DRAFT ENVIRONMENTAL ASSESSMENT

Segments B2 and B3 Levee and Floodwall Construction
Green Brook Flood Damage Reduction Project
Middlesex Borough, Middlesex County, NJ

May 2016

Prepared By:

US Army Corps of Engineers
New York District

Environmental Assessment
Segments B2 and B3, Levee and Floodwall Construction,
Green Brook Flood Damage Reduction Project
Middlesex Borough, Middlesex County, NJ

Table of Contents

1.0 Introduction 1
2.0 Green Brook Flood Control Project Background 1
3.0 Proposed Action 7
4.0 Alternative Analysis 7
5.0 Affected Environment 7
5.1. Soils 7
5.2. Water Resources 8
5.3. Vegetation 8
5.3.1. Wetlands 8
5.4. Wildlife and Fisheries Resources 9
5.4.1. Federal and State Endangered, Threatened and Special Concern Species 9
5.5. Environmental Contamination 10
5.6. Cultural Resources 10
5.7. Air Quality 11
5.8. Socioeconomics 11
6.0 Environmental Impacts 11
6.1. Soils 11
6.2. Water Resources 12
6.3. Vegetation 12
6.3.1. Wetlands 12
6.4. Wildlife and Fisheries Resources 13
6.4.1. Federal and State Endangered, Threatened and Special Concern Species 13
6.5. Environmental Contamination 13
6.6. Cultural Resources 14
6.7. Air Quality and Noise 14
6.7.1. Air Quality 14
6.7.2. Noise 14
6.8. Socioeconomics 14
6.8.1. Environmental Justice 15
6.9. Recreation 15
6.10. Cumulative Impacts 15
7.0 Public and Agency Coordination 16
8.0 Conclusion 17
9.0 References 19
10.0 List of Preparers 20

Table of Figures

Figure 1: Proposed Green Brook Flood Damage Reduction Project 4
Figure 2: Element No. 2 of the Green Brook Flood Damage Reduction Project 5
Figure 3: Green Brook Flood Damage Reduction Project, Segment B 6

Appendices:

Appendix A: Section 404(b)(1) Evaluation
Appendix B: Record of Non-Applicability (Air Conformity)
Appendix C: Pertinent Correspondence
Appendix D: Project Plans
Appendix E: Draft Finding of No Significant Impact

LIST OF ACRONYMS

Acronym	Definition
APE	Area of Potential of Effect
CERCLA	Comprehensive, Environmental Response, Compensation, Liability Act
CFR	Code of Federal Regulations
District	U.S. Army Corps of Engineers, New York District
EO	Executive Order
FEIS	Final Environmental Impact Statement
FSEIS	Final Supplemental Environmental Impact Statement
FHACAR	Flood Hazard Area Control Act Rules
FUSRAP	Formally Utilized Sites Remedial Action Program
FWCAR	Fish and Wildlife Coordination Act Report
GBFDRP	Green Brook Flood Damage Reduction Project
HTRW	Hazardous, Toxic, and Radioactive Waste
NJDEP KCS	New Jersey Department of Environmental Protection Known Contaminated Sites
MBTA	Migratory Bird Treaty Act
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJDEP BFBM	NJDEP, Bureau of Freshwater and Biological Monitoring
NJHPO	New Jersey Historic Preservation Office
NPL	National Priority List
NRHP	National Register of Historic Places
PM	Particulate Matter
RCRA	Resources Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery System
TRIS	Toxic Release Inventory System
USEPA	United States Environmental Protection Agency
USFWS	United Fish and Wildlife Service
VOC	Volatile Organic Compounds

1.0 Introduction

The U.S. Army Corps of Engineers, New York District (District) and the New Jersey Department of Environmental Protection (NJDEP) are proposing to construct approximately 923 feet of floodwalls and 334 feet of levees, known as Segments B2 and B3, along the Bound Brook in Middlesex Borough in Middlesex County, New Jersey. Segments B2 and B3 are part of the overall Green Brook Flood Damage Reduction Project (GBFDRP).

The purpose of this environmental assessment is to supplement the evaluation of potential environmental impacts that were previously addressed in the U.S. Army Corps of Engineers (Corps), New York District, *Final Environmental Impact Statement* (*FEIS) for the Proposed Plan for the Green Brook Flood Control in the Green Brook Sub-Basin, Somerset, Middlesex and Union Counties, New Jersey*, filed August, 1980 and the *Final Supplemental Environmental Impact Statement* (*FSEIS*) *for the Proposed Plan for the Green Brook Flood Control in the Green Brook Sub-Basin, Somerset, Middlesex and Union Counties, New Jersey,* filed in May 1997.

This Environmental Assessment is being prepared specifically to address the significance of potential impacts the construction of Segments B2 and B3 will have on Indiana bat (*Myotis* sodalis), a federal and state endangered species, northern long-eared bat (*Myotis septentrionalis*) a federal threatened species, and on General Conformity of the Clean Air Act. At the time the 1980 FEIS and 1997 FSEIS were filed, the Indiana bat was not identified as occurring within the GBFDR project area. The northern long-eared bat was listed by the U.S. Fish and Wildlife Service (USFWS) as threatened under the Endangered Species Act in April 2015. The U.S. Environmental Protection Agency revised the General Conformity rules of the Clean Air Act in April 2010, requiring an updated General Conformity analysis for the project. The evaluation of impacts will determine if the proposed changed conditions warrants the preparation of a supplemental environmental impact statement to the *FSEIS* and *FEIS*.

2.0 Green Brook Flood Control Project Background

The overall Green Brook basin encompasses sixty-five square miles within the State of New Jersey in the counties of Somerset, Middlesex and Union, and incorporates the Green Brook sub-basin of the Raritan River Basin, a short reach of the Raritan River along the border of the Borough of Bound Brook and the Middle Brook tributary to the Raritan River (Figure 1).

Flooding has been a longstanding problem in the Green Brook Sub-Basin. In September of 1999, Tropical Storm Floyd caused significant flood damages throughout the Sub-Basin, with the most extreme damages experienced in the Borough of Bound Brook. More recently, the April 2007 nor'easter caused significant flooding in Bound Brook and approximately $200,000 in damages to the Segment T pump station.

The Green Brook Flood Control Project was authorized for construction in Section 401a of the Water Resources Development Act of 1986 and involves the construction of seven different elements. Each element consists typically of multiple construction segments or contract reaches.

Two of the elements in the Upper Basin have been deferred for reanalysis, but the other elements will be constructed as federal and state partnered funding becomes available.

The recommended plan for the GBFDRP will provide flood protection to the lower portion of the basin and the Stony Brook portion of the basin through various structural and non-structural flood control elements including approximately 14 miles of levees and floodwalls along Green Brook with supporting pump stations and closure structures, bridge replacements and removals, approximately 1 mile of channel modification in the Stony Brook portion of the project, and various levels of flood proofing including buy-outs. Plans for the upper portion of the basin have been deferred for reevaluation at a later time.

Element No. 1 - Bound Brook

Element No. 1 is comprised of Segments A, N, R, T, and U. Segment R was subdivided into several construction contracts: Segment R-1 which includes the Talmadge Avenue Bridge Replacement, and Segment R-2. Construction of Element No. 1 started in 2001, and has continued with implementation of levees, floodwalls and associated pump stations and drainage features at Segments T, U, R-2, floodproofing of 500 Union Avenue residences and buy-outs at Prospect Place in Middlesex Borough. An additional component involving the removal of an abandoned Conrail Bridge over the Raritan River was included in Element 1 to reduce the potential of flooding during the completion of Segment R2. Segment R2, was the last remaining segment to be constructed, with construction completed in May 2015.

Element No. 2- Green Brook and Middlesex

Element No. 2 is comprised of Segments B, C, H and D (Figure 2) and is located in Green Brook Township and the Borough of Middlesex. Proposed flood damage reduction measures for Element No. 2 include approximately 6,750 feet of floodwall, 24,100 feet of levee, a total of six buy-outs of residential structures, flood proofing of 26 commercial structures and the raising of the Sebrings Mills Road, South Lincoln Avenue, and Union Avenue bridges.

Segment B is further broken down into Segments B-1, B-2, B-3 and B-4 (Figure 3). Construction of Segment B1 was initiated in 2010 and has been substantially completed. Construction of Segment B2 is anticipated to be initiated in July 2016, and construction of Segment B3 is anticipated to be initiated in February 2016. Because the construction of Segment B4 will induce flooding on the eastern downstream side of the Bound Brook , it is not scheduled to be constructed until 2021 in conjunction with portions of Segment C, which will provide protection to the induced flooding.

Mitigation

The Finderne Farms Mitigation Site, located in Bridgewater Township, serves as off-site wetland and habitat mitigation acreage for the environmental impacts of the Bound Brook construction segments that could not be mitigated for on-site, including the construction of future structural project elements in Middlesex County.

The total property size is 179 acres, with the mitigation project focused on approximately 130 acres of the floodplain portion of the site. Habitats created, restored, enhanced or preserved as

part of the mitigation effort include 35 acres of forested wetland, six acres of scrub-shrub wetland, five acres of emergent wetland enhancement, preservation of six acres of palustrine emergent wetland, six acres of upland forest, 27 acres of riparian forest, and 800 linear feet of stream restoration. In addition, 12 acres of active and passive recreation including two soccer fields and trails that will become part of the Raritan River Greenway have been created. Construction of the mitigation site and recreational fields began in Fall 2005, and was completed in June 2006.

The wetland areas constructed on the Finderne Site have been undergoing monitoring to document compliance with Corps policy and NJDEP wetland mitigation regulations since 2006. Monitoring of the riparian area began in the Fall of 2010 and has continued to ensure compliance with the requirements set forth in the Flood Hazard Area Control Act Rules N.J.A.C. 7:13-10.2(t). Monitoring has indicated that adaptive management measures such as invasive plant species management and replanting with native species is required within the majority of the riparian mitigation areas. The District is currently developing an adaptive management plan that will focus on invasive species management and replanting and anticipates executing the adaptive management measures in late 2016/early 2017.

Additional Project Background Information can be viewed online at the District project website: http://www.nan.usace.army.mil/business/prjlinks/flooding/greenbk/index.htm.

Figure 1: Proposed Green Brook Flood Damage Reduction Project

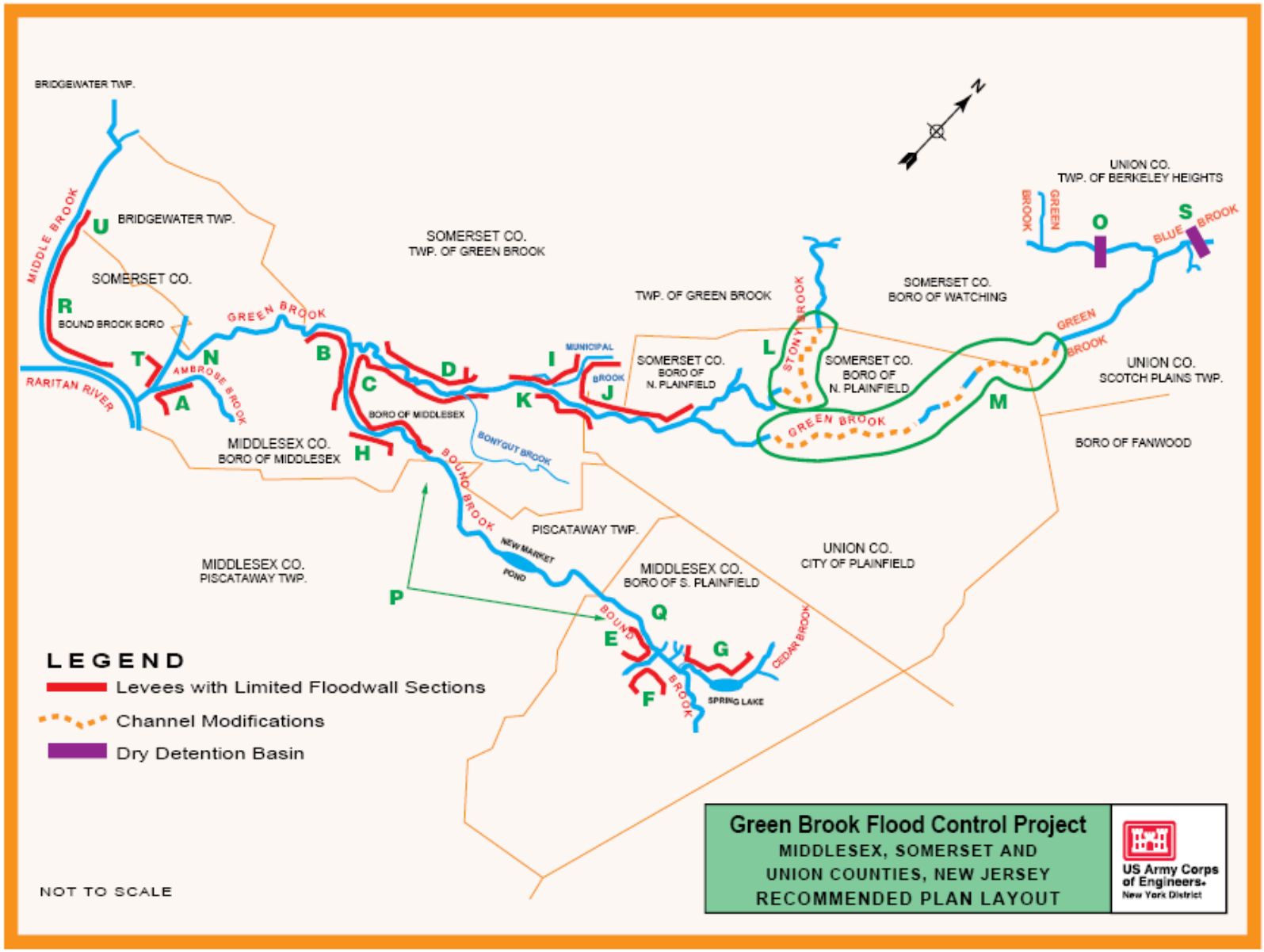


Figure 2: Element No. 2 of the Green Brook Flood Damage Reduction Project

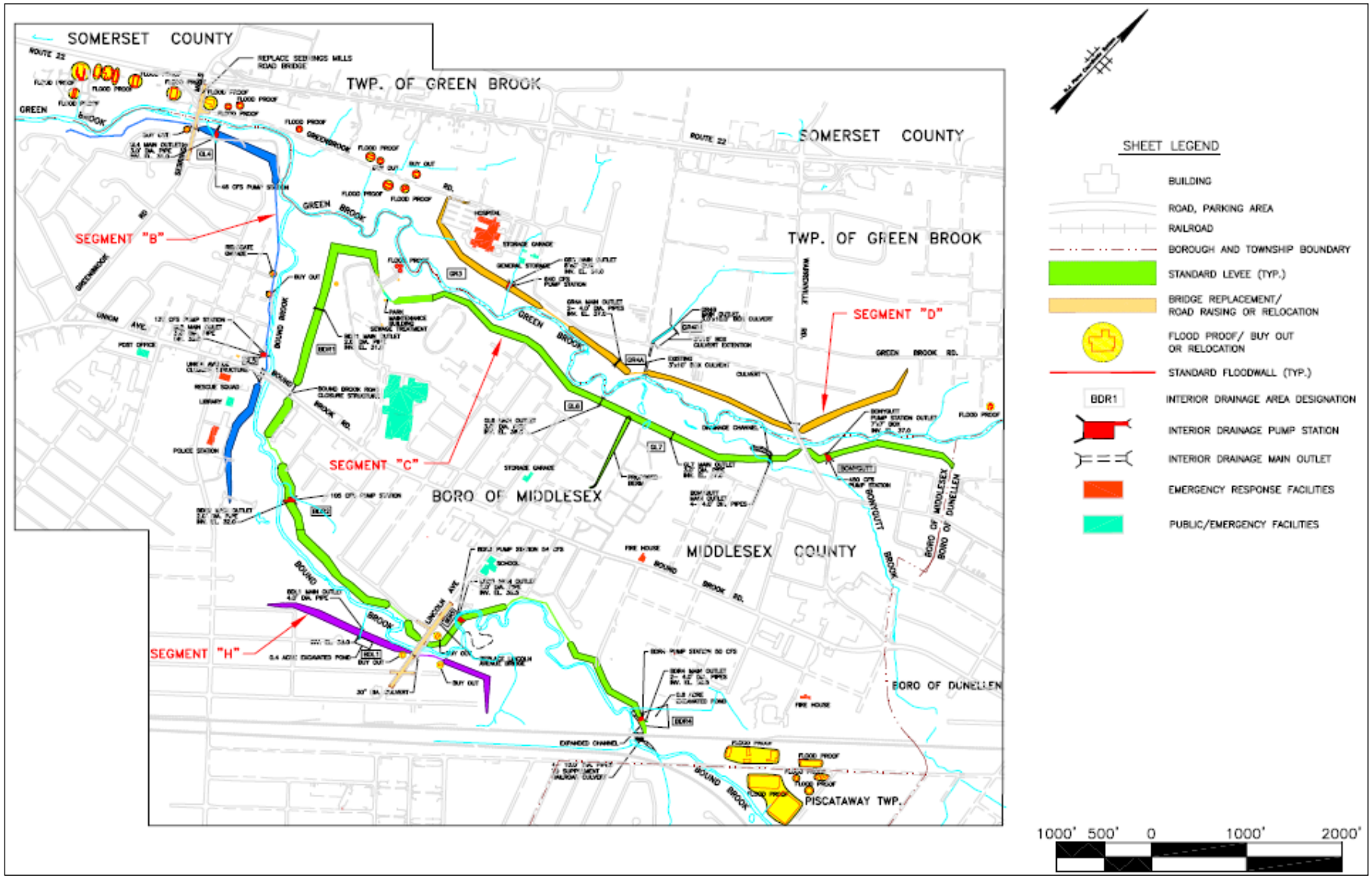
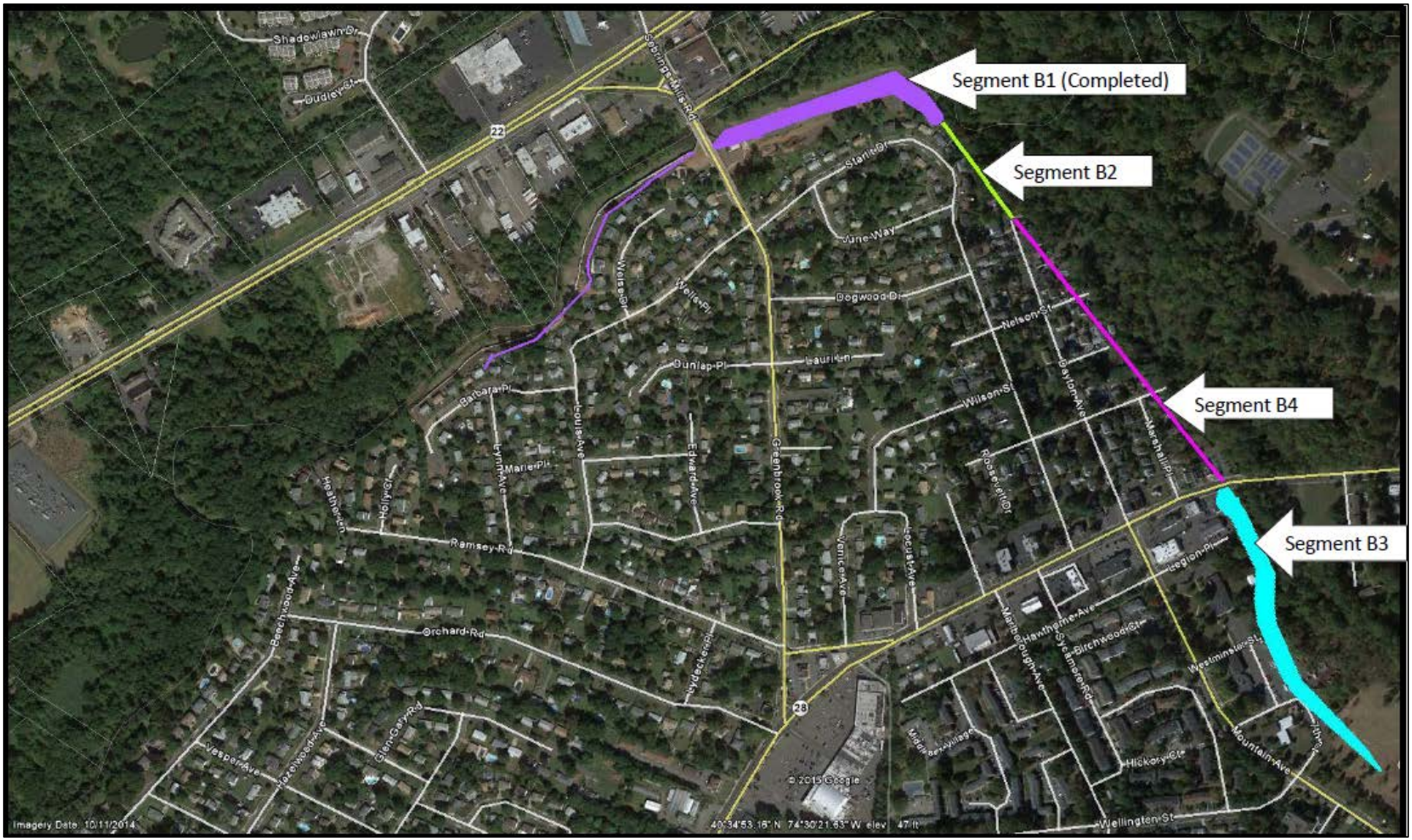


Figure 3: Green Brook Flood Damage Reduction Project, Segment B



3.0 Proposed Action

Segment B2 consists of a levee approximately 110 feet long with an average height of 16 feet and 405 feet of floodwall ranging in height from 9-16 feet. The Segment B2 levee is effectively an extension of the Segment B1 levee, therefore, as part of the construction of Segment B2, the rip rap capping at the end of the existing Segment B-1 levee will be removed. In addition, the existing gabion structure used to temporarily tie off the Segment B-1 levee to high ground will be removed.

The Segment B2 floodwall will be constructed from the upstream end of the Segment B2 levee to its temporary terminus approximately 405 feet upstream. The floodwall will consist of reinforced concrete walls and concrete capped sheet pile driven walls where space is extremely constrained.

There is a 154 linear foot section of the west bank of the Bound Brook within the location of the Segment B2 floodwall that is severely eroded. A more stable stream bank will be created by filling in approximately 0.2 acres of the Bound Brook. The new stream bank will be stabilized with turf reinforcement matting and the toe of slope will be stabilized using a sheetpile cutoff. This is necessary to protect against scouring that could adversely affect the structural integrity of the floodwall.

Segment B2 increase the temporary level of protection from approximately a 10-year event with the completion of Segment B-1 to nearly a 40-year level of protection.

Segment B3 consists of approximately 518 ft of concrete floodwall ranging in 12-16 feet in height, and 234 ft of earthen levee with an average height of 10 feet. Internal drainage to convey stormwater runoff through the levee/floodwall and into Bound Brook drainage structures, internal drainage to convey runoff to a pump station to lift the water over the floodwall and into Bound Brook, and pump station housing, pumps will not be installed until after completion of Segment B4.

4.0 Alternative Analysis

A complete alternative analysis was performed in the 1989 FEIS and 1997 FSEIS. There were no other feasible alternatives to the proposed Segment B2 and B3 levee and floodwall systems. The existing residential area is fully developed and constrains the river bank corridor. As the existing residential development in this reach of the stream is in close proximity to the stream, alternatives available for the line of protection alignment are minimal without either further encroachment into the stream corridor or greatly impacting on the properties it is intended to protect.

5.0 Affected Environment

5.1. Soils

The dominant soil in the project area is Bowmansville silt loam. The Bowmansville series consists of very deep, poorly and somewhat poorly drained soils. The soils are found on floodplains with slopes of 0 to 3 percent and are formed in recent alluvial deposits derived from weathered red and brown shale and sandstone or dolerite or basalt (USDA,2008). Bowmansville

soils are frequently flooded and are included on the list of hydric soils for New Jersey developed by the Natural Resources Conservation Service (USDA, NRCS 2010). Soils with this classification are those saturated through natural or artificial means sufficiently enough to support the growth and regeneration of hydrophytic vegetation (USDA, NRCS 2010).

5.2. Water Resources

The project area is bounded by the Bound Brook to the north and east. Bound Brook originates in Metuchen and flows in a northwesterly direction before converging with the Green Brook around the Segment B2 project area. Bound Brook is classified as a FW-2 NT or freshwater river not supporting trout spawning or maintenance (N.J.A.C. 7:9B 2008).

Within the project area, Bound Brook has an average width of 40 feet and an average depth of one foot. The substrate is comprised of silt, sand, mud. The stream banks are vegetated with mature trees along the north and south bank, although severe erosion is occurring along 154 feet of the west bank within the area of the proposed Segment B2 floodwall.

Based on water quality and habitat assessment conducted by the New Jersey Department of Environmental Protection Bureau of Freshwater and Biological Monitoring (NJDEP BFBM), the water quality of Bound Brook is considered fair and habitat is considered suboptimal as it relates to supporting various life cycles of aquatic species.

5.3. Vegetation

Vegetation within the project area of the proposed floodwall varies from maintained lawn and ornamental shrubs and trees to mature deciduous forest located behind the residences and along the Bound Brook.

The New Jersey Flood Hazard Area Control Act Rules, N.J.A.C. 13 (FHACAR) establishes and requires the preservation of riparian zones. The width of the established riparian zone is based on the environmental resources being protected and can range from 50, 150 or 300 feet as measured from the side of surface waters. The Green Brook is designated FW2-NT and does not support habitat for any threatened or endangered species; therefore, the riparian zone is 50 feet as described in N.J.A.C. 7:13-4.1(c) 3.

A wetland delineation was conducted within the project area in March and April 2010. Freshwater wetlands were identified and delineated within the project area using the method described in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Federal Interagency Committee on Wetland Delineation, January 1989). Further discussion regarding wetlands is located in Section 5.3.1.

5.3.1. Wetlands

Federal (33 CFR 328.3(b); EO 11990) and State (N.J.A.C. 7:7A1.4) definitions of wetlands are similar, identifying wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” As defined above, wetlands generally include swamps, marshes, bogs, and similar areas.

A wetland delineation conducted within the entire Segment B footprint in 2010 identified palustrine forested wetlands in the Segment B2 and B3 project areas. Dominant vegetative species identified include pin oak (*Quercus* palustris), box elder (*Acer* negundo), silver maple (*Acer* saccharinum), American elm (Ulmus Americana), green ash (*Fraxinus* pennsylvanica), and red maple (*Acer* rubrum), along with species multiflora rose, (*Rose* multiflora), and greenbrier (*Smilax* rotundifolia).

In addition, as per State regulations, a 50- foot transition area was delineated from the boundary of the four wetlands. By definition, a transition area is "an area of upland adjacent to a freshwater wetland which minimizes adverse impacts on the wetland or serves as an integral component of the wetlands ecosystem."

5.4. Wildlife and Fisheries Resources

The NJDEP BFBM conducts fish sampling studies in New Jersey waters as part of their long term biomonitoring program to determine the level of water quality impairments to state waters. A fish survey station (FIBI091) has been established in Bound Brook near Union Ave, approximately 2 ¼ miles downstream from the project area. Based on surveys conducted by the NJDEP BFBM Green Brook supports fish species such as spottail shiner (*Notropis* hudsonius*)*, American eel (*Anguilla* rostrata*)*, tessellated darter (*Etheostoma* olmstedi), white sucker (*Catostomus* commersoni), longnose dace (*Rhinichthys* cataractae), redbreast sunfish (*Lepomis* auritus), fallfish (*Semotilus* corporalis), banded killifish (*Fundulus* diaphanus), swallowtail shiner (*Notropis* procne), green sunfish (*Lepomis* cyanellus), yellow bullhead (*Ameiurus natalis*), bluegill (*Lepomis macrochirus*), pumpkinseed (*Lepomis gibbosus*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*) (NJDEP 2009).

Mammals within the project area include squirrel (*Sciurus* carolinensis), eastern cottontail (*Sylvilagus* foridanus), white-tailed deer (*Odocoileus* virginianus) and other species. Bird species tolerant of urban-suburban areas, such as American robin (*Turdus* migratorius), European starling (*Sturnus* vulgaris), northern cardinal (*Baeolophus* bicolor), and gray catbird (*Dumetella* carolinensis), utilize the riparian habitat of the project area.

