block retaining wall being placed on the northeastern edge of the streambank. A 145-SF "W" rock weir is located at the proposed streambed south of the retaining wall. Two (2) boulder clusters containing approximately 6 to 10 CY of rocks each will be placed along the proposed streambed during Phase 2, with brush matting being placed during Phase 3. An approximately 190-SF rock cross-vein is located north of a second temporary stream crossing, as described in Phase 1. Approximately 450 SF of brush matting will be placed on both sides of the streambed located north of the 18,900 SF of riprap reinforcing the junction of the tributary traveling west under Cranford Drive (See Phase 6 for the tributary work). The brush matting and riprap will be placed on the eastern side during Phase 2, and on the western side during Phase 3. The southern portion of the Phase 2 section includes placement of approximately 90 SF of riprap for a sewer crossing, a third temporary stream crossing as described in Phase 1, and 150 feet for a boulder revetment to reinforce the new streambed curve on the western bank of the z-curve. Approximately 270 trees with diameters 8" or greater will be removed during Phase 2, while approximately 64 trees with diameters 8 inches or greater will be removed during Phase 3.

Phase 4 and Phase 5 also run approximately parallel to one another, with Phase 4 occurring on the eastern bank and Phase 5 occurring on the western bank. Phase 5 also overlaps the southern tip of Phase 2. Phase 5 involves placement of a 150-foot boulder revetment to reinforce the new streambed curve on the eastern bank of the z-curve, with a 190-SF rock cross-vein located to the south of the boulder revetment. Approximately 175 SF of brush matting will be located on the eastern bank, north of approximately 2,800

SF of riprap for sewer crossings at the southern tip of the work area. Approximately 225 SF of brush matting will be placed on the western bank and approximately 65 feet of boulder revetment on the eastern bank, both located south of the sewer crossing riprap. Approximately 16 trees with diameters 8 inches or greater will be removed during Phase 4, while approximately 67 trees with diameters 8 inches or greater will be removed during Phase 5.

Phase 6 involves work on the tributary traveling west under Cranford Drive. The riprap from Phase 2 and Phase 3 ends at the eastern side of Cranford Drive. The western banks will have stabilized construction entrances from Cranford Drive. The stream will be staying in approximately the same footprint as the existing streambed, but it will be reinforced with two boulder clusters of approximately 6 to 10 CY, with a single 180-SF "W" rock weir and two (2) 210-SF rock cross-veins. Approximately 82 trees with diameters 8 inches or greater will be removed during Phase 6. As the stream stabilization and restoration work is completed, habitat improvements including approximately 674 major trees, 156 minor trees, 1,790 shrubs, and 4,010 ground-cover plants will be planted along the stream banks to replace the removed trees, shrubs, and grasses.

The project will involve approximately 8,000 cubic yards of excavation material at the site. The top-soil will be stripped, stockpiled, and respread on the site. Excavated boulders and stones will be reused in the channels for stabilization, and the excess soils will be disposed of at approved locations. The project is not located in a defined archaeological sensitive buffer zone.

Pursuant to NHPA Section 106, GOSR has initiated consultation with the State Historic Preservation Office (SHPO) concerning this Project and its potential to affect historic resources that are listed on or eligible for listing on the NRHP. No determination has been received from SHPO to date. GOSR is completing an environmental review for this project pursuant to HUD NEPA regulations. If the Area of Potential Effect encompasses historic properties of religious or cultural significance to your Nation please respond within 30 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.

Sincerely,

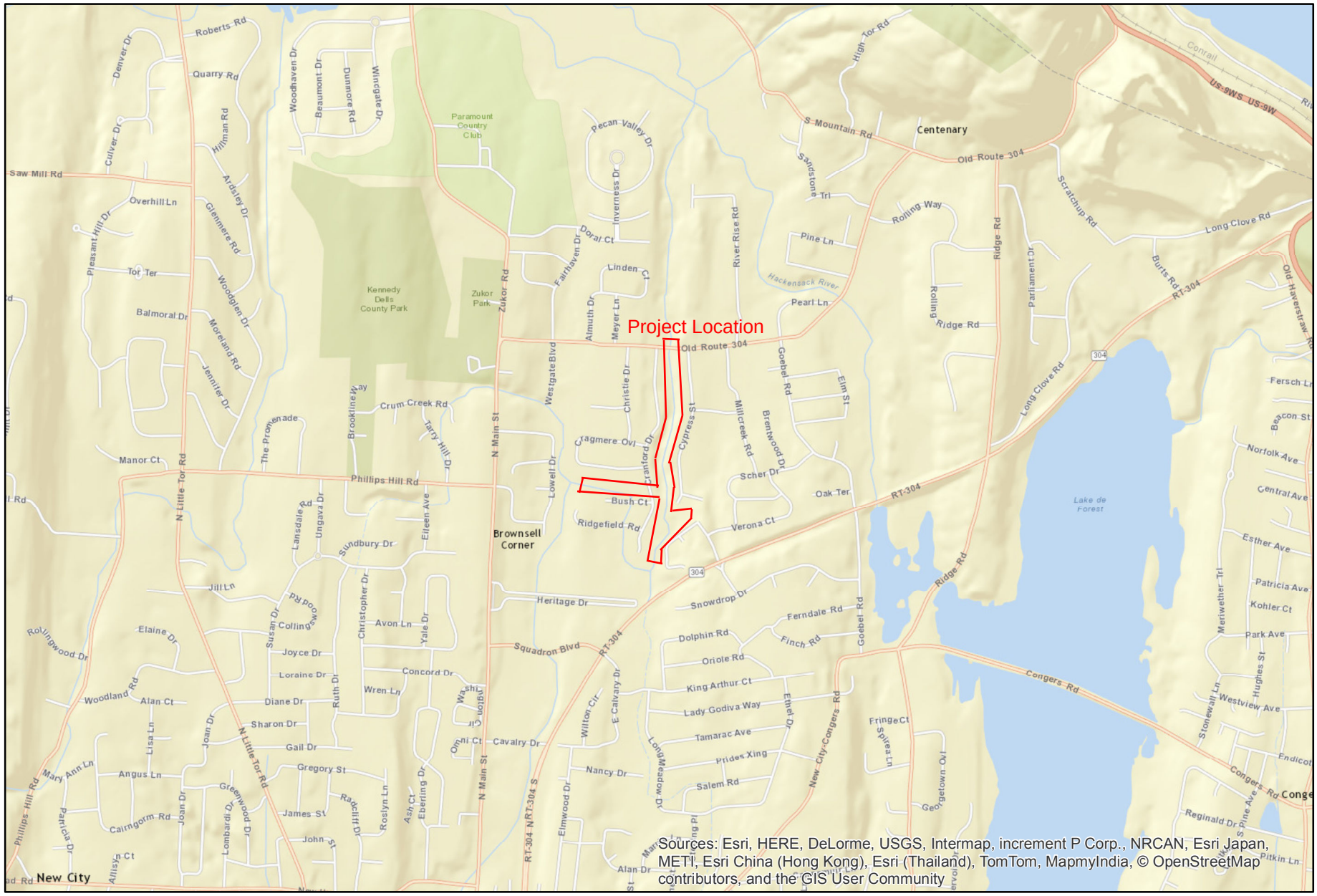
Thomas J. King
Assistant General Counsel and Certifying Officer
Governor's Office of Storm Recovery

Enclosures:
Attachment 1: Project Location Maps
Attachment 2: Project Site Plans (included as part of the NYSDEC Permit)

Electronic letter sent to:
Nekole Alligood, Cultural Preservation Director
Delaware Nation
P.O. Box 825
Anadarko, OK 73005

Attachment 1

Project Location Maps



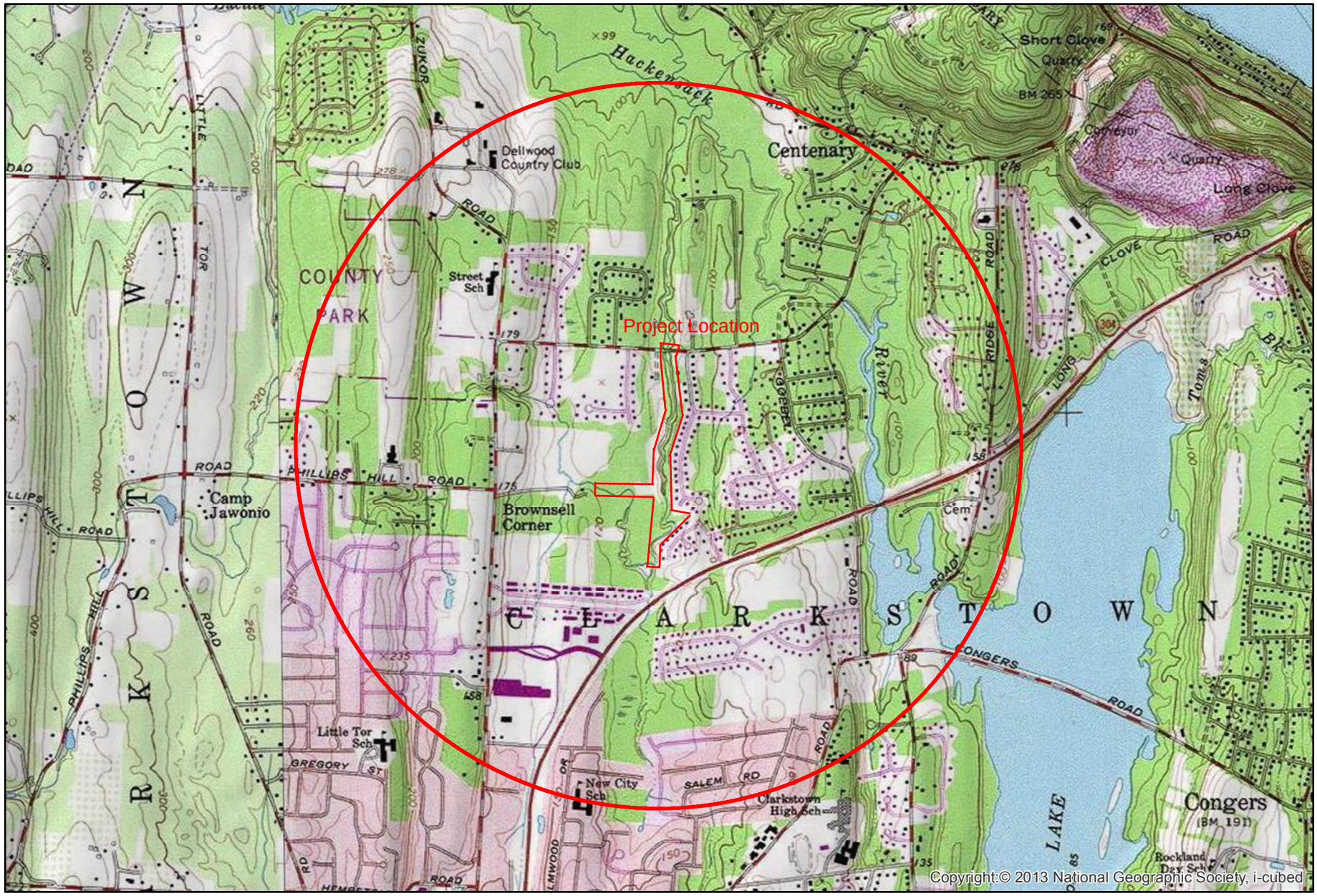
TECTONIC
Practical Solutions, Exceptional Service

0 0.25 0.5 1 Miles

1:24,000

STREET MAP
CRANFORD DRIVE
CLARKSTOWN, NY 10956
ROCKLAND COUNTY

N
W E
S



TECTONIC

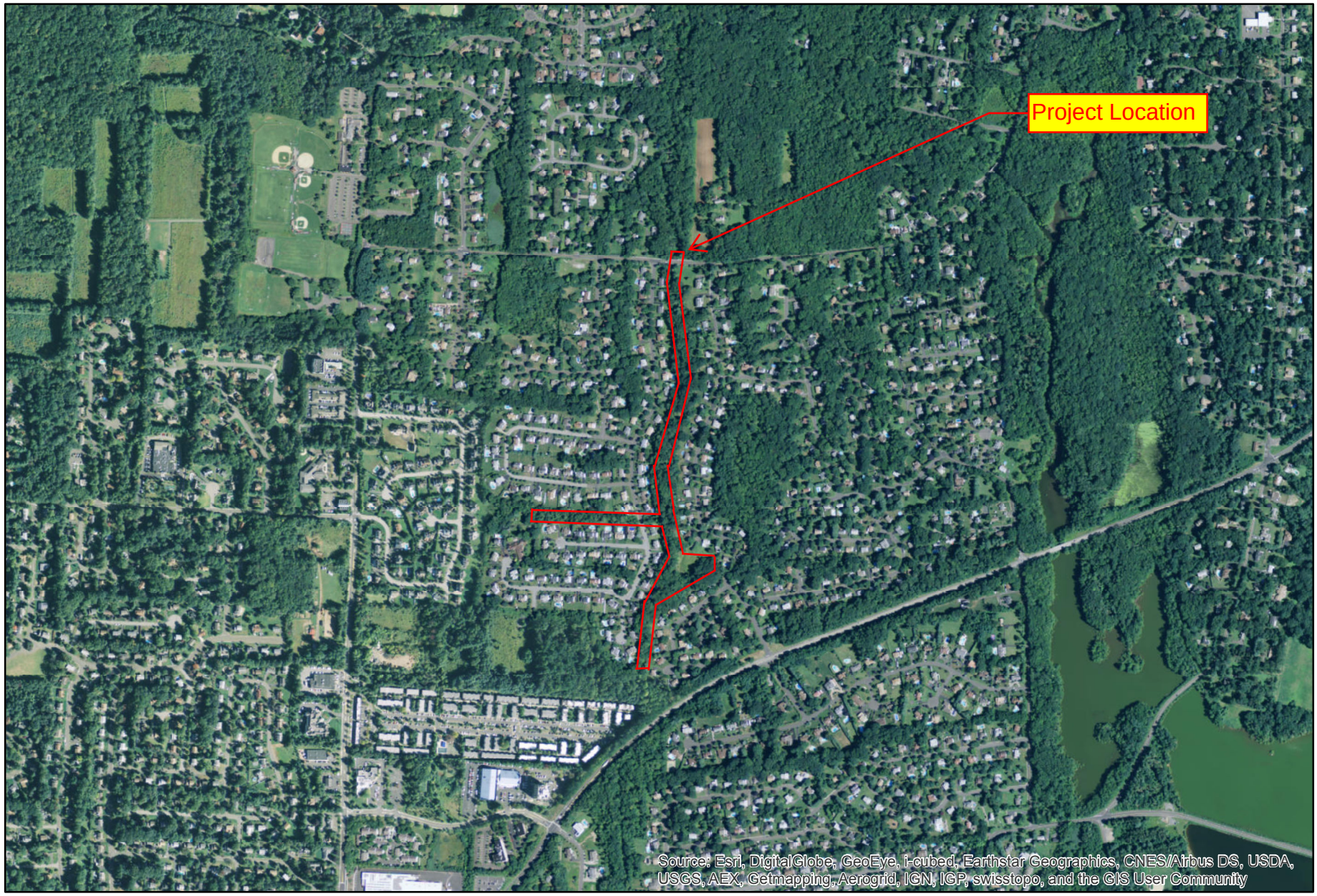
Practical Solutions, Exceptional Service

0 0.25 0.5 1 Miles

1:24,000

TOPOGRAPHIC MAP
CRANFORD DRIVE
CLARKSTOWN, NY 10956
ROCKLAND COUNTY

N
W E
S



TECTONIC

Practical Solutions, Exceptional Service

0 0.125 0.25 0.5 Miles

1:13,000

AERIAL IMAGERY
CRANFORD DRIVE
CLARKSTOWN, NY 10956
ROCKLAND COUNTY

N
W E
S

Attachment 2

Project Site Plans
(included as part of the NYSDEC Permit)

PERMIT

Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
TOWN OF CLARKSTOWN
10 MAPLE AVE
NEW CITY, NY 10956-5013
(845) 639-6200

Facility:
DEMAREST KILL FLOOD CONTROL
CRANFORD DR
CLARKSTOWN, NY 10956

Facility Location: in CLARKSTOWN in ROCKLAND COUNTY
Facility Principal Reference Point: NYTM-E: 585.638 NYTM-N: 4557.648
Latitude: 41°09'56.3" Longitude: 73°58'45.0"

Authorized Activity: Modification and realignment of approximately 4,650 linear feet of the bed and banks of a tributary of West Branch Hankensack [Water Index No. NJ-1-12-3, Class C(T)], also known as the Demarest Kill, in accordance with project plans referenced in Natural Resource Condition #1 and as conditioned by this permit. The authorized activities are associated with the Town's Cranford Drive Flood Amelioration Project.

Permit Authorizations

Stream Disturbance - Under Article 15, Title 5
Permit ID 3-3920-00297/00010
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

Water Quality Certification - Under Section 401 - Clean Water Act
Permit ID 3-3920-00297/00011
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: JOHN W PETRONELLA, Deputy Regional Permit Administrator
Address: NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY 12561

Authorized Signature: John W. Petronella Date 7 / 19 / 2016

JRM

Distribution List

US ARMY CORPS OF ENGINEERS - NY DISTRICT
BRIAN DRUMM
DENNIS LETSON, DEPT. OF ENVIRONMENTAL CONTROL, TOWN OF CLAKSON

Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

WATER QUALITY CERTIFICATION SPECIFIC CONDITION

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Permit Attachments

Project Location Map (Attachment I)
Site Plan (Attachment II)
Permit Sign

NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: STREAM DISTURBANCE; WATER QUALITY CERTIFICATION

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by Town of Clarkstown's Department of Environmental Control, titled "Cranford Drive Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets) (Attachment II) .

2. **Post Permit Sign** The permit sign enclosed with this permit shall be posted in a conspicuous location on the worksite and adequately protected from the weather.

3. **Notice of Intent to Commence Work** The permittee shall notify Brian Drumm, DEC Bureau of Habitat, via electronic mail (brian.drumm@dec.ny.gov) at least 48 hours in advance of the time of commencement of each phase described in plans referenced in Natural Resource Condition No. 1.

4. **Floodplain Regulations** The project must meet all local and federal floodplain regulations.

5. **Phase Project to Reduce Erosion** To reduce the potential for erosion, the project shall be constructed in six phases as defined in the plans approved by this permit and provided as an enclosure to the US Army Corps of Engineers New York District's Public Notice issued April 11, 2016 (Public Notice Number: NAN-2014-00305-ESW). Such plans are titled "Cranford Drive, Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets).

All activities within the phase must be fully completed and stablized prior to commencing project activities for the next phase.

6. **Maintain Water Flow During Work** During periods of work activity, sufficient flow of water shall be maintained at all times to sustain aquatic life downstream.

7. **Temporary Diversion Channel** A temporary diversion channel, culvert or pump-around shall be constructed to prevent running water in the work area. The area of temporary diversion must be restored to its original condition following completion of the work. If a diversion channel is used, its sides and bottom shall be protected by rock riprap or other suitable non-erodible materials to prevent scour and erosion.

8. **No Impedance to Aquatic Organisms** Structures must not impede upstream and downstream migration of aquatic organisms.

9. **No Turbidity from Dewatering** No turbid water resulting from dewatering operations shall be discharged directly to or allowed to enter the stream. Such water shall be pumped to settling basins or to an upland vegetated area prior to any discharge to the stream. All other necessary measures shall be implemented to prevent any visible increase in turbidity or sedimentation downstream of the work site.

10. **Straw Bales or Other Downslope of Work Area** Bales of straw or other effective means to control erosion are to be used on the downslope edge of any disturbed areas. This barrier to sediments is to be put in place before any disturbance of the ground occurs and is to be maintained in good condition until all disturbed land is heavily vegetated.

11. **Temporary Seeding of Disturbed/ Stockpiled Soils** All disturbed areas where soil is temporarily exposed or stockpiled for more than one month shall be stabilized with a temporary seeding or ground cover.

12. **Clean Fill Only** All fill material utilized for this project shall consist of uncontaminated earthen materials only. Acceptable fill materials include gravel, rock, overburden, topsoil and similar natural mineral resources.

13. **Work During Low Flows** All work shall be performed during low flow conditions.

14. **Materials Removed from Bed and Banks** Any debris or excess materials from construction of this project shall be immediately and completely removed from the bed and banks of all water areas to an appropriate upland area for disposal.

15. **Dredgings Disposed at Upland Site** All dredged and excavated material shall be disposed of on an upland site and be suitably stabilized so that it cannot reasonably re-enter any water body or wetland area.

16. **Seed, Mulch Disturbed Soils** All areas of soil disturbance resulting from this project (above the mean high water line) shall be seeded with an appropriate perennial grass seed and mulched with straw within one week of final grading. Mulch shall be maintained until a suitable vegetative cover is established.

17. **Temporary Mulch, Final Seeding** If seeding is impracticable due to the time of year, a temporary mulch shall be applied and final seeding shall be performed at the earliest opportunity when weather conditions favor germination and growth but not more than six months after project completion.

18. **Precautions Against Contamination of Waters** All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

19. **State May Order Removal or Alteration of Work** If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

20. **State May Require Site Restoration** If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

21. **State Not Liable for Damage** The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

WATER QUALITY CERTIFICATION SPECIFIC CONDITIONS

1. Water Quality Certification The authorized project, as conditioned pursuant to the Certificate, complies with Section 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act, as amended and as implemented by the limitations, standards, and criteria of state statutory and regulatory requirements set forth in 6 NYCRR Section 608.9(a). The authorized project, as conditioned, will also comply with applicable New York State water quality standards, including but not limited to effluent limitations, best usages and thermal discharge criteria, as applicable, as set forth in 6 NYCRR Parts 701, 702, 703, and 704.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. Facility Inspection by The Department The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. Relationship of this Permit to Other Department Orders and Determinations Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. Applications For Permit Renewals, Modifications or Transfers The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY12561

4. Submission of Renewal Application The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Stream Disturbance, Water Quality Certification.

5. Permit Modifications, Suspensions and Revocations by the Department The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. Permit Transfer Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

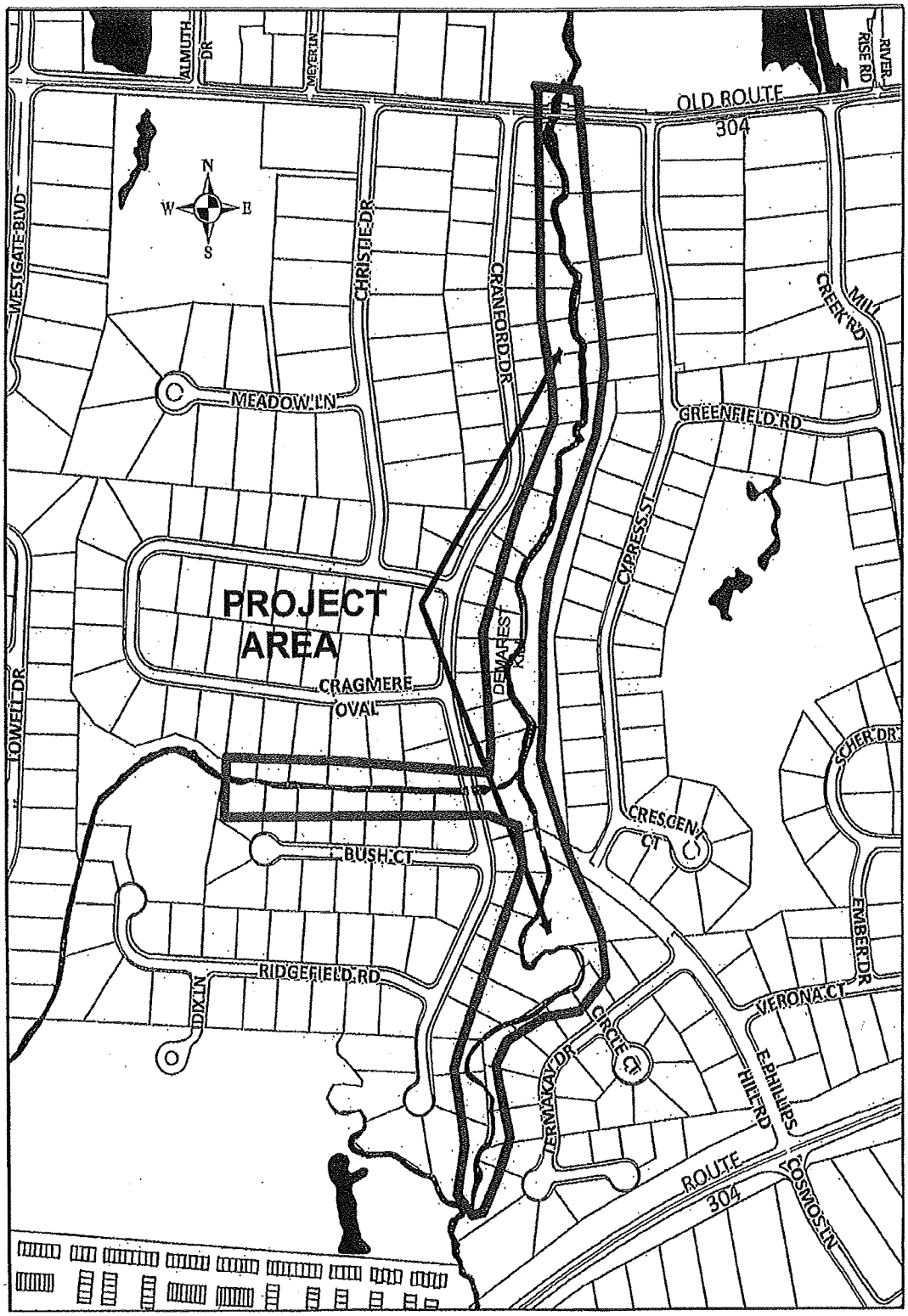
Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

Item E: SEQR Type I Action, No Significant Impact Under the State Environmental Quality Review Act (SEQR), the project associated with this permit is classified as a Type I Action with Clarkson Town Board designated as the lead agency. It has been determined that the project will not have a significant effect on the environment.

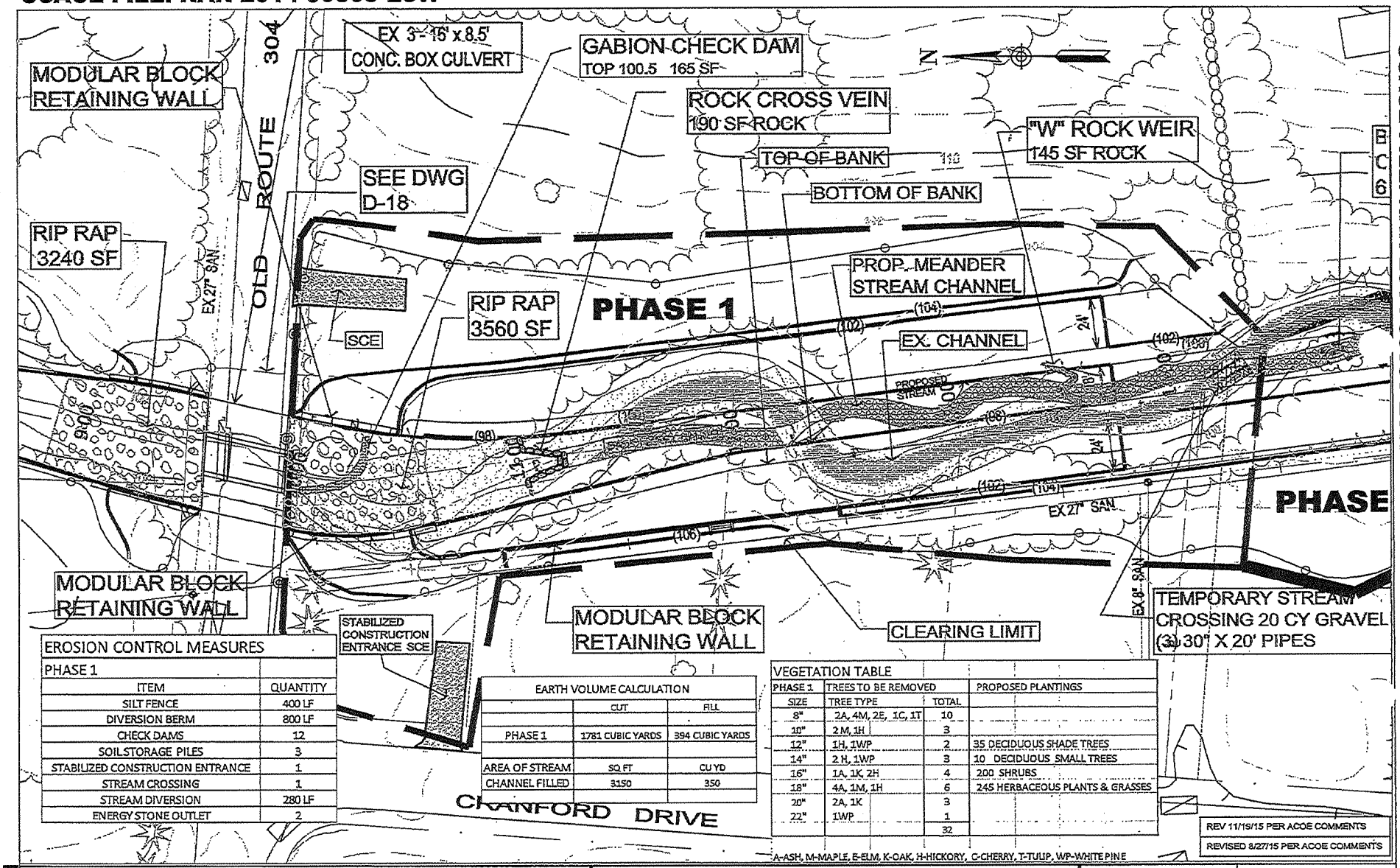
Project Location Map (Attachment I)

USACE FILE: NAN-2014-00305-ESW



500 250 0 500 Feet

CRANFORD DRIVE
FLOOD AMELIORATION PROJECT
TOWN OF CLARKSTOWN
NEW CITY, NEW YORK



EROSION CONTROL MEASURES	
PHASE 1	
ITEM	QUANTITY
SILT FENCE	400 LF
DIVERSION BERM	800 LF
CHECK DAMS	12
SOILSTORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	280 LF
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1	1781 CUBIC YARDS	394 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT 3150	CU YD 350

VEGETATION TABLE			
PHASE 1	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	2A, 4M, 2E, 1C, 1T	10	
10"	2 M, 1H	3	
12"	1H, 1WP	2	35 DECIDUOUS SHADE TREES
14"	2 H, 1WP	3	10 DECIDUOUS SMALL TREES
16"	1A, 1K, 2H	4	200 SHRUBS
18"	4A, 1M, 1H	6	245 HERBACEOUS PLANTS & GRASSES
20"	2A, 1K	3	
22"	1WP	1	
		32	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY, T-TULIP, WP-WHITE PINE

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

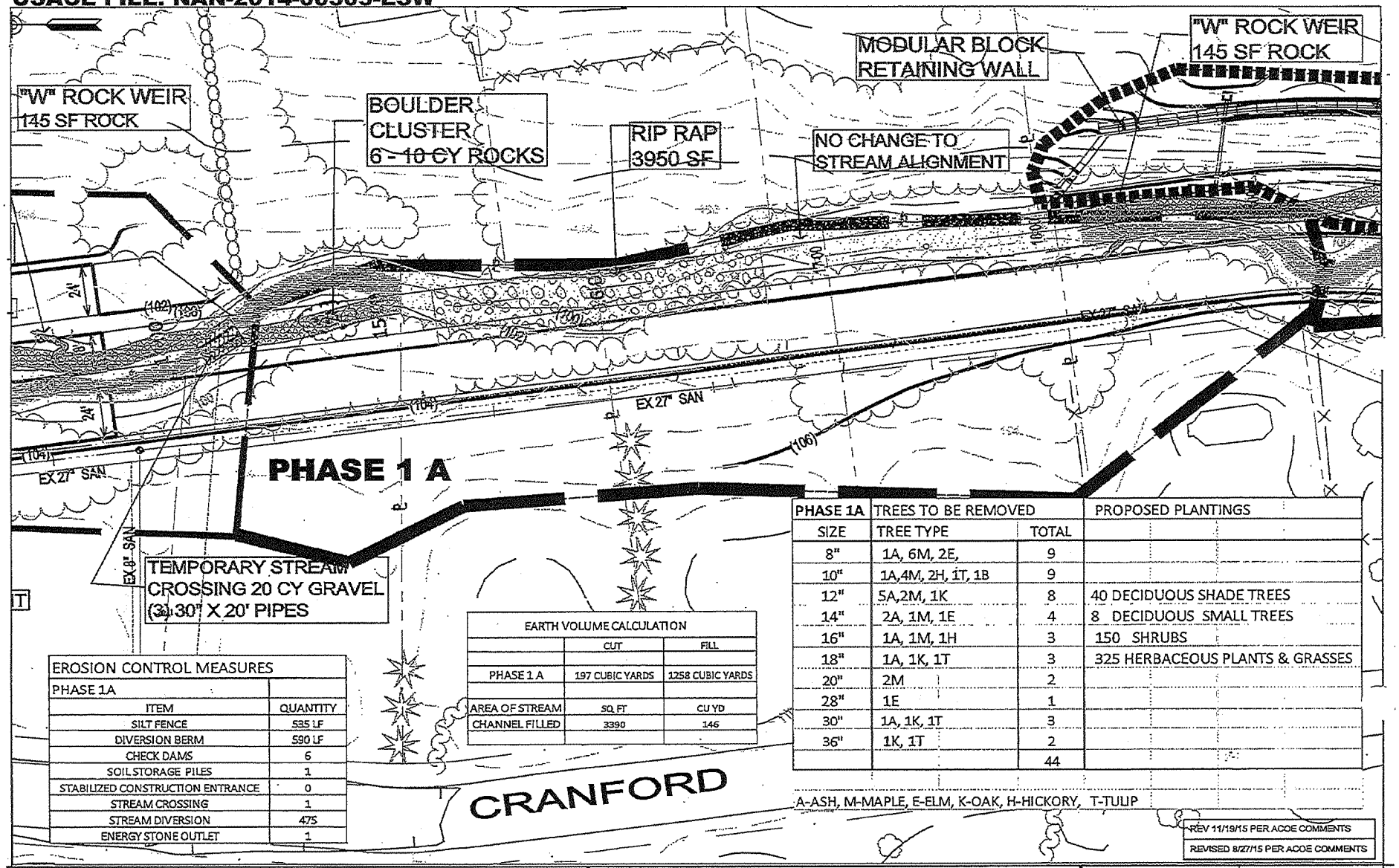
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-1
SHEET _1_ OF _31_ SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

Site Plan (Attachment 1)



EROSION CONTROL MEASURES	
PHASE 1A	
ITEM	QUANTITY
SILT FENCE	535 LF
DIVERSION BERM	590 LF
CHECK DAMS	6
SOIL STORAGE PILES	1
STABILIZED CONSTRUCTION ENTRANCE	0
STREAM CROSSING	1
STREAM DIVERSION	475
ENERGY STONE OUTLET	1

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1 A	197 CUBIC YARDS	1258 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ. FT	CU YD
	3390	146

PHASE 1A	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1A, 6M, 2E,	9	
10"	1A,4M, 2H, 1T, 1B	9	
12"	5A,2M, 1K	8	40 DECIDUOUS SHADE TREES
14"	2A, 1M, 1E	4	8 DECIDUOUS SMALL TREES
16"	1A, 1M, 1H	3	150 SHRUBS
18"	1A, 1K, 1T	3	325 HERBACEOUS PLANTS & GRASSES
20"	2M	2	
28"	1E	1	
30"	1A, 1K, 1T	3	
36"	1K, 1T	2	
		44	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

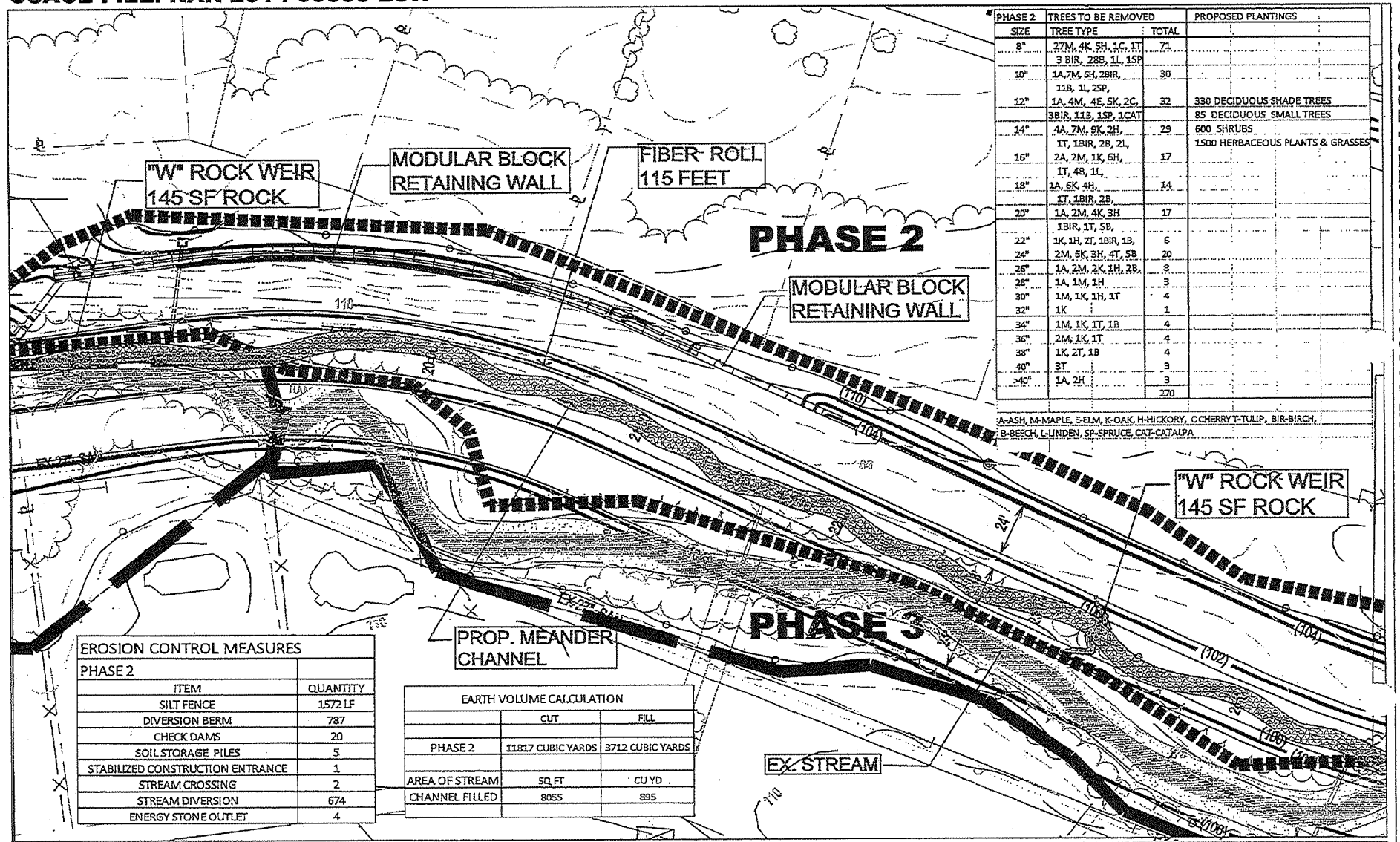
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-2
SHEET 2 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 2	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	27M, 4K, 5H, 1C, 1T 3 BIR, 28B, 1L, 1SP	71	
10"	1A,7M, 6H, 2BIR, 11B, 1L, 2SP,	30	
12"	1A, 4M, 4E, 5K, 2C, 3BIR, 11B, 1SP, 1CAT	32	330 DECIDUOUS SHADE TREES
			85 DECIDUOUS SMALL TREES
14"	4A, 7M, 9K, 2H, 1T, 1BIR, 2B, 2L,	29	600 SHRUBS
16"	2A, 2M, 1K, 6H, 1T, 4B, 1L,	17	1500 HERBACEOUS PLANTS & GRASSES
18"	1A, 6K, 4H, 1T, 1BIR, 2B,	14	
20"	1A, 2M, 4K, 3H 1BIR, 1T, 5B,	17	
22"	1K, 1H, 2T, 1BIR, 1B,	6	
24"	2M, 6K, 3H, 4T, 5B	20	
26"	1A, 2M, 2K, 1H, 2B,	8	
28"	1A, 1M, 1H	3	
30"	1M, 1K, 1H, 1T	4	
32"	1K	1	
34"	1M, 1K, 1T, 1B	4	
36"	2M, 1K, 1T	4	
38"	1K, 2T, 1B	4	
40"	3T	3	
>40"	1A, 2H	3	
		270	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY T-TULIP, BIR-BIRCH, B-BEECH, L-LINDEN, SP-SPRUCE, CAT-CATALPA

EROSION CONTROL MEASURES	
PHASE 2	
ITEM	QUANTITY
SILT FENCE	1572 LF
DIVERSION BERM	787
CHECK DAMS	20
SOIL STORAGE PILES	5
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	2
STREAM DIVERSION	674
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 2	11817 CUBIC YARDS	3712 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	8055	895

REV 11/19/15 PER ACOE COMMENTS | REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

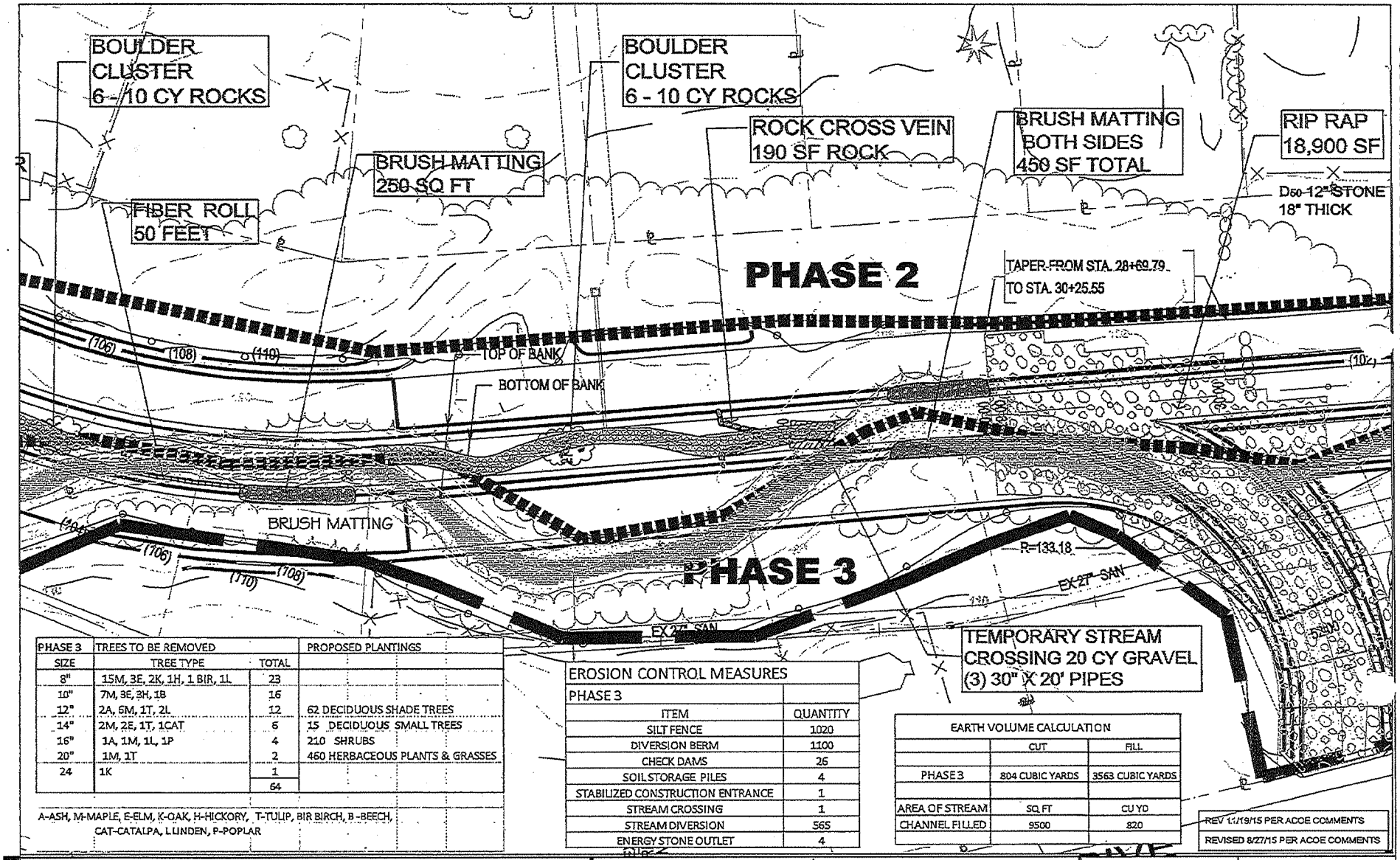
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-3

SHEET _3_ OF _31 SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 3	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	15M, 3E, 2K, 1H, 1 BIR, 1L	23	
10"	7M, 3E, 3H, 1B	16	
12"	2A, 6M, 1T, 2L	12	62 DECIDUOUS SHADE TREES
14"	2M, 2E, 1T, 1CAT	6	15 DECIDUOUS SMALL TREES
16"	1A, 1M, 1L, 1P	4	210 SHRUBS
20"	1M, 1T	2	460 HERBACEOUS PLANTS & GRASSES
24	1K	1	
		64	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, CAT-CATALPA, L LINDEN, P-POPLAR

EROSION CONTROL MEASURES	
PHASE 3	
ITEM	QUANTITY
SILT FENCE	1020
DIVERSION BERM	1100
CHECK DAMS	26
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	565
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 3	804 CUBIC YARDS	3563 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	9500	820

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

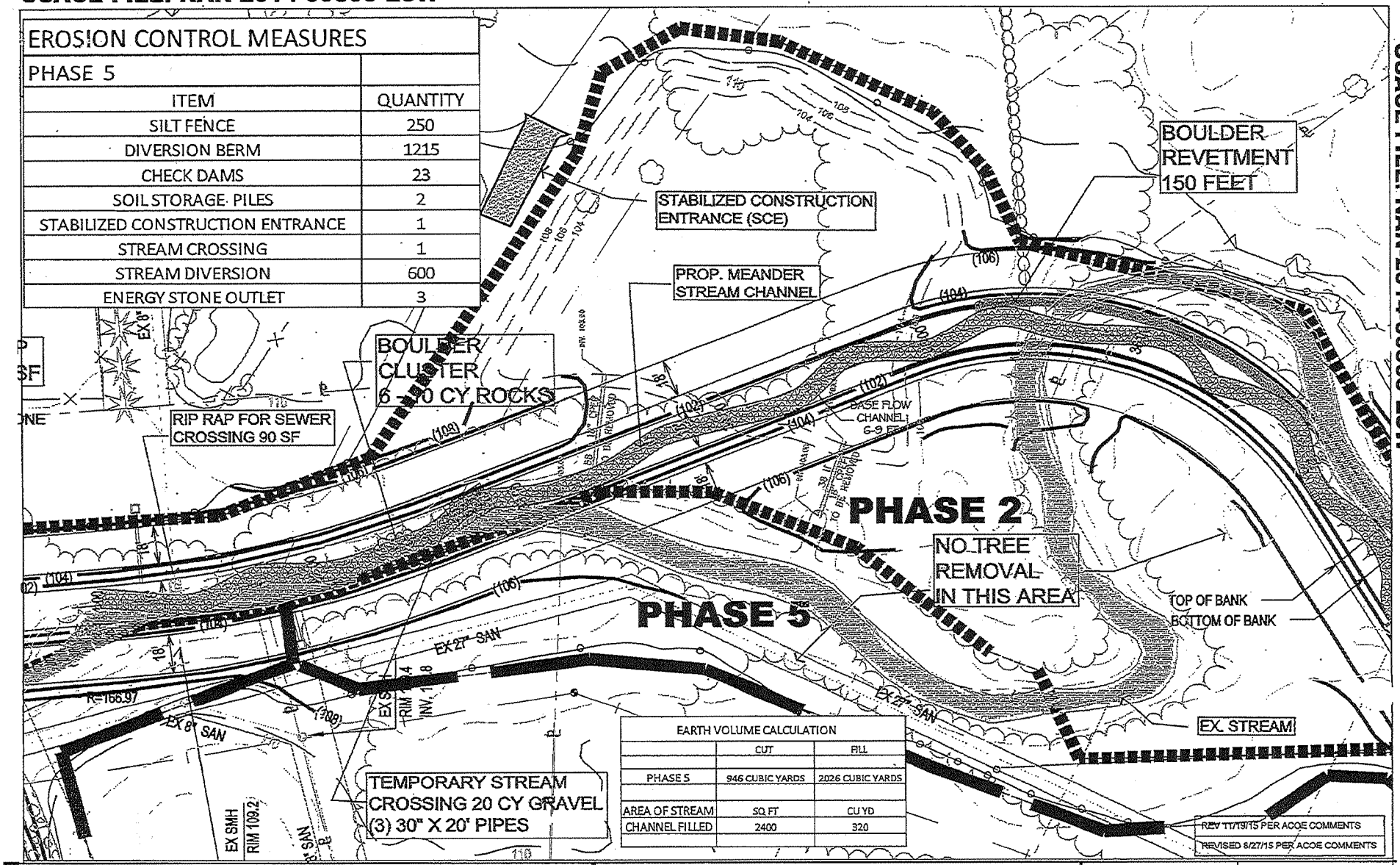
SITE LAYOUT PLAN
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-4
SHEET 4 OF 31 SHTS.
DRAWING FILE: e:\engineering\cranford drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

EROSION CONTROL MEASURES	
PHASE 5	
ITEM	QUANTITY
SILT FENCE	250
DIVERSION BERM	1215
CHECK DAMS	23
SOIL STORAGE PILES	2
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	600
ENERGY STONE OUTLET	3



EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 5	946 CUBIC YARDS	2026 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT	CU YD
	2400	320

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

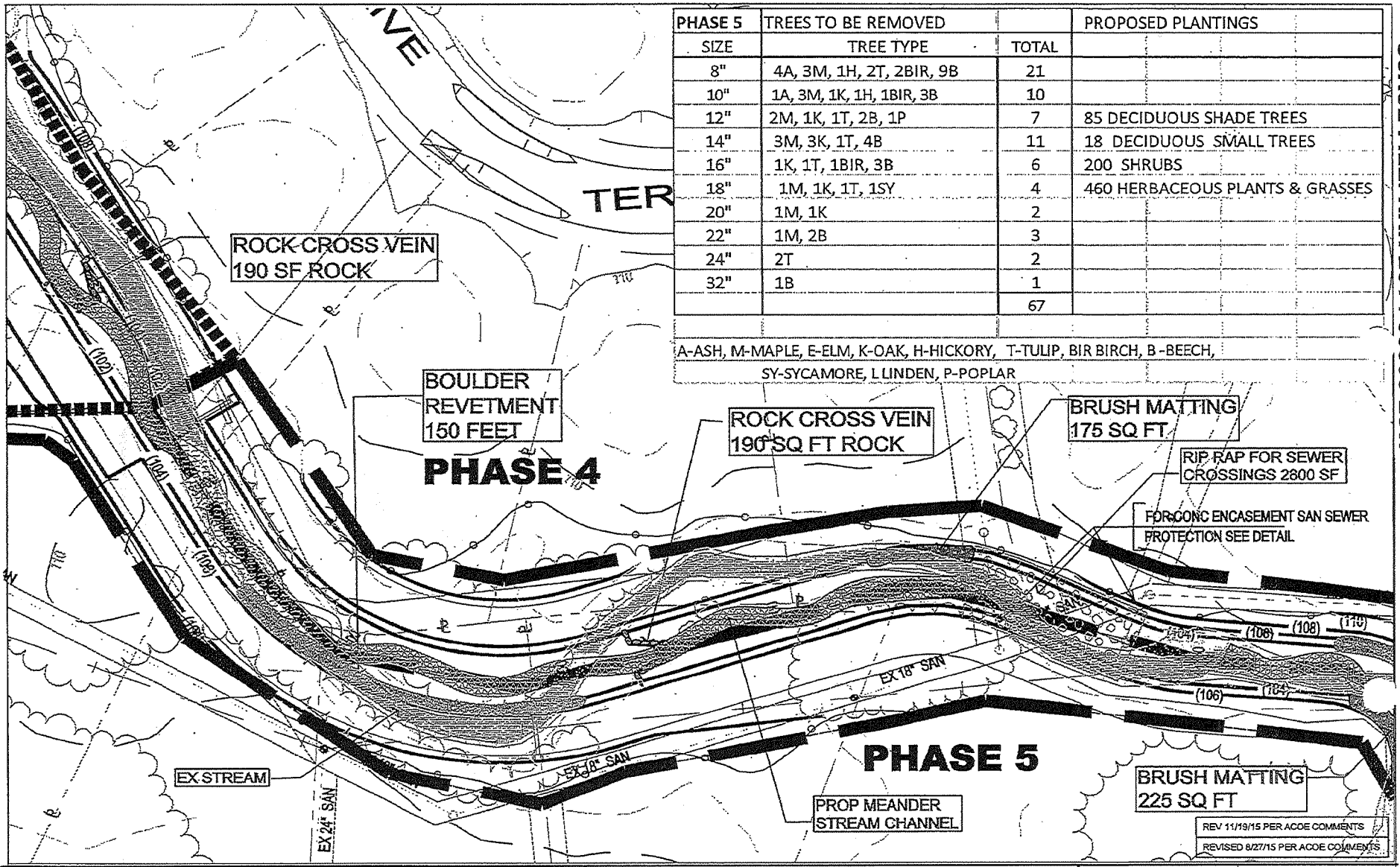
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	KOZ
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-5
SHEET 5 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

PHASE 5	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	4A, 3M, 1H, 2T, 2BIR, 9B	21	
10"	1A, 3M, 1K, 1H, 1BIR, 3B	10	
12"	2M, 1K, 1T, 2B, 1P	7	85 DECIDUOUS SHADE TREES
14"	3M, 3K, 1T, 4B	11	18 DECIDUOUS SMALL TREES
16"	1K, 1T, 1BIR, 3B	6	200 SHRUBS
18"	1M, 1K, 1T, 1SY	4	460 HERBACEOUS PLANTS & GRASSES
20"	1M, 1K	2	
22"	1M, 2B	3	
24"	2T	2	
32"	1B	1	
		67	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, SY-SYCAMORE, L LINDEN, P-POPLAR



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

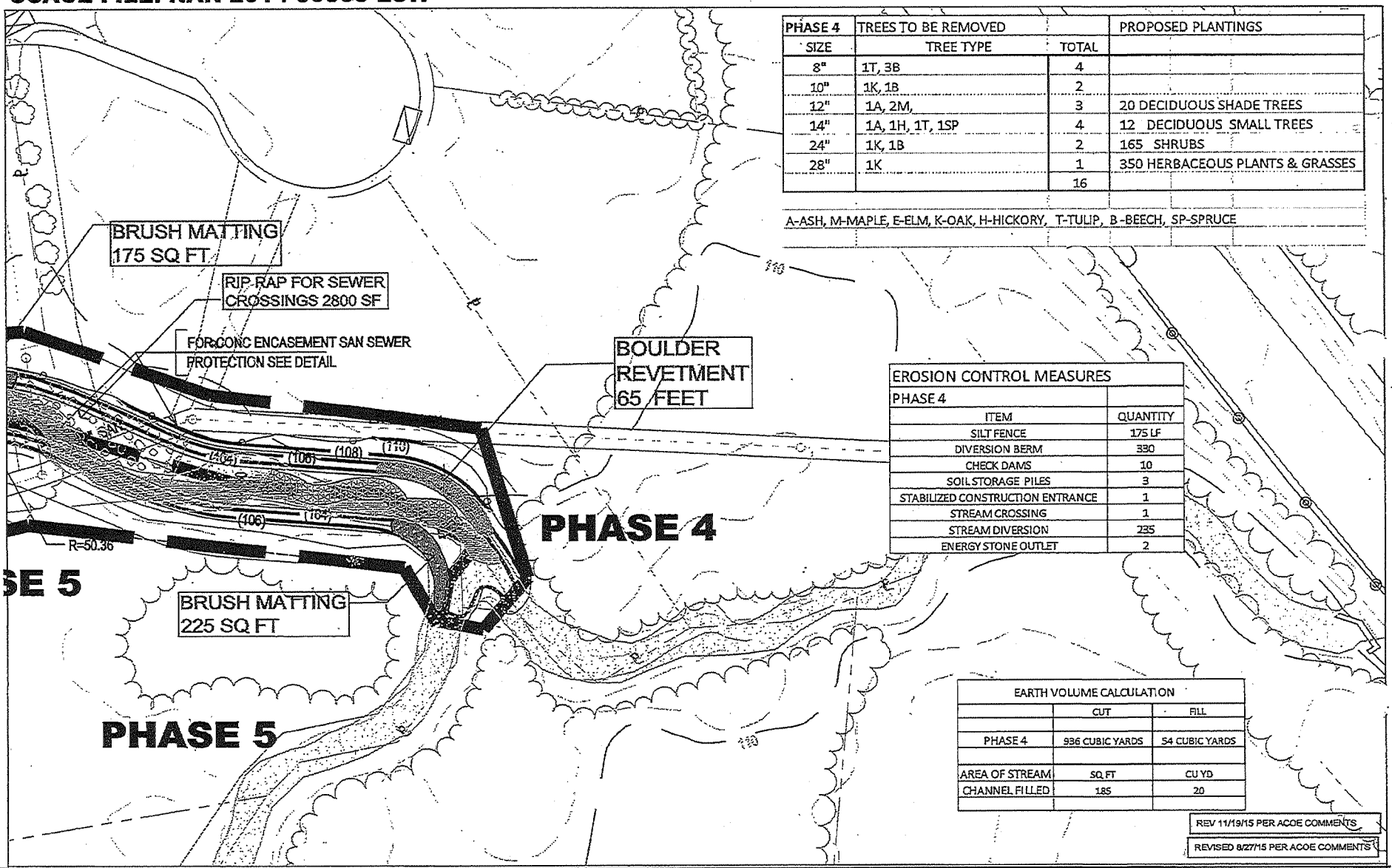
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-6

SHEET _6_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe



PHASE 4	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1T, 3B	4	
10"	1K, 1B	2	
12"	1A, 2M,	3	20 DECIDUOUS SHADE TREES
14"	1A, 1H, 1T, 1SP	4	12 DECIDUOUS SMALL TREES
24"	1K, 1B	2	165 SHRUBS
28"	1K	1	350 HERBACEOUS PLANTS & GRASSES
		16	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, B-BEECH, SP-SPRUCE

EROSION CONTROL MEASURES	
PHASE 4	
ITEM	QUANTITY
SILT FENCE	175 LF
DIVERSION BERM	330
CHECK DAMS	10
SOIL STORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	235
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 4	936 CUBIC YARDS	54 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	185	20

REV 11/19/15 PER ACOE COMMENTS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

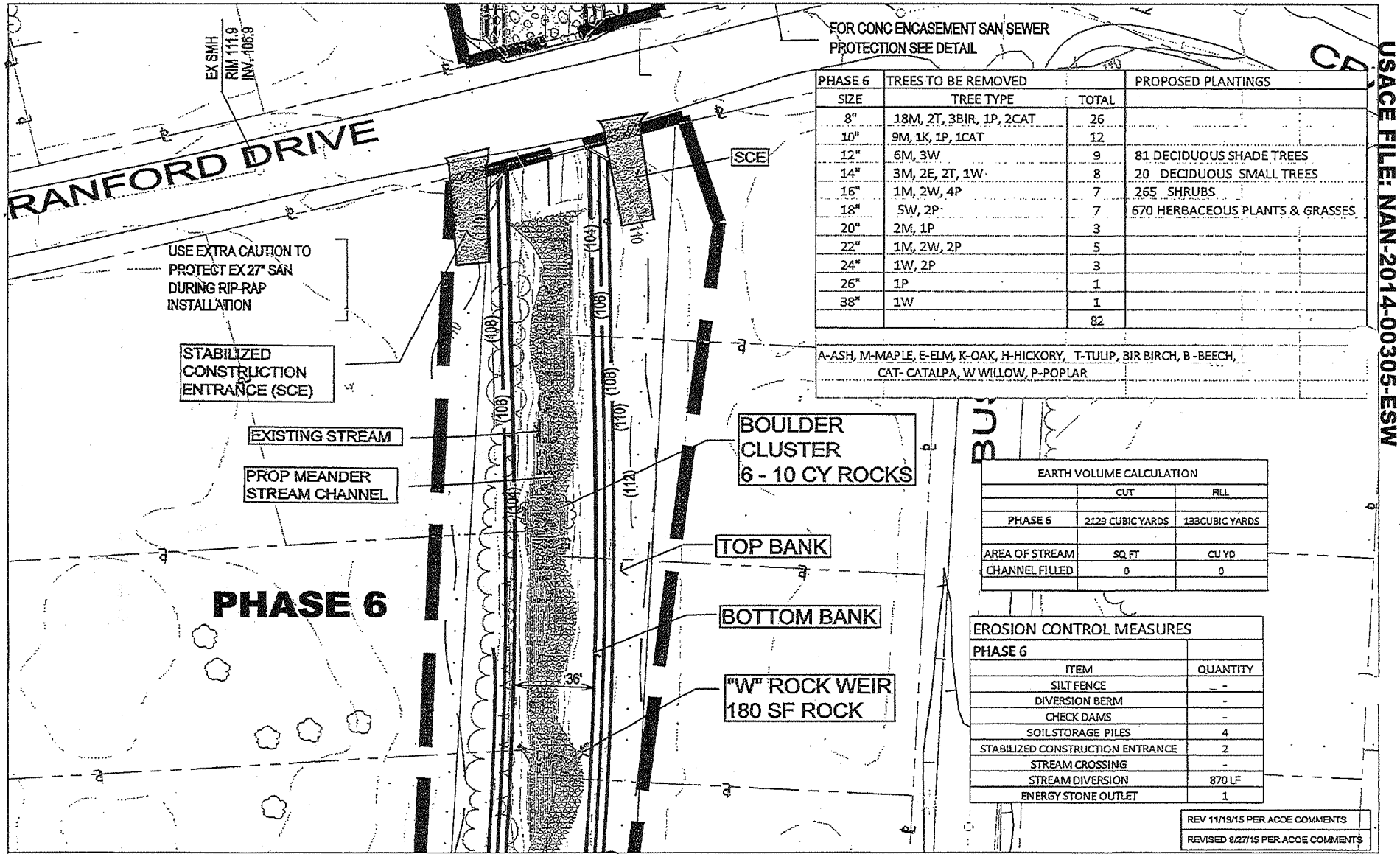
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-7

SHEET _7_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 6	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	18M, 2T, 3BIR, 1P, 2CAT	26	
10"	9M, 1K, 1P, 1CAT	12	
12"	6M, 3W	9	81 DECIDUOUS SHADE TREES
14"	3M, 2E, 2T, 1W	8	20 DECIDUOUS SMALL TREES
16"	1M, 2W, 4P	7	265 SHRUBS
18"	5W, 2P	7	670 HERBACEOUS PLANTS & GRASSES
20"	2M, 1P	3	
22"	1M, 2W, 2P	5	
24"	1W, 2P	3	
26"	1P	1	
38"	1W	1	
		82	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B -BEECH, CAT- CATALPA, W WILLOW, P-POPLAR

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 6	2129 CUBIC YARDS	133CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	0	0

EROSION CONTROL MEASURES	
PHASE 6	
ITEM	QUANTITY
SILT FENCE	-
DIVERSION BERM	-
CHECK DAMS	-
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	2
STREAM CROSSING	-
STREAM DIVERSION	870 LF
ENERGY STONE OUTLET	1

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

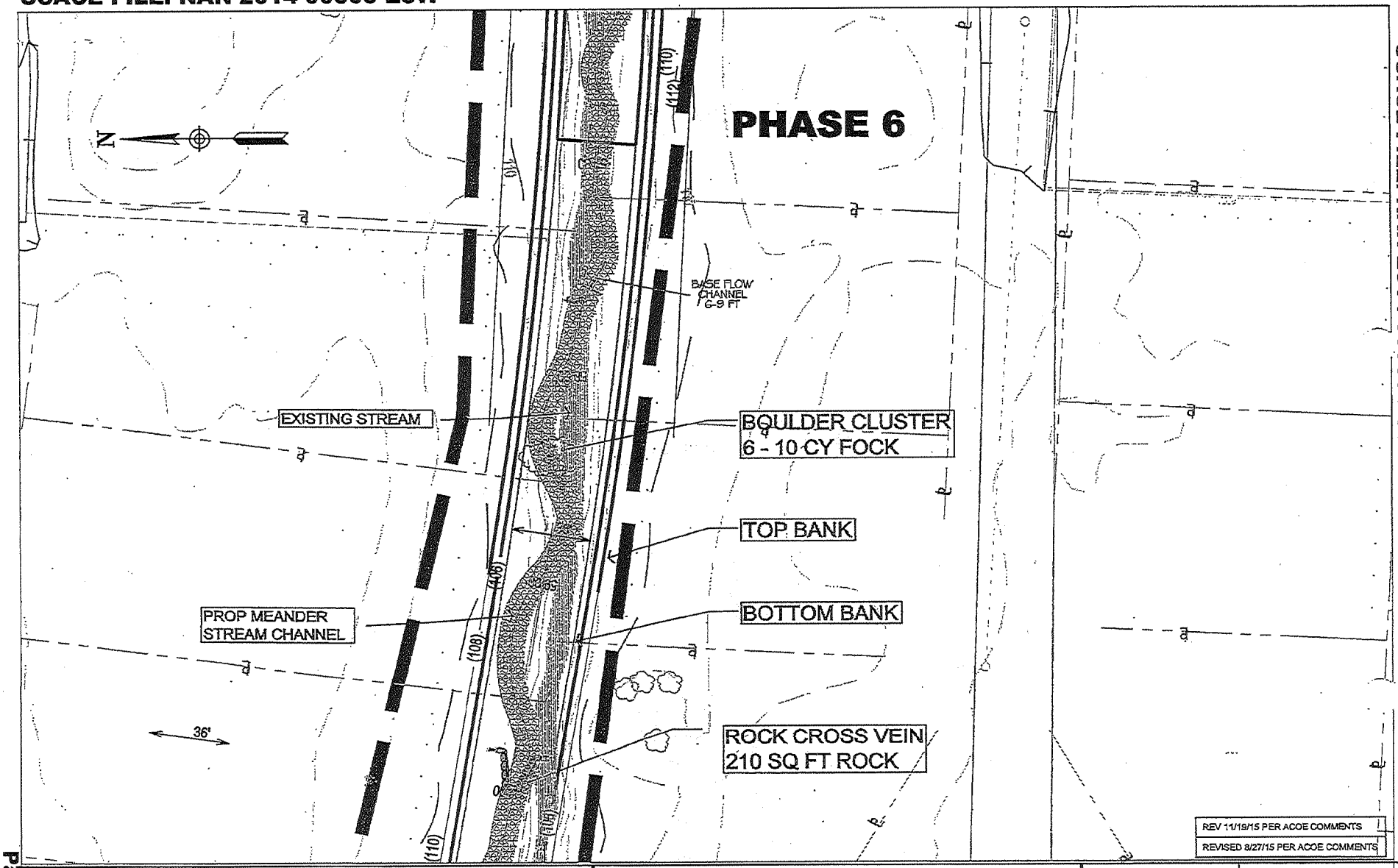
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-8
SHEET 8 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

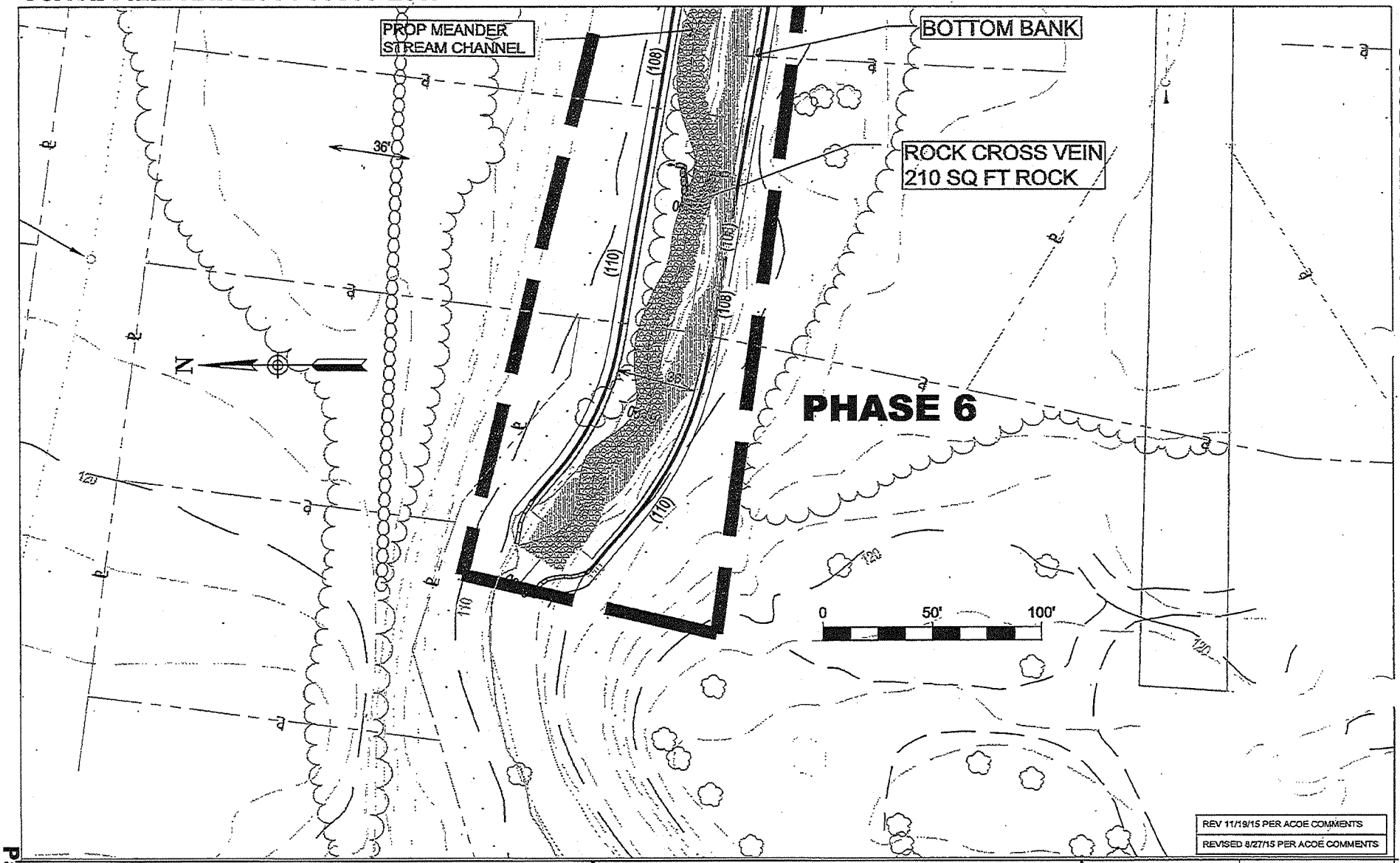
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-9

SHEET _9_ OF _31_ SHTS.