5.4.1. Federal and State Endangered, Threatened and Special Concern Species

Indiana bat (Federal and State Endangered) and Northern long-eared bat (Federal Threatened)

Based on a review of the USFWS Information for Planning and Conservation (IPAC) Website, Indiana bat (*Myotis sodalis*) and northern long eared bat (*Myotis septentrionalis)* may occur within the Segments B2 and B3 project area.

Both species spend the winter hibernating in caves and mines. The Hibernia Mine located in Hibernia, NJ, is a known Indiana and northern long-eared hibernaculum. Both species occupy summer maternity roosts under the loose bark of dead or dying trees within riparian, floodplain, and upland forests. Tree species commonly used as roost sites include American elm, slippery elm (*Ulmus* rubra), shagbark hickory, silver maple, and green ash.

Preferred foraging areas are streams, associated flood plain forests, and impounded bodies of water such as ponds and reservoirs. However, they have been observed in upland forests;

pastures and clearings with early successional vegetation; cropland borders; and wooded fencerows (USFWS 2007).

Bald Eagle (State Threatened)
The designation of the bald eagle foraging habitat is part of New Jersey's "Landscape Project" developed by the NJ Division of Fish and Wildlife's Endangered and Nongame Species Program which delineates and identifies critical habitat for the states threatened and endangered species. The bald eagle foraging habitat is defined as the "amount of habitat required to support a nesting pair of eagles throughout the year."

5.5. Environmental Contamination

As required by ER 1165-2-132 (Hazardous, Toxic and Radioactive Waste Guidance for Civil Works, 26 June 1992), an assessment of hazardous, toxic, and radioactive waste (HTRW) was conducted in the project area. Hazardous, Toxic, and Radioactive Waste (HTRW) are defined as any "hazardous substance" regulated under Comprehensive, Environmental Response, Compensation, Liability Act (CERCLA), 42 U.S.C. 9601 et seq, including "hazardous wastes" under Section 3001 of the Resources Conservation and Recovery Act (RCRA), 42 U.S.C. 6921 et seq.

In conducting the environmental contamination assessment for Segments B-2 and B-3, the NJDEP Known Contaminated Sites List (KCS) and NJ-GeoWeb were used. Both data bases provide lists and locations of contaminated soil and ground water and status of remediation. Federal data bases used include the National Priority List (NPL), Comprehensive Environmental Response, Compensation and Liability System (CERCLIS), Toxic Release Inventory System (TRIS), Resource Conservation and Recovery System (RCRIS). Segment B-2 as proposed traverses a residential area that includes Starlit Drive and Dayton Avenue. The back yards of the homes along these roads extend to the stream. This area has historically been wooded or residential. Segment B-3 traverses a commercial/municipal area. Starting form Bound Brook Road (Rt. 28) going south through private lots to the town library and the Borough Hall complex. This segment currently ends at the fence line of Borough Hall complex and the former Middlesex Municipal Landfill. This landfill is a Formally Utilized Remedial Action Program (FUSRAP) site managed by the Army Corps of Engineers.

5.6. Cultural Resources

A cultural resources reconnaissance survey was conducted in 1989/90 for the overall Green Brook Flood Damage Reduction Project (GBFDRP) (Hunter Research 1990). In 1998 a Programmatic Agreement (PA) for the GBFDRP was signed by the Corps, New Jersey Historic Preservation Office (NJHPO) and the Advisory Council on Historic Preservation. A number of structures and archeological sites within the larger project area of potential effect were identified in the PA as eligible for the National Register of Historic Places (NRHP). Most of the lengths of Segments B-3 and B-4 were investigated at that time and no significant cultural resources were encountered. An architectural survey conducted of structures proposed for flood proofing or buy-out included two structures along Segments B-3 and B-4, a garage proposed to be relocated and a dwelling proposed to for buy-out. Both structures were determined not eligible for the NRHP (Panamerican Consultants, Inc. 1999). All previous survey results were coordinated with the NJHPO. There are, however, short segments where the alignment has shifted slightly that

were not previously studied. Based on previous work along the alignments these are not considered archaeologically sensitive however the locations will be tested as property access is acquired.

5.7. Air Quality

In accordance with the Clean Air Act of 1977, as amended, the U.S. Environmental Protection Agency (USEPA) developed National Ambient Air Quality Standards (NAAQS) to establish the maximum allowable atmospheric concentrations of pollutants that may occur while ensuring protection of public health and welfare with a reasonable margin of safety.

The USEPA measures community-wide air quality based on daily measured concentrations of six criteria air pollutants; carbon monoxide, sulfur dioxide, respirable particulate matter, lead, nitrogen dioxide, and ozone. Based on these measurements of air quality, the USEPA designates attainment areas and non-attainment areas nationwide. Non-attainment areas are designated in areas where air pollution levels persistently exceed the national ambient air quality standards.

Somerset and Middlesex Counties are located in the New York-New Jersey-Long Island Air Quality Control Region. Similar to most urban industrial areas, emissions from automobiles, manufacturing processes, utility plants, and refineries have impacted air quality in the Project area. Based on the National Ambient Air Quality Standards (NAAQS) six primary pollutants, Somerset County is designated as a non-attainment area for ozone and particulate matter (PM2.5) and an attainment area for sulfur dioxide, carbon dioxide, particulate matter (PM10), lead and nitrogen oxide.

5.8. Socioeconomics

Middlesex Borough has a population of 13,717 with 3,921.15 persons/square mile. The population is comprised of 87% White, 9% Hispanic, and 3.4% African American. The median age is 38 and the median per capita income is $27,834 (U.S. Census Bureau 2000). Approximately 2.4% of families and 3.6% of individuals live below the poverty line. 39.4% of the residents are occupied in the management and professional sector. 73% of the residential structures are detached, single family homes; 37% of which were built from 1940 to 1959 (U.S. Census Bureau 2000).

6.0 Environmental Impacts

6.1. Soils

The in-situ soil does not meet the geotechnical specifications for levee construction, therefore soil that meets the specifications will be imported from off-site. Although the importation of soil will constitute a change in the existing soil type within the immediate vicinity of the levee, no changes to the soil beyond the levee footprint are proposed. Soil may also need to be imported to use as backfill when constructing the floodwall but as with the levee, the change in soil type will not extend beyond the immediate footprint of the floodwall. The floodwall will provide some long term protection against the soil erosion occurring along the western most portion of the project area.

6.2. Water Resources

The full range of impacts to water resources were evaluated in 1980 FEIS and 1997 SEIS. Approximately 154 linear feet equaling to 0.055 acres of open water in the Bound Brook will be filled as a result of the installation of the sheetpile cutoff to create a more streamlined stream bank in the Segment B2 project area. This impact will be compensated through the use of open water credits available at the Finderne Farms Wetland Mitigation Site.

Approximately 0.298 acres of open water within the Bound Brook will be temporarily disturbed during the construction of Segment B3. Introduction of excess sediment into Bound Brook during construction and minimization of turbidity during in-channel work will be controlled to the extent practicable through use of best management practices identified in the soil and sedimentation erosion control plan. A preliminary erosion and sediment control plan is included in Appendix D. The District will be applying for Soil and Sedimentation Erosion Control and Request for Authorization permits from the Freehold Soil Conservation Districts prior to construction.

6.3. Vegetation

Approximately two acres of vegetation will be removed in order to construct the levee and floodwall; with the majority of the impacts occurring in wetlands. The limits of construction have been minimized to greatest extent possible to reduce loss of vegetation. Upon completion of the levee and the house demolition, shrubs and trees will be planted and the area will be reseeded with native grasses and wildflowers. The floodwall area will be reseeded with native grasses and wildflowers.

Approximately 0.79 acres of riparian zone will be permanently impacted through the construction of the levee and floodwall. The FHACAR allow for a maximum 3,000 square feet of riparian zone disturbance for flood damage reduction projects before requiring an application for a Hardship Exception and compensating the impact through mitigation at a 2:1 ratio. Given that the impact acreage exceeds the maximum limit, the District and NJDEP have included a Hardship Exception as part of the Flood Hazard Area Individual Permit application and have demonstrated in the application that public safety cannot be adequately ensured without exceeding this limit. A 0.51 acre mitigation credit will be applied at the Finderne Mitigation site to compensate for the impacts to the riparian zone.

6.3.1. Wetlands

A total of 0.85 acres of forested wetlands and 0.67 acres of wetland transition area will be permanently impacted as a result of the construction of the Segment B2 and B3 levees/floodwalls. Approximately 0.58 acres of forested wetlands will be temporarily impacted during the construction of the Segment B2 levee/floodwall.

Permanent forested wetland impacts will be mitigated through the use of forested wetland mitigation credits purchased by the District from the Cranbury Mitigation Bank in 27 August 2015. The Cranbury Mitigation bank, located in Cranbury, New Jersey is a State of New Jersey approved wetland mitigation bank and is located within the same Watershed Management Area as the project. The receipt of the mitigation credit purchase is located in Appendix c.

Temporary forested wetland impacts will be compensated through on-site planting. Species to be replanted include serviceberry (*Amelanchier Canadensis*), river birch (*Betula nigra*), hackberry (*Celtis occidentalis*), hackberry (*Cercis Canadensis*), cockspur (*Crategus crus-galli*), blackgum (*Nyssa sylvatica*), willow oak (*Quercus phellos*), swamp white oak (*Quercus bicolor*), and eastern white pine (*Pinus strobus*).

6.4. Wildlife and Fisheries Resources

The full range of impacts to fish and wildlife resources were evaluated in the 1980 FEIS and the 1997 SEIS. In general, the removal of mature trees to construct the floodwall and levee will result in a permanent reduction of cover, nesting and food sources for wildlife. Construction activities will temporarily displace animals that utilize the forest such as birds, squirrels, raccoons, etc., but they are anticipated to return to the area post-construction. To comply with the Migratory Bird Treaty Act (MBTA), trees and shrubs will be cleared outside of a 15 March through 31 July window to avoid adverse impacts to any potential nesting birds that are covered under this act.

Erosion and sediment control best management practices will be implemented to reduce the introduction of sediment into open water surfaces. In addition, in water construction will be restricted to occur outside May 1 through June 30 to protect any spawning fish species.

6.4.1. Federal and State Endangered, Threatened and Special Concern Species

Indiana and Northern long-eared bat

Based on a phone conversation with USFWS, Indiana bat is not expected to occur within the Segment B2 and B3 project area due to the level of habitat fragmentation and urbanization. However, there are documented northern long eared bat maternal colonies several miles from the project area and this species is known to form colonies in urban areas (personal communication, J. Markuson, R. Popowski, 24 November 2015). As a result, the District will adhere to a vegetation clearing restriction from 1 April through 30 September to protect this species. Alternatively, if clearing must occur within this timeframe, a presence/absence survey will be conducted prior to construction and results will be coordinated with the USFWS.

Bald Eagle

Based on coordination with staff from NJDEP Division of Fish and Wildlife's Endangered and Nongame Species Program, due to the urbanized nature of the project area and the relatively small width of Green Brook, the project area was determined to not provide suitable bald eagle foraging habitat. Therefore, no adverse impacts to the bald eagle or its supportive habitat are anticipated from the implementation of the project. See Appendix C for additional documentation from NJDEP regarding this matter.

6.5. Environmental Contamination

Based on review of Federal and State operated data bases the area where Segment B-2 is proposed to be built shows no environmental contamination issues. This area has historically been wooded followed by development into residential housing. There is no history of any industrial activity in this area. That area of Segment B-3 was developed into commercial properties. Currently a restaurant, and American Legion Hall occupy the land. South of this is Borough owned land with the library and Borough Hall complex. Part of the complex includes the Borough re-cycling center. The most recent soil borings conducted on Borough property

showed low levels of radiologic soil several feet beneath the surface and minimally impacted soils with volatile organics, semi-volatile organics and metals. These compounds present are not surprising since the Borough complex has been in existence for over fifty years and contains the re-cycling center, parking areas for vehicles and storage. Adding to the levels found is the property buts up to the former Middlesex Municipal Landfill. This former landfill contains mixed wasted and radiologic material left over from the processing of radiologic sources during the Manhattan Project of World War II. Remediation of this site in being conducted by the Army Corps of Engineers under FUSRAP (Formally Utilized Site Remedial Action Program). A Remedial Investigation (RI) is currently being done on the site. The levels of compounds found in the Borough Hall complex should not be an issue during construction. Presently used excavation/construction protocols for working in this type environment should be sufficient in protecting worker health and safety, and the environment.

6.6. Cultural Resources

No historic properties were identified through archaeological testing and architectural survey of the Segments B2 and B3. While not considered sensitive for archaeological resources based on previous work in the area, a short reach of Segment B3 will be tested for archeologically resources. It was not surveyed previously as the alignment shifted since the original study.

6.7. Air Quality and Noise

6.7.1. Air Quality

Construction emissions for the proposed project have been estimated to be below the Federal de minimis thresholds in accordance with the Clean Air Act. The emissions will be below the thresholds of 100 tons/year for NOx, 50 tons/year for VOC, and below 100 tons/year for PM 2.5. The emissions from the project are considered to have an insignificant impact on the regional air quality, and according to 40 CFR 93.153 (f) and (g), the proposed project is presumed to conform to the State Implementation Plan. A General Conformity, Record of Non-Applicability (RONA) and associated air emissions calculations are included in Appendix C of this document.

6.7.2. Noise

The proximity of the project area to residences will increase noise levels due to the operation of construction equipment. The impacts of noise will be mitigated to the extent possible through restriction of the work hours within normal operating hours and by coordinating with the local communities to comply with any locally enforced noise ordinances or work periods. Wildlife in the area may be temporarily displaced during active construction, but would be expected to return to the project area post-construction.

6.8. Socioeconomics

During construction of the floodwall, some of the residents within this project area will be unable to fully utilize their property. Additionally, they may be required to move or disassemble structures such as sheds and above ground swimming pools to accommodate construction. Further, setting the floodwall back from the Bound Brook will fragment some of the properties and will result in the loss of direct access to the portion of property between the brook and floodwall. This loss will be offset through the acquisition of permanent easements for the operation and maintenance of the floodwall and compensating the property owner at its fair market value for the effect on the property.

Long term benefits achieved by the project include flood damage reduction benefits that include reduced damage to property, protection of business and residential structures, improved public health and safety, reduced traffic delays, and emergency access for the fire department, medical personnel and police protection. The proposed action is not expected to adversely impact the socioeconomic environment of the area.

6.8.1. Environmental Justice

Executive Order 12898, Federal Actions to address Environmental Justice in Minority and Low Income Populations mandates that each federal agency will identify and address potential disproportionately high and adverse human health or environmental effects of its activities on minority populations and low income populations.

No significant environmental impacts on the human population are anticipated as a result of the proposed action. The proposed project is not located in a low income area and is intended to protect the surrounding community from flood related damages. Therefore, a disproportionate negative impact on minority or low-income groups in the community is not anticipated and a full evaluation of Environmental Justice issues is not required for this EA.

6.9. Recreation

The Middlesex Library, which is located within the Segment B3 project area, has a small children's playground containing play equipment (e.g. swings) and a 53 x 32 foot picnic pagoda in the rear of its property. Both will be relocated slightly closer to the library to accommodate the primary ponding area and drainage culvert associated with the Segment B3 levee and floodwall. Both the playground area and the pagoda will not be available for use during construction for safety reasons but will be open to the public once construction is completed. Therefore, significant impacts are not expected.

6.10. Cumulative Impacts

Cumulative impacts refer to one or more individual impacts, which when considered together, are considerable or which compound or increase the other's impacts. The cumulative impact from several projects is the change in the environment that results from the incremental impact of the selected plan when added to other closely related past, present or reasonably foreseeable future projects.

Past and current actions that need to be considered against the proposed action include construction of Element No. 1 of the GBFDRP. The proposed construction may overlap with the on-going Segment R2 construction in Bound Brook. However, the overlap of the construction activities is not anticipated to result in any unanticipated adverse environmental (e.g. air quality, wetlands) or socioeconomic impacts.

The total wetland impacts resulting from the construction of Element No. 1 of the GBFDRP and Segments B2 and B3 includes 12.85 acres of forested wetland, 0.15 acres of open water and 0.26 acres of scrub shrub wetlands. These impacts have been mitigated through the use of credits generated by the Finderne Farms mitigation site and through the purchase of forested wetland mitigation credits from a NJDEP approved wetland mitigation bank.

Future actions to be considered include the construction of Segments B4 and B5, and the construction of segments C, H and D. Upon its completion, Segment B will provide a flood protection level for a 150 year event. Overall, the construction of future segments of the GBFDRP will provide comprehensive flood damage reduction within the Green Brook sub-basin.

Adverse cumulative impacts to wetlands will be assessed as project design for each segment are developed and if necessary, additional mitigation sites will be identified and created to compensate for such impacts.

Emissions analyses will be conducted for each segment to ensure compliance with General Conformity and if needed, construction operations will be scheduled in a manner to stay below the yearly de minimis levels for the applicable NAAQS. Continued coordination will occur with the USFWS to identify the need for field surveys to ensure that Indiana bat and/or northern long-eared bat will not be adversely impacted. Coordination with the SHPO will be on-going to ensure significant cultural resources will not be adversely impacted or identify mitigation requirements for any cultural resource impacts.

7.0 Public and Agency Coordination

The Draft Environmental Assessment is being coordinated with the public and involved agencies through targeted mailings, placement of the report in public repositories such as the local library and by advertisement of the documents availability on the New York District's website.

Coordination with the public includes meetings with affected property owners to discuss the project features. The affected residents were also notified of the Flood Hazard and Freshwater Regulations Individual permit applications for Segment B3 and will be notified for the Segment B2 Flood Hazard and Freshwater Individual permit applications. Additionally, the proposed action has been coordinated with the State and local partners of the Green Brook Flood Damage Reduction Project, including NJDEP, Somerset and Middlesex Counties as well as with the Green Brook Flood Control Commission.

The proposed project has been coordinated with the NJDEP Land Use Regulation Program Office via a pre-application meeting held in March 2015 for Segment B2 and submission of the Flood Hazard Area and Freshwater Wetlands Individual Permit applications. Correspondence documenting coordination between the District and the State Historic Preservation Office Correspondence pertaining to cultural resources is located in Appendix C.

Based on 15 December 2015 call with Ron Popowski of the USFWS, it was agreed that formal Fish and Wildlife Coordination Act Report (FWCAR) will not be required given that no major changes to project have occurred since preparation of the original FWCAR developed in 1996. This Environmental Assessment will be used for them to update any recommendations from the previous FWCAR.

The circulation of this Environmental Assessment for public comment fulfills public coordination requirements in accordance with the National Environmental Policy Act of 1970. The District will prepare a final NEPA document to address all received comments.

8.0 Conclusion

In summary, the implementation of Segments B2 and B3 are not anticipated to have significant adverse impacts on the environment, cultural resources or socioeconomics and is therefore proposed to be documented with a Finding of No Significant Impact (FONSI). The proposed action is necessary to ultimately provide flood damage reduction for the Borough of Middlesex that will benefit the economics, health and safety of the residents. Temporary disturbance to floodplain and wetland habitat will be mitigated on-site through site landscaping and permanent floodplain and wetland impacts will be mitigated offsite at the Finderne Farms mitigation site. Therefore, a supplemental EIS is not required. Applicable laws and regulations related to federal actions are summarized in Table 1.

Table 1: Summary of Primary Federal and State laws and Regulations Applicable to the Proposed Action

Federal		
Legislative Title U.S. Code/Other		Compliance
Clean Air Act	42 U.S.C. §§ 7401-7671g	An air quality analysis was completed for the project. Based upon the completed analysis, the emissions from the project are considered to have an insignificant impact on the regional air quality, and according to 40 CFR 93.153 (f) and (g) the proposed project is presumed to conform to the SIP. A Record of Non-Applicability is located in Appendix C.
Clean Water Act	33 U.S.C. §§ 1251 et seq.	The Corps obtained a Freshwater Wetlands Individual Permit application to NJDEP to fulfill the requirements of Section 404 of this act for Segment B3 on 20 October 2015. A Freshwater Wetlands Individual Permit for Segment B2 will be submitted in April 2016. A 404(b) Review is also included in this report in Appendix A.
Endangered Species Act of 1973	16 U.S.C. §§ 1531 et seq.	Information provided by the U.S. Fish and Wildlife Service indicates that the proposed project will not have adverse impacts to any endangered or threatened species.
Fish and Wildlife Coordination Act	16 U.S.C. § 661 et seq.	A formal FWCAR is not required. However, the Corps is in continued coordination with the U.S. Fish and Wildlife Service.
National Environmental	42 U.S.C. §§ 4321-	The circulation of the Finding of No

Policy Act of 1969	4347	Significant Impact fulfills requirements of this act.
National Historic Preservation Act of 1966	16 U.S.C. §§ 470 et seq.	The Corps has continued to coordinate with the State Historic Preservation Office to fulfill requirements of this act. Correspondence indicating SHPO's non objection to the project is located in Appendix C.
Executive Order 11990, Protection of Wetlands	May 24, 1977	Circulation of this report for public and agency review fulfills the requirements of this order.
Executive Order 11988 Floodplain Management	May 24, 1977	The proposed action is within the floodplain. However the project is designed to reduce damages to existing infrastructure located landward of the proposed project. The circulation of the Draft EA for public review satisfies the public coordination requirement under this EO.
Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks	April 21, 1997	Implementation of this project will reduce environmental health risks. Circulation of this report for public and agency review fulfills the requirements of this order.
State		
Legislative Title and code/date		Compliance
NJDEP Rules and Regulations – Flood Hazard Area	N.J.A.C. 7:13 (N.J.S.A 58:16A)	A permit for Segment B3 has been received and is included in Appendix C. The permit application for Segment B2 was submitted to NJDEP LURP on 2 May 2016.
NJDEP Rules and Regulations – Freshwater Wetlands Permit	N.J.A.C. 7:7A (N.J.S.A. 13:9B)	The permit for Segment B3 has been received and is included in Appendix C. The permit application for Segment B2 was submitted to NJDEP LURP on 2 May 2016.

9.0 References

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URS/Kupper Joint Venture. January 1996. Green Brook Flood Control Project, Hazardous, Toxic and Radioactive Waste Feasibility Study, Updated Records Search.

USFWS IPAC Accessed 5 October, 2015.

10.0 List of Preparers

Kimberly Rightler, Project Biologist, U.S. Army Corps of Engineers, NY District
Lynn Rakos, Project Archaeologist, U.S. Army Corps of Engineers, NY District
Richard Dabal, Physical Scientist, U.S. Army Corps of Engineers, NY District

Appendix A

Section 404 (b)(1) Evaluation

Segments B2 and B3 Levee and Floodwall Construction,
Green Brook Flood Damage Reduction Project
Borough of Middlesex, Middlesex County, NJ
Section 404 (b)(1) Evaluation

I. PROJECT DESCRIPTION

a. Location: Borough of Middlesex, Middlesex County, New Jersey.

b. General Description: Segment B2: Installation of 110 feet of levee and 405 feet of floodwall along the west bank of the Bound Brook. Segment B3: Installation of 234 feet of earthern levee, 518 feet of concrete floodwall, and housing for a future pump station.

c. Authority and Purpose:
The study has been authorized under Section 401a of the Flood Control Act of 1986 as amended, to study and construct flood damage reduction measures for public works and non-profit public services. The purpose of the project is to provide flood damage reduction measures to the community of the Borough of Middlesex.

d. General Description of Fill Material
1.) Characteristics of Material: Material used to construct the levee will be clean fill that meets Corps specifications for levee construction. Other materials used in association of levee construction includes rip rap around discharge outlets to reduce discharge velocities and prevent scouring and soil erosion. The floodwall will be constructed of concrete.
2.) Quantity of Material: Levee: Approximately 16,000 cy soil and 150 cy of stone; Floodwall Approximately 8,000 cy of soil and 2,100 cy of concrete.
3.) Source of Material: The rock will be obtained from a local quarry. Soil fill will be clean material and will be acquired at an adequate site.

e. Description of the Proposed Discharge Sites
1.) Location: The discharge site is located on along the west bank of the Bound Brook in the Borough of Middlesex Brook, New Jersey.
2.) Size: Approximately 923 feet of floodwall and 334 feet of levee will be constructed.
3.) Type of Site: Segment B2 is located within a residential area; Land use within the Segment B3 project area is a mix of commercial and municipal buildings.
4.) Types of Habitat: The levees and floodwall is located in a combination of forested wetland, some of which has been disturbed through the conversion to lawns. The aquatic habitat consists nontidal freshwater classified as FW2-NT (general fresh surface water, non-trout) by NJDEP.
5.) Time and Duration of Disposal: Construction of the Segment B2 and Segment B3 levee and floodwall systems will take approximately 24 months.

f. Description of Disposal Method: Land based construction equipment will be used to excavate and construct the flood damage reduction measures.

II. FACTUAL DETERMINATION

a. Physical Substrate Determinations

1) Substrate Evaluation and Slope: The project area is generally flat with the dominant soil in the project area being the Bowmansville Series.

2) Sediment Type: The sediment is primarily alluvial soils.

3) Dredged/Fill Material Movement: The majority of fill activities will occur in freshwater wetlands. Placement and grading of fill, riprap and concrete will result in the temporary disturbance of 0.58 acres of forested wetlands and the permanent loss of 0.85 acres of forested wetlands. Temporary wetland impacts will be mitigated through on-site restoration following completion of construction activities. Approximately 0.055 acres of the Bound Brook will be filled as part restoring 155 linear feet of eroded bank within the footprint of the Segment B2 floodwall. Permanent wetland impacts will be mitigated by utilizing credits purchased from the Cranbury Wetland Mitigation Bank. Permanent open water impacts will be mitigated by utilizing credits generated from the Finderne Farms Wetland Mitigation Site located in Bridgewater Township that the District constructed specifically for the Green Brook Flood Control Project.

4) Physical Effects on Stream Bottom: The project is not expected to change the existing substrate or characteristics of Green Brook given that the levee and floodwalls are setback from the stream bank.

5) Other Effects: No unique or other effects are anticipated from this project.

6) Actions Taken to Minimize Impacts: Best management practices, include but not limited to silt fencing and straw bales, will be utilized during const ruction. Additionally, work will be limited to that which can be completed and stabilized in one day.

b. Water Circulation, Fluctuation and Salinity Determinations

1) Water, Consider Effects on:

a. Salinity- No effect

b. Water Chemistry- No effect

c. Clarity- Water clarity may be slightly impacted during construction activities; No long-term effect is anticipated.

d. Color- No effect

e. Odor- No effect

f. Taste – No effect

g. Dissolved Gas Levels- No effect

h. Nutrients- No effects

i. Eutrophication- No effect

j. Others as Appropriate- No other adverse impacts are anticipated from the project.

2) Current Patterns and Circulation:
   a. Current Patterns and Flow- The project will not impact normal flows.
   b. Velocity- The project will not impact velocities of the Bound Brook.
   c. Stratification- No effect.
   d. Hydrologic Regime- No effect.

3) Normal Water Level Fluctuations: The project will not cause any change in normal water levels.

4) Salinity Gradients: Not applicable.

5) Actions Taken to Minimize Impacts: Erosion and sediment control practices will be utilized during construction.

c. Suspended Particulate/Turbidity Determinations.

1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Sites: Effects of the proposed project on turbidity and suspended sediment concentrations will be minimal.

2) Effects on Chemical/Physical Properties of the Water Column:
   a. Light Penetration- No effect.
   b. Dissolved Oxygen- No effect.
   c. Toxic Metals and Organics- No effect.
   d. Pathogens- The project will not cause any change in pathogen levels as no sewage or animal waste use or treatment is involved.
   e. Aesthetics- The aesthetics of the project area will be somewhat compromised as the majority of the project area behind the residences is forested. Restoration of grass and shrub and tree species will be implemented to restore the vegetation.
   f. Others as Appropriate- Not applicable

3) Effects on Biota:
   a. Primary Production, Photosynthesis- Not applicable
   b. Suspension/ Filter Feeders- No impact is expected. Erosion and sediment control best management practices will be implemented during construction to reduce sedimentation to Green Brook.
   c. Sight Feeders- No impact is expected.

4) Actions Taken to Minimize Impacts: Erosion and sediment controls will be implemented during construction.

d. Contaminant Determinations: All fill material will be clean and will not pose a risk.

e. Aquatic Ecosystem and Organism Determinations.
1) Effects on Plankton: No effect.
2) Effects on Benthos: No effect.

3) Effects on Nekton: No effect.

4) Effects on Aquatic Food Web: No effect. Setting the floodwall and levee back from the stream bank will preserve the vegetation immediately along the bank.

5) Effects on Special Aquatic Sites:

a. Sanctuaries and Refuges- Non applicable

b. Wetlands- 0.85 acres of forested wetland will be permanently impacted by construction of the levee and floodwall with 0.58 acres of forested wetland being temporarily impacted during construction.

c. Mudflats- Non applicable.

d. Vegetated Shallows- Not applicable.

e. Coral Reefs- Not applicable.

f. Riffle and Pool Complexes- No effect.

6) Threatened and Endangered Species: Based on a 24 November 2015 personal communication with representatives of the USFWS, Indiana bat is not expected to occur within the project area due to the level of urbanization and habitat fragmentation. However, northern long-eared bat, which is more adaptable to developed areas, may occur within the project area. A tree clearing restriction from 1 April through 30 September will be implemented during construction to minimize impacts to the bat species.

7) Other Wildlife: The project is not expected to have significant long-term impacts on the waterfowl, upland birds or mammals in the project area. A tree clearing restriction from 15 March until 30 July will be implemented during construction to avoid adverse impacts to migratory birds.

8) Actions to Minimize Impacts: Best management practices including but not limited to silt fence, cofferdams and turbidity curtains will be utilized during construction.

f. Proposed Disposal Site Determinations

1) Mixing Zone: Not applicable

2) Determination of Compliance with Applicable Water Quality Standards: Fill will be clean construction material and will meet water quality standards.

3) Potential Effects on Human Use Characteristic:

a. Municipal and Private Water Supply - The Bound Brook is not used as a water supply so no direct or indirect adverse impacts to the municipal water supply form project implementation are expected.

b. Recreational and Commercial Fisheries - The project is not expected to have any adverse impacts to recreational or commercial fisheries.

c. Water Related Recreation- The Green Brook is not used for recreational purposes within the project area; therefore no permanent or temporary adverse impacts are expected as a result of project implementation.

d. Aesthetics - Removal of mature trees to construct the levees and floodwalls will reduce the aesthetics of the project area. However, the need for flood protection to homes within

Middlesex Borough outweighs the loss. The floodwall will receive a decorative façade to minimize the impact. The levee is set back from residential homes will minimize the direct impacts the levee will have on views.

e. Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves - Not Applicable

f. Determination of Cumulative Effects on the Aquatic Ecosystem.

Segments B2 and B3 are a component of the larger Green Brook Flood Damage Reduction Project. Other components comprising of levees, buyouts and floodwalls have been implemented 3 miles west of the project area in the Borough of Bound Brook. In addition, the District completed the removal of the Jefferson Avenue bridge in Dunellen approximately 2.5 miles from the project area. The bridge was removed as part of the GBFDRP. The majority of the cumulative impacts have been through the temporary disturbance and permanent loss of freshwater wetlands. Compensation for the permanent impact of wetlands and open water is being performed through the use of credits from the Finderne Farms mitigation site that was specifically constructed for the GBFDRP, and through the purchase of wetland mitigation credits of the New Jersey Department of Environmental Protection approved Cranbury Mitigation Bank located in Cranbury, New Jersey.

g. Determination of Secondary Effects on the Aquatic Ecosystem.

No secondary effects on the aquatic ecosystem are expected from this project.

III. FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE.

a. No significant adaptation of the Section 404(b)(1) guidelines was made relative to this evaluation.
b. The objective of protecting Middlesex Borough from catastrophic flood damages necessitates the implementation of the floodwalls and levees.
c. The proposed activity will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.
d. The proposed disposal operations will not harm any Federal or state endangered species or its critical habitat under the Endangered Species Act of 1973.
e. The proposed discharge of fill material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, fish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife will not be significantly affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values are not expected to occur.
f. Appropriate steps to minimize potential adverse impacts of the discharge of fill material include the implementation of an erosion and sediment control plan and judicious engineering practices.

APPENDIX B

RECORD OF NON-APPLICABILITY

GENERAL CONFORMITY - RECORD OF NON-APPLICABILITY

Project/Action Name: *Segment B2 Green Brook Flood Damage Reduction Project*

Project/Action Identification Number:*N/A*

Project/Action Point of Contact: *Kimberly Rightler, (917) 790-8722*

Begin Date: *To Be Determined*

End Date: *To Be Determined*

General Conformity under the Clean Air Act, Section 176 has been evaluated for the project described above according to the requirements of 40 CFR 93, Subpart B. The requirements of this rule are not applicable to this project/action because:

_____ The project/action is an exempt action under 40 CFR 93.153(c) or (d), (*SPECIFY APPLICABLE EXEMPTION CATEGORY AND REGULATORY CITATION)*

OR

X Total direct and indirect emission from this project/action have been estimated at 3.90 tons CO, 0.18 tons VOC, 2.07 tons NOx and 0.33 tons PM, and are below the conformity threshold value established at 40 CFR 93.153(b) of *100 tons CO, 100 tons NOx, 100 tons PM and 50 tons VOC.*

AND

The project/action is not considered regionally significant under 40 CFR 93.153(i).

Supporting documentation and emissions estimates are

(X) ATTACHED

( ) APPEAR IN THE NEPA DOCUMENTATION (*PROVIDE REFERENCE*)

( ) OTHER _____.

SIGNED _____.

(*Peter Weppler, Chief, Environmental Branch, Planning Division*)

Green Brook Flood Damage Reduction Project
Equipment Specifications and Hours of Operation

Nonroad Vehicles - Equipment Description	Equip Hrs	Horsepower	Fuel Type	Sources and Assumptions
AIR COMPRESSOR, 250 CFM (7 CMM), 100 PSI (689 KPA) (ADD HOSE)	45.40	85	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
AIR HOSE, 1.5" (38 MM) DIA x 100' (31 M) LENGTH, HARDROCK (USE AS DRILLING ACCESSORY)	88.31	NA	NA	No emissions
ASPHALT DISTRIBUTOR, 3,000 GAL (11,355 L) (ADD 45,000 LB (20,412 KG) GVW TRUCK)	341.55	245	Diesel	Truck hp from specifications from equipmentwatch.com; fuel type assumed
ASPHALT FINISHER, 10' WIDE SCREED, WHEEL, W/19' 6" SCREED EXTENSION, 215 CF HOPPER	5.12	158	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
BUCKET, CONCRETE, GENERAL PURPOSE, 1.0 CY (0.8 M3)	2.50	NA	NA	No emissions
BUCKET, DRAGLINE, 0.8 CY (0.6 M3) MEDIUM WEIGHT (ADD TEETH WEAR COST)	21.25	NA	NA	No emissions
CHAINSAW, 16" - 24" (406-610 MM) BAR	77.45	5.7	Gasoline	Specifications from Husqvarna.com
CONCRETE FINISHER, ROTO TROWEL, 46" (1,168 MM) DIA, 4 BLADE	162.00	9	Gasoline	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
CONCRETE MIXER, PLASTER/MORTAR, 12 CF (0.3 M3), W/TRAILER	81.00	13	Gasoline	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
CONCRETE PUMP, 117 CY/HR, 75' BOOM, TRUCK MTD	371.21	210	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
CONCRETE SAW, 13" (330 MM) DEPTH, SELF PROPELLED (ADD WATER AND COST FOR SAWBLADE WEAR)	19.46	66	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
CONCRETE VIBRATOR, 2.5" (63.5 MM) DIA, W/7.5 HP (5.6 KW) GENERATOR	396.89	7.5	Diesel	Hp provided in description; fuel type assumed
CRANE, HYDRAULIC, SELF-PROPELLED, ROUGH TERRAIN, 20 TON (18 MT), 70' (21.3 M) BOOM, 4X4	31.99	152	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
CRANE, MECHANICAL, LATTICE BOOM, CRAWLER, DRAGLINE/CLAMSHELL, 0.75 CY (0.6 M3), 25 TON (23 MT), 100' (30.5 M) BOOM (ADD BUCKET)	20.89	150	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
CRANE, MECHANICAL, LATTICE BOOM, TRUCK MOUNTED, 125 TON (113 MT), 240' (73.2 M) BOOM	16.87	197	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
CRANES, HYDRAULIC, SELF-PROPELLED, ROUGH TERRAIN, 30 TON, 95' BOOM, 4X4	10.10	152	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
CRANES, HYDRAULIC, SELF-PROPELLED, YARD, 10 TON, 30' BOOM, 4X4, NON-ROTATING OPERATOR'S CAB	8.66	62	Gasoline	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
CRANES, HYDRAULIC, TRUCK MTD, 70 TON, 115' BOOM, 8X4	6.91	400	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
CRANES, HYDRAULIC, TRUCK MTD, ALL TERRAIN, 25 TON, 94' BOOM, 6X4X2	30.41	250	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
GRADER, MOTOR, ARTICULATED, 135 HP (101 KW), 12' (3.6 M) BLADE WIDTH	266.60	135	Diesel	Hp provided in description; fuel type assumed
GRADER, MOTOR, ARTICULATED, 6X4, 12' BLADE W/17 TEETH SCARIFIERS	2.44	135	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
HYDRAULIC EXCAVATOR, CRAWLER, 24,640 LBS, 0.60 CY BUCKET, 16.50' MAX DIGGING DEPTH	636.58	79	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
LOADER / BACKHOE, WHEEL, 0.80 CY FRONT END BUCKET, 24" DIP, 4.3 CF, 12' DIGGING DEPTH, 4X4	348.18	67	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
LOADER, FRONT END, CRAWLER, 1.30 CY BUCKET	1.66	90	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
LOADER, FRONT END, WHEEL, SKID-STEER, 14.3 CF, 60" BUCKET	43.00	46	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
LOADER, FRONT END, WHEEL, SKID-STEER, 9-11 CF (0.2-0.3 M3), 60" (1.5 M) BUCKET {BOBCAT}, 13 CWT (590 KG)	27.20	46	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
LOADER/BACKHOE, WHEEL, 0.80 CY (0.6 M3) FRONT END BUCKET, 9.8' (3.0 M) DEPTH OF HOE, 24" (0.61 M) DIPPER, 4X4	2.66	67	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
LOADER/BACKHOE, WHEEL, 1.25 CY (0.9 M3) FRONT END BUCKET, 12.0' (3.7 M) DEPTH OF HOE, 24" (0.61 M) DIPPER, (0.2 M3), 4X2 11.06	4.76	92	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
PAVING BREAKER, 66 LB (30 KG) (ADD 100 CFM (2.8 CMM) COMPRESSOR)	88.24	35	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
PUMP, WATER, CENTRIFUGAL, TRASH, HOSE, SUCTION/DISCH, 2" (50 MM) DIA X 50' (15 M) WITH COUPLING (PER SECTION)	34.40	10	Gasoline	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
PUMP, WATER, CENTRIFUGAL, TRASH, HOSE, SUCTION/DISCH, 2" (51 MM) DIA x 20' (6.1 M) LENGTH, W/COUPLING/SECTION	17.20	10	Gasoline	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
PUMP, WATER, DIAPHRAGM, SKID MTD, ENGINE DRIVE, 2" (51 MM) DIA, 2,000 GPH (7,571 LPH) @ 25' (7.6 M) HEAD (ADD HOSES)	17.20	4	Gasoline	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
RIPPER, 3-SHANKS & BEAM, HYDRAULIC (ADD TO 341-440 HP (254-328 KW) DOZER & COST FOR POINT WEAR)	0.49	440	Diesel	Hp provided in description; fuel type assumed
RIPPER, SHANK, EACH (ADD TO 340-440 HP (254-328 KW) DOZER & COST FOR POINT WEAR)	0.49	440	Diesel	Hp provided in description; fuel type assumed
ROLLER, STATIC, SELF-PROPELLED, PNEUMATIC, 14.25 TON, 68" WIDE, 9 TIRE, ASPHALT COMPACTOR	8.08	70	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
ROLLER, VIBRATORY, SELF-PROPELLED, DOUBLE DRUM, SMOOTH, 2.9 TON, 47.2" WIDE, 2X1, ASPHALT COMPACTOR	21.50	33	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
ROLLER, VIBRATORY, SELF-PROPELLED, DOUBLE DRUM, SMOOTH, 7.8 TON, 66.1" WIDE, 2X1, ASPHALT COMPACTOR	1.50	108	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
ROLLER, VIBRATORY, TOWED, SINGLE DRUM, SHEEPSFOOT, 25.5 TON, 72" WIDE (ADD 180 HP TOWING UNIT)	11.40	50	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
SCRAPER, TANDEM POWERED, STANDARD LOADING, 21 CY, 24 TON, 4X4, D-9 ASSISTED LOADING	1,452.30	330	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
SCRAPER, TANDEM POWERED, STANDARD LOADING, 34 CY, 37.5 TON, 4X4, D-10 ASSISTED LOADING	49.62	450	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
SCRAPER, TOWED, 12-18 CY (9-14 M3), 18 TON (16.3 MT) (ADD 285 HP (213 KW) TRACTOR)	21.91	285	Diesel	Hp provided in description; fuel type assumed
TRACTOR, CRAWLER (DOZER), 240 HP, LOW GROUND PRESSURE, W/7.70 CY STRAIGHT BLADE (ADD ATTACHMENTS)	472.20	240	Diesel	Hp provided in description; fuel type assumed
TRACTOR, CRAWLER (DOZER), 300-340 HP (224-254 KW), POWERSHIFT, W/UNIVERSAL BLADE	0.49	340	Diesel	Hp provided in description; fuel type assumed
TRACTOR, CRAWLER (DOZER), 310 HP, POWERSHIFT, W/15.3 CY SEMI-U BLADE (ADD ATTACHMENTS)	238.40	310	Diesel	Hp provided in description; fuel type assumed
TRACTOR, CRAWLER (DOZER), 341-440 HP (254-328 KW), POWERSHIFT, W/UNIVERSAL BLADE	25.90	440	Diesel	Hp provided in description; fuel type assumed

Highway Vehicles - Equipment Description	Equip Hrs	Horsepower	Fuel Type	Sources and Assumptions
DUMP TRUCK, HIGHWAY, 10 - 13 CY (7.6 - 9.9 M3) DUMP BODY, 35,000 LBS (15,900 KG) GVW, 2 AXLE, 4X2	2.80	265	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
DUMP TRUCK, HIGHWAY, 16 - 20 CY (12.2 - 15.3 M3) DUMP BODY, 75,000 LBS (34,000 KG) GVW, 2 AXLE, 6X4	1,796.11	400	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
TRUCK OPTION, DUMP BODY, REAR, 10.0 CY (7.7 M3) (ADD 35,000 LB (15,876 KG) GVW TRUCK)	4.80	265	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
TRUCK OPTION, DUMP BODY, REAR, 12 CY (9.2 M3) (ADD 45,000 LB (20,412 KG) GVW TRUCK)	4.20	230	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
TRUCK OPTION, FLATBED, 8' (2.4 M) x 20' (6.1 M) (ADD 25,000 LB (11,340 KG) GVW TRUCK)	4.80	210	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
TRUCK OPTION, FLATBED, 8' (2.4M) x 12' (3.7 M) (ADD 25,000 LB (11,340 KG) GVW TRUCK)	6.03	210	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
TRUCK, HIGHWAY, 20,000 LBS (9,000 KG) GVW, 2 AXLE, 4X2 WITH FLATBED	0.32	210	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
TRUCK, HIGHWAY, 25,000 LB (11,340 KG) GVW, 4X2, 2 AXLE (ADD ACCESSORIES)	16.16	210	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
TRUCK, HIGHWAY, 35,000 LB (15,876 KG) GVW, 4X2, 2 AXLE (ADD ACCESSORIES)	341.13	265	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
TRUCK, HIGHWAY, 35,000 LB (15,876 KG) GVW, 4X2, 2 AXLE (ADD ACCESSORIES)	11.06	265	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8
TRUCK, HIGHWAY, 45,000 LB (20,412 KG) GVW, 6X4, 3 AXLE (ADD ACCESSORIES)	4.20	230	Diesel	USACE Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8

Green Brook Flood Damage Reduction Project
Emission Factors and Operation Load

Nonroad Vehicles - Equipment Description	Fuel Type	hp	Load Factor (%)	Emission Factors (g/hp-hr)* THC (VOC)	NOx	PM-10	PM-2.5	CO	SO2	Sources and Assumptions
AIR COMPRESSOR, 250 CFM (7 CMM), 100 PSI (689 KPA) (ADD HOSE)	Diesel	85	43%	0.18	3	0.3	0.29	2.37	0.00542	EPA Nonroad 2008a; SCC Code 2270003040; Diesel Other General Industrial Equipment; 75-100 hp; Tier 3
AIR HOSE, 1.5" (38 MM) DIA x 100' (31 M) LENGTH, HARDROCK (USE AS DRILLING ACCESSORY)	NA	NA	NA	NA	NA	NA	NA	NA	NA	No emissions associated with air hose alone
ASPHALT DISTRIBUTOR, 3,000 GAL (11,355 L) (ADD 45,000 LB (20,412 KG) GVW TRUCK)	Diesel	245	59%	0.19	2.61	0.22	0.21	1.14	0.00492	EPA Nonroad 2008a; SCC Code 2270002021; Diesel Paving Equipment; 175-300 hp; Tier 3
ASPHALT FINISHER, 10' WIDE SCREED, WHEEL, W/19' 6" SCREED EXTENSION, 215 CF HOPPER	Diesel	158	59%	0.19	2.61	0.32	0.31	1.33	0.00492	EPA Nonroad 2008a; SCC Code 2270002021; Diesel Paving Equipment; 100-175 hp; Tier 3
BUCKET, CONCRETE, GENERAL PURPOSE, 1.0 CY (0.8 M3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	No emissions associated with bucket alone
BUCKET, DRAGLINE, 0.8 CY (0.6 M3) MEDIUM WEIGHT (ADD TEETH WEAR COST)	NA	NA	NA	NA	NA	NA	NA	NA	NA	No emissions associated with bucket alone
CHAINSAW, 16" - 24" (406-610 MM) BAR	Gasoline	5.7	70%	47.98	0.91	7.7	7.7	283.4	0	EPA Nonroad 2008a; SCC Code 2260004021; 2-Stroke Chainsaws <6hp Commercial; Gasoline 2-stroke Handheld Class 5 Meeting Phase 2 Standards (G2H52); Assume PM10 = PM2.5
CONCRETE FINISHER, ROTO TROWEL, 46" (1,168 MM) DIA, 4 BLADE	Gasoline	9	49%	7.68	1.916	0.26	0.26	288.2	0	EPA Nonroad 2008a; SCC Code 2265002024; 4-Stroke Surfacing Equipment; Gasoline 4-stroke Nonhandheld Class 1 side-valve carburetor meeting Phase 2 Standards (G4N1S2); assume PM10 = PM2.5
CONCRETE MIXER, PLASTER/MORTAR, 12 CF (0.3 M3), W/TRAILER	Gasoline	13	54%	7.68	1.916	0.26	0.26	288.2	0	EPA Nonroad 2008a; SCC Code 2265003040; 4-Stroke Other General Industrial Equipment; Gasoline 4-stroke Nonhandheld Class 1 side-valve carburetor meeting Phase 2 Standards (G4N1S2); assume PM10 = PM2.5
CONCRETE PUMP, 117 CY/HR, 75' BOOM, TRUCK MTD	Diesel	210	59%	0.19	2.61	0.22	0.21	1.14	0.00492	EPA Nonroad 2008a; SCC Code 2270002081; Diesel Other Construction Equipment; 175-300 hp; Tier 3
CONCRETE SAW, 13" (330 MM) DEPTH, SELF PROPELLED (ADD WATER AND COST FOR SAWBLADE WEAR)	Diesel	66	59%	0.19	3.13	0.44	0.43	3.62	0.00547	EPA Nonroad 2008a; SCC Code 2270002039; Diesel Concrete/Industrial Saws; 50-75 hp; Tier 3
CONCRETE VIBRATOR, 2.5" (63.5 MM) DIA, W/7.5 HP (5.6 KW) GENERATOR	Diesel	7.5	43%	0.55	4.3	0.5	0.49	4.11	0.00541	EPA Nonroad 2008a; SCC Code 2270002009; Diesel Plate Compactors; 0-11 hp; Tier 3
CRANE, HYDRAULIC, SELF-PROPELLED, ROUGH TERRAIN, 20 TON (18 MT), 70' (21.3 M) BOOM, 4X4	Diesel	152	43%	0.18	2.5	0.22	0.21	0.87	0.00487	EPA Nonroad 2008a; SCC Code 2270002045; Diesel Cranes; 100-175 hp; Tier 3
CRANE, MECHANICAL, LATTICE BOOM, CRAWLER, DRAGLINE/CLAMSHELL, 0.75 CY (0.6 M3), 25 TON (23 MT), 100' (30.5 M) BOOM (ADD BUCKET)	Diesel	150	43%	0.18	2.5	0.22	0.21	0.87	0.00487	EPA Nonroad 2008a; SCC Code 2270002045; Diesel Cranes; 100-175 hp; Tier 3
CRANE, MECHANICAL, LATTICE BOOM, TRUCK MOUNTED, 125 TON (113 MT), 240' (73.2 M) BOOM	Diesel	197	43%	0.18	2.5	0.15	0.15	0.75	0.00487	EPA Nonroad 2008a; SCC Code 2270002045; Diesel Cranes; 175-300 hp; Tier 3
CRANES, HYDRAULIC, SELF-PROPELLED, ROUGH TERRAIN, 30 TON, 95' BOOM, 4X4	Diesel	152	43%	0.18	2.5	0.22	0.21	0.87	0.00487	EPA Nonroad 2008a; SCC Code 2270002045; Diesel Cranes; 100-175 hp; Tier 3
CRANES, HYDRAULIC, SELF-PROPELLED, YARD, 10 TON, 30' BOOM, 4X4, NON-ROTATING OPERATOR'S CAB	Gasoline	62	54%	7.68	1.916	0.26	0.26	288.2	0	EPA Nonroad 2008a; SCC Code 2265003040; 4-Stroke Other General Industrial Equipment; Gasoline 4-stroke Nonhandheld Class 1 side-valve carburetor meeting Phase 2 Standards (G4N1S2); assume PM10 = PM2.5
CRANES, HYDRAULIC, TRUCK MTD, 70 TON, 115' BOOM, 8X4	Diesel	400	43%	0.17	2.5	0.15	0.15	0.84	0.00487	EPA Nonroad 2008a; SCC Code 2270002045; Diesel Cranes; 300-600 hp; Tier 3
CRANES, HYDRAULIC, TRUCK MTD, ALL TERRAIN, 25 TON, 94' BOOM, 6X4X2	Diesel	250	43%	0.18	2.5	0.15	0.15	0.75	0.00487	EPA Nonroad 2008a; SCC Code 2270002045; Diesel Cranes; 175-300 hp; Tier 3
GRADER, MOTOR, ARTICULATED, 135 HP (101 KW), 12' (3.6 M) BLADE WIDTH	Diesel	135	59%	0.19	2.61	0.32	0.31	1.33	0.00492	EPA Nonroad 2008a; SCC Code 2270002048; Diesel Graders; 170-175 hp; Tier 3
GRADER, MOTOR, ARTICULATED, 6X4, 12' BLADE W/17 TEETH SCARIFIERS	Diesel	135	59%	0.19	2.61	0.32	0.31	1.33	0.00492	EPA Nonroad 2008a; SCC Code 2270002048; Diesel Graders; 170-175 hp; Tier 3
HYDRAULIC EXCAVATOR, CRAWLER, 24,640 LBS, 0.60 CY BUCKET, 16.50' MAX DIGGING DEPTH	Diesel	79	59%	0.19	3.13	0.44	0.43	3.62	0.00547	EPA Nonroad 2008a; SCC Code 2270002036; Diesel Excavators 75-100 hp; Tier 3
LOADER / BACKHOE, WHEEL, 0.80 CY FRONT END BUCKET, 24" DIP, 4.3 CF, 12' DIGGING DEPTH, 4X4	Diesel	67	21%	0.42	3.64	0.71	0.69	6.08	0.00698	EPA Nonroad 2008a; SCC Code 2270002066; Diesel Tractors/Loaders/Backhoes; 50-75 hp; Tier 3
LOADER, FRONT END, CRAWLER, 1.30 CY BUCKET	Diesel	90	21%	0.42	3.64	0.71	0.69	6.08	0.00638	EPA Nonroad 2008a; SCC Code 2270002066; Diesel Tractors/Loaders/Backhoes; 75-100 hp; Tier 3
LOADER, FRONT END, WHEEL, SKID-STEER, 14.3 CF, 60" BUCKET	Diesel	46	21%	0.64	5.22	0.67	0.65	3.94	0.00637	EPA Nonroad 2008a; SCC Code 2270002072; Diesel Skid Steer Loaders; 25-50 hp; Tier 3
LOADER, FRONT END, WHEEL, SKID-STEER, 9-11 CF (0.2-0.3 M3), 60" (1.5 M) BUCKET (BOBCAT), 13 CWT (590 KG)	Diesel	46	21%	0.64	5.22	0.67	0.65	3.94	0.00637	EPA Nonroad 2008a; SCC Code 2270002072; Diesel Skid Steer Loaders; 25-50 hp; Tier 3
LOADER/BACKHOE, WHEEL, 0.80 CY (0.6 M3) FRONT END BUCKET, 9.8' (3.0 M) DEPTH OF HOE, 24" (0.61 M) DIPPER, 4X4	Diesel	67	21%	0.42	3.64	0.71	0.69	6.08	0.00638	EPA Nonroad 2008a; SCC Code 2270002066; Diesel Tractors/Loaders/Backhoes; 50-75 hp; Tier 3
LOADER/BACKHOE, WHEEL, 1.25 CY (0.9 M3) FRONT END BUCKET, 12.0' (3.7 M) DEPTH OF HOE, 24" (0.61 M) DIPPER, (0.2 M3), 4X2 11.06	Diesel	92	21%	0.42	3.64	0.71	0.69	6.08	0.00638	EPA Nonroad 2008a; SCC Code 2270002066; Diesel Tractors/Loaders/Backhoes; 75-100 hp; Tier 3
PAVING BREAKER, 66 LB (30 KG) (ADD 100 CFM (2.8 CMM) COMPRESSOR)	Diesel	35	43%	0.28	4.73	0.34	0.33	1.53	0.00541	EPA Nonroad 2008a; SCC Code 2270002006; Diesel Tampers/Rammers (unused) 25-50 hp; Tier 3
PUMP, WATER, CENTRIFUGAL, TRASH, HOSE, SUCTION/DISCH, 2" (50 MM) DIA X 50' (15 M) WITH COUPLING (PER SECTION)	Gasoline	10	69%	0.27	0.69	0.06	0.06	11.94	0	EPA Nonroad 2008a; SCC Code 2265006010; 4-Stroke Light Commercial Pumps; Gasoline 4-stroke greater than 25 horsepower meeting Tier 2 Standards (G4GT252); Assume PM10 = PM2.5
PUMP, WATER, CENTRIFUGAL, TRASH, HOSE, SUCTION/DISCH, 2" (51 MM) DIA x 20' (6.1 M) LENGTH, W/COUPLING/SECTION	Gasoline	10	69%	0.27	0.69	0.06	0.06	11.94	0	EPA Nonroad 2008a; SCC Code 2265006010; 4-Stroke Light Commercial Pumps; Gasoline 4-stroke greater than 25 horsepower meeting Tier 2 Standards (G4GT252); Assume PM10 = PM2.5
PUMP, WATER, DIAPHRAGM, SKID MTD, ENGINE DRIVE, 2" (51 MM) DIA, 2,000 GPH (7,571 LPH) @ 25' (7.6 M) HEAD (ADD HOSES)	Gasoline	4	69%	0.27	0.69	0.06	0.06	11.94	0	EPA Nonroad 2008a; SCC Code 2265006010; 4-Stroke Light Commercial Pumps; Gasoline 4-stroke greater than 25 horsepower meeting Tier 2 Standards (G4GT252); Assume PM10 = PM2.5
RIPPER, 3-SHANKS & BEAM, HYDRAULIC (ADD TO 341-440 HP (254-328 KW) DOZER & COST FOR POINT WEAR)	Diesel	440	59%	0.17	2.61	0.22	0.21	1.29	0.00493	EPA Nonroad 2008a; SCC Code 2270002063; Diesel Rubber Tire Dozers; 300-600 hp; Tier 3
RIPPER, SHANK, EACH (ADD TO 340-440 HP (254-328 KW) DOZER & COST FOR POINT WEAR)	Diesel	440	59%	0.17	2.61	0.22	0.21	1.29	0.00493	EPA Nonroad 2008a; SCC Code 2270002063; Diesel Rubber Tire Dozers; 300-600 hp; Tier 3
ROLLER, STATIC, SELF-PROPELLED, PNEUMATIC, 14.25 TON, 68" WIDE, 9 TIRE, ASPHALT COMPACTOR	Diesel	70	59%	0.19	3.13	0.44	0.43	3.62	0.00547	EPA Nonroad 2008a; SCC Code 2270002015; Diesel Rollers; 50-75 hp; Tier 3
ROLLER, VIBRATORY, SELF-PROPELLED, DOUBLE DRUM, SMOOTH, 2.9 TON, 47.2" WIDE, 2X1, ASPHALT COMPACTOR	Diesel	33	59%	0.29	4.48	0.42	0.41	2.34	0.00547	EPA Nonroad 2008a; SCC Code 2270002015; Diesel Rollers; 25-50 hp; Tier 3
ROLLER, VIBRATORY, SELF-PROPELLED, DOUBLE DRUM, SMOOTH, 7.8 TON, 66.1" WIDE, 2X1, ASPHALT COMPACTOR	Diesel	108	59%	0.19	2.31	0.32	0.31	1.33	0.00492	EPA Nonroad 2008a; SCC Code 2270002015; Diesel Rollers; 100-175 hp; Tier 3
ROLLER, VIBRATORY, TOWED, SINGLE DRUM, SHEEPSFOOT, 25.5 TON, 72" WIDE (ADD 180 HP TOWING UNIT)	Diesel	50	59%	0.19	3.13	0.44	0.43	3.62	0.00547	EPA Nonroad 2008a; SCC Code 2270002015; Diesel Rollers; 50-75 hp; Tier 3
SCRAPER, TANDEM POWERED, STANDARD LOADING, 21 CY, 24 TON, 4X4, D-9 ASSISTED LOADING	Diesel	330	59%	0.17	2.61	0.22	0.21	1.29	0.00493	EPA Nonroad 2008a; SCC Code 2270002018; Diesel Scrapers 300-600 hp; Tier 3
SCRAPER, TANDEM POWERED, STANDARD LOADING, 34 CY, 37.5 TON, 4X4, D-10 ASSISTED LOADING	Diesel	450	59%	0.17	2.61	0.22	0.21	1.29	0.00493	EPA Nonroad 2008a; SCC Code 2270002018; Diesel Scrapers 300-600 hp; Tier 3
SCRAPER, TOWED, 12-18 CY (9-14 M3), 18 TON (16.3 MT) (ADD 285 HP (213 KW) TRACTOR)	Diesel	285	59%	0.19	2.61	0.22	0.21	1.14	0.00492	EPA Nonroad 2008a; SCC Code 2270002018; Diesel Scrapers 175-300 hp; Tier 3
TRACTOR, CRAWLER (DOZER), 240 HP, LOW GROUND PRESSURE, W/7.70 CY STRAIGHT BLADE (ADD ATTACHMENTS)	Diesel	240	59%	0.19	2.61	0.22	0.21	1.14	0.00492	EPA Nonroad 2008a; SCC Code 2270002069; Diesel Crawler Tractors 175-300 hp; Tier 3
TRACTOR, CRAWLER (DOZER), 300-340 HP (224-254 KW), POWERSHIFT, W/UNIVERSAL BLADE	Diesel	340	59%	0.17	2.61	0.22	0.21	1.29	0.00493	EPA Nonroad 2008a; SCC Code 2270002069; Diesel Crawler Tractors 300-600 hp; Tier 3
TRACTOR, CRAWLER (DOZER), 310 HP, POWERSHIFT, W/15.3 CY SEMI-U BLADE (ADD ATTACHMENTS)	Diesel	310	59%	0.17	2.61	0.22	0.21	1.29	0.00493	EPA Nonroad 2008a; SCC Code 2270002069; Diesel Crawler Tractors 300-600 hp; Tier 3
TRACTOR, CRAWLER (DOZER), 341-440 HP (254-328 KW), POWERSHIFT, W/UNIVERSAL BLADE	Diesel	440	59%	0.17	2.61	0.22	0.21	1.29	0.00493	EPA Nonroad 2008a; SCC Code 2270002069; Diesel Crawler Tractors 300-600 hp; Tier 3