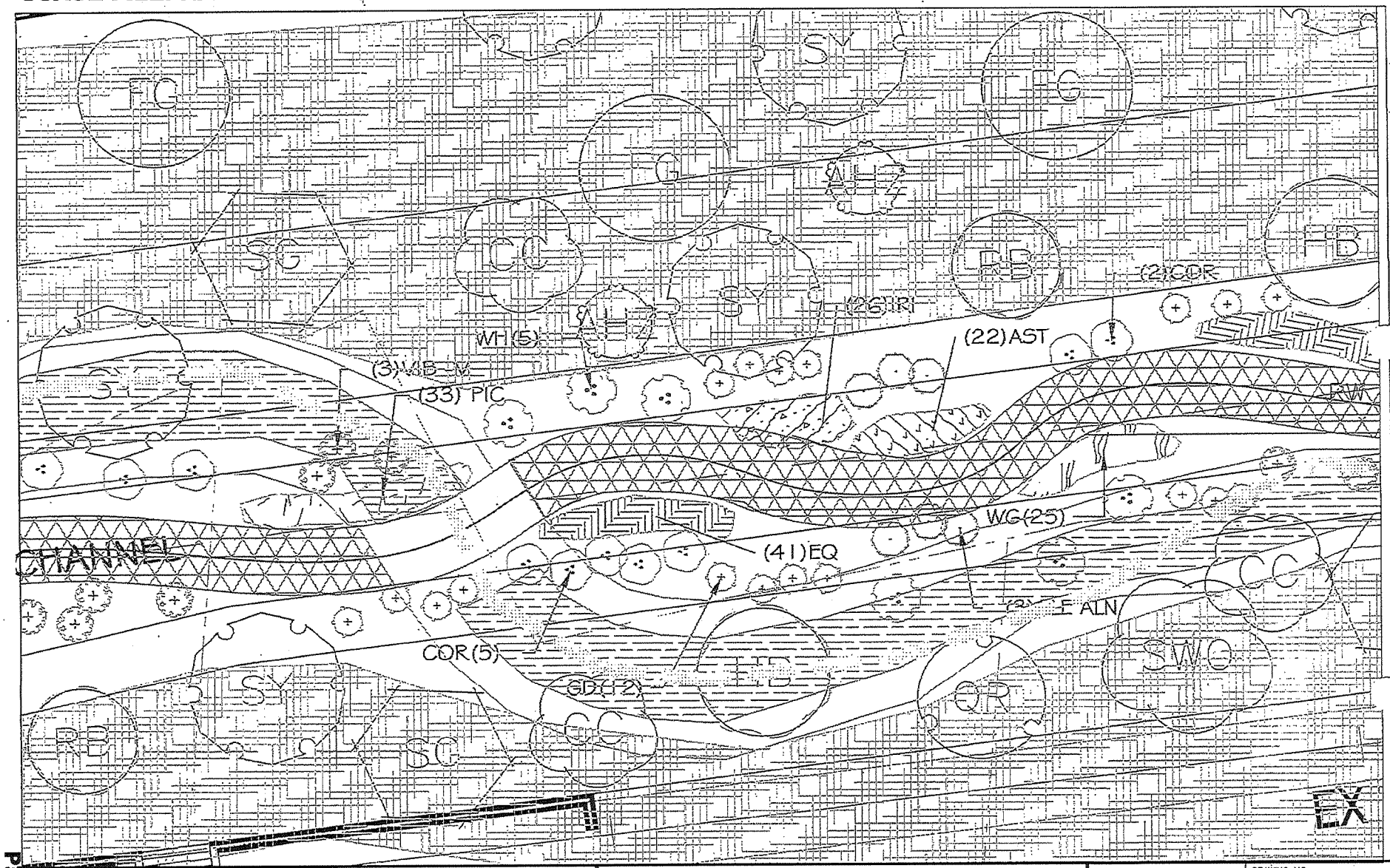
DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	SITE LAYOUT PLAN	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWING NO.: S-10 SHEET 10 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	**TYPICAL CHANNEL PLANTING**	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: **L-1** SHEET _11_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
RM	18	Red Maple / Acer rubrum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
SM	18	Sugar Maple / Acer saccharum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AML	10	Allegheny Serviceberry / Amelanchier laevis		7 gal	6-8` HT
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
CAR	15	Shagbark Hickory / Carya ovata	B & B	2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
RB	9	River Birch / Betula nigra	B & B	10` ht
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
PP	9	Paper Birch / Betula papynfera	B & B	2" CAL
	9			7 GAL	1/2" CAL
	9			3 GAL	3-4' HT
HB	8	American Hornbeam / Carpinus caroliniana		B & B	2" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
CC	9	Eastern Redbud / Cercis canadensis	B & B	2" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AHZ	24	American Hazelnut / Corylus americana		7 gal	4-5` HT
FG	19	Green Ash / Fraxinus pennsylvanica	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
HL	15	Sunburst Honey Locust / Gleditsia triacanthos `Sunburst`	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
SG	17	Sweet Gum / Liquidambar styraciflua	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
LT	10	Tulip Tree / Liriodendron tulipifera	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
N	15	Sour Gum / Nyssa sylvatica	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
BE	10	Box Elder / Acer negundo		6-8` HT
	10			7 GAL	4-5' HT
	10			3 GAL	3-4' HT
PA	5	Norway Spruce / Picea abies	B & B	6-8` HT
	15			7 GAL	4-5' HT
	15			3 GAL	3-4' HT
WP	11	White Pine / Pinus strobus	B & B	6-7` HT
	15			B & B	4-5' HT
	15			3 GAL	3-4' HT
SY	18	American Sycamore / Platanus occidentalis		B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
SWO	10	Swamp White Oak / Quercus bicolor		B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
PO	18	Pin Oak / Quercus palustris	B & B	2 1/2-3" CAL
	18			7 GAL	1/2" CAL
	18			3 GAL	3-4' HT
QR	10	Red Oak / Quercus rubra	B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	18		3 GAL	3-4' HT
TD	6	Bald Cypress / Taxodium distichum		B & B	5-6` HT
	5			B & B	3-4' HT
	15			3 GAL	2-3' HT

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-2
SHEET _12 OF _31_ SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

SHRUB AREAS

QTY		COMMON NAME / BOTANICAL NAME	CON	SPACING
AM3	122	Chokeberry / Aronia melanocarpa	2 gal	72"
CLE	110	Summersweet Clethra / Clethra alnifolia	2 gal	60"
CAM	155	Silky Dogwood / Cornus amonum	2 gal	72"
CG	168	Gray Dogwood / Cornus racemosa	2 gal	60"
HV	165	Common Witch Hazel / Hamamelis virginiana	2 gal	84"
ITE	65	Virginia Sweetspire / Itea virginica `Virginia`	2 gal	68"
IX	160	Winterberry Ilex verticillata	2 gal	60"
LIN	132	Spicebush / Lindera benzoin	2 gal	60"
ELD	60	Elderberry / Sambucus canadensis	2 gal	58"
VAC	188	Highbush Blueberry / Vaccinium corymbosum	2 gal	72"
VW	180	Arrowwood Viburnum / Viburnum dentatum	1 gal	72"
VA	130	Alleghany Viburnum Viburnum x rhytidophylloides	2 gal	72"
LEN	155	NANNYBERRY / VIBURNUM LENTAGO	2 gal	80"

GROUND COVERS

	QTY	COMMON NAME / BOTANICAL NAME		
AST	950	New York Aster / Aster novi-belgii	2 1/4" pots	24"
EQ	680	Dwarf Horsetail / Equisetum scirpoides	flat	20"
IRI	880	Blue Flag / Iris versicolor	2 1/4" pots	24"
PIC	680	Pickerel Weed / Pontederia cordata	2 1/4" pots	24"
WG	820	Wool Grass / Scirpus cyperinus	2 1/4" pots	24"

SUMMARY OF PLANTINGS

MAJOR TREES	674
MINOR TREES	156
SHRUBS	1790
GROUND COVER	4010

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

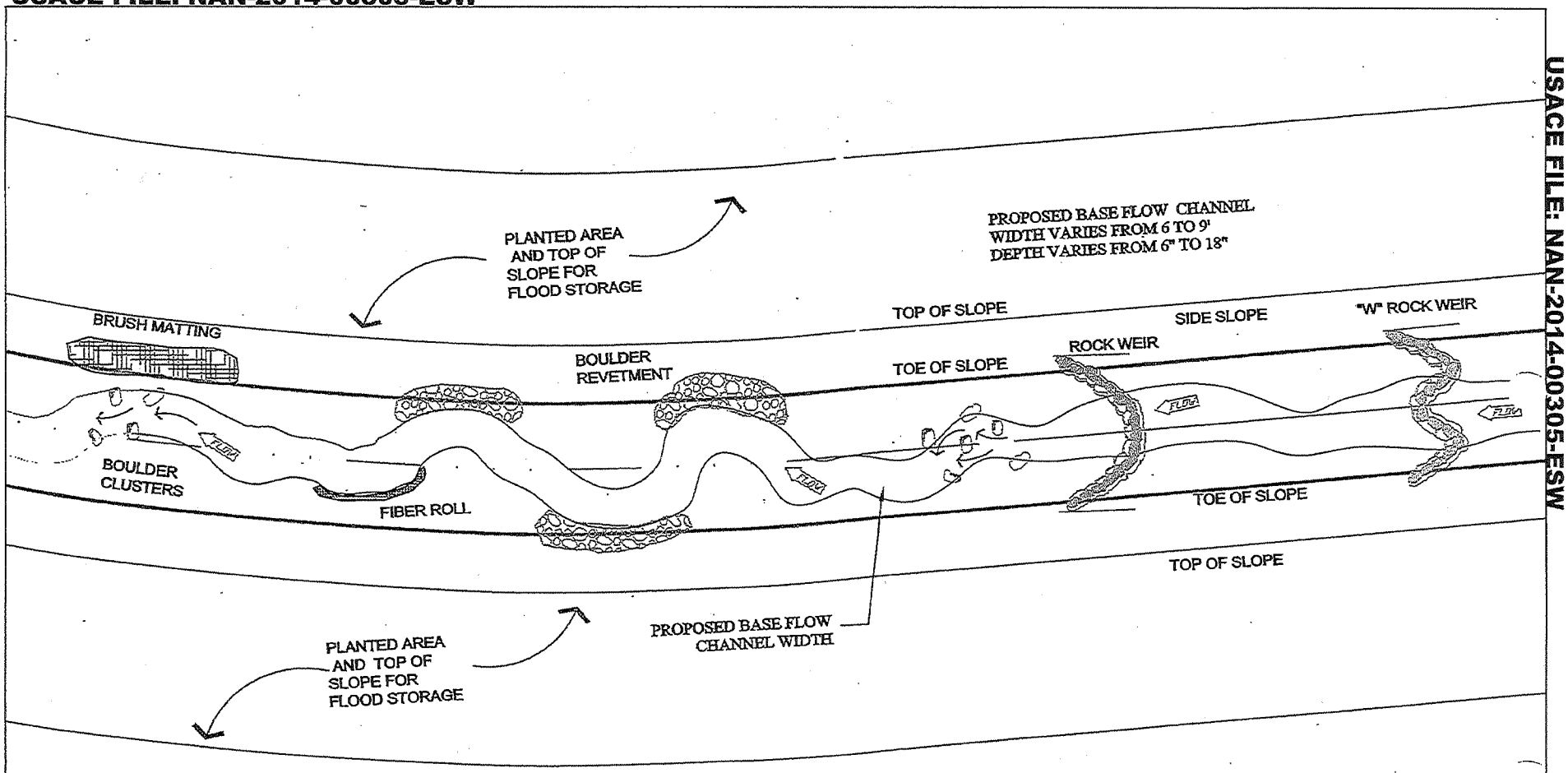
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-3

SHEET 13 OF 31 SHTS.

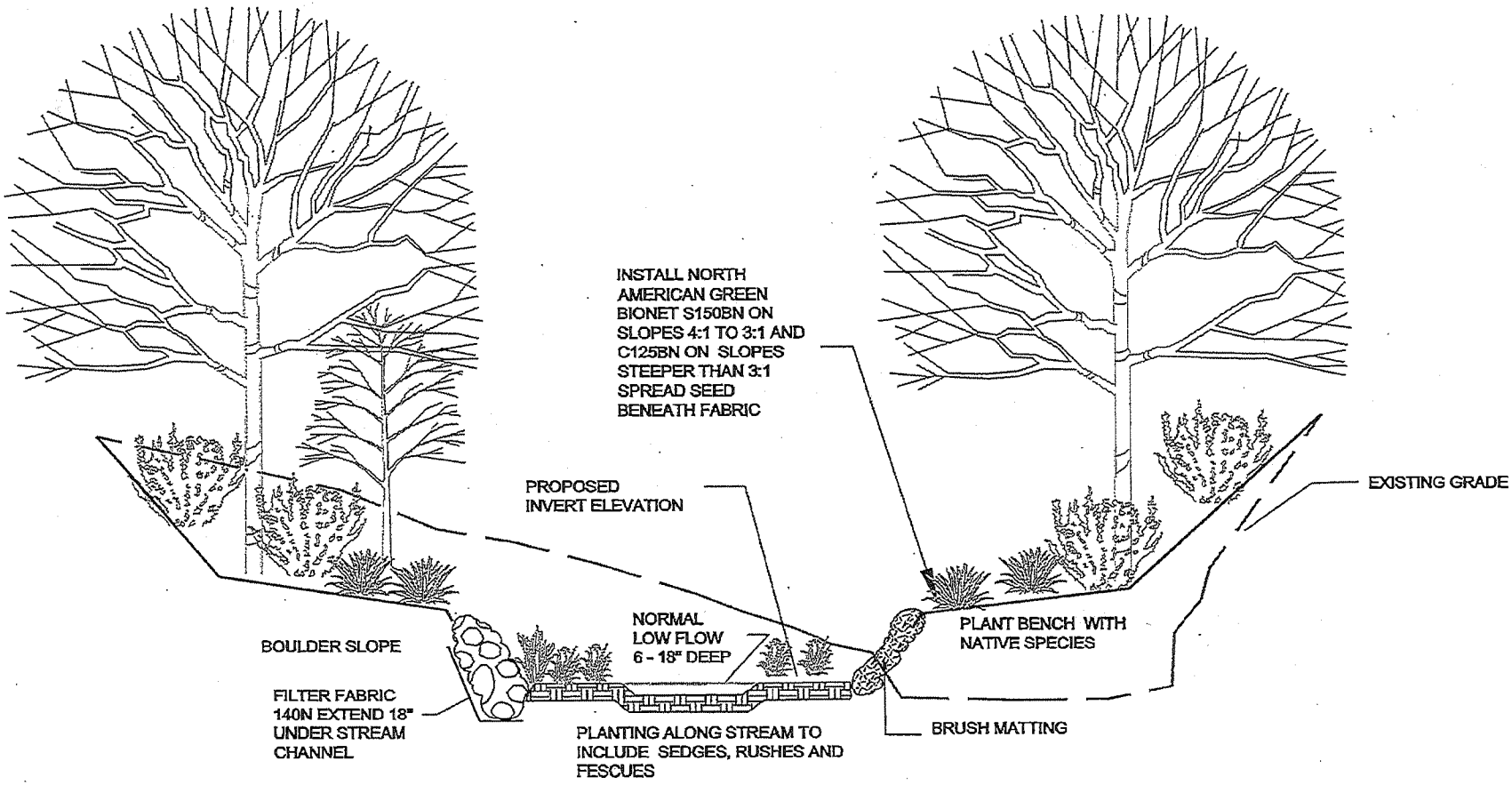
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe



CHANNEL TREATMENT MEASURES
SEE SITE PLAN AND DETAIL SHEETS
FOR LOCATIONS OF EACH TREATMENT

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-1 SHEET 14 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: x:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

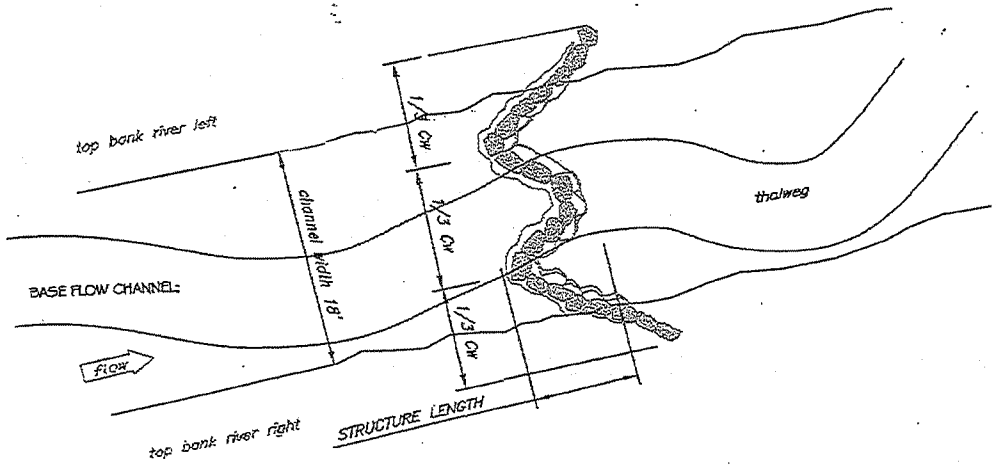


TYPICAL CHANNEL SECTION & STABILIZATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

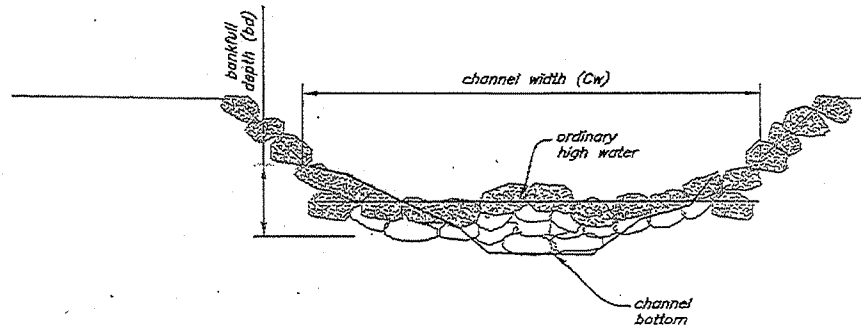
TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-2 SHEET _15_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



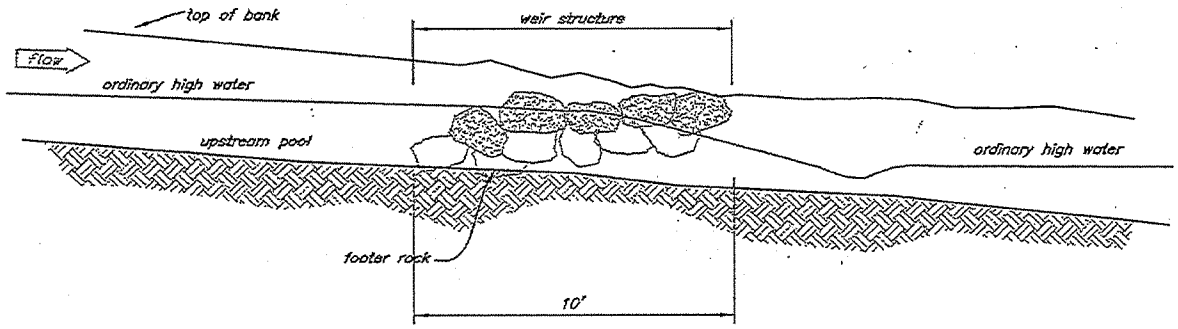
PLAN VIEW

W ROCK WEIR SCHEDULE

STRUCTURE ID	STATION	ELEVATION	Cw	L
WRW # 1	13+50	98.6	24'	12'
WRW # 2	18+19	99.36	24'	12'
WRW # 3	23+25	100.2	24'	12'
WRW # 4	37+00	102.15	24'	12'
WRW # 5	56+00	104.4	41'	18'



SECTION



PROFILE

ROCK WEIR

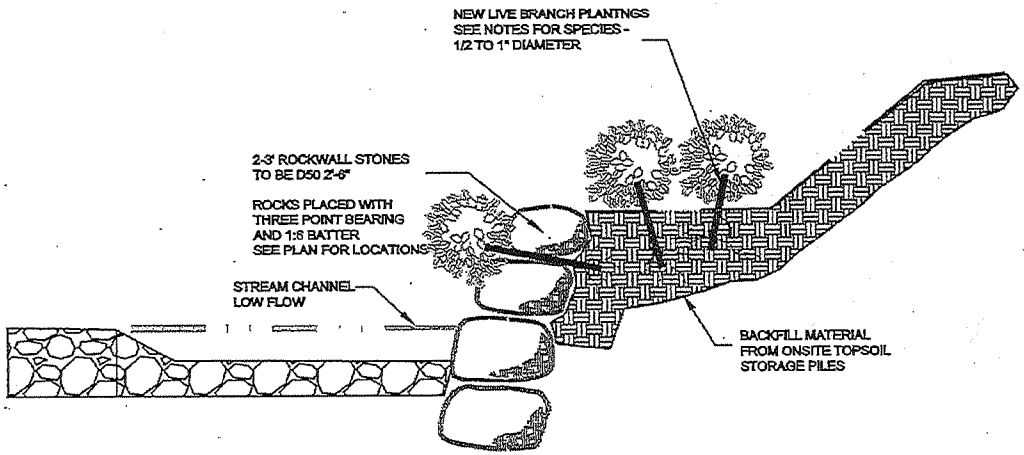
N.T.S.

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN	DRAWING NO.: D-3
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET 16 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

SCHEDULE

STRUCTURE ID	STATION	TO	LOC
BR #1	35+25	36+75	E
BR #2	39+50	41+00	W
BR #3	44+60	45+20	E



BOULDER REVETMENT

N.T.S.

NOTES
1. INSTALL SEDIMENT CONTROL MEASURES AS DIRECTED.
2 INSTALL NEW ROCKWALL BENCHES AS DETAILED AND SHOWN ON THE PLANS.
3 SPREAD STOCKPILED TOPSOIL BEHIND ROCKWALL BENCH AS DETAILED OR DIRECTED BY TOWN.

4. PLANTING LIVE FASCNES

ALL MATERIAL SHALL CONSIST OF MIXTURE OF STREAMCO WILLOW (SALIX PURPUREA) BANKERS WILLOW
SALIX COTTIRTI, PRAIRIE WILLOW (SALIX HUMILIS), GRAY DOGWOOD (CORNUS RACEMOSES AND/OR RED-OISER DOGWOOD (CORNUS SERVICEA.

A. SPACE BRANCHES 4 FT ON CENTER ALTERNATING ROWS WITH ONE FOOT VERITICAL SEPARATION.

B, LIVE BRANCHES TO BE TO ½" TO 1" DIAMETER 4 TO 6 FT LENGTH. TOPS OF LIVE BRANCHES TO PROTRUDE MINIMUM 6" BEYOND FACE OF WALL.

C, BACKFILL BEHIND WALL HAND TAMPED IN 6 IN LIFTS.

D. CUTTING SHALL BE PLACED ON THE BACKFILL AND COVER WITH MINIMUM OF 3" OF CLEAN FILL BETWEEN LAYER AND ROCK.

F. ALL PLANT MATERIAL SHALL BE INSTALLED WITHIN 8 (EIGHT) HOURS OF CUTTING UNLESS PROVISIONS FOR PROPER STORAGE IS MADE.

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

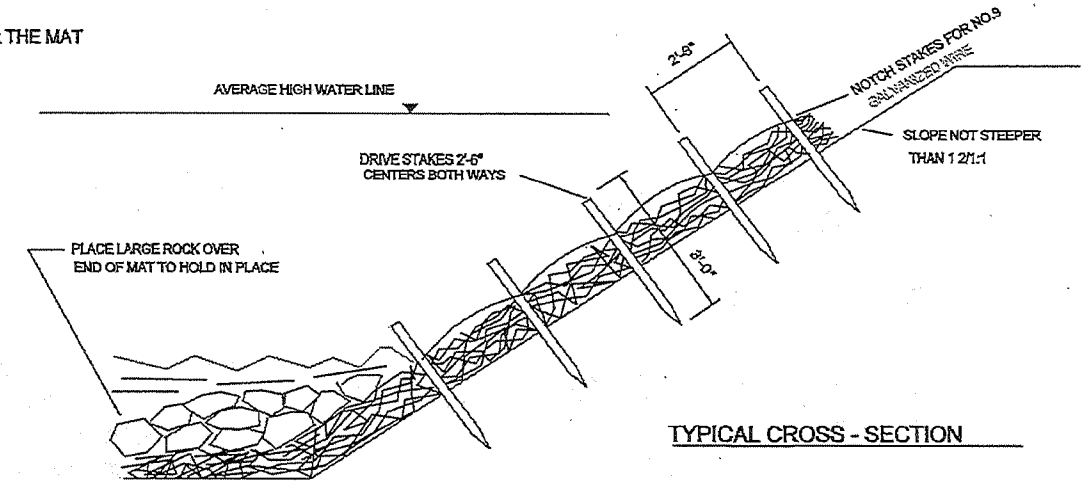
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-4
SHEET 17 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

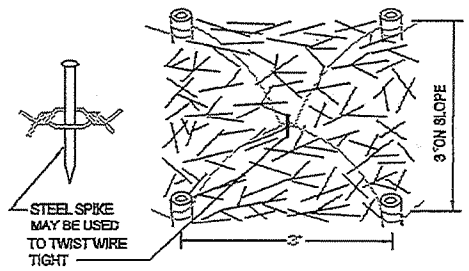
USACE FILE: NAN-2014-00305-ESW

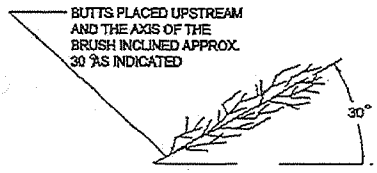
CONSTRUCTION SPECIFICATIONS

1. PREPARE SLOPE SURFACE BY GRADING TO A UNIFORM, SMOOTH SURFACE.
2. LAY HARDWOOD BRUSH IN AN UPSTREAM DIRECTION BEGINNING AT THE DOWN-STREAM END. THE TOE SHOULD BE ESTABLISHED FIRST.
3. THE BUTT END OF THE BRUSH WILL BE PLACED UPSTREAM AND THE PLANT MATERIALS INCLINED APPROXIMATELY 30 DEGREES.
4. THE UPSTREAM EDGE OF THE MAT WILL BE KEYED INTO THE SLOPE 2 FEET. STAKES WILL BE DRIVEN THROUGHOUT THE MATTING ON 3 FOOT CENTERS EACH WAY BEGINNING ALONG THE TOE OF THE MAT.
5. NO. 9 GALVANIZED WIRE WILL BE ATTACHED TO THE STAKES OVER THE MAT AND TIGHTENED TO SECURE THE MAT.
6. SLOPE AREAS ABOVE THE MAT WILL BE SLOPED AND SEEDED.



TYPICAL CROSS - SECTION



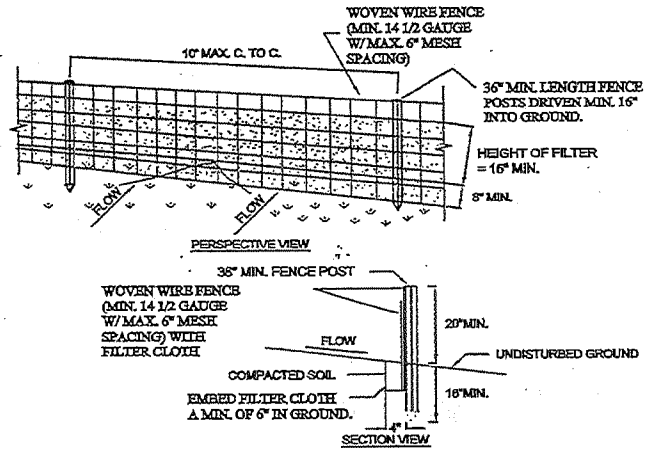


STATION	TO
25+50	26+00 W
28+50	28+95 E
28+50	28+95 W
42+50	42+89 E
44+80	45+25 W

BRUSH MATTING

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-5 SHEET _18_ OF __31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



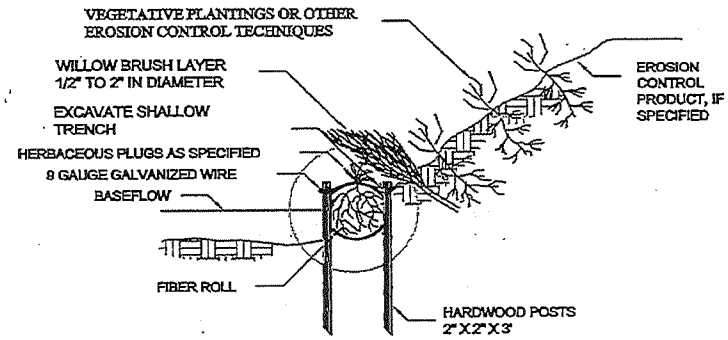
CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

SILT FENCE

FIBER ROLL SCHEDULE

STATION	TO
19+50 EAST	20+65
25+10 WEST	25+60



CROSS SECTION
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. EXCAVATE A SHALLOW TRENCH AT THE TOE OF SLOPE TO SLIGHTLY BELOW BASEFLOW.
2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" x 2" POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IF NECESSARY.
3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR 1/8" DIAMETER BRAIDED NYLON ROPE.
4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

FIBER ROLL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

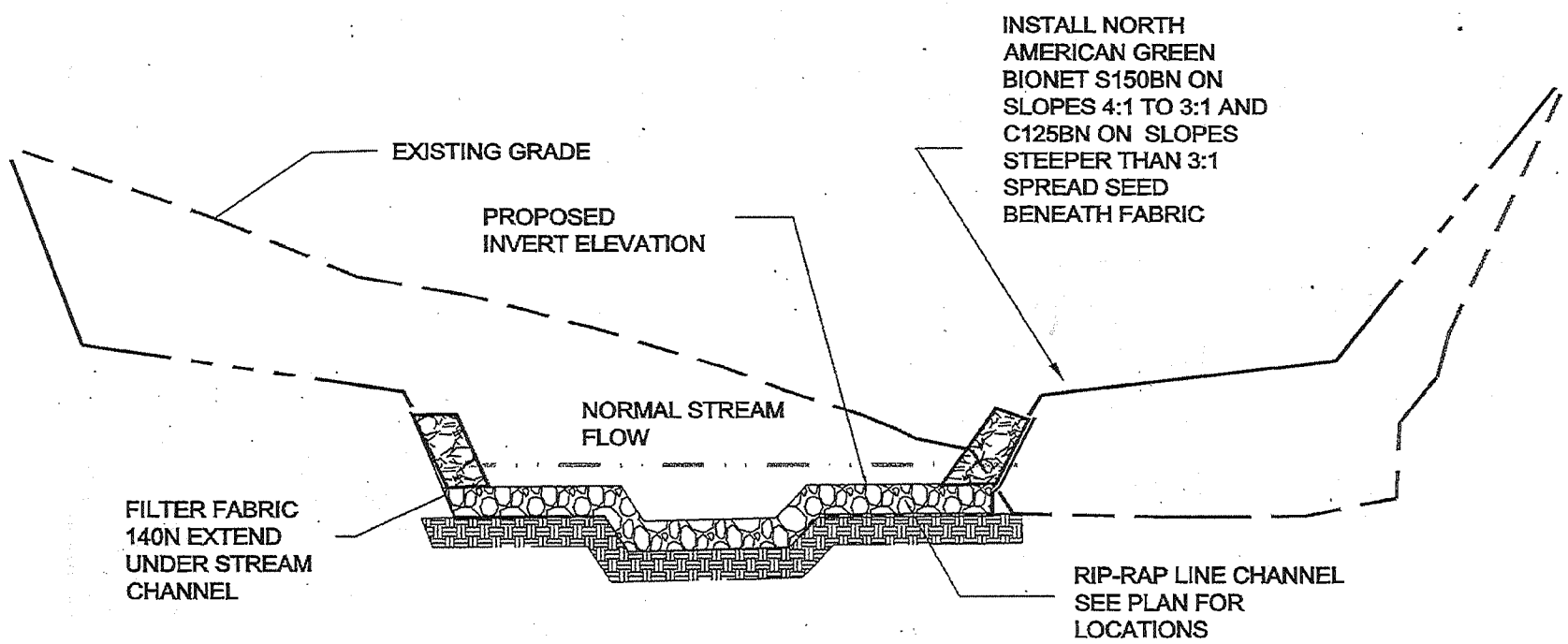
PROJECT NO.:	30--2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-6

SHEET 19 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



ARMORED CHANNEL

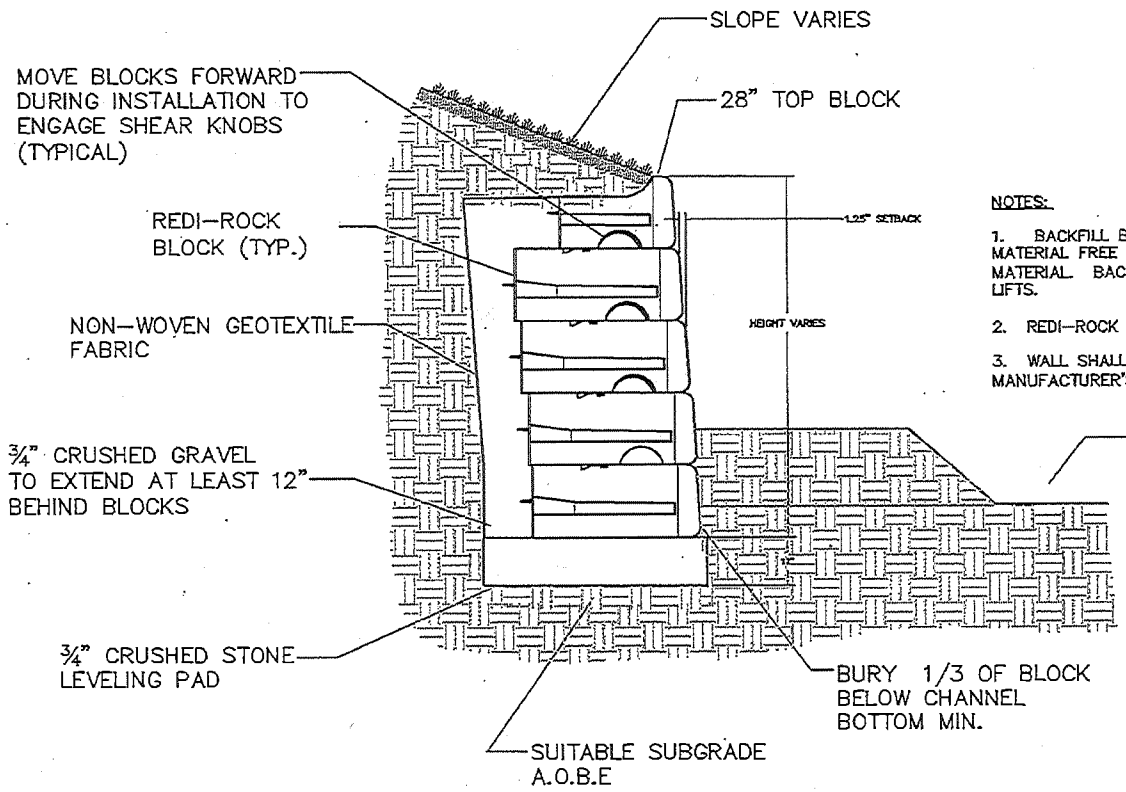
SEE PLAN FOR LOCATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN	DRAWING NO.: D-7
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET _20_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



NOTES:

1. BACKFILL BEHIND WALL SHALL BE SUITABLE FILL MATERIAL FREE FROM LARGE ROCKS, DEBRIS, AND ORGANIC MATERIAL. BACKFILL SHALL BE COMPACTED IN 8" MAXIMUM LIFTS.
2. REDI-ROCK WALL FINISH SHALL BE "LEDGESTONE".
3. WALL SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

SCHEDULE

STATION	TO
9+08	9+54.5 E
9+08	9+54.5 W
9+98	10+47 E
9+98	10+57.5 W
10+75	12+43.5W
18+75	19+87.8 E

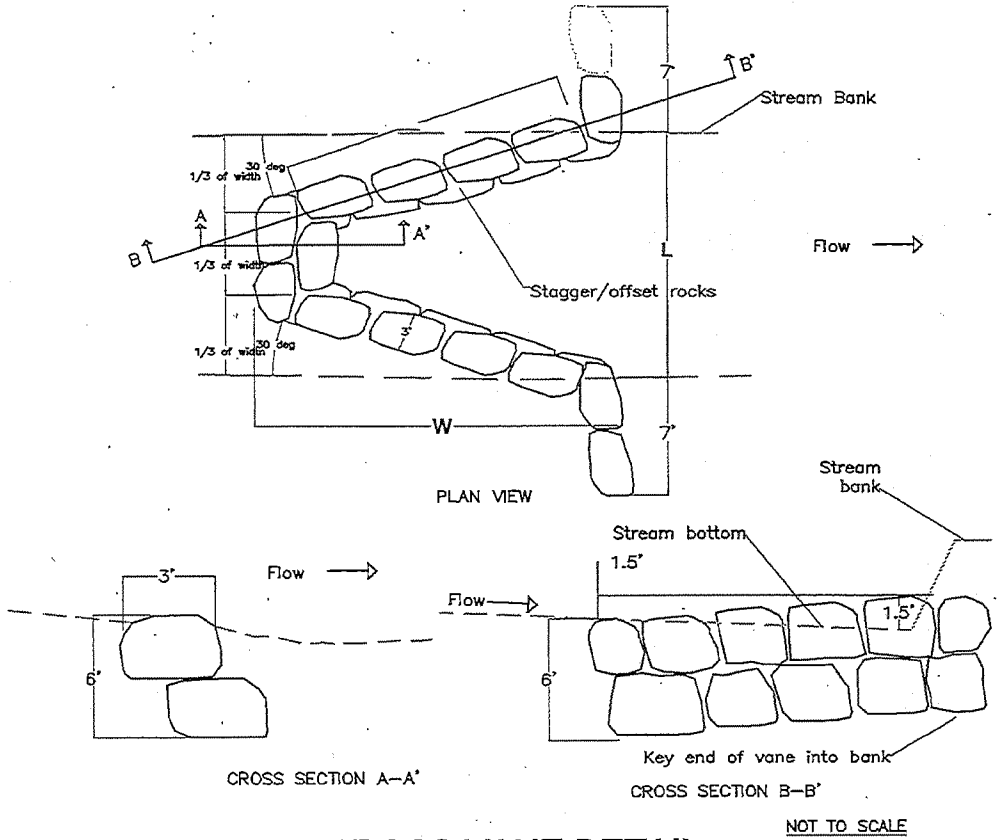
MODULAR RETAINING WALL

N.T.S.

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-8 SHEET _21_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



NOT TO SCALE

CROSS VANE DETAIL

CROSS VANE SCHEDULE

STRUCTURE ID	STATION	ELEVATION	W	L
CV # 1	11+25	97.6	24'	16'
CV # 2	28+15	100.9	24'	16'
CV # 3	38+00	102.6	24'	16'
CV # 4	41+50	102.9	24'	16'
CV # 5	60+00	105.2	44'	20'

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

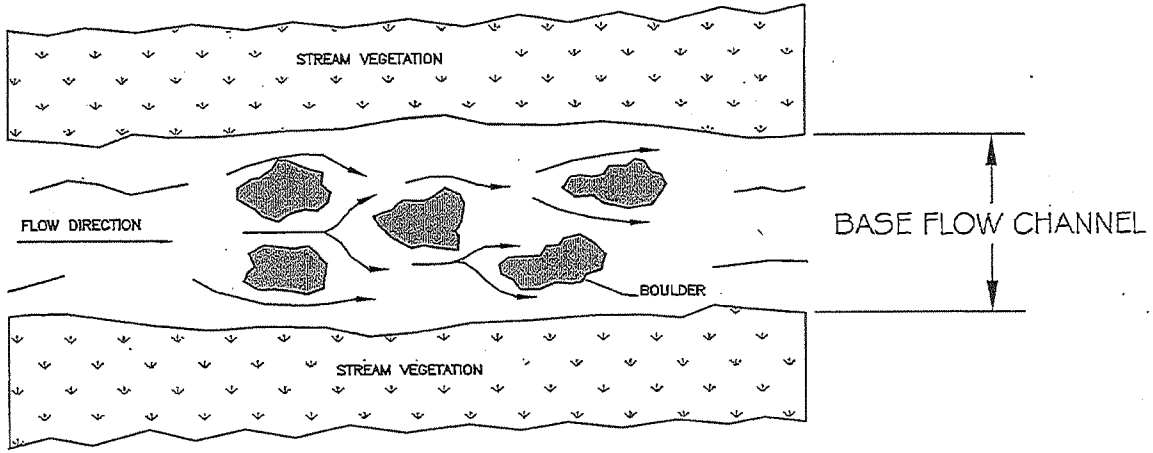
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-9

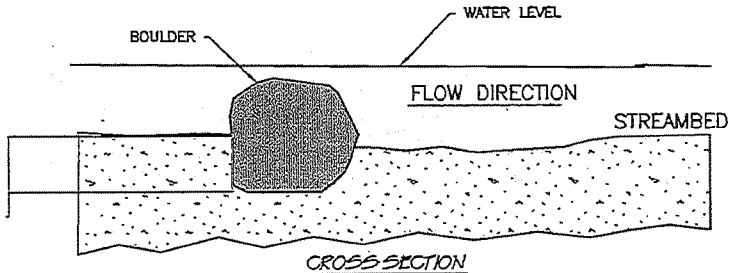
SHEET 32 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PLAN VIEW



CROSS SECTION

SCHEDULE

STATION
14+75
24+65
27+00
32+40
54+80
58+35

- AVERAGE ROCK SIZE- 2.5'-3.5' DIA.-ROCK, SIZE IS SITE DEPENDENT.
- A MINIMUM OF ONE BOULDER PER SET OF BOULDERS SHOULD PROTRUDE FROM WATER SURFACE DURING TIMES OF ORDINARY FLOW TO ACT AS MID-STREAM PERCHING/LOAFING SITES.
- USE BOULDERS WITH IRREGULARITIES OR MULITPLE BOULDERS TOGETHER TO PROVIDE SLIGHT OVERHANGING COVER.
- PLACE BOULDERS SO CURRENT WILL NOT BE DEFLECTED INTO UNPROTECTED STREAM BANKS.

BOULDER CLUSTERS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

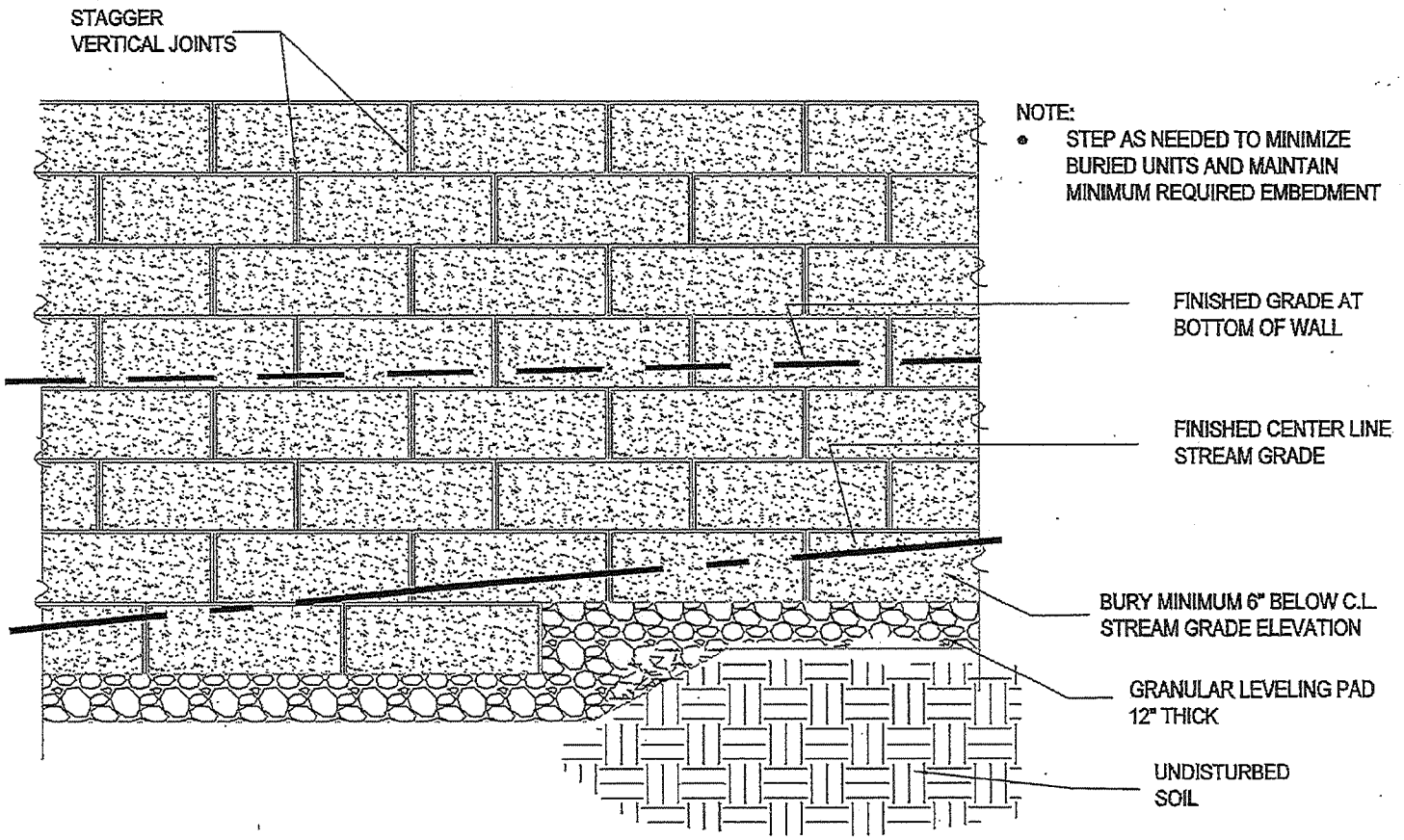
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-10

SHEET 23 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

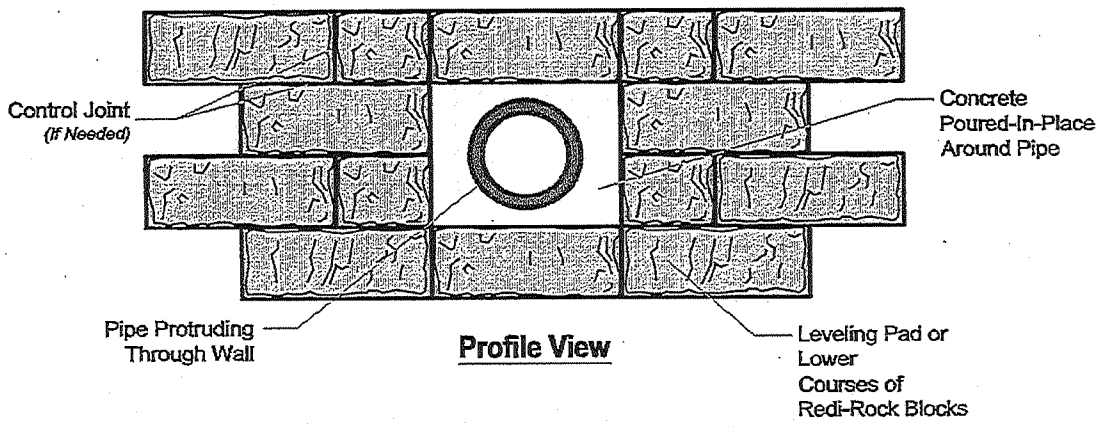
USACE FILE: NAN-2014-00305-ESW



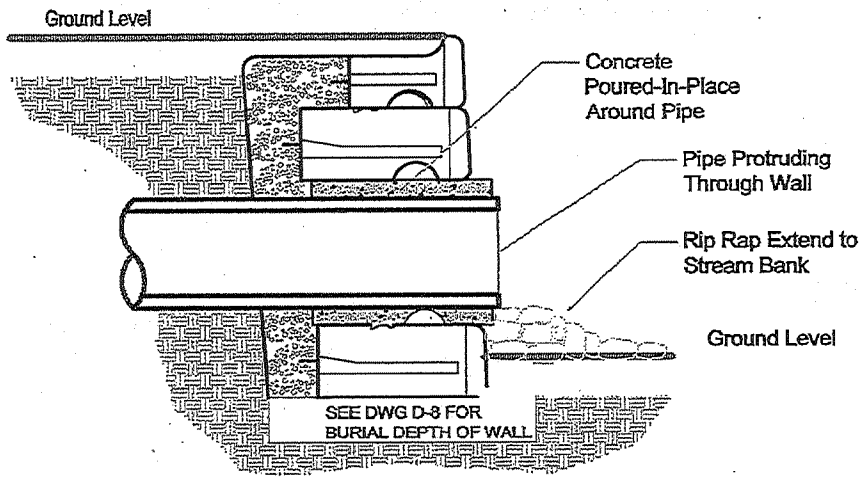
REDI ROCK RETAINING WALL

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL 10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	DETAIL CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-11 SHEET 24 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



Profile View



Section View

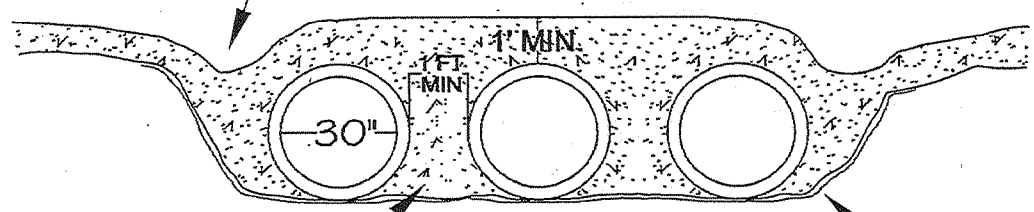
Pipe Through Wall Detail

NTS

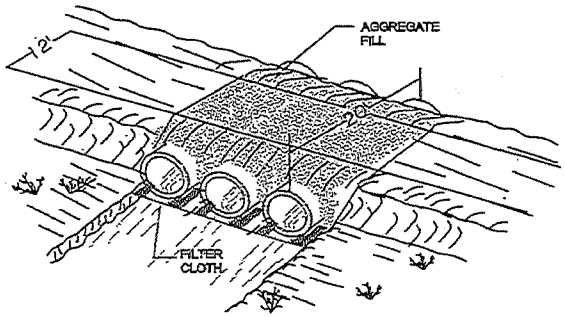
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30–2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-12 SHEET _25_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



INSTALL (3) 30" HDPE PIPES - 20' LENGTH EACH



MULTIPLE PIPES

LOCATIONS

STA 4+25
STA 28+10
STA 32+75

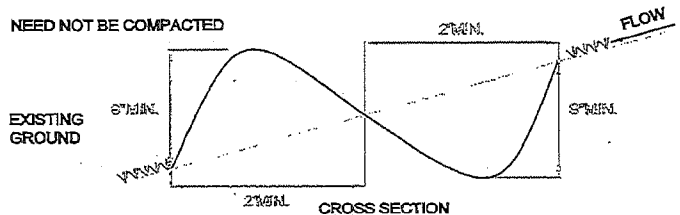
TEMPORARY STREAM CROSSING DETAIL

NOT TO SCALE

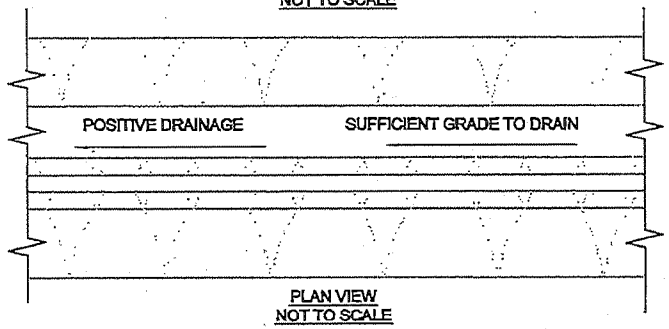
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-13 SHEET 26 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

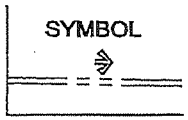
USACE FILE: NAN-2014-00305-ESW



CROSS SECTION
NOT TO SCALE



PLAN VIEW
NOT TO SCALE



CONSTRUCTION SPECIFICATIONS

1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATIONS FOR TEMPORARY SEEDING AND MULCHING, AND SHALL BE DONE WITHIN 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

MAX. DRAINAGE AREA LIMIT: 2 ACRES

PERIMETER DIKE OR SWALE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

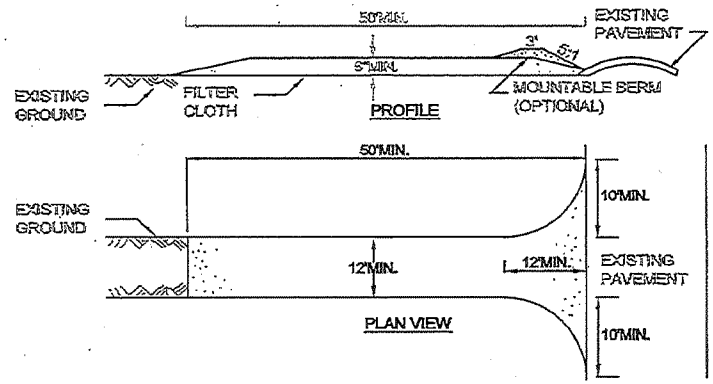
DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-14
SHEET 27 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



SYMBOL

CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – USE 2" CLEAN STONE
2. LENGTH – NOT LESS THAN 50 FEET
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY–FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ENTRANCE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

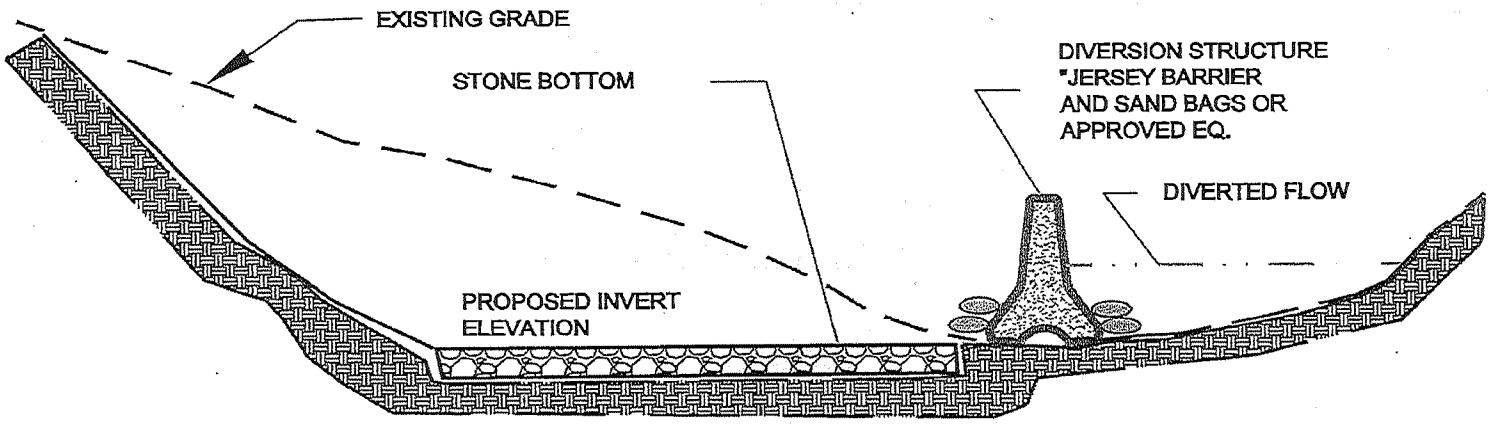
PROJECT NO.:	30–2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-15

SHEET 28 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TYPICAL TEMPORARY CHANNEL DIVERSION

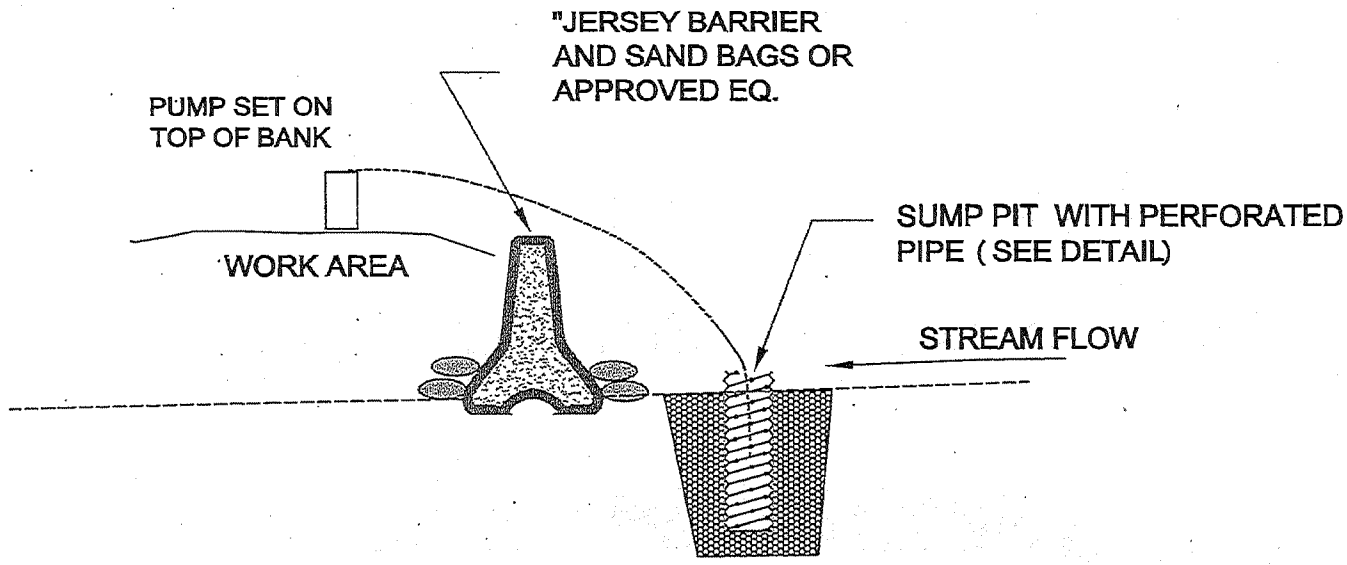
N.T.S.