Highway Vehicles - Equipment Description	Vehicle Class	hp	Miles @ 15 mph**	Emission Factors (g/mi)* VOC	NOx	PM-10	PM-2.5	CO	SO2	Notes/Sources
DUMP TRUCK, HIGHWAY, 10 - 13 CY (7.6 - 9.9 M3) DUMP BODY, 35,000 LBS (15,900 KG) GVW, 2 AXLE, 4X2	HDDV8A	265	42	0.778	9.664	0.277	0.2247	4.19	0.0145	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles 33,001 - 60,000 lb GVW (Class HDDV8A); average speed 15 mph (assumed typical for construction sites)
DUMP TRUCK, HIGHWAY, 16 - 20 CY (12.2 - 15.3 M3) DUMP BODY, 75,000 LBS (34,000 KG) GVW, 2 AXLE, 6X4	HDDV8B	400	26,942	0.824	9.67	0.2524	0.202	4.51	0.0151	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles >60,000 lb GVW (Class HDDV8B); average speed 15 mph (assumed typical for construction sites)
TRUCK OPTION, DUMP BODY, REAR, 10.0 CY (7.7 M3) (ADD 35,000 LB (15,876 KG) GVW TRUCK)	HDDV8A	265	72	0.778	9.664	0.277	0.2247	4.19	0.0145	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles 33,001 - 60,000 lb GVW (Class HDDV8A); average speed 15 mph (assumed typical for construction sites)
TRUCK OPTION, DUMP BODY, REAR, 12 CY (9.2 M3) (ADD 45,000 LB (20,412 KG) GVW TRUCK)	HDDV8A	230	63	0.778	9.664	0.277	0.2247	4.19	0.0145	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles 33,001 - 60,000 lb GVW (Class HDDV8A); average speed 15 mph (assumed typical for construction sites)
TRUCK OPTION, FLATBED, 8' (2.4 M) x 20' (6.1 M) (ADD 25,000 LB (11,340 KG) GVW TRUCK)	HDDV6	210	72	0.518	5.011	0.1564	0.1297	1.92	0.0109	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles 19,501 - 26,000 lb GVW (Class HDDV6); average speed 15 mph (assumed typical for construction sites)
TRUCK OPTION, FLATBED, 8' (2.4M) x 12' (3.7 M) (ADD 25,000 LB (11,340 KG) GVW TRUCK)	HDDV6	210	90	0.518	5.011	0.1564	0.1297	1.92	0.0109	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles 19,501 - 26,000 lb GVW (Class HDDV6); average speed 15 mph (assumed typical for construction sites)
TRUCK, HIGHWAY, 20,000 LBS (9,000 KG) GVW, 2 AXLE, 4X2 WITH FLATBED	HDDV6	210	5	0.518	5.011	0.1564	0.1297	1.92	0.0109	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles 19,501 - 26,000 lb GVW (Class HDDV6); average speed 15 mph (assumed typical for construction sites)
TRUCK, HIGHWAY, 25,000 LB (11,340 KG) GVW, 4X2, 2 AXLE (ADD ACCESSORIES)	HDDV6	210	242	0.518	5.011	0.1564	0.1297	1.92	0.0109	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles 19,501 - 26,000 lb GVW (Class HDDV6); average speed 15 mph (assumed typical for construction sites)
TRUCK, HIGHWAY, 35,000 LB (15,876 KG) GVW, 4X2, 2 AXLE (ADD ACCESSORIES)	HDDV8A	265	5,117	0.778	9.664	0.277	0.2247	4.19	0.0145	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles 33,001 - 60,000 lb GVW (Class HDDV8A); average speed 15 mph (assumed typical for construction sites)
TRUCK, HIGHWAY, 35,000 LB (15,876 KG) GVW, 4X2, 2 AXLE (ADD ACCESSORIES)	HDDV8A	265	166	0.778	9.664	0.277	0.2247	4.19	0.0145	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles 33,001 - 60,000 lb GVW (Class HDDV8A); average speed 15 mph (assumed typical for construction sites)
TRUCK, HIGHWAY, 45,000 LB (20,412 KG) GVW, 6X4, 3 AXLE (ADD ACCESSORIES)	HDDV8A	230	63	0.778	9.664	0.277	0.2247	4.19	0.0145	EPA Mobile6.2 run for Northeast US (Massachusetts); Heavy Duty Diesel Vehicles 33,001 - 60,000 lb GVW (Class HDDV8A); average speed 15 mph (assumed typical for construction sites)

*Emission factors for nonroad construction equipment were extracted from U.S. EPA's Nonroad2008a emission model. Tier 3 emission factors for diesel equipment and Phase 2 emission factors for gasoline equipment were used because these standards are in effect as of 2010. Emission factors for highway vehicles were developed using Mobile 6.2

** Highway vehicle emission factors are given per mile traveled rather than per hours of operation. In order to estimate the miles traveled by the highway vehicles, It is assumed that they operate at an average of 15 mph while on the construction site for the duration of the estimated equipment hours

Green Brook Flood Damage Reduction Project
Total Project Emissions

Equipment Description	THC (VOC) (lbs)	NOx (lbs)	PM-10 (lbs)	PM-2.5 (lbs)	CO (lbs)	SO2 (lbs)
Nonroad Equipment						
AIR COMPRESSOR, 250 CFM (7 CMM), 100 PSI (689 KPA) (ADD HOSE)	0.66	10.97	1.10	1.06	8.67	0.02
AIR HOSE, 1.5" (38 MM) DIA x 100' (31 M) LENGTH, HARDROCK (USE AS DRILLING ACCESSORY)	NA	NA	NA	NA	NA	NA
ASPHALT DISTRIBUTOR, 3,000 GAL (11,355 L) (ADD 45,000 LB (20,412 KG) GVW TRUCK)	20.68	284.08	23.95	22.86	124.08	0.54
ASPHALT FINISHER, 10' WIDE SCREED, WHEEL, W/19' 6" SCREED EXTENSION, 215 CF HOPPER	0.20	2.75	0.34	0.33	1.40	0.01
BUCKET, CONCRETE, GENERAL PURPOSE, 1.0 CY (0.8 M3)	NA	NA	NA	NA	NA	NA
BUCKET, DRAGLINE, 0.8 CY (0.6 M3) MEDIUM WEIGHT (ADD TEETH WEAR COST)	NA	NA	NA	NA	NA	NA
CHAINSAW, 16" - 24" (406-610 MM) BAR	32.69	0.62	5.25	5.25	193.07	0.00
CONCRETE FINISHER, ROTO TROWEL, 46" (1,168 MM) DIA, 4 BLADE	12.10	3.02	0.41	0.41	453.92	0.00
CONCRETE MIXER, PLASTER/MORTAR, 12 CF (0.3 M3), W/TRAILER	9.63	2.40	0.33	0.33	361.28	0.00
CONCRETE PUMP, 117 CY/HR, 75' BOOM, TRUCK MTD	19.27	264.64	22.31	21.29	115.59	0.50
CONCRETE SAW, 13" (330 MM) DEPTH, SELF PROPELLED (ADD WATER AND COST FOR SAWBLADE WEAR)	0.32	5.23	0.74	0.72	6.05	0.01
CONCRETE VIBRATOR, 2.5" (63.5 MM) DIA, W/7.5 HP (5.6 KW) GENERATOR	1.55	12.13	1.41	1.38	11.60	0.02
CRANE, HYDRAULIC, SELF-PROPELLED, ROUGH TERRAIN, 20 TON (18 MT), 70' (21.3 M) BOOM, 4X4	0.83	11.52	1.01	0.97	4.01	0.02
CRANE, MECHANICAL, LATTICE BOOM, CRAWLER, DRAGLINE/CLAMSHELL, 0.75 CY (0.6 M3), 25 TON (23 MT), 100' (30.5 M) BOOM (ADD BUCKET)	0.53	7.43	0.65	0.62	2.58	0.01
CRANE, MECHANICAL, LATTICE BOOM, TRUCK MOUNTED, 125 TON (113 MT), 240' (73.2 M) BOOM	0.57	7.88	0.47	0.47	2.36	0.02
CRANES, HYDRAULIC, SELF-PROPELLED, ROUGH TERRAIN, 30 TON, 95' BOOM, 4X4	0.26	3.64	0.32	0.31	1.27	0.01
CRANES, HYDRAULIC, SELF-PROPELLED, YARD, 10 TON, 30' BOOM, 4X4, NON-ROTATING OPERATOR'S CAB	4.91	1.22	0.17	0.17	184.21	0.00
CRANES, HYDRAULIC, TRUCK MTD, 70 TON, 115' BOOM, 8X4	0.45	6.55	0.39	0.39	2.20	0.01
CRANES, HYDRAULIC, TRUCK MTD, ALL TERRAIN, 25 TON, 94' BOOM, 6X4X2	1.30	18.02	1.08	1.08	5.41	0.04
GRADER, MOTOR, ARTICULATED, 135 HP (101 KW), 12' (3.6 M) BLADE WIDTH	8.89	122.18	14.98	14.51	62.26	0.23
GRADER, MOTOR, ARTICULATED, 6X4, 12' BLADE W/17 TEETH SCARIFIERS	0.08	1.12	0.14	0.13	0.57	0.00
HYDRAULIC EXCAVATOR, CRAWLER, 24,640 LBS, 0.60 CY BUCKET, 16.50' MAX DIGGING DEPTH	12.43	204.74	28.78	28.13	236.79	0.36
LOADER / BACKHOE, WHEEL, 0.80 CY FRONT END BUCKET, 24" DIP, 4.3 CF, 12' DIGGING DEPTH, 4X4	4.54	39.31	7.67	7.45	65.66	0.08
LOADER, FRONT END, CRAWLER, 1.30 CY BUCKET	0.03	0.25	0.05	0.05	0.42	0.00
LOADER, FRONT END, WHEEL, SKID-STEER, 14.3 CF, 60" BUCKET	0.59	4.78	0.61	0.60	3.61	0.01
LOADER, FRONT END, WHEEL, SKID-STEER, 9-11 CF (0.2-0.3 M3), 60" (1.5 M) BUCKET {BOBCAT}, 13 CWT (590 KG)	0.37	3.02	0.39	0.38	2.28	0.00
LOADER/BACKHOE, WHEEL, 0.80 CY (0.6 M3) FRONT END BUCKET, 9.8' (3.0 M) DEPTH OF HOE, 24" (0.61 M) DIPPER, 4X4	0.03	0.30	0.06	0.06	0.50	0.00
LOADER/BACKHOE, WHEEL, 1.25 CY (0.9 M3) FRONT END BUCKET, 12.0' (3.7 M) DEPTH OF HOE, 24" (0.61 M) DIPPER, (0.2 M3), 4X2 11.06	0.09	0.74	0.14	0.14	1.23	0.00
PAVING BREAKER, 66 LB (30 KG) (ADD 100 CFM (2.8 CMM) COMPRESSOR)	0.82	13.85	1.00	0.97	4.48	0.02
PUMP, WATER, CENTRIFUGAL, TRASH, HOSE, SUCTION/DISCH, 2" (50 MM) DIA X 50' (15 M) WITH COUPLING (PER SECTION)	0.14	0.36	0.03	0.03	6.25	0.00
PUMP, WATER, CENTRIFUGAL, TRASH, HOSE, SUCTION/DISCH, 2" (51 MM) DIA x 20' (6.1 M) LENGTH, W/COUPLING/SECTION	0.07	0.18	0.02	0.02	3.12	0.00
PUMP, WATER, DIAPHRAGM, SKID MTD, ENGINE DRIVE, 2" (51 MM) DIA, 2,000 GPH (7,571 LPH) @ 25' (7.6 M) HEAD (ADD HOSES)	0.03	0.07	0.01	0.01	1.25	0.00
RIPPER, 3-SHANKS & BEAM, HYDRAULIC (ADD TO 341-440 HP (254-328 KW) DOZER & COST FOR POINT WEAR)	0.05	0.73	0.06	0.06	0.36	0.00
RIPPER, SHANK, EACH (ADD TO 340-440 HP (254-328 KW) DOZER & COST FOR POINT WEAR)	0.05	0.73	0.06	0.06	0.36	0.00
ROLLER, STATIC, SELF-PROPELLED, PNEUMATIC, 14.25 TON, 68" WIDE, 9 TIRE, ASPHALT COMPACTOR	0.14	2.30	0.32	0.32	2.66	0.00
ROLLER, VIBRATORY, SELF-PROPELLED, DOUBLE DRUM, SMOOTH, 2.9 TON, 47.2" WIDE, 2X1, ASPHALT COMPACTOR	0.27	4.13	0.39	0.38	2.16	0.01
ROLLER, VIBRATORY, SELF-PROPELLED, DOUBLE DRUM, SMOOTH, 7.8 TON, 66.1" WIDE, 2X1, ASPHALT COMPACTOR	0.04	0.49	0.07	0.07	0.28	0.00
ROLLER, VIBRATORY, TOWED, SINGLE DRUM, SHEEPSFOOT, 25.5 TON, 72" WIDE (ADD 180 HP TOWING UNIT)	0.14	2.32	0.33	0.32	2.68	0.00
SCRAPER, TANDEM POWERED, STANDARD LOADING, 21 CY, 24 TON, 4X4, D-9 ASSISTED LOADING	105.97	1627.01	137.14	130.91	804.15	3.07
SCRAPER, TANDEM POWERED, STANDARD LOADING, 34 CY, 37.5 TON, 4X4, D-10 ASSISTED LOADING	4.94	75.80	6.39	6.10	37.47	0.14
SCRAPER, TOWED, 12-18 CY (9-14 M3), 18 TON (16.3 MT) (ADD 285 HP (213 KW) TRACTOR)	1.54	21.20	1.79	1.71	9.26	0.04
TRACTOR, CRAWLER (DOZER), 240 HP, LOW GROUND PRESSURE, W/7.70 CY STRAIGHT BLADE (ADD ATTACHMENTS)	28.01	384.73	32.43	30.96	168.04	0.73
TRACTOR, CRAWLER (DOZER), 300-340 HP (224-254 KW), POWERSHIFT, W/UNIVERSAL BLADE	0.04	0.57	0.05	0.05	0.28	0.00
TRACTOR, CRAWLER (DOZER), 310 HP, POWERSHIFT, W/15.3 CY SEMI-U BLADE (ADD ATTACHMENTS)	16.34	250.89	21.15	20.19	124.00	0.47
TRACTOR, CRAWLER (DOZER), 341-440 HP (254-328 KW), POWERSHIFT, W/UNIVERSAL BLADE	2.52	38.69	3.26	3.11	19.12	0.07
Highway Vehicles						
DUMP TRUCK, HIGHWAY, 10 - 13 CY (7.6 - 9.9 M3) DUMP BODY, 35,000 LBS (15,900 KG) GVW, 2 AXLE, 4X2	0.07	0.89	0.03	0.02	0.39	0.001
DUMP TRUCK, HIGHWAY, 16 - 20 CY (12.2 - 15.3 M3) DUMP BODY, 75,000 LBS (34,000 KG) GVW, 2 AXLE, 6X4	48.94	574.35	14.99	12.00	267.87	0.897
TRUCK OPTION, DUMP BODY, REAR, 10.0 CY (7.7 M3) (ADD 35,000 LB (15,876 KG) GVW TRUCK)	0.12	1.53	0.04	0.04	0.67	0.002
TRUCK OPTION, DUMP BODY, REAR, 12 CY (9.2 M3) (ADD 45,000 LB (20,412 KG) GVW TRUCK)	0.11	1.34	0.04	0.03	0.58	0.002
TRUCK OPTION, FLATBED, 8' (2.4 M) x 20' (6.1 M) (ADD 25,000 LB (11,340 KG) GVW TRUCK)	0.08	0.80	0.02	0.02	0.30	0.002
TRUCK OPTION, FLATBED, 8' (2.4M) x 12' (3.7 M) (ADD 25,000 LB (11,340 KG) GVW TRUCK)	0.10	1.00	0.03	0.03	0.38	0.002
TRUCK, HIGHWAY, 20,000 LBS (9,000 KG) GVW, 2 AXLE, 4X2 WITH FLATBED	0.01	0.05	0.00	0.00	0.02	0.000
TRUCK, HIGHWAY, 25,000 LB (11,340 KG) GVW, 4X2, 2 AXLE (ADD ACCESSORIES)	0.28	2.68	0.08	0.07	1.03	0.006
TRUCK, HIGHWAY, 35,000 LB (15,876 KG) GVW, 4X2, 2 AXLE (ADD ACCESSORIES)	8.78	109.02	3.12	2.53	47.27	0.164
TRUCK, HIGHWAY, 35,000 LB (15,876 KG) GVW, 4X2, 2 AXLE (ADD ACCESSORIES)	0.28	3.53	0.10	0.08	1.53	0.005
TRUCK, HIGHWAY, 45,000 LB (20,412 KG) GVW, 6X4, 3 AXLE (ADD ACCESSORIES)	0.11	1.34	0.04	0.03	0.58	0.002
Total Project Emissions (lbs)	**352.96**	**4,139.15**	**335.72**	**319.15**	**3,357.59**	**7.51**
Total Project Emissions (tons)	**0.18**	**2.07**	**0.17**	**0.16**	**1.68**	**0.00**

APPENDIX C

PERTINENT CORRESPONDENCE

Bill of Sale

This Bill of Sale between GreenVest/Cranbury Limited Liability Company and Cranbury/Indian Run Limited Liability Company (collectively "Seller"), and US Army Corps of Engineers, New York (Buyer) and is dated August 27, 2015.

WHEREAS, the Buyer, in accordance with NJDEP File No. 0000-10-0044.1 and the Permit(s) issued therein (the "Permit") by the New Jersey Department of Environmental Protection ("NJDEP"), is required to undertake certain mitigation activities related to the construction of Segment B of the Green Brook Flood Control Project located within the Raritan River Basin, and in satisfaction thereof is specifically authorized to purchase Two (2.0) mitigation credits from the Cranbury Mitigation Bank, and;

WHEREAS, the Buyer and seller did execute an Agreement of Sale to Purchase Wetland Mitigation Credits on or about August 26, 2015 whereby Buyer agreed to buy and Seller agreed to sell certain mitigation credits to satisfy a portion of the Permit referenced above, and;

THEREFORE, in consideration of the terms of sale in the Agreement to Purchase Mitigation Credits executed between Seller and Buyer dated the 26th day of August 2015 the Seller hereby:

1. Acknowledges receipt of the executed contract between Buyer and Seller for Buyer to purchase from Seller Two (2.0) wetland mitigation credits, and;

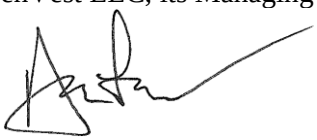
2. Sells and transfers to Buyer Two (2.0) wetland mitigation credits from the Cranbury Mitigation Bank.

3. Acknowledges that it shall file its credit ledger with NJDEP reflecting this sale in the ordinary course of business per NJDEP protocols.

IN WITNESS WHEREOF, the Seller has executed this Agreement to become effective as of the day and year first written above.

GreenVest/Cranbury LLC (Seller)

By: GreenVest LLC, its Managing Member



_____

By: Douglas Lashley, Managing Member

Cranbury/Indian Run LLC (Seller)

By: GreenVest LLC, its Co-Managing Member

_____

By: Douglas Lashley, Managing Member

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF LAND USE REGULATION

Mail Code 501-02A, P.O. Box 420, Trenton, New Jersey 08625-0420
Telephone: (609) 777-0454 or Fax: (609) 777-3656
www.state.nj.us/dep/landuse

PERMIT

In accordance with the laws and regulations of the State of New Jersey, the Department of Environmental Protection hereby grants this permit to perform the activities described below. This permit is revocable with due cause and is subject to the limitations, terms and conditions listed below and on the attached pages. For the purpose of this document, "permit" means "approval, certification, registration, authorization, waiver, etc." Violation of any term, condition or limitation of this permit is a violation of the implementing rules and may subject the permittee to enforcement action.

Approval Date
OCT 2 0 2015

Expiration Date
OCT 1 9 2020

Permit Number(s):	Type of Approval(s):	Enabling Statute(s):
1211-02-0004.3 FWW150001 1211-02-0004.3 FHA150001	Freshwater Wetlands Individual Permit Flood Hazard Area Permit	NJSA 13:9B FWPA NJSA 58:10A WPCA NJSA 58:16A FHACA

Permittee:

NJDEP, John Moyle, P.E.
501 East State Street
Trenton , NJ 08625

Site Location:

Block: 214 & Lot: 19
Block: 215 & Lot: 1
Block: 216 & Lot: 1
Municipality: Middlesex Borough
County: Middlesex

Description of Authorized Activities:

The applicant, New Jersey Department of Environmental Protection (NJDEP), is proposing structural flood protection (levee system and floodwall), along the Bound Brook in the Borough of Middlesex in Middlesex County along the west bank of Bound Brook from Union Avenue southeast approximately 1,500 feet until it ends near Mountain Avenue. The project is known as Segment B-3 of the Green Brook Flood Control Project.

The levee system will consist of 234 linear foot earthen levee, a 100 CFS pumping station and construction of one outfall structure, and 518 linear feet of cast in place concrete T-wall floodwall. The levee height in the project location is at elevation ± 52 feet, approximately 15 feet above grade, with 2.5:1 side slopes, a 110 foot wide footprint, and a 10 foot wide paved access way on top of the levee in order to provide maintenance and inspection access. The overall purpose of this project is to protect homes along the Bound Brook in Middlesex Borough.

The floodwall and levee system will result in disturbances of the following: 0.15 acres of permanent wetland disturbance, 0.24 of an acre of permanent intermediate resource value transition area disturbance, 0.09 of an acre of temporary State open water disturbance, 0.35 acres of temporary intermediate resource value transition area. In addition, the Segment B-3 of the levee system will result in the disturbance of 24,394 S.F. (0.56 acres) of permanent riparian zone disturbance. **The permitee must mitigate for the permanent loss of 0.15 acres of palustrine forested wetlands and 0.49 acres of forested riparian zone.**

Prepared by:

Tina Wolff

THIS PERMIT IS NOT EFFECTIVE AND NO CONSTRUCTION APPROVED BY THIS PERMIT, OR OTHER REGULATED ACTIVITY, MAY BE UNDERTAKEN UNTILTHE APPLICANT HAS SATISFIED ALL PRE-CONSTRUCTION CONDITIONS AS SET FORTH HEREIN.

Received and/or Recorded by County Clerk:

Received or Recorded by County Clerk

This permit is not valid unless authorizing signature appears on the last page.

PRE-CONSTRUCTION CONDITIONS:

1. **Timing:** If this permit contains a condition that must be satisfied prior to the commencement of construction, the permittee must comply with such condition(s) within the time required by the permit or, if no time specific requirement is imposed, then within six months of the effective date of the permit, or provide evidence satisfactory to the Division that such condition(s) cannot be satisfied.

2. **Monitoring:** The permittee shall provide monitoring results and reports to the Department [insert intervals/requirements].

3. **Material Disposal:** All excavated material and dredge material shall be disposed of in a lawful manner. The material shall be placed outside of any flood hazard area, riparian zone, regulated water, freshwater/coastal wetlands and adjacent transition area, and in such a way as to not interfere with the positive drainage of the receiving area.

STANDARD CONDITIONS:

1. **Responsibilities:**
   a. The permittee, its contractors and subcontractors shall comply with all conditions of this permit, authorizing and/or supporting documents and approved plans and drawings.

   b. A copy of this permit, other authorizing documents, records and information including all approved plans and drawings shall be maintained at the authorized site at all times and made available to Department representatives or their designated agents upon request.

2. **Permit modification:** Plans and specifications in the application and conditions imposed by this permit shall remain in full force and effect so long as the proposed development or any portion thereof is in existence, unless modified by the Department. No change in plans or specifications upon which this permit is issued shall be made except with the prior written permission of the Department. The filing of a request to modify an issued permit by the permittee, or a notification of planned changes or anticipated noncompliance does not stay any condition of this permit.

3. **Duty to minimize environmental impacts:** The permittee shall take all reasonable steps to prevent, minimize or correct any adverse impact on the environment resulting from activities conducted pursuant to the permit, or from noncompliance with the permit. The permittee shall immediately inform the Department of any unanticipated adverse effects on the environment not described in the application or in the conditions of this permit. The Department may, upon discovery of such unanticipated adverse effects, and upon the failure of the permittee to submit a report thereon, notify the permittee of its intent to suspend the permit

4. **Proper site maintenance:** While the regulated activities are being undertaken, neither the permittee, its contractors nor subcontractors shall cause or permit any unreasonable interference with the free flow of a regulated feature by placing or dumping any materials, equipment, debris or structures within or adjacent to the regulated area. Upon completion or abandonment of the work, the permittee, its contractors or subcontractors shall remove and dispose of in a lawful manner all excess materials, debris, equipment, silt fences and other temporary soil erosion and sediment control devices from all regulated areas. Only clean non-toxic fill shall be used where necessary.

5. **Sediment control:** Development which requires soil disturbance, creation of drainage structures, or changes in natural contours shall conduct operations in accordance with the latest revised version of "Standards for Soil Erosion Sediment Control in New Jersey," promulgated by the New Jersey State Soil Conservation Committee, pursuant to the Soil Erosion and Sediment Control Act of 1975, N.J.S.A. 4:24-42 et seq. and N.J.A.C. 2:90-1.3-1.14.

6. **Rights of the State:**
   a. This permit does not convey any property rights of any sort, or any exclusive privilege.

   b. Upon notification and presentation of credentials, the permittee shall allow Department representatives or their designated agents, to enter upon the project site and/or where records must be kept under the conditions of this permit, inspect at reasonable times any facilities, equipment, practices or operations regulated or required under the permit, and sample or monitor for the purposes of determining compliance. Failure to allow reasonable access shall be considered a violation of this permit and subject the permittee to enforcement action.

   c. The issuance of this permit shall in no way expose the State of New Jersey or the Department to liability for the sufficiency or correctness of the design of any construction, structure or structures. Neither the State nor the Department shall, in any way, be liable for the loss of life or property which may occur by virtue of the activity of development resulting from any permit.

7. **Duty to Reapply:** If the permittee wishes to continue an activity covered by the permit after the expiration date of the permit authorization, the permittee must apply for and obtain a new permit authorization.

8. **Transfer of Permit:** This permit may not be transferable to any person unless the transfer is approved by the Department. Please refer to the applicable rules for more information.

9. **Other Approvals:** The permittee must obtain any and all other Federal, State and/or Local approvals. Authorization to undertake a regulated activity under this permit does not indicate that the activity also meets the requirements of any other rule, plan or ordinance.

10. **Noncompliance:**
    a. Any noncompliance with this permit constitutes a violation, and is grounds for enforcement action, as well as modification, suspension and/or termination of the permit.

    b. The permittee shall immediately report to the Department by telephone at (877) 927-6337 any noncompliance that may endanger health or the environment. In addition, the permittee shall report all noncompliance to Bureau of Coastal and Land Use Compliance and Enforcement, 401 E. State Street, 4th Floor, P.O. Box 420, Mail Code: 401-04C, Trenton, NJ 08625, in writing within five business days of the time the permittee becomes aware of the noncompliance. The written notice shall include: a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and, if the noncompliance has not been corrected, the anticipated length of time it

is expected to continue; and steps taken or planned to reduce, eliminate and prevent recurrence of the noncompliance. Such notice shall not, however, serve as a defense to enforcement action if the project is found to be in violation of this chapter.

11. **Appeal of Permit**: In accordance with the applicable regulations, any person who is aggrieved by this decision or any of the conditions of this permit may request a hearing within 30 days after notice of the decision is published in the DEP Bulletin. This request must include a completed copy of the Administrative Hearing Request Checklist. The DEP Bulletin is available through the Department's website at http://www.nj.gov/dep/bulletin and the Checklist is available through the Division's website at http://www.nj.gov/dep/landuse/download/lur_024.pdf. In addition to your hearing request, you may file a request with the Office of Dispute Resolution to engage in alternative dispute resolution. Please see the website www.nj.gov/dep/odr for more information about this process.

SPECIAL CONDITIONS:

1. This permit authorizes the disturbance of 0.15 acres of permanent wetland disturbance, 0.24 of an acre of permanent intermediate resource value transition area disturbance, 0.09 of an acre of temporary State open water disturbance, 0.35 acres of temporary intermediate resource value transition area for the construction of Segment B-3 of a structural flood protection (levee system and flood wall), under a Freshwater Wetland Individual Permit. Any additional disturbance of freshwater wetlands, State open waters and/or transition areas besides that shown on the approved plans shall be considered a violation of the Freshwater Wetlands Protection Act rules unless the activity is exempt or a permit is obtained from the Department prior to the start of the proposed disturbance. In addition, this permit to conduct a regulated activity in a wetland or open water includes the Department's approval of a Water Quality Certificate for these activities

2. In order to protect the general game fish within the Bound Brook any proposed grading or construction activities within the banks of this or any other stream on site are prohibited between 5/1 through 6/30 of each year. Furthermore, any activity outside a watercourse, which would likely introduce sediment into the watercourse and/or increase its turbidity, is also prohibited during this period. The Department reserves the right to suspend all regulated activities onsite should it be determined that the applicant has not taken proper precautions to ensure continuous compliance with this condition.

3. Prior to the commencement of site clearing, grading or construction, the permittee shall have a silt fence erected at the limits of the clearing. These fences shall serve as both a siltation and debris barrier as well as a physical barrier protecting the wetland and transition area from encroachment by construction vehicles or activities. These fences shall be kept in place and maintained throughout the duration of construction, until such time that the site is stabilized. No other regulated activities, including grading or clearing may occur in wetland or transition areas on site without the prior approval of the Department.

4. Construction equipment shall not be stored, staged or driven within any channel, freshwater wetland or transition area, unless expressly approved by this permit and/or described on the approved plans.

5. The Division has determined that the riparian zone required adjacent to the Bound Brook is 50 feet. Specifically, this permit authorizes the disturbance of 24,394 S.F. (0.56 acres) of permanent riparian zone disturbance for the flood control project described above and as shown on the approved plans. No other vegetation within 50 feet of the top of bank of any stream onsite shall be disturbed for any reason. This condition applies to all channels onsite regardless of contributory drainage area. The applicant shall be responsible for preserving and minimizing vegetative disturbances along streams.

6. The riprap proposed within the channel shall be carefully imbedded into the channel substrate and contoured to mimic the original physical characteristics of the channel (such as its shape, slope, thalweg and meander) in order to provide low-flow aquatic passage throughout the entire disturbed area. Furthermore, any void spaces within the riprap shall be filled with native substrate from the channel.

7. Upon completion of the project, all temporarily disturbed areas within 50 feet of the top of any stream bank onsite shall be restored to original topography and replanted with indigenous, non-invasive vegetation in accordance with N.J.A.C. 7:13-10.2(u).

8. The applicant must adhere to the agreed-upon Stipulations included in the Programmatic Agreement among the U.S. Army Corps of Engineers, New York District, the Advisory Council on Historic Preservation, and the New Jersey Historic Preservation Officer Regarding the Green Brook Flood Control Project.

FRESHWATER WETLAND MITIGATION PERMIT CONDITIONS:

1. The permittee shall mitigate for the temporary disturbance of 0.09 acres of State open waters through an on-site restoration project as shown on the plans entitled "GREEN BROOK FLOOD DAMAGE REDUCTION PROJECT SUB-BASIN OF THE RARITAN RIVER SEGMENT B-3 CONTRACT BORO. OF MIDDLESEX AND GREEN BROOK TOWNSHIP, NJ PLAN SHEET STA. 53+77.66 TO STA. 58+00" sheet VH-101 of 2 sheets, dated July 17, 2015 and last revised September 10, 2015, and prepared by the U.S. Army Corps of Engineers New York District and Jacobs Ammann & Whitley and "GREEN BROOK FLOOD DAMAGE REDUCTION PROJECT SUB-BASIN OF THE RARITAN RIVER SEGMENT B-3 CONTRACT BORO. OF MIDDLESEX AND GREEN BROOK TOWNSHIP, NJ PLAN SHEET STA. 58+00 TO STA. 62+40" sheet VH-102 of 2 sheets, dated July 17, 2015 and last revised September 10, 2015, and prepared by the U.S. Army Corps of Engineers New York District and Jacobs Ammann & Whitley.

2. The permittee shall mitigate for the permanent disturbance of 0.15 acres of palustrine forested freshwater wetlands through use of the Finderne Mitigation Site located in Bridgewater (NJDEP File No. 1806-02-0013.1 FHA 050001), New Jersey that was constructed by the U.S. Army Corps of Engineers, New York District in advance of anticipated impacts from the Green Brook Flood Damage Reduction Project.

3. The permittee shall compensate for the permanent disturbance to 0.49 acres of forested riparian zone (that overlaps with wetland transition area) at a 2:1 ratio (0.98 acres to be debited at the Finderne Mitigation Site) through the through use of the Finderne

Mitigation Site located in Bridgewater (NJDEP File No. 1806-02-0013.1 FHA 050001), New Jersey that was constructed by the U.S. Army Corps of Engineers, New York District in advance of anticipated impacts from the Green Brook Flood Damage Reduction Project.

4. For the temporary State open water impacts, the restoration shall be conducted immediately following completion of the activity that cause the disturbance, and shall be continued to completion within six months after the end of the activity that caused the disturbance.

5. If the permittee fails to perform the restoration of the State open water impacts within the applicable time period the acreage of mitigation required shall be increased by 20 percent each year after the date mitigation was to begin (N.J.A.C. 7:7A-15.3(b).

6. The permittee shall be responsible for ensuring that best management practices are used throughout construction to control the spread and colonization of highly invasive plants. Specifically, all equipment, especially tracks and tires, must be thoroughly cleaned every time equipment or vehicles move from an area containing invasive plants or from off-site to the restoration area. In addition, soil containing root fragments and above-ground vegetative material from invasive plants shall be carefully managed during earthmoving activities and disposed of at a suitable off site location rather than mulched and reused or stockpiled elsewhere on the site. For information on the specific species that are considered to be invasive, please refer to the Invasive Plant Atlas at http://www.invasiveplantatlas.org/index.html.

APPROVED PLANS:

The drawings hereby approved are thirty-three (33) plan sheets prepared by U.S. ARMY CORPS OF ENGINEERS NEW YORK DISTRICT NEW YORK, NEW YORK and JACOBS AMMANN & WHITNEY, dated July 7, 2015, revised July 7, 2015, unless otherwise noted, entitled:

"GREEN BROOK FLOOD RISK MANAGEMENT PROJECT SUB-BASIN OF THE RARITAN RIVER SEGMENT B-3 CONTRACT BORO. OF MIDDLESEX AND GREEN BROOK TW, NJ"

"COVER SHEET", SHEET IDENTIFICATION G-101, undated and unrevised,

"GENERAL PLAN SHEET STA. 53+77.66 TO STA. 58+00", SHEET IDENTIFICATION C-101,

"GENERAL PLAN SHEET STA. 58+00 TO STA. 63+20", SHEET IDENTIFICATION C-102,

"DRAINAGE PROFILE SHEET STA. 53+77.66 TO STA. 58+00", SHEET IDENTIFICATION C-201,

"DRAINAGE PROFILE SHEET STA. 58+00 TO STA. 61+33.26", SHEET IDENTIFICATION C-202,

"STORM SEWER PROFILES SHEET 1", SHEET IDENTIFICATION C-203,

"RELOCATED SANITARY SEWER PROFILE SHEET 1", SHEET IDENTIFICATION C-204,

"SEGMENTAL BLOCK WALL PROFILE", SHEET IDENTIFICATION C-205,

"LEVEE TYPICAL SECTIONS", SHEET IDENTIFICATION C-301,

"CROSS SECTIONS STA. 54+00 TO STA. 55+50", SHEET IDENTIFICATION C-302,

"CROSS SECTIONS STA. 56+00 TO STA. 57+50", SHEET IDENTIFICATION C-303,

"CROSS SECTIONS STA. 58+00 TO STA. 59+50", SHEET IDENTIFICATION C-304,

"CROSS SECTIONS STA. 60+00 TO STA. 61+33.26", SHEET IDENTIFICATION C-305,

"PUMP STATION OUTFLOW DETAILS", SHEET IDENTIFICATION C-501,

"PUMP STATION SITE DETAILS SHEET 1", SHEET IDENTIFICATION C-502,

"PUMP STATION SITE DETAILS SHEET 2", SHEET IDENTIFICATION C-503,

"FLOODWALL PLAN AND PROFILE SHEET 1", SHEET IDENTIFICATION S-103,

"FLOODWALL PLAN AND PROFILE SHEET 2", SHEET IDENTIFICATION S-104,

"FLOODWALL PLAN AND PROFILE SHEET 3", SHEET IDENTIFICATION S-105,

"FLOODWALL MONOLITH SECTIONS MONOLITHS M54 THRU M59", SHEET IDENTIFICATION S-301,

"FLOODWALL MONOLITH SECTIONS MONOLITHS M60 THRU 65", SHEET IDENTIFICATION S-302,

"FLOODWALLMONOLITH SECTIONS MONOLITHS M66 AND M67", SHEET IDENTIFICATION S-303,

"CULVERT DETAILS SHEET 1", SHEET IDENTIFICATION S-714,

"CULVERT DETAILS SHEET 2", SHEET IDENTIFICATION S-715,

"CULVERT DETAILS SHEET 3", SHEET IDENTIFICATION S-716,

"HEADWALL NO. 8-5 PLAN, SECTIONS AND DETAILS", SHEET IDENTIFICATION S-717,

"HEADWALL NO. 9-2 PLAN, SECTIONS AND DETAILS", SHEET IDENTIFICATION S-718,

"HEADWALL NO. 9-2 SECTIONS AND DETAILS", SHEET IDENTIFICATION S-719,

"DRAINAGE CHAMBER NO. 8-4 PLAN SECTIONS AND DETAILS", SHEET IDENTIFICATION S-720, and

"GREEN BROOK FLOOD DAMAGE REDUCTION PROJECT SUB-BASIN OF THE RARITAN RIVER SEGMENT B-3 CONTRACT BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ"

"PLAN SHEET STA.53+77.66 TO 58+00", SHEET IDENTIFICATION VH-101, dated September 16, 2015 and last revised September 10, 2015,

"PLAN SHEET STA.58+00 TO 62+40", SHEET IDENTIFICATION VH-102, dated September 16, 2015 and last revised September 10, 2015,

"RIPARIAN IMPACT PLAN SHEET STA.53+77 TO 58+00", SHEET IDENTIFICATION VH-101, dated October 14, 2015 and last revised October 14, 2015,

"RIPARIAN IMPACT PLAN SHEET STA.58+00 to 62+40", SHEET IDENTIFICATION VH-102, dated October 14, 2015 and last revised October 14, 2015,

If you need clarification on any section of this permit or conditions, please contact the Division of Land Use Regulation's Technical Support Call Center at (609) 777-0454.

Approved By:

Richard C. Reilly

Richard C. Reilly, Manager
Bureau of Inland Regulation
Division of Land Use Regulation

10/20/15
Date

Original sent to Agent to record
c: Permittee

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF
Environmental Analysis Branch

1 October, 2015

Mr. Eric Schrading
Field Supervisor
U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main St.
Building D
Pleasantville, NJ 08232

Dear Mr. Schrading:

The Army Corps of Engineers, New York District (District) is continuing construction of Segment B of the Green Brook Flood Control Project located along the Green and Bound Brooks in the Borough of Middlesex in Middlesex County, New Jersey (Enclosure 1). Specifically, the District will be constructing Segment B2, consisting of approximately 500 feet of floodwall, and Segment B3, consisting of approximately 500 feet of floodwall, 230 feet of levee, and pump station housing (Enclosure 2).

For your reference, construction of Segment B1 has been completed. Your office prepared a Fish and Wildlife Coordination Act Report in 2010 for this segment (Enclosure 3). The District is anticipating awarding the construction contract for Segment B3 in February 2016 (Segment B3) and for Segment B2 in July 2016.

Pursuant to the Fish and Wildlife Coordination Act, as amended, we would like to initiate coordination with your office. Enclosed with this letter for your review is a draft Scope of Work to develop the Coordination Act Report (CAR)(Enclosure 4).

Regarding Section 7 Endangered Species Act compliance, the project area has potentially suitable summer roosting and foraging habitat for Indiana bat (*Myotis sodalis*) and northern long eared bat (*Myotis septentrionalis*). The District will implement a tree clearing restriction window of 1 April through 30 September during construction to avoid impacts to these species. The District will also implement a shrub and tree clearing restriction window of 15 March through 31 July during construction in order to comply with the Migratory Bird Treaty Act.

Please review the SOW and provide a time and cost estimate for your services. The District will coordinate with your agency closely, to assist in your preparation of the report. Should any

questions arise, or additional information is needed, please contact Ms. Kimberly Rightler at (917) 790-8722.

Sincerely,

Peter Weppler
Chief, Environmental Analysis Branch

Enclosure

From: Kathy Clark
To: Rightler, Kimberly A NAN02
Subject: [EXTERNAL] Re: Question Related to Bald Eagle and Great Blue Heron Foraging Habitat - Middlesex Borough, NJ (UNCLASSIFIED)
Date: Wednesday, April 08, 2015 1:25:27 PM

Hi Kim,
Sorry for the delay. I don't see any significant conflicts with the project for bald eagles or great blue herons. I concur with your timing restriction on veg clearing. There is no such restriction for turtles in the aquatic portion of your project, but in the summer months they should be active and hopefully have time to move away from the soil work area.

Thanks,
Kathy

Kathleen Clark
Endangered and Nongame Species Program
NJ Division of Fish and Wildlife
2201 Route 631, Woodbine, NJ 08270
Tel: 609-628-1605
Fax: 609-628-2734
www.NJFishandWildlife.com/ensphome.htm
Kathy.Clark@dep.nj.gov

From: Rightler, Kimberly A NAN02 <Kimberly.A.Rightler@usace.army.mil>
Sent: Wednesday, April 1, 2015 12:59 PM
To: Kathy Clark
Subject: Question Related to Bald Eagle and Great Blue Heron Foraging Habitat - Middlesex Borough, NJ (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Good Afternoon Ms. Clark,

I work with the U.S. Army Corps of Engineers and we are proposing to construct a levee and floodwall, referred to as Segment B2, along the Green and Bound Brooks in Middlesex Borough (refer to the first attachment). This segment is part of the larger Green Brook Food Control Project and will be connecting to the Segment B1 floodwall and levee system of which we have just completed construction (2nd attachment).

Based on Landscape Project mapping, the Project Area is noted as foraging habitat for bald eagle and great blue heron.

Back in 2010 when we were applying for the Wetlands IP and FHA permits for Segment B1, Mr. John Heilferty from Land Use coordinated with you regarding bald eagle foraging habitat (third attachment). At the time, you determined that the area was not significant foraging habitat.

At your earliest convenience, could please let me know if you feel this is still the case for bald eagle as well as the level of significance of foraging habitat for great blue heron?

If you are no longer the appropriate point of contact for this, if you provide me with the name of the appropriate

person I greatly would appreciate it.

Just for your reference, we will be implementing a no vegetation clearing window of 15 March through 30 July in order to comply with the Migratory Bird Treaty Act.

If you have any questions, please feel free to contact me.

Thank you,

Kimberly Rightler
Project Biologist
917-790-8722

U.S. Army Corps of Engineers, New York District
Attn: CENAN-PL-E
26 Federal Plaza
New York, NY 10278

Classification: UNCLASSIFIED
Caveats: NONE

PROGRAMMATIC AGREEMENT AMONG THE U. S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER REGARDING THE GREEN BROOK FLOOD CONTROL PROJECT

WHEREAS, the U.S. Army Corps of Engineers, New York District, (New York District) proposes to construct a flood control project in the Green Brook Sub-Basin (the Project), channel modifications, levees, flood walls, bridge replacements, and closure structures, as well as the flood proofing or purchase of properties in flood prone locations (a map depicting the Green Brook Sub-Basin and its constituent Lower, and Stony Brook basins and detailed description of project actions are provided in Appendix 1 of this Programmatic Agreement [PA]), located in Middlesex, Somerset, and Union Counties, New Jersey;

WHEREAS, proposed flood protection in the Upper Basin of the Green Brook Basin in Union and Somerset counties, consist of two dry detention structures and channel modification, and bridge replacement, has been deferred, pending a reanalysis by the Upper Basin Task Force which will evaluate additional alternatives to be described in supplemental engineering, environmental, and cultural resource documents to be circulated by the NY District for public comment;

WHEREAS, the New York District is authorized to undertake these studies by the Water Resources Development Act of 1986 (PL99-662);

WHEREAS, the New York District and State of New Jersey intend to execute a Project Cooperation Agreement to formalize the roles and responsibilities of the federal and state governments in he implementation of the Green Brook Flood Control Project;

WHEREAS the Project will be implemented in phases anticipated over the next 12 years as specified in Appendix 1 of this PA;

WHEREAS, the New York District will implement the provisions of this PA as funding for the project is appropriated in future years;

WHEREAS, the New York District has defined the "Area of Potential Effect" for this undertaking to included all areas impacted by activities required to construct the channel modifications, the levees, flood walls, the bridge replacements, and closure structures, as well as the flood proofing or purchase of properties in flood prone areas, including all construction staging and borrow areas, all access roads, all ponding areas, all flowage easement acquisitions, viewsheds, and all environmental mitigation measures (a detailed

description is provided in Appendix 2 of this PA which also defines the proposed project relative to the National Economic Development [NED] Plan);

WHEREAS, the New York District has determined that properties listed and/or eligible for listing on the National Register of Historic Places (National Register) may be adversely affected by implementation of the Project;

WHEREAS, the New York District is applying the National Register Criteria (Criteria) to properties identified within the "Area of Potential Effect" on a phased basis, and to date has completed substantial surveys within the lower, Stony Brook, and upper portions of the Green Brook basin (as specified in Appendix 2 of this PA) which shall be hereafter referred to as the "Investigated Portion of the Area of Potential Effect" with the recognition that additional identifications and evaluations are required for project actions which have not yet been finalized, as specified in Appendix 2 of this PA;

WHEREAS, the New York District, in consultation with the State Historic Preservation Office (SHPO), has identified and developed treatment plans for two historic properties, the Bound Brook [Railroad] Station in Bound Brook and the Lincoln Boulevard/ East Main Street Bridge, in Bound Brook, which if implemented in accordance with SHPO correspondence, Appendix 3 of this PA, the SHPO agrees will not adversely affect these properties;

WHEREAS, the project actions described in the General Re-evaluation Report (Final May 1997) and Appendix 1 of this PA shall be detailed in the development of the Feature Design Memoranda and in subsequent Plans and Specifications construction documents (as described in the project schedule provided in Appendix 1 of this PA);

WHEREAS, the New York District has identified several interested parties to participate in the Section 106 consultation process and project planning, to include the Union County Department of Operational Services; South Plainfield Environmental Commission; and the North Plainfield Historical Society, and will consider subsequent requests as appropriate;

WHEREAS the New York District is coordinating, and shall continue to coordinate a public outreach program for this undertaking (detailed in Appendix 4 of this PA) which in the past has consisted of a number of public hearings and the circulation of cultural resource and environmental documents related to the Section 106 review process; and

WHEREAS, in accordance with 36 CFR Part 800.13, the New York District, the SHPO, and the Advisory Council on Historic Preservation (Council) have determined that execution of this PA and the Project Cooperation Agreement will establish alternative procedures to streamline the coordination of the Project;

WHEREAS, the New York District shall continue to consult with the SHPO regarding plans and surveys to identify, evaluate and treat historic properties as the New York

District and its agents implement all phases of the Green Brook Flood Control Project;

WHEREAS, the New York District shall provide the SHPO all plans and reports, including but not limited to all comments, notifications, and scope of works by certified mail; and

NOW, THEREFORE, the New York District, the Council, and the SHPO agree that the Project shall be administered in accordance with the following stipulations to satisfy the New York District's Section 106 responsibility for all individual undertaking of the Project.

Stipulations

The New York District shall ensure that the following measures are carried out:

I. IDENTIFICATION AND EVALUATION

A. The New York District, in consultation with the SHPO, has determined that the following historic properties located within the Investigated Portion of the Area of Potential Effect, are eligible for or listed on the National Register:

1. the Lehigh Valley Railroad and Port Reading Railroad Bridges in Bound Brook,
2. the Central Railroad of New Jersey Main Line Corridor Historic District,
3. the Deserted Village of Feltville Historic District, the Washington Park Historic District, Prehistoric Site 28-Mi-150, and
4. the Vail/Randoph Mill Complex Site 28-So-106.

B. The New York District shall consult with the SHPO to develop Plans to complete the identification of historic properties within the remaining portion of the Project's Area of Potential Effect. The SHPO will provide comments on the scope of work and final Plans within 30 days of receipt.

C. The New York District shall revise Plans to address comments and recommendations provided by the SHPO prior to proceeding with identification and evaluation activities.

D. The New York District shall ensure that qualified professionals meeting the National Park Service professional qualifications for the appropriate discipline [National Park Service Professional Qualification Standards, Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44738-39)] are used to complete all identification and evaluation plans related to this undertaking, to include archaeological surveys and testing, historic structure inventories, and documentation.

E. The New York District and the SHPO shall consider the views of the public or interested parties in completing its identification and evaluation responsibilities.

F. The New York District shall maintain records of all decisions it makes related to the

National Register eligibility of properties.

G. Application of National Register Criteria

1. The New York District, in consultation with the SHPO, shall evaluate historic properties using the criteria:

a. If the New York District and the SHPO agree that the Criteria apply or do not apply, in evaluating the National Register eligibility of a property, the property shall be treated accordingly for purposes of this PA.

b. If the New York District and the SHPO disagree regarding National Register eligibility, or if the Council or the National Park Service so request, prior to the start of any Project-related work at the site or in the vicinity of the property, the New York District shall obtain a formal Determination of Eligibility (DOE) from the Keeper of the National Register (Keeper), National Park Service, whose determination shall be final.

2. Prior to the initiation of construction related activities, which are not exempt under the terms of this PA and which may affect historic properties in unsurveyed project areas, the New York District, in consultation with the SHPO, shall identify and evaluate:

a. Archaeological Sites

i. The New York District shall ensure that archaeological surveys within the uninvestigated portions of the Area of Potential Effect are conducted in a manner consistent with the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23) and the New Jersey Historic Preservation Office's (HPO) Guidelines for Phase 1 Archaeological Investigations: Identification of Archaeological Resources (January 17, 1996), and take into account the National Park Service publication The Archaeological Survey: Methods and Uses (1978) and the statewide historic contexts developed by the SHPO.

ii. The survey shall be conducted following consultation with the SHPO, and a report of the survey, consistent with the SHPO's Guidelines for Preparing Cultural Resource Management Archaeological Reports Submitted to the HPO (December 1994), shall be submitted to the SHPO for review and consultation.

b. Traditional Cultural Properties.

i. The New York District and the SHPO have agreed that no Traditional Cultural Properties are located within the Investigated Portion of the Area of Potential Effect.

ii. The New York District shall ensure that future surveys within the uninvestigated portions of the Area of Potential Effects includes procedures to identify Traditional Cultural Properties and to consult with Native Americans and other affected parties in accordance with the guidelines provided by National Park Service Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties.

iii. In the event that a Native American Tribe or affected group contacts the New York District regarding its recognition of a Traditional Cultural Property, located within the Area of Potential Effect, the New York District shall notify the SHPO and initiate

discussions with all parties to evaluate whether the property is a Traditional Cultural Property that meets the Criteria.

c. Buildings and Structures

i. The New York District shall ensure that surveys are conducted for buildings and structures in the Project's uninvestigated portion of the Area of Potential Effect in a manner consistent with the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23) and which takes into account the statewide historic contexts developed by the SHPO. The survey shall be conducted following consultation with the SHPO, and a report of the survey, consistent with the SHPO's Guidelines for Architectural Survey (1998), shall be submitted to the SHPO for review and consultation.

ii. The New York District, in consultation with the SHPO, shall identify and evaluate buildings and structures that are located adjacent to listed or eligible National Register Historic Districts to determine whether such properties should be considered as part of the Historic District or an expanded District.

d. Historic Districts or Multiple Areas (MRA) Resource

i. The New York District shall ensure that surveys to identify other historic districts or MRAs will be performed in the uninvestigated portion of the Area of Potential Effects.

ii. As surveys for all types of historic properties are completed, the New York District shall consult with the SHPO to determine whether the surveyed properties should be considered a District of Multiple Resource Area. The New York District and SHPO shall establish the historic context for any Historic District or Multiple Resource Area so as to facilitate its evaluation.

e. Historic Landscapes and View Sheds

i. The New York District shall consult with the SHPO to identify and evaluate historic landscapes and viewsheds located within the uninvestigated portion of the Project's Area of Potential Effect. The New York District shall consult National Park Service Bulletins 18, How to Evaluate and Nominate Designed Historic Landscapes, and 30 Guidelines for Evaluating and Documenting Rural Historic Landscapes, National Park Service Preservation Brief 36, Protecting Cultural Landscapes, and other publications and materials made available by the SHPO to assist in defining the criteria that should be applied to such properties.

ii. The objective in conducting the surveys is to identity National Register listed or potentially eligible Historic Landscapes and affected View Sheds within the project area that may be adversely affected by the Project implementation, and to determine whether they meet the National Register criteria set forth in 36 CFR Part 60.4.