NOTE
SEE CROSS SECTION DRAWINGS
FOR STREAM CONFIGURATION
AND LOCATION OF NORMAL LOW
FLOW CHANNEL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-16 SHEET 29 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



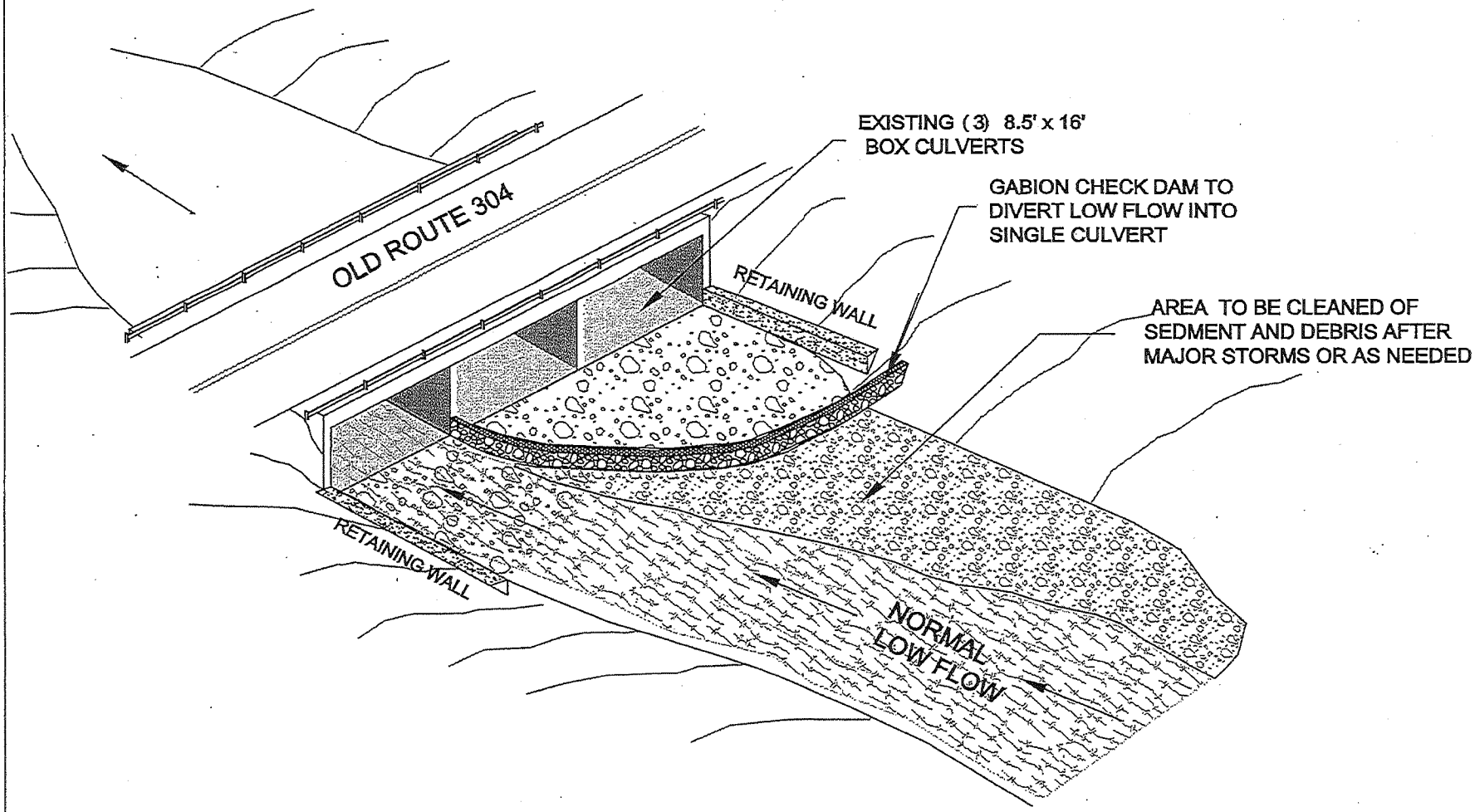
TEMPORARY COFFER DAM

N.T.S

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWING NO.: D-17 SHEET _30_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	GABION WEIR AT BOX CULVERT	PROJECT NO.: 30–2005 DATE: 05/14/15 SCALE: NONE DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-18 SHEET _31_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

New York State
Department of Environmental Conservation

NOTICE

The Department of Environmental Conservation (DEC) has issued permit(s) pursuant to the Environmental Conservation Law for work being conducted at this site. For further information regarding the nature and extent of work approved and any Department conditions on it, contact the DEC at 845/256-3054. Please refer to the permit number shown when contacting the DEC.

Permittee: (T) Clarkstown Permit No. 3- 3920-00297/00010,11

Effective Date: 7/20/2016 Expiration date: 12/31/2020

☐ Applicable if checked. No instream work allowed between October 1 & April 30

NOTE: This notice is **NOT** a permit.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 3
21 South Putt Corners Road, New Paltz, NY 12561-1620
P: (845) 256-3054 I F: (845) 255-4659
www.dec.ny.gov

IMPORTANT NOTICE TO ALL PERMITTEES

The permit you requested is enclosed. Please read it carefully and note the conditions that are included in it. The permit is valid for only that activity expressly authorized therein; work beyond the scope of the permit may be considered a violation of law and be subject to appropriate enforcement action. Granting of this permit does not relieve the permittee of the responsibility of obtaining any other permission, consent or approval from any other federal, state, or local government which may be required.

Please note the expiration date of the permit. Applications for permit renewal should be made well in advance of the expiration date (minimum of 30 days) and submitted to the Regional Permit Administrator at the above address. For SPDES, Solid Waste and Hazardous Waste Permits, renewals must be made at least 180 days prior to the expiration date.

The DEC permit number & program ID number noted on page 1 under "Permit Authorization" of the permit are important and should be retained for your records. These numbers should be referenced on all correspondence related to the permit, and on any future applications for permits associated with this facility/project area.

If a permit notice sign is enclosed, you must post it at the work site with appropriate weather protection, as well as a copy of the permit per General Condition 1.

If the permit is associated with a project that will entail construction of new water pollution control facilities or modifications to existing facilities, plan approval for the system design will be required from the appropriate Department's regional Division of Water or delegated local Health Department, as specified in the State Pollutant Discharge Elimination System (SPDES) permit.

If you have any questions on the extent of work authorized or your obligations under the permit, please contact the staff person indicated below or the Division of Environmental Permits at the above address.

Joseph A Murray
Division of Environmental Permits, Region 3
Telephone (845) 256-3040

☐ Applicable only if checked. Please note all work authorized under this permit is prohibited during trout spawning season commencing October 1 and ending April 30.

☑ Applicable only if checked for STORMWATER SPDES INFORMATION: We have determined that your project requires coverage under the General Stormwater SPDES Permit. You must file a Notice of Intent to obtain coverage under the General Permit. This form can be downloaded at: http://www.dec.ny.gov/chemical/43133.html

☑ Applicable only if checked - MS4 Areas: This site is within an MS4 area (Municipal Separate Storm Sewer System), therefore the SWPPP must be reviewed and accepted by the municipality. The MS-4 Acceptance Form must be submitted in addition to the Notice of Intent.

Send the completed form(s) to: NYS DEC, Stormwater Permitting, Division of Water, 625 Broadway, Albany, New York 12233-3505; in addition, DEC requests that you provide one electronic copy of the approved SWPPP directly to NYS DEC, 100 Hillside Avenue - Suite 1W, White Plains, NY 10603-2860.

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

September 27, 2016

Kerry Holton, President
Delaware Nation
P.O. Box 825
Anadarko, OK 73005

Re: Update related to Section 106 Compliance for Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, NY – New York Rising Community Reconstruction Program

Dear Chief Chet Brooks:

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). GOSR is the entity responsible for compliance with the HUD environmental review procedures set forth in 24 CFR Part 58. GOSR is acting on behalf of HUD in providing the enclosed project information and inviting this discussion with your Tribe to respond with any concerns or comments.

GOSR processes environmental reviews for projects funded with HUD CDBG-DR on a case-by-case basis. 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.

Update and Request for Comment: GOSR has completed the Phase 1 survey and geomorphological analysis of the area of potential effect. The archeological survey and geomorphological analysis report has been provided to you. GOSR has also submitted the Phase I report to SHPO and no comments have been received from SHPO to date. GOSR respectfully submits for your review the attached documentation for the proposed project(s) described herein. If the Area of Potential Effect 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.

Mrs. Alicia Shultz
Community Developer - Environmental Services
New York State Homes & Community Renewal
38-40 State St.,408N, Hampton Plaza
Albany, NY 12207

Sincerely,

Alicia Shultz
Community Developer – Environmental Services
New York State Homes and Community Renewal

Enclosures: Phase I Archeology Report

Electronic letter sent to:
Nekole Alligood, Cultural Preservation Director
Delaware Nation
P.O. Box 825
Anadarko, OK 73005

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS

NY Rising Community Reconstruction Program

Phase I
Archaeological and Geomorphological Survey

Town of Clarkstown
Rockland County
New York 12304

TECTONIC
Practical Solutions, Exceptional Service

Prepared for: **Governor's Office of Storm Recovery**

[illegible]-[illegible]0 State Street, [illegible]0[illegible]N Hampton Pla[illegible]a
[illegible]lbany, New York 1[illegible]0[illegible]

Prepared by: **Tectonic Engineering & Surveying Consultants P.C.**

[illegible]0 Pleasant Hill Road
Mountainville , New York 10[illegible]

September [illegible]01[illegible]
Job No. [illegible]

Governor's Office of Storm Recovery
New York State Homes & Community Renewal
38-40 State Street, 408N Hampton Plaza
Albany, New York 12207

Attn: Alicia Shultz
Via email (Alicia.Shultz@nyshcr.org)

September 26, 2016

RE: WO 7363.23
PHASE I ARCHAEOLGICAL AND GEOMORPHOLOGICAL SURVEY FOR
CLARKSTOWN DRAINAGE IMPROVEMENTS
NY RISING COMMUNITY RECONSTRUCTION PROGRAM
TOWN OF CLARKSTOWN,
ROCKLAND COUNTY, NEW YORK

Dear Ms. Shultz,

Tectonic Engineering & Surveying's (Tectonic) subcontractor, Christine Davis Consultants, Inc. (CDC), has completed a Phase I Archaeological and Geomorphological Survey for the above referenced site. As part of the environmental review process, the New York SHPO required a cultural resource survey of the subject property. This report presents the findings of a Phase I Archeological Survey conducted on behalf of the Town of Clarkstown (Subrecipient) for the Cranford Drive Drainage Improvements Project in the Town of Clarkstown, Rockland County, New York. The Governor's Office of Storm Recovery (GOSR), operating under auspices of New York State Homes and Community Renewal's Housing Trust Fund Corporation, is the Responsible Entity for direct administration of the U.S. Dept. of Housing & Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) funds. The Project is part of the New York Rising Community Reconstruction Program and is receiving funding for a stormwater management improvement project involving the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

The Phase I Archaeological and Geomorphological Survey included archival research, a reconnaissance survey, and Phase I archaeological and geomorphological subsurface testing in order to evaluate the subject properties potential to contain significant cultural resources. No significant cultural resources were identified during the Phase I survey. No further archaeological work is recommended for the Clarkstown Drainage Improvements project. The final reports have been submitted for agency review. This work was performed in accordance with Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* and the *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New*

York State published by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) in 2005.

Attached please find the following documentation:

1.) Combined Phase IA/1B Archaeological Survey Report for the Clarkstown Drainage Improvements project

2.) Geomorphological Survey for the Clarkstown Drainage Improvements project

Feel free to contact the undersigned if you have any questions.

Sincerely,
TECTONIC ENGINEERING AND SURVEYING CONSULTANTS P.C.

Peter T. Sutherland

Peter T. Sutherland, P.E., L.E.P., C.P.G.
Vice President Environmental Services

PHASE I ARCHAEOLOGICAL AND GEOMORPHOLOGICAL SURVEYS

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS TOWN OF CLARKSTOWN, ROCKLAND COUNTY, NEW YORK

16PR05212

A Cultural Resource Management Report Prepared for:

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

September 2016

CHRISTINE DAVIS CONSULTANTS, INC.
560 Penn Street, Verona, Pennsylvania 15147
Phone: 412/826-0443 Fax: 412/826-0458

PHASE I ARCHAEOLOGICAL AND GEOMORPHOLOGICAL SURVEYS

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS
TOWN OF CLARKSTOWN,
ROCKLAND COUNTY, NEW YORK

16PR05212

BY:

CHRISTINE E. DAVIS
Principal Investigator

For final submission to:

New York State Office of Parks, Recreation and Historic Preservation
P.O. Box 189, Waterford, New York 12188-0189

ABSTRACT

Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering & Surveying Consultants P.C. to conduct a Phase I Archaeological and Geomorphological Survey for the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York. The agency for this project is the Governor's Office of Storm Recovery (GOSR).

The area of potential effect (APE) involves of approximately 3,666 linear feet (ft) (1,117 linear meters (m)) with a right-of-way (ROW) width of 100 ft or approximately 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)). It is topographically situated within a floodplain/terrace and lower hillslope environment setting associated with Demarest Kill and its unnamed tributary streams within the Piedmont Lowlands section of the Piedmont physiographic province.

The Phase I field survey was conducted in summer of 2016. Phase I field methodology included surface surveillance and the hand excavation of shovel tests (STs). A portion of the APE, involving approximately 19,031 sq m (204,845 sq ft or 4.7 ac), was not tested due to the presence of slopes greater than 15 percent and disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond. The total tested area within the APE measured approximately 29,155 sq m (313,821 sq ft or 7.2 ac). A total of 134 STs at 15 m intervals were excavated during the Phase I Survey. A total of 134 STs were negative. Based on the results of the Phase I Survey no cultural resources were recorded.

Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Canford Drive Drainage Improvements project.

MANAGEMENT SUMMARY

State Historic Preservation Office (SHPO) Project Review Number: 16PR05212

Agency:
Governor's Office of Storm Recovery (GOSR)

Phase of Survey:
Phase I Archaeological and Geomorphological Surveys

Location Information:

Location:	Brownswell Corner
Minor Civil Division:	Town of Clarkstown
County:	Rockland

Survey Area:

Length:	1,117 m (3,666 ft)
Width:	50 m (100 ft)
Depth:	n/a
# of Acres Surveyed:	48,186 sq m (518,666 sq ft or 11.9 ac)

USGS 7.5 Minute Quadrangle Map:
Haverstraw, NY 2016
Thiells, NY 2016

Archaeological Survey Overview:

Number and Interval of Shovel Tests:	134 tests at 15 m (50 ft) intervals
Number and Size of Units:	n/a
Width of Plowed Strips:	n/a
Surface Survey Transect Interval:	n/a

Results of Archaeological Survey:

Number and Name of Prehistoric Sites Identified:	0
Number and Name of Historic Sites Identified:	0
Number and Name of Sites Recommended for Phase II/Avoidance:	0

Results of Architectural Survey:

Number of Buildings/ Structures/ Cemeteries within Project Area:	n/a
Number of Buildings/ Structures/ Cemeteries Adjacent to Project Area:	n/a
Number of Previously Determined NR Listed or Eligible Buildings/ Structures/Cemeteries/ Districts:	n/a
Number of Identified Eligible Buildings/ Structures/ Cemeteries/ Districts:	n/a

Report Authors
Christine E. Davis

Date of Report
September 2016

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 PROPOSED UNDERTAKING 1
1.2 AREA OF POTENTIAL EFFECT (APE) 4
1.3 DISPOSITION OF MATERIALS 4
1.4 AGENCY COORDINATION 4

2.0 ENVIRONMENTAL BACKGROUND 8

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY 8
2.2 CLIMATE 8

3.0 BACKGROUND RESEARCH 9

3.1 CULTURAL PREHISTORIC OVERVIEW 9
3.2 OVERVIEW OF ROCKLAND COUNTY AND THE TOWN OF CLARKSTOWN 11
3.3 SOILS 11

4.0 SENSITIVITY ASSESSMENT 13

5.0 DISTURBANCE 14

6.0 TESTING RECOMMENDATIONS 17

6.1 GEOMORPHOLOGICAL SURVEY RESULTS 17

7.0 PHASE I FIELD SURVEY 18

7.1 FIELD METHODOLOGY 18
7.2 FIELD SURVEY RESULTS 18

8.0 SUMMARY 23

8.1 CONCLUSIONS 23

9.0 REFERENCES 24

APPENDICES:

I AGENCY COORESPONDENCE
II GEOMORPHOLOGICAL REPORT
III SHOVEL TEST RECORDS

FIGURES

1 GENERAL PROJECT LOCATION, NEW YORK TRANSPORTATION MAP 2

2 ARCHAEOLOGICAL AREA OF POTENTIAL EFFECT (APE), HAVERSTRAW AND THIELLS, NY 7.5' USGS MAP 3

3 APE, PROJECT MAPPING 5

4 APE INDICATING TESTED, WET, AND DISTURBED, PROJECT MAPPING 16

5 AREA A 22

PHOTOGRAPHS

1 APE, LOOKING NORTHEAST 6

2 APE, LOOKING NORTHEAST 6

3 APE, LOOKING SOUTHEAST 7

4 EROSION CONTROL AREAS INCLUDED THE USE OF LARGE STONES ALONG THE FLOODPLAIN AND TERRACES, LOOKING SOUTHEAST 14

5 EROSION CONTROL AREAS INCLUDED THE USE OF LARGE STONES ALONG THE FLOODPLAIN AND TERRACES, LOOKING WEST 14

6 MAN-MADE RETENTION POND, LOOKING SOUTHWEST 15

7 ARTIFICIALLY CONSTRUCTED DRAINAGE, LOOKING WEST 15

8 AREA A, LOOKING SOUTH 19

9 AREA A, LOOKING SOUTH 19

10 AREA A, LOOKING NORTHEAST 20

11 AREA A, LOOKING NORTHEAST 20

TABLES

1 PREVIOUSLY RECORDED HISTORIC PROPERTIES WITHIN A ONE-MILE RADIUS 13

1.0 INTRODUCTION

Historic and cultural resources are protected under Federal law through Section 106 of the National Historic Preservation Act of 1966, as amended, and implementing regulation 36 CFR 800 as revised in January of 2001; the Archaeological and Historic Preservation Act of 1974; Section 101(b)(4) of the National Environmental Policy Act of 1969; Executive Orders 11593 and 12362; 18 CFR Part 380.14; 23 CFR 771, as amended, August 28, 1987; 36 CFR 60; the guidelines developed by the Advisory Council on Historic Preservation (ACHP) published November, 26, 1980; and the amended procedures for the Protection of Historic and Cultural Properties, as set forth in 36 CFR 800.

The regulations developed under Section 106 of the National Historic Preservation Act require that prior to approval of federal funding, agencies should consider the impact of a project on any district, site, building, structure, or object that is included on, or eligible for inclusion on, the National Register of Historic Places (NRHP), and the ACHP must be given an opportunity to comment on such an undertaking. The Historic and Archeological Data Preservation Act directs Federal agencies to preserve historic and archeological data that would otherwise be lost as a result of a Federal action. A project is considered to have an adverse effect on such sensitive resources if it changes the quality of cultural characteristics that render them eligible for listing on the NRHP.

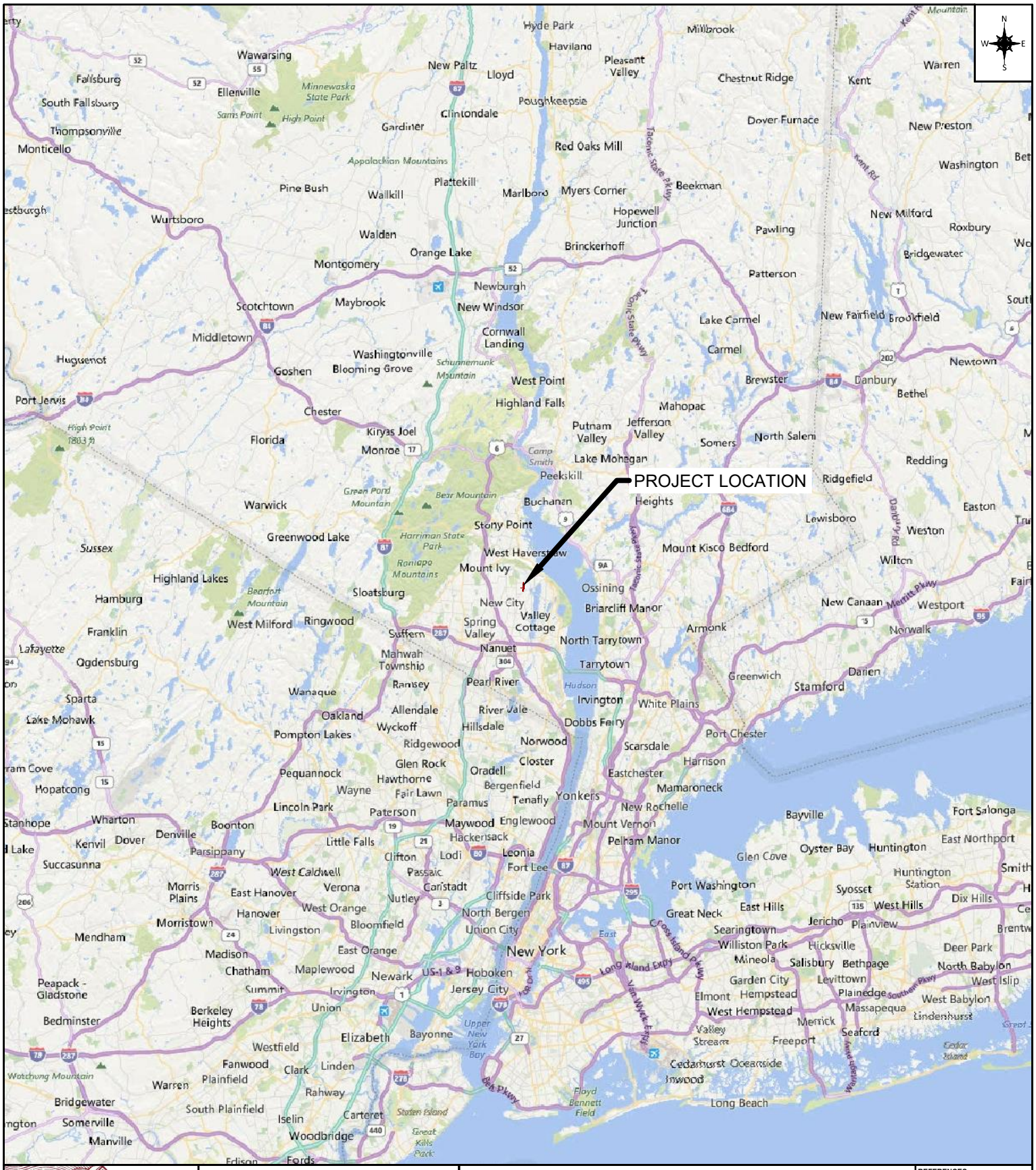
Historic properties of national, state and local significance may be nominated to the NRHP following an evaluation in accordance with an established set of criteria. The evaluation process is conducted at the state level by the New York State Historic Preservation Officer (SHPO) and at the federal level by the NRHP staff of the Department of the Interior. The National Park Service administers the National Register and has established four criteria for the evaluation of the potential significance of historic and archeological properties. These criteria are described in Title 36, Part 60 of the Code of Federal Regulations and are summarized as follows:

- Criterion A: A property is associated with historically significant events that have made a significant contribution to the broad patterns of our history. To meet this criterion, a historic property needs to have existed at the time of the important event and be associated in a significant way with the event.
- Criterion B: A property is associated with the lives of persons significant in our past.
- Criterion C: A property that embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D: A property that has yielded, or may be likely to yield, information important in prehistory or history.

Archaeological studies are completed under Section 106 of the National Historic Preservation Act of 1966 as amended; the National Environmental Policy Act of 1969; the Archaeological and Historic Preservation Act of 1974; and the regulations of the ACHP 36 CFR 63 and 36 CFR 800. This technical scope of work was developed in accordance with the *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State* published by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) in 2005.

1.1 PROPOSED UNDERTAKING

Christine Davis Consultants, Inc. (*CDC*) was retained by Tectonic Engineering & Surveying Consultants P.C. to conduct a Phase I Archaeological and Geomorphological Survey for the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York (Figures 1 and 2). The proposed drainage improvements are located north of the town of New City and west of De Forest Lake primarily between Cranford Drive and Cypress Street.



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

0 — 1 INCH = 10 MILES — 20 MILES

REFERENCES:
NAVTEQ - 2010
Road Map

Project Location
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 1

Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDaviesConsultants.com
412-826-0443

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

REFERENCES:

TECTONIC
Erosion Control Plan 5-30-13

USGS 7.5 MINUTE QUADRANGLES
HAVERSTRAW, NY 2016
THIELLS, NY 2016

Area of Potential Effect
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 2

The Clarkstown Cranford Drive Drainage Improvements project is part of the New York Rising Community Reconstruction Program and is receiving funding for a stormwater management improvement project involving the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

1.2 AREA OF POTENTIAL EFFECT (APE)

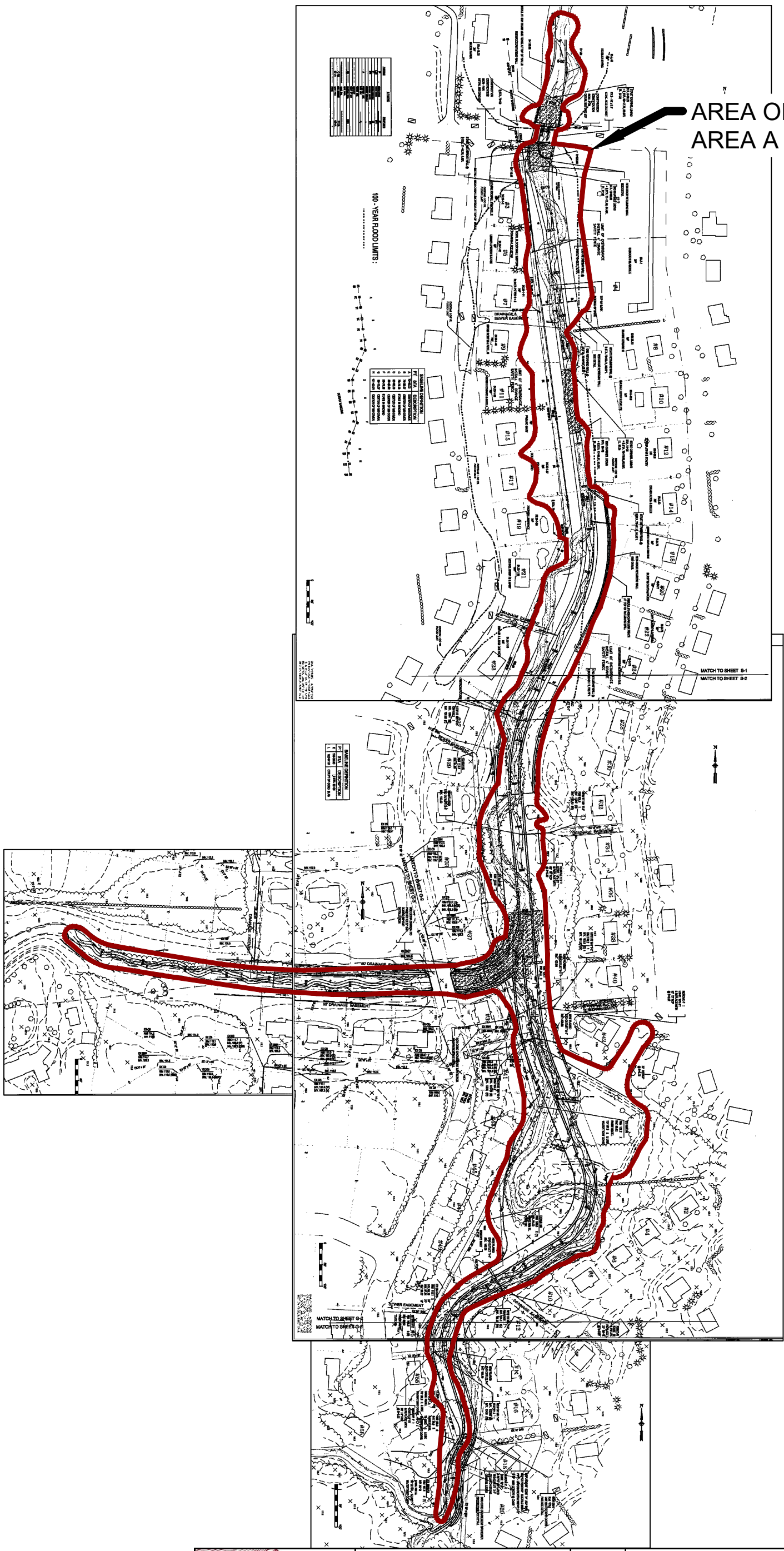
The area of potential effect (APE) consists 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)) topographically situated in a floodplain/terrace and lower hillslope environment associated with Demarest Kill and its unnamed tributary streams (Figure 3). The APE is characterized by deciduous hardwoods interspersed with herb/shrub communities. The APE is generally located west of the Hudson River and north of New City, New York between S.R. 304 and Old Route 304 within Clarkstown (Photos 1 to 3).

1.3 DISPOSITION OF MATERIALS

CDC will supply copies of this document to Tectonic Engineering & Surveying Consultants P.C. and the OPRHP.

1.4 AGENCY COORDINATION

In their response letter, the OPRHP required a Phase I Archaeological Survey to locate potentially significant archaeological resources within areas that will involve ground disturbance and cannot be documented as disturbed (Appendix I).



APE / AREA A

N
W E
S

0 1 CM = 30 METERS 120 METERS

Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

Project Mapping
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

REFERENCES:

TECTONIC
Erosion Control Plan 5-30-13

USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 3

Photo 1: APE, looking northeast

Photo 2: APE, looking northeast

Photo 3: APE, looking southeast

2.0 ENVIRONMENTAL BACKGROUND

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY

The bedrock of Rockland County is composed of sedimentary rock formations of Upper Triassic age such as the Newark group (USGS 2016). The arkose, mudstone, shale, and sandstone of the Brunswick Formation have been greatly altered by the advance and retreat of continental ice sheets of the late Pleistocene Epoch. The retreat of the glaciers of this period has resulted in the deposition of glacial till over the ground surface of the region (NYSM 2016; USFWS 2016).

The Phase IA study area is situated in the Triassic Lowland section of the Northern Piedmont physiographic province. This section is characterized by broad, gently sloping valleys with a moderate pattern of ridges (USDA 1990). Elevations in the vicinity of the APE range from approximately 80 to 150 ft above mean sea level (amsl).

2.2 CLIMATE

Climatic conditions in Rockland County include cold and snowy winters and warm to hot summers. Precipitation is adequate and well distributed. The average winter temperature for most of the county is 28 degrees Fahrenheit (F) (-2.2 degrees Celsius (C)). The average summer temperature is 70 degrees F (21.1 degrees C). The total annual precipitation is 119.4 centimeters (cm) (47 inches (in)) of which approximately 50 percent falls from April through September. Prevailing winds are out of the south (USDA 1990).

3.0 BACKGROUND RESEARCH

The sequence of archival maps, aerial photographs, and other basic historical research relating specifically to the project area was evaluated. Background research for this project was conducted using information from CDC's library, the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) Cultural Resource Information System (CRIS), and other online resources. Important archival maps included the County Atlas of Rockland from 1875 (Beers 1875) along with archival USGS Tarrytown, NY maps from 1892 and 1902 provided information about land-use at the turn of the twentieth century. The Gazetteer of the State of New York along with a volume of Rockland County History were valuable additions to the research conducted (French 1860; Green 1886).

3.1 CULTURAL PREHISTORIC OVERVIEW

An examination of the cultural prehistory of the project area provides relevant background data for characterizing and predicting the area's prehistoric settlement system. This data contributes to the ability of archaeologists to identify and establish the probability of archaeological sites in a specific area.

The **Paleoindian** occupation originated between 9500 and 9000 B.C. and marked the first undisputed evidence of man's entry into the northeast. However, based on radiocarbon dates from Meadowcroft Rock Shelter near Avella in Washington County, Pennsylvania it can be suggested that a pre-Paleoindian occupation employing polyhedral-core and blade-based lithic technology may have been present as early as 14000 B.C. (Adovasio 1993:207). Paleoindian fluted projectile lanceolates, distinguished by elongated channel scars, are sometimes found in association with extinct Pleistocene megafauna such as mammoth and mastodon. The geographical distribution of these distinctive points and other tool forms from this period includes most of the New World (Ritchie 1980).

The majority of Paleoindian sites in the northeast are recognized by fluted points, keeled unifacial tools, gravers, and blades fabricated from a variety of cherts and jaspers. Site types include kill sites with single projectile points; upland and waterside camps with varied tool kits; trail camps associated with Indian paths and natural trails; and specialized quarry and tool manufacturing sites where raw materials were procured and worked into tools. An average of 72 percent of Paleoindian sites in the northeast are located less than 200 m from second or higher-order streams. These riverine environments would have provided Paleoindian groups with a wide variety of important resources. (Carr 1998; Ritchie 1980)

The **Early Archaic** period (8000-6000 B.C.) roughly correlates with a time of notable environmental changes that began during the Pleistocene with episodes of glacial retreat; however, late Paleoindians lived within essentially the same environment as subsequent Archaic groups. Continuity between the Paleoindian and Early Archaic periods has been recognized, particularly through their subsistence regimes and mobility patterns. By the Early Archaic, Pleistocene megafauna became extinct and were replaced by modern species such as caribou and elk. Evidence for resource availability is poorly known, but it is believed that Early Archaic cultures were generalized hunters and gatherers living in small ephemeral sites located in a diversity of geographical settings. The Paleoindian preference for floodplain settings was replaced with an increase in upland site locations. The Early Archaic period is recognized by classic projectile tool types such as Kirk, Palmer, Big Sandy, and Thebes found at a relatively small number of localities. Continuity with Paleoindian populations can be suggested by Early Archaic tool attributes such as basal grinding (Ritchie 1980).

Bifurcated points mark the end of the Early Archaic period and the gradual emergence of the **Middle Archaic** cultures. By the Middle Archaic period (6500-3000 B.C.), some archaeologists suggest that a major economic shift toward increased specialization in hunting and gathering resources had

occurred perhaps in response to continued Early Holocene environmental changes. Human populations responded to these climatic fluctuations either by abandoning traditional exploitative strategies in one zone and continuing them in another or by exploiting new resources. The adaptive responses in place during the Middle Archaic period were coupled with a significant increase in population. Population increase also may be correlated with the trend toward territoriality and more sedentary lifeways as observed in the subsequent Late Archaic period (Ritchie 1980; Stewart 1989).

Hallmarks for the **Late Archaic** period include an emerging widespread interaction sphere in which objects such as copper, marine shell and chert were traded vis a vis long distance networks. Woodworking, weaving and hideworking tools are evident on larger base camps and settlement camps where ceremonial and domestic activities were likely to have occurred. Base camps were located on major rivers and may have at least partially functioned to take advantage of riverine links with cultures outside of the river valleys for the purpose of trade, group hunting activities, ceremonies, and/or the exchange of ritual and marriage partners. Specialized subsistence practices such as the collection of mussel shell and hickory nuts as well as an increased use of fish and avian resources seem to have intensified during the Late Archaic, although data for an increase in subsistence diversity is difficult to assess because of the scarcity of archaeological findings for this period. A diversity of topographic situations in the uplands and major riverine areas were utilized during the Late Archaic.

The **Early Woodland** period (1000 B.C.-100 B.C.) is characterized by a shift to ceramic production, the introduction of cultivated plants, and a more sedentary settlement system. However, data from some Early Woodland sites suggest a persistence of the Archaic hunting, gathering and fishing lifeway. The presence of both Early Woodland and Late Archaic artifacts on the same sites suggests a continuation of Late Archaic subsistence and procurement patterns. Preferred habitation locales included major floodplains and terraces where high yields of seed plants and riverine resources could be obtained. Gradually, cultigens such as squash, pumpkin, gourd, and corn were introduced. Of particular importance in the subsistence strategies during the **Middle Woodland** period (100 B.C.-A.D. 900) was the use of aquatic resources. Although deer provided the most significant part of the subsistence system, other components included fish, birds, turtles, and amphibians. Evidence for domesticated plants is not impressive during the Middle Woodland; instead, there seems to have been more of a reliance on a broad spectrum subsistence pattern including the harvesting of wild or quasi-domesticated crops near rich hunting and gathering sites (Ritchie 1980).

The **Late Woodland**/ **Late Prehistoric** period (A.D. 800-1600), subsistence strategies shifted to a reliance on domesticated plants including corn, beans and squash, which were cultivated primarily on the large floodplains and terraces of major rivers. During the Late Woodland period, a climatic episode known as the NeoBoreal brought cool, moist conditions to the general region. The effect of such climatic changes on the growing season for Late Woodland crops is difficult to assess without additional studies and particularly data relating to the significance of cultigens during this period. Continued occupation of upland sites included hunting and gathering stations, winter campsites, small farmsteads and villages. At the time of European Contact, the Munsee-Delaware occupied lands within Rockland County (Ritchie 1980; Salomon 1982:36).

3.2 OVERVIEW OF ROCKLAND COUNTY AND THE TOWN OF CLARKSTOWN

Situated 10 miles north of New York City, the triangular-shaped Rockland County is bound by the Hudson River, Orange County, New York, and the State of New Jersey. The county is watered by the Hackensack River, Ramapo River, and tributaries of the Hudson River, including Minisceongo Creek, Minas Fall Creek, and Spar Kil. The Ramapo Mountains occupy the western third of the county with steep rocky peaks and narrow valleys. Mountains also separate the northern portion of the township from the Hudson River and were an early barrier to the growth and development of the area. Today, the county is made up of 17 villages and five towns: Clarkstown, Haverstraw, Orangetown, Ramapo, and Stony Point.

The first settlers arrived in 1690 and were Dutch. At that time, Rockland County was part of the Kakiat Patent, which was later sold to a group of five men in 1716, one of whom was Daniel De Clark. When his land was sold in 1764, it became known as Clarke's Town. After the original courthouse in Tappan burned in 1774, a more central location was selected for the new courthouse and the area was named New City. Clarkstown was officially established in 1791 from part of Haverstraw to the north and contains the county seat of New City. Rockland County was then established in 1798 from parts of Orange County (Green 1886).

During this time, the area remained rural in spite of its close proximity to New York City. In 1800, the population was 1,806 persons and by 1880 it had only increased to 4,382. The economy focused on fruit growing and milk production, along with the manufacturing of lime, brick, shoes, wooden ware, and woolen yarn (French 1860).

Two early transportation systems impacted the economic growth of the county: the Nyack Turnpike and the New York and Erie Railroad. The Nyack Turnpike was constructed in the 1830s to connect the port at Nyack with the interior village of Suffern at the base of the Ramapo Mountains. The route is located in the south central portion of the county and still exists today as S. R. 0059. The New York and Erie Railroad was constructed between 1832 and 1861 to connect Piermont on the Hudson River to Lake Erie.

By the 1920's, artists, sculptors, composers, actors, and playwrights began moving to the area from New York City. However, it wasn't until the 1950s with the construction of the New York State Thruway from Suffern to Yonkers and the opening of the Tappan Zee Bridge that the population of Rockland County significantly boomed; the population more than doubled between 1950 and 1960 from 15,674 to 33,196 (Casey 2016). The Tappan Zee Bridge carries seven lanes of motor traffic over the Hudson River. Today, the population has burgeoned to 87,059 with the economy focused on professional, scientific, and technical services, retail, and health care (U.S. Census Bureau 2012).

3.3 SOILS

Soils in the project area derived from the Weathersfield-Cheshire-Urban Land association general soil unit. This soil association consists of very deep, nearly level to moderately steep, well drained soils formed on acidic glacial till derived from reddish sandstone on till plains. The soils within the study geomorphology study area are mapped as Cheshire-Urban land complex (CuB), Rippowam sandy loam (Ra), and Yalesville sandy loam (YaB) (USDA 1990; NRCS 2016).

Cheshire-Urban land complex soils consist of very deep, gently sloping, well drained Cheshire soils and areas covered by urban development. These soils are typically formed in glacial till derived from red Triassic sandstone ridges with slopes of 2 to 8 percent. A representative soil profile for Cheshire soils consists of a very dark grayish brown gravelly fine sandy loam A horizon, a reddish brown gravelly fine sandy loam Bw horizon, and a dark reddish brown gravelly sandy loam C horizon.

Rippowam sandy loam consists of very deep, nearly level, and poorly drained soil located on floodplains with slopes of 0 to 3 percent. These soils formed in alluvium mainly derived from granite and sandstone. A representative soil profile for Rippowam sandy loam consists of a very dark grayish brown sandy loam A horizon, a series of dark grayish brown to grayish brown sandy loam Bw horizons, a dark gray and grayish brown fine sandy loam BC horizon, and a dark brown loamy sand C horizon.

Yalesville sandy loam consists of moderately deep, well-drained soil located on uplands with slopes of 0 to 3 percent. These soils formed in glacial till derived from red Triassic sandstone. A representative soil profile for Yalesville sandy loam consists of a dark brown to dark reddish brown sandy loam A horizon, a series of reddish brown to red gravelly loam Bw horizons, and a red extremely channery loam C horizon.

4.0 SENSITIVITY ASSESSMENT

To aid in the prediction of prehistoric and historic archaeological site probability within the APE, a literature search was conducted. The literature search included an examination of the data bases in the New York Office of Parks, Recreation, and Historic Preservation's (OPRHP) Cultural Resource Information System (CRIS).

According to the OPRHP letter (see Appendix I), the APE is considered to be located on an Archaeological Sensitive landform. One archaeological survey project has been conducted within a 1.6 kilometers (km) (1 mi) radius of the the Clarkstown Canford Drive Drainage Improvements. Currently, an Archaeological Sensitivity Assessment for the Buckley Farms Subdivision project (16PR04923) is taking place southwest of the current APE. No other projects were completed in the general area of the APE.

No previously recorded archaeological sites have been documented near the vicinity of the APE or within a 1.6 km (1 mile) radius. Eight previously documented properties over 50 years of age have been documented within a one-mile radius of the APE, including four properties listed on the National Register, two which are considered not eligible, and two which are undetermined (Table 1).

Table 1
Previously Recorded Historic Properties within a One-Mile Radius

Number	Name	Status
90NR02398	Jacob Abramse Blauvelt House, Carriage House, and Barn - 20 Zukor Rd	Listed
07NR05796	Peter DePew House - 101 Old Route 304	Listed
04NR05229	H.R. Stevens House - 234 Congers Rd	Listed
91NR00049	Rockland County Courthouse and Dutch Gardens	Listed
	New City Free Library - 220 North Main St	Not Eligible
	Zachar - 311 Old NY 304	Not Eligible
	Clarkstown North High School - 151 Congers Rd	Undetermined
	Unidentified Federal House - South Mountain Rd	Undetermined

One of the National Register listed historic resources, Peter DePew House (07NR05796), is located adjacent but not within the APE. The Peter DePew House is located northeast of the APE. The property was originally constructed ca. 1750 and consists of three buildings and six structures. The property was listed on the National Register in July of 2008.

5.0 DISTURBANCE

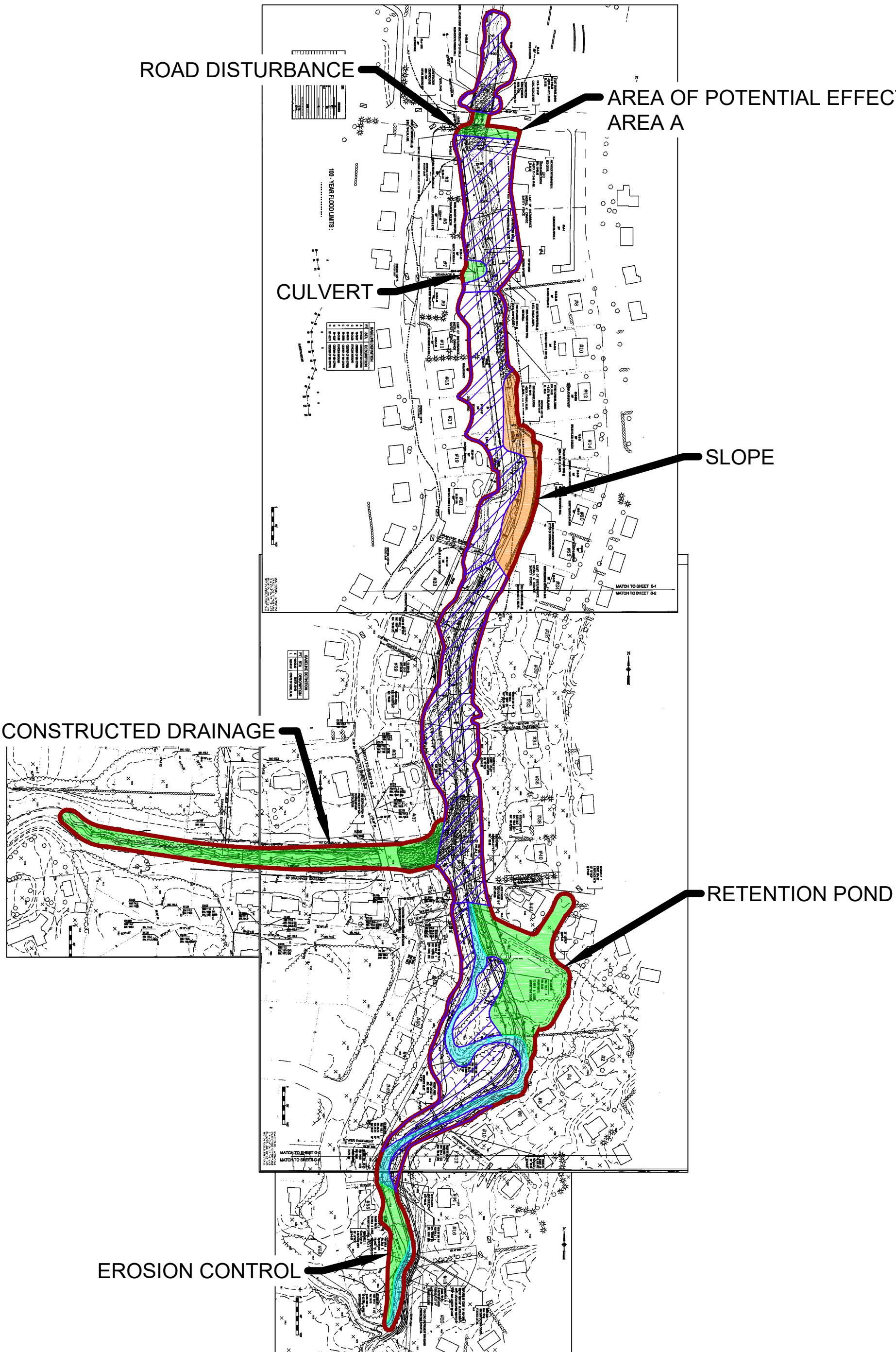
Portions of the APE contained slopes greater than 15 percent and could not be tested. In addition, disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond were noted within the APE (Photos 4 through 7; Figure 4).

Photo 4: Erosion control areas included the use of large stones along the floodplain and terraces, looking southeast

Photo 5: Erosion control areas included the use of large stones along the floodplain and terraces, looking west

Photo 6: Man-made retention pond, looking southwest

Photo 7: Artificially constructed drainage, looking west



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

APE / AREA A
TESTED
WET
STEEP
DISTURBED

N W E S

0 1 CM = 30 METERS 120 METERS

REFERENCES:
TECTONIC
Erosion Control Plan 5-30-13
USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

Tested, Wet, Steep and Disturbed Areas
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 4

6.0 TESTING RECOMMENDATIONS

The factors described below are specific to Clarkstown Canford Drive Drainage Improvements APE and provide pertinent information to predict the location of sites. Well drained soils in nearly level to gently sloping topographic settings generally are the highest probability areas for archaeological sites. The APE is situated within a wet floodplain/terrace associated with Demarest Kill but the potential for archaeological remains, particularly in buried contexts, is higher in floodplain areas.

A tributary of the West Branch of Hackensack River (Demarest Kill) and its tributary streams lies within the APE. This stream had been artificially diverted to its current course in the recent past. No intact alluvial soils with any potential for significant buried cultural material are present within this portion of the APE. Due to the presence of alluvial soils and the potential for buried living surfaces, a geomorphology study was conducted for this project. Joshua Pfarr conducted the Geomorphological Survey, which consisted of an examination of the stratigraphy within auger probes. The results are presented in *Section 6.1 Geomorphological Survey Results*.

A recent examination of CRIS revealed no previously recorded archaeological sites within the APE. No previously recorded archaeological sites were documented near the vicinity of the APE or within a 1.6 km (1 mile) radius; however, according to the OPRHP letter the APE is considered to be located on an Archaeological Sensitive landform. The APE was designated as having moderate to high probability for the discovery of archaeological sites based on the geomorphological results, soil survey, and examination of the CRIS system.

6.1 GEOMORPHOLOGICAL SURVEY RESULTS

A total of four auger probes were excavated within the APE to identify the representative soil and sediment profiles present along the West Branch of Hackensack River (Demarest Kill). A T0 floodplain zone comprises a majority of the APE. Narrow T00 floodplains/active stream channel zones consisting of recent coarse sand and gravel alluvium were also visually identified within the APE. These T00 floodplains represent areas of extremely low probability for containing in situ historic or prehistoric cultural material. The lower portions of upland hillslopes were also identified within the APE containing relatively shallow soils developed on colluvium or partially altered glacial till. The T0 floodplain zone will be the focus of this geomorphology survey.

The auger probes excavated on the T0 floodplain zones of the West Branch of Hackensack River (Demarest Kill) revealed soil development on sandy stream channel and flood deposits. On much of the T0 floodplain relatively recent sandy flood deposits are present at or just below the ground surface. Archaeological testing on these landforms is recommended to extend to the top of the fine to coarse sand C horizons located beneath the A and Bw horizons. These massive, sandy C horizons represent sterile, partially altered, sedimentary parent material. This testing can be accomplished by the hand excavation of shovel tests (STs) to depths of approximately 40 to 90 cm (15.7 to 35.4 in) bgs. The geomorphological report is presented in its entirety in Appendix II.

7.0 PHASE I FIELD SURVEY

7.1 FIELD METHODOLOGY

The Phase I field methodology conforms to the approach developed by the New York Archaeological Council (NYAC) (2005). Field work began with a systematic ground surface inspection of the APE for the purpose of defining any surface evidence of archaeological sites such as foundations or other extant features; of detecting any variability in topographic and soil maps; and finally to note any impact to the archaeological integrity of the APE. There was no ground surface evidence for historic sites identified during the pedestrian inspection.

Based on the results of the geomorphological survey, in potentially undisturbed areas of less than 15 percent slopes where ground surface visibility was not adequate for surface collection, the hand excavation of .5-by-.5 m (1.6 ft x 1.6 ft) shovel tests were conducted at 15 m (50 ft) intervals. Shovel tests were excavated to undisturbed soil levels. Once sterile subsoil was reached, a minimum of ten additional cm (3.9 in) of subsoil was excavated to confirm the natural stratigraphy of the horizon. Auger probes were conducted to verify soil profiles in areas of potentially disturbed soil horizons. Wetland environments were tested unless standing water was present.

All subsurface units were numbered sequentially, and soil profiles were cleaned and documented by a pedological description. All hand-excavated soils were screened through quarter-inch hardware mesh and returned to original ground surface condition.

7.2 FIELD SURVEY RESULTS

The Phase I field survey was conducted in August of 2016. The APE involves approximately 48,186 sq m (518,666 sq ft or 11.9 ac). During the ground surface inspection, the entire APE was examined to determine the potential for archaeological resources. Portions of the APE were designated as having low to no probability for the discovery of archaeological sites based on previous impacts and wetland environments. Previous impacts to the APE included disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond. A total of 29,155 sq m (313,821 sq ft or 7.2 ac) were tested within the APE.

Area A

Description: Area A encompasses approximately 48,186 sq m (518,666 sq ft or 11.9 ac), located adjacent to Cranford Drive and Cypress Street (see Figure 4; Photos 8 through 11). It is topographically situated within a floodplain/terrace and lower hillslope environment associated with Demarest Kill and is bound by the limits of the APE on all sides. The area is characterized by deciduous hardwoods interspersed with herb/shrub communities. Elevations range from 100 ft to 116 ft amsl.

Approximately 29,155 sq m (313,821 sq ft or 7.2 ac) within Area A was subjected to Phase I testing; the remaining 19,031 sq m (204,845 sq ft or 4.7 ac) did not require testing due to the disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond

Methodology: Field methodology consisted of the hand-excavation of shovel tests at 15 m (50 ft) intervals.

Photo 8: Area A, looking south

Photo 9: Area A, looking south

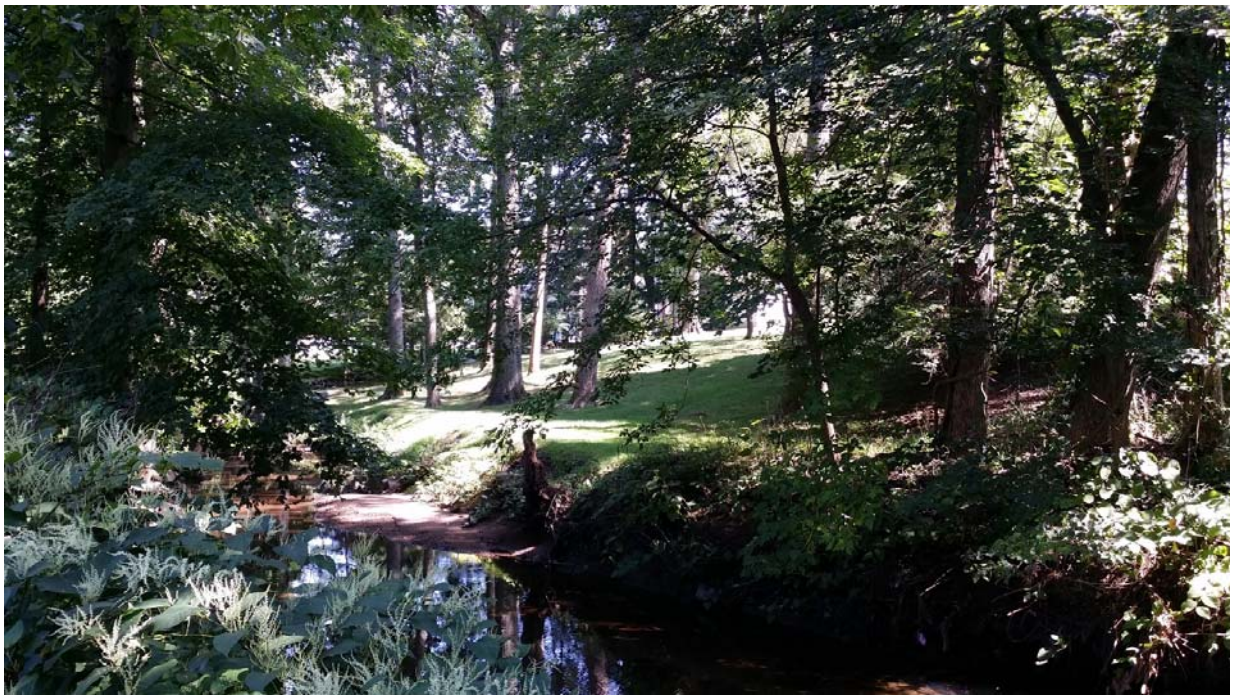


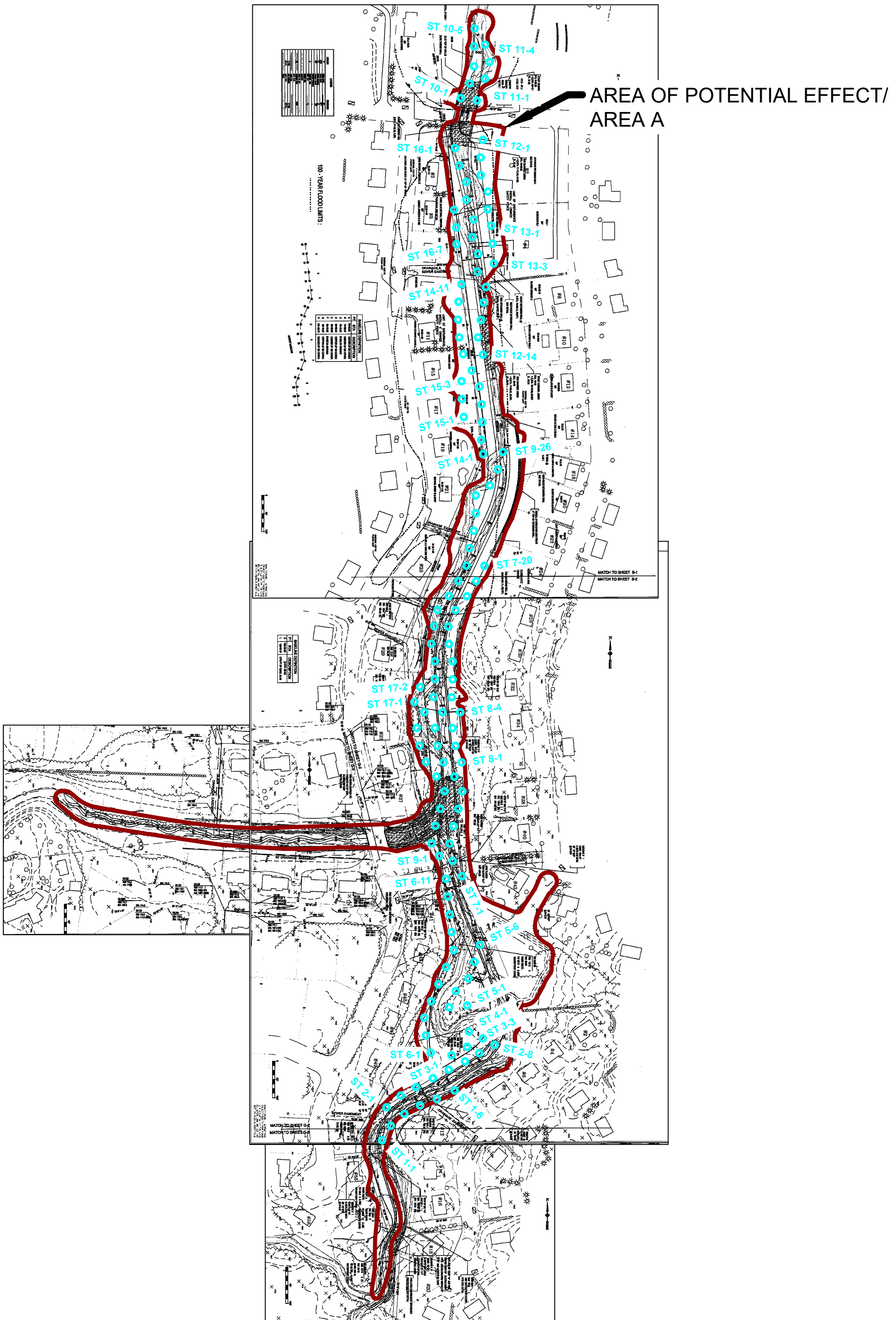
Photo 10: Area A, looking northeast

Photo 11: Area A, looking northeast

Results: A total of 134 STs were hand-excavated in Area A at 15 m (50 ft) intervals along 17 transects and all 134 STs were negative (Figure 5). The majority of soil profiles ranged from 14 to 56 cm of light brown to brown sandy silt loam over yellow brown sand to sandy silt loam. Some profiles terminated in a rock impasse. Other profiles consisted of light brown to brown or dark brown sandy silt loam over yellow brown sand to brown sandy loam and terminated in light yellow brown to grey brown sand to sandy loam. Representative soil profiles are presented below. ST records are presented in their entirety in Appendix III. Based on the results of the Phase I Survey, no evidence of prehistoric or historic archaeological sites were identified.