3. The New York District shall ensure that the identification and evaluation of historic properties that may be affected by each phase of Project activities is completed prior to the initiation of any formal action by the Corps including rehabilitation, relocation,

demolition, etc.

II. INTERIM PROTECTION OF PROPERTIES

A. As the New York District facilitates the buyout of historic properties in the Area of Potential Effect, the New York District shall take appropriate measures to preserve and protect historic properties pending their ultimate disposition and treatment and to ensure that historic properties are not inadvertently demolished or damaged. Protection of all buildings shall be consistent with the guidelines set forth in Preservation Brief #31, Mothballing Historic Buildings (1993).

B. The New York District shall submit procedures for the protection of historic properties to the SHPO for review and comment. The New York District shall revise the procedures to address comments and recommendations provided by the SHPO and take into consideration comments provided by interested parties. The New York District shall implement the procedures once they are approved by the SHPO.

III. TREATMENT OF HISTORIC PROPERTIES.

The New York District shall adhere to the following treatment strategies in order to avoid adverse effect to historic properties.

A. The New York District shall ensure that treatment plans are developed and implemented for all properties within the Investigated Portion of the Area of Potential Effect consistent with the terms of the PA, determined eligible for listing in the National Register (Appendix 3 of this PA).

B. The New York District, in consultation with the SHPO, shall develop appropriate treatment plans for historic properties identified within the unsurveyed portion of the Area of Potential Effect which may be affected by the Project. Unless the SHPO objects within 30 days of receipt of any plan, the New York District shall ensure that treatment plans are implemented by the New York District or its representative(s). The New York District shall revise Plans to address comments and recommendations provided by the SHPO.

C. The New York District shall ensure that qualified professionals meeting the National Park Service professional qualifications for the appropriate discipline [National Park Service Professional Qualification Standards, Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44738-39)] are used to develop and implement all treatment plan.

D. Avoidance. The preferred treatment is avoidance of effects to historic properties.

The New York District shall, to the extent feasible, avoid historic properties either through project design changes, use of temporary fencing or barricades, realignments, landscaping, or other measures that will protect historic properties. The New York District, and the SHPO shall consult to develop plans for avoiding impacts to historic properties. The New York District shall incorporate feasible avoidance measures into project activities as part of the implementation of the Project. If, in consultation with the SHPO, avoidance is determined to be infeasible, the New York District shall develop and implement treatment/mitigation plans consistent with Stipulations III and IX of this PA.

E. Preservation In Place. When the New York District and SHPO agree that complete avoidance of historic properties is infeasible, the New York District shall explore preservation in place, if appropriate. Preservation in place may entail partial avoidance or protection of historic properties against project related activities in proximity to the property. The New York District shall preserve properties in place through project design, i.e incorporating color, texture, scale, materials which are compatible with the architectural or historic character of the historic property, use of fencing, berms or barricades, preservation of vegetation including mature trees, landscaping and planting which screen the property. If the New York District, in consultation with the SHPO, determines that preservation in place is infeasible, the New York District shall develop and implement treatment/mitigation plans consistent with Stipulations III and IX of this PA.

F. When the New York District, in consultation with the SHPO, determines that project activities will have an effect on buildings, districts, and structures, the District shall ensure that a treatment plan is developed for these properties.

1. Buildings and Structures and Districts

a. The New York District, in consultation with the SHPO, shall determine the effect the Project will have on listed or eligible historic building, district, and structure and ensure that a treatment plan be developed for these properties.

b. The New York District and the SHPO have identified select Project related-activities as set forth in Appendix 6 of this PA which are exempt from further review under this PA, since these activities have limited potential to affect historic properties. No further review of these activities is required when the project activity is limited solely to those listed in Appendix 6.

c. When avoidance or preservation in place is infeasible, treatment plans for buildings, structures, and historic districts shall adhere to the following guidelines.

i. Rehabilitation/Alteration

The New York District shall ensure that plans and specifications for rehabilitation/alteration activities for historic buildings and structures shall adhere to the recommended approaches in The Secretary of the Interior's Standards and Guidelines for Treatment of Historic Properties (1995) [Standards].

ii. New Construction/Additions

The New York District shall ensure that the design of new construction and additions

to historic buildings required for flood protection are compatible with the architectural character, scale, setting, massing, size and color, of adjacent historic properties or the historic district in which the site is located. If the New York District and the SHPO concur that the addition may affect a building or structure that is part of a viewshed, then the New York District shall document the relationship between the historic property and its viewshed and, as appropriate consider, additional mitigation measures to preserve the viewshed.

iii. Relocation

(a) When the New York District determines that historic properties within the Area of Potential Effect must be removed to provide flood protection, the New York District shall consult with the SHPO to determine the feasibility of marketing historic properties for relocation. As appropriate, the New York District shall develop and implement a marketing plan to advertise the availability of the affected buildings or structures in order to facilitate their relocation to alternative sites where the properties can be preserved. The New York District shall submit the marketing plans to the SHPO, for review and approval. The New York District shall distribute the marketing plan to interested parties, affected landowners, and appropriate local groups for their information. The New York District shall ensure that marketing plans include proposed preservation covenants or easements approved by the SHPO.

(1) An information package including but not limited to photographs of the historic property; a parcel map; information on the property's historic significance; information on the historic property's cost; information on tax benefits for rehabilitation of historic properties; notification that the purchase shall be required to move the historic property to a location acceptable to the New York District and subject to review and comment by the SHPO; notification that the moving of the historic property shall conform to the approaches recommended in Moving Historic Buildings (John Obed Curtis, 1979, American Association for State and Local History; notification that the move shall be conducted by a professional mover possessing the capability to appropriately relocate historic structures; and notification that the purchaser shall be required to rehabilitate and maintain the building in accordance with a preservation covenant specific to the historic property and the recommended approaches in the Secretary of the Interior's Standards for Rehabilitation and Illustrated Guidelines for Rehabilitating Historic Buildings (U.S. Department of the Interior, National Park Service, 1992),

(2) A distribution list of potential purchasers or transferees,

(3) An advertising plan and schedule, and

(4) A schedule for receiving and reviewing offers.

(b) Review of Offers. The New York District, in consultation with the SHPO shall review each offer it receives in response to the marketing plan and select the one that meets the following criteria:

(1) the offer provides for relocation and rehabilitation of the building as stipulated in the marketing package, including information on the location and suitability of the new site;

(2) the offerer has the financial and technical ability to carry out the terms of the offer; and

(3) the offerer agrees to accept transfer of the historic property with

the proposed preservation covenant or easement within a reasonable time frame.

(c) Modification of requirements. If the New York District receives no offers that meet the review criteria, the New York District, in consultation with the SHPO, may modify the requirements and re-offer the building with a modified convenant, or may demolish the historic property in accordance with Stipulation IX of this PA. Should the SHPO disagree with the New York District's decision regarding the marketing of the historic property, the New York District shall consult with the Council and implement Stipulation XIV of this PA.

(d) Within 90 days of the move, the New York District shall request that the SHPO re-evaluate the NR eligibility of the historic property at its new site.

iv. Transfer of Historic Properties

Should the New York District or its designee determine that properties which were the subject of Project buyouts will not be included in the Project, the New York District shall submit the location of the property, a current photograph and proposed convenant language to the SHPO for review and comment prior to making the historic property available for transfer. The New York District shall not convey historic properties until the SHPO has approved the proposed covenant language.

2. Archaeological Sites

a. Archaeological Data Recovery

The District shall develop a data recovery plan for archaeological sites eligible solely under National Register Criterion D which the New York District and the SHPO agree cannot be avoided or appropriately preserved in place. The data recovery plan to retrieve significant archaeological information, will be developed and implemented by the New York District or its representative(s), following approval from the SHPO and prior to the implementation of project-related activities within or in the vicinity of the archaeological sites.

b. The New York District shall ensure that the data recovery plan for each eligible site addresses substantive research questions developed in consultation with the SHPO. The plan shall be consistent with the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734-37) and take into account the Council's publication, Treatment of Archaeological Properties. Each plan shall specify, at a minimum, the following:

(i) the property, properties, or portions of properties where data recovery is to be carried out;

(ii) the research questions to be addressed through the data recovery, with an explanation of their relevance and importance;

(iii) the methods to be used, with an explanation of their relevance to and effectiveness in addressing the research questions;

(iv) a discussion of the potential research value of any human remains that may be encountered, as well as a process for consultation with the SHPO, the Council, any descendent communities, and any persons or groups that have expressed an interest, to develop a treatment plan for human remains; and

(v). a proposed schedule for the submission of progress reports and the draft data recovery report to the SHPO.

c. The New York District shall submit data recovery plans to the SHPO for review and approval. The New York District and SHPO shall consult to resolve any objections to the data recovery plan as proposed. The data recovery plan shall then be implemented by the New York District once approved by the SHPO. If no response is received from the SHPO after 30 days of receipt of adequate documentation, the New York District may assume the SHPO`s concurrence and proceed with implementation of the plan submitted.

d. The New York District shall ensure that data recovery plan(s) will be carried out by or under the direct supervision of an archaeologist(s) who meets, at minimum, the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738-9).

e. The New York District, in consultation with the SHPO, shall develop adequate provisions for site security during data recovery to avoid vandalism.

f. If any human remains and/or grave-associated artifacts are encountered during data recovery, the New York District, the SHPO, and the Council shall consult to develop a treatment plan for human remains that is responsive to the Council's "Policy Statement on Human Remains" (September 27, 1988), the Native American Grave Protection and Repatriation Act (PL 101-601) and, U.S. Army Corps of Engineers, Policy Guidance Letter No. 57, (1998) Indian Sovereignty and Government-to-Government Relations With Indian Tribes (see Appendix 5 of this PA).

g. Curation and Dissemination of Information:

i. The New York District or its designee, in consultation with the SHPO shall ensure that all materials and records resulting from the survey, evaluation, and data recovery conducted for the Project will be curated in accordance with 36 CFR Part 79 "Curation of Federally-Owned and Administered Archaeological Collections" and ER 1130-2- 433 "Project Operations: Collections Management and Curation of Archaeological and Historical Data." All material and records recovered from non-Federally owned land shall be maintained in accordance with 36 CFR Part 79 until their analysis is complete and, if necessary, are returned to their owner(s).

ii. The New York District shall ensure that all final reports resulting from actions pursuant to this PA will be provided, to the SHPO, and upon request, to other interested parties. All such plans shall be responsive to contemporary standards. Final plans shall be submitted to SHPO for review and approval. The New York District shall implement approved final plans.

3. Traditional Cultural Properties

a. The New York District shall develop a plan to involve, or continue to involve, Native Americans and communities, persons or groups that could be affected by the District`s proposed project activity at a specific historic site or property. The plan shall describe 1) a process for the analysis of options responsive to the continued use and access to traditional cultural properties; 2) development of measures for the safe ingress and egress use of the traditional cultural properties during construction; 3) analysis of treatment options, including the recommended treatment; and 4) the measures which will be implemented to ensure that project activities do not compromise the analysis of treatment options.

b. The New York District shall submit the final to the SHPO and to the affected group

and shall implement the plan in accordance to the procedures outlined in the plan, if formal objectives are not received within 30 days following its distribution.

c. If the New York District and SHPO or affected groups cannot resolve the objection, the New York District shall request the comments of the Council in accordance with Stipulation VI.

IV. TREATMENT OF HISTORIC LANDSCAPES

A. The New York District, in consultation with the SHPO, shall develop a plan to identify and evaluate design alternatives which will avoid, minimize, or compensate for impacts when it is determined that a historic landscape will be affected by Project activities.

B. Treatment measures for historic landscapes shall consider, in order of priority, preservation, rehabilitation, restoration, reconstruction, and additions in accordance with The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes (1996) and Protecting Cultural Landscapes, National Park Service Preservation Brief Number 36.

V. EMERGENCY ACTIVITIES

A. The New York District shall consider an emergency to exist when a structure, building or site poses an immediate threat to life, safety, or property. Such situations should require an immediate response (30 days or less) based upon the findings of an engineer, architect, emergency response professional, or project manager, representing the New York District or a participating community. If an action is not required by the New York District within thirty days or less the project activity shall not be considered an emergency and should be reviewed under terms of PA.

B. The New York District shall immediately notify the SHPO of any such emergency via certified mail and the proposed response and request a written approval within five (5) business days unless the nature of the emergency does not allow for such a delay. The District shall submit relevant background information including current photographs, engineering or structural reports, local citations, etc. If an immediate response is required, the New York District shall undertake the action and subsequently provide SHPO with documentation.

If the SHPO fails to respond within five (5) business days, the New York District may assume concurrence with its proposed response and proceed.

VI. RESOLUTION OF ADVERSE EFFECTS

A. When the New York District, in consultation with the SHPO, determines that Project related activities cannot adhere to treatment plans developed in accordance with

Stipulation III.E. or would otherwise have an adverse effect, the New York District shall:

1. Develop a Standard Mitigation Agreement (SMA) with the SHPO; or
2. Consult with the Council to develop a Memorandum of Agreement (MOA) in accordance with 36 CFR Part 800.5 (e).

B. The New York District shall invite the Council to participate in consultation when:

1. The New York District and SHPO determine that an agreement or a SMA cannot be reached;
2. a National Historic Landmark is involved;
3. human remains have been identified; or
4. there is widespread public interest in a historic property or properties.

C. The New York District and the SHPO, and interested parties as appropriate, shall consult to develop alternatives to mitigate or minimize adverse effects. The analysis of alternatives shall consider program needs, cost, public benefit and values, and design feasibility.

D. Development of Standard Mitigation Agreements (SMA).

1. The New York District, in consultation with the SHPO and interested parties, as appropriate, shall develop SMAs for historic properties which will be adversely affected by the Project. The New York District shall submit the SMA to the SHPO for review and approval by certified mail. The SHPO shall have 30 days from receipt of adequate information in which to review and comment on the SMA(s) . If the SHPO fails to respond within 30 days, or if there is disagreement, the New York District shall notify the Council and consult to develop the propose SMA into an MOA and submit copies of background information and the proposed SMA to facilitate consultation to develop an MOA in accordance with 36 CFR Part 800.
2. After signing by the New York District and SHPO, the New York District shall file all SMAs with the Council.

E. Standard Mitigation Agreements (SMA)

1. SMAs developed between the New York District and the SHPO, may include one or more of the following stipulations which address routine adverse effects that may occur to historic properties as a result of project implementation.
2. Recordation. The New York District shall consult with the SHPO or Historic American Building Survey/Historic American Engineering Record (HABS/HAER) to determine the appropriate level and type of recordation for affected resources. For historic properties with state and/or local significance, recordation shall be consistent with the requirements and standards of the Department of the Interior (October 1997). All documentation must be submitted to SHPO and HABS/HAER for acceptance, prior to the initiation of project activities, unless otherwise agreed to by the SHPO or NPS.
3. Salvage and Donation of Significant Architectural Elements. Prior to demolition, partial demolition, or substantial alteration of historic properties, the New York

District, in consultation with the SHPO, shall develop a salvage and donation plan to identify appropriate parties willing and capable of receiving and preserving the salvaged significant architectural elements. The New York District shall submit the plans to the SHPO for review and approval.

4. Alternative Treatments or Design Plan which meet the Standards. Prior to demolition partial demolition, or substantial alteration of historic properties, the New York District, in consultation with the SHPO, shall develop a plan identifying protocols for developing treatment guidelines and evaluating design standards for new construction within historic districts in keeping with the Secretary's Standards. The New York District shall submit the plans to the SHPO for review and approval.

5. Rehabilitation and new construction which does not adhere to the Standards. The New York District shall consult with the SHPO to develop alternate treatment plans or designs for those elements or features, which cannot meet the Standards. The District shall submit final plans and specifications to the SHPO for review and approval.

6. Transfer or conveyance without convenants. In instances where the historic properties will not be conveyed or transferred with preservation convenants (vis a vis Section III.F.1.), the New York District shall record these properties to SHPO or HABS/HAER standards and provide prospective owners of the properties with information about Preservation Tax Incentives for Historic Buildings, sources of funding for historic properties, and information regarding rehabilitation of historic properties including the Secretary of the Interior's Standards. Prior to demolition, partial demolition, or substantial alteration of historic properties, the New York District, in consultation with the SHPO, shall develop a plan to transfer and convey the historic property without convenants. The New York District shall submit the plans to the SHPO for review and approval.

7. Data recovery for archaeological sites eligible under Criterion D and others and data recovery and treatment of archaeological sites where data recovery will not result in a finding of no adverse effect. The New York District shall conduct data recovery on archaeological sites following agreement on the perspective data recovery and treatment plans between the New York District and the SHPO when the archaeological sites are eligible for National Register inclusion under additional Criteria than Criterion D (for the information which they contain) or when the full informational value of the site cannot be substantially preserved through the conduct of appropriate research to professional standards and guidelines. To the maximum extent feasible, data recovery and treatment plans shall be developed to take into account and mitigate for the fullest range of archaeological site values and significance. Prior to construction, the New York District shall develop a data recovery plan for archaeological sites eligible under Criterion D and others. The New York District shall submit the plans to the SHPO for review and approval.

8. Off-site mitigation for the loss of a historic property. The New York District, with the approval of the SHPO, may preserve similar property types or sites outside the Area of Potential Effect in lieu of preservation of properties that are within strategic locations within the Greenbrook Flood Control Project area. The New York District and the SHPO will consult to develop appropriate easements, convenants and other mechanisms for the protection of these properties. Prior to demolition, partial

demolition, or substantial alteration of historic properties, the New York District, in consultation with the SHPO, shall develop an off-site mitigation plan to compensate for the loss of historic properties. The New York District shall submit the plans via certified mail to the SHPO for review and approval.

VII. INTERPRETIVE EXHIBIT

A. The New York District shall consult with the SHPO to develop a plan for the creation of an interpretive exhibit as part of mitigation for project related impacts. The Scope of Work prepared for the interpretative exhibit shall be submitted with the New York District's schedule for implementation to the SHPO for review and approval. The New York District and the SHPO shall consult to resolve any objections. The final plan shall be implemented by the New York District once approved by the SHPO. If no response is received from the SHPO within 30 days following receipt of adequate documentation the plan shall be implemented as submitted.

B. The New York District shall consult with the SHPO and the public to ensure that the location of the exhibit is publicly accessible and has appropriate management and maintenance.

C. The New York District shall include in the interpretive exhibit for the Project the findings of cultural resources investigations and all records resulting from HABS/HAER or, where the New York District and SHPO concur is appropriate, SHPO level documentation and historical research.

D. The New York District shall consult with the SHPO to develop a plan for the creation, reproduction, and distribution of a brochure describing the Project, findings generated by the investigation undertaken as part of this PA, and pertinent information on the location and access to the interpretive exhibit.

E. The New York District, in consultation with the SHPO, shall develop and disseminate a press release to publicize the interpretive exhibit, brochure, and substantive contributions of the cultural resource program for the Project.

VIII. DISCOVERY

A. If previously unidentified properties are discovered during Project implementation, the New York District shall cease all work in the vicinity of the discovered historic property until it can be evaluated pursuant to the guidelines in Stipulation I of this PA. If the property is determined to be eligible, the New York District shall consult with the SHPO to develop a treatment plan or SMA in accordance with Stipulations III and VI of this PA.

B. The New York District shall implement the treatment or SMA once approved by the SHPO.

IX. COORDINATION OF REVIEWS FOR PROJECT ACTIVITIES

A. All plans, documents, reports, and materials shall be submitted by the New York District (or its representative) to the SHPO by certified mail, for a 30 day review period unless otherwise stipulated in this PA. If the SHPO fails to comment within the specified time, the New York District must request the Council's comments unless the PA provides for the New York District to assume the SHPO's concurrence when the 30-day review period has elapsed.

B. When interested parties are participating in the review of activities or actions outlined in this PA the New York District shall ensure that all interested parties are provided documentation at the time it is forwarded to the SHPO and afforded a 30 day review period. As appropriate, the New York District shall submit the comments of interested parties to the SHPO to facilitate further consultation.

C. If after consulting with the SHPO and interested parties for a period of 90 days on any action or activity provided for in this PA, the New York District or SHPO concludes there is no progress in developing treatment/mitigation plan or other documents required by this PA, the New York District or SHPO may notify the Council and request the Council's involvement to expedite completion of the consultation process.

D. The New York District shall ensure that all submissions to the SHPO, interested parties, and the Council include all relevant information to facilitate their review. The New York District shall provide all additional information requested by SHPO, interested parties, or Council within a timely manner unless the signatories to this PA agree otherwise.

E. The New York District shall ensure that all draft and final reports resulting from actions pursuant to the Stipulations of this PA will be provided to the SHPO, and upon request, to other interested parties and will identify the Principal Investigator responsible for the report. All reports will be responsive to contemporary standards, and as appropriate to the Department of the Interior's Format Standards for Final Reports of Data Recovery Programs (42 FR 5377-79) and HPO report standards. Precise locational data may be provided only in a separate appendix if it appears that its release could jeopardize archaeological sites consistent with National Register Bulletin Number 29, Guidelines for Restricting Information about Historic and Prehistoric Resources.

F. SHPO Review of Treatment/ Mitigation Pans.

1. The New York District shall ensure that all treatment/mitigation plans are submitted to the SHPO for review and comment. The New York District shall also obtain the comments of all interested parties, affected landowners, and appropriate local interest groups during the development of treatment/ mitigation plans and SMAs. All comments shall be made available to the SHPO with a recommendation from the

New York District regarding the need for further consultation among all parties.

2. If the New York District and SHPO do not concur on the adequacy, appropriateness, or extent of

treatment/mitigation plans, or SMAs, the New York District and the SHPO shall consult in an attempt to resolve the

disagreement. If the disagreement is limited to treatment the New York District shall consult with the SHPO in

accordance with Stipulation VI. If the disagreement is related to mitigation in a proposed SMA, in compliance

with the terms of an executed SMA or PA the New York District shall involve the Council in accordance with

Stipulation X of this PA.

G. If the District proposes revisions or addenda to SHPO approved treatment/ mitigation plans or other documents, the New York District and SHPO shall consult to determine whether additional conditions or mitigation measures are appropriate.

H. The New York District shall certify in writing that all requirements for identification and evaluation, and the implementation of treatment/mitigation plans have been satisfactorily completed prior to the initiation of construction activities for a specified portion of the Project. The New York District shall submit a copy of this certification to the SHPO by certified mail. The SHPO shall have 30 days to object to the certification based on the SHPO's finding of incomplete compliance or inadequate compliance with the terms of this PA. If the SHPO does not object, the District may proceed with construction for the specified segment of the Project.

X. DISPUTE RESOLUTION

A. The SHPO shall have 30 days to object to determinations, evaluations, plans, and documents submitted by the New York District . The New York District and SHPO shall attempt to resolve any disagreement arising from implementation of this PA. If there is a determination that the disagreement cannot be resolved, the New York District shall request the Council`s recommendations or request the comments of the Council in accordance with 36 CFR Part 800.6(b).

B. Any Council recommendations or comments provided in response will be considered in accordance with 36 CFR Part 800.6(c)(2), with reference only to the subject of the dispute. The New York District shall respond to Council recommendations or comments indicating how the New York District has taken the Council's recommendations or comments into account and complied with same prior to proceeding with Project activities that are subject to dispute. Responsibility to carry out all other actions under this PA that are not the subject of the dispute will remain unchanged.

XI. PUBLIC INVOLVEMENT

A. In consultation with the SHPO, the New York District shall develop a plan to inform

the interested public of the existence of this Agreement, and the New York District plan for meeting the terms of this PA. Copies of this Agreement and relevant documentation prepared pursuant to the terms of this PA shall be made available for public inspection (information regarding the locations of archaeological sites will be withheld in accordance with the Freedom of Information Act and National Register Bulletin 29, if it appears that this information could jeopardize archaeological sites). Any comments received from the public under this Agreement shall be taken into account by the New York District.

B. Public Objections. The New York District shall review and resolve timely substantive public objections. Public objections shall be considered timely when they are provided within the review periods specified in Appendix 4 of this PA public participation plan specified. The New York District shall consult with the SHPO, and as appropriate with the Council, to resolve objections. Project actions which are not the subject of the objection may proceed while the consultation is conducted.

XII. MONITORING

A. Upon execution of the Project Cooperation Agreement, the New York District shall prepare annual reports summarizing the status of compliance with the terms of this PA and a summary of the completed activities and the exempt activities for the past year and proposed activities for the next fiscal year to the SHPO, Council, and interested parties by the New York District. Reports shall be submitted by January 31 of every year. The Annual Reports shall be provided to Council, SHPO, and interested parties until the Project-related activities are complete.

B. The Council and the SHPO may request a site visit to follow up information in the annual Report or to monitor activities carried out pursuant to this PA. The Council and the SHPO shall provide the New York District with 30 days written notice when requesting a site visit unless otherwise agreed. The New York District may also schedule a site visit with the SHPO and the Council at its discretion.

XIII. AMENDMENTS

Any signatory to this PA may request that it be amended, whereupon all the parties will consult in accordance with 36 CFR Part 800.13 to consider such amendment.

XIV. TERMINATION

Any signatory to this PA may terminate it by providing thirty days notice to the other parties, provided that the parties will consult during the period prior to termination by certified mail to seek agreement on amendments or other actions that would avoid termination. In the event of termination, the New York District will comply with 36 CFR Parts 800.4 through 800.6 with regard to individual undertakings covered by this Agreement.

XV. SUNSET CLAUSE.

A. This PA will continue in full force and effect until the construction of the Project is complete and all terms of this PA are met, unless the Project is terminated or authorization is rescinded.

Execution and implementation of this PA evidences that the New York District has satisfied its Section 106 responsibilities for all individual undertakings of the Project, and that the New York District has afforded the Council and the SHPO an opportunity to comment on the undertaking and its effects on historic properties.

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: _____ Date: 8/4/98
John M. Fowler, Executive Director

NEW JERSEY STATE HISTORIC PRESERVATION OFFICE

By: _____ Date: 6-26-98
Dorothy P. Guzzo, Deputy State Historic Preservation Officer

U.S. ARMY CORPS OF ENGINEERS

By: _____ Date: June 1, 1998
Gary Thomas
District Engineer, New York District

Appendix 1 Map of the Green Brook Sub-Basin, and Lower, Middle and Upper Basins Detailed Description of Project Actions and Proposed Schedule for Implementation of the Green Brook Flood Control Project

Appendix 2 Area of Potential Effect, Percentage of Area of Potential Effect Identified to Date, and Investigated Portion of Area of Potential Effect

Appendix 3 SHPO Approval Letters for Plans for Historic Properties Identified in the Investigated Portion of the Area of Potential Effect

The Project will have no effect on the Central Railroad of New Jersey Middle Brook Bridge and the Central Railroad of New Jersey East Main Street Bridge, which are part of the Central Railroad of New Jersey Main Line Corridor Historic District, or on Central Railroad of New Jersey Main Line Corridor Historic District. The Deserted Village of Feltville Historic District may be affected and require development of a treatment/mitigation plan consistent with the terms of this PA.

The New York District, in consultation with the SHPO, has developed treatment plans for one building and one structure affected by the Project as defined in Appendix 1 of this PA, in the Investigated Portion of the Area of Potential Effect. The New York District shall implement the following treatment plans. Design modifications have been included in the Project to avoid impacts to the setting of the Bound Brook [Railroad] Station in Bound Brook. The Project will have an effect on the Lincoln Boulevard Bridge, in Bound Brook. The New York District shall ensure that prior to construction, archival documentation is prepared to record the Lincoln Boulevard Bridge is prepared in accordance with SHPO guidance. The lamp stanchions from the bridge will be removed and stored in a secure location. The New York District shall design the replacement bridge to be in keeping with the original balustrade features subject to SHPO review and shall re-install the original lamp stanchions to the extent feasible. Plans and specifications for the replacement structure shall be provided to the SHPO for review and comment prior to the initiation of any project actions in the vicinity of the bridge.

Appendix 4 Public Coordination for the Green Brook Flood Control Project

Appendix 5 Native American Graves Protection and Repatriation Act and Council's Policy Statement on Human Remains (September 27, 1988); Corps Guidance on Native Americans.

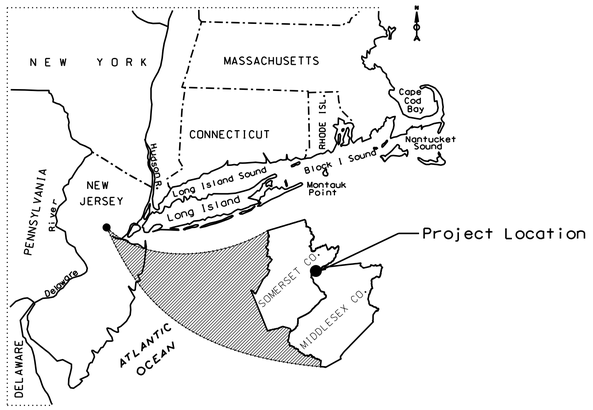
Appendix 6 Project-Related Activities Exempt from Further Coordination Under the PA. The New York District shall ensure that qualified professionals are used to ensure that project actions meet the requirements of exempt activities. All professionals shall meet the standards set forth in the qualified professionals Secretary of the Interior's Standards

and Guidelines for Archaeology and Historic Preservation (48 FR 44738-39). Exempt activities are:

Repair in kind of Historic Buildings and Structure
Routine Maintenance of constructed project features such as levees, floodwalls, channels, pump stations, flood proofing
New construction with compatible materials
Flood-proofing of non-historic buildings
Modifications to non-historic bridges

APPENDIX D
PROJECT DESIGNS

APPENDIX D
PROJECT DESIGNS



LOCATION MAP
NTS

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOROUGH OF MIDDLESEX AND GREEN BROOK TOWNSHIP, NJ
100% SUBMISSION, 8 JANUARY 2016

INDEX TO DRAWINGS		
TITLE	SHEET NO.	SHEET REFERENCE NO.
GENERAL		
Title and Index Sheet	1	G-001
General Plan	2	G-101
Survey Control Data - 1	3	V-101
Survey Control Data - 2	4	V-102
Project Alignment	5	C-101
Project Limits	6	C-102
Boring Logs and Location Plan	7	B-101
Boring Legend	8	B-001
Hydrologic Data	9	X-001
CIVIL		
Plan and Profile Segment B-1 Levee Weir Raising	10	C-103
Seg. B-1 Contract Design w/ Existing Site Conditions	11	C-104
Levee System Site Plan	12	C-105
Demolition Plan	13	C-106
Levee System Profile	14	C-201
Levee System Cross-Sections - 1	15	C-301
Levee System Cross-Sections - 2	16	C-302
Levee System Cross-Sections,- 3	17	C-303
Levee System Cross-Sections,- 4	18	C-304
Levee System Cross-Sections - 5	19	C-305
Levee System Cross-Sections - 6	20	C-306
Sheetpile Cutoff Alignment Plan	21	C-105
Channel Bend TRM Cross-Sections - 1	22	C-307
Channel Bend TRM Cross-Sections - 2	23	C-308
Channel Bend TRM Cross-Sections - 3	24	C-309
Channel Bend TRM Cross-Sections - 4	25	C-310
Channel Bend TRM Cross-Sections - 5	26	C-311
Erosion and Sediment Control Plan - 1	27	CG101
Erosion and Sediment Control Plan - 2	28	CG102

INDEX TO DRAWINGS		
TITLE	SHEET NO.	SHEET REFERENCE NO.
CIVIL (CONT.)		
Erosion and Sediment Control Notes - 1	29	CG001
Erosion and Sediment Control Notes - 2	30	CG002
Erosion and Sediment Control Notes - 3	31	CG003
Planting Plan - 1	32	LP101
Planting Plan - 2	33	LP102
Planting Notes - 1	34	LP001
Planting Notes - 2	35	LP002
Planting Details	36	LP501
Floating Turbidity Barrier Details	37	C-501
Silt Fence/Check Dam Details	38	C-502
Haybales/Construction Fence Details	39	C-503
Inlet Protection Details	40	C-504
HMA Pavement Details	41	C-505
Articulated Block Details (Option #1)	42	C-506
Excavation and NSRS Benchmark Details	43	C-507
Single Leaf Gate Details	44	C-508
Chain Link Fence Details	45	C-509
Chain Link Gate Details	46	C-510
STRUCTURAL		
General Notes - 1	47	S-001
General Notes - 2	48	S-002
Floodwall General Plan View	49	S-101
Floodwall Profile	50	S-201
Floodwall Detail Plan - 1	51	S-401
Floodwall Detail Plan - 2	52	S-402
Floodwall Sections - 1	53	S-501
Floodwall Sections - 2	54	S-502
Fluted Fin Texture Details - 1	55	S-503
Flited Fin Texture Details - 2	56	S-504
Floodwall MCI Sections	57	S-505

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

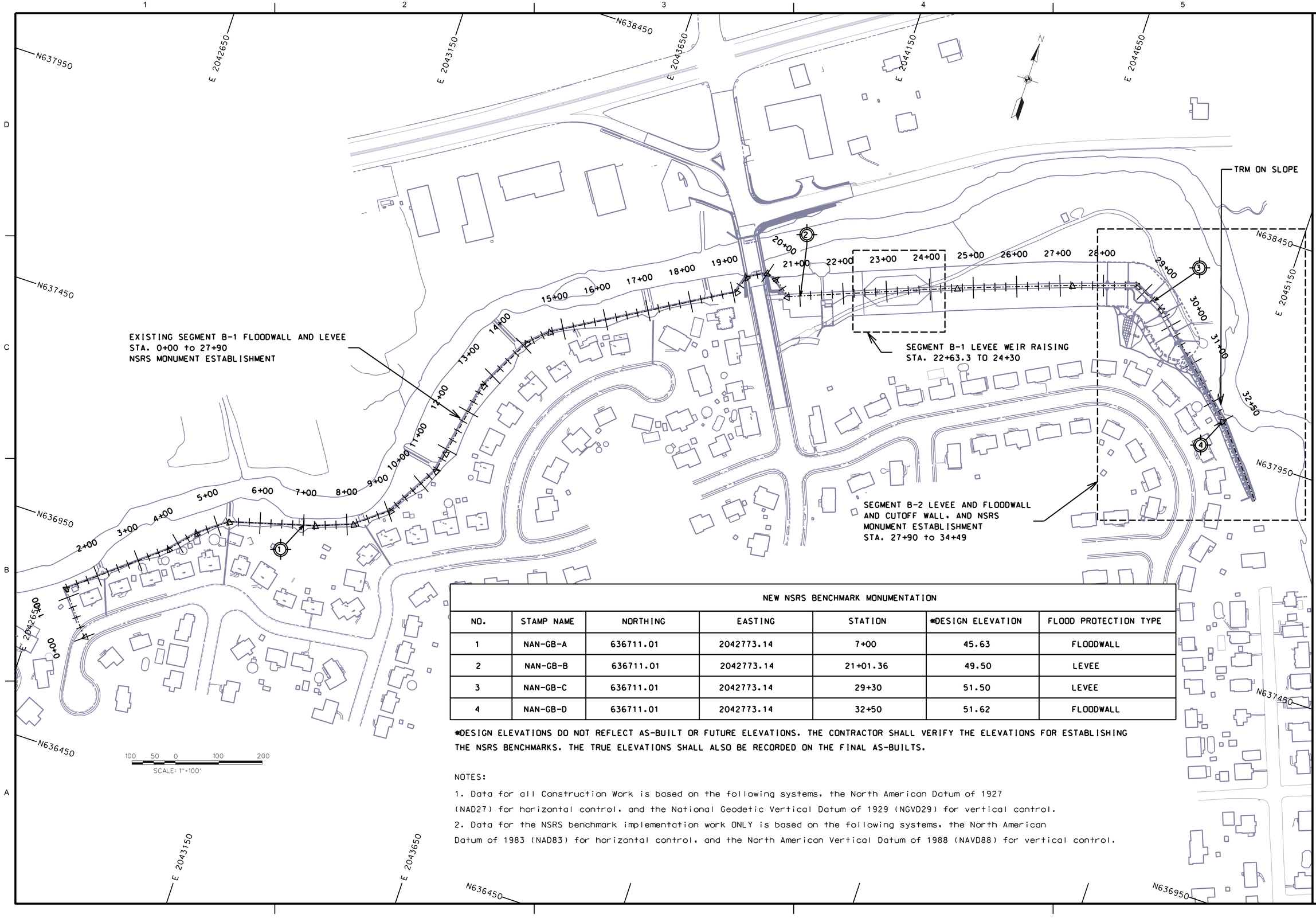
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: NAS
DWN BY: NAS
SUBMITTED BY: NAS
PLOT SCALE: 1
SIZE: ANSI D
DATE: 8 JANUARY 2016
CKD BY:
SOLICITATION NO.:
CONTRACT NO.:
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2G001.dgn
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

TITLE AND INDEX SHEET

SHEET IDENTIFICATION
G-001
SHEET 1 OF 58



NEW NSRS BENCHMARK MONUMENTATION						
NO.	STAMP NAME	NORTHING	EASTING	STATION	*DESIGN ELEVATION	FLOOD PROTECTION TYPE
1	NAN-GB-A	636711.01	2042773.14	7+00	45.63	FLOODWALL
2	NAN-GB-B	636711.01	2042773.14	21+01.36	49.50	LEVEE
3	NAN-GB-C	636711.01	2042773.14	29+30	51.50	LEVEE
4	NAN-GB-D	636711.01	2042773.14	32+50	51.62	FLOODWALL

*DESIGN ELEVATIONS DO NOT REFLECT AS-BUILT OR FUTURE ELEVATIONS. THE CONTRACTOR SHALL VERIFY THE ELEVATIONS FOR ESTABLISHING THE NSRS BENCHMARKS. THE TRUE ELEVATIONS SHALL ALSO BE RECORDED ON THE FINAL AS-BUILTS.

NOTES:

1. Data for all Construction Work is based on the following systems, the North American Datum of 1927 (NAD27) for horizontal control, and the National Geodetic Vertical Datum of 1929 (NGVD29) for vertical control.
2. Data for the NSRS benchmark implementation work ONLY is based on the following systems, the North American Datum of 1983 (NAD83) for horizontal control, and the North American Vertical Datum of 1988 (NAVD88) for vertical control.

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MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

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DESIGNED BY: NAS
DWN BY: NAS
SUBMITTED BY: NAS
CKD BY:
PLOT SCALE: AS NOTED
SIZE: ANSI D
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
ISSUE DATE: MAY 2016
FILE NAME: GB_SEGB1B2G101.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP., NJ

GENERAL PLAN

SHEET IDENTIFICATION
G-101
SHEET 2 OF 58

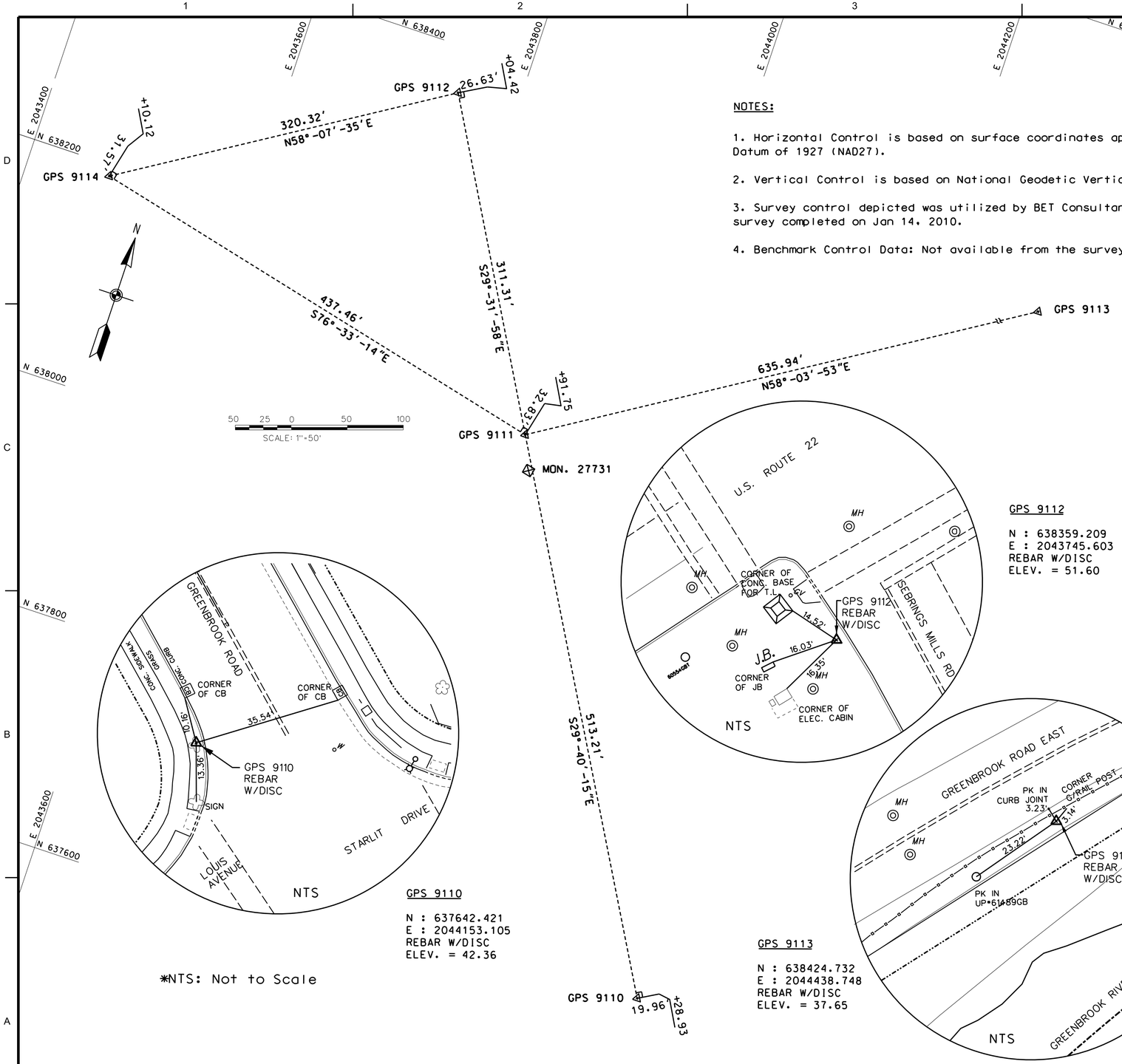
NOTES:

1. Horizontal Control is based on surface coordinates applied to the North American Datum of 1927 (NAD27).

2. Vertical Control is based on National Geodetic Vertical Datum of 1929 (NGVD29).

3. Survey control depicted was utilized by BET Consultant, Inc. for the topographical survey completed on Jan 14, 2010.

4. Benchmark Control Data: Not available from the survey.



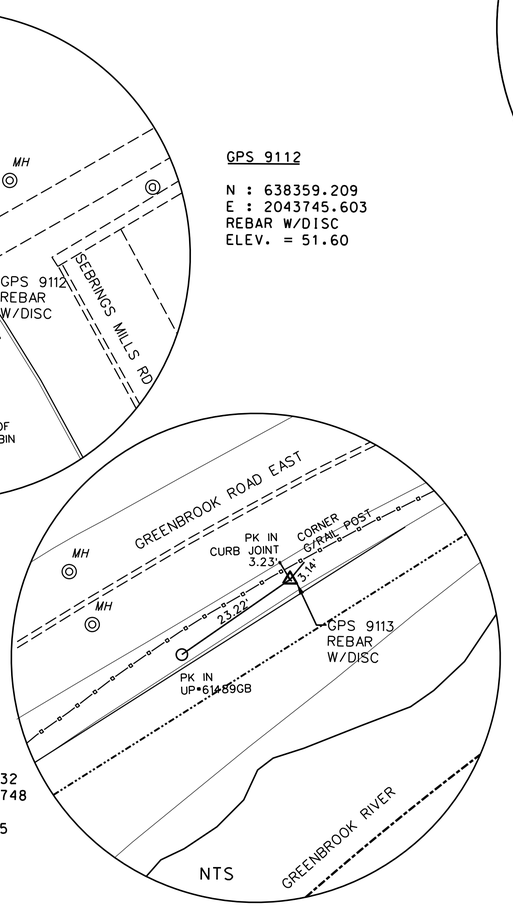
GPS 9110

N : 637642.421
E : 2044153.105
REBAR W/DISC
ELEV. = 42.36

*NTS: Not to Scale

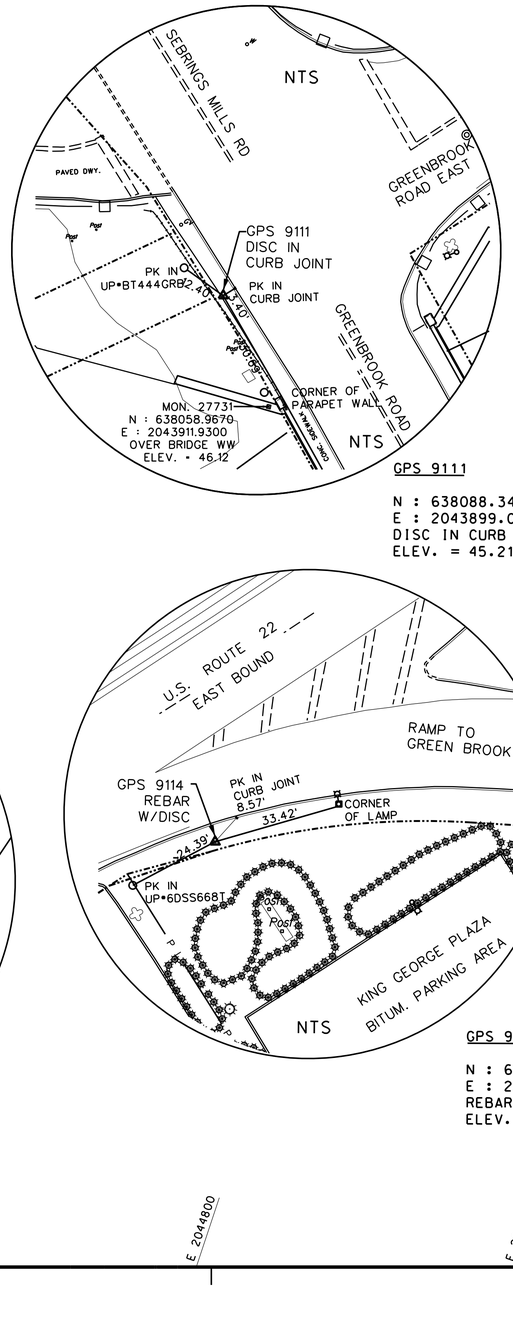
GPS 9112

N : 638359.209
E : 2043745.603
REBAR W/DISC
ELEV. = 51.60



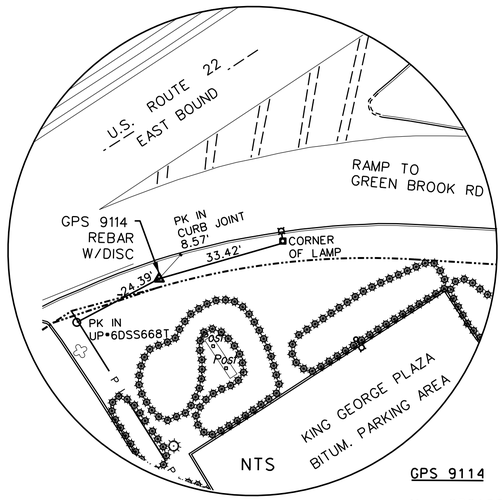
GPS 9113

N : 638424.732
E : 2044438.748
REBAR W/DISC
ELEV. = 37.65



GPS 9111

N : 638088.343
E : 2043899.057
DISC IN CURB JOINT
ELEV. = 45.21



GPS 9114

N : 638190.067
E : 2043473.585
REBAR W/DISC
ELEV. = 51.50

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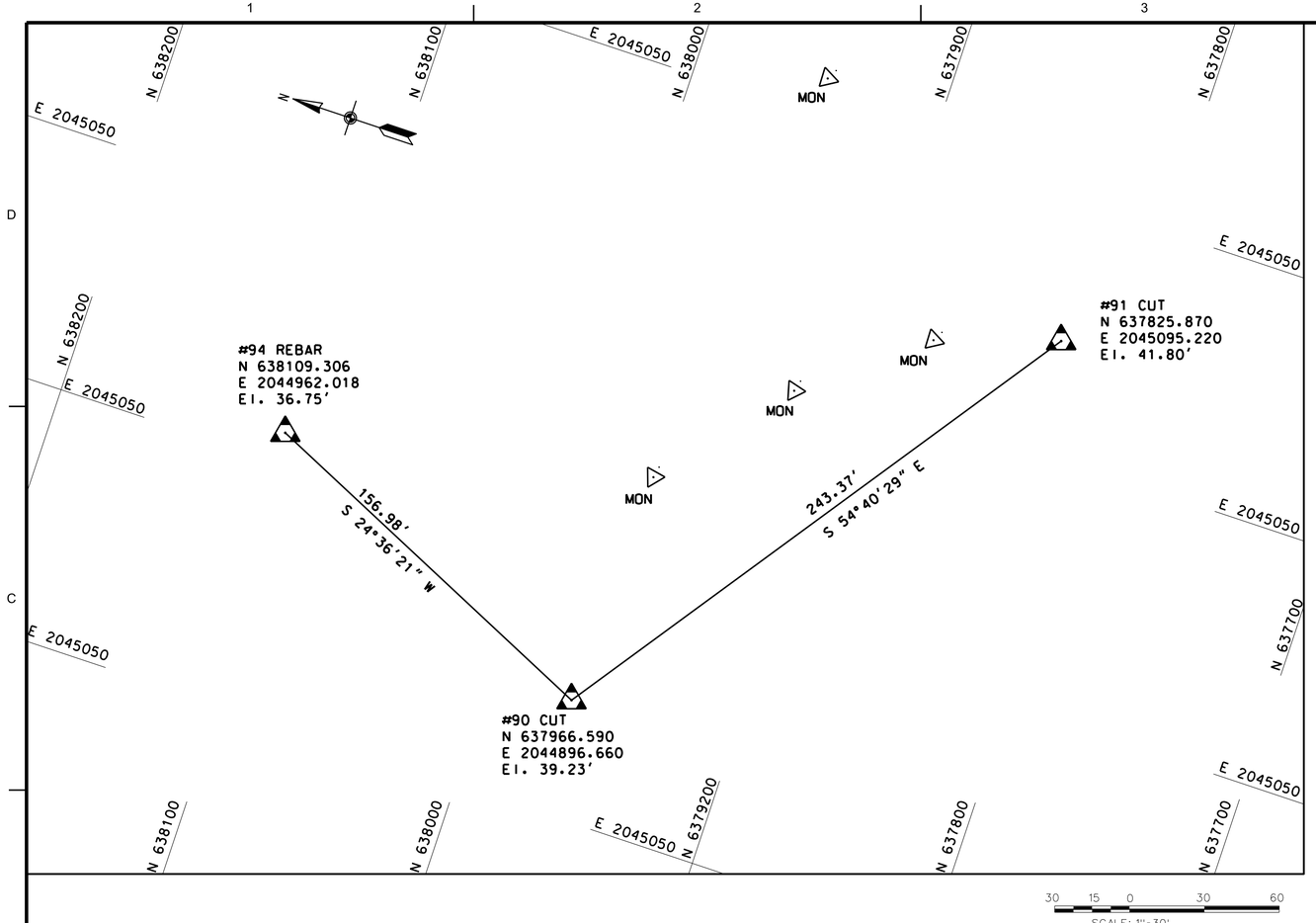
DESIGNED BY: NAS
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1.000'
PLOT DATE: 8 JANUARY 2016
FILE NUMBER:
FILE NAME: GB_SEGB1B2V101.dgn
SIZE: ANSI D

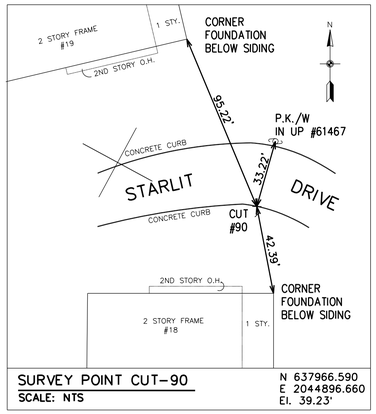
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

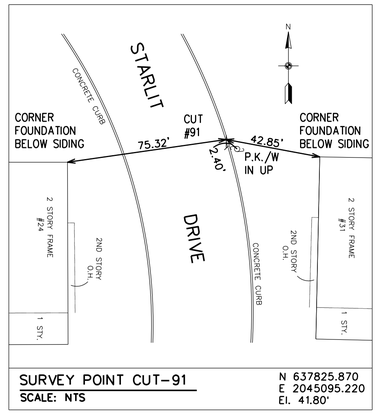
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

SURVEY CONTROL DATA
1

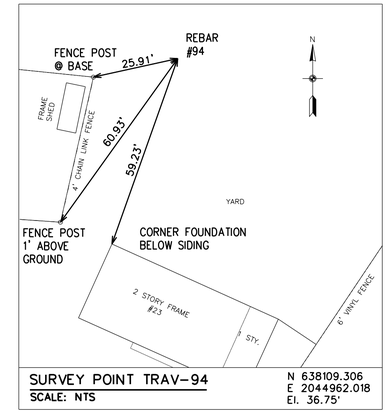
SHEET IDENTIFICATION
V-101
SHEET 3 OF 58







* NTS: Not to Scale



NOTES:

1. Horizontal Control is based on surface coordinates applied to the North American Datum of 1927 (NAD27).

2. Vertical Control is based on National Geodetic Vertical Datum of 1929 (NGVD29).

3. Survey control depicted was utilized by Rogers Surveying, LLC (Staten Island, NY) for the topographical survey performed between April 10 - 12, 2012 and May 8 - 11, 2012.

4. Benchmark Control Data:
   NGS "G 25" (KV1318)
   Elevation: 66.16 (NGVD 29)

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New York District

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

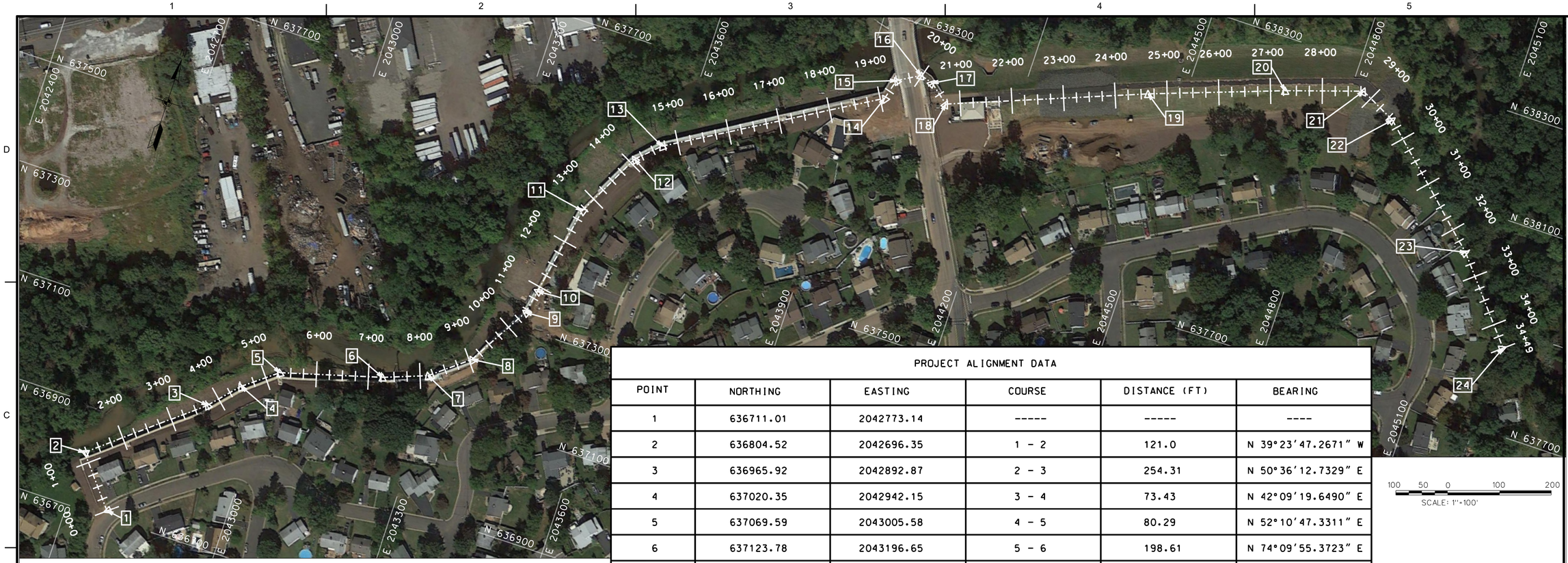
DESIGNED BY: NAS
DWN BY: NAS
SUBMITTED BY: NAS
PLOT SCALE: 1" = 30'
SIZE: ANSI D
DATE: 8 JANUARY 2016
CKD BY:
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2V102.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

SURVEY CONTROL DATA
2

SHEET IDENTIFICATION
V-102
SHEET 4 OF 58



100 50 0 100 200

SCALE: 1"=100'

NOTES:

1. The Horizontal Control is based on surface coordinates applied to the North American Datum of 1927 (NAD27).

2. The Vertical Control is based on the National Geodetic Vertical Datum of 1929 (NGVD29).

3. The Contractor shall furnish all labor, materials, equipment, supplies, transportation, supervision, methods and procedures necessary to complete the construction work in accordance with the terms of this Contract. Construction must be within the the contractor's working limits (refer to Sheet C-102). The major components of the Contract include:

(a) Establishment of new permanent benchmarks on the levee system for inclusion into the the NSRS (National Spatial Reference System) monument system between Sta. 0+00 to 34+49. THE DATA REFERENCE AND LOCATIONS FOR THE NSRS BENCHMARKS ARE PROVIDED ON SHEET G-101.