Soil Profile: Area A Shovel Test 5-3 Description	**Strata and Artifact Description**
Medium Brown Sandy Silt Loam	0-23 cm bgs A Horizon 10YR 3/3 No Cultural Material
Yellow Brown Sand	23-33 cm bgs Bw Horizon 10YR 5/3

Soil Profile: Area A Shovel Test 9-12 Description	**Strata and Artifact Description**
Dark Brown Sandy Loam	0-20 cm bgs Ao Horizon 10YR 3/3 No Cultural Material
Brown Sandy Loam	20-80 cm bgs Bw Horizon 10YR 4/3
Light Yellow and Brown Sandy Loam	80-90 cm bgs C1 Horizon 10YR 7/3



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

APE / AREA A

NEGATIVE SHOVEL TEST

N W E S

0 1 CM = 30 METERS 120 METERS

REFERENCES:
TECTONIC
Erosion Control Plan 5-30-13
USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

Area A
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 5

8.0 SUMMARY

8.1 CONCLUSIONS

The proposed project involves the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York. CDC was retained by retained by Tectonic Engineering & Surveying Consultants P.C.to perform cultural resource investigations for this project. The sponsoring agency for this project is Governor's Office of Storm Recovery (GOSR).

The Phase I field survey was conducted for this project in summer of 2016. Phase I field methodology involved surface surveillance and the hand excavation of STs at 15 m intervals. A portion of the APE, involving approximately 48,186 sq m (518,666 sq ft or 11.9 ac), was not tested due to the presence of slopes greater than 15 percent and wet areas and disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond

The total tested area within the APE measured approximately 29,155 sq m (313,821 sq ft or 7.2 ac). A total of 134 STs were excavated within the APE at 15 m intervals and all 134 STs were negative. No artifacts were recovered during the survey and no evidence of archaeological resources was identified during the Phase I Archaeological testing.

Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Canford Drive Drainage Improvements project.

9.0 REFERENCES

Adovasio, J. M.
1993 The Ones That Will Not Go Away: A Biased View of Pre-Clovis Populations in the New World. In *From Kostenki to Clovis: Upper Paleolithic-Paleo-Indian Adaptations*, edited by O. Soffer and N. D. Praslov. Plenum Press, New York.

Beers, F. W.
1875 *County Atlas of Rockland, New York.* Walker & Jewett, New York.

Carr, K. W.
1998 The Early Archaic Period in Pennsylvania. *Pennsylvania Archaeologist* 68(2):42-69.

Casey, Thomas F. X.
2016 A Brief History of Rockland. RocklandHistory.org

French, J. H.
1860 *Historical and Statistical Gazetteer of New York State.* Heart of the Lakes Publishing, Interlaken, New York.

Green, Frank Bertangue
1886 *History of Rockland County, New York.* A. S. Barnes & Co., New York.

Independence Hall Association
2013 "Major John Andre". http://www.ushistory.org/march/bio/andre.htm (accessed on September 9, 2016).

Natural Resources Conservation Service
2016 The Web Soil Survey http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx (accessed on August 24, 2016).

New York State Archaeological Council
2000 *Cultural Resource Standards Handbook-Guidance for Understanding and Applying the New York State Standards for Cultural Resource Investigations.*

2005 *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State.*

New York State Museum
2016 Geology-Geographic Information System http://www.nysm.nysed.gov/research-collections/geology/gis (accessed on August 24, 2016)

Ritchie, William A.
1980 *The Archaeology of New York State.* Harbor Hill Books, Harrison, New York. Revised edition.

Stewart, Michael
1989 The Middle Archaic of Western Maryland. Paper presented at the 56th Annual Meeting of the Eastern States Archaeological Federation, East Windsor, Connecticut.

Salomon, Julian H.
1982 *Indians of the Lower Hudson Region, The Munsee*. Historical Society of Rockland County, New City, New York.

Town of Clarkstown
2016 "History" <http://www.town.clarkstown.ny.us/html/history_profile.html> (accessed on September 9, 2016).

United States Census Bureau
2012 American Fact Finder. Accessed electronically at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF . Accessed on September 9, 2016.

United States Department of Agriculture, Soil Conservation Service
1990 *Soil Survey of Rockland County, New York.* Prepared in cooperation with Cornell University Agricultural Experiment.

United States Fish and Wildlife Service
2016 *Geomorphic Provinces and Sections of the New York Bight Watershed*. National Conservation Training Center https://nctc.fws.gov/pubs5/web_link/text/geolsect.htm (accessed on August 24, 2016).

United States Geological Survey
1892 Tarrytown Quadrangle, New York 15' series.

1902 Tarrytown Quadrangle, New York 15' series.

2016 Mineral Resources Online Spatial Data http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NYTRba;3 (accessed on August 24, 2016).

Web Soil Survey NRCS
2008 *Web Soil Survey.* < http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx> (accessed on August 5, 2008).

APPENDIX I
AGENCY COORDINATION

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation and Historic Preservation

ANDREW M. CUOMO
Governor

ROSE HARVEY
Commissioner

ARCHAEOLOGY COMMENTS

Phase I Archaeological Survey Recommendation
16PR05212 – Clarkstown Cranford Drive Drainage Improvements

The project is located in on archaeologically sensitive landform. Therefore, the Office of Parks, Recreation and Historic Preservation (OPRHP) recommends a Phase I archaeological survey for all portions of the project that will involve ground disturbance, unless substantial prior ground disturbance can be documented. OPRHP anticipates that some portions of the project area have experienced extensive prior soil disturbance and that no archaeological testing will be needed in those areas. If you consider the entire project area to be disturbed, documentation of the disturbance will need to be reviewed by OPRHP. Examples of disturbance include mining activities and multiple episodes of building construction and demolition.

Documentation of ground disturbance should include a description of the disturbance with confirming evidence. Confirmation can include current photographs and/or older photographs of the project area which illustrate the disturbance (approximately keyed to a project area map), past maps or site plans that accurately record previous disturbances, or current soil borings that verify past disruptions to the land. Agricultural activity is not considered to be substantial ground disturbance.

Please note that in areas with alluvial soils or fill archaeological deposits may exist below the depth of superficial disturbances such as pavement or even deeper disturbances, depending on the thickness of the alluvium or fill. Evaluation of the possible impact of prior disturbance on archaeological sites must consider the depth of potentially culture-bearing deposits and the depth of planned disturbance by the proposed project.

A Phase I survey is designed to determine the presence or absence of archaeological sites or other cultural resources in the project's area of potential effect. The OPRHP can provide standards for conducting cultural resource investigations upon request. Cultural resource surveys and survey reports that meet these standards will be accepted and approved by the OPRHP.

Our office does not conduct archaeological surveys. A 36 CFR 61 qualified archaeologist should be retained to conduct the Phase I survey. Many archaeological consulting firms advertise their availability in the yellow pages. The services of qualified archaeologists can also be obtained by contacting local, regional, or statewide professional archaeological organizations. Phase I surveys can be expected to vary in cost per mile of right-of-way or by the number of acres impacted. We encourage you to contact a number of consulting firms and compare examples of each firm's work to obtain the best product.

Please also be aware that a Section 233 permit from the New York State Education Department (SED) may be necessary before archaeological fieldwork is conducted on State-owned land. If any portion of the project includes the lands of New York State you should contact the SED before initiating survey activities. The SED contact is Christina B. Rieth and she can be reached at (518) 402-5975. Section 233 permits are not required for projects on private land.

If you have any questions concerning archaeology, please contact Tim Lloyd at 518-268-2186 or Timothy.Lloyd@parks.ny.gov

APPENDIX II
GEOMPRPHOLOGICAL REPORT

CHRISTINE DAVIS CONSULTANTS, INC.
560 Penn Street, Verona, Pennsylvania 15147
Phone: 412/826-0443 Fax: 412/826-0458

PHASE IA GEOMORPHOLOGICAL SURVEY

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS

TOWN OF CLARKSTOWN, ROCKLAND COUNTY, NEW YORK

BY:

JOSHUA M. PFARR
Principal Investigator/Geomorphologist
Christine Davis Consultants, Inc.

ABSTRACT

A Phase IA Geomorphological Survey was conducted for the proposed Clarkstown Cranford Drive Drainage Improvements project in Town of Clarkstown, Rockland County, New York. Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering & Surveying Consultants, P.C. to perform cultural resource investigations for this project which include geomorphology evaluation. The sponsoring agency for this project is the Army Corps of Engineers (COE).

The area of potential effect (APE) consists of approximately 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)) of stream modification and realignment. It is topographically situated within floodplain/terrace settings associated with a tributary of the West Branch Hackensack River known as Demarest Kill within the Triassic Lowland Section of the Northern Piedmont physiographic province.

The field survey was conducted in August of 2016. Geomorphological field methodology involved the evaluation of soils and sediments within hand excavated auger probes. The excavation of auger probes revealed intact soils located on the T0 floodplain of the West Branch of Hackensack River also known as Demarest Kill.

Based on the results of the Phase IA Geomorphological Survey, shovel test probes on the T0 floodplain extending through any A and Bw horizons to the depth of the C horizon sands will be sufficient for a Phase I Archaeological Survey.

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 PROPOSED UNDERTAKING 1
1.2 AREA OF POTENTIAL EFFECT (APE) 1
1.3 PURPOSE OF INVESTIGATION 1

2.0 ENVIRONMENTAL BACKGROUND 4

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY 4
2.2 CLIMATE 4
2.3 SOILS 4

3.0 GEOMORPHOLOGICAL FIELD SURVEY 6

3.1 FIELD METHODOLOGY 6
3.2 FIELD SURVEY RESULTS 6

4.0 CONCLUSIONS AND RECOMMENDATIONS 13

5.0 REFERENCES 14

FIGURES

1	PROJECT LOCATION, HAVERSTRAW, NY 7.5' USGS MAPS	2
2	AREA OF POTENTIAL EFFECT (APE)	3
3	SOIL MAP OF APE	5
7	AUGER PROBE LOCATIONS	8
11	REPRESENTATIVE SOIL & SEDIMENT PROFILES	11-12

PHOTOGRAPHS

1	WEST BRANCH OF HACKENSACK RIVER (DEMAREST KILL) CHANNEL AND T00 FLOODPLAIN LOOKING SOUTHWEST	7
2	T0 FLOODPLAIN AT SOUTH END OF APE INCLUDING ABANDONED STREAM CHANNEL LOOKING NORTH	9
3	ARTIFICIAL RETENTION POND WEST OF STREAM NEAR SOUTH END OF APE LOOKING SOUTHWEST	9
4	AP 3 LOCATION NEAR CENTER OF APE LOOKING SOUTHEAST	10
5	NORTH END OF APE LOOKING SOUTH	10

1.0 INTRODUCTION

1.1 PROPOSED UNDERTAKING

The proposed undertaking involves the Clarkstown Cranford Drive Drainage Improvements project in the Town of Clarkstown, Rockland County, New York. Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering and Surveying Consultants, P.C. to perform cultural resource investigations for this project. The sponsoring agency for this project is the Army Corps of Engineers (COE).

1.2 AREA OF POTENTIAL EFFECT (APE)

The proposed project includes portions of the floodplain zones associated with the West Branch of Hackensack River, also known as Demarest Kill. The APE for this project encompasses a total size of 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)). The APE includes the areas where potential ground surface impacts will occur as part of the proposed undertaking. The APE is generally located west of the Hudson River and north of New City, New York between S.R. 304 and Old Route 304 within Clarkstown (Figures 1 and 2).

The West Branch of Hackensack River (Demarest Kill) flows north towards its confluence with the Hackensack River approximately 1 kilometer (km) (3,281 ft) away. It is fed by an artificially rerouted tributary that flows east between Cragmere Oval and Bush Ct. The landforms within the APE along the West Branch of Hackensack River (Demarest Kill) include T00 and T0 floodplain zones located at a nominal elevation of 30.5 to 36.6 m (100 to 120 ft) above sea level (asl).

A tributary of the West Branch of Hackensack River (Demarest Kill) also lies within the APE. This stream had been artificially diverted to its current course in the recent past. No intact alluvial soils with any potential for significant buried cultural material are present within this portion of the APE.

1.3 PURPOSE OF INVESTIGATION

The objectives of the geomorphological survey are to determine the relative age of the landforms and soils within the APE and to determine the maximum depth of excavation required for the recovery of cultural material during the Phase I Archaeological Survey. The floodplain zones of the West Branch of Hackensack River (Demarest Kill) and their associated soils will be the focus of the study.

FIGURE 1: PROJECT LOCATION, HAVERSTRAW, NY 7.5' USGS MAPS

FIGURE 2: AREA OF POTENTIAL EFFECT (APE) (NRCS 2016)

2.0 ENVIRONMENTAL BACKGROUND

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY

The bedrock of Rockland County is composed of sedimentary rock formations of Upper Triassic age such as the Newark group (USGS 2016). The conglomerate, mudstone, shale, and sandstone of the Brunswick Formation have been greatly altered by the advance and retreat of continental ice sheets of the late Pleistocene Epoch. The retreat of the glaciers of this period has resulted in the deposition of glacial till over the ground surface of the region (NYSM 2016; USFWS 2016; Van Diver 1985).

The Phase IA study area is situated in the Triassic Lowland section of the Northern Piedmont physiographic province. This section is characterized by broad, gently sloping valleys with a moderate pattern of ridges (USDA 1990). Elevations in the vicinity of the APE range from approximately 80 to 150 ft asl.

2.2 CLIMATE

Climatic conditions in Rockland County include cold and snowy winters and warm to hot summers. Precipitation is adequate and well distributed. The average winter temperature for most of the county is 28 degrees Fahrenheit (F)(-2.2 degrees Celsius (C)). The average summer temperature is 70 degrees F (21.1 degrees C). The total annual precipitation is 119.4 centimeters (cm) (47 inches (in)) of which approximately 50% falls from April through September. Prevailing winds are out of the south (USDA 1990).

2.3 SOILS

Soils in the project area derived from the Weathersfield-Cheshire-Urban Land association general soil unit. This soil association consists of very deep, nearly level to moderately steep, well drained soils formed on acidic glacial till derived from reddish sandstone on till plains. The soils within the study geomorphology study area are mapped as Cheshire-Urban land complex (CuB), Rippowam sandy loam (Ra), and Yalesville sandy loam (YaB) (Figure 3) (USDA 1990; NRCS 2016).

Cheshire-Urban land complex soils consist of very deep, gently sloping, well drained Cheshire soils and areas covered by urban development. These soils are typically formed in glacial till derived from red Triassic sandstone ridges with slopes of 2 to 8 percent. A representative soil profile for Cheshire soils consists of a very dark grayish brown gravelly fine sandy loam A horizon, a reddish brown gravelly fine sandy loam Bw horizon, and a dark reddish brown gravelly sandy loam C horizon.

Rippowam sandy loam consists of very deep, nearly level, and poorly drained soil located on floodplains with slopes of 0 to 3 percent. These soils formed in alluvium mainly derived from granite and sandstone. A representative soil profile for Rippowam sandy loam consists of a very dark grayish brown sandy loam A horizon, a series of dark grayish brown to grayish brown sandy loam Bw horizons, a dark gray and grayish brown fine sandy loam BC horizon, and a dark brown loamy sand C horizon.

Yalesville sandy loam consists of moderately deep, well drained soil located on uplands with slopes of 0 to 3 percent. These soils formed in glacial till derived from red Triassic sandstone. A representative soil profile for Yalesville sandy loam consists of a dark brown to dark reddish brown sandy loam A horizon, a series of reddish brown to red gravelly loam Bw horizons, and a red extremely channery loam C horizon.

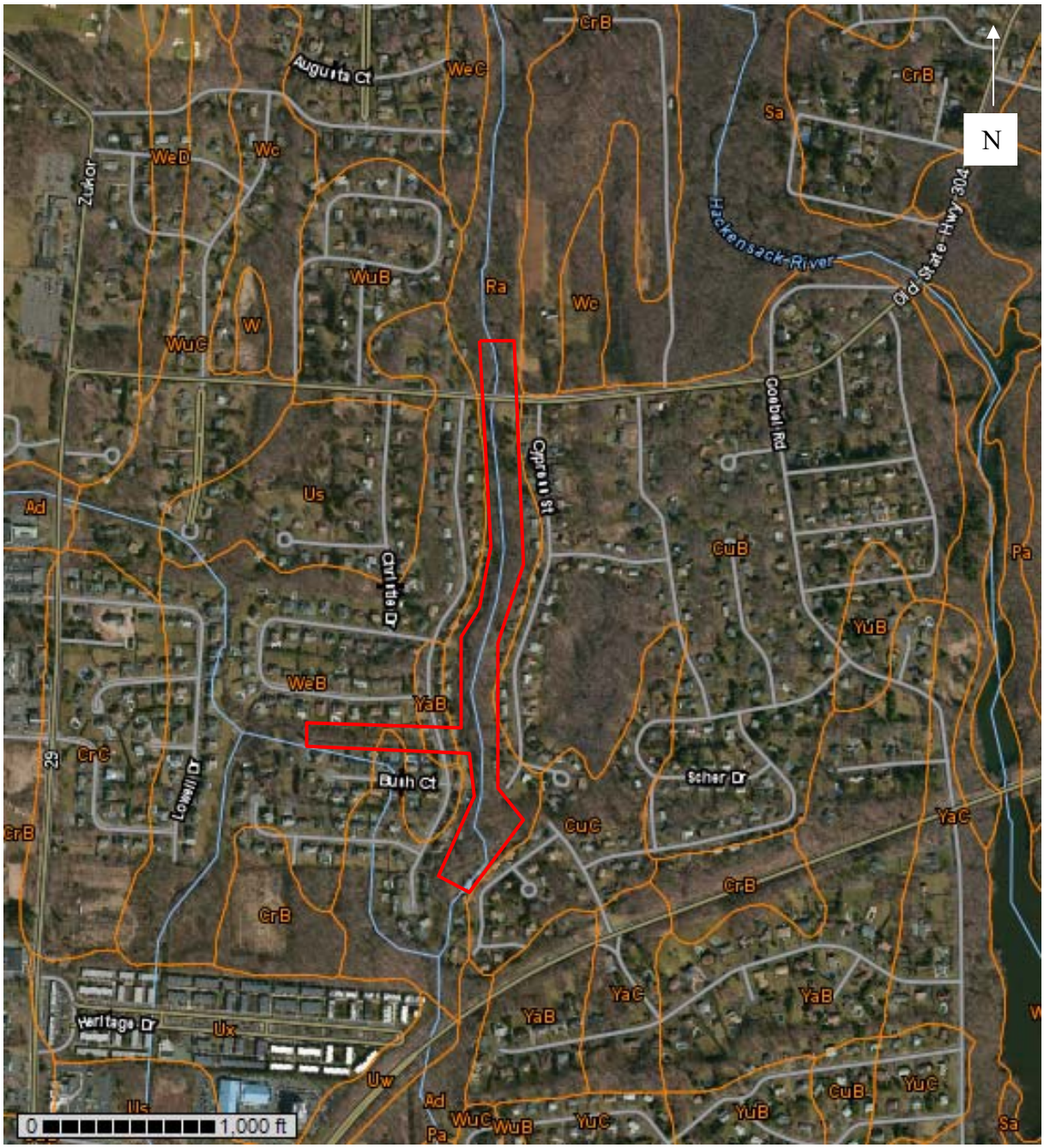


FIGURE 3: SOIL MAP OF THE APE (NRCS 2016)

3.0 GEOMORPHOLOGICAL FIELD SURVEY

3.1 FIELD METHODOLOGY

A total of four auger probes were excavated within the APE to identify the representative soil and sediment profiles present along the West Branch of Hackensack River (Demarest Kill). A T0 floodplain zone comprises a majority of the APE. Narrow T00 floodplains/active stream channel zones consisting of recent coarse sand and gravel alluvium were also visually identified within the APE (Photo 1). These T00 floodplains represent areas of extremely low probability for containing in situ historic or prehistoric cultural material. The lower portions of upland hillslopes were also identified within the APE containing relatively shallow soils developed on colluvium or partially altered glacial till. The T0 floodplain zone will be the focus of this geomorphology survey.

3.2 FIELD SURVEY RESULTS

The first and second auger probes (AP 1 & 2) were placed on the T0 floodplain on the west and east banks, respectively, of the West Branch of Hackensack River (Demarest Kill) near the south end of the APE at a height of approximately 80 cm (31.5 in) above the active stream channel. The profile of AP 1 included an 18 cm (7.1 in) thick dark brown sandy loam A horizon with a weak granular structure. The Bw horizon located beneath the A horizon consisted of a 22 cm (8.7 in) brown to yellowish brown sandy loam with a moderate granular structure. The Bw horizon was underlain by a series of massive loamy fine to coarse sand C horizons beginning at a depth of 40 cm (15.7 in) below ground surface (bgs) and extending to channel lag gravels at 150 cm (59.1 in) bgs (Figure 4; Photos 2 and 3).

The third auger probe (AP 3) was placed on the T0 floodplain on the east bank of the West Branch of Hackensack River (Demarest Kill) near the center of the APE located at a height of approximately 100 cm (39.4 in) above the active stream channel. The soil and sediment profile included a 10 cm (3.9 in) thick dark brown sandy loam Ao horizon with a weak to moderate granular structure. The Ao horizon was underlain by a 60 cm (23.6 in) thick brown sandy loam Bw horizon with a moderate granular structure. The Bw horizon was underlain by a 20 cm (7.9 in) thick grayish brown and yellowish brown massive loamy sand C horizon. A gray and dark gray medium to coarse sand C2 horizon was encountered at a depth of 90 cm (35.4 in) bgs (see Figure 4; Photo 4).

The fourth auger probe (AP 4) was placed on the T0 terrace on the east bank of the stream near the north end of the APE at a height of approximately 130 cm (51.2 in) above the active stream channel. The soil and sediment profile included a 10 cm (3.9 in) thick dark brown loamy sand Ao horizon. The Ao horizon was underlain by a 30 cm (11.8 in) thick brown and gray sand C horizon representing a relatively recent, massive flooding. The C horizon was underlain by a 25 cm (9.8 in) thick dark brown sandy loam 2Ab horizon with a moderate granular structure. This 2Ab horizon represents a former ground surface that was buried rapidly beneath the flood sands of the overlying C horizon. This buried ground surface has the highest potential for containing in situ cultural material. However, it is likely of relatively young age given the lack of soil development in the overlying matrix. Beneath the 2Ab horizon was a 25 cm (9.8 in) thick brown sandy loam 2Bw horizon with a moderate granular structure. A dark gray and brown mottled massive loamy sand 2C horizon was encountered at a depth of 90 cm (35.4 in) bgs followed by a massive gray and yellowish brown sandy clay 3C horizon at 120 cm (47.2 in) bgs (see Figure 4; Photo 5).

Figure 5 contains representative soil and sediment profiles for each area tested within the APE (south, center, and north).

PHOTO 1: WEST BRANCH OF HACKENSACK RIVER (DEMAREST KILL) CHANNEL AND T00 FLOODPLAIN LOOKING SOUTHWEST

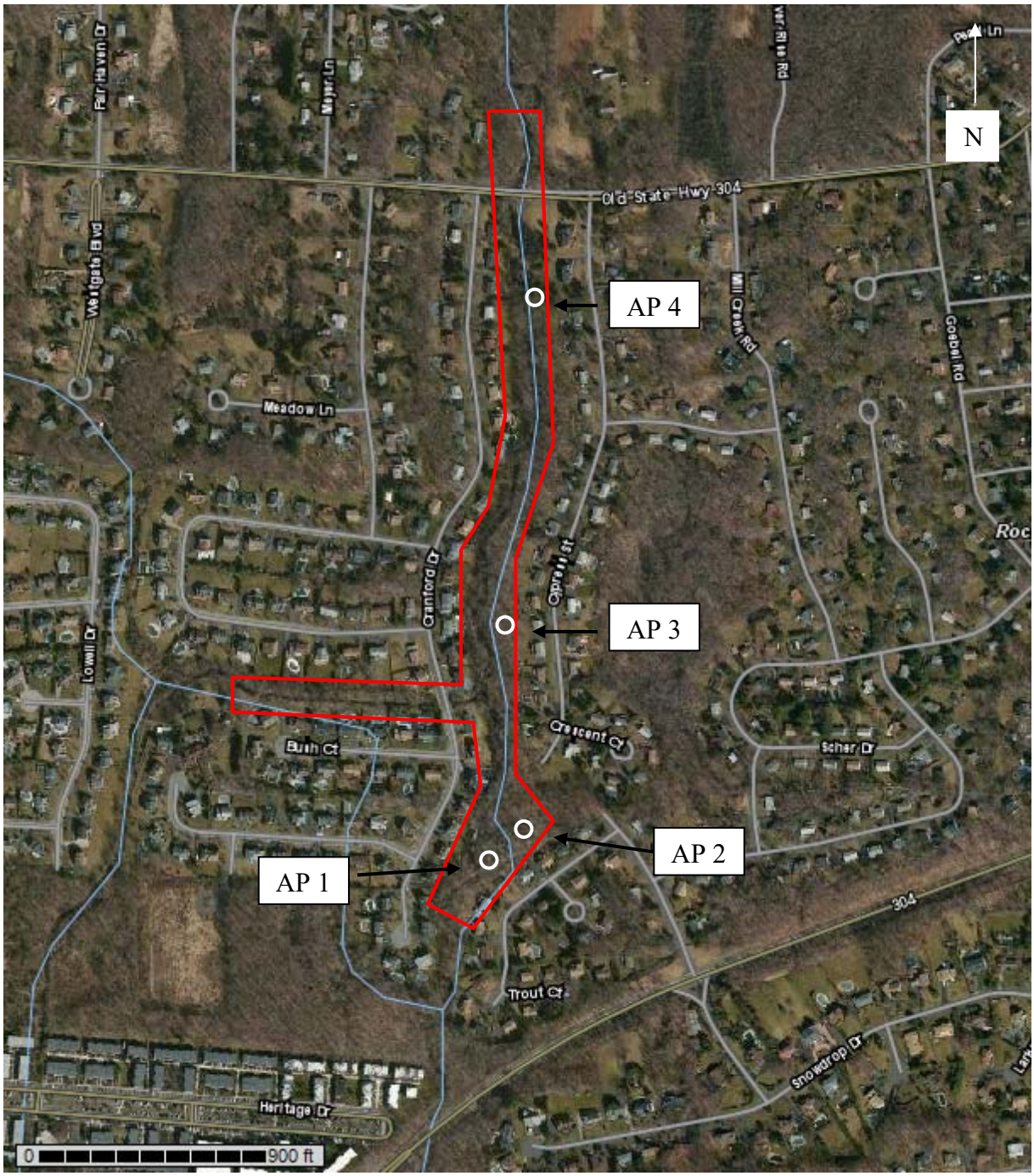


FIGURE 4: AUGER PROBE LOCATIONS

PHOTO 2: T0 FLOODPLAIN AT SOUTH END OF APE INCLUDING ABANDONED STREAM CHANNEL LOOKING NORTH

PHOTO 3: ARTIFICIAL RETENTION POND WEST OF STREAM NEAR SOUTH END OF APE LOOKING SOUTHWEST

PHOTO 4: AP 3 LOCATION NEAR CENTER OF APE LOOKING SOUTHEAST

PHOTO 5: NORTH END OF APE LOOKING SOUTH

Soil & Sediment Profile: AP 1	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-18 cm Ao Horizon 10YR 3/3
Brown & Yellowish Brown Sandy Loam	18-40 cm Bw Horizon 10YR 5/3 & 5/8
Very Pale Brown Loamy Fine Sand	40-79 cm C1 Horizon 10YR 7/3
Gray & Brownish Yellow Medium Sand	79-116 cm C2 Horizon 10YR 5/1 & 6/6
Gray Coarse Sand	116-150 cm C3 Horizon 10YR 6/1
Gray Gravel	150+ cm 2C Horizon 10YR 6/1

Soil & Sediment Profile: AP 3	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-10 cm Ao Horizon 10YR 3/3
Brown Sandy Loam	10-70 cm Bw Horizon 10YR 4/3
Gray Brown & Yellowish Brown Loamy Sand	70-90 cm C1 Horizon 10YR 5/2 & 5/8
Gray & Dark Gray Medium to Coarse Sands	90+ cm C2 Horizon 10YR 5/2 & 4/1

FIGURE 5: REPRESENTATIVE SOIL AND SEDIMENT PROFILES

Soil & Sediment Profile: AP 4	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-10 cm Ao Horizon 10YR 3/3
Brown & Gray Sand	10-40 cm C Horizon 10YR 5/3 & 5/1
Dark Brown Sandy Loam	40-65 cm 2Ab Horizon 10YR 3/3
Brown Sandy Loam	65-90 cm 2Bw Horizon 10YR 5/3
Dark Gray & Brown Loamy Sand	90-120 cm 2C Horizon 10YR 4/1 & 4/3
Gray & Yellowish Brown Sandy Clay	120+ cm 3C Horizon 10YR 6/1 & 5/6

FIGURE 5 continued: REPRESENTATIVE SOIL AND SEDIMENT PROFILES

4.0 CONCLUSIONS AND RECOMMENDATIONS

The Phase IA Geomorphological field survey was conducted for the Clarkstown Cranford Drive Drainage Improvements project in August of 2016. Field methodology involved the hand excavation of auger probes in alluvial environments across an APE of approximately 48,186 sq m (518,666 sq ft or 11.9 ac). The geomorphological survey involved the stream the floodplain zones of the West Branch of Hackensack River (Demarest Kill) and an unnamed tributary within the APE.

The auger probes excavated on the T0 floodplain zones of the West Branch of Hackensack River (Demarest Kill) revealed soil development on sandy stream channel and flood deposits. On much of the T0 floodplain relatively recent sandy flood deposits are present at or just below the ground surface. Archaeological testing on these landforms is recommended to extend to the top of the fine to coarse sand C horizons located beneath the A and Bw horizons. These massive, sandy C horizons represent sterile, partially altered, sedimentary parent material. This testing can be accomplished by the hand excavation of shovel test probes (STPs) to depths of approximately 40 to 90 cm (15.7 to 35.4 in) bgs.

5.0 REFERENCES

Natural Resources Conservation Service
2016 The Web Soil Survey http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx (accessed on August 24, 2016).

New York State Museum
2016 Geology-Geographic Information System http://www.nysm.nysed.gov/research-collections/geology/gis (accessed on August 24, 2016)

United States Department of Agriculture, Soil Conservation Service
1990 *Soil Survey of Rockland County, New York.* Prepared in cooperation with Cornell University Agricultural Experiment.

United States Fish and Wildlife Service
2016 *Geomorphic Provinces and Sections of the New York Bight Watershed*. National Conservation Training Center https://nctc.fws.gov/pubs5/web_link/text/geolsect.htm (accessed on August 24, 2016).

United States Geological Survey
2016 Mineral Resources Online Spatial Data http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NYTRba;3 (accessed on August 24, 2016).

Van Diver, Bradford B.
1985 *Roadside Geology of New York*. Mountain Press Publishing Company, Missoula.

APPENDIX III
SHOVEL TEST RECORDS

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 1-1	0-36	Medium Brown Sandy Clay Loam	NCM
	36-46	Brown and Gray Sand	NCM
ST 1-2	0-28	Dark Brown Sandy Silt Loam	NCM
	28-41	Gray Brown Sandy Loam	NCM
	41-51	Gray Sand	NCM
ST 1-3	0-29	Dark Brown Sandy Silt Loam	NCM
	29-42	Gray Brown Sandy Clay Loam	NCM
	42-52	Gray Brown Sand and Rocks	NCM
ST 1-4	0-10	Reddish Brown Silt Loam	NCM
	10-50	Grey Organic Lense	NCM
	50-62	Sandy Clay Loam	NCM
	62+	Grey Brown Sand	NCM
ST 1-5	0-46	Brown Sandy Silt Loam	NCM
	46-56	Brown Sand	NCM
ST 1-6	0-47	Brown Sandy Silt Loam	NCM
	47-57	Brown Sand	NCM
ST 2-1	0-21	Brown Sandy Silt Loam	NCM
	21-31	Brown Sand	NCM
ST 2-2	0-19	Brown Sandy Silt Loam	NCM
	19-42	Yellow Brown Sandy Silt Loam	NCM
	42	Rock Impasse	
ST 2-3	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 2-4	0-29	Brown Sandy Silt Loam	NCM
	29-39	Brown Sand	NCM
ST 2-5	0-34	Brown Sandy Silt Loam	NCM
	34-44	Brown Sand	NCM
ST 2-6	0-43	Brown Sandy Silt Loam	NCM
	43-53	Brown Sand	NCM
ST 2-7	0-48	Brown Sandy Silt Loam	NCM
	48-58	Brown Sand	NCM
ST 2-8	0-39	Brown Sandy Silt Loam	NCM
	39-49	Brown Sand	NCM
ST 3-1	0-51	Brown Sandy Silt Loam	NCM
	51-61	Brown Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 3-2	0-44	Brown Sandy Silt Loam	NCM
	44-54	Brown Sand	NCM
ST 3-3	0-47	Brown Sandy Silt Loam	NCM
	47-57	Brown Sand	NCM
ST 4-1	0-43	Brown Sandy Silt Loam	NCM
	43-53	Brown Sand	NCM
ST 5-1	0-40	Brown Sandy Silt Loam	NCM
	40-50	Brown Sand	NCM
ST 5-2	0-14	Brown Silt Loam	NCM
	14-47	Light Yellow Brown Sandy Silt Loam	NCM
	47-57	Pale Yellow Sand	NCM
ST 5-3	0-23	Brown Sandy Silt Loam	NCM
	23-33	Yellow Brown Sand	NCM
ST 5-4	0-19	Brown Sandy Silt Loam	NCM
	19-29	Brown Sand	NCM
ST 5-5	0-30	Brown Sandy Silt Loam	NCM
	30-40	Brown Sand	NCM
ST 5-6	0-31	Brown Sandy Silt Loam	NCM
	31-41	Brown Sand	NCM
ST 6-1	0-6		NCM
	6	Brown Sandy Silt Loam	NCM
		Rock Impasse	
ST 6-2	0-8		NCM
	8	Brown Sandy Silt Loam	NCM
		Rock Impasse	
ST 6-3	0-32		NCM
	32-42	Brown Sandy Silt Loam	NCM
		Brown Sand	
ST 6-4	0-36		NCM
	36-46	Brown Sandy Silt Loam	NCM
		Brown Sand	
ST 6-5	0-38	Brown Sandy Silt Loam	NCM
	38-48	Brown Sand	NCM
ST 6-6	0-30	Brown Sandy Silt Loam	NCM
	30-40	Brown Sand	NCM
ST 6-7	0-20	Brown Sandy Silt Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	20-30	Brown Sand	NCM
ST 6-8	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 6-9	0-46	Brown Sandy Silt Loam	NCM
	46-56	Brown Sand	NCM
ST 6-10	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 6-11	0-37	Brown Sandy Silt Loam	NCM
	37-47	Brown Sand	NCM
ST 7-1	0-12	Brown Sandy Silt Loam	NCM
	12-37	Light Brown Sandy Silt Loam	NCM
	37	Rock Impasse	NCM
ST 7-2	0-51	Brown Sandy Silt Loam	NCM
	51	Rock Impasse	NCM
ST 7-3	0-43	Brown Sandy Silt Loam	NCM
	43-53	Yellow Brown Sand	NCM
ST 7-4	0-32	Brown Sandy Silt Loam	NCM
	32-42	Yellow Brown Sand	NCM
ST 7-5	0-31	Brown Sandy Silt Loam	NCM
	31-41	Yellow Brown Sand	NCM
ST 7-6	0-28	Dark Brown Sandy Loam	NCM
	28-70	Brown Sandy Loam	NCM
	70-80	Light Yellow Brown Loamy Sand	NCM
ST 7-7	0-36	Brown Sandy Silt Loam	NCM
	36-46	Yellow Brown Sand	NCM
ST 7-8	0-34	Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 7-9	0-31	Brown Sandy Silt Loam	NCM
	31-41	Yellow Brown Sand	NCM
ST 7-10	0-29	Brown Sandy Silt Loam	NCM
	29-39	Yellow Brown Sand	NCM
ST 7-11	0-27	Rocky Brown Silt Loam	NCM
	27	Rock Impasse	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 7-12	0-25	Rocky Brown Silt Loam	NCM
	25	Rock Impasse	NCM
ST 7-13	0-24	Brown Sandy Silt Loam	NCM
	24-39	Red Brown Sandy Silt Loam	NCM
	39049	Yellow Brown Sand	NCM
ST 7-14	0-17	Brown Sandy Silt Loam	NCM
	17-34	Red Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 7-15	0-19	Brown Sandy Silt Loam	NCM
	19	Rock Impasse	NCM
ST 7-16	0-14	Brown Sandy Silt Loam	NCM
	14	Rock Impasse	NCM
ST 7-17	0-32	Brown Sandy Silt Loam	NCM
	32-42	Yellow Brown Sand	NCM
ST 7-18	0-19	Brown Sandy Silt Loam	NCM
	19-29	Yellow Brown Sand	NCM
ST 7-19	0-23	Brown Sandy Silt Loam	NCM
	23-33	Yellow Brown Sand	NCM
ST 7-20	0-47	Brown Sandy Silt Loam	NCM
	47	Rock Impasse	NCM
ST 8-1	0-34	Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 8-2	0-24	Brown Sandy Silt Loam	NCM
	24-60	Red Brown Sandy Silt Loam	NCM
	60-70	Yellow Brown Sand	NCM
ST 8-3	0-40	Brown Sandy Silt Loam	NCM
	40-50	Yellow Brown Sand	NCM
ST 8-4	0-5	Mottled Brown and Gray Sandy Silt Loam and Gravel	NCM
	5	Gravel Disturbance	NCM
ST 9-1	0-36	Brown Sandy Silt Loam	NCM
	36-46	Brown Sand	NCM
ST 9-2	0-39	Brown Sandy Silt Loam	NCM
	39-49	Brown Sand	NCM
ST 9-3	0-34	Brown Sandy Silt Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	34-44	Brown Sand	NCM
ST 9-4	0-49	Brown Sandy Silt Loam	NCM
	49-59	Brown Sand	NCM
ST 9-5	0-40	Brown Sandy Silt Loam	NCM
	40-50	Brown Sand	NCM
ST 9-6	0-19	Brown Sandy Silt Loam	NCM
	19-39	Light Brown Sandy Silt Loam	NCM
	39	Rock Impasse	NCM
ST 9-7	0-17	Mottled Brown and Yellow Sandy Silt Loam	NCM
	17	Rock Impasse	NCM
ST 9-8	0-47	Brown Sandy Silt Loam	NCM
	47	Rock Impasse	NCM
ST 9-9	0-11	Brown Sandy Silt Loam	NCM
	11-30	Light Brown Sandy Silt Loam	NCM
	30-40	Pale Yellow Brown Sand	NCM
ST 9-10	0-42	Brown Sandy Silt Loam	NCM
	42-44	Yellow Brown Sandy Silt	NCM
	44	Rock Impasse	NCM
ST 9-11	0-33	Brown Sandy Silt Loam	NCM
	33-43	Yellow Brown Sand	NCM
ST 9-12	0-20	Dark Brown Sandy Loam	NCM
	20-80	Brown Sandy Loam	NCM
	80-90	Light Yellow Brown Loamy Sand	NCM
ST 9-13	0-20	Medium Brown Silt Loam	NCM
	20-80	Med Brown Sand	NCM
	80-90	Gray Brown Sand	NCM
ST 9-14	0-23	Dark Brown Sandy Silt Loam	NCM
	23-60	Brown Silt Loam	NCM
	60-70	Gray Brown Sand Loam	NCM
ST 9-15	0-15	Dark Brown Sandy Silt Loam	NCM
	15-30	Brown Sandy Loam	NCM
	30-45	Gray Brown Sandy Loam	NCM
	45-65	Light Gray and Yellow Brown Sandy Clay Loam	NCM
	65-75	Light Gray and Yellow Brown Loamy Sand	NCM
ST 9-16	0-11	Dark Brown Sandy Silt Loam	NCM
	11-40	Brown Sand Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	40	Rock Impasse	NCM
ST 9-17	0-23	Dark Brown Sandy Silt Loam	NCM
	23-33	Brown Sand Loam	NCM
ST 9-18	0-31	Brown Sand	NCM
	31-57	Dark Brown Sandy Silt Loam	NCM
	57-67	Light Brown Sand	NCM
ST 9-19	0-25	Brown Sand	NCM
	25-42	Gray Brown Sandy Loam	NCM
	42-55	Light Brown Sandy Loam	NCM
	55-65	Yellow Brown Sand	NCM
ST 9-20	0-22	Brown Sand	NCM
	22-56	Brown Sandy Loam	NCM
	56-80	Yellow Brown Sandy Loam	NCM
	80-90	Yellow and Gray Loamy Sand	NCM
ST 9-21	0-27	Brown Sand	NCM
	27-75	Brown Sandy Silt Loam	NCM
	75-85	Yellow and Gray Loamy Sand	NCM
ST 9-22	0-36	Dark Brown Sandy Silt Loam	NCM
	36-46	Yellow Brown Sand	NCM
ST 9-23	0-21	Brown Sand	NCM
	21-35	Brown Sandy Loam	NCM
	35-40	Yellow Brown Sandy Loam	NCM
	40	Rock Impassse	NCM
ST 9-24	0-30	Brown Sand	NCM
	30-55	Brown Sandy Loam	NCM
	55-65	Yellow Brown Sandy Loam	NCM
ST 9-25	0-31	Brown Sand	NCM
	31-66	Brown Sandy Loam	NCM
	66-76	Yellow Brown Sandy Loam	NCM
ST 9-26	0-30	Brown Sand	NCM
	30-70	Dark Brown Sandy Loam	NCM
	70-100	Yellow Brown Sandy Loam	NCM
	100-110	Yellow and Gray Loamy Sand	NCM
ST 10-1	0-23	Brown Sand	NCM
	23-80	Brown Silty Clay Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 10-2	0-21	Brown Sandy Silt Loam	NCM
	21-72	Gray Brown Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	72-82	Yellow Brown Sand	NCM
ST 10-3	0-20	Dark Brown Silt Loam	NCM
	20-48	Gray Brown Sand	NCM
	48-82	Brown Sandy Loam	NCM
	82-92	Dark Gray Sand	NCM
ST 10-4	0-37	Dark Brown Silt Loam	NCM
	37-64	Gray Brown Silty Clay Loam	NCM
	64-74	Light Gray Clay Loam	NCM
ST 10-5	0-12	Dark Brown Silt Loam	NCM
	12-52	Brown Sand	NCM
	52-90	Dark Gray Brown Sandy Loam	NCM
	90-105	Dark Gray and Dark Yellow Brown Sandy Clay Loam	NCM
	105	Rock Impasse	NCM
ST 11-1	0-17	Dark Brown Sandy Silt Loam	NCM
	17-60	Brown Sand Loam	NCM
	60-70	Gray Sand	NCM
ST 11-2	0-10	Brown Silt Loam	NCM
	10	Buried Pipe	NCM
ST 11-3	0-19	Dark Brown Sandy Silt Loam	NCM
	19-81	Brown Sand Loam	NCM
	81-92	Brown and Gray Sandy Silt Loam	NCM
	92-102	Gray Sand	NCM
ST 11-4	0-53	Brown Sandy Silt Loam	NCM
	53-63	Dark Gray Brown Sand	NCM
ST 12-1	0-10	Brown Silt Loam	NCM
	10-38	Yellow Brown Sandy Clay Loam	NCM
	38-48	Yellow Brown Sand	NCM
ST 12-2	0-20	Brown Silt Loam	NCM
	20-65	Brown Sandy Silt Loam	NCM
	65-75	Rock and Sand	NCM
ST 12-3	0-41	Brown Silt Loam	NCM
	41-80	Brown Sandy Silt Loam	NCM
	80-90	Rock and Sand	NCM
ST 12-4	0-17	Dark Brown Sandy Silt Loam	NCM
	17-50	Brown Sandy Loam	NCM
	50-75	Light Brown Sandy Silt	NCM
	75-85	Light Brown Gravelly Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 12-5	0-9	Dark Brown Sandy Silt Loam	NCM
	9-61	Brown Sandy Loam	NCM
	61-82	Light Brown Sandy Silt	NCM
	82	Rock Impasse	NCM
ST 12-6	0-18	Brown Sandy Loam	NCM
	18-62	Brown Sand	NCM
	62-72	Gray Brown Loamy Sand	NCM
ST 12-7	0-31	Brown Sand	NCM
	31-86	Gray Brown Sandy Silt Loam	NCM
	86-96	Brown Sand	NCM
ST 12-8	0-29	Rocky Brown Sand	NCM
	29-71	Gray Brown Sandy Silt Loam	NCM
	71-81	Gray Brown Sand	NCM
ST 12-9	0-30	Dark Brown Silt Loam	NCM
	30	Rock Impasse	NCM
ST 12-10	0-58	Brown Sandy Silt Loam	NCM
	58-68	Yellow Brown Sandy Loam	NCM
ST 12-11	0-24	Medium Brown Silt Loam	NCM
	24-40	Yellow Brown Sandy Silt Loam	NCM
	40-50	Gray Brown Sand	NCM
ST 12-12	0-22	Brown Silt Loam	NCM
	22-53	Brown Sandy Silt Loam	NCM
	53	Rock Impasse	NCM
ST 12-13	0-14	Dark Brown Silt Loam	NCM
	14-28	Yellow Brown Sandy Silt Loam	NCM
	28	Rock Impasse	NCM
ST 12-14	0-38	Brown Sandy Silt Loam	NCM
	38	Rock Impasse	NCM
ST 13-1	0-12	Dark Brown Sandy Silt Loam	NCM
	12-48	Brown Sandy Silt Loam	NCM
	48	Rock Impasse	NCM
ST 13-2	0-53	Dark Brown Sandy Silt Loam	NCM
	53-69	Brown Sandy Silt Loam	NCM
	69-79	Brown Sand	NCM
ST 13-3	0-20	Brown Sandy Loam	NCM
	20-35	Brown Sand	NCM
	35-45	Gray Brown Loamy Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 14-1	0-24	Brown Silt Loam	NCM
	24-80	Brown Sandy Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 14-2	0-21	Brown Sandy Silt Loam	NCM
	21-65	Gray Brown Sandy Silt Loam	NCM
	65-75	Yellow Brown Sand	NCM
ST 14-3	0-14	Dark Brown Sandy Loam	NCM
	14-43	Light Brown Sandy Silt Loam	NCM
	43-90	Gray Brown Sandy Loam	NCM
	90	Light Gray Sand	NCM
ST 14-4	0-39	Brown Sandy Silt Loam	NCM
	39-92	Dark Brown Sandy Silt Loam	NCM
	92-106	Gray Brown Sandy Loam	NCM
	106-126	Light Gray Sand	NCM
ST 14-5	0-38	Brown Silt Loam	NCM
	38-80	Yellow Brown Sandy Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 14-6	0-34	Dark Brown Sandy Loam	NCM
	34-108	Gray Brown Sandy Silt Loam	NCM
	108-118	Light Gray Clay Loam	NCM
ST 14-7	0-15	Dark Brown Sandy Silt Loam	NCM
	15-35	Brown Sandy Loam	NCM
	35-57	Brown Sand	NCM
	57-75	Dark Gray Brown Silt Loam	NCM
	75-102	Brown Silt Loam	NCM
	102-112	Gravelly Loam	NCM
ST 14-8	0-53	Brown Sandy Silt Loam	NCM
	53-63	Gray Sand	NCM
ST 14-9	0-60	Brown Sandy Silt Loam	NCM
	60-70	Brown Sand	NCM
ST 14-10	0-51	Brown Sandy Silt Loam	NCM
	51-90	Gray Brown Sandy Loam	NCM
	90-100	Gray Sand	NCM
ST 14-11	0-59	Brown Sandy Silt Loam	NCM
	59-69	Gray Sand	NCM
ST 15-1	0-43	Brown Sandy Silt Loam	NCM
	43	Rock Impasse	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 15-2	0-37	Dark Brown Sandy Silt Loam	NCM
	37-44	Gravelly Red Brown Silty Clay Loam	NCM
	44	Rock Impasse	NCM
ST 15-3	0-29	Brown Sandy Silt Loam	NCM
	29-42	Light Brown Sandy Silt Loam	NCM
	42	Rock Impasse	NCM
ST 16-1	0-11	Dark Brown Sandy Silt Loam	NCM
	11	Rock Impasse	NCM
ST 16-2	0-20	Dark Brown Sandy Silt Loam	NCM
	20	Rock Impasse	NCM
ST 16-3	0-31	Brown Sandy Silt Loam	NCM
	31	Rock Impasse	NCM
ST 16-4	0-37	Brown Sandy Silt Loam	NCM
	37-47	Red Brown Sand	NCM
ST 16-5	0-35	Brown Sandy Silt Loam	NCM
	35	Rock Impasse	NCM
ST 16-6	0-21	Brown Sandy Silt Loam	NCM
	21-33	Gravelly Dark Yellow Brown Loamy Sand	NCM
	33-43	Dark Yellow Brown Sandy Gravel	NCM
ST 16-7	0-36	Brown Sandy Silt Loam	NCM
	36-46	Light Gray Brown Sandy Gravel	NCM
ST 17-1	0-35	Brown Sandy Loam	NCM
	35	Rock Impasse	NCM
ST 17-2	0-34	Brown Sandy Loam	NCM
	34	Rock Impasse	NCM

Civil Engineering

Environmental Services

Geotechnical Engineering

Structural Engineering

Land Surveying

Homeland Security

Site Acquisition

Program/Construction Management

Construction Inspection & Materials Testing

TECTONIC

Practical Solutions, Exceptional Service

Corporate Headquarters:

□0 Pleasant Hill Road, P.O.Box □□

Mountainville, New York 10□□□

Phone□□□00□□□□-□□□1

Additional Office Locations:

□lbany, New York

□lbu□uer□ue, New Mexico

Boca Raton, Florida

Charlotte, North Carolina

Hartford, Connecticut

New York, New York

Short Hills, New Jesey

Newburgh, New York

Phoenix, □ri□ona

Pittsburgh, Pennsylvania

Rochester, New York

Richmond, Virginia

Tampa, Florida

www.tectonicengineering.com

July 27, 2016

Chet Brooks, Chief
Delaware Tribe of Indians, Delaware Tribal Headquarters
5100 Tuxedo Blvd
Bartlesville, OK 74006

Re: Section 106 Compliance for the Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, NY – New York Rising Community Reconstruction Program

Dear Chief Chet Brooks:

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), an office 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"), is serving as the entity responsible for compliance with the HUD environmental review procedures set forth in 24 CFR Part 58. GOSR is acting on behalf of HUD in providing the enclosed project information and inviting this discussion with your Tribe to respond with any concerns or comments.

GOSR processes environmental reviews for projects funded with HUD CDBG-DR on a case by case basis. GOSR proposes to provide funding for a stormwater management improvements project in Clarkstown, New York. In accordance with Section 101(d)(6)(B) of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 302706(b)), and its implementing regulations, 36 Code of Federal Regulations (CFR) Part 800, this letter serves as notification of the proposed action. This consultation is being sent to the Delaware Nation, the Delaware Tribe of Indians and the Stockbridge-Munsee Community Band of Mohicans.

Area of Potential Effect: The Clarkstown Cranford Drive Drainage Improvements Project is a stormwater management improvement project involving the modification and realignment of a tributary of the West Branch Hackensack, also known as the Demarest Kill, located in the Town of Clarkstown, Rockland County, New York (Project location maps are included in **Attachment 1**). This work includes modification of existing on-site drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

Proposed Project Description: The proposed work will be performed in six phases to reduce the potential for erosion (Project site plans are included in Attachment 2). Phase 1 will begin at the Old Route 304 bridge, and the subsequent phases will move south down the Demarest Kill. Approximately 4,650 linear feet of the bed and banks of the Demarest Kill, located south of Old Route 304 and running approximately parallel to Cranford Drive, will be realigned and reinforced. The redesign of the stream channel incorporates a multi-channel design, including a normal low flow channel (thalwag), a bank full channel, and the floodplain channel. Backflow preventers will be installed at all drainage pipes out letting into the stream channel to prevent backflow from the channel flooding onto the roadway.

A drainage study of the Demarest Kill was commissioned by the Rockland County Drainage Agency in 1991, where a survey elevation error was discovered as presented in the 1983 Flood Insurance Study (FIS). An elevation difference of approximately five (5) feet was noted in the vicinity of Old Route 304 and Cranford Drive. As such, the Base Flood Elevations (BFE's), established from the 100-year flood level, were approximately five feet lower in this area than what they should have been. Subsequently, a number of homes built before and around 1991 were located within the 100-year flood zone on the 2000 revision of the FIS for Rockland County. As such, the proposed project's objectives are to alleviate flooding in and around the houses and streets currently within the 100-year flood zone by modifying the Demarest Kill channel and floodplain to appropriate dimensions to contain a one-percent flood within the channel banks.

Phase 1 of the proposed project involves 3,240 square feet (SF) of riprap being installed on either side of the three (3) existing 16-foot x 8.5-foot concrete box culverts at Old Route 304 (Project site plans are included in **Attachment 2**). Modular block retaining walls will be located on the south side of the three culverts, with a 165-SF gabion check dam in place to divert low flow waters into a single culvert. The existing stream channel is to be realigned, with a 190-SF rock cross-vein and 145-SF "W" rock weir being located in the proposed stream channel. A temporary stream crossing will be constructed using three (3) 30-inch x 20-foot high-density polyethylene (HDPE) pipes covered by approximately 20 cubic yards (CY) of ¾-inch aggregate fill placed on a filter fabric. There will be approximately one (1) foot of the ¾-inch aggregate fill placed on both sides and on top of the 20-foot pipes. A total of 32 trees of 8-inch diameter or larger are proposed to be removed during Phase 1.

Phase 1A of the proposed project involves approximately a boulder cluster of approximately 6 to 10 CY to be placed next to 3,950 SF of riprap before the proposed stream alignment connects to the existing streambed. A 145-SF "W" rock weir will be placed on the south portion of this area, where the proposed streambed diverges from the existing streambed. A total of 44 trees of an 8-inch or larger diameter are proposed to be removed during Phase 1A.

Phase 2 and Phase 3 run approximately parallel with one another, with Phase 2 involving work to create the proposed stream channel on the eastern bank and Phase 3 work on the western bank to fill in the existing stream and reinforce the streambed. Phase 2 work involves a modular block retaining wall being placed on the northeastern edge of the streambank. A 145-SF "W" rock weir is located at the proposed streambed south of the retaining wall. Two (2) boulder clusters containing approximately 6 to 10 CY of rocks each will be placed along the proposed streambed during Phase 2, with brush matting being placed during Phase 3. An approximately 190-SF rock cross-vein is located north of a second temporary stream crossing, as described in Phase 1. Approximately 450 SF of brush matting will be placed on both sides of the streambed located north of the 18,900 SF of riprap reinforcing the junction of the tributary traveling west under Cranford Drive (See Phase 6 for the tributary work). The brush matting and riprap will be placed on the eastern side during Phase 2, and on the western side during Phase 3. The southern portion of the Phase 2 section includes placement of approximately 90 SF of riprap for a sewer crossing, a third temporary stream crossing as described in Phase 1, and 150 feet for a boulder revetment to reinforce the new streambed curve on the western bank of the z-curve. Approximately 270 trees with diameters 8" or greater will be removed during Phase 2, while approximately 64 trees with diameters 8 inches or greater will be removed during Phase 3.

Phase 4 and Phase 5 also run approximately parallel to one another, with Phase 4 occurring on the eastern bank and Phase 5 occurring on the western bank. Phase 5 also overlaps the southern tip of Phase 2. Phase 5 involves placement of a 150-foot boulder revetment to reinforce the new streambed curve on the eastern bank of the z-curve, with a 190-SF rock cross-vein located to the south of the boulder revetment. Approximately 175 SF of brush matting will be located on the eastern bank, north of approximately 2,800

SF of riprap for sewer crossings at the southern tip of the work area. Approximately 225 SF of brush matting will be placed on the western bank and approximately 65 feet of boulder revetment on the eastern bank, both located south of the sewer crossing riprap. Approximately 16 trees with diameters 8 inches or greater will be removed during Phase 4, while approximately 67 trees with diameters 8 inches or greater will be removed during Phase 5.

Phase 6 involves work on the tributary traveling west under Cranford Drive. The riprap from Phase 2 and Phase 3 ends at the eastern side of Cranford Drive. The western banks will have stabilized construction entrances from Cranford Drive. The stream will be staying in approximately the same footprint as the existing streambed, but it will be reinforced with two boulder clusters of approximately 6 to 10 CY, with a single 180-SF "W" rock weir and two (2) 210-SF rock cross-veins. Approximately 82 trees with diameters 8 inches or greater will be removed during Phase 6. As the stream stabilization and restoration work is completed, habitat improvements including approximately 674 major trees, 156 minor trees, 1,790 shrubs, and 4,010 ground-cover plants will be planted along the stream banks to replace the removed trees, shrubs, and grasses.

The project will involve approximately 8,000 cubic yards of excavation material at the site. The top-soil will be stripped, stockpiled, and respread on the site. Excavated boulders and stones will be reused in the channels for stabilization, and the excess soils will be disposed of at approved locations. The project is not located in a defined archaeological sensitive buffer zone.

Pursuant to NHPA Section 106, GOSR has initiated consultation with the State Historic Preservation Office (SHPO) concerning this Project and its potential to affect historic resources that are listed on or eligible for listing on the NRHP. No determination has been received from SHPO to date. GOSR is completing an environmental review for this project pursuant to HUD NEPA regulations. If the Area of Potential Effect encompasses historic properties of religious or cultural significance to your Tribe please respond within 30 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.

Sincerely,

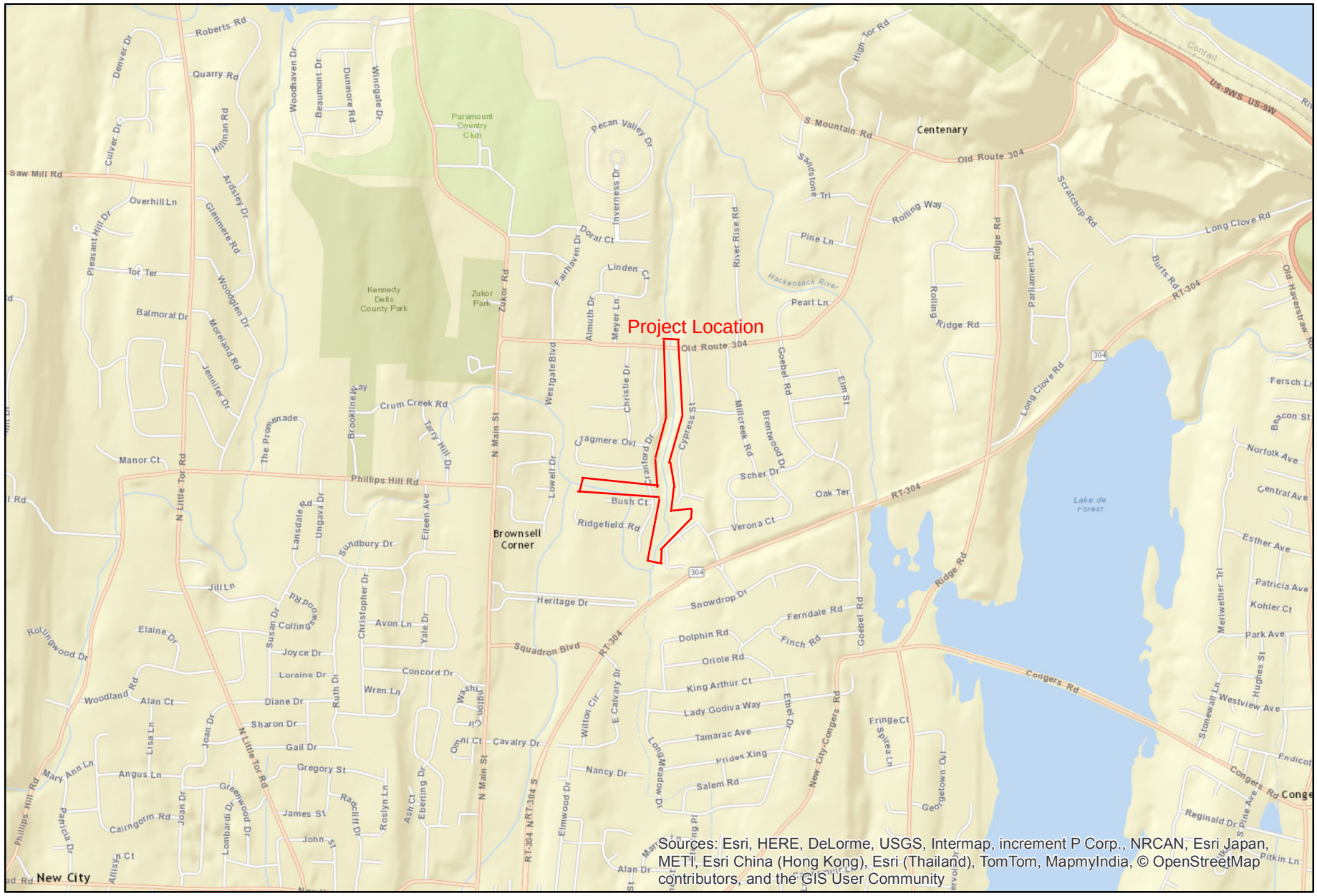
Thomas J. King
Assistant General Counsel and Certifying Officer
Governor's Office of Storm Recovery

Enclosures:
Attachment 1: Project Location Maps
Attachment 2: Project Site Plans (included as part of the NYSDEC Permit)

Electronic letter sent to:
Susan Bachor
Delaware Tribe of Indians Historic Preservation Representative
P.O. Box 64
Pocono Lake, PA 73005

Attachment 1

Project Location Maps



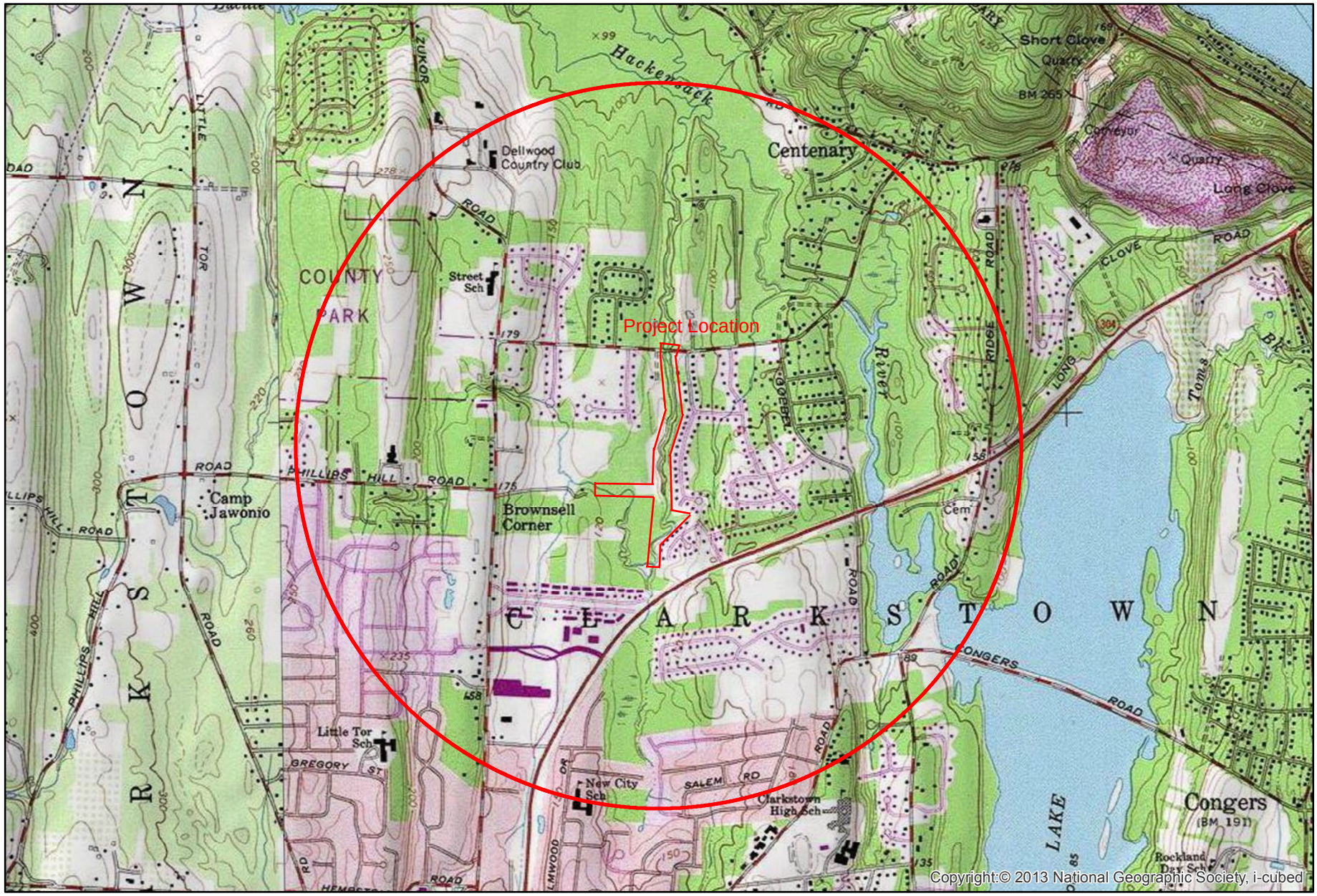
TECTONIC
Practical Solutions, Exceptional Service

0 0.25 0.5 1 Miles

1:24,000

STREET MAP
CRANFORD DRIVE
CLARKSTOWN, NY 10956
ROCKLAND COUNTY

N
W E
S



TECTONIC

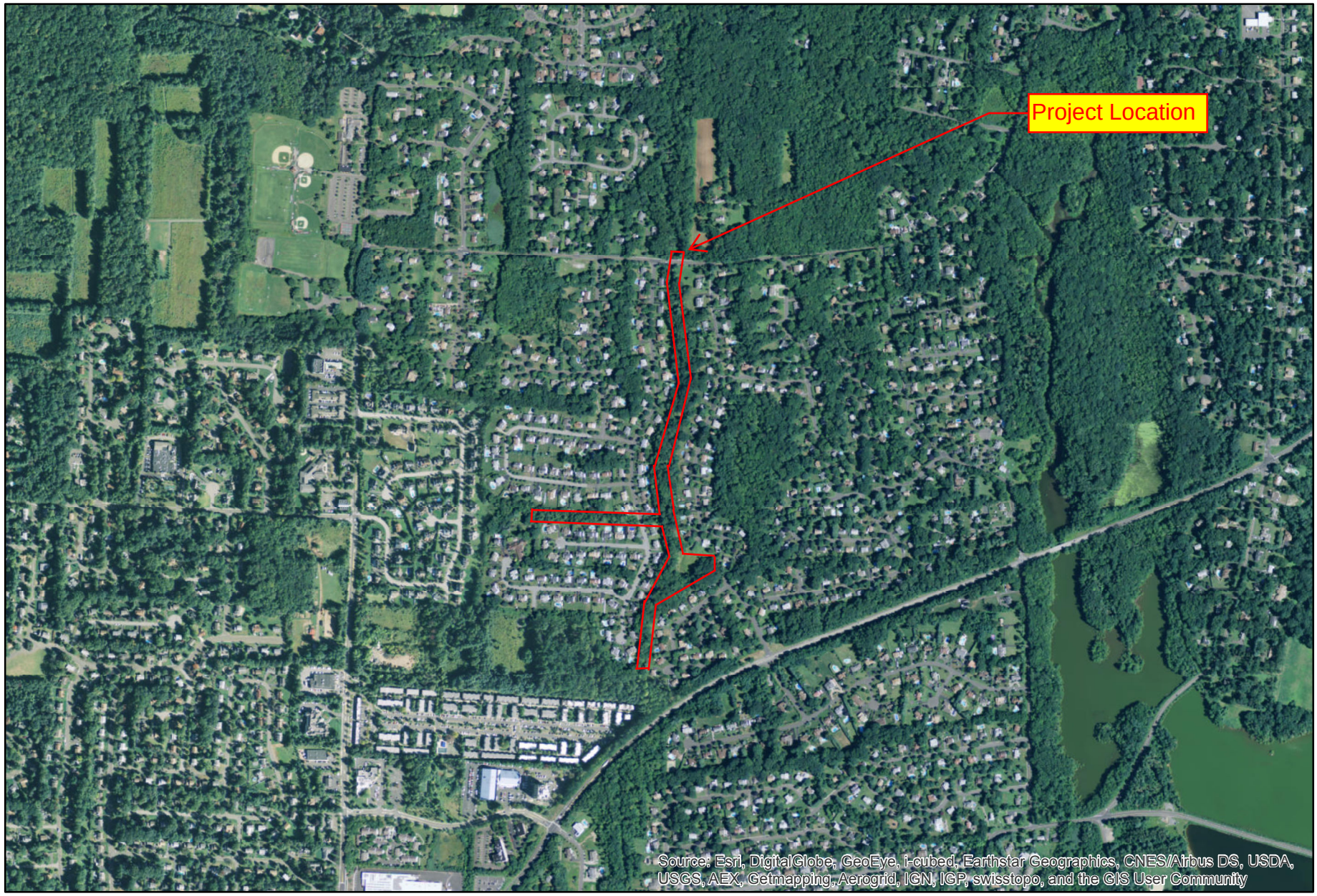
Practical Solutions, Exceptional Service

0 0.25 0.5 1 Miles

1:24,000

TOPOGRAPHIC MAP
CRANFORD DRIVE
CLARKSTOWN, NY 10956
ROCKLAND COUNTY

N
W E
S



TECTONIC

Practical Solutions, Exceptional Service

0 0.125 0.25 0.5 Miles

1:13,000

AERIAL IMAGERY
CRANFORD DRIVE
CLARKSTOWN, NY 10956
ROCKLAND COUNTY

N
W E
S

Attachment 2

Project Site Plans
(included as part of the NYSDEC Permit)

PERMIT

Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
TOWN OF CLARKSTOWN
10 MAPLE AVE
NEW CITY, NY 10956-5013
(845) 639-6200

Facility:
DEMAREST KILL FLOOD CONTROL
CRANFORD DR
CLARKSTOWN, NY 10956

Facility Location: in CLARKSTOWN in ROCKLAND COUNTY
Facility Principal Reference Point: NYTM-E: 585.638 NYTM-N: 4557.648
Latitude: 41°09'56.3" Longitude: 73°58'45.0"

Authorized Activity: Modification and realignment of approximately 4,650 linear feet of the bed and banks of a tributary of West Branch Hankensack [Water Index No. NJ-1-12-3, Class C(T)], also known as the Demarest Kill, in accordance with project plans referenced in Natural Resource Condition #1 and as conditioned by this permit. The authorized activities are associated with the Town's Cranford Drive Flood Amelioration Project.

Permit Authorizations

Stream Disturbance - Under Article 15, Title 5
Permit ID 3-3920-00297/00010
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

Water Quality Certification - Under Section 401 - Clean Water Act
Permit ID 3-3920-00297/00011
New Permit Effective Date: 7/20/2016 Expiration Date: 12/31/2020

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: JOHN W PETRONELLA, Deputy Regional Permit Administrator
Address: NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY 12561

Authorized Signature: John W. Petronella Date 7 / 19 / 2016

JRM

Distribution List

US ARMY CORPS OF ENGINEERS - NY DISTRICT
BRIAN DRUMM
DENNIS LETSON, DEPT. OF ENVIRONMENTAL CONTROL, TOWN OF CLAKSON

Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

WATER QUALITY CERTIFICATION SPECIFIC CONDITION

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Permit Attachments

Project Location Map (Attachment I)
Site Plan (Attachment II)
Permit Sign

NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: STREAM DISTURBANCE; WATER QUALITY CERTIFICATION

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by Town of Clarkstown's Department of Environmental Control, titled "Cranford Drive Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets) (Attachment II) .

2. **Post Permit Sign** The permit sign enclosed with this permit shall be posted in a conspicuous location on the worksite and adequately protected from the weather.

3. **Notice of Intent to Commence Work** The permittee shall notify Brian Drumm, DEC Bureau of Habitat, via electronic mail (brian.drumm@dec.ny.gov) at least 48 hours in advance of the time of commencement of each phase described in plans referenced in Natural Resource Condition No. 1.

4. **Floodplain Regulations** The project must meet all local and federal floodplain regulations.

5. **Phase Project to Reduce Erosion** To reduce the potential for erosion, the project shall be constructed in six phases as defined in the plans approved by this permit and provided as an enclosure to the US Army Corps of Engineers New York District's Public Notice issued April 11, 2016 (Public Notice Number: NAN-2014-00305-ESW). Such plans are titled "Cranford Drive, Flood Amelioration Project, Town of Clarkstown, New City, New York", dated 6/29/15, and last revised 11/19/15 (31 sheets).

All activities within the phase must be fully completed and stablized prior to commencing project activities for the next phase.

6. **Maintain Water Flow During Work** During periods of work activity, sufficient flow of water shall be maintained at all times to sustain aquatic life downstream.

7. **Temporary Diversion Channel** A temporary diversion channel, culvert or pump-around shall be constructed to prevent running water in the work area. The area of temporary diversion must be restored to its original condition following completion of the work. If a diversion channel is used, its sides and bottom shall be protected by rock riprap or other suitable non-erodible materials to prevent scour and erosion.

8. **No Impedance to Aquatic Organisms** Structures must not impede upstream and downstream migration of aquatic organisms.

9. **No Turbidity from Dewatering** No turbid water resulting from dewatering operations shall be discharged directly to or allowed to enter the stream. Such water shall be pumped to settling basins or to an upland vegetated area prior to any discharge to the stream. All other necessary measures shall be implemented to prevent any visible increase in turbidity or sedimentation downstream of the work site.

10. **Straw Bales or Other Downslope of Work Area** Bales of straw or other effective means to control erosion are to be used on the downslope edge of any disturbed areas. This barrier to sediments is to be put in place before any disturbance of the ground occurs and is to be maintained in good condition until all disturbed land is heavily vegetated.

11. **Temporary Seeding of Disturbed/ Stockpiled Soils** All disturbed areas where soil is temporarily exposed or stockpiled for more than one month shall be stabilized with a temporary seeding or ground cover.

12. **Clean Fill Only** All fill material utilized for this project shall consist of uncontaminated earthen materials only. Acceptable fill materials include gravel, rock, overburden, topsoil and similar natural mineral resources.

13. **Work During Low Flows** All work shall be performed during low flow conditions.

14. **Materials Removed from Bed and Banks** Any debris or excess materials from construction of this project shall be immediately and completely removed from the bed and banks of all water areas to an appropriate upland area for disposal.

15. **Dredgings Disposed at Upland Site** All dredged and excavated material shall be disposed of on an upland site and be suitably stabilized so that it cannot reasonably re-enter any water body or wetland area.

16. **Seed, Mulch Disturbed Soils** All areas of soil disturbance resulting from this project (above the mean high water line) shall be seeded with an appropriate perennial grass seed and mulched with straw within one week of final grading. Mulch shall be maintained until a suitable vegetative cover is established.

17. **Temporary Mulch, Final Seeding** If seeding is impracticable due to the time of year, a temporary mulch shall be applied and final seeding shall be performed at the earliest opportunity when weather conditions favor germination and growth but not more than six months after project completion.

18. **Precautions Against Contamination of Waters** All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

19. **State May Order Removal or Alteration of Work** If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

20. **State May Require Site Restoration** If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

21. **State Not Liable for Damage** The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

WATER QUALITY CERTIFICATION SPECIFIC CONDITIONS

1. Water Quality Certification The authorized project, as conditioned pursuant to the Certificate, complies with Section 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act, as amended and as implemented by the limitations, standards, and criteria of state statutory and regulatory requirements set forth in 6 NYCRR Section 608.9(a). The authorized project, as conditioned, will also comply with applicable New York State water quality standards, including but not limited to effluent limitations, best usages and thermal discharge criteria, as applicable, as set forth in 6 NYCRR Parts 701, 702, 703, and 704.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. Facility Inspection by The Department The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. Relationship of this Permit to Other Department Orders and Determinations Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. Applications For Permit Renewals, Modifications or Transfers The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC Region 3 Headquarters
21 S Putt Corners Rd
New Paltz, NY12561

4. Submission of Renewal Application The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Stream Disturbance, Water Quality Certification.

5. Permit Modifications, Suspensions and Revocations by the Department The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. Permit Transfer Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

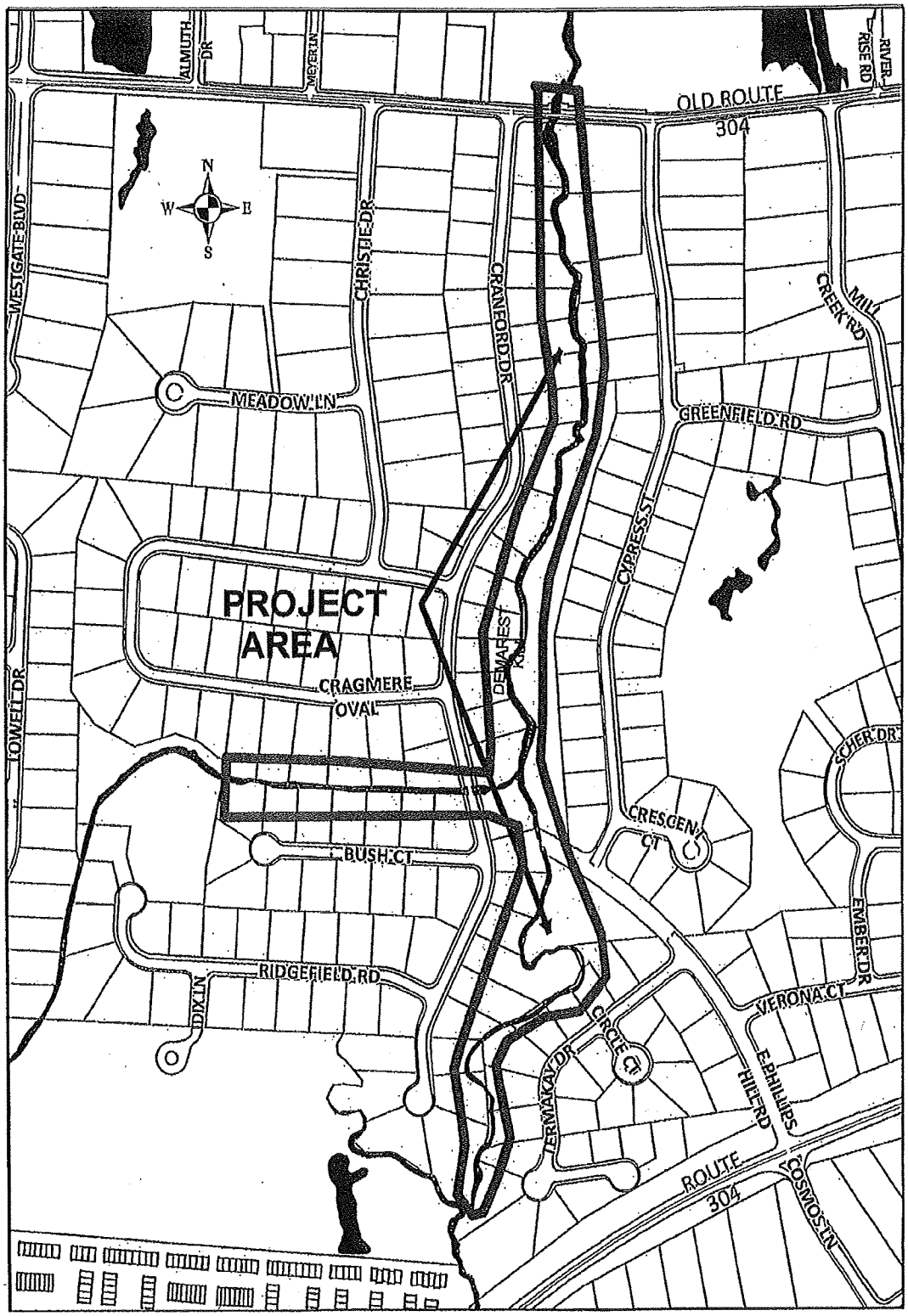
Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

Item E: SEQR Type I Action, No Significant Impact Under the State Environmental Quality Review Act (SEQR), the project associated with this permit is classified as a Type I Action with Clarkson Town Board designated as the lead agency. It has been determined that the project will not have a significant effect on the environment.

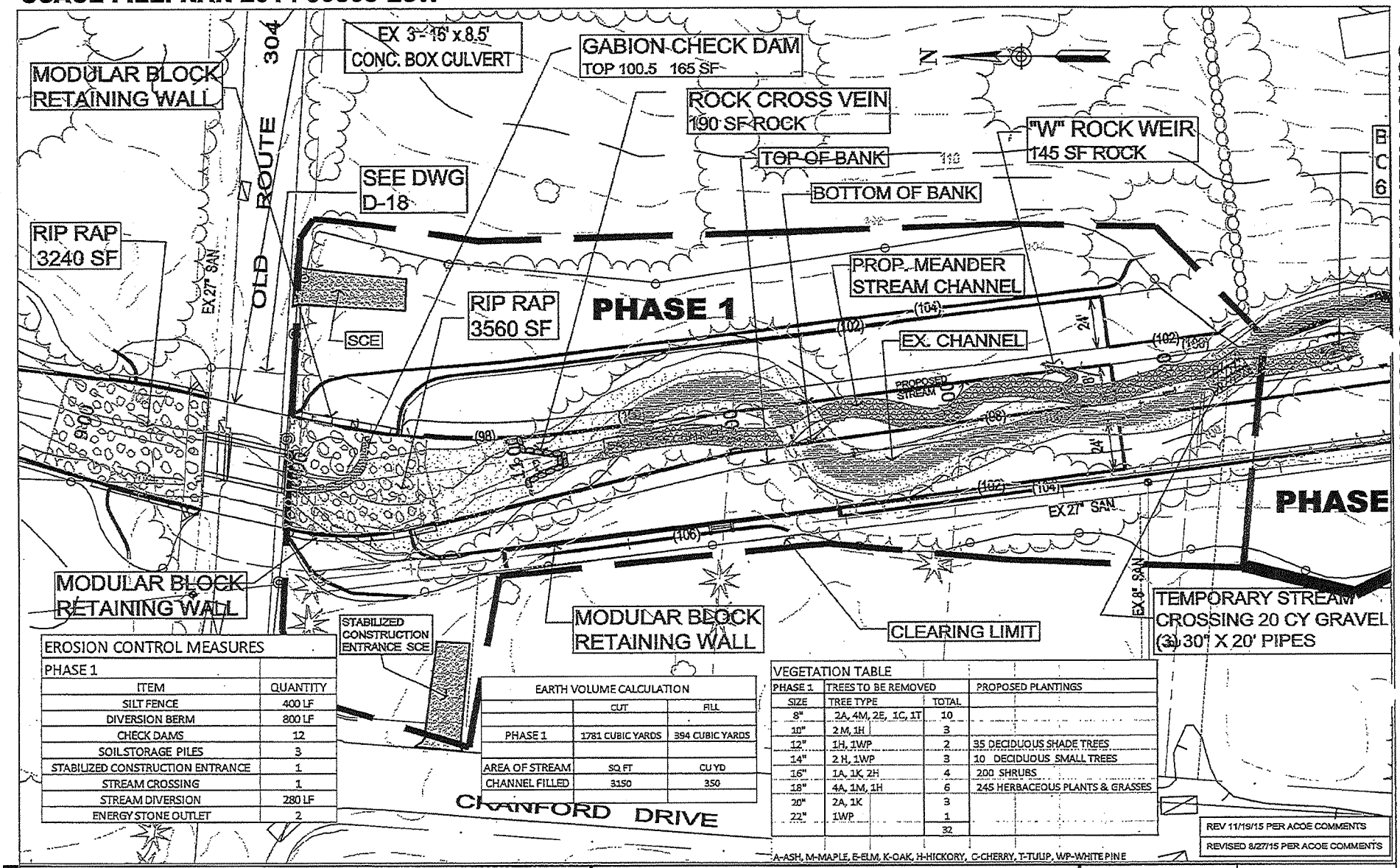
Project Location Map (Attachment I)

USACE FILE: NAN-2014-00305-ESW



500 250 0 500 Feet

CRANFORD DRIVE
FLOOD AMELIORATION PROJECT
TOWN OF CLARKSTOWN
NEW CITY, NEW YORK



EROSION CONTROL MEASURES	
PHASE 1	
ITEM	QUANTITY
SILT FENCE	400 LF
DIVERSION BERM	800 LF
CHECK DAMS	12
SOILSTORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	280 LF
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1	1781 CUBIC YARDS	394 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT 3150	CU YD 350

VEGETATION TABLE			
PHASE 1	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	2A, 4M, 2E, 1C, 1T	10	
10"	2 M, 1H	3	
12"	1H, 1WP	2	35 DECIDUOUS SHADE TREES
14"	2 H, 1WP	3	10 DECIDUOUS SMALL TREES
16"	1A, 1K, 2H	4	200 SHRUBS
18"	4A, 1M, 1H	6	245 HERBACEOUS PLANTS & GRASSES
20"	2A, 1K	3	
22"	1WP	1	
		32	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY, T-TULIP, WP-WHITE PINE

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

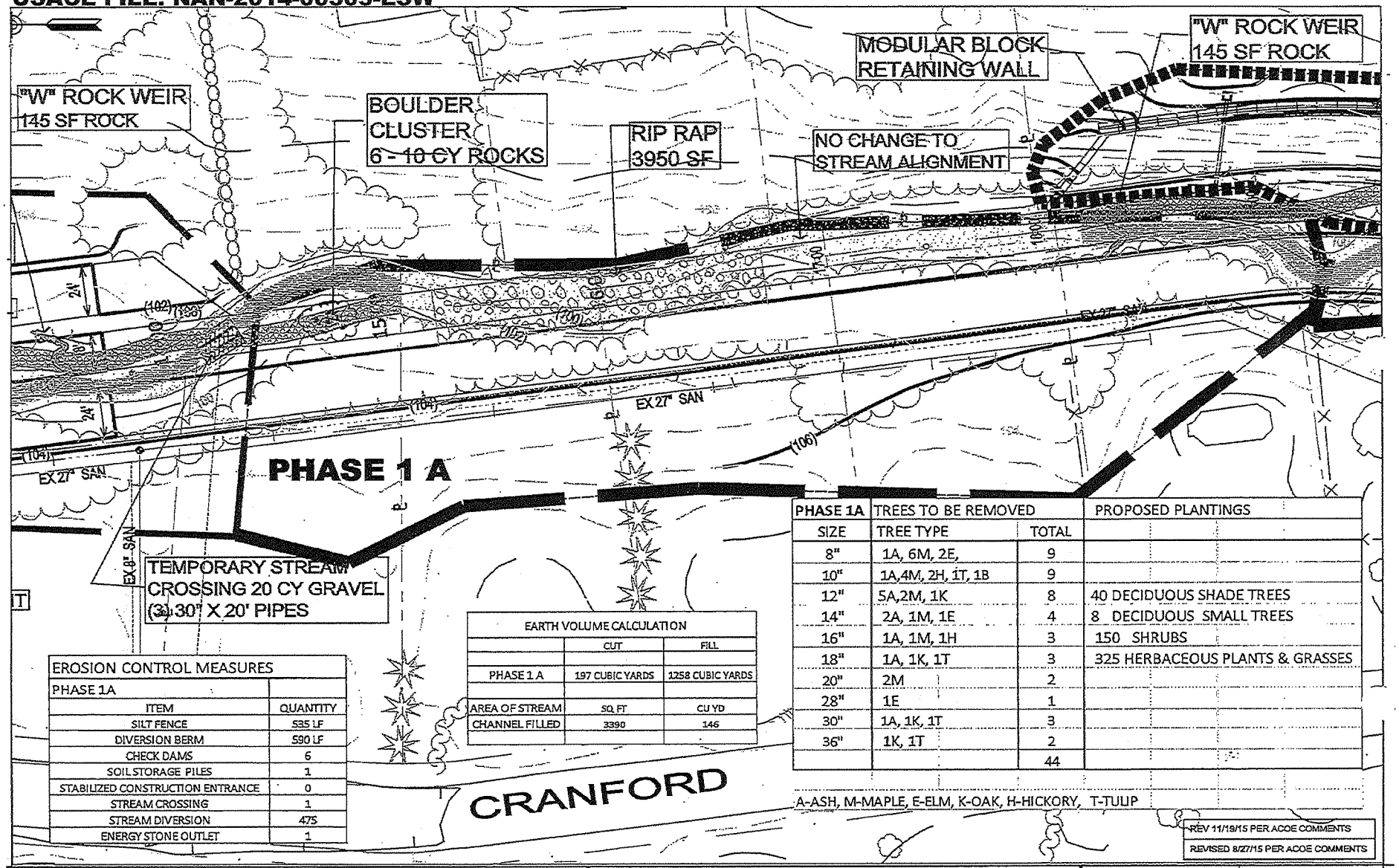
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-1
SHEET _1_ OF _31_ SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

Site Plan (Attachment 1)



EROSION CONTROL MEASURES	
PHASE 1A	
ITEM	QUANTITY
SILT FENCE	535 LF
DIVERSION BERM	590 LF
CHECK DAMS	6
SOIL STORAGE PILES	1
STABILIZED CONSTRUCTION ENTRANCE	0
STREAM CROSSING	1
STREAM DIVERSION	475
ENERGY STONE OUTLET	1

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 1 A	197 CUBIC YARDS	1258 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ. FT	CU YD
	3390	146

PHASE 1A	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1A, 6M, 2E,	9	
10"	1A,4M, 2H, 1T, 1B	9	
12"	5A,2M, 1K	8	40 DECIDUOUS SHADE TREES
14"	2A, 1M, 1E	4	8 DECIDUOUS SMALL TREES
16"	1A, 1M, 1H	3	150 SHRUBS
18"	1A, 1K, 1T	3	325 HERBACEOUS PLANTS & GRASSES
20"	2M	2	
28"	1E	1	
30"	1A, 1K, 1T	3	
36"	1K, 1T	2	
		44	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

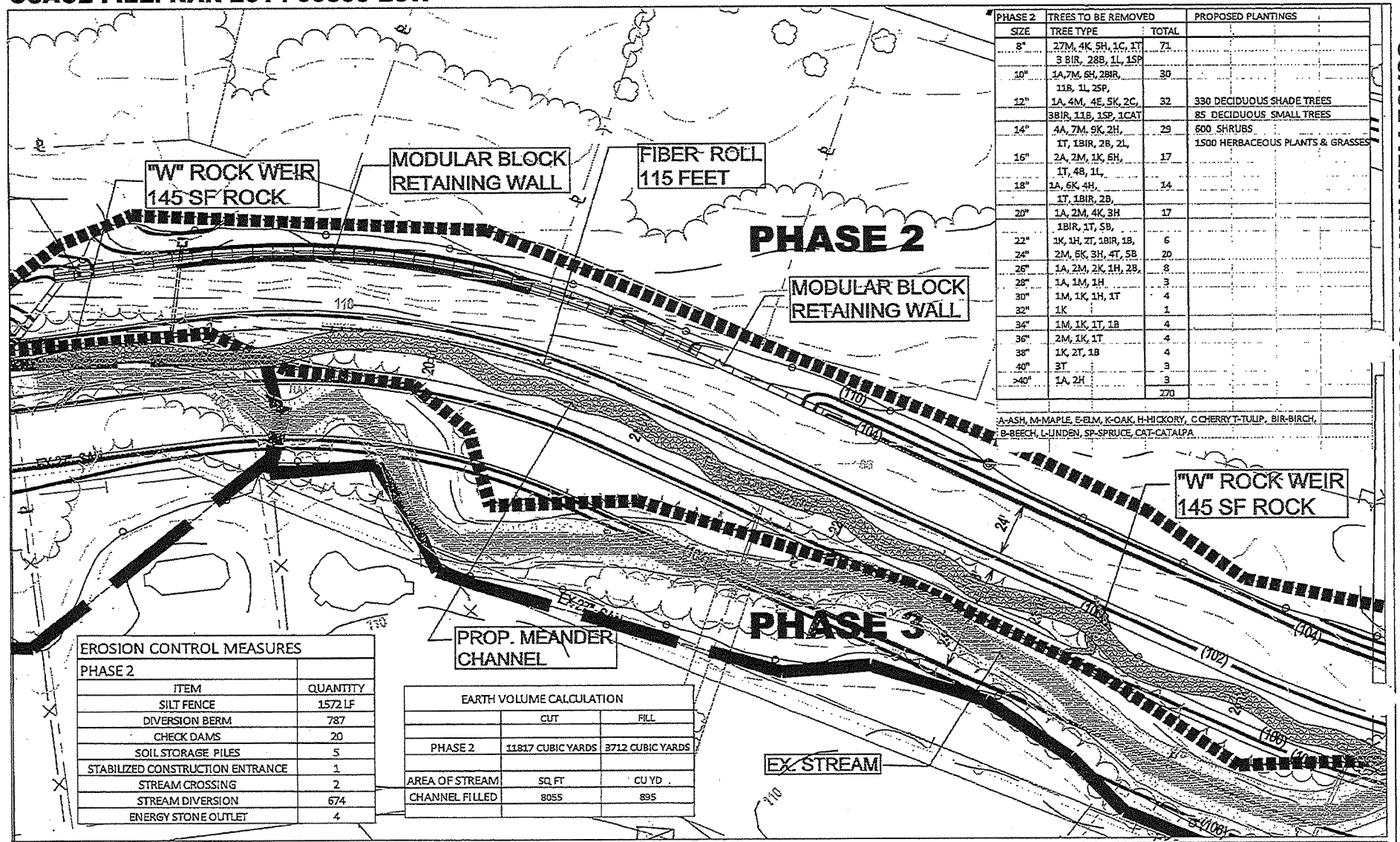
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-2
SHEET 2 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 2	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	27M, 4K, 5H, 1C, 1T 3 BIR, 28B, 1L, 1SP	71	
10"	1A,7M, 6H, 2BIR, 11B, 1L, 2SP,	30	
12"	1A, 4M, 4E, 5K, 2C, 3BIR, 11B, 1SP, 1CAT	32	330 DECIDUOUS SHADE TREES
			85 DECIDUOUS SMALL TREES
14"	4A, 7M, 9K, 2H, 1T, 1BIR, 2B, 2L,	29	600 SHRUBS
16"	2A, 2M, 1K, 6H, 1T, 4B, 1L,	17	1500 HERBACEOUS PLANTS & GRASSES
18"	1A, 6K, 4H, 1T, 1BIR, 2B,	14	
20"	1A, 2M, 4K, 3H 1BIR, 1T, 5B,	17	
22"	1K, 1H, 2T, 1BIR, 1B,	6	
24"	2M, 6K, 3H, 4T, 5B	20	
26"	1A, 2M, 2K, 1H, 2B,	8	
28"	1A, 1M, 1H	3	
30"	1M, 1K, 1H, 1T	4	
32"	1K	1	
34"	1M, 1K, 1T, 1B	4	
36"	2M, 1K, 1T	4	
38"	1K, 2T, 1B	4	
40"	3T	3	
>40"	1A, 2H	3	
		270	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, C-CHERRY T-TULIP, BIR-BIRCH, B-BEECH, L-LINDEN, SP-SPRUCE, CAT-CATALPA

EROSION CONTROL MEASURES	
PHASE 2	
ITEM	QUANTITY
SILT FENCE	1572 LF
DIVERSION BERM	787
CHECK DAMS	20
SOIL STORAGE PILES	5
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	2
STREAM DIVERSION	674
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 2	11817 CUBIC YARDS	3712 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	8055	895

REV 11/19/15 PER ACOE COMMENTS | REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL

10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

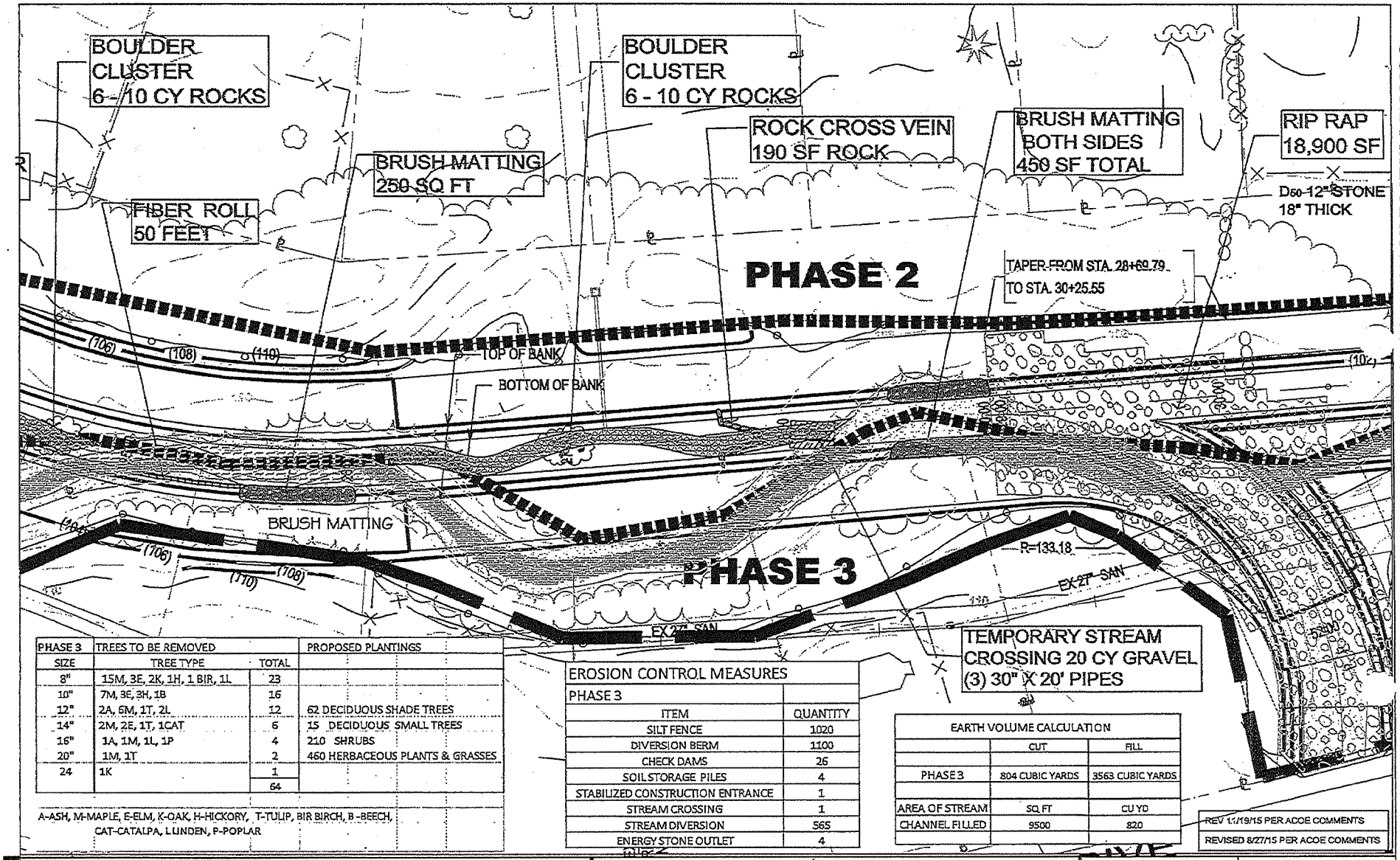
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-3

SHEET _3_ OF _31 SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 3	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	15M, 3E, 2K, 1H, 1 BIR, 1L	23	
10"	7M, 3E, 3H, 1B	16	
12"	2A, 6M, 1T, 2L	12	62 DECIDUOUS SHADE TREES
14"	2M, 2E, 1T, 1CAT	6	15 DECIDUOUS SMALL TREES
16"	1A, 1M, 1L, 1P	4	210 SHRUBS
20"	1M, 1T	2	460 HERBACEOUS PLANTS & GRASSES
24	1K	1	
		64	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, CAT-CATALPA, L LINDEN, P-POPLAR

EROSION CONTROL MEASURES	
PHASE 3	
ITEM	QUANTITY
SILT FENCE	1020
DIVERSION BERM	1100
CHECK DAMS	26
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	565
ENERGY STONE OUTLET	4

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 3	804 CUBIC YARDS	3563 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	9500	820

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

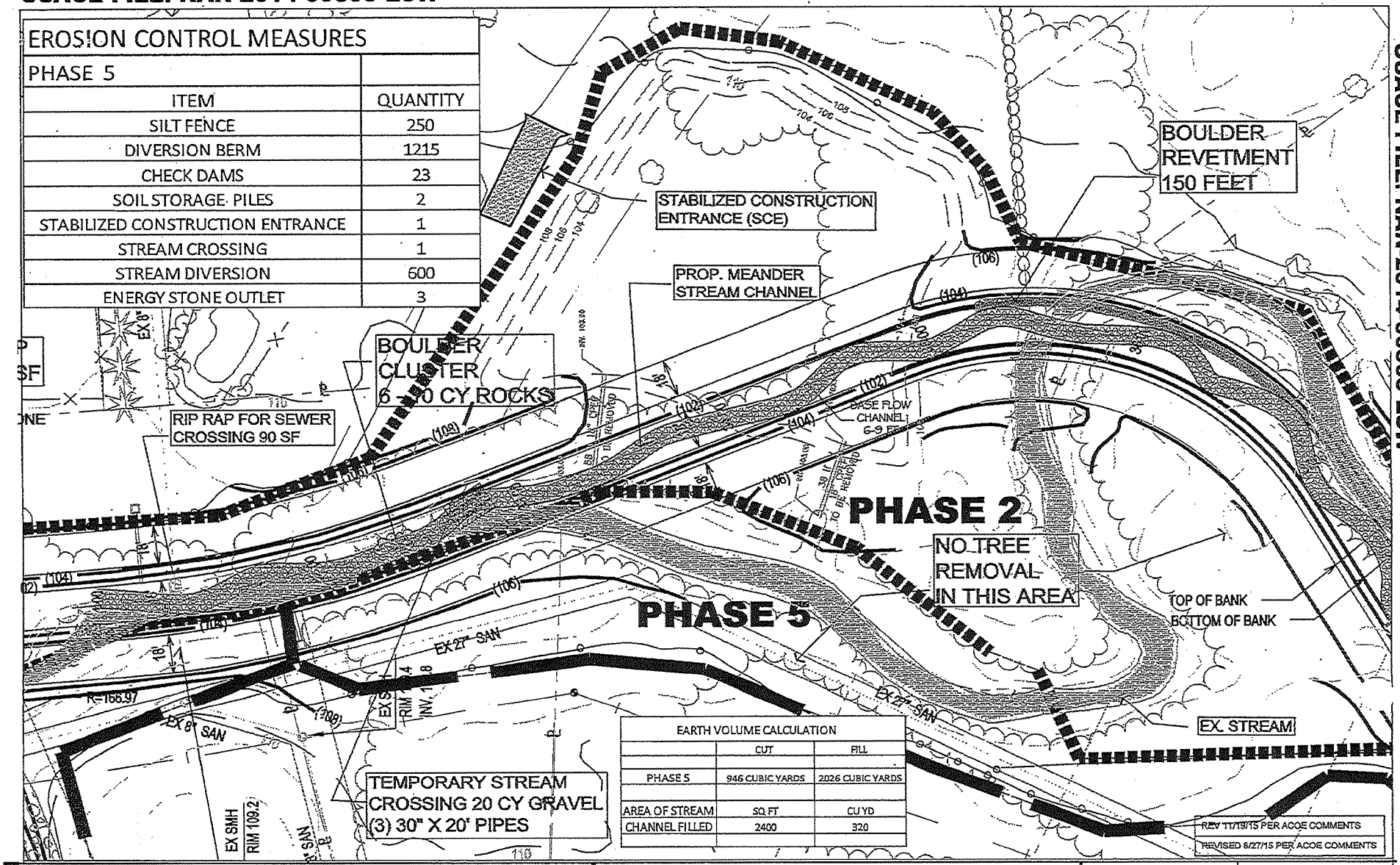
SITE LAYOUT PLAN
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-4
SHEET 4 OF 31 SHTS.
DRAWING FILE: e:\engineering\cranford drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

EROSION CONTROL MEASURES	
PHASE 5	
ITEM	QUANTITY
SILT FENCE	250
DIVERSION BERM	1215
CHECK DAMS	23
SOIL STORAGE PILES	2
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	600
ENERGY STONE OUTLET	3



EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 5	946 CUBIC YARDS	2026 CUBIC YARDS
AREA OF STREAM CHANNEL FILLED	SQ FT	CU YD
	2400	320

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

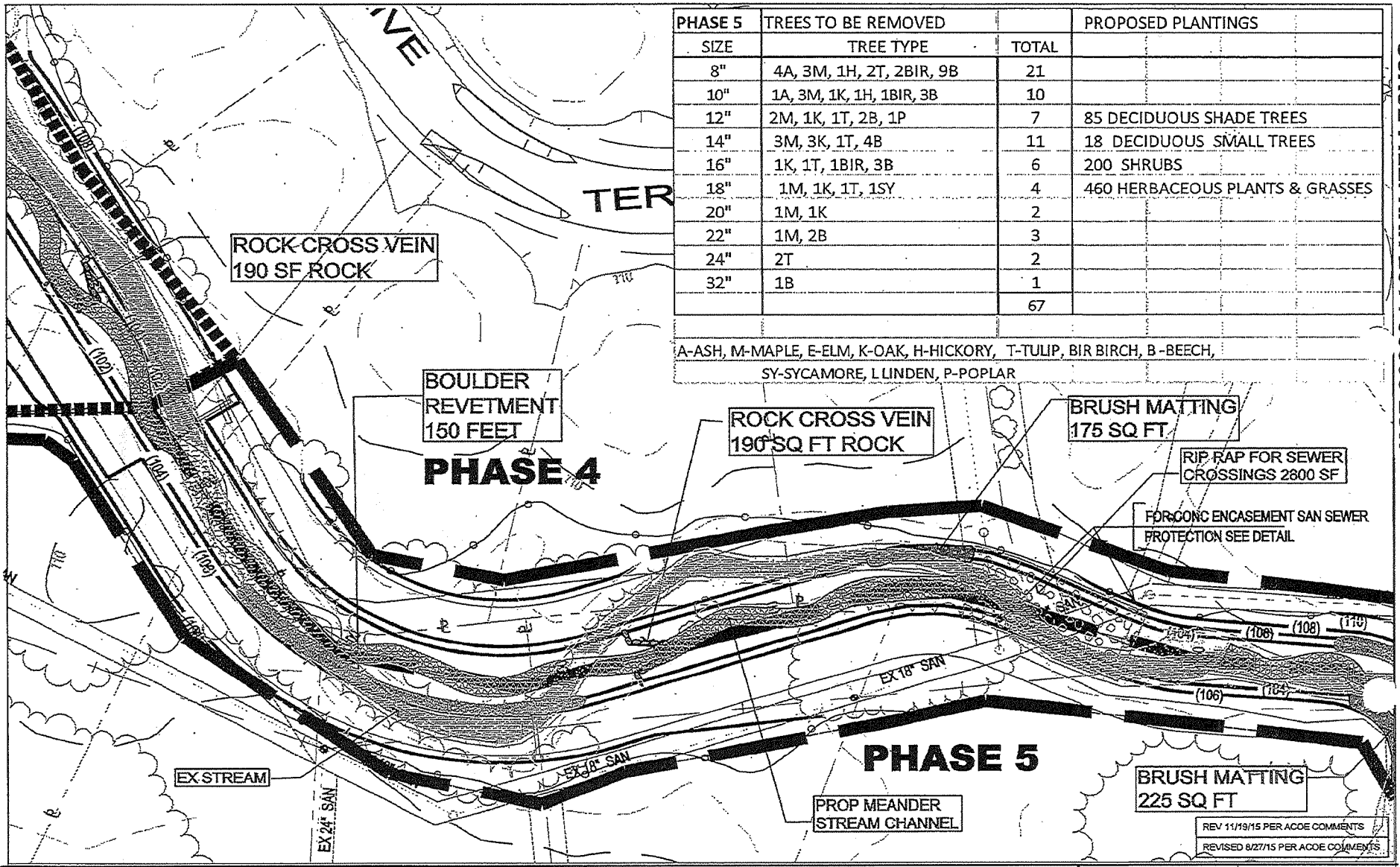
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	KOZ
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-5
SHEET 5 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

PHASE 5	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	4A, 3M, 1H, 2T, 2BIR, 9B	21	
10"	1A, 3M, 1K, 1H, 1BIR, 3B	10	
12"	2M, 1K, 1T, 2B, 1P	7	85 DECIDUOUS SHADE TREES
14"	3M, 3K, 1T, 4B	11	18 DECIDUOUS SMALL TREES
16"	1K, 1T, 1BIR, 3B	6	200 SHRUBS
18"	1M, 1K, 1T, 1SY	4	460 HERBACEOUS PLANTS & GRASSES
20"	1M, 1K	2	
22"	1M, 2B	3	
24"	2T	2	
32"	1B	1	
		67	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B-BEECH, SY-SYCAMORE, L LINDEN, P-POPLAR



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

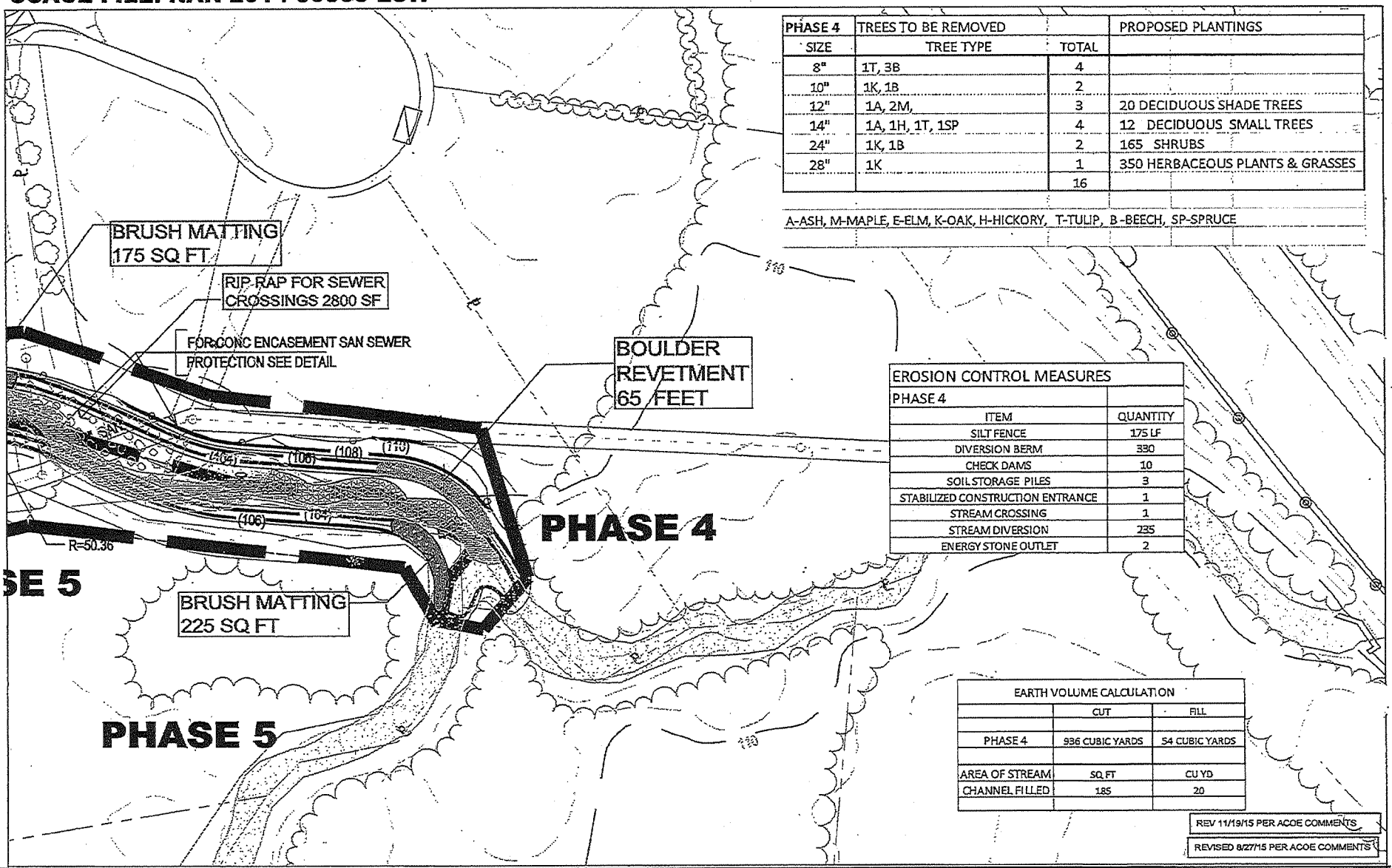
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-6

SHEET _6_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe



PHASE 4	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	1T, 3B	4	
10"	1K, 1B	2	
12"	1A, 2M,	3	20 DECIDUOUS SHADE TREES
14"	1A, 1H, 1T, 1SP	4	12 DECIDUOUS SMALL TREES
24"	1K, 1B	2	165 SHRUBS
28"	1K	1	350 HERBACEOUS PLANTS & GRASSES
		16	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, B-BEECH, SP-SPRUCE

EROSION CONTROL MEASURES	
PHASE 4	
ITEM	QUANTITY
SILT FENCE	175 LF
DIVERSION BERM	330
CHECK DAMS	10
SOIL STORAGE PILES	3
STABILIZED CONSTRUCTION ENTRANCE	1
STREAM CROSSING	1
STREAM DIVERSION	235
ENERGY STONE OUTLET	2

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 4	936 CUBIC YARDS	54 CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	185	20

REV 11/19/15 PER ACOE COMMENTS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

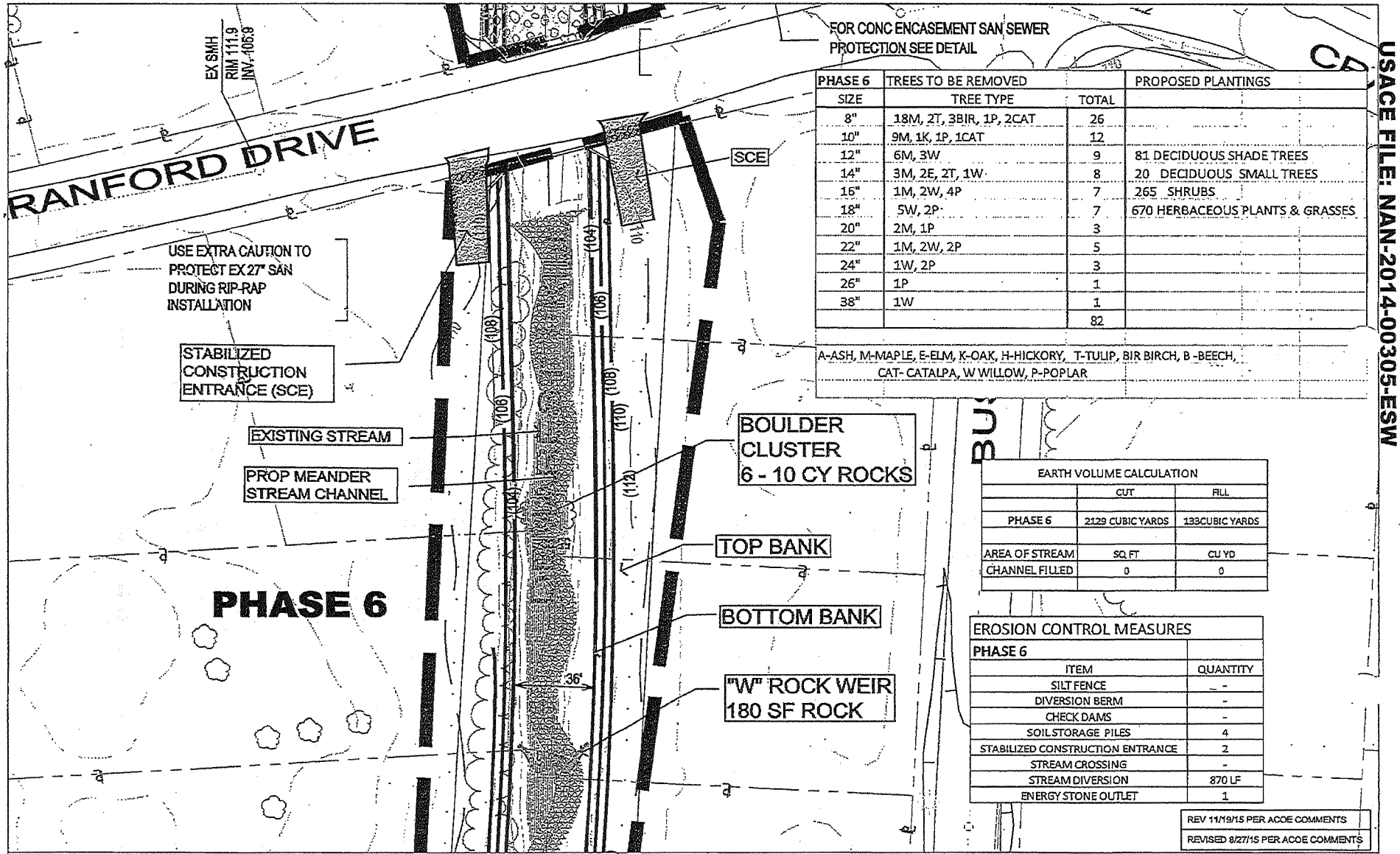
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-7

SHEET _7_ OF _31_ SHTS.

DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PHASE 6	TREES TO BE REMOVED		PROPOSED PLANTINGS
SIZE	TREE TYPE	TOTAL	
8"	18M, 2T, 3BIR, 1P, 2CAT	26	
10"	9M, 1K, 1P, 1CAT	12	
12"	6M, 3W	9	81 DECIDUOUS SHADE TREES
14"	3M, 2E, 2T, 1W	8	20 DECIDUOUS SMALL TREES
16"	1M, 2W, 4P	7	265 SHRUBS
18"	5W, 2P	7	670 HERBACEOUS PLANTS & GRASSES
20"	2M, 1P	3	
22"	1M, 2W, 2P	5	
24"	1W, 2P	3	
26"	1P	1	
38"	1W	1	
		82	

A-ASH, M-MAPLE, E-ELM, K-OAK, H-HICKORY, T-TULIP, BIR BIRCH, B -BEECH, CAT- CATALPA, W WILLOW, P-POPLAR

EARTH VOLUME CALCULATION		
	CUT	FILL
PHASE 6	2129 CUBIC YARDS	133CUBIC YARDS
AREA OF STREAM	SQ FT	CU YD
CHANNEL FILLED	0	0

EROSION CONTROL MEASURES	
PHASE 6	
ITEM	QUANTITY
SILT FENCE	-
DIVERSION BERM	-
CHECK DAMS	-
SOIL STORAGE PILES	4
STABILIZED CONSTRUCTION ENTRANCE	2
STREAM CROSSING	-
STREAM DIVERSION	870 LF
ENERGY STONE OUTLET	1

REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

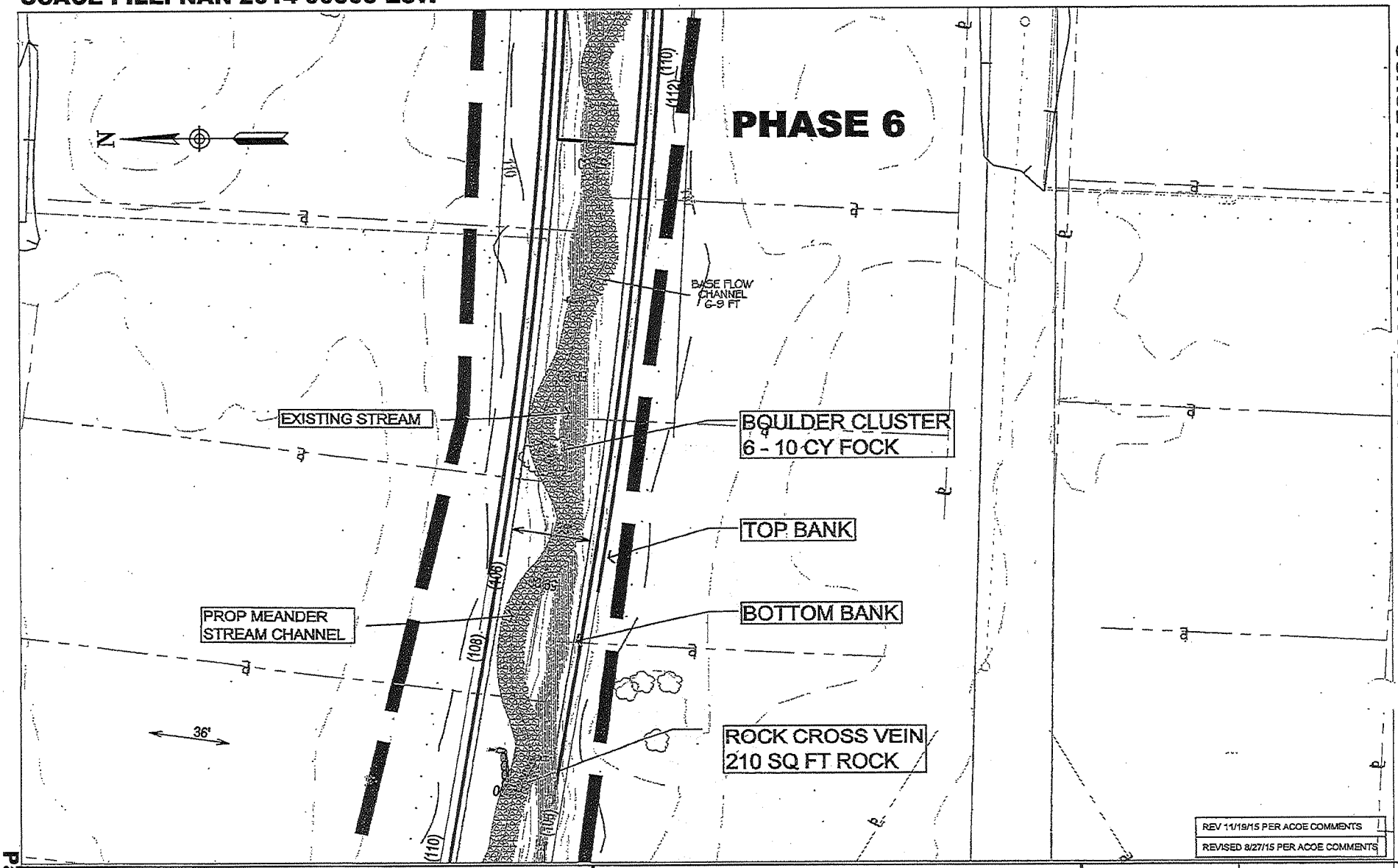
SITE LAYOUT PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.: 30-2005
DATE: 6/29/15
SCALE: 1" = 60'
DESIGN BY:
DRAWN BY: RH
CHECKED BY: DML / KLK

DRAWING NO.: S-8
SHEET 8 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

SITE LAYOUT PLAN

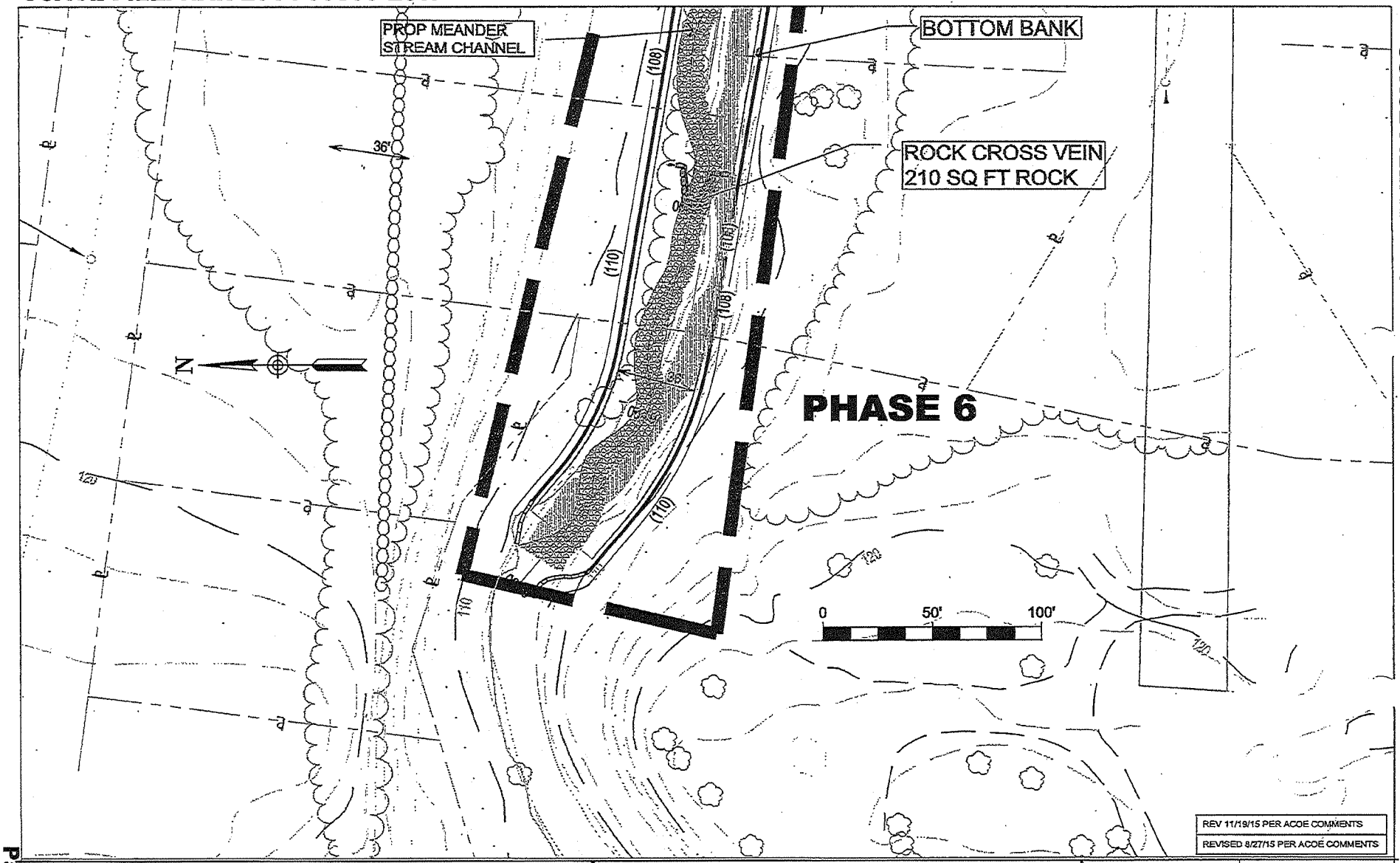
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: S-9

SHEET _9_ OF _31_ SHTS.

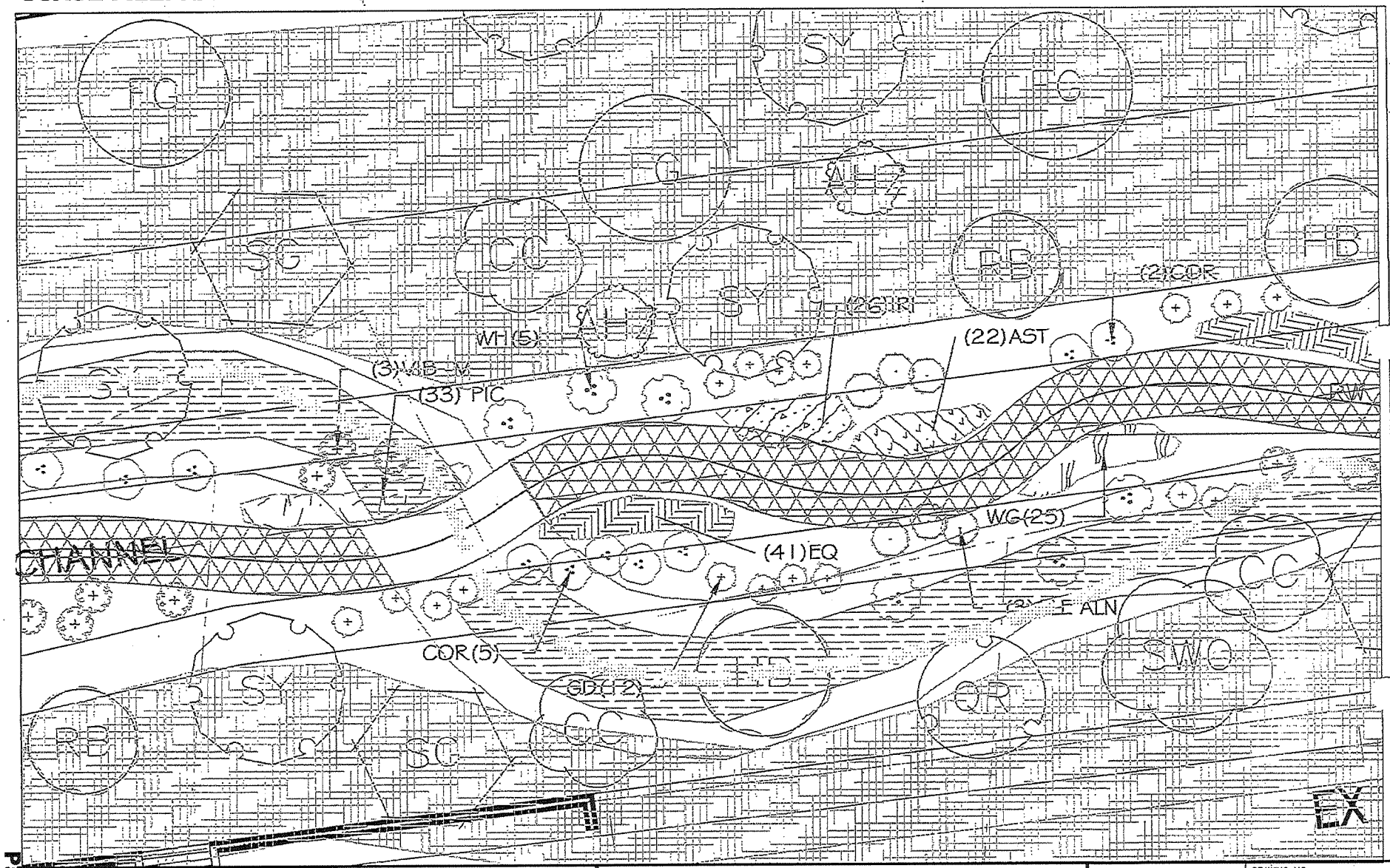
DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



REV 11/19/15 PER ACOE COMMENTS
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	SITE LAYOUT PLAN	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWING NO.: S-10 SHEET 10 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	**TYPICAL CHANNEL PLANTING**	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: 1" = 60' DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: **L-1** SHEET _11_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
RM	18	Red Maple / Acer rubrum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
SM	18	Sugar Maple / Acer saccharum	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AML	10	Allegheny Serviceberry / Amelanchier laevis		7 gal	6-8` HT
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
CAR	15	Shagbark Hickory / Carya ovata	B & B	2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
RB	9	River Birch / Betula nigra	B & B	10` ht
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
PP	9	Paper Birch / Betula papynfera	B & B	2" CAL
	9			7 GAL	1/2" CAL
	9			3 GAL	3-4' HT
HB	8	American Hornbeam / Carpinus caroliniana		B & B	2" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
CC	9	Eastern Redbud / Cercis canadensis	B & B	2" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
AHZ	24	American Hazelnut / Corylus americana		7 gal	4-5` HT
FG	19	Green Ash / Fraxinus pennsylvanica	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
HL	15	Sunburst Honey Locust / Gleditsia triacanthos `Sunburst`	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT

TREES	QTY	COMMON NAME / BOTANICAL NAME	CONT	SIZE
SG	17	Sweet Gum / Liquidambar styraciflua	B & B	2 1/2-3" CAL
	10			7 GAL	1/2" CAL
	10			3 GAL	3-4' HT
LT	10	Tulip Tree / Liriodendron tulipifera	B & B	2 1/2-3" CAL
	12			7 GAL	1/2" CAL
	12			3 GAL	3-4' HT
N	15	Sour Gum / Nyssa sylvatica	B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
BE	10	Box Elder / Acer negundo		6-8` HT
	10			7 GAL	4-5' HT
	10			3 GAL	3-4' HT
PA	5	Norway Spruce / Picea abies	B & B	6-8` HT
	15			7 GAL	4-5' HT
	15			3 GAL	3-4' HT
WP	11	White Pine / Pinus strobus	B & B	6-7` HT
	15			B & B	4-5' HT
	15			3 GAL	3-4' HT
SY	18	American Sycamore / Platanus occidentalis		B & B	2 1/2-3" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
SWO	10	Swamp White Oak / Quercus bicolor		B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	15			3 GAL	3-4' HT
PO	18	Pin Oak / Quercus palustris	B & B	2 1/2-3" CAL
	18			7 GAL	1/2" CAL
	18			3 GAL	3-4' HT
QR	10	Red Oak / Quercus rubra	B & B	2-2 1/2" CAL
	15			7 GAL	1/2" CAL
	18		3 GAL	3-4' HT
TD	6	Bald Cypress / Taxodium distichum		B & B	5-6` HT
	5			B & B	3-4' HT
	15			3 GAL	2-3' HT

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-2
SHEET _12 OF _31_ SHTS.
DRAWING FILE: z:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

PLANT SCHEDULE

SHRUB AREAS

QTY		COMMON NAME / BOTANICAL NAME	CON	SPACING
AM3	122	Chokeberry / Aronia melanocarpa	2 gal	72"
CLE	110	Summersweet Clethra / Clethra alnifolia	2 gal	60"
CAM	155	Silky Dogwood / Cornus amonum	2 gal	72"
CG	168	Gray Dogwood / Cornus racemosa	2 gal	60"
HV	165	Common Witch Hazel / Hamamelis virginiana	2 gal	84"
ITE	65	Virginia Sweetspire / Itea virginica `Virginia`	2 gal	68"
IX	160	Winterberry Ilex verticillata	2 gal	60"
LIN	132	Spicebush / Lindera benzoin	2 gal	60"
ELD	60	Elderberry / Sambucus canadensis	2 gal	58"
VAC	188	Highbush Blueberry / Vaccinium corymbosum	2 gal	72"
VW	180	Arrowwood Viburnum / Viburnum dentatum	1 gal	72"
VA	130	Alleghany Viburnum Viburnum x rhytidophylloides	2 gal	72"
LEN	155	NANNYBERRY / VIBURNUM LENTAGO	2 gal	80"

GROUND COVERS

	QTY	COMMON NAME / BOTANICAL NAME		
AST	950	New York Aster / Aster novi-belgii	2 1/4" pots	24"
EQ	680	Dwarf Horsetail / Equisetum scirpoides	flat	20"
IRI	880	Blue Flag / Iris versicolor	2 1/4" pots	24"
PIC	680	Pickerel Weed / Pontederia cordata	2 1/4" pots	24"
WG	820	Wool Grass / Scirpus cyperinus	2 1/4" pots	24"

SUMMARY OF PLANTINGS

MAJOR TREES	674
MINOR TREES	156
SHRUBS	1790
GROUND COVER	4010

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

LANDSCAPE PLAN

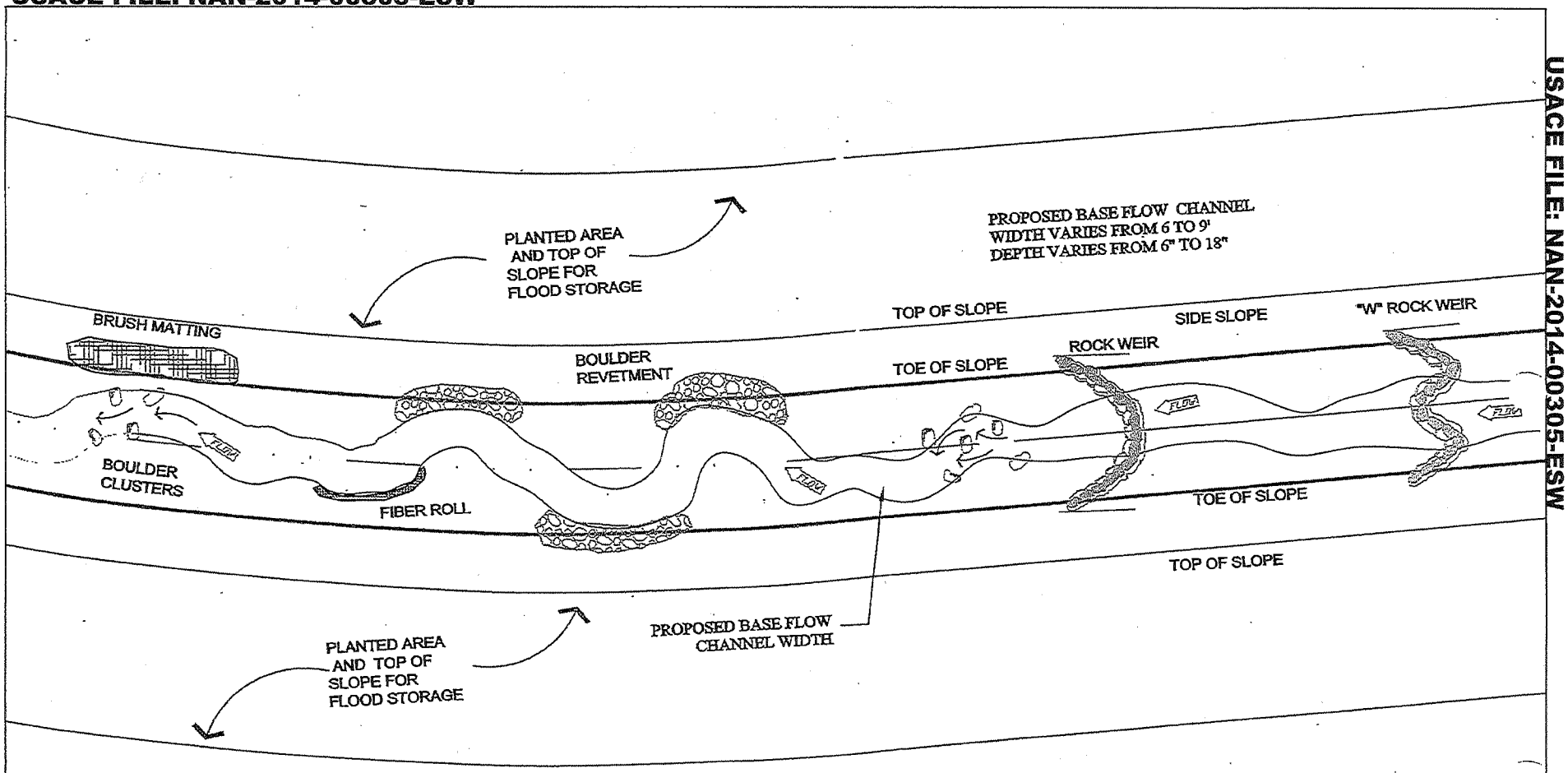
CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	1" = 60'
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: L-3

SHEET 13 OF 31 SHTS.

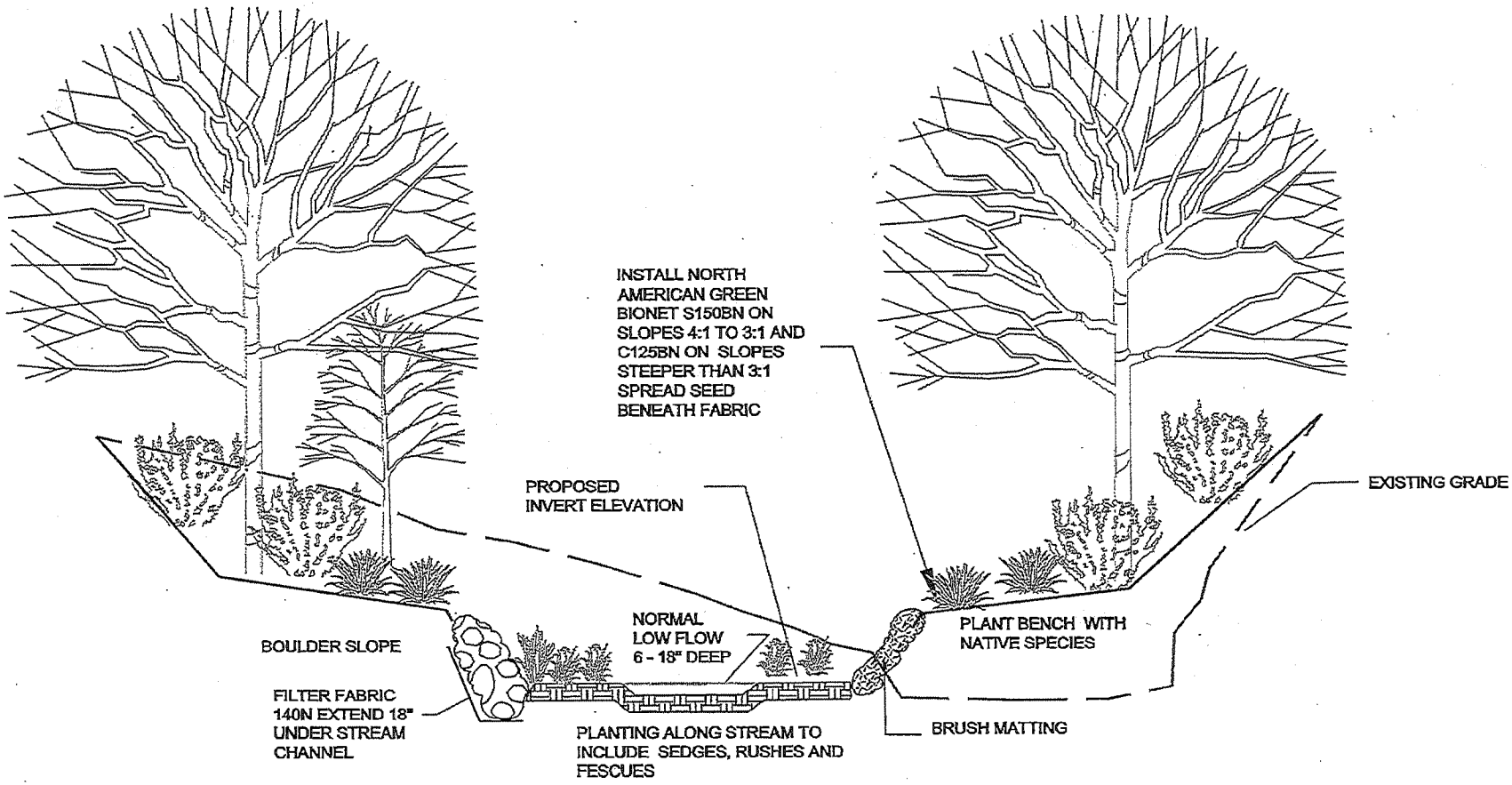
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe



CHANNEL TREATMENT MEASURES
SEE SITE PLAN AND DETAIL SHEETS
FOR LOCATIONS OF EACH TREATMENT

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-1 SHEET 14 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: x:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW

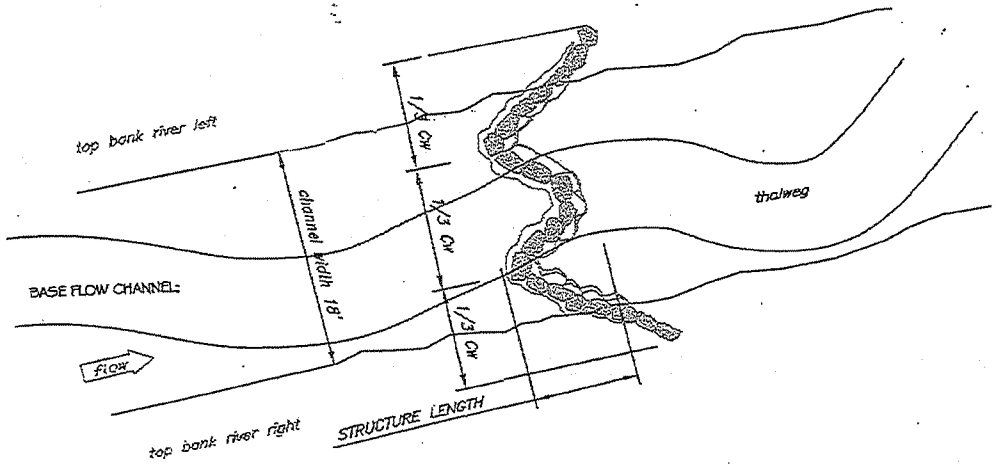


TYPICAL CHANNEL SECTION & STABILIZATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

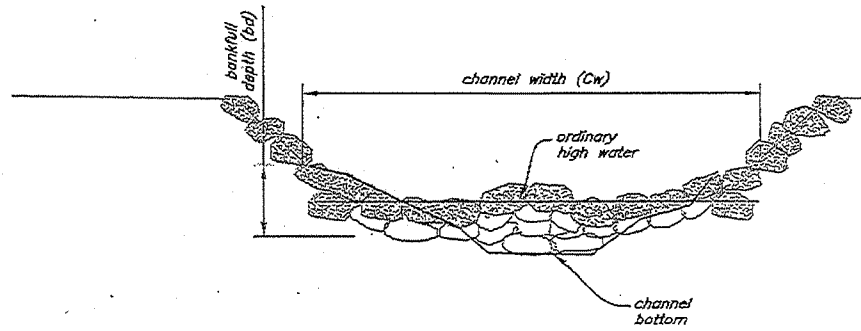
TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-2 SHEET _15_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



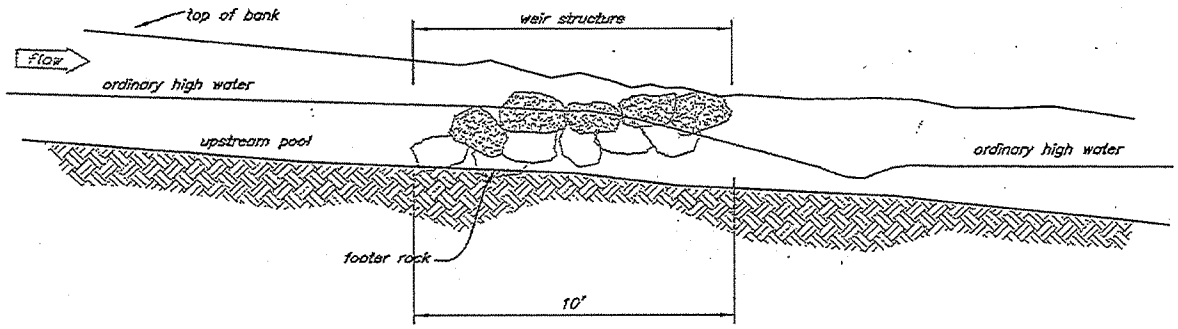
PLAN VIEW

W ROCK WEIR SCHEDULE

STRUCTURE ID	STATION	ELEVATION	Cw	L
WRW # 1	13+50	98.6	24'	12'
WRW # 2	18+19	99.36	24'	12'
WRW # 3	23+25	100.2	24'	12'
WRW # 4	37+00	102.15	24'	12'
WRW # 5	56+00	104.4	41'	18'



SECTION



PROFILE

ROCK WEIR

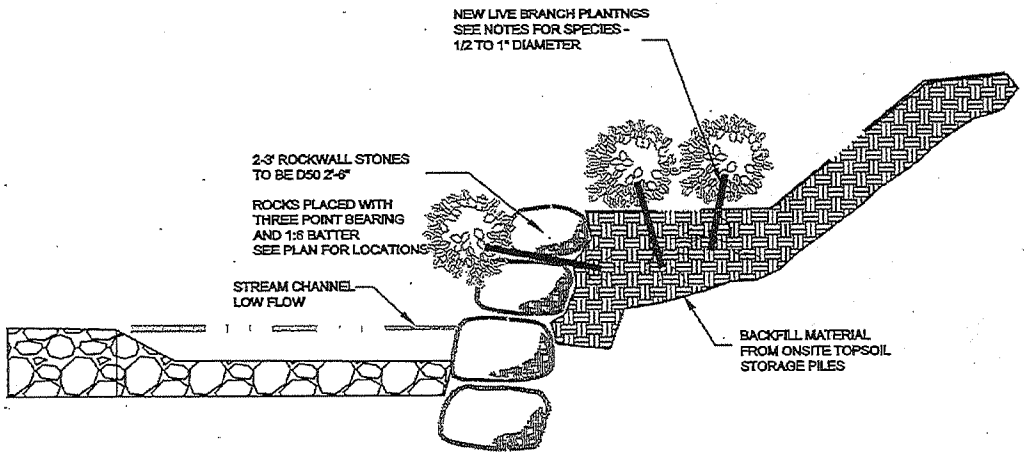
N.T.S.

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN	DRAWING NO.: D-3
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET 16 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

SCHEDULE

STRUCTURE ID	STATION	TO	LOC
BR #1	35+25	36+75	E
BR #2	39+50	41+00	W
BR #3	44+60	45+20	E



BOULDER REVETMENT

N.T.S.

NOTES
1. INSTALL SEDIMENT CONTROL MEASURES AS DIRECTED.
2 INSTALL NEW ROCKWALL BENCHES AS DETAILED AND SHOWN ON THE PLANS.
3 SPREAD STOCKPILED TOPSOIL BEHIND ROCKWALL BENCH AS DETAILED OR DIRECTED BY TOWN.

4. PLANTING LIVE FASCNES

ALL MATERIAL SHALL CONSIST OF MIXTURE OF STREAMCO WILLOW (SALIX PURPUREA) BANKERS WILLOW
SALIX COTTIRTI, PRAIRIE WILLOW (SALIX HUMILIS), GRAY DOGWOOD (CORNUS RACEMOSES AND/OR RED-OISER DOGWOOD (CORNUS SERVICEA.

A. SPACE BRANCHES 4 FT ON CENTER ALTERNATING ROWS WITH ONE FOOT VERITICAL SEPARATION.

B, LIVE BRANCHES TO BE TO ½" TO 1" DIAMETER 4 TO 6 FT LENGTH. TOPS OF LIVE BRANCHES TO PROTRUDE MINIMUM 6" BEYOND FACE OF WALL.

C, BACKFILL BEHIND WALL HAND TAMPED IN 6 IN LIFTS.

D. CUTTING SHALL BE PLACED ON THE BACKFILL AND COVER WITH MINIMUM OF 3" OF CLEAN FILL BETWEEN LAYER AND ROCK.

F. ALL PLANT MATERIAL SHALL BE INSTALLED WITHIN 8 (EIGHT) HOURS OF CUTTING UNLESS PROVISIONS FOR PROPER STORAGE IS MADE.

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

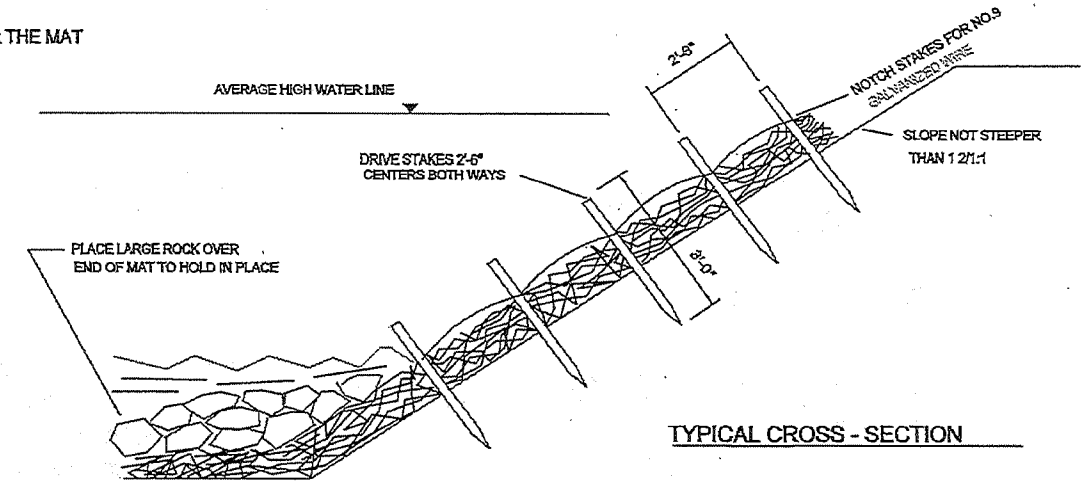
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-4
SHEET 17 OF 31 SHTS.
DRAWING FILE: z:\engineering\cranford \drive\permits\acoe

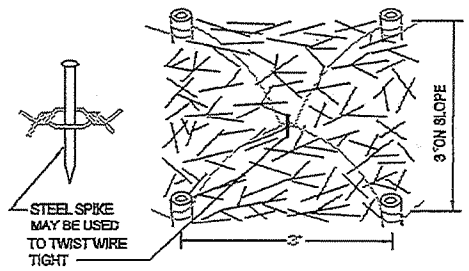
USACE FILE: NAN-2014-00305-ESW

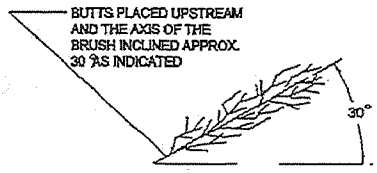
CONSTRUCTION SPECIFICATIONS

1. PREPARE SLOPE SURFACE BY GRADING TO A UNIFORM, SMOOTH SURFACE.
2. LAY HARDWOOD BRUSH IN AN UPSTREAM DIRECTION BEGINNING AT THE DOWN-STREAM END. THE TOE SHOULD BE ESTABLISHED FIRST.
3. THE BUTT END OF THE BRUSH WILL BE PLACED UPSTREAM AND THE PLANT MATERIALS INCLINED APPROXIMATELY 30 DEGREES.
4. THE UPSTREAM EDGE OF THE MAT WILL BE KEYED INTO THE SLOPE 2 FEET. STAKES WILL BE DRIVEN THROUGHOUT THE MATTING ON 3 FOOT CENTERS EACH WAY BEGINNING ALONG THE TOE OF THE MAT.
5. NO. 9 GALVANIZED WIRE WILL BE ATTACHED TO THE STAKES OVER THE MAT AND TIGHTENED TO SECURE THE MAT.
6. SLOPE AREAS ABOVE THE MAT WILL BE SLOPED AND SEEDED.



TYPICAL CROSS - SECTION



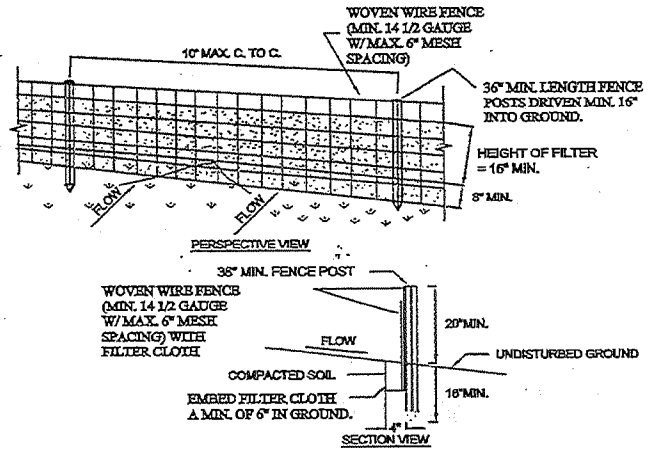


STATION	TO
25+50	26+00 W
28+50	28+95 E
28+50	28+95 W
42+50	42+89 E
44+80	45+25 W

BRUSH MATTING

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-5 SHEET _18_ OF __31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



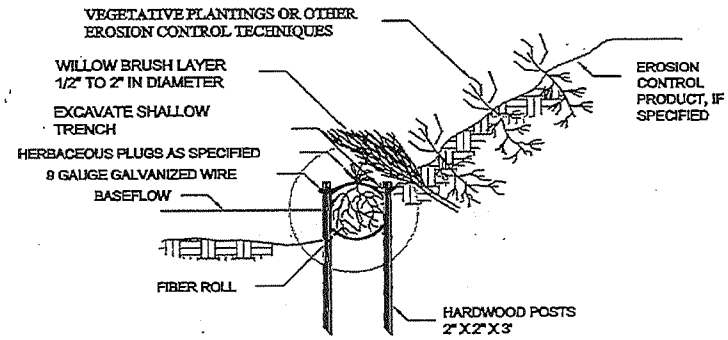
CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

SILT FENCE

FIBER ROLL SCHEDULE

STATION	TO
19+50 EAST	20+65
25+10 WEST	25+60



CROSS SECTION
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. EXCAVATE A SHALLOW TRENCH AT THE TOE OF SLOPE TO SLIGHTLY BELOW BASEFLOW.
2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" x 2" POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IF NECESSARY.
3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR 1/8" DIAMETER BRAIDED NYLON ROPE.
4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

FIBER ROLL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

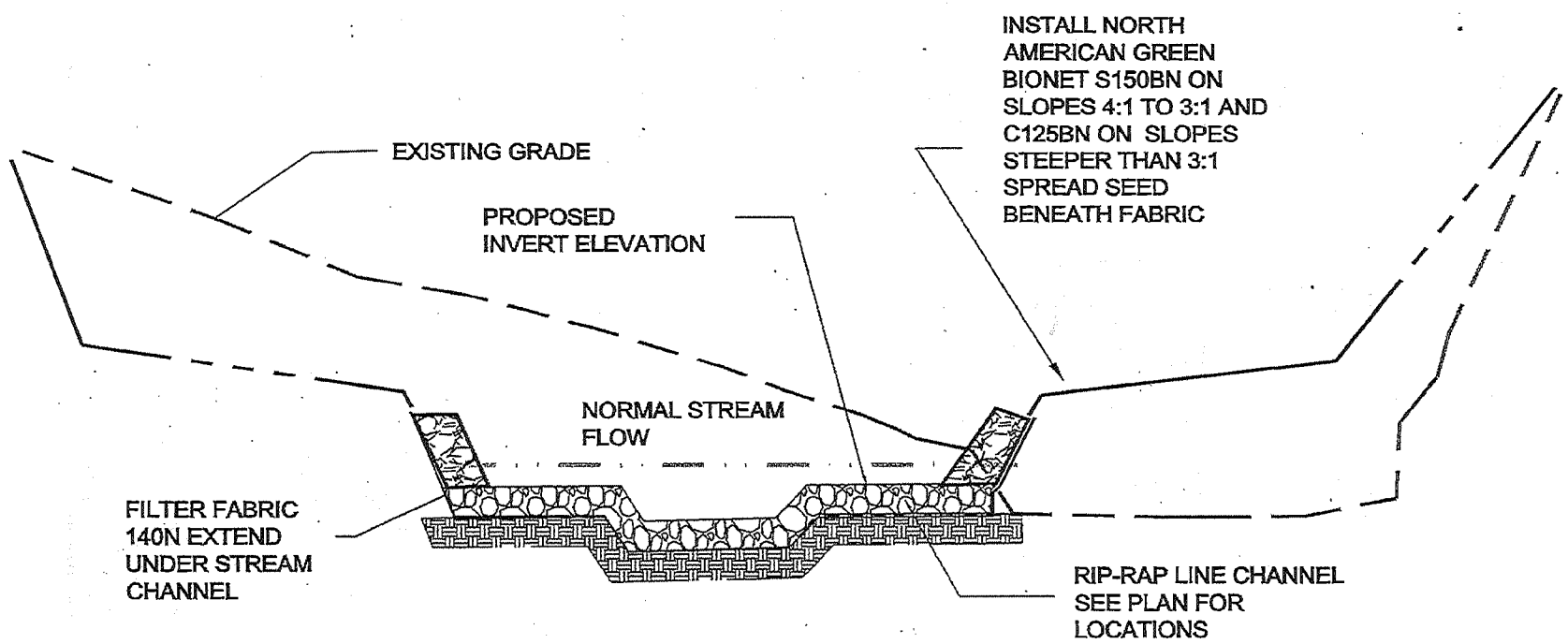
PROJECT NO.:	30--2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-6

SHEET 19 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



ARMORED CHANNEL

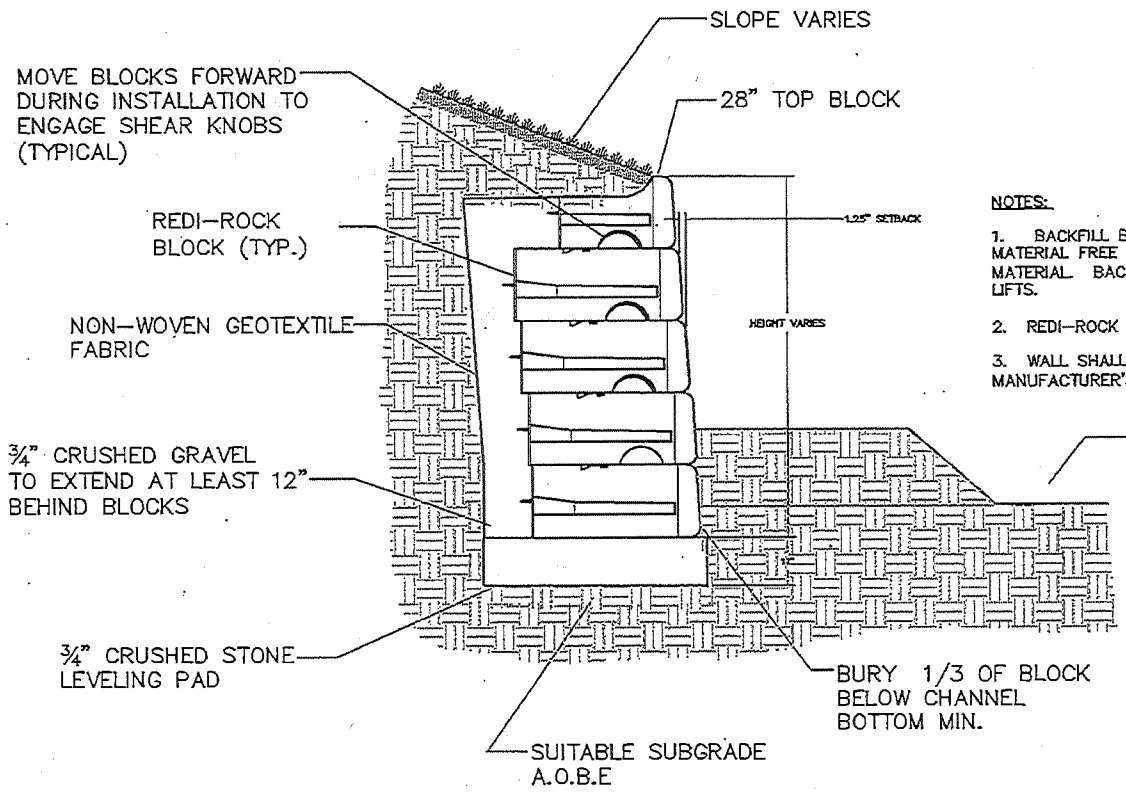
SEE PLAN FOR LOCATION

N.T.S.

USACE FILE: NAN-2014-00305-ESW

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30--2005 DATE: 6/29/15 SCALE: AS SHOWN	DRAWING NO.: D-7
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	SHEET _20_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



NOTES:

1. BACKFILL BEHIND WALL SHALL BE SUITABLE FILL MATERIAL FREE FROM LARGE ROCKS, DEBRIS, AND ORGANIC MATERIAL. BACKFILL SHALL BE COMPACTED IN 8" MAXIMUM LIFTS.
2. REDI-ROCK WALL FINISH SHALL BE "LEDGESTONE".
3. WALL SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

SCHEDULE

STATION	TO
9+08	9+54.5 E
9+08	9+54.5 W
9+98	10+47 E
9+98	10+57.5 W
10+75	12+43.5W
18+75	19+87.8 E

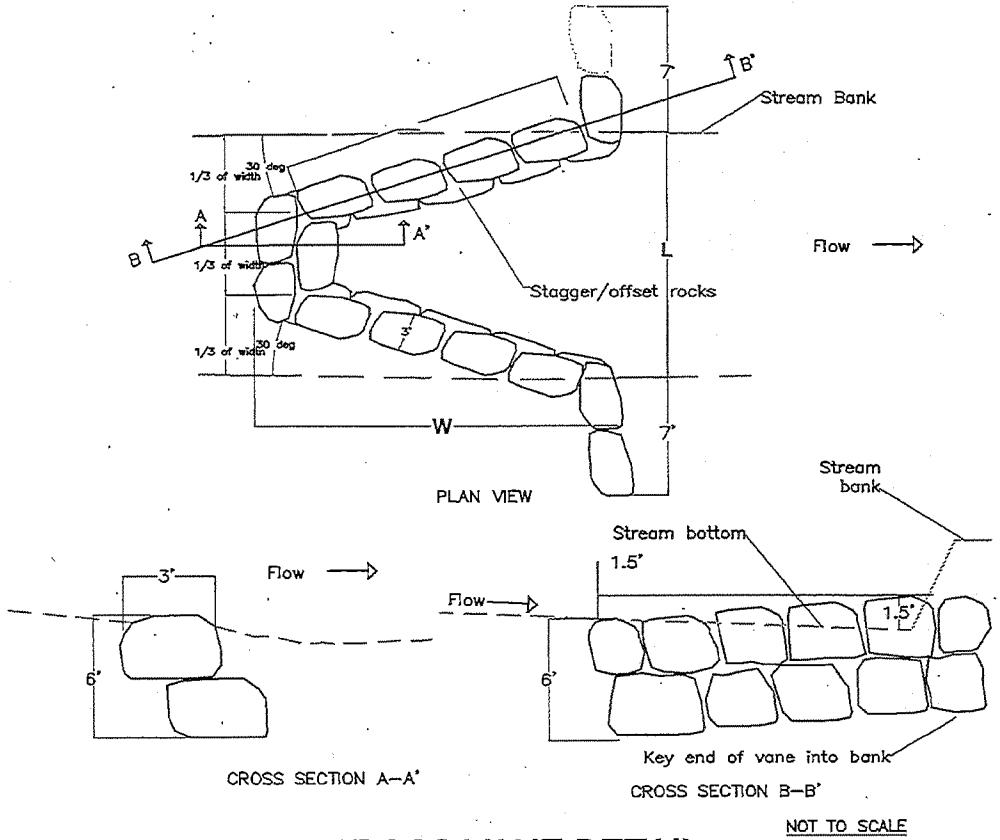
MODULAR RETAINING WALL

N.T.S.

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-8 SHEET _21_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



NOT TO SCALE

CROSS VANE DETAIL

CROSS VANE SCHEDULE

STRUCTURE ID	STATION	ELEVATION	W	L
CV # 1	11+25	97.6	24'	16'
CV # 2	28+15	100.9	24'	16'
CV # 3	38+00	102.6	24'	16'
CV # 4	41+50	102.9	24'	16'
CV # 5	60+00	105.2	44'	20'

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

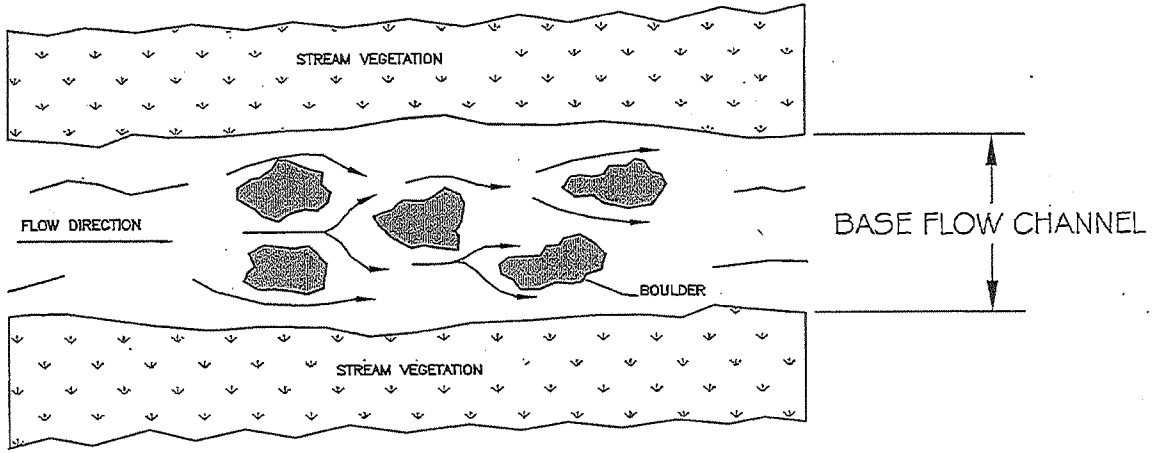
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-9

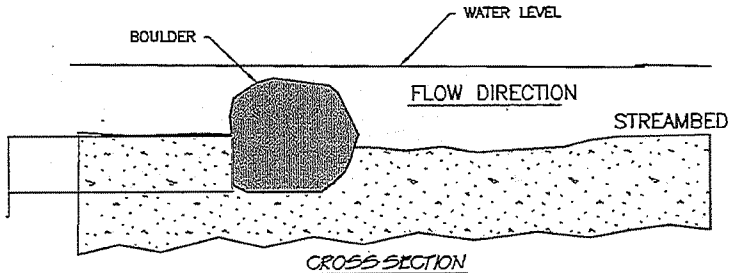
SHEET 32 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



PLAN VIEW



CROSS SECTION

SCHEDULE

STATION
14+75
24+65
27+00
32+40
54+80
58+35

- AVERAGE ROCK SIZE- 2.5'-3.5' DIA.-ROCK, SIZE IS SITE DEPENDENT.
- A MINIMUM OF ONE BOULDER PER SET OF BOULDERS SHOULD PROTRUDE FROM WATER SURFACE DURING TIMES OF ORDINARY FLOW TO ACT AS MID-STREAM PERCHING/LOAFING SITES.
- USE BOULDERS WITH IRREGULARITIES OR MULITPLE BOULDERS TOGETHER TO PROVIDE SLIGHT OVERHANGING COVER.
- PLACE BOULDERS SO CURRENT WILL NOT BE DEFLECTED INTO UNPROTECTED STREAM BANKS.

BOULDER CLUSTERS

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

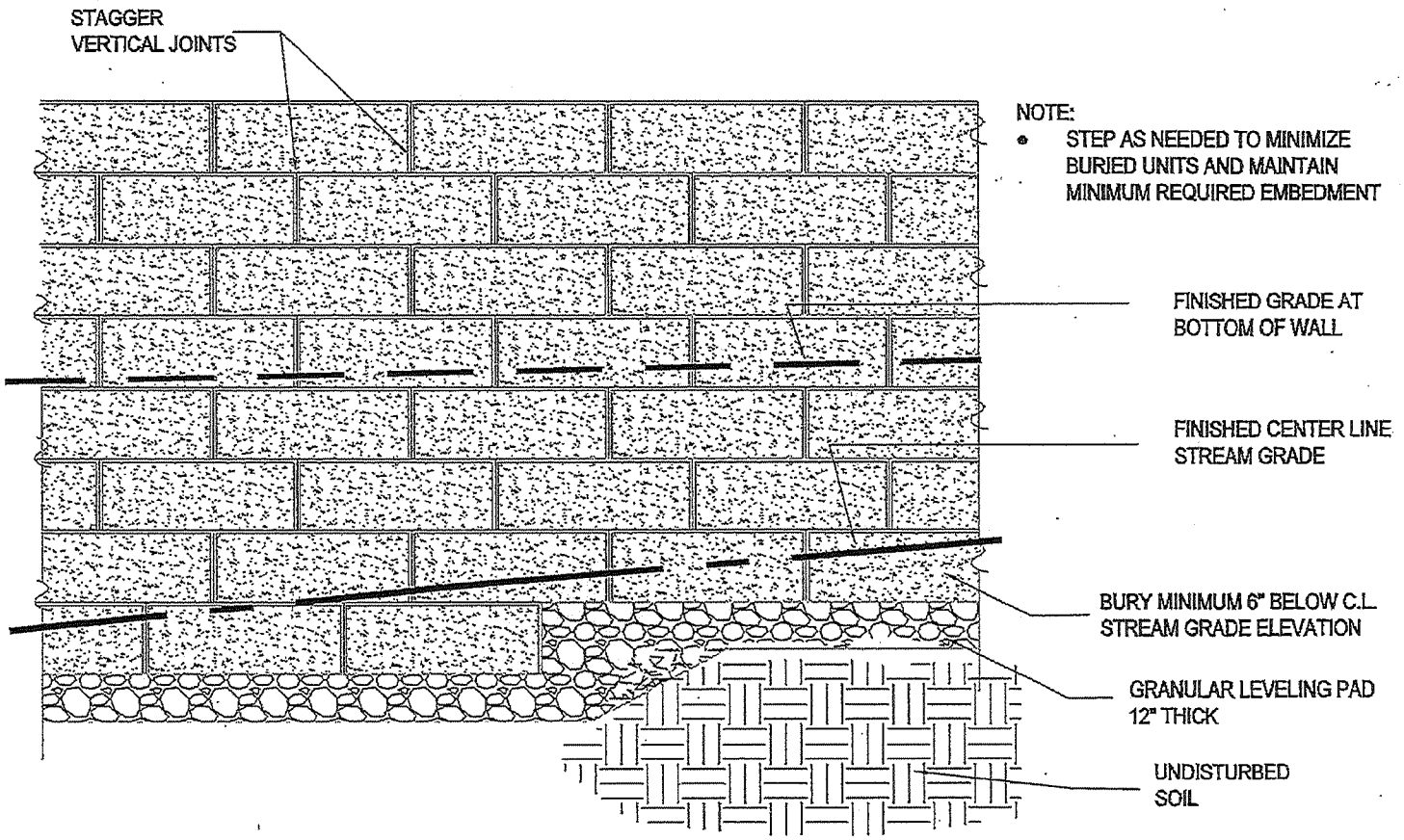
PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-10

SHEET 23 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

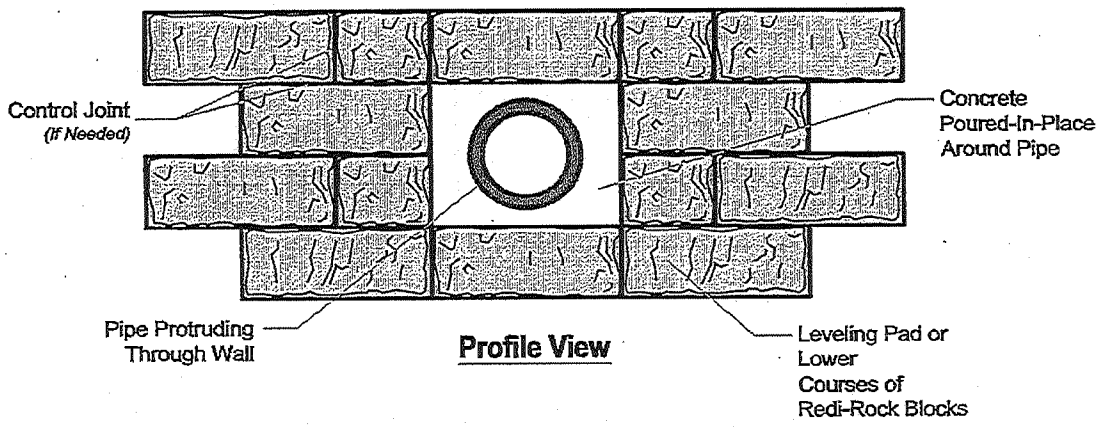
USACE FILE: NAN-2014-00305-ESW



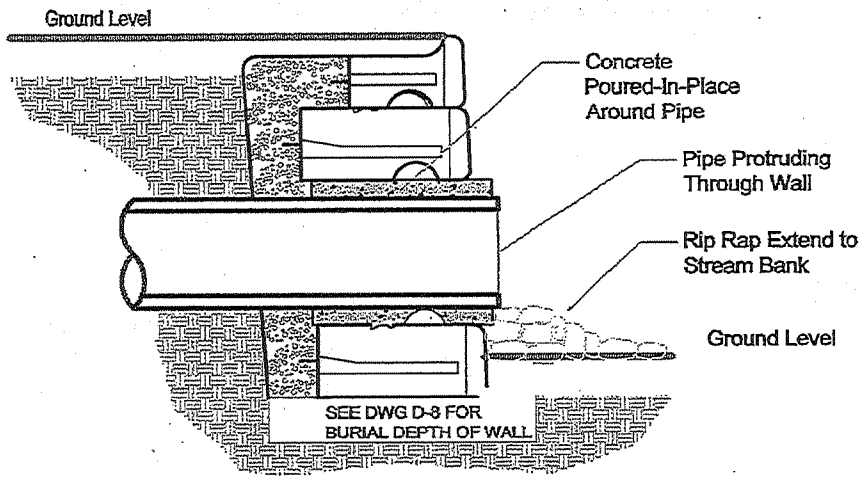
REDI ROCK RETAINING WALL

USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL 10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	DETAIL CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-11 SHEET 24 OF 31 SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe



Profile View



Section View

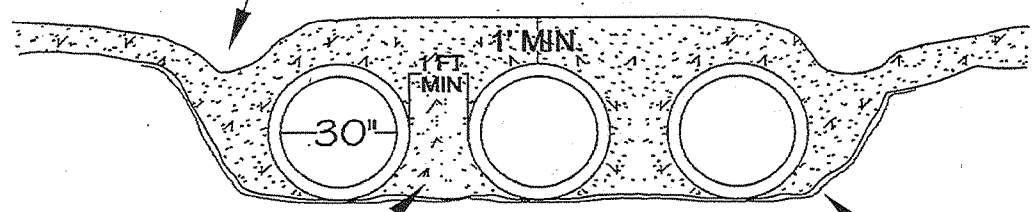
Pipe Through Wall Detail

NTS

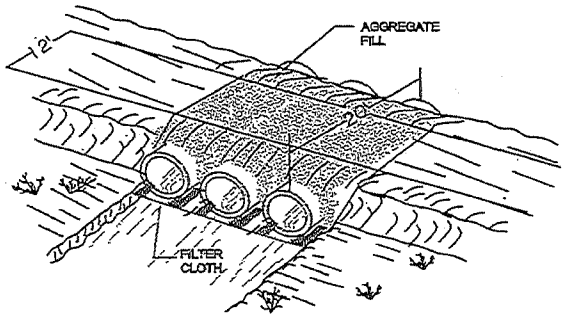
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30–2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-12 SHEET _25_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



INSTALL (3) 30" HDPE PIPES - 20' LENGTH EACH



MULTIPLE PIPES

LOCATIONS

STA 4+25
STA 28+10
STA 32+75

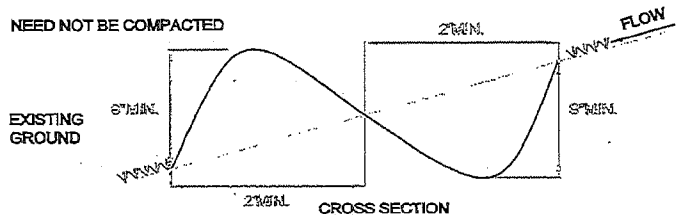
TEMPORARY STREAM CROSSING DETAIL

NOT TO SCALE

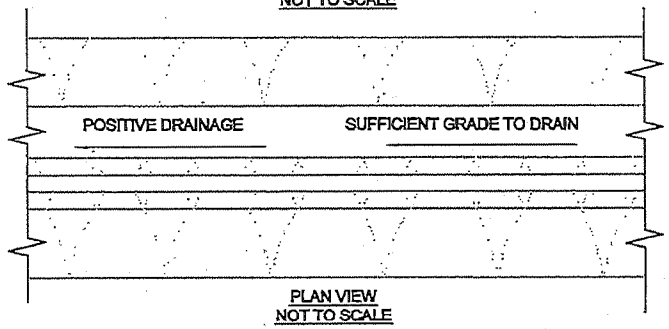
REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-13 SHEET 26 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

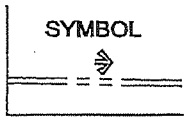
USACE FILE: NAN-2014-00305-ESW



CROSS SECTION
NOT TO SCALE



PLAN VIEW
NOT TO SCALE



CONSTRUCTION SPECIFICATIONS

1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATIONS FOR TEMPORARY SEEDING AND MULCHING, AND SHALL BE DONE WITHIN 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

MAX. DRAINAGE AREA LIMIT: 2 ACRES

PERIMETER DIKE OR SWALE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

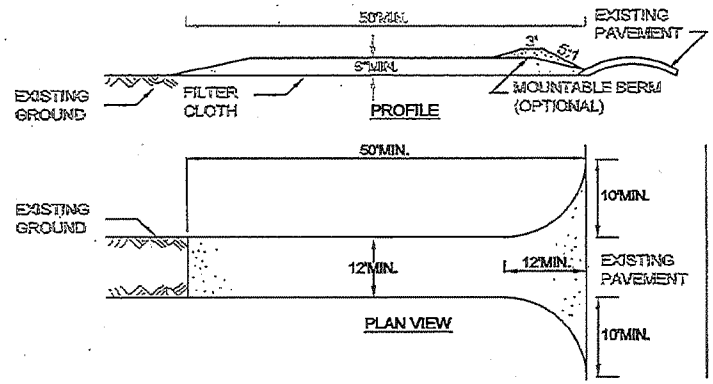
DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

PROJECT NO.:	30-2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-14
SHEET 27 OF 31 SHTS.
DRAWING FILE: s:\engineering\cranford\drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



SYMBOL

CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – USE 2" CLEAN STONE
2. LENGTH – NOT LESS THAN 50 FEET
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY–FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ENTRANCE

TOWN OF CLARKSTOWN
DEPARTMENT OF ENVIRONMENTAL CONTROL
10 MAPLE AVENUE
NEW CITY, NEW YORK 10956
TEL. (845) 639-2111 FAX (845) 634-3743

DETAIL

CRANFORD DRIVE FLOOD AMELIORATION
NEW CITY, NEW YORK

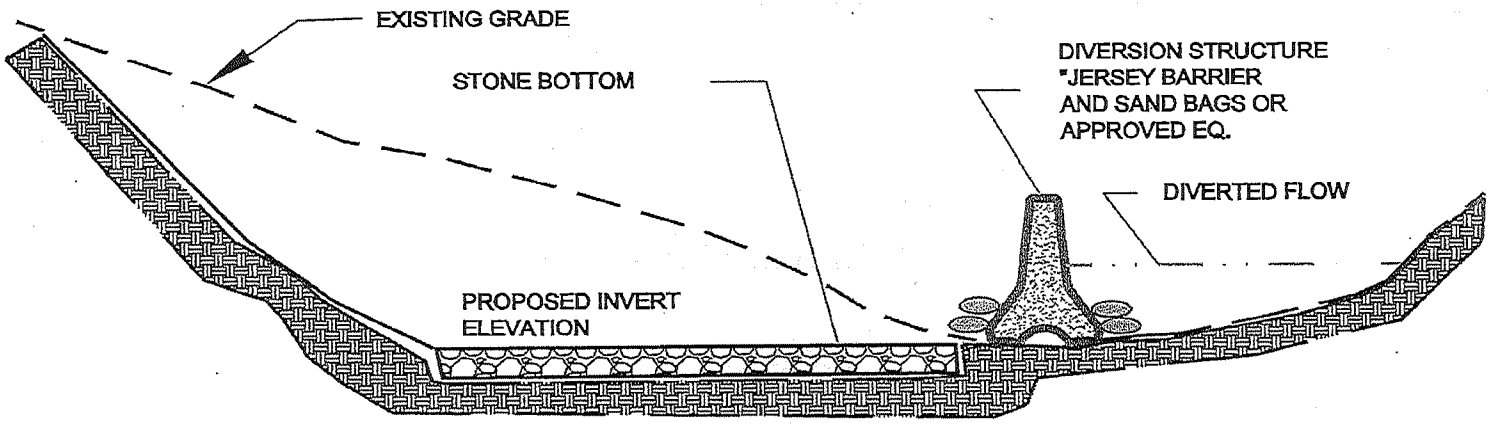
PROJECT NO.:	30–2005
DATE:	6/29/15
SCALE:	AS SHOWN
DESIGN BY:	
DRAWN BY:	RH
CHECKED BY:	DML / KLK

DRAWING NO.: D-15

SHEET 28 OF 31 SHTS.

DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



TYPICAL TEMPORARY CHANNEL DIVERSION

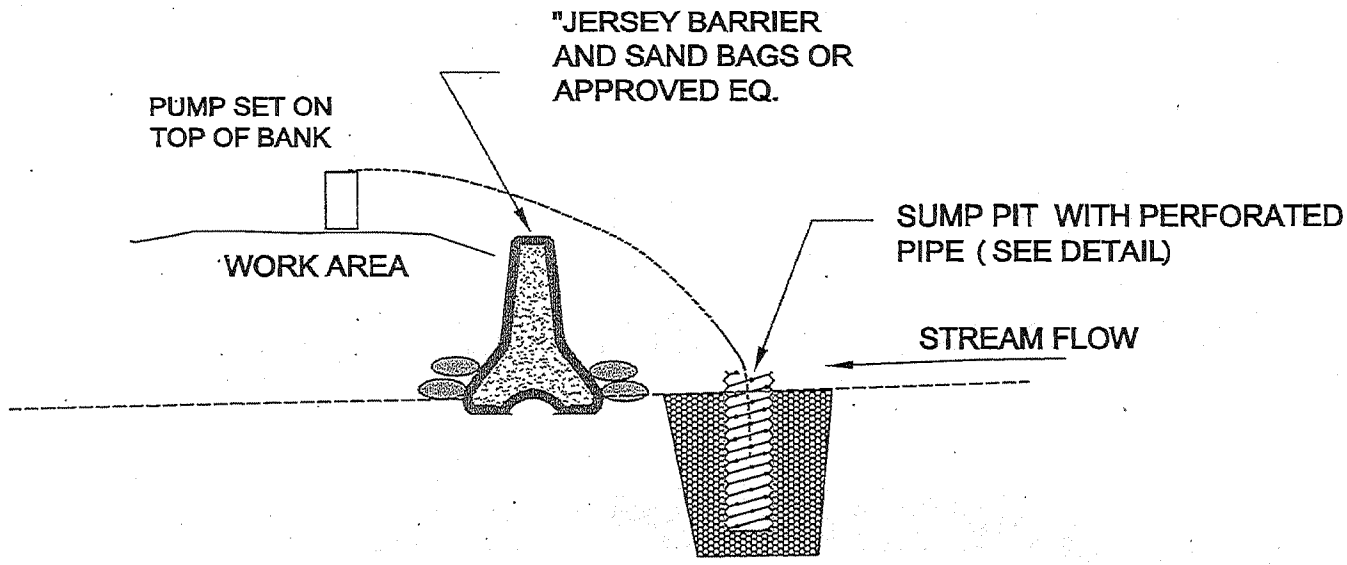
N.T.S.

NOTE
SEE CROSS SECTION DRAWINGS
FOR STREAM CONFIGURATION
AND LOCATION OF NORMAL LOW
FLOW CHANNEL

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-16 SHEET 29 OF 31 SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



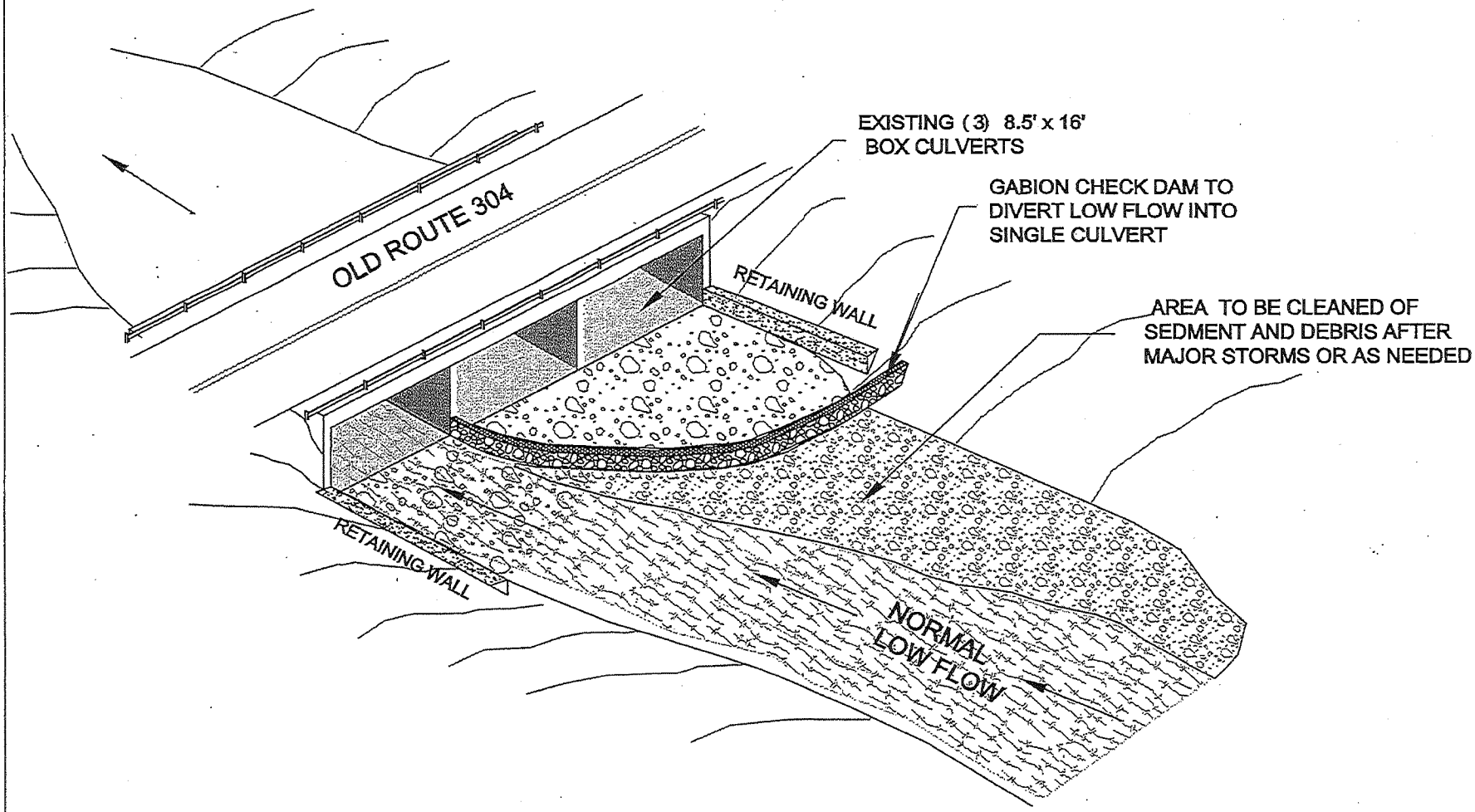
TEMPORARY COFFER DAM

N.T.S

REVISED 8/27/15 PER ACOE COMMENTS

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	DETAIL	PROJECT NO.: 30-2005 DATE: 6/29/15 SCALE: AS SHOWN DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK	DRAWING NO.: D-17 SHEET _30_ OF _31_ SHTS. DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

USACE FILE: NAN-2014-00305-ESW



USACE FILE: NAN-2014-00305-ESW

TOWN OF CLARKSTOWN DEPARTMENT OF ENVIRONMENTAL CONTROL	GABION WEIR AT BOX CULVERT	PROJECT NO.: 30–2005 DATE: 05/14/15 SCALE: NONE DESIGN BY: DRAWN BY: RH CHECKED BY: DML / KLK	DRAWING NO.: D-18 SHEET _31_ OF _31_ SHTS.
10 MAPLE AVENUE NEW CITY, NEW YORK 10956 TEL. (845) 639-2111 FAX (845) 634-3743	CRANFORD DRIVE FLOOD AMELIORATION NEW CITY, NEW YORK		DRAWING FILE: s:\engineering\cranford \drive\permits\acoe

New York State
Department of Environmental Conservation

NOTICE

The Department of Environmental Conservation (DEC) has issued permit(s) pursuant to the Environmental Conservation Law for work being conducted at this site. For further information regarding the nature and extent of work approved and any Department conditions on it, contact the DEC at 845/256-3054. Please refer to the permit number shown when contacting the DEC.

Permittee: (T) Clarkstown Permit No. 3- 3920-00297/00010,11

Effective Date: 7/20/2016 Expiration date: 12/31/2020

☐ Applicable if checked. No instream work allowed between October 1 & April 30

NOTE: This notice is **NOT** a permit.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 3
21 South Putt Corners Road, New Paltz, NY 12561-1620
P: (845) 256-3054 I F: (845) 255-4659
www.dec.ny.gov

IMPORTANT NOTICE TO ALL PERMITTEES

The permit you requested is enclosed. Please read it carefully and note the conditions that are included in it. The permit is valid for only that activity expressly authorized therein; work beyond the scope of the permit may be considered a violation of law and be subject to appropriate enforcement action. Granting of this permit does not relieve the permittee of the responsibility of obtaining any other permission, consent or approval from any other federal, state, or local government which may be required.

Please note the expiration date of the permit. Applications for permit renewal should be made well in advance of the expiration date (minimum of 30 days) and submitted to the Regional Permit Administrator at the above address. For SPDES, Solid Waste and Hazardous Waste Permits, renewals must be made at least 180 days prior to the expiration date.

The DEC permit number & program ID number noted on page 1 under "Permit Authorization" of the permit are important and should be retained for your records. These numbers should be referenced on all correspondence related to the permit, and on any future applications for permits associated with this facility/project area.

If a permit notice sign is enclosed, you must post it at the work site with appropriate weather protection, as well as a copy of the permit per General Condition 1.

If the permit is associated with a project that will entail construction of new water pollution control facilities or modifications to existing facilities, plan approval for the system design will be required from the appropriate Department's regional Division of Water or delegated local Health Department, as specified in the State Pollutant Discharge Elimination System (SPDES) permit.

If you have any questions on the extent of work authorized or your obligations under the permit, please contact the staff person indicated below or the Division of Environmental Permits at the above address.

Joseph A Murray
Division of Environmental Permits, Region 3
Telephone (845) 256-3040

☐ Applicable only if checked. Please note all work authorized under this permit is prohibited during trout spawning season commencing October 1 and ending April 30.

☑ Applicable only if checked for STORMWATER SPDES INFORMATION: We have determined that your project requires coverage under the General Stormwater SPDES Permit. You must file a Notice of Intent to obtain coverage under the General Permit. This form can be downloaded at: http://www.dec.ny.gov/chemical/43133.html

☑ Applicable only if checked - MS4 Areas: This site is within an MS4 area (Municipal Separate Storm Sewer System), therefore the SWPPP must be reviewed and accepted by the municipality. The MS-4 Acceptance Form must be submitted in addition to the Notice of Intent.

Send the completed form(s) to: NYS DEC, Stormwater Permitting, Division of Water, 625 Broadway, Albany, New York 12233-3505; in addition, DEC requests that you provide one electronic copy of the approved SWPPP directly to NYS DEC, 100 Hillside Avenue - Suite 1W, White Plains, NY 10603-2860.

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

September 27, 2016

Chet Brooks, Chief
Delaware Tribe of Indians, Delaware Tribal Headquarters
5100 Tuxedo Blvd
Bartlesville, OK 74006

Re: Update related to Section 106 Compliance for Clarkstown Cranford Drive Drainage Improvements Project in Clarkstown, Rockland County, NY – New York Rising Community Reconstruction Program

Dear Chief Chet Brooks:

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). GOSR is the entity responsible for compliance with the HUD environmental review procedures set forth in 24 CFR Part 58. GOSR is acting on behalf of HUD in providing the enclosed project information and inviting this discussion with your Tribe to respond with any concerns or comments.

GOSR processes environmental reviews for projects funded with HUD CDBG-DR on a case-by-case basis. 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.

Update and Request for Comment: GOSR has completed the Phase 1 survey and geomorphological analysis of the area of potential effect. The archeological survey and geomorphological analysis report has been provided to you. GOSR has also submitted the Phase I report to SHPO and no comments have been received from SHPO to date. GOSR respectfully submits for your review the attached documentation for the proposed project(s) described herein. If the Area of Potential Effect 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.

Mrs. Alicia Shultz
Community Developer - Environmental Services
New York State Homes & Community Renewal
38-40 State St.,408N, Hampton Plaza
Albany, NY 12207

Sincerely,

Alicia Shultz
Community Developer – Environmental Services
New York State Homes and Community Renewal

Enclosures: Phase I Archeology Report

Electronic letter sent to:
Susan Bachor
Delaware Tribe of Indians Historic Preservation Representative
P.O. Box 64
Pocono Lake, PA 73005

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS

NY Rising Community Reconstruction Program

Phase I
Archaeological and Geomorphological Survey

Town of Clarkstown
Rockland County
New York 12304

TECTONIC
Practical Solutions, Exceptional Service

Prepared for: **Governor's Office of Storm Recovery**

[illegible]-[illegible]0 State Street, [illegible]0[illegible]N Hampton Pla[illegible]a
[illegible]lbany, New York 1[illegible]0[illegible]

Prepared by: **Tectonic Engineering & Surveying Consultants P.C.**

[illegible]0 Pleasant Hill Road
Mountainville , New York 10[illegible]

September [illegible]01[illegible]
Job No. [illegible]

Governor's Office of Storm Recovery
New York State Homes & Community Renewal
38-40 State Street, 408N Hampton Plaza
Albany, New York 12207

Attn: Alicia Shultz
Via email (Alicia.Shultz@nyshcr.org)

September 26, 2016

RE: WO 7363.23
PHASE I ARCHAEOLGICAL AND GEOMORPHOLOGICAL SURVEY FOR
CLARKSTOWN DRAINAGE IMPROVEMENTS
NY RISING COMMUNITY RECONSTRUCTION PROGRAM
TOWN OF CLARKSTOWN,
ROCKLAND COUNTY, NEW YORK

Dear Ms. Shultz,

Tectonic Engineering & Surveying's (Tectonic) subcontractor, Christine Davis Consultants, Inc. (CDC), has completed a Phase I Archaeological and Geomorphological Survey for the above referenced site. As part of the environmental review process, the New York SHPO required a cultural resource survey of the subject property. This report presents the findings of a Phase I Archeological Survey conducted on behalf of the Town of Clarkstown (Subrecipient) for the Cranford Drive Drainage Improvements Project in the Town of Clarkstown, Rockland County, New York. The Governor's Office of Storm Recovery (GOSR), operating under auspices of New York State Homes and Community Renewal's Housing Trust Fund Corporation, is the Responsible Entity for direct administration of the U.S. Dept. of Housing & Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) funds. The Project is part of the New York Rising Community Reconstruction Program and is receiving funding for a stormwater management improvement project involving the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

The Phase I Archaeological and Geomorphological Survey included archival research, a reconnaissance survey, and Phase I archaeological and geomorphological subsurface testing in order to evaluate the subject properties potential to contain significant cultural resources. No significant cultural resources were identified during the Phase I survey. No further archaeological work is recommended for the Clarkstown Drainage Improvements project. The final reports have been submitted for agency review. This work was performed in accordance with Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* and the *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New*

York State published by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) in 2005.

Attached please find the following documentation:

1.) Combined Phase IA/1B Archaeological Survey Report for the Clarkstown Drainage Improvements project

2.) Geomorphological Survey for the Clarkstown Drainage Improvements project

Feel free to contact the undersigned if you have any questions.

Sincerely,
TECTONIC ENGINEERING AND SURVEYING CONSULTANTS P.C.

Peter T. Sutherland

Peter T. Sutherland, P.E., L.E.P., C.P.G.
Vice President Environmental Services

PHASE I ARCHAEOLOGICAL AND GEOMORPHOLOGICAL SURVEYS

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS TOWN OF CLARKSTOWN, ROCKLAND COUNTY, NEW YORK

16PR05212

A Cultural Resource Management Report Prepared for:

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

September 2016

CHRISTINE DAVIS CONSULTANTS, INC.
560 Penn Street, Verona, Pennsylvania 15147
Phone: 412/826-0443 Fax: 412/826-0458

PHASE I ARCHAEOLOGICAL AND GEOMORPHOLOGICAL SURVEYS

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS
TOWN OF CLARKSTOWN,
ROCKLAND COUNTY, NEW YORK

16PR05212

BY:

CHRISTINE E. DAVIS
Principal Investigator

For final submission to:

New York State Office of Parks, Recreation and Historic Preservation
P.O. Box 189, Waterford, New York 12188-0189

ABSTRACT

Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering & Surveying Consultants P.C. to conduct a Phase I Archaeological and Geomorphological Survey for the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York. The agency for this project is the Governor's Office of Storm Recovery (GOSR).

The area of potential effect (APE) involves of approximately 3,666 linear feet (ft) (1,117 linear meters (m)) with a right-of-way (ROW) width of 100 ft or approximately 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)). It is topographically situated within a floodplain/terrace and lower hillslope environment setting associated with Demarest Kill and its unnamed tributary streams within the Piedmont Lowlands section of the Piedmont physiographic province.

The Phase I field survey was conducted in summer of 2016. Phase I field methodology included surface surveillance and the hand excavation of shovel tests (STs). A portion of the APE, involving approximately 19,031 sq m (204,845 sq ft or 4.7 ac), was not tested due to the presence of slopes greater than 15 percent and disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond. The total tested area within the APE measured approximately 29,155 sq m (313,821 sq ft or 7.2 ac). A total of 134 STs at 15 m intervals were excavated during the Phase I Survey. A total of 134 STs were negative. Based on the results of the Phase I Survey no cultural resources were recorded.

Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Canford Drive Drainage Improvements project.

MANAGEMENT SUMMARY

State Historic Preservation Office (SHPO) Project Review Number: 16PR05212

Agency:
Governor's Office of Storm Recovery (GOSR)

Phase of Survey:
Phase I Archaeological and Geomorphological Surveys

Location Information:

Location:	Brownswell Corner
Minor Civil Division:	Town of Clarkstown
County:	Rockland

Survey Area:

Length:	1,117 m (3,666 ft)
Width:	50 m (100 ft)
Depth:	n/a
# of Acres Surveyed:	48,186 sq m (518,666 sq ft or 11.9 ac)

USGS 7.5 Minute Quadrangle Map:
Haverstraw, NY 2016
Thiells, NY 2016

Archaeological Survey Overview:

Number and Interval of Shovel Tests:	134 tests at 15 m (50 ft) intervals
Number and Size of Units:	n/a
Width of Plowed Strips:	n/a
Surface Survey Transect Interval:	n/a

Results of Archaeological Survey:

Number and Name of Prehistoric Sites Identified:	0
Number and Name of Historic Sites Identified:	0
Number and Name of Sites Recommended for Phase II/Avoidance:	0

Results of Architectural Survey:

Number of Buildings/ Structures/ Cemeteries within Project Area:	n/a
Number of Buildings/ Structures/ Cemeteries Adjacent to Project Area:	n/a
Number of Previously Determined NR Listed or Eligible Buildings/ Structures/Cemeteries/ Districts:	n/a
Number of Identified Eligible Buildings/ Structures/ Cemeteries/ Districts:	n/a

Report Authors
Christine E. Davis

Date of Report
September 2016

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 PROPOSED UNDERTAKING 1
1.2 AREA OF POTENTIAL EFFECT (APE) 4
1.3 DISPOSITION OF MATERIALS 4
1.4 AGENCY COORDINATION 4

2.0 ENVIRONMENTAL BACKGROUND 8

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY 8
2.2 CLIMATE 8

3.0 BACKGROUND RESEARCH 9

3.1 CULTURAL PREHISTORIC OVERVIEW 9
3.2 OVERVIEW OF ROCKLAND COUNTY AND THE TOWN OF CLARKSTOWN 11
3.3 SOILS 11

4.0 SENSITIVITY ASSESSMENT 13

5.0 DISTURBANCE 14

6.0 TESTING RECOMMENDATIONS 17

6.1 GEOMORPHOLOGICAL SURVEY RESULTS 17

7.0 PHASE I FIELD SURVEY 18

7.1 FIELD METHODOLOGY 18
7.2 FIELD SURVEY RESULTS 18

8.0 SUMMARY 23

8.1 CONCLUSIONS 23

9.0 REFERENCES 24

APPENDICES:

I AGENCY COORESPONDENCE
II GEOMORPHOLOGICAL REPORT
III SHOVEL TEST RECORDS

FIGURES

1 GENERAL PROJECT LOCATION, NEW YORK TRANSPORTATION MAP 2

2 ARCHAEOLOGICAL AREA OF POTENTIAL EFFECT (APE), HAVERSTRAW AND THIELLS, NY 7.5' USGS MAP 3

3 APE, PROJECT MAPPING 5

4 APE INDICATING TESTED, WET, AND DISTURBED, PROJECT MAPPING 16

5 AREA A 22

PHOTOGRAPHS

1 APE, LOOKING NORTHEAST 6

2 APE, LOOKING NORTHEAST 6

3 APE, LOOKING SOUTHEAST 7

4 EROSION CONTROL AREAS INCLUDED THE USE OF LARGE STONES ALONG THE FLOODPLAIN AND TERRACES, LOOKING SOUTHEAST 14

5 EROSION CONTROL AREAS INCLUDED THE USE OF LARGE STONES ALONG THE FLOODPLAIN AND TERRACES, LOOKING WEST 14

6 MAN-MADE RETENTION POND, LOOKING SOUTHWEST 15

7 ARTIFICIALLY CONSTRUCTED DRAINAGE, LOOKING WEST 15

8 AREA A, LOOKING SOUTH 19

9 AREA A, LOOKING SOUTH 19

10 AREA A, LOOKING NORTHEAST 20

11 AREA A, LOOKING NORTHEAST 20

TABLES

1 PREVIOUSLY RECORDED HISTORIC PROPERTIES WITHIN A ONE-MILE RADIUS 13

1.0 INTRODUCTION

Historic and cultural resources are protected under Federal law through Section 106 of the National Historic Preservation Act of 1966, as amended, and implementing regulation 36 CFR 800 as revised in January of 2001; the Archaeological and Historic Preservation Act of 1974; Section 101(b)(4) of the National Environmental Policy Act of 1969; Executive Orders 11593 and 12362; 18 CFR Part 380.14; 23 CFR 771, as amended, August 28, 1987; 36 CFR 60; the guidelines developed by the Advisory Council on Historic Preservation (ACHP) published November, 26, 1980; and the amended procedures for the Protection of Historic and Cultural Properties, as set forth in 36 CFR 800.

The regulations developed under Section 106 of the National Historic Preservation Act require that prior to approval of federal funding, agencies should consider the impact of a project on any district, site, building, structure, or object that is included on, or eligible for inclusion on, the National Register of Historic Places (NRHP), and the ACHP must be given an opportunity to comment on such an undertaking. The Historic and Archeological Data Preservation Act directs Federal agencies to preserve historic and archeological data that would otherwise be lost as a result of a Federal action. A project is considered to have an adverse effect on such sensitive resources if it changes the quality of cultural characteristics that render them eligible for listing on the NRHP.

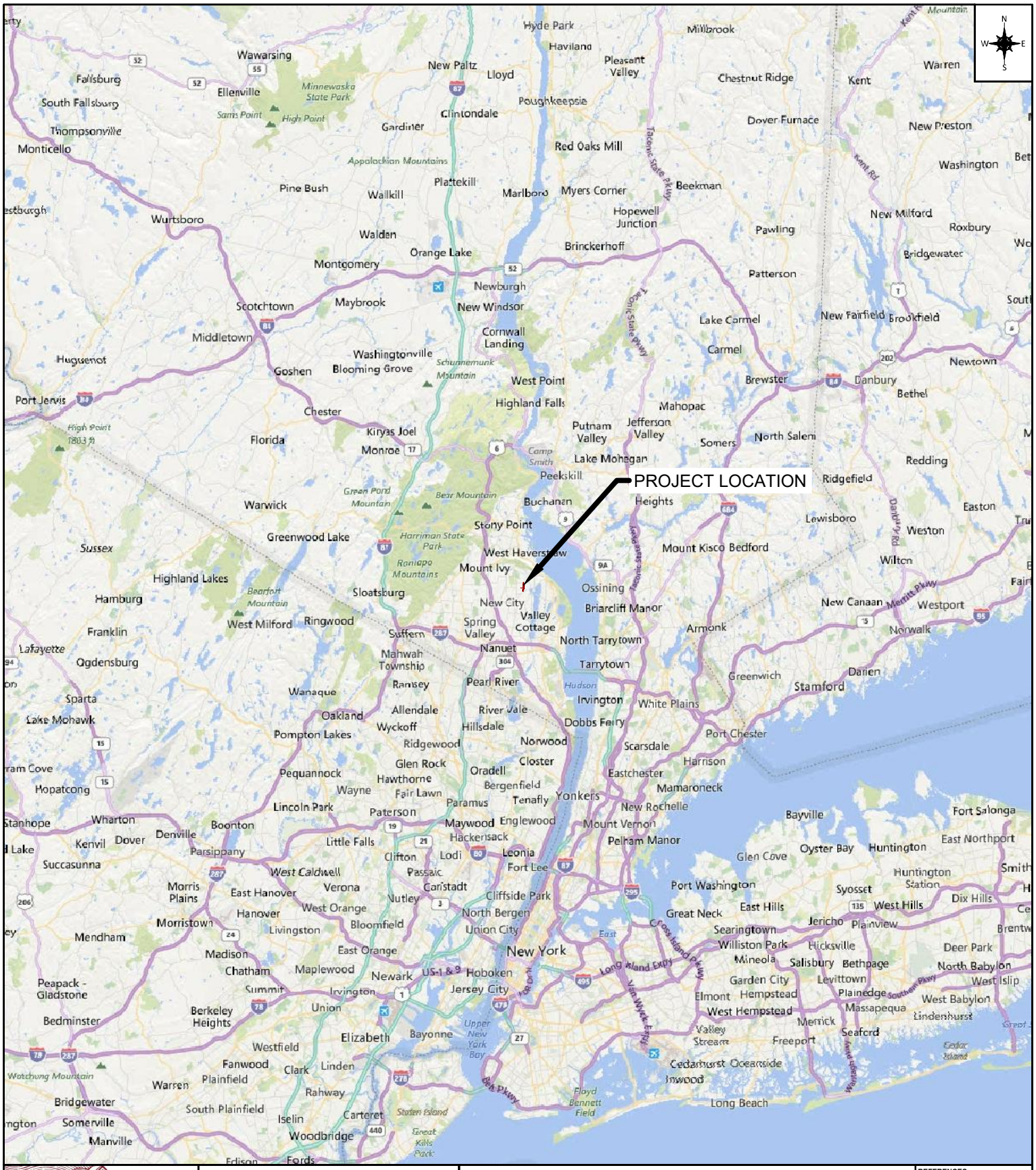
Historic properties of national, state and local significance may be nominated to the NRHP following an evaluation in accordance with an established set of criteria. The evaluation process is conducted at the state level by the New York State Historic Preservation Officer (SHPO) and at the federal level by the NRHP staff of the Department of the Interior. The National Park Service administers the National Register and has established four criteria for the evaluation of the potential significance of historic and archeological properties. These criteria are described in Title 36, Part 60 of the Code of Federal Regulations and are summarized as follows:

- Criterion A: A property is associated with historically significant events that have made a significant contribution to the broad patterns of our history. To meet this criterion, a historic property needs to have existed at the time of the important event and be associated in a significant way with the event.
- Criterion B: A property is associated with the lives of persons significant in our past.
- Criterion C: A property that embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D: A property that has yielded, or may be likely to yield, information important in prehistory or history.

Archaeological studies are completed under Section 106 of the National Historic Preservation Act of 1966 as amended; the National Environmental Policy Act of 1969; the Archaeological and Historic Preservation Act of 1974; and the regulations of the ACHP 36 CFR 63 and 36 CFR 800. This technical scope of work was developed in accordance with the *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State* published by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) in 2005.

1.1 PROPOSED UNDERTAKING

Christine Davis Consultants, Inc. (*CDC*) was retained by Tectonic Engineering & Surveying Consultants P.C. to conduct a Phase I Archaeological and Geomorphological Survey for the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York (Figures 1 and 2). The proposed drainage improvements are located north of the town of New City and west of De Forest Lake primarily between Cranford Drive and Cypress Street.



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

0 — 1 INCH = 10 MILES — 20 MILES

REFERENCES:
NAVTEQ - 2010
Road Map

Project Location
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 1

Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDaviesConsultants.com
412-826-0443

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

REFERENCES:

TECTONIC
Erosion Control Plan 5-30-13

USGS 7.5 MINUTE QUADRANGLES
HAVERSTRAW, NY 2016
THIELLS, NY 2016

Area of Potential Effect
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 2

The Clarkstown Cranford Drive Drainage Improvements project is part of the New York Rising Community Reconstruction Program and is receiving funding for a stormwater management improvement project involving the modification and realignment of the Demarest Kill, a tributary of the western branch of the Hackensack River. This work includes modification of existing onsite drainage infrastructure and the installation of new drainage controls in order to contain future 100-year flood levels within the stream channel.

1.2 AREA OF POTENTIAL EFFECT (APE)

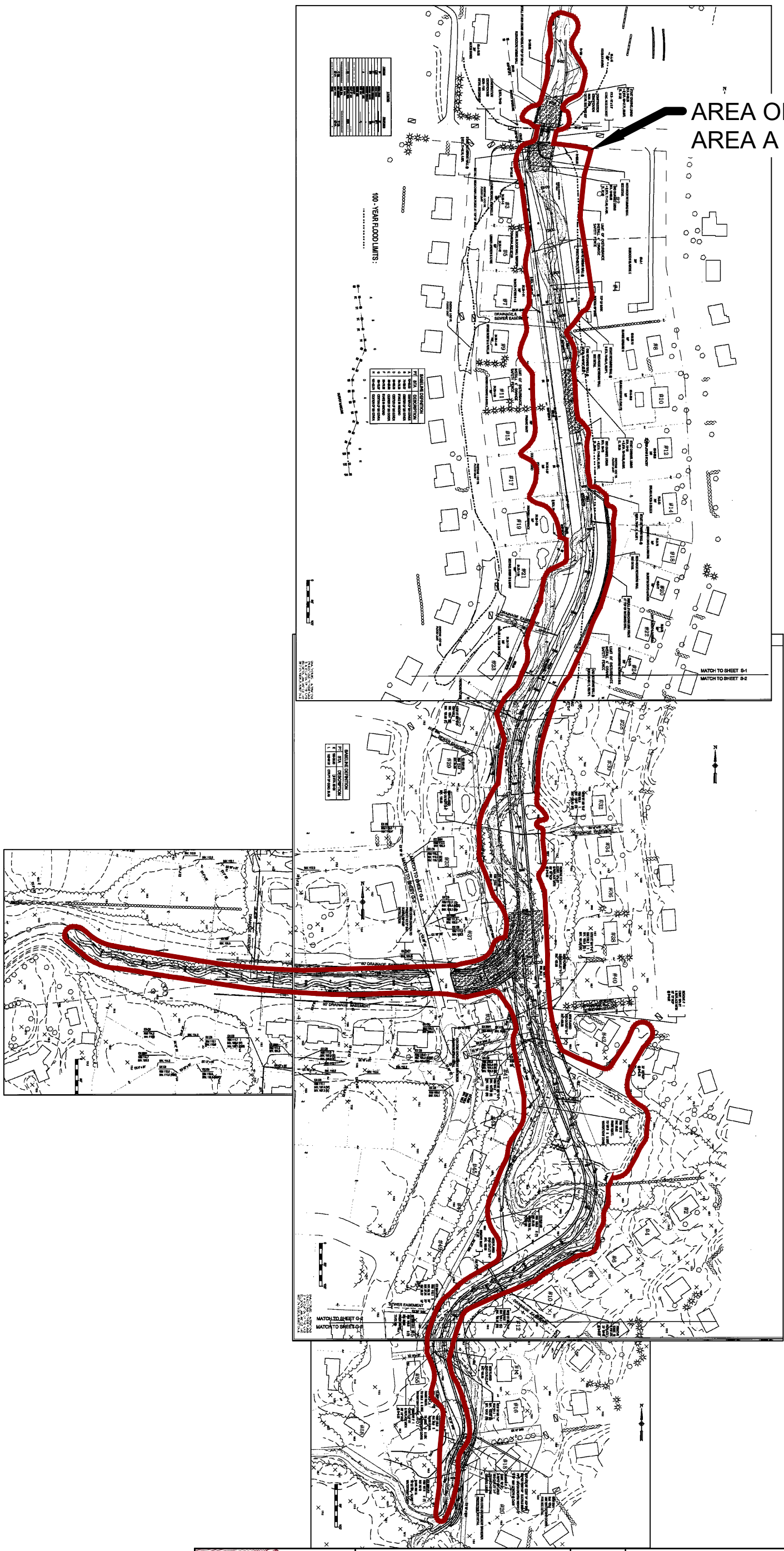
The area of potential effect (APE) consists 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)) topographically situated in a floodplain/terrace and lower hillslope environment associated with Demarest Kill and its unnamed tributary streams (Figure 3). The APE is characterized by deciduous hardwoods interspersed with herb/shrub communities. The APE is generally located west of the Hudson River and north of New City, New York between S.R. 304 and Old Route 304 within Clarkstown (Photos 1 to 3).

1.3 DISPOSITION OF MATERIALS

CDC will supply copies of this document to Tectonic Engineering & Surveying Consultants P.C. and the OPRHP.

1.4 AGENCY COORDINATION

In their response letter, the OPRHP required a Phase I Archaeological Survey to locate potentially significant archaeological resources within areas that will involve ground disturbance and cannot be documented as disturbed (Appendix I).



APE / AREA A

N
W E
S

0 1 CM = 30 METERS 120 METERS

Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

Project Mapping
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

REFERENCES:

TECTONIC
Erosion Control Plan 5-30-13

USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 3

Photo 1: APE, looking northeast

Photo 2: APE, looking northeast

Photo 3: APE, looking southeast

2.0 ENVIRONMENTAL BACKGROUND

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY

The bedrock of Rockland County is composed of sedimentary rock formations of Upper Triassic age such as the Newark group (USGS 2016). The arkose, mudstone, shale, and sandstone of the Brunswick Formation have been greatly altered by the advance and retreat of continental ice sheets of the late Pleistocene Epoch. The retreat of the glaciers of this period has resulted in the deposition of glacial till over the ground surface of the region (NYSM 2016; USFWS 2016).

The Phase IA study area is situated in the Triassic Lowland section of the Northern Piedmont physiographic province. This section is characterized by broad, gently sloping valleys with a moderate pattern of ridges (USDA 1990). Elevations in the vicinity of the APE range from approximately 80 to 150 ft above mean sea level (amsl).

2.2 CLIMATE

Climatic conditions in Rockland County include cold and snowy winters and warm to hot summers. Precipitation is adequate and well distributed. The average winter temperature for most of the county is 28 degrees Fahrenheit (F) (-2.2 degrees Celsius (C)). The average summer temperature is 70 degrees F (21.1 degrees C). The total annual precipitation is 119.4 centimeters (cm) (47 inches (in)) of which approximately 50 percent falls from April through September. Prevailing winds are out of the south (USDA 1990).

3.0 BACKGROUND RESEARCH

The sequence of archival maps, aerial photographs, and other basic historical research relating specifically to the project area was evaluated. Background research for this project was conducted using information from CDC's library, the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) Cultural Resource Information System (CRIS), and other online resources. Important archival maps included the County Atlas of Rockland from 1875 (Beers 1875) along with archival USGS Tarrytown, NY maps from 1892 and 1902 provided information about land-use at the turn of the twentieth century. The Gazetteer of the State of New York along with a volume of Rockland County History were valuable additions to the research conducted (French 1860; Green 1886).

3.1 CULTURAL PREHISTORIC OVERVIEW

An examination of the cultural prehistory of the project area provides relevant background data for characterizing and predicting the area's prehistoric settlement system. This data contributes to the ability of archaeologists to identify and establish the probability of archaeological sites in a specific area.

The **Paleoindian** occupation originated between 9500 and 9000 B.C. and marked the first undisputed evidence of man's entry into the northeast. However, based on radiocarbon dates from Meadowcroft Rock Shelter near Avella in Washington County, Pennsylvania it can be suggested that a pre-Paleoindian occupation employing polyhedral-core and blade-based lithic technology may have been present as early as 14000 B.C. (Adovasio 1993:207). Paleoindian fluted projectile lanceolates, distinguished by elongated channel scars, are sometimes found in association with extinct Pleistocene megafauna such as mammoth and mastodon. The geographical distribution of these distinctive points and other tool forms from this period includes most of the New World (Ritchie 1980).

The majority of Paleoindian sites in the northeast are recognized by fluted points, keeled unifacial tools, gravers, and blades fabricated from a variety of cherts and jaspers. Site types include kill sites with single projectile points; upland and waterside camps with varied tool kits; trail camps associated with Indian paths and natural trails; and specialized quarry and tool manufacturing sites where raw materials were procured and worked into tools. An average of 72 percent of Paleoindian sites in the northeast are located less than 200 m from second or higher-order streams. These riverine environments would have provided Paleoindian groups with a wide variety of important resources. (Carr 1998; Ritchie 1980)

The **Early Archaic** period (8000-6000 B.C.) roughly correlates with a time of notable environmental changes that began during the Pleistocene with episodes of glacial retreat; however, late Paleoindians lived within essentially the same environment as subsequent Archaic groups. Continuity between the Paleoindian and Early Archaic periods has been recognized, particularly through their subsistence regimes and mobility patterns. By the Early Archaic, Pleistocene megafauna became extinct and were replaced by modern species such as caribou and elk. Evidence for resource availability is poorly known, but it is believed that Early Archaic cultures were generalized hunters and gatherers living in small ephemeral sites located in a diversity of geographical settings. The Paleoindian preference for floodplain settings was replaced with an increase in upland site locations. The Early Archaic period is recognized by classic projectile tool types such as Kirk, Palmer, Big Sandy, and Thebes found at a relatively small number of localities. Continuity with Paleoindian populations can be suggested by Early Archaic tool attributes such as basal grinding (Ritchie 1980).

Bifurcated points mark the end of the Early Archaic period and the gradual emergence of the **Middle Archaic** cultures. By the Middle Archaic period (6500-3000 B.C.), some archaeologists suggest that a major economic shift toward increased specialization in hunting and gathering resources had

occurred perhaps in response to continued Early Holocene environmental changes. Human populations responded to these climatic fluctuations either by abandoning traditional exploitative strategies in one zone and continuing them in another or by exploiting new resources. The adaptive responses in place during the Middle Archaic period were coupled with a significant increase in population. Population increase also may be correlated with the trend toward territoriality and more sedentary lifeways as observed in the subsequent Late Archaic period (Ritchie 1980; Stewart 1989).

Hallmarks for the **Late Archaic** period include an emerging widespread interaction sphere in which objects such as copper, marine shell and chert were traded vis a vis long distance networks. Woodworking, weaving and hideworking tools are evident on larger base camps and settlement camps where ceremonial and domestic activities were likely to have occurred. Base camps were located on major rivers and may have at least partially functioned to take advantage of riverine links with cultures outside of the river valleys for the purpose of trade, group hunting activities, ceremonies, and/or the exchange of ritual and marriage partners. Specialized subsistence practices such as the collection of mussel shell and hickory nuts as well as an increased use of fish and avian resources seem to have intensified during the Late Archaic, although data for an increase in subsistence diversity is difficult to assess because of the scarcity of archaeological findings for this period. A diversity of topographic situations in the uplands and major riverine areas were utilized during the Late Archaic.

The **Early Woodland** period (1000 B.C.-100 B.C.) is characterized by a shift to ceramic production, the introduction of cultivated plants, and a more sedentary settlement system. However, data from some Early Woodland sites suggest a persistence of the Archaic hunting, gathering and fishing lifeway. The presence of both Early Woodland and Late Archaic artifacts on the same sites suggests a continuation of Late Archaic subsistence and procurement patterns. Preferred habitation locales included major floodplains and terraces where high yields of seed plants and riverine resources could be obtained. Gradually, cultigens such as squash, pumpkin, gourd, and corn were introduced. Of particular importance in the subsistence strategies during the **Middle Woodland** period (100 B.C.-A.D. 900) was the use of aquatic resources. Although deer provided the most significant part of the subsistence system, other components included fish, birds, turtles, and amphibians. Evidence for domesticated plants is not impressive during the Middle Woodland; instead, there seems to have been more of a reliance on a broad spectrum subsistence pattern including the harvesting of wild or quasi-domesticated crops near rich hunting and gathering sites (Ritchie 1980).

The **Late Woodland**/ **Late Prehistoric** period (A.D. 800-1600), subsistence strategies shifted to a reliance on domesticated plants including corn, beans and squash, which were cultivated primarily on the large floodplains and terraces of major rivers. During the Late Woodland period, a climatic episode known as the NeoBoreal brought cool, moist conditions to the general region. The effect of such climatic changes on the growing season for Late Woodland crops is difficult to assess without additional studies and particularly data relating to the significance of cultigens during this period. Continued occupation of upland sites included hunting and gathering stations, winter campsites, small farmsteads and villages. At the time of European Contact, the Munsee-Delaware occupied lands within Rockland County (Ritchie 1980; Salomon 1982:36).

3.2 OVERVIEW OF ROCKLAND COUNTY AND THE TOWN OF CLARKSTOWN

Situated 10 miles north of New York City, the triangular-shaped Rockland County is bound by the Hudson River, Orange County, New York, and the State of New Jersey. The county is watered by the Hackensack River, Ramapo River, and tributaries of the Hudson River, including Minisceongo Creek, Minas Fall Creek, and Spar Kil. The Ramapo Mountains occupy the western third of the county with steep rocky peaks and narrow valleys. Mountains also separate the northern portion of the township from the Hudson River and were an early barrier to the growth and development of the area. Today, the county is made up of 17 villages and five towns: Clarkstown, Haverstraw, Orangetown, Ramapo, and Stony Point.

The first settlers arrived in 1690 and were Dutch. At that time, Rockland County was part of the Kakiat Patent, which was later sold to a group of five men in 1716, one of whom was Daniel De Clark. When his land was sold in 1764, it became known as Clarke's Town. After the original courthouse in Tappan burned in 1774, a more central location was selected for the new courthouse and the area was named New City. Clarkstown was officially established in 1791 from part of Haverstraw to the north and contains the county seat of New City. Rockland County was then established in 1798 from parts of Orange County (Green 1886).

During this time, the area remained rural in spite of its close proximity to New York City. In 1800, the population was 1,806 persons and by 1880 it had only increased to 4,382. The economy focused on fruit growing and milk production, along with the manufacturing of lime, brick, shoes, wooden ware, and woolen yarn (French 1860).

Two early transportation systems impacted the economic growth of the county: the Nyack Turnpike and the New York and Erie Railroad. The Nyack Turnpike was constructed in the 1830s to connect the port at Nyack with the interior village of Suffern at the base of the Ramapo Mountains. The route is located in the south central portion of the county and still exists today as S. R. 0059. The New York and Erie Railroad was constructed between 1832 and 1861 to connect Piermont on the Hudson River to Lake Erie.

By the 1920's, artists, sculptors, composers, actors, and playwrights began moving to the area from New York City. However, it wasn't until the 1950s with the construction of the New York State Thruway from Suffern to Yonkers and the opening of the Tappan Zee Bridge that the population of Rockland County significantly boomed; the population more than doubled between 1950 and 1960 from 15,674 to 33,196 (Casey 2016). The Tappan Zee Bridge carries seven lanes of motor traffic over the Hudson River. Today, the population has burgeoned to 87,059 with the economy focused on professional, scientific, and technical services, retail, and health care (U.S. Census Bureau 2012).

3.3 SOILS

Soils in the project area derived from the Weathersfield-Cheshire-Urban Land association general soil unit. This soil association consists of very deep, nearly level to moderately steep, well drained soils formed on acidic glacial till derived from reddish sandstone on till plains. The soils within the study geomorphology study area are mapped as Cheshire-Urban land complex (CuB), Rippowam sandy loam (Ra), and Yalesville sandy loam (YaB) (USDA 1990; NRCS 2016).

Cheshire-Urban land complex soils consist of very deep, gently sloping, well drained Cheshire soils and areas covered by urban development. These soils are typically formed in glacial till derived from red Triassic sandstone ridges with slopes of 2 to 8 percent. A representative soil profile for Cheshire soils consists of a very dark grayish brown gravelly fine sandy loam A horizon, a reddish brown gravelly fine sandy loam Bw horizon, and a dark reddish brown gravelly sandy loam C horizon.

Rippowam sandy loam consists of very deep, nearly level, and poorly drained soil located on floodplains with slopes of 0 to 3 percent. These soils formed in alluvium mainly derived from granite and sandstone. A representative soil profile for Rippowam sandy loam consists of a very dark grayish brown sandy loam A horizon, a series of dark grayish brown to grayish brown sandy loam Bw horizons, a dark gray and grayish brown fine sandy loam BC horizon, and a dark brown loamy sand C horizon.

Yalesville sandy loam consists of moderately deep, well-drained soil located on uplands with slopes of 0 to 3 percent. These soils formed in glacial till derived from red Triassic sandstone. A representative soil profile for Yalesville sandy loam consists of a dark brown to dark reddish brown sandy loam A horizon, a series of reddish brown to red gravelly loam Bw horizons, and a red extremely channery loam C horizon.

4.0 SENSITIVITY ASSESSMENT

To aid in the prediction of prehistoric and historic archaeological site probability within the APE, a literature search was conducted. The literature search included an examination of the data bases in the New York Office of Parks, Recreation, and Historic Preservation's (OPRHP) Cultural Resource Information System (CRIS).

According to the OPRHP letter (see Appendix I), the APE is considered to be located on an Archaeological Sensitive landform. One archaeological survey project has been conducted within a 1.6 kilometers (km) (1 mi) radius of the the Clarkstown Canford Drive Drainage Improvements. Currently, an Archaeological Sensitivity Assessment for the Buckley Farms Subdivision project (16PR04923) is taking place southwest of the current APE. No other projects were completed in the general area of the APE.

No previously recorded archaeological sites have been documented near the vicinity of the APE or within a 1.6 km (1 mile) radius. Eight previously documented properties over 50 years of age have been documented within a one-mile radius of the APE, including four properties listed on the National Register, two which are considered not eligible, and two which are undetermined (Table 1).

Table 1
Previously Recorded Historic Properties within a One-Mile Radius

Number	Name	Status
90NR02398	Jacob Abramse Blauvelt House, Carriage House, and Barn - 20 Zukor Rd	Listed
07NR05796	Peter DePew House - 101 Old Route 304	Listed
04NR05229	H.R. Stevens House - 234 Congers Rd	Listed
91NR00049	Rockland County Courthouse and Dutch Gardens	Listed
	New City Free Library - 220 North Main St	Not Eligible
	Zachar - 311 Old NY 304	Not Eligible
	Clarkstown North High School - 151 Congers Rd	Undetermined
	Unidentified Federal House - South Mountain Rd	Undetermined

One of the National Register listed historic resources, Peter DePew House (07NR05796), is located adjacent but not within the APE. The Peter DePew House is located northeast of the APE. The property was originally constructed ca. 1750 and consists of three buildings and six structures. The property was listed on the National Register in July of 2008.

5.0 DISTURBANCE

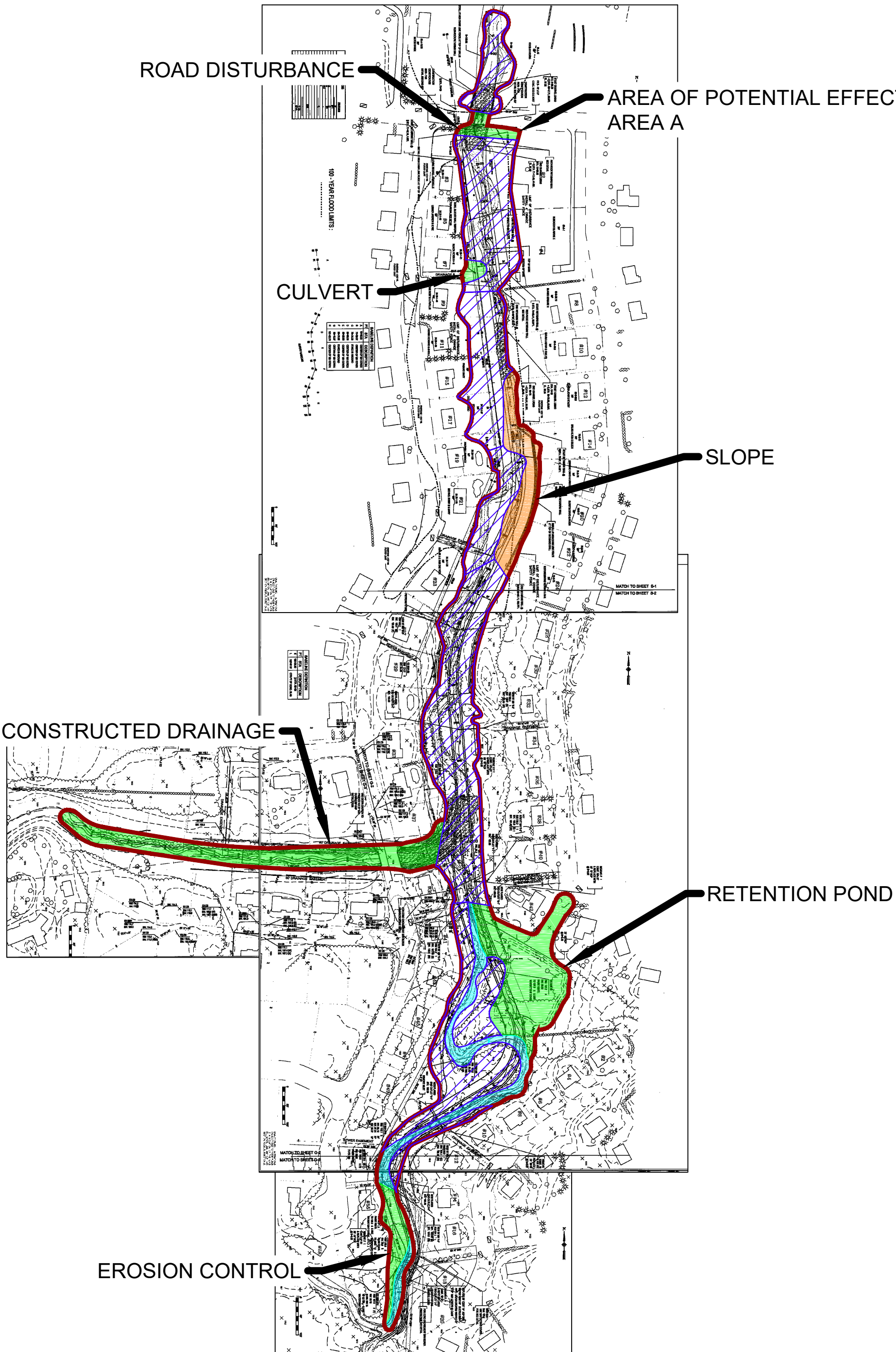
Portions of the APE contained slopes greater than 15 percent and could not be tested. In addition, disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond were noted within the APE (Photos 4 through 7; Figure 4).

Photo 4: Erosion control areas included the use of large stones along the floodplain and terraces, looking southeast

Photo 5: Erosion control areas included the use of large stones along the floodplain and terraces, looking west

Photo 6: Man-made retention pond, looking southwest

Photo 7: Artificially constructed drainage, looking west



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

APE / AREA A
TESTED
WET
STEEP
DISTURBED

N W E S

0 1 CM = 30 METERS 120 METERS

REFERENCES:
TECTONIC
Erosion Control Plan 5-30-13
USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

Tested, Wet, Steep and Disturbed Areas
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 4

6.0 TESTING RECOMMENDATIONS

The factors described below are specific to Clarkstown Canford Drive Drainage Improvements APE and provide pertinent information to predict the location of sites. Well drained soils in nearly level to gently sloping topographic settings generally are the highest probability areas for archaeological sites. The APE is situated within a wet floodplain/terrace associated with Demarest Kill but the potential for archaeological remains, particularly in buried contexts, is higher in floodplain areas.

A tributary of the West Branch of Hackensack River (Demarest Kill) and its tributary streams lies within the APE. This stream had been artificially diverted to its current course in the recent past. No intact alluvial soils with any potential for significant buried cultural material are present within this portion of the APE. Due to the presence of alluvial soils and the potential for buried living surfaces, a geomorphology study was conducted for this project. Joshua Pfarr conducted the Geomorphological Survey, which consisted of an examination of the stratigraphy within auger probes. The results are presented in *Section 6.1 Geomorphological Survey Results*.

A recent examination of CRIS revealed no previously recorded archaeological sites within the APE. No previously recorded archaeological sites were documented near the vicinity of the APE or within a 1.6 km (1 mile) radius; however, according to the OPRHP letter the APE is considered to be located on an Archaeological Sensitive landform. The APE was designated as having moderate to high probability for the discovery of archaeological sites based on the geomorphological results, soil survey, and examination of the CRIS system.

6.1 GEOMORPHOLOGICAL SURVEY RESULTS

A total of four auger probes were excavated within the APE to identify the representative soil and sediment profiles present along the West Branch of Hackensack River (Demarest Kill). A T0 floodplain zone comprises a majority of the APE. Narrow T00 floodplains/active stream channel zones consisting of recent coarse sand and gravel alluvium were also visually identified within the APE. These T00 floodplains represent areas of extremely low probability for containing in situ historic or prehistoric cultural material. The lower portions of upland hillslopes were also identified within the APE containing relatively shallow soils developed on colluvium or partially altered glacial till. The T0 floodplain zone will be the focus of this geomorphology survey.

The auger probes excavated on the T0 floodplain zones of the West Branch of Hackensack River (Demarest Kill) revealed soil development on sandy stream channel and flood deposits. On much of the T0 floodplain relatively recent sandy flood deposits are present at or just below the ground surface. Archaeological testing on these landforms is recommended to extend to the top of the fine to coarse sand C horizons located beneath the A and Bw horizons. These massive, sandy C horizons represent sterile, partially altered, sedimentary parent material. This testing can be accomplished by the hand excavation of shovel tests (STs) to depths of approximately 40 to 90 cm (15.7 to 35.4 in) bgs. The geomorphological report is presented in its entirety in Appendix II.

7.0 PHASE I FIELD SURVEY

7.1 FIELD METHODOLOGY

The Phase I field methodology conforms to the approach developed by the New York Archaeological Council (NYAC) (2005). Field work began with a systematic ground surface inspection of the APE for the purpose of defining any surface evidence of archaeological sites such as foundations or other extant features; of detecting any variability in topographic and soil maps; and finally to note any impact to the archaeological integrity of the APE. There was no ground surface evidence for historic sites identified during the pedestrian inspection.

Based on the results of the geomorphological survey, in potentially undisturbed areas of less than 15 percent slopes where ground surface visibility was not adequate for surface collection, the hand excavation of .5-by-.5 m (1.6 ft x 1.6 ft) shovel tests were conducted at 15 m (50 ft) intervals. Shovel tests were excavated to undisturbed soil levels. Once sterile subsoil was reached, a minimum of ten additional cm (3.9 in) of subsoil was excavated to confirm the natural stratigraphy of the horizon. Auger probes were conducted to verify soil profiles in areas of potentially disturbed soil horizons. Wetland environments were tested unless standing water was present.

All subsurface units were numbered sequentially, and soil profiles were cleaned and documented by a pedological description. All hand-excavated soils were screened through quarter-inch hardware mesh and returned to original ground surface condition.

7.2 FIELD SURVEY RESULTS

The Phase I field survey was conducted in August of 2016. The APE involves approximately 48,186 sq m (518,666 sq ft or 11.9 ac). During the ground surface inspection, the entire APE was examined to determine the potential for archaeological resources. Portions of the APE were designated as having low to no probability for the discovery of archaeological sites based on previous impacts and wetland environments. Previous impacts to the APE included disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond. A total of 29,155 sq m (313,821 sq ft or 7.2 ac) were tested within the APE.

Area A

Description: Area A encompasses approximately 48,186 sq m (518,666 sq ft or 11.9 ac), located adjacent to Cranford Drive and Cypress Street (see Figure 4; Photos 8 through 11). It is topographically situated within a floodplain/terrace and lower hillslope environment associated with Demarest Kill and is bound by the limits of the APE on all sides. The area is characterized by deciduous hardwoods interspersed with herb/shrub communities. Elevations range from 100 ft to 116 ft amsl.

Approximately 29,155 sq m (313,821 sq ft or 7.2 ac) within Area A was subjected to Phase I testing; the remaining 19,031 sq m (204,845 sq ft or 4.7 ac) did not require testing due to the disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond

Methodology: Field methodology consisted of the hand-excavation of shovel tests at 15 m (50 ft) intervals.

Photo 8: Area A, looking south

Photo 9: Area A, looking south

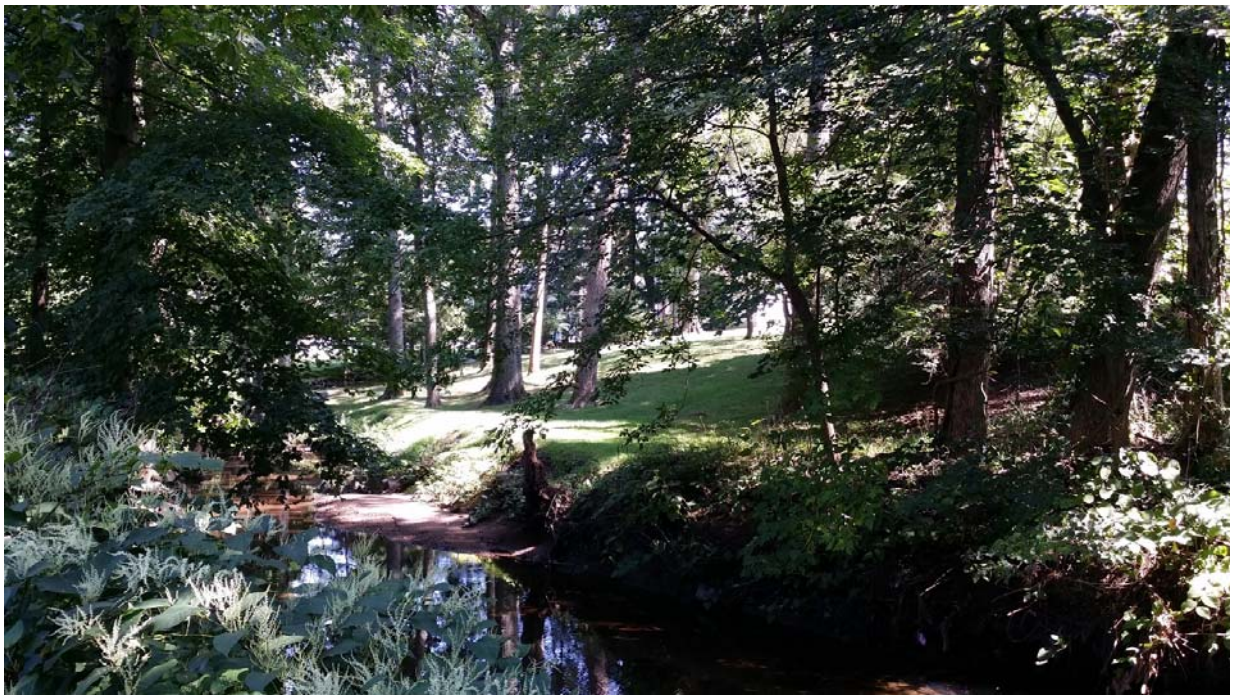


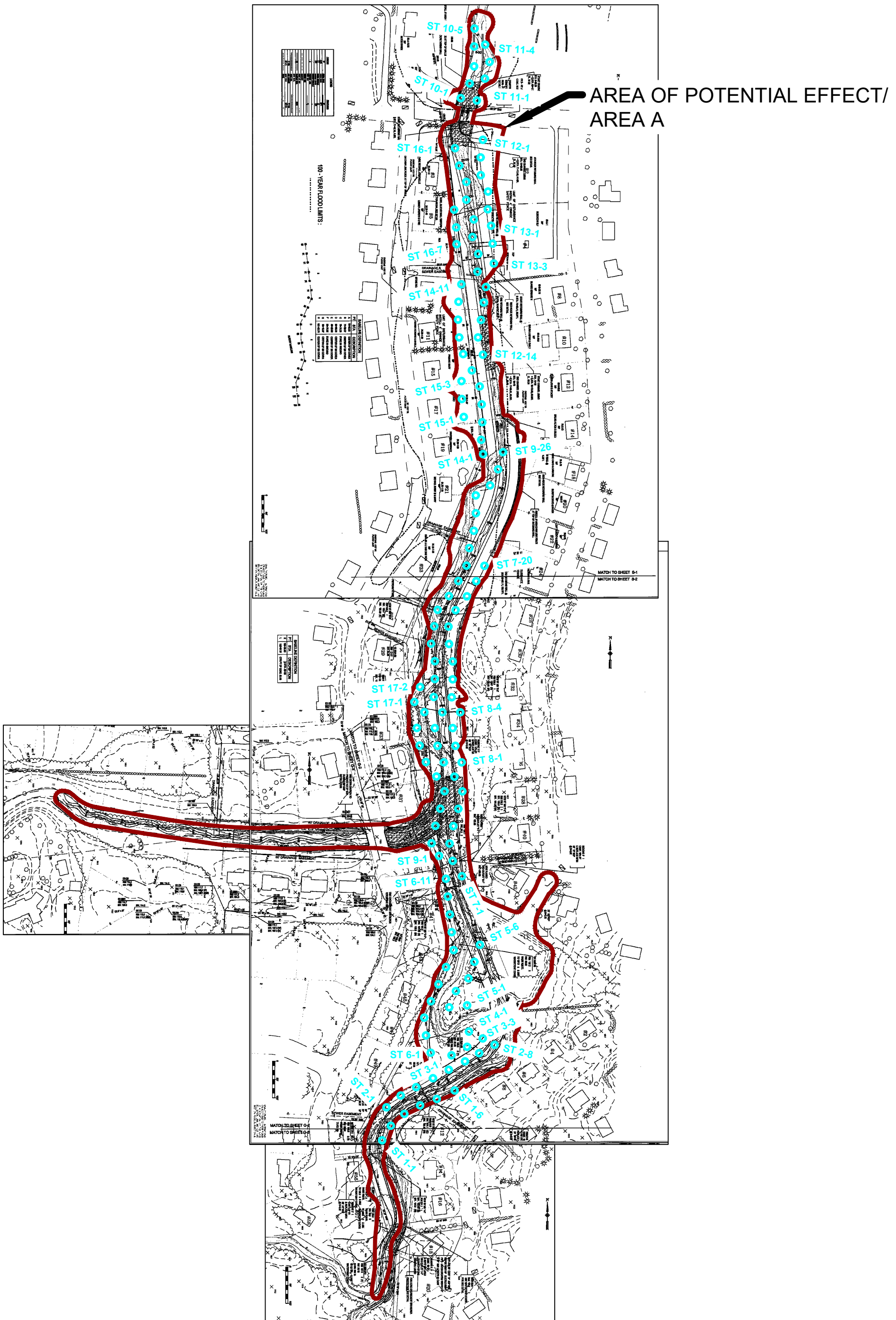
Photo 10: Area A, looking northeast

Photo 11: Area A, looking northeast

Results: A total of 134 STs were hand-excavated in Area A at 15 m (50 ft) intervals along 17 transects and all 134 STs were negative (Figure 5). The majority of soil profiles ranged from 14 to 56 cm of light brown to brown sandy silt loam over yellow brown sand to sandy silt loam. Some profiles terminated in a rock impasse. Other profiles consisted of light brown to brown or dark brown sandy silt loam over yellow brown sand to brown sandy loam and terminated in light yellow brown to grey brown sand to sandy loam. Representative soil profiles are presented below. ST records are presented in their entirety in Appendix III. Based on the results of the Phase I Survey, no evidence of prehistoric or historic archaeological sites were identified.

Soil Profile: Area A Shovel Test 5-3 Description	**Strata and Artifact Description**
Medium Brown Sandy Silt Loam	0-23 cm bgs A Horizon 10YR 3/3 No Cultural Material
Yellow Brown Sand	23-33 cm bgs Bw Horizon 10YR 5/3

Soil Profile: Area A Shovel Test 9-12 Description	**Strata and Artifact Description**
Dark Brown Sandy Loam	0-20 cm bgs Ao Horizon 10YR 3/3 No Cultural Material
Brown Sandy Loam	20-80 cm bgs Bw Horizon 10YR 4/3
Light Yellow and Brown Sandy Loam	80-90 cm bgs C1 Horizon 10YR 7/3



Christine Davis Consultants
Archaeology and History
Cider Mill of Pittsburgh
560 Penn Street
Verona, PA 15147
www.ChristineDavisConsultants.com
412-826-0443

APE / AREA A

NEGATIVE SHOVEL TEST

N W E S

0 1 CM = 30 METERS 120 METERS

REFERENCES:
TECTONIC
Erosion Control Plan 5-30-13
USGS EARTHSTAR GEOGRAPHICS
Aerial Imagery - 2016

Area A
CLARKSTOWN CRANFORD DRIVE
DRAINAGE IMPOROVEMENTS
16PR05212
Town of Clarkstown, Rockland County, New York

PROJECT NO: 16048
MAP AUTHOR: BD
PUB. DATE: 9-16-16

FIGURE 5

8.0 SUMMARY

8.1 CONCLUSIONS

The proposed project involves the Clarkstown Canford Drive Drainage Improvements, located within the Town of Clarkstown, Rockland County, New York. CDC was retained by retained by Tectonic Engineering & Surveying Consultants P.C.to perform cultural resource investigations for this project. The sponsoring agency for this project is Governor's Office of Storm Recovery (GOSR).

The Phase I field survey was conducted for this project in summer of 2016. Phase I field methodology involved surface surveillance and the hand excavation of STs at 15 m intervals. A portion of the APE, involving approximately 48,186 sq m (518,666 sq ft or 11.9 ac), was not tested due to the presence of slopes greater than 15 percent and wet areas and disturbances caused by the construction of roadways, culverts, erosion control, an artificially constructed drainage and a man-made retention pond

The total tested area within the APE measured approximately 29,155 sq m (313,821 sq ft or 7.2 ac). A total of 134 STs were excavated within the APE at 15 m intervals and all 134 STs were negative. No artifacts were recovered during the survey and no evidence of archaeological resources was identified during the Phase I Archaeological testing.

Based on the results of the Phase I Archaeological and Geomorphological Survey, no archaeological resources were identified; therefore, no further archaeological survey work is recommended for the Clarkstown Canford Drive Drainage Improvements project.

9.0 REFERENCES

Adovasio, J. M.
1993 The Ones That Will Not Go Away: A Biased View of Pre-Clovis Populations in the New World. In *From Kostenki to Clovis: Upper Paleolithic-Paleo-Indian Adaptations*, edited by O. Soffer and N. D. Praslov. Plenum Press, New York.

Beers, F. W.
1875 *County Atlas of Rockland, New York.* Walker & Jewett, New York.

Carr, K. W.
1998 The Early Archaic Period in Pennsylvania. *Pennsylvania Archaeologist* 68(2):42-69.

Casey, Thomas F. X.
2016 A Brief History of Rockland. RocklandHistory.org

French, J. H.
1860 *Historical and Statistical Gazetteer of New York State.* Heart of the Lakes Publishing, Interlaken, New York.

Green, Frank Bertangue
1886 *History of Rockland County, New York.* A. S. Barnes & Co., New York.

Independence Hall Association
2013 "Major John Andre". http://www.ushistory.org/march/bio/andre.htm (accessed on September 9, 2016).

Natural Resources Conservation Service
2016 The Web Soil Survey http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx (accessed on August 24, 2016).

New York State Archaeological Council
2000 *Cultural Resource Standards Handbook-Guidance for Understanding and Applying the New York State Standards for Cultural Resource Investigations.*

2005 *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State.*

New York State Museum
2016 Geology-Geographic Information System http://www.nysm.nysed.gov/research-collections/geology/gis (accessed on August 24, 2016)

Ritchie, William A.
1980 *The Archaeology of New York State.* Harbor Hill Books, Harrison, New York. Revised edition.

Stewart, Michael
1989 The Middle Archaic of Western Maryland. Paper presented at the 56th Annual Meeting of the Eastern States Archaeological Federation, East Windsor, Connecticut.

Salomon, Julian H.
1982 *Indians of the Lower Hudson Region, The Munsee*. Historical Society of Rockland County, New City, New York.

Town of Clarkstown
2016 "History" <http://www.town.clarkstown.ny.us/html/history_profile.html> (accessed on September 9, 2016).

United States Census Bureau
2012 American Fact Finder. Accessed electronically at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF . Accessed on September 9, 2016.

United States Department of Agriculture, Soil Conservation Service
1990 *Soil Survey of Rockland County, New York.* Prepared in cooperation with Cornell University Agricultural Experiment.

United States Fish and Wildlife Service
2016 *Geomorphic Provinces and Sections of the New York Bight Watershed*. National Conservation Training Center https://nctc.fws.gov/pubs5/web_link/text/geolsect.htm (accessed on August 24, 2016).

United States Geological Survey
1892 Tarrytown Quadrangle, New York 15' series.

1902 Tarrytown Quadrangle, New York 15' series.

2016 Mineral Resources Online Spatial Data http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NYTRba;3 (accessed on August 24, 2016).

Web Soil Survey NRCS
2008 *Web Soil Survey.* < http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx> (accessed on August 5, 2008).

APPENDIX I
AGENCY COORDINATION

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation and Historic Preservation

ANDREW M. CUOMO
Governor

ROSE HARVEY
Commissioner

ARCHAEOLOGY COMMENTS

Phase I Archaeological Survey Recommendation
16PR05212 – Clarkstown Cranford Drive Drainage Improvements

The project is located in on archaeologically sensitive landform. Therefore, the Office of Parks, Recreation and Historic Preservation (OPRHP) recommends a Phase I archaeological survey for all portions of the project that will involve ground disturbance, unless substantial prior ground disturbance can be documented. OPRHP anticipates that some portions of the project area have experienced extensive prior soil disturbance and that no archaeological testing will be needed in those areas. If you consider the entire project area to be disturbed, documentation of the disturbance will need to be reviewed by OPRHP. Examples of disturbance include mining activities and multiple episodes of building construction and demolition.

Documentation of ground disturbance should include a description of the disturbance with confirming evidence. Confirmation can include current photographs and/or older photographs of the project area which illustrate the disturbance (approximately keyed to a project area map), past maps or site plans that accurately record previous disturbances, or current soil borings that verify past disruptions to the land. Agricultural activity is not considered to be substantial ground disturbance.

Please note that in areas with alluvial soils or fill archaeological deposits may exist below the depth of superficial disturbances such as pavement or even deeper disturbances, depending on the thickness of the alluvium or fill. Evaluation of the possible impact of prior disturbance on archaeological sites must consider the depth of potentially culture-bearing deposits and the depth of planned disturbance by the proposed project.

A Phase I survey is designed to determine the presence or absence of archaeological sites or other cultural resources in the project's area of potential effect. The OPRHP can provide standards for conducting cultural resource investigations upon request. Cultural resource surveys and survey reports that meet these standards will be accepted and approved by the OPRHP.

Our office does not conduct archaeological surveys. A 36 CFR 61 qualified archaeologist should be retained to conduct the Phase I survey. Many archaeological consulting firms advertise their availability in the yellow pages. The services of qualified archaeologists can also be obtained by contacting local, regional, or statewide professional archaeological organizations. Phase I surveys can be expected to vary in cost per mile of right-of-way or by the number of acres impacted. We encourage you to contact a number of consulting firms and compare examples of each firm's work to obtain the best product.

Please also be aware that a Section 233 permit from the New York State Education Department (SED) may be necessary before archaeological fieldwork is conducted on State-owned land. If any portion of the project includes the lands of New York State you should contact the SED before initiating survey activities. The SED contact is Christina B. Rieth and she can be reached at (518) 402-5975. Section 233 permits are not required for projects on private land.

If you have any questions concerning archaeology, please contact Tim Lloyd at 518-268-2186 or Timothy.Lloyd@parks.ny.gov

APPENDIX II
GEOMPRPHOLOGICAL REPORT

CHRISTINE DAVIS CONSULTANTS, INC.
560 Penn Street, Verona, Pennsylvania 15147
Phone: 412/826-0443 Fax: 412/826-0458

PHASE IA GEOMORPHOLOGICAL SURVEY

CLARKSTOWN CRANFORD DRIVE DRAINAGE IMPROVEMENTS

TOWN OF CLARKSTOWN, ROCKLAND COUNTY, NEW YORK

BY:

JOSHUA M. PFARR
Principal Investigator/Geomorphologist
Christine Davis Consultants, Inc.

ABSTRACT

A Phase IA Geomorphological Survey was conducted for the proposed Clarkstown Cranford Drive Drainage Improvements project in Town of Clarkstown, Rockland County, New York. Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering & Surveying Consultants, P.C. to perform cultural resource investigations for this project which include geomorphology evaluation. The sponsoring agency for this project is the Army Corps of Engineers (COE).

The area of potential effect (APE) consists of approximately 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)) of stream modification and realignment. It is topographically situated within floodplain/terrace settings associated with a tributary of the West Branch Hackensack River known as Demarest Kill within the Triassic Lowland Section of the Northern Piedmont physiographic province.

The field survey was conducted in August of 2016. Geomorphological field methodology involved the evaluation of soils and sediments within hand excavated auger probes. The excavation of auger probes revealed intact soils located on the T0 floodplain of the West Branch of Hackensack River also known as Demarest Kill.

Based on the results of the Phase IA Geomorphological Survey, shovel test probes on the T0 floodplain extending through any A and Bw horizons to the depth of the C horizon sands will be sufficient for a Phase I Archaeological Survey.

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 PROPOSED UNDERTAKING 1
1.2 AREA OF POTENTIAL EFFECT (APE) 1
1.3 PURPOSE OF INVESTIGATION 1

2.0 ENVIRONMENTAL BACKGROUND 4

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY 4
2.2 CLIMATE 4
2.3 SOILS 4

3.0 GEOMORPHOLOGICAL FIELD SURVEY 6

3.1 FIELD METHODOLOGY 6
3.2 FIELD SURVEY RESULTS 6

4.0 CONCLUSIONS AND RECOMMENDATIONS 13

5.0 REFERENCES 14

FIGURES

1	PROJECT LOCATION, HAVERSTRAW, NY 7.5' USGS MAPS	2
2	AREA OF POTENTIAL EFFECT (APE)	3
3	SOIL MAP OF APE	5
7	AUGER PROBE LOCATIONS	8
11	REPRESENTATIVE SOIL & SEDIMENT PROFILES	11-12

PHOTOGRAPHS

1	WEST BRANCH OF HACKENSACK RIVER (DEMAREST KILL) CHANNEL AND T00 FLOODPLAIN LOOKING SOUTHWEST	7
2	T0 FLOODPLAIN AT SOUTH END OF APE INCLUDING ABANDONED STREAM CHANNEL LOOKING NORTH	9
3	ARTIFICIAL RETENTION POND WEST OF STREAM NEAR SOUTH END OF APE LOOKING SOUTHWEST	9
4	AP 3 LOCATION NEAR CENTER OF APE LOOKING SOUTHEAST	10
5	NORTH END OF APE LOOKING SOUTH	10

1.0 INTRODUCTION

1.1 PROPOSED UNDERTAKING

The proposed undertaking involves the Clarkstown Cranford Drive Drainage Improvements project in the Town of Clarkstown, Rockland County, New York. Christine Davis Consultants, Inc. (CDC) was retained by Tectonic Engineering and Surveying Consultants, P.C. to perform cultural resource investigations for this project. The sponsoring agency for this project is the Army Corps of Engineers (COE).

1.2 AREA OF POTENTIAL EFFECT (APE)

The proposed project includes portions of the floodplain zones associated with the West Branch of Hackensack River, also known as Demarest Kill. The APE for this project encompasses a total size of 48,186 square (sq) meters (m) (518,666 sq ft or 11.9 acres (ac)). The APE includes the areas where potential ground surface impacts will occur as part of the proposed undertaking. The APE is generally located west of the Hudson River and north of New City, New York between S.R. 304 and Old Route 304 within Clarkstown (Figures 1 and 2).

The West Branch of Hackensack River (Demarest Kill) flows north towards its confluence with the Hackensack River approximately 1 kilometer (km) (3,281 ft) away. It is fed by an artificially rerouted tributary that flows east between Cragmere Oval and Bush Ct. The landforms within the APE along the West Branch of Hackensack River (Demarest Kill) include T00 and T0 floodplain zones located at a nominal elevation of 30.5 to 36.6 m (100 to 120 ft) above sea level (asl).

A tributary of the West Branch of Hackensack River (Demarest Kill) also lies within the APE. This stream had been artificially diverted to its current course in the recent past. No intact alluvial soils with any potential for significant buried cultural material are present within this portion of the APE.

1.3 PURPOSE OF INVESTIGATION

The objectives of the geomorphological survey are to determine the relative age of the landforms and soils within the APE and to determine the maximum depth of excavation required for the recovery of cultural material during the Phase I Archaeological Survey. The floodplain zones of the West Branch of Hackensack River (Demarest Kill) and their associated soils will be the focus of the study.

FIGURE 1: PROJECT LOCATION, HAVERSTRAW, NY 7.5' USGS MAPS

FIGURE 2: AREA OF POTENTIAL EFFECT (APE) (NRCS 2016)

2.0 ENVIRONMENTAL BACKGROUND

2.1 BEDROCK GEOLOGY AND PHYSIOGRAPHY

The bedrock of Rockland County is composed of sedimentary rock formations of Upper Triassic age such as the Newark group (USGS 2016). The conglomerate, mudstone, shale, and sandstone of the Brunswick Formation have been greatly altered by the advance and retreat of continental ice sheets of the late Pleistocene Epoch. The retreat of the glaciers of this period has resulted in the deposition of glacial till over the ground surface of the region (NYSM 2016; USFWS 2016; Van Diver 1985).

The Phase IA study area is situated in the Triassic Lowland section of the Northern Piedmont physiographic province. This section is characterized by broad, gently sloping valleys with a moderate pattern of ridges (USDA 1990). Elevations in the vicinity of the APE range from approximately 80 to 150 ft asl.

2.2 CLIMATE

Climatic conditions in Rockland County include cold and snowy winters and warm to hot summers. Precipitation is adequate and well distributed. The average winter temperature for most of the county is 28 degrees Fahrenheit (F)(-2.2 degrees Celsius (C)). The average summer temperature is 70 degrees F (21.1 degrees C). The total annual precipitation is 119.4 centimeters (cm) (47 inches (in)) of which approximately 50% falls from April through September. Prevailing winds are out of the south (USDA 1990).

2.3 SOILS

Soils in the project area derived from the Weathersfield-Cheshire-Urban Land association general soil unit. This soil association consists of very deep, nearly level to moderately steep, well drained soils formed on acidic glacial till derived from reddish sandstone on till plains. The soils within the study geomorphology study area are mapped as Cheshire-Urban land complex (CuB), Rippowam sandy loam (Ra), and Yalesville sandy loam (YaB) (Figure 3) (USDA 1990; NRCS 2016).

Cheshire-Urban land complex soils consist of very deep, gently sloping, well drained Cheshire soils and areas covered by urban development. These soils are typically formed in glacial till derived from red Triassic sandstone ridges with slopes of 2 to 8 percent. A representative soil profile for Cheshire soils consists of a very dark grayish brown gravelly fine sandy loam A horizon, a reddish brown gravelly fine sandy loam Bw horizon, and a dark reddish brown gravelly sandy loam C horizon.

Rippowam sandy loam consists of very deep, nearly level, and poorly drained soil located on floodplains with slopes of 0 to 3 percent. These soils formed in alluvium mainly derived from granite and sandstone. A representative soil profile for Rippowam sandy loam consists of a very dark grayish brown sandy loam A horizon, a series of dark grayish brown to grayish brown sandy loam Bw horizons, a dark gray and grayish brown fine sandy loam BC horizon, and a dark brown loamy sand C horizon.

Yalesville sandy loam consists of moderately deep, well drained soil located on uplands with slopes of 0 to 3 percent. These soils formed in glacial till derived from red Triassic sandstone. A representative soil profile for Yalesville sandy loam consists of a dark brown to dark reddish brown sandy loam A horizon, a series of reddish brown to red gravelly loam Bw horizons, and a red extremely channery loam C horizon.

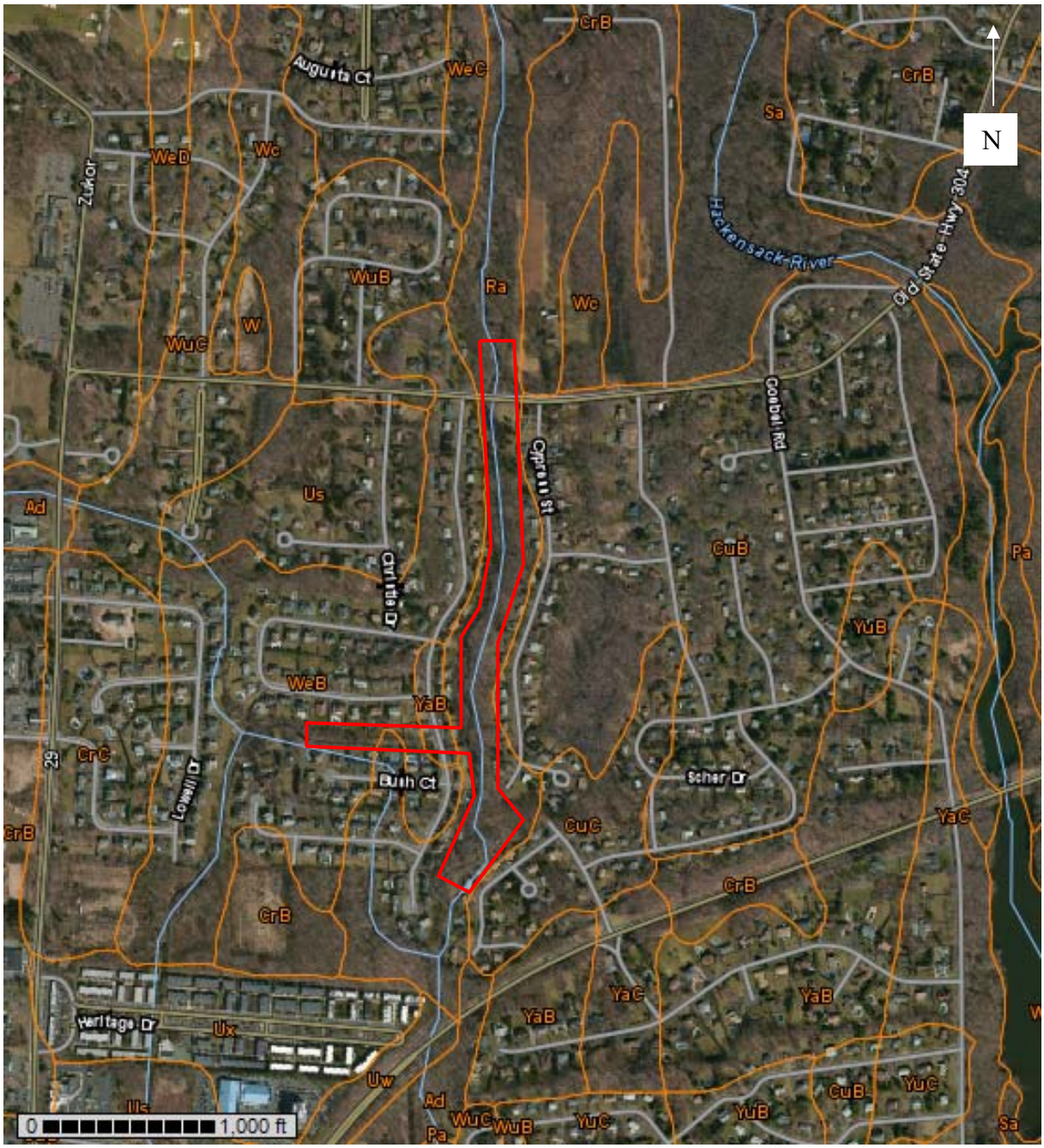


FIGURE 3: SOIL MAP OF THE APE (NRCS 2016)

3.0 GEOMORPHOLOGICAL FIELD SURVEY

3.1 FIELD METHODOLOGY

A total of four auger probes were excavated within the APE to identify the representative soil and sediment profiles present along the West Branch of Hackensack River (Demarest Kill). A T0 floodplain zone comprises a majority of the APE. Narrow T00 floodplains/active stream channel zones consisting of recent coarse sand and gravel alluvium were also visually identified within the APE (Photo 1). These T00 floodplains represent areas of extremely low probability for containing in situ historic or prehistoric cultural material. The lower portions of upland hillslopes were also identified within the APE containing relatively shallow soils developed on colluvium or partially altered glacial till. The T0 floodplain zone will be the focus of this geomorphology survey.

3.2 FIELD SURVEY RESULTS

The first and second auger probes (AP 1 & 2) were placed on the T0 floodplain on the west and east banks, respectively, of the West Branch of Hackensack River (Demarest Kill) near the south end of the APE at a height of approximately 80 cm (31.5 in) above the active stream channel. The profile of AP 1 included an 18 cm (7.1 in) thick dark brown sandy loam A horizon with a weak granular structure. The Bw horizon located beneath the A horizon consisted of a 22 cm (8.7 in) brown to yellowish brown sandy loam with a moderate granular structure. The Bw horizon was underlain by a series of massive loamy fine to coarse sand C horizons beginning at a depth of 40 cm (15.7 in) below ground surface (bgs) and extending to channel lag gravels at 150 cm (59.1 in) bgs (Figure 4; Photos 2 and 3).

The third auger probe (AP 3) was placed on the T0 floodplain on the east bank of the West Branch of Hackensack River (Demarest Kill) near the center of the APE located at a height of approximately 100 cm (39.4 in) above the active stream channel. The soil and sediment profile included a 10 cm (3.9 in) thick dark brown sandy loam Ao horizon with a weak to moderate granular structure. The Ao horizon was underlain by a 60 cm (23.6 in) thick brown sandy loam Bw horizon with a moderate granular structure. The Bw horizon was underlain by a 20 cm (7.9 in) thick grayish brown and yellowish brown massive loamy sand C horizon. A gray and dark gray medium to coarse sand C2 horizon was encountered at a depth of 90 cm (35.4 in) bgs (see Figure 4; Photo 4).

The fourth auger probe (AP 4) was placed on the T0 terrace on the east bank of the stream near the north end of the APE at a height of approximately 130 cm (51.2 in) above the active stream channel. The soil and sediment profile included a 10 cm (3.9 in) thick dark brown loamy sand Ao horizon. The Ao horizon was underlain by a 30 cm (11.8 in) thick brown and gray sand C horizon representing a relatively recent, massive flooding. The C horizon was underlain by a 25 cm (9.8 in) thick dark brown sandy loam 2Ab horizon with a moderate granular structure. This 2Ab horizon represents a former ground surface that was buried rapidly beneath the flood sands of the overlying C horizon. This buried ground surface has the highest potential for containing in situ cultural material. However, it is likely of relatively young age given the lack of soil development in the overlying matrix. Beneath the 2Ab horizon was a 25 cm (9.8 in) thick brown sandy loam 2Bw horizon with a moderate granular structure. A dark gray and brown mottled massive loamy sand 2C horizon was encountered at a depth of 90 cm (35.4 in) bgs followed by a massive gray and yellowish brown sandy clay 3C horizon at 120 cm (47.2 in) bgs (see Figure 4; Photo 5).

Figure 5 contains representative soil and sediment profiles for each area tested within the APE (south, center, and north).

PHOTO 1: WEST BRANCH OF HACKENSACK RIVER (DEMAREST KILL) CHANNEL AND T00 FLOODPLAIN LOOKING SOUTHWEST

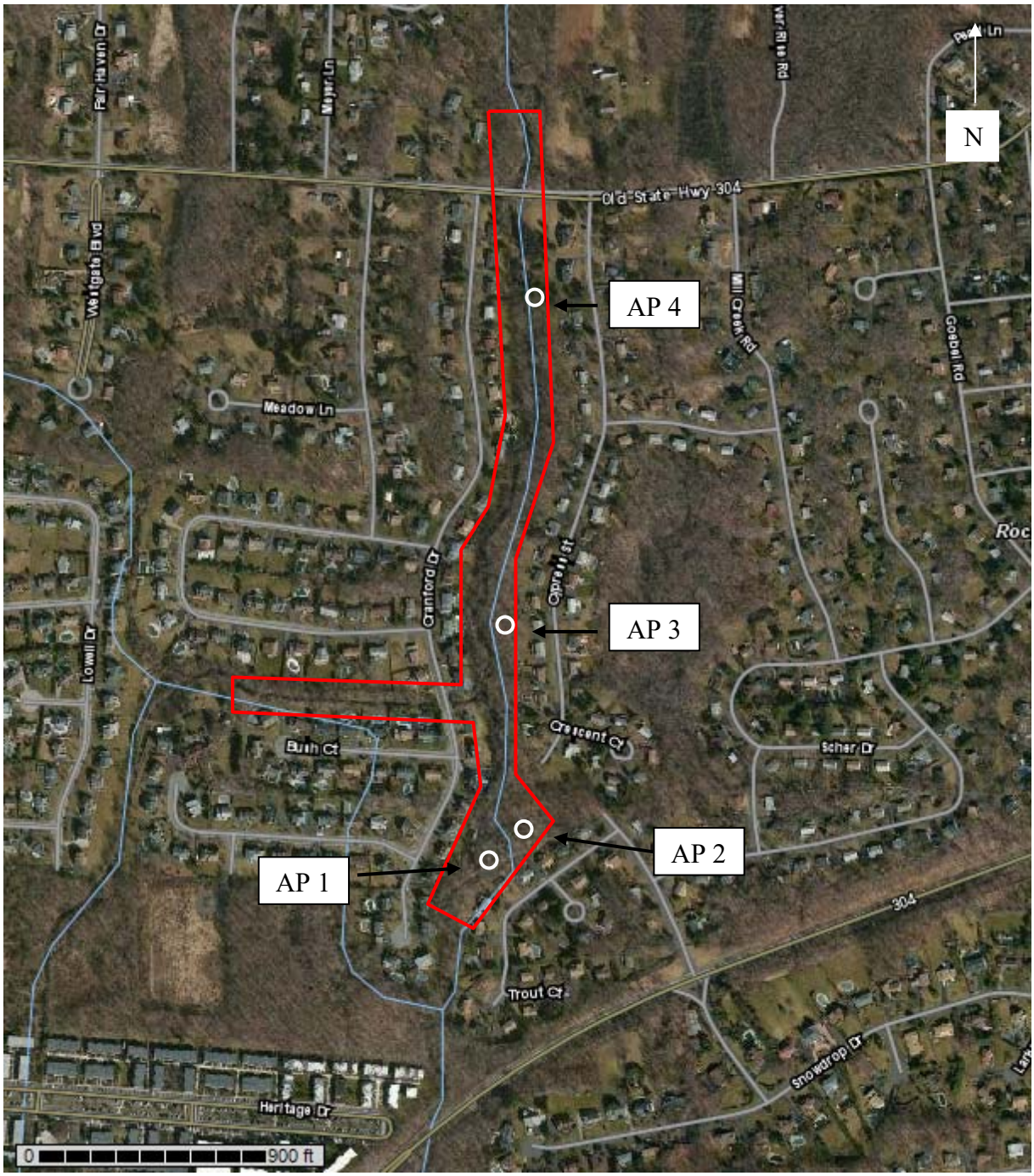


FIGURE 4: AUGER PROBE LOCATIONS

PHOTO 2: T0 FLOODPLAIN AT SOUTH END OF APE INCLUDING ABANDONED STREAM CHANNEL LOOKING NORTH

PHOTO 3: ARTIFICIAL RETENTION POND WEST OF STREAM NEAR SOUTH END OF APE LOOKING SOUTHWEST

PHOTO 4: AP 3 LOCATION NEAR CENTER OF APE LOOKING SOUTHEAST

PHOTO 5: NORTH END OF APE LOOKING SOUTH

Soil & Sediment Profile: AP 1	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-18 cm Ao Horizon 10YR 3/3
Brown & Yellowish Brown Sandy Loam	18-40 cm Bw Horizon 10YR 5/3 & 5/8
Very Pale Brown Loamy Fine Sand	40-79 cm C1 Horizon 10YR 7/3
Gray & Brownish Yellow Medium Sand	79-116 cm C2 Horizon 10YR 5/1 & 6/6
Gray Coarse Sand	116-150 cm C3 Horizon 10YR 6/1
Gray Gravel	150+ cm 2C Horizon 10YR 6/1

Soil & Sediment Profile: AP 3	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-10 cm Ao Horizon 10YR 3/3
Brown Sandy Loam	10-70 cm Bw Horizon 10YR 4/3
Gray Brown & Yellowish Brown Loamy Sand	70-90 cm C1 Horizon 10YR 5/2 & 5/8
Gray & Dark Gray Medium to Coarse Sands	90+ cm C2 Horizon 10YR 5/2 & 4/1

FIGURE 5: REPRESENTATIVE SOIL AND SEDIMENT PROFILES

Soil & Sediment Profile: AP 4	Strat and Artifact Description
Description	
Dark Brown Sandy Loam	0-10 cm Ao Horizon 10YR 3/3
Brown & Gray Sand	10-40 cm C Horizon 10YR 5/3 & 5/1
Dark Brown Sandy Loam	40-65 cm 2Ab Horizon 10YR 3/3
Brown Sandy Loam	65-90 cm 2Bw Horizon 10YR 5/3
Dark Gray & Brown Loamy Sand	90-120 cm 2C Horizon 10YR 4/1 & 4/3
Gray & Yellowish Brown Sandy Clay	120+ cm 3C Horizon 10YR 6/1 & 5/6

FIGURE 5 continued: REPRESENTATIVE SOIL AND SEDIMENT PROFILES

4.0 CONCLUSIONS AND RECOMMENDATIONS

The Phase IA Geomorphological field survey was conducted for the Clarkstown Cranford Drive Drainage Improvements project in August of 2016. Field methodology involved the hand excavation of auger probes in alluvial environments across an APE of approximately 48,186 sq m (518,666 sq ft or 11.9 ac). The geomorphological survey involved the stream the floodplain zones of the West Branch of Hackensack River (Demarest Kill) and an unnamed tributary within the APE.

The auger probes excavated on the T0 floodplain zones of the West Branch of Hackensack River (Demarest Kill) revealed soil development on sandy stream channel and flood deposits. On much of the T0 floodplain relatively recent sandy flood deposits are present at or just below the ground surface. Archaeological testing on these landforms is recommended to extend to the top of the fine to coarse sand C horizons located beneath the A and Bw horizons. These massive, sandy C horizons represent sterile, partially altered, sedimentary parent material. This testing can be accomplished by the hand excavation of shovel test probes (STPs) to depths of approximately 40 to 90 cm (15.7 to 35.4 in) bgs.

5.0 REFERENCES

Natural Resources Conservation Service
2016 The Web Soil Survey http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx (accessed on August 24, 2016).

New York State Museum
2016 Geology-Geographic Information System http://www.nysm.nysed.gov/research-collections/geology/gis (accessed on August 24, 2016)

United States Department of Agriculture, Soil Conservation Service
1990 *Soil Survey of Rockland County, New York.* Prepared in cooperation with Cornell University Agricultural Experiment.

United States Fish and Wildlife Service
2016 *Geomorphic Provinces and Sections of the New York Bight Watershed*. National Conservation Training Center https://nctc.fws.gov/pubs5/web_link/text/geolsect.htm (accessed on August 24, 2016).

United States Geological Survey
2016 Mineral Resources Online Spatial Data http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NYTRba;3 (accessed on August 24, 2016).

Van Diver, Bradford B.
1985 *Roadside Geology of New York*. Mountain Press Publishing Company, Missoula.

APPENDIX III
SHOVEL TEST RECORDS

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 1-1	0-36	Medium Brown Sandy Clay Loam	NCM
	36-46	Brown and Gray Sand	NCM
ST 1-2	0-28	Dark Brown Sandy Silt Loam	NCM
	28-41	Gray Brown Sandy Loam	NCM
	41-51	Gray Sand	NCM
ST 1-3	0-29	Dark Brown Sandy Silt Loam	NCM
	29-42	Gray Brown Sandy Clay Loam	NCM
	42-52	Gray Brown Sand and Rocks	NCM
ST 1-4	0-10	Reddish Brown Silt Loam	NCM
	10-50	Grey Organic Lense	NCM
	50-62	Sandy Clay Loam	NCM
	62+	Grey Brown Sand	NCM
ST 1-5	0-46	Brown Sandy Silt Loam	NCM
	46-56	Brown Sand	NCM
ST 1-6	0-47	Brown Sandy Silt Loam	NCM
	47-57	Brown Sand	NCM
ST 2-1	0-21	Brown Sandy Silt Loam	NCM
	21-31	Brown Sand	NCM
ST 2-2	0-19	Brown Sandy Silt Loam	NCM
	19-42	Yellow Brown Sandy Silt Loam	NCM
	42	Rock Impasse	
ST 2-3	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 2-4	0-29	Brown Sandy Silt Loam	NCM
	29-39	Brown Sand	NCM
ST 2-5	0-34	Brown Sandy Silt Loam	NCM
	34-44	Brown Sand	NCM
ST 2-6	0-43	Brown Sandy Silt Loam	NCM
	43-53	Brown Sand	NCM
ST 2-7	0-48	Brown Sandy Silt Loam	NCM
	48-58	Brown Sand	NCM
ST 2-8	0-39	Brown Sandy Silt Loam	NCM
	39-49	Brown Sand	NCM
ST 3-1	0-51	Brown Sandy Silt Loam	NCM
	51-61	Brown Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 3-2	0-44	Brown Sandy Silt Loam	NCM
	44-54	Brown Sand	NCM
ST 3-3	0-47	Brown Sandy Silt Loam	NCM
	47-57	Brown Sand	NCM
ST 4-1	0-43	Brown Sandy Silt Loam	NCM
	43-53	Brown Sand	NCM
ST 5-1	0-40	Brown Sandy Silt Loam	NCM
	40-50	Brown Sand	NCM
ST 5-2	0-14	Brown Silt Loam	NCM
	14-47	Light Yellow Brown Sandy Silt Loam	NCM
	47-57	Pale Yellow Sand	NCM
ST 5-3	0-23	Brown Sandy Silt Loam	NCM
	23-33	Yellow Brown Sand	NCM
ST 5-4	0-19	Brown Sandy Silt Loam	NCM
	19-29	Brown Sand	NCM
ST 5-5	0-30	Brown Sandy Silt Loam	NCM
	30-40	Brown Sand	NCM
ST 5-6	0-31	Brown Sandy Silt Loam	NCM
	31-41	Brown Sand	NCM
ST 6-1	0-6		NCM
	6	Brown Sandy Silt Loam	NCM
		Rock Impasse	
ST 6-2	0-8		NCM
	8	Brown Sandy Silt Loam	NCM
		Rock Impasse	
ST 6-3	0-32		NCM
	32-42	Brown Sandy Silt Loam	NCM
		Brown Sand	
ST 6-4	0-36		NCM
	36-46	Brown Sandy Silt Loam	NCM
		Brown Sand	
ST 6-5	0-38	Brown Sandy Silt Loam	NCM
	38-48	Brown Sand	NCM
ST 6-6	0-30	Brown Sandy Silt Loam	NCM
	30-40	Brown Sand	NCM
ST 6-7	0-20	Brown Sandy Silt Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	20-30	Brown Sand	NCM
ST 6-8	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 6-9	0-46	Brown Sandy Silt Loam	NCM
	46-56	Brown Sand	NCM
ST 6-10	0-32	Brown Sandy Silt Loam	NCM
	32-42	Brown Sand	NCM
ST 6-11	0-37	Brown Sandy Silt Loam	NCM
	37-47	Brown Sand	NCM
ST 7-1	0-12	Brown Sandy Silt Loam	NCM
	12-37	Light Brown Sandy Silt Loam	NCM
	37	Rock Impasse	NCM
ST 7-2	0-51	Brown Sandy Silt Loam	NCM
	51	Rock Impasse	NCM
ST 7-3	0-43	Brown Sandy Silt Loam	NCM
	43-53	Yellow Brown Sand	NCM
ST 7-4	0-32	Brown Sandy Silt Loam	NCM
	32-42	Yellow Brown Sand	NCM
ST 7-5	0-31	Brown Sandy Silt Loam	NCM
	31-41	Yellow Brown Sand	NCM
ST 7-6	0-28	Dark Brown Sandy Loam	NCM
	28-70	Brown Sandy Loam	NCM
	70-80	Light Yellow Brown Loamy Sand	NCM
ST 7-7	0-36	Brown Sandy Silt Loam	NCM
	36-46	Yellow Brown Sand	NCM
ST 7-8	0-34	Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 7-9	0-31	Brown Sandy Silt Loam	NCM
	31-41	Yellow Brown Sand	NCM
ST 7-10	0-29	Brown Sandy Silt Loam	NCM
	29-39	Yellow Brown Sand	NCM
ST 7-11	0-27	Rocky Brown Silt Loam	NCM
	27	Rock Impasse	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 7-12	0-25	Rocky Brown Silt Loam	NCM
	25	Rock Impasse	NCM
ST 7-13	0-24	Brown Sandy Silt Loam	NCM
	24-39	Red Brown Sandy Silt Loam	NCM
	39049	Yellow Brown Sand	NCM
ST 7-14	0-17	Brown Sandy Silt Loam	NCM
	17-34	Red Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 7-15	0-19	Brown Sandy Silt Loam	NCM
	19	Rock Impasse	NCM
ST 7-16	0-14	Brown Sandy Silt Loam	NCM
	14	Rock Impasse	NCM
ST 7-17	0-32	Brown Sandy Silt Loam	NCM
	32-42	Yellow Brown Sand	NCM
ST 7-18	0-19	Brown Sandy Silt Loam	NCM
	19-29	Yellow Brown Sand	NCM
ST 7-19	0-23	Brown Sandy Silt Loam	NCM
	23-33	Yellow Brown Sand	NCM
ST 7-20	0-47	Brown Sandy Silt Loam	NCM
	47	Rock Impasse	NCM
ST 8-1	0-34	Brown Sandy Silt Loam	NCM
	34-44	Yellow Brown Sand	NCM
ST 8-2	0-24	Brown Sandy Silt Loam	NCM
	24-60	Red Brown Sandy Silt Loam	NCM
	60-70	Yellow Brown Sand	NCM
ST 8-3	0-40	Brown Sandy Silt Loam	NCM
	40-50	Yellow Brown Sand	NCM
ST 8-4	0-5	Mottled Brown and Gray Sandy Silt Loam and Gravel	NCM
	5	Gravel Disturbance	NCM
ST 9-1	0-36	Brown Sandy Silt Loam	NCM
	36-46	Brown Sand	NCM
ST 9-2	0-39	Brown Sandy Silt Loam	NCM
	39-49	Brown Sand	NCM
ST 9-3	0-34	Brown Sandy Silt Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	34-44	Brown Sand	NCM
ST 9-4	0-49	Brown Sandy Silt Loam	NCM
	49-59	Brown Sand	NCM
ST 9-5	0-40	Brown Sandy Silt Loam	NCM
	40-50	Brown Sand	NCM
ST 9-6	0-19	Brown Sandy Silt Loam	NCM
	19-39	Light Brown Sandy Silt Loam	NCM
	39	Rock Impasse	NCM
ST 9-7	0-17	Mottled Brown and Yellow Sandy Silt Loam	NCM
	17	Rock Impasse	NCM
ST 9-8	0-47	Brown Sandy Silt Loam	NCM
	47	Rock Impasse	NCM
ST 9-9	0-11	Brown Sandy Silt Loam	NCM
	11-30	Light Brown Sandy Silt Loam	NCM
	30-40	Pale Yellow Brown Sand	NCM
ST 9-10	0-42	Brown Sandy Silt Loam	NCM
	42-44	Yellow Brown Sandy Silt	NCM
	44	Rock Impasse	NCM
ST 9-11	0-33	Brown Sandy Silt Loam	NCM
	33-43	Yellow Brown Sand	NCM
ST 9-12	0-20	Dark Brown Sandy Loam	NCM
	20-80	Brown Sandy Loam	NCM
	80-90	Light Yellow Brown Loamy Sand	NCM
ST 9-13	0-20	Medium Brown Silt Loam	NCM
	20-80	Med Brown Sand	NCM
	80-90	Gray Brown Sand	NCM
ST 9-14	0-23	Dark Brown Sandy Silt Loam	NCM
	23-60	Brown Silt Loam	NCM
	60-70	Gray Brown Sand Loam	NCM
ST 9-15	0-15	Dark Brown Sandy Silt Loam	NCM
	15-30	Brown Sandy Loam	NCM
	30-45	Gray Brown Sandy Loam	NCM
	45-65	Light Gray and Yellow Brown Sandy Clay Loam	NCM
	65-75	Light Gray and Yellow Brown Loamy Sand	NCM
ST 9-16	0-11	Dark Brown Sandy Silt Loam	NCM
	11-40	Brown Sand Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	40	Rock Impasse	NCM
ST 9-17	0-23	Dark Brown Sandy Silt Loam	NCM
	23-33	Brown Sand Loam	NCM
ST 9-18	0-31	Brown Sand	NCM
	31-57	Dark Brown Sandy Silt Loam	NCM
	57-67	Light Brown Sand	NCM
ST 9-19	0-25	Brown Sand	NCM
	25-42	Gray Brown Sandy Loam	NCM
	42-55	Light Brown Sandy Loam	NCM
	55-65	Yellow Brown Sand	NCM
ST 9-20	0-22	Brown Sand	NCM
	22-56	Brown Sandy Loam	NCM
	56-80	Yellow Brown Sandy Loam	NCM
	80-90	Yellow and Gray Loamy Sand	NCM
ST 9-21	0-27	Brown Sand	NCM
	27-75	Brown Sandy Silt Loam	NCM
	75-85	Yellow and Gray Loamy Sand	NCM
ST 9-22	0-36	Dark Brown Sandy Silt Loam	NCM
	36-46	Yellow Brown Sand	NCM
ST 9-23	0-21	Brown Sand	NCM
	21-35	Brown Sandy Loam	NCM
	35-40	Yellow Brown Sandy Loam	NCM
	40	Rock Impassse	NCM
ST 9-24	0-30	Brown Sand	NCM
	30-55	Brown Sandy Loam	NCM
	55-65	Yellow Brown Sandy Loam	NCM
ST 9-25	0-31	Brown Sand	NCM
	31-66	Brown Sandy Loam	NCM
	66-76	Yellow Brown Sandy Loam	NCM
ST 9-26	0-30	Brown Sand	NCM
	30-70	Dark Brown Sandy Loam	NCM
	70-100	Yellow Brown Sandy Loam	NCM
	100-110	Yellow and Gray Loamy Sand	NCM
ST 10-1	0-23	Brown Sand	NCM
	23-80	Brown Silty Clay Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 10-2	0-21	Brown Sandy Silt Loam	NCM
	21-72	Gray Brown Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
	72-82	Yellow Brown Sand	NCM
ST 10-3	0-20	Dark Brown Silt Loam	NCM
	20-48	Gray Brown Sand	NCM
	48-82	Brown Sandy Loam	NCM
	82-92	Dark Gray Sand	NCM
ST 10-4	0-37	Dark Brown Silt Loam	NCM
	37-64	Gray Brown Silty Clay Loam	NCM
	64-74	Light Gray Clay Loam	NCM
ST 10-5	0-12	Dark Brown Silt Loam	NCM
	12-52	Brown Sand	NCM
	52-90	Dark Gray Brown Sandy Loam	NCM
	90-105	Dark Gray and Dark Yellow Brown Sandy Clay Loam	NCM
	105	Rock Impasse	NCM
ST 11-1	0-17	Dark Brown Sandy Silt Loam	NCM
	17-60	Brown Sand Loam	NCM
	60-70	Gray Sand	NCM
ST 11-2	0-10	Brown Silt Loam	NCM
	10	Buried Pipe	NCM
ST 11-3	0-19	Dark Brown Sandy Silt Loam	NCM
	19-81	Brown Sand Loam	NCM
	81-92	Brown and Gray Sandy Silt Loam	NCM
	92-102	Gray Sand	NCM
ST 11-4	0-53	Brown Sandy Silt Loam	NCM
	53-63	Dark Gray Brown Sand	NCM
ST 12-1	0-10	Brown Silt Loam	NCM
	10-38	Yellow Brown Sandy Clay Loam	NCM
	38-48	Yellow Brown Sand	NCM
ST 12-2	0-20	Brown Silt Loam	NCM
	20-65	Brown Sandy Silt Loam	NCM
	65-75	Rock and Sand	NCM
ST 12-3	0-41	Brown Silt Loam	NCM
	41-80	Brown Sandy Silt Loam	NCM
	80-90	Rock and Sand	NCM
ST 12-4	0-17	Dark Brown Sandy Silt Loam	NCM
	17-50	Brown Sandy Loam	NCM
	50-75	Light Brown Sandy Silt	NCM
	75-85	Light Brown Gravelly Loam	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 12-5	0-9	Dark Brown Sandy Silt Loam	NCM
	9-61	Brown Sandy Loam	NCM
	61-82	Light Brown Sandy Silt	NCM
	82	Rock Impasse	NCM
ST 12-6	0-18	Brown Sandy Loam	NCM
	18-62	Brown Sand	NCM
	62-72	Gray Brown Loamy Sand	NCM
ST 12-7	0-31	Brown Sand	NCM
	31-86	Gray Brown Sandy Silt Loam	NCM
	86-96	Brown Sand	NCM
ST 12-8	0-29	Rocky Brown Sand	NCM
	29-71	Gray Brown Sandy Silt Loam	NCM
	71-81	Gray Brown Sand	NCM
ST 12-9	0-30	Dark Brown Silt Loam	NCM
	30	Rock Impasse	NCM
ST 12-10	0-58	Brown Sandy Silt Loam	NCM
	58-68	Yellow Brown Sandy Loam	NCM
ST 12-11	0-24	Medium Brown Silt Loam	NCM
	24-40	Yellow Brown Sandy Silt Loam	NCM
	40-50	Gray Brown Sand	NCM
ST 12-12	0-22	Brown Silt Loam	NCM
	22-53	Brown Sandy Silt Loam	NCM
	53	Rock Impasse	NCM
ST 12-13	0-14	Dark Brown Silt Loam	NCM
	14-28	Yellow Brown Sandy Silt Loam	NCM
	28	Rock Impasse	NCM
ST 12-14	0-38	Brown Sandy Silt Loam	NCM
	38	Rock Impasse	NCM
ST 13-1	0-12	Dark Brown Sandy Silt Loam	NCM
	12-48	Brown Sandy Silt Loam	NCM
	48	Rock Impasse	NCM
ST 13-2	0-53	Dark Brown Sandy Silt Loam	NCM
	53-69	Brown Sandy Silt Loam	NCM
	69-79	Brown Sand	NCM
ST 13-3	0-20	Brown Sandy Loam	NCM
	20-35	Brown Sand	NCM
	35-45	Gray Brown Loamy Sand	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 14-1	0-24	Brown Silt Loam	NCM
	24-80	Brown Sandy Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 14-2	0-21	Brown Sandy Silt Loam	NCM
	21-65	Gray Brown Sandy Silt Loam	NCM
	65-75	Yellow Brown Sand	NCM
ST 14-3	0-14	Dark Brown Sandy Loam	NCM
	14-43	Light Brown Sandy Silt Loam	NCM
	43-90	Gray Brown Sandy Loam	NCM
	90	Light Gray Sand	NCM
ST 14-4	0-39	Brown Sandy Silt Loam	NCM
	39-92	Dark Brown Sandy Silt Loam	NCM
	92-106	Gray Brown Sandy Loam	NCM
	106-126	Light Gray Sand	NCM
ST 14-5	0-38	Brown Silt Loam	NCM
	38-80	Yellow Brown Sandy Loam	NCM
	80-90	Yellow Brown Sand	NCM
ST 14-6	0-34	Dark Brown Sandy Loam	NCM
	34-108	Gray Brown Sandy Silt Loam	NCM
	108-118	Light Gray Clay Loam	NCM
ST 14-7	0-15	Dark Brown Sandy Silt Loam	NCM
	15-35	Brown Sandy Loam	NCM
	35-57	Brown Sand	NCM
	57-75	Dark Gray Brown Silt Loam	NCM
	75-102	Brown Silt Loam	NCM
	102-112	Gravelly Loam	NCM
ST 14-8	0-53	Brown Sandy Silt Loam	NCM
	53-63	Gray Sand	NCM
ST 14-9	0-60	Brown Sandy Silt Loam	NCM
	60-70	Brown Sand	NCM
ST 14-10	0-51	Brown Sandy Silt Loam	NCM
	51-90	Gray Brown Sandy Loam	NCM
	90-100	Gray Sand	NCM
ST 14-11	0-59	Brown Sandy Silt Loam	NCM
	59-69	Gray Sand	NCM
ST 15-1	0-43	Brown Sandy Silt Loam	NCM
	43	Rock Impasse	NCM

Clarkstown Cranford Drive Drainage Improvements, Rockland County, New York			
SHOVEL TEST RECORDS: AREA A			
Test	**Depth-cm**	**Soil Profile Description**	**Artifact Summary**
ST 15-2	0-37	Dark Brown Sandy Silt Loam	NCM
	37-44	Gravelly Red Brown Silty Clay Loam	NCM
	44	Rock Impasse	NCM
ST 15-3	0-29	Brown Sandy Silt Loam	NCM
	29-42	Light Brown Sandy Silt Loam	NCM
	42	Rock Impasse	NCM
ST 16-1	0-11	Dark Brown Sandy Silt Loam	NCM
	11	Rock Impasse	NCM
ST 16-2	0-20	Dark Brown Sandy Silt Loam	NCM
	20	Rock Impasse	NCM
ST 16-3	0-31	Brown Sandy Silt Loam	NCM
	31	Rock Impasse	NCM
ST 16-4	0-37	Brown Sandy Silt Loam	NCM
	37-47	Red Brown Sand	NCM
ST 16-5	0-35	Brown Sandy Silt Loam	NCM
	35	Rock Impasse	NCM
ST 16-6	0-21	Brown Sandy Silt Loam	NCM
	21-33	Gravelly Dark Yellow Brown Loamy Sand	NCM
	33-43	Dark Yellow Brown Sandy Gravel	NCM
ST 16-7	0-36	Brown Sandy Silt Loam	NCM
	36-46	Light Gray Brown Sandy Gravel	NCM
ST 17-1	0-35	Brown Sandy Loam	NCM
	35	Rock Impasse	NCM
ST 17-2	0-34	Brown Sandy Loam	NCM
	34	Rock Impasse	NCM

Civil Engineering

Environmental Services

Geotechnical Engineering

Structural Engineering

Land Surveying

Homeland Security

Site Acquisition

Program/Construction Management

Construction Inspection & Materials Testing

TECTONIC

Practical Solutions, Exceptional Service

Corporate Headquarters:

□0 Pleasant Hill Road, P.O.Box □□

Mountainville, New York 10□□□

Phone□□□00□□□□-□□□1

Additional Office Locations:

□lbany, New York

□lbu□uer□ue, New Mexico

Boca Raton, Florida

Charlotte, North Carolina

Hartford, Connecticut

New York, New York

Short Hills, New Jesey

Newburgh, New York

Phoenix, □ri□ona

Pittsburgh, Pennsylvania

Rochester, New York

Richmond, Virginia

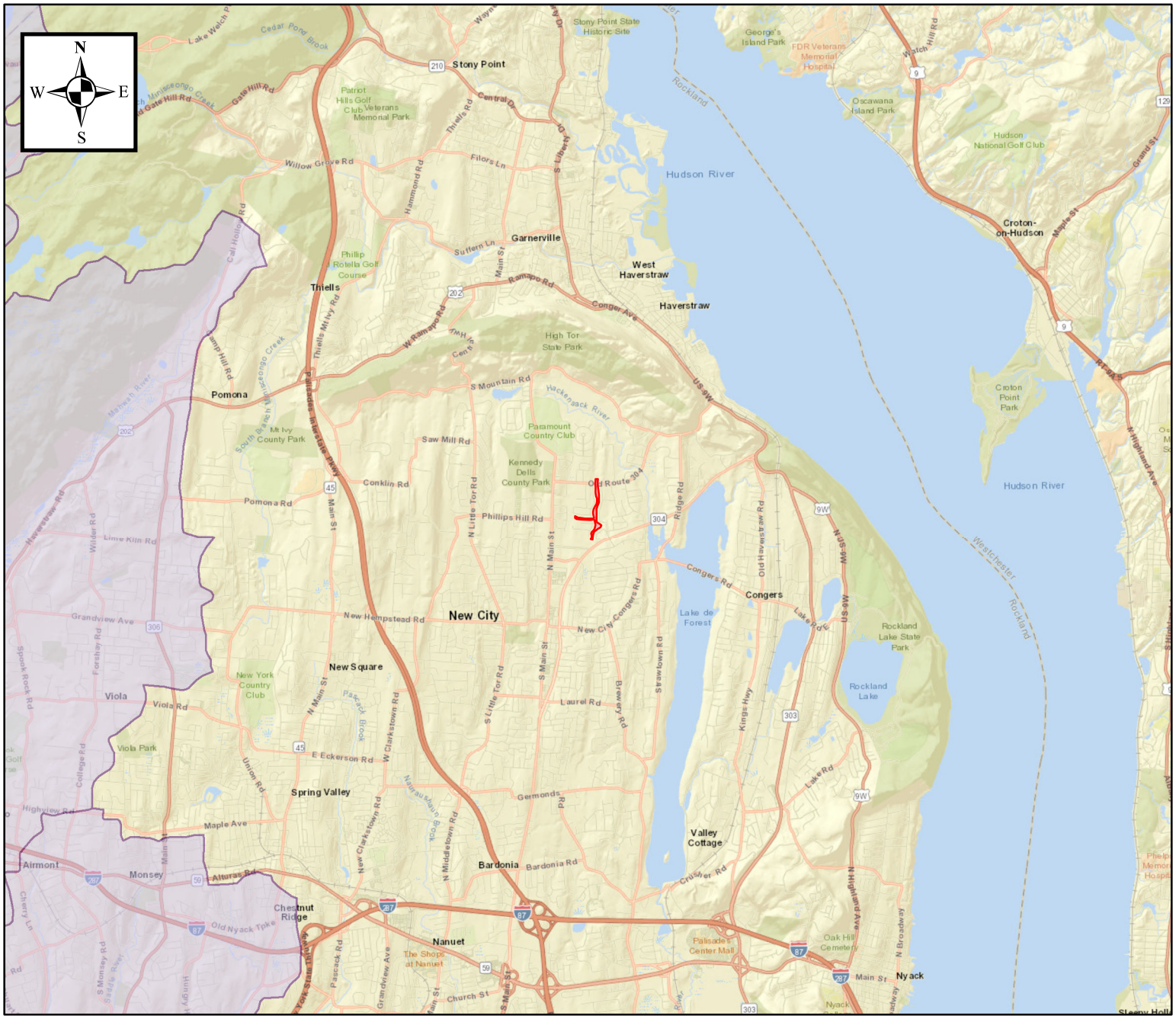
Tampa, Florida

www.tectonicengineering.com

Attachment 9

EPA Sole Source Aquifer Map

Sole Source Aquifer Map



TECTONIC
Practical Solutions, Exceptional Service

0 6,250 12,500 25,000 Feet

1:100,000

CRANFORD DRIVE DRAINAGE IMPROVEMENTS
Cranford Drive
North of Old Route 304 to the intersection
of Cranford Drive with Route 304
New City Hamlet, Town of Clarkstown
Rockland County, New York

Created: 11/14/2016
Source data: Sole Source Aquifer areas were published by the United States Environmental Protection Agency on 10/15/2016.

http://www.epa.gov/region02/water/aquifer/

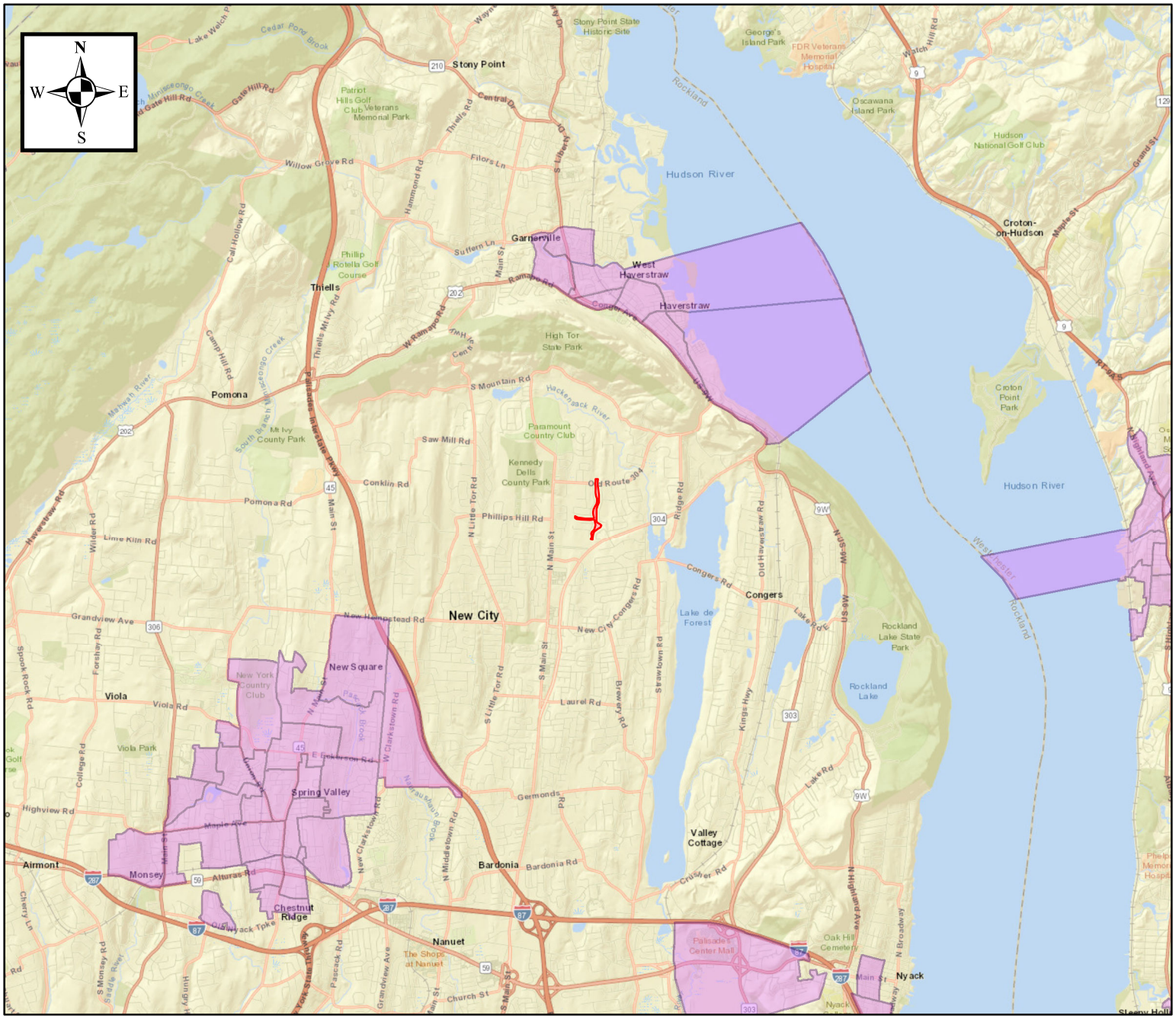
Legend

- Cranford Project Area
- US EPA Sole Source Aquifer Areas

Attachment 10

NYS Potential Environmental Justice Areas Map

Potential Environmental Justice Areas



TECTONIC
Practical Solutions, Exceptional Service

0 6,250 12,500 25,000 Feet

1:100,000

CRANFORD DRIVE DRAINAGE IMPROVEMENTS
Cranford Drive
North of Old Route 304 to the intersection
of Cranford Drive with Route 304
New City Hamlet, Town of Clarkstown
Rockland County, New York

Legend

- Cranford Project Area
- Potential Environmental Justice Areas

Created: 11/14/2016
Source data: Potential Environmental Justice Areas were published in the NYSDEC Database on 12/14/2009.