(b) Raising of the existing B-1 Levee Weir to the full design height between Sta. 22+63 to 24+30. Refer to Sheet C-102 for the weir profile. As-built information is unavailable, thus the weir profile is based on the Segment B-1 contract drawings. The Contractor shall survey and record the existing levee weir profile for approval by the COR prior to construction work.

(c) Realignment and extension of the existing Segment B-1 levee and construction of the Segment B-2 floodwall between Sta.27+90 to 34+49.

(d) Grade streambank with embankment fill and install TRM (turf reinforcement material) at the Green Brook channel bend and along the limits as shown in these contract drawings.

4. Pre-existing and final project conditions shall be surveyed and recorded according to Section 01 12 00.00 18, Section 01 78 00.00 18, and Section 00 80 00.

PROJECT ALIGNMENT DATA

POINT	NORTHING	EASTING	COURSE	DISTANCE (FT)	BEARING
1	636711.01	2042773.14	-----	-----	----
2	636804.52	2042696.35	1 - 2	121.0	N 39°23'47.2671" W
3	636965.92	2042892.87	2 - 3	254.31	N 50°36'12.7329" E
4	637020.35	2042942.15	3 - 4	73.43	N 42°09'19.6490" E
5	637069.59	2043005.58	4 - 5	80.29	N 52°10'47.3311" E
6	637123.78	2043196.65	5 - 6	198.61	N 74°09'55.3723" E
7	637154.58	2043278.71	6 - 7	87.66	N 69°25'51.0439" E
8	637211.03	2043349.46	7 - 8	90.51	N 51°24'41.0491" E
9	637329.93	2043418.97	8 - 9	137.72	N 30°18'37.9199" E
10	637375.9	2043427.74	9 - 10	46.80	N 10°47'44.8586" E
11	637550.99	2043460.88	10 - 11	178.20	N 10°43'14.2069" E
12	637676.81	2043524.96	11 - 12	141.20	N 26°59'10.1101" E
13	637717.9	2043567.61	12 - 13	59.22	N 46°04'23.0436" E
14	637941.06	2043946.24	13 - 14	439.51	N 59°29'04.6634" E
15	637980.63	2043956.96	14 - 15	40.99	N 15°09'16.4965" E
16	638004.97	2043999.37	15 - 16	48.90	N 60°08'51.5558" E
17	637997.91	2044024.26	16 - 17	25.88	S 74°09'41.3224" E
18	637967.96	2044061.9	17 - 18	48.09	S 51°29'09.9362" E
19	638110.11	2044426.31	18 - 19	391.16	N 68°41'24.5259" E
20	638199.59	2044675.52	19 - 20	264.78	N 70°14'55.4251" E
21	638246.68	2044819.91	20 - 21	151.88	N 71°56'16.7911" E
22	638211.59	2044889.88	21 - 22	78.27	S 63°22'07.7429" E
23	638013.44	2045105.16	22 - 23	292.59	S 47°22'21.7583" E
24	637861.09	2045231.63	23 - 24	198.00	S 39°41'53.6040" E

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New York District

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

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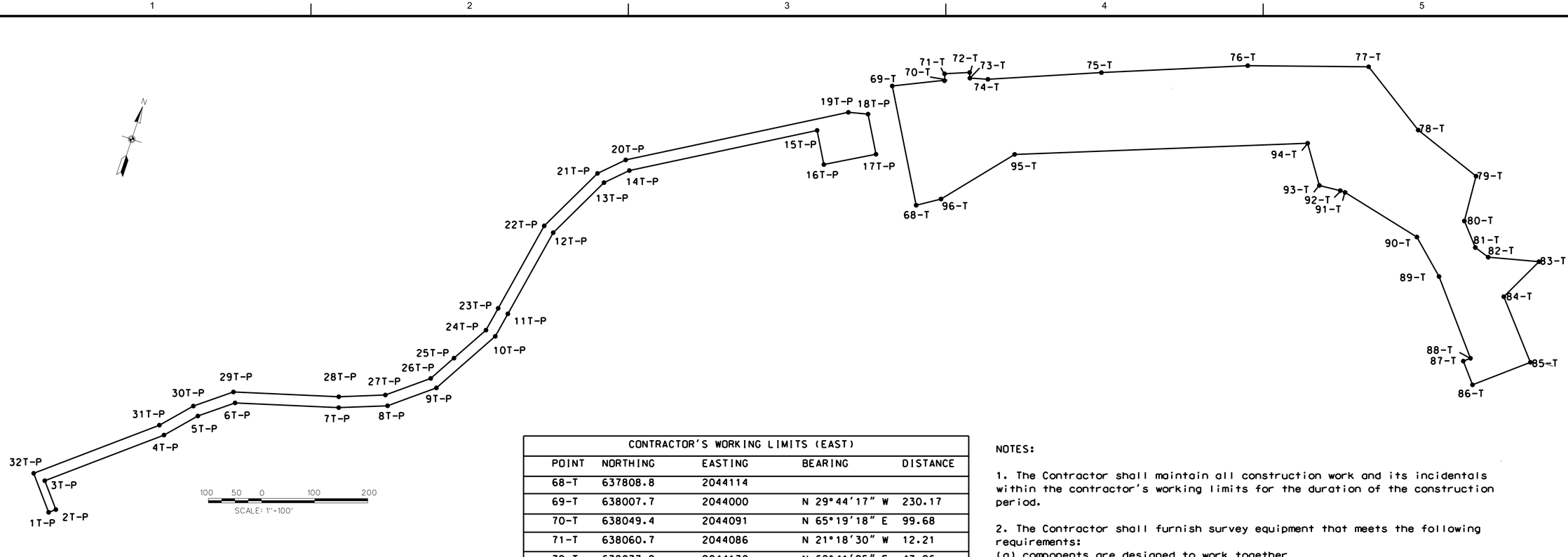
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: MAS
DWN BY: MAS
CKD BY:
SUBMITTED BY: MAS
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT SCALE: 1" = 100'
PLOT DATE: AS ANNOTATED
SIZE: ANSI D
ISSUE DATE:
FILE NAME: GB_SEGB1B2C101.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP., NJ

PROJECT ALIGNMENT

SHEET IDENTIFICATION
C-101
SHEET 5 OF 58



CONTRACTOR'S WORKING LIMITS (WEST)

POINT	STATION	NORTHING	EASTING	BEARING	DISTANCE
1T-P	0+00.00	636743.57	2042747.70		
2T-P	0+14.50	636752.77	2042758.90	N 50°36'13" E	14.5
3T-P	0+72.69	636797.74	2042721.97	N 39°23'47" W	58.19
4T-P	3+13.09	636950.32	2042907.74	N 50°36'13" E	240.4
5T-P	3+86.21	637004.53	2042956.82	N 42°09'20" E	73.13
6T-P	4+60.44	637050.04	2043015.46	N 52°10'47" E	74.23
7T-P	6+55.76	637103.34	2043203.37	N 74°09'55" E	195.32
8T-P	7+47.72	637135.65	2043289.46	N 69°25'51" E	91.95
9T-P	8+45.65	637196.73	2043366.00	N 51°24'41" E	97.93
10T-P	9+93.09	637323.98	2043440.49	N 30°20'25" E	147.45
11T-P	10+41.72	637371.75	2043449.59	N 10°47'45" E	48.63
12T-P	12+16.75	637543.72	2043482.15	N 10°43'14" E	175.03
13T-P	13+51.03	637663.38	2043543.09	N 26°59'10" E	134.28
14T-P	14+03.90	637700.06	2043581.16	N 46°04'23" E	52.87
15T-P	17+65.36	637883.60	2043892.56	N 59°29'05" E	361.46
16T-P	18+30.87	637826.63	2043924.91	S 29°35'20" E	65.51
17T-P	19+30.87	637876.01	2044011.86	N 60°24'44" E	100
18T-P	20+07.87	637942.97	2043973.84	N 29°35'16" W	77
19T-P	20+45.12	637934.50	2043937.56	S 76°51'48" W	37.26
20T-P	24+73.67	637716.89	2043568.37	S 59°29'05" W	428.55
21T-P	25+32.54	637676.06	2043525.97	S 46°04'23" W	58.87
22T-P	26+73.35	637550.58	2043462.08	S 26°59'10" W	140.81
23T-P	28+51.37	637375.67	2043428.96	S 10°43'14" W	178.02
24T-P	28+98.38	637329.48	2043420.16	S 10°47'45" W	47.02
25T-P	29+78.42	637260.51	2043379.55	S 30°29'22" W	80.04
26T-P	30+36.50	637210.37	2043350.23	S 30°18'38" W	58.08
27T-P	31+27.36	637153.70	2043279.21	S 51°24'41" W	90.86
28T-P	32+15.22	637122.83	2043196.96	S 69°25'51" W	87.86
29T-P	34+13.67	637068.68	2043006.03	S 74°09'55" W	198.46
30T-P	34+93.68	637019.62	2042942.83	S 52°10'47" W	80.01
31T-P	35+67.10	636965.20	2042893.56	S 42°09'20" W	73.41
32T-P	38+20.48	636804.38	2042697.75	S 50°36'13" W	253.38
1T-P	38+99.17	636743.57	2042747.70	S 39°23'47" E	78.69

CONTRACTOR'S WORKING LIMITS (EAST)

POINT	NORTHING	EASTING	BEARING	DISTANCE
68-T	637808.8	2044114		
69-T	638007.7	2044000	N 29°44'17" W	230.17
70-T	638049.4	2044091	N 65°19'18" E	99.68
71-T	638060.7	2044086	N 21°18'30" W	12.21
72-T	638077.9	2044130	N 68°41'25" E	47.26
73-T	638068.1	2044134	S 21°14'53" E	10.57
74-T	638076.6	2044167	N 75°22'56" E	33.94
75-T	638156.2	2044366	N 68°10'29" E	213.98
76-T	638255.7	2044623	N 68°51'23" E	275.81
77-T	638325.6	2044840	N 72°06'17" E	227.65
78-T	638242.1	2044966	S 56°29'28" E	151.36
79-T	638194.1	2045097	S 69°51'49" E	139.25
80-T	638107.1	2045102	S 3°50'07" E	87.21
81-T	638066.2	2045138	S 40°49'20" E	54.11
82-T	638056.6	2045167	S 71°32'18" E	30.32
83-T	638078.7	2045260	N 76°38'19" E	95.95
84-T	637995.1	2045218	S 26°38'36" W	93.54
85-T	637893.7	2045305	S 40°27'29" E	133.36
86-T	637819	2045215	S 50°18'06" W	116.88
87-T	637855.9	2045184	N 39°41'54" W	48
88-T	637865.2	2045195	N 50°18'06" E	14.47
89-T	637992.7	2045090	N 39°25'19" W	165.06
90-T	638050.1	2045027	N 47°41'24" W	85.23
91-T	638087	2044872	N 76°33'48" W	159.22
92-T	638087.3	2044863	N 88°40'18" W	9.64
93-T	638084.1	2044822	S 85°32'56" W	40.56
94-T	638152.6	2044776	N 33°56'07" W	82.52
95-T	637958.2	2044260	S 69°22'54" W	551.96
96-T	637834.7	2044155	S 40°19'54" W	162.09
68-T	637808.8	2044114	S 57°32'16" W	48.25

NOTES:

1. The Contractor shall maintain all construction work and its incidentals within the contractor's working limits for the duration of the construction period.

2. The Contractor shall furnish survey equipment that meets the following requirements:
(a) components are designed to work together
(b) capable of achieving the tolerances as indicated in the specifications
(c) maintained to meet the manufacturer's specifications
(d) kept in proper adjustment throughout the duration of the construction period.

3. The Contractor is responsible for the accuracy of the lines, slopes, and grades that the Contractor provides. The Contractor shall construct the work conforming to the lines, grades, cross-sections, and dimensions as shown on the drawings and indicated in the specifications.

4. The Contractor shall recover or calculate the benchmark data, grades, and alignment from plan information. The Contractor shall check horizontal and vertical information including but not limited to alignments, locations, elevations, and dimensions. The Contractor shall replace and augment control stations as necessary to control the project. The Contractor shall perform checks of the horizontal control network by measuring arbitrary cross ties and comparing it with the measured values. The vertical control shall also be checked with the measured values.

5. The Contractor shall preserve all existing and Contractor established horizontal and vertical control network for the duration of the construction period.

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New York District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

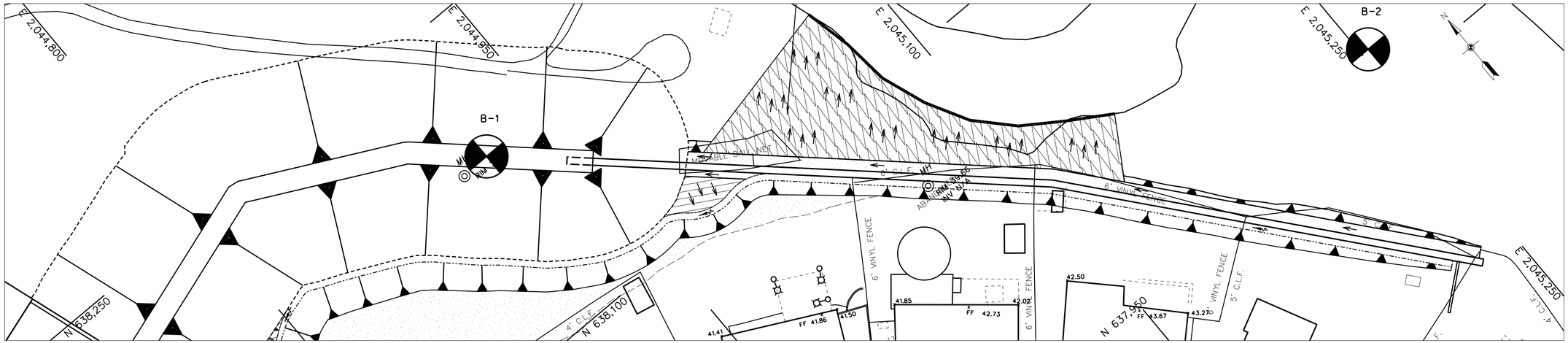
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: MAS
DWN BY: MAS
SUBMITTED BY: MAS
PLOT SCALE: 1:100
PLOT SIZE: ANSI D
DATE: 8 JANUARY 2016
CKD BY:
ISSUE DATE: AS NOTED
FILE NAME: GB_SEGB1B2C102.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

PROJECT LIMITS

SHEET IDENTIFICATION
C-102
SHEET 6 OF 58



25 12.5 0 25 50
SCALE: 1"=25'

2 August 2012

B-1					N 638187.19	
33.75'					E 2044916.57	
ELEV.	DEPTH	BLOWS 6"	SAMPLE NUMBER	LEGEND	CLASSIFICATION OF MATERIALS	REMARKS
30	1	2 3 4 5	S1		(SM) Top 6"Dark Brown Silty SAND (SP) Bot. 14"Dark Brown m-f SAND	
	2	6				
	3	13 11	S2		(ML) Brown Sandy SILT	
	4	18				HTRW sample taken between 6.5'-7'
	5	5 12 12 11	S3		(SC) Top 3"Yellowish Tan Clayey SAND (SP) Bot. 19"Reddish-Brown c-f SAND	
	6	5				
	7	13 12 6	S4		(SP) Brown c-f SAND	
	8	4				
25	9	5 6 6	S5		(SP-SM) Brown c-f Sand, trace silt	GWT determined to be approx. 7' below ground surface.
	10	4				
	11	2 3 4	S6		(SP) Brown c-f SAND	
	12					
	13					
20	14					
	15	4				
	16	5 4 5	S7		(SP) Brown c-f Sand, trace gravel	
	17					
	18					
15	19					
	20	4				
	21	10 11 13	S8		(SP) Reddish-Brown and Brown c-m SAND, trace gravel	
	22					
	23					
	24					
10	25	7			(SP) Top 6"Reddish-Brown c-m SAND, some gravel	
	26	19 26 100/2"	S9		Bot. 6" completely weathered siltstone: Red-brown, fine-grained, very weak stone	
	27					
	28					
	29				Completely weathered siltstone: Red-brown, fine-grained, very weak stone	
5	30	50/1"	S10			Rig chatter around 30'. Casing to 31'.
	31				Siltstone: Red-brown, slightly weathered, fine-grained, closely fractured, medium strong rock	
	32					
	33					
	34					
0	35					
	36				Bore terminated at 36' and backfilled w/grout.	

2-3 August 2012

B-2					N 637968.38	
31.29'					E 2045253.64	
ELEV.	DEPTH	BLOWS 6"	SAMPLE NUMBER	LEGEND	CLASSIFICATION OF MATERIALS	REMARKS
30	1	1 1 3 3	S1		(SP-SM) Top 8"Brown m-f SAND, little silt with occasional organics (roots) (CL-ML) Bot. 10"Brown SILT and CLAY with occasional organics (roots)	Shelby tube sample taken between 2-4'. Sandy soils caused disturbance to the sample.
	2	3				
	3	U S H	S2		(SC) Brown clayey SAND	
	4	WOH				HTRW sample taken between 5.5'-6'. Conducted perm. test between 5'-7' below groundsurface. Top of gravel for permeability test was 5.7' below ground surface.
	5	1 1 1	S3		(SP-SM) Brown c-f SAND, trace silt with occasional organic (tree root)	
25	6					
	7					
	8					
	9	5 7 9 7	S4		(SP) Reddish-Brown gravelly c-f SAND	
	10	6				
	11	9 16 16	S5		(SP-SM) Reddish-Brown c-f SAND, some silt	
20	12					
	13					
	14					
	15					
	16	5 8 12 10	S6		(SP-SM) Reddish-Brown c-f SAND, some gravel	
15	17					
	18					
	19					
	20					
	21	4 7 7 10	S7		(SP-SM) Reddish-Brown c-f SAND, some gravel	
	22					
	23					
	24					
10	25					
	26	44 50/1" - -	S8		Completely weathered Siltstone: Red-Brown, fine-grained, very weak	Rig chatter around 25'.
	27					
	28	50/1"	S9			
	29				Completely weathered Siltstone: Red-Brown, fine-grained, very weak	
5	30					
					Bore terminated at 30' and backfilled w/grout.	
0						
-5						

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DESIGNED BY: NAS
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1" = 25'
PLOT DATE: 14 JANUARY 2016
FILE NAME: GB_SECB1B2B101.dgn
ISSUE DATE:
FILE NUMBER:
SIZE: ANSI D

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

BORING LOGS AND LOCATION PLAN

SHEET IDENTIFICATION
B-101
SHEET 7 OF 58

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION		TYPE	LETTER SYMBOL	SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS (More than half of material is larger than No. 200 sieve size)	GRAVEL (More than half of coarse fraction is larger than No. 4 sieve size)	CLEAN GRAVEL (Little or No Fines)	GW		GRAVEL, Well Graded, GRAVEL-SAND mixtures, little or no fines
			GP		GRAVEL, Poorly Graded, GRAVEL-SAND mixtures, little or no fines
		GRAVEL WITH FINES (Appreciable Amount of Fines)	GM		Silty GRAVEL, GRAVEL-SAND-SILT mixtures
			GC		Clayey GRAVEL, GRAVEL-SAND-CLAY mixtures
	SAND (More than half of coarse fraction is smaller than No. 4 sieve size)	CLEAN SAND (Little or No Fines)	SW		SAND, Well Graded, gravelly sands with little or no fines (Silt and Clay)
			SP		SAND, Poorly Graded, gravelly sands with little or no fines (Silt and Clay)
		SAND WITH FINES (Appreciable Amount of Fines)	SM		SILTY SAND, SAND-SILT mixtures
			SC		CLAYEY SAND, SAND-CLAY mixtures
FINE GRAINED SOILS (More than half the material is smaller than No. 200 sieve size)		SILTS AND CLAYS (Liquid Limit <50)	ML		SILT (inorganic to slightly organic) & very fine Sand, Silty or Clayey fine SAND or Clayey SILT, slight plasticity
			CL		LEAN CLAY; Sandy CLAY; Silty CLAY; of low to medium plasticity, inorganic
			OL		ORGANIC SILTS, and organic silty clays of low plasticity
		SILTS AND CLAYS (Liquid Limit >50)	MH		SILT, fine sandy or silty soil with high plasticity
			CH		FAT CLAY, inorganic CLAY of high plasticity
			OH		ORGANIC CLAYS of medium to high plasticity, organic SILT
HIGHLY ORGANIC SOILS			PT		PEAT, and other highly organic soil

NOTE: Soils possessing characteristics of two groups are designated by combinations of group symbols.

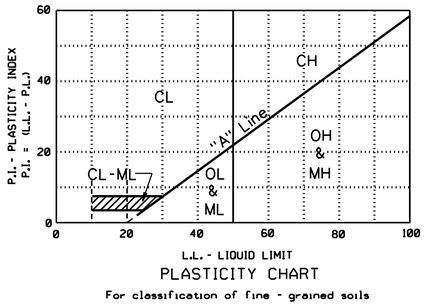
SOILS LEGEND

TYPE	LETTER SYMBOL	SYMBOL	TYPICAL NAMES
Agglomerate or Flow Breccia	AGGL		Cobbles (3" - 8") and Boulders (greater than 8")
Compaction Shale	COMSHA		SHALE Bedrock

DESCRIPTIVE SYMBOLS

COLOR	
COLOR	SYMBOL
TAN	T
YELLOW	Y
RED	R
BLACK	Bk
GRAY	Gr
LIGHT GRAY	lGr
DARK GRAY	dGr
BROWN	Br
LIGHT BROWN	lBr
DARK BROWN	dBr
BROWNISH - GRAY	brGr
GRAYISH - BROWN	grBr
GREENISH - GRAY	gnGr
GRAYISH - GREEN	grGn
GREEN	Gn
BLUE	Bl
BLUE - GREEN	BlGn
WHITE	Wh
MOTTLED	Mot

CONSISTENCY FOR COHESIVE SOILS		
CONSISTENCY	COHESION IN LBS./SQ. FT. FROM UNCONFINED COMPRESSION TEST	SYMBOL
VERY SOFT	< 250	vSo
SOFT	250 - 500	So
MEDIUM	500 - 1000	M
STIFF	1000 - 2000	St
VERY STIFF	2000 - 4000	vSt
HARD	> 4000	H



PLASTICITY CHART

For classification of fine - grained soils

MODIFICATIONS	
MODIFICATION	SYMBOL
Traces	Tr
Fine	F
Medium	M
Coarse	C
Concretions	cc
Rootlets	rt
Lignite fragments	lg
Shale fragments	sh
Sandstone fragments	sds
Shell fragments	slf
Organic matter	O
Clay strata or lenses	CS
Silt strata or lenses	SIS
Sand strata or lenses	SS
Sandy	S
Gravelly	G
Boulders	B
Slickensides	SL
Wood	Wd
Oxidized	Ox
Saturated	Sat
Lumps of Clay	Clp

GENERAL NOTES:

1. While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of subsurface materials of the region are anticipated. If encountered, such variations will not be considered as differing materially. However, bidders are encouraged to perform their own site investigation and are expected to make their own assessment of the site before commencing with construction work.

2. Ground water elevations shown on the borings logs represent ground water surfaces encountered in such borings on the dates shown. Absence of water surface data on certain borings indicates that no ground water data are available from the boring but does not necessarily mean that ground water will not be encountered at the locations or within the vertical reaches of such borings.

3. Consistency of cohesive soils shown on the boring logs is based on driller's log and visual examination and is approximate, except within those vertical reaches of the borings where shear strengths from unconfined compression tests are shown.

4. Driving resistances, shown in blows per foot, are determined with a standard split spoon sampler (1 $\frac{3}{8}$" I.D. - 2" O.D.) and a 140 lb. dring hammer with a 30" drop, except as otherwise noted.

5. Boring locations and date(s) of exploration are identified on the plan sheets.

CLASSIFICATION AND TERMS:

BEDROCK: Natural solid mineral matter (rock) occurring in great thickness and extent in its natural location. Normally underlays soil.
SOIL: Sediment or other uncosolidated particles produced by the physical and chemical weathering of rocks.
BOULDER...Larger than 8"
COBBLE or SMALL STONE...8" - 3"
GRAVEL (Coarse).....3" - ¾"
GRAVEL (Medium)..... ¾" 4.76 mm
SAND (Coarse).....4.76 mm - 2 mm
SAND (Medium).....2 mm - 0.42 mm
SAND (Fine).....0.42 mm - 0.074 mm
SILT and CLAY.....Finer than 0.074 mm

▽ Ground water surface

Major component is shown with all letters CAPITALIZED.
Minor component % signifies amount of total sample:
and.....40 to 50%
some...40 to 20%
little...20 to 10%
trace...10 to 1%

ABBREVIATIONS:

WOR = Weight of Rods
WOH = Weight of Hammer
NR = No Recovery
NS = Insufficient Sample

% G = Percent Gravel-sized particles
% S = Percent Sand-sized particles
% F = Percent fines (silt and clay)
% H_2O = Water Content (Weight H20 / Weight Dry Soil)
SG = Specific Gravity

LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index

P.I. = (L.L. - P.L.)

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DWN BY: NAS
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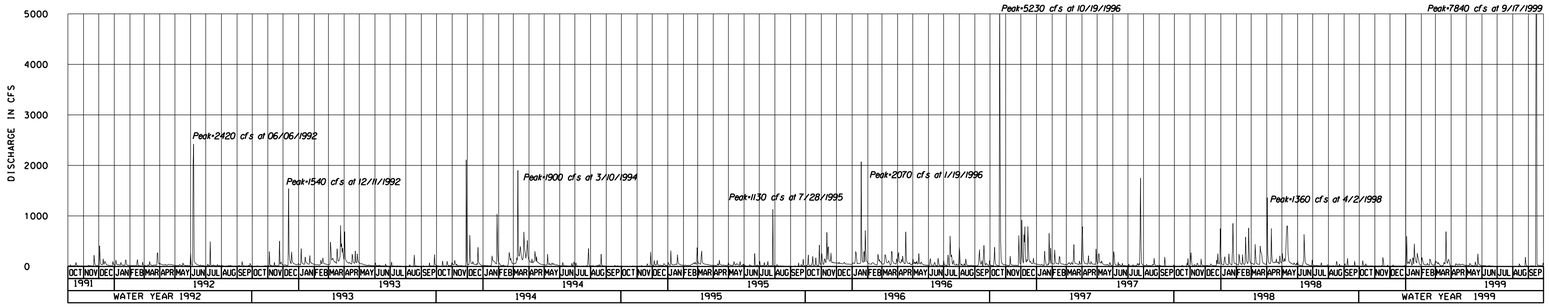
SUBMITTED BY: NAS
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
ISSUE DATE: JANUARY 2016
PLOT SCALE: AS NOTED
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEGB1B2B-001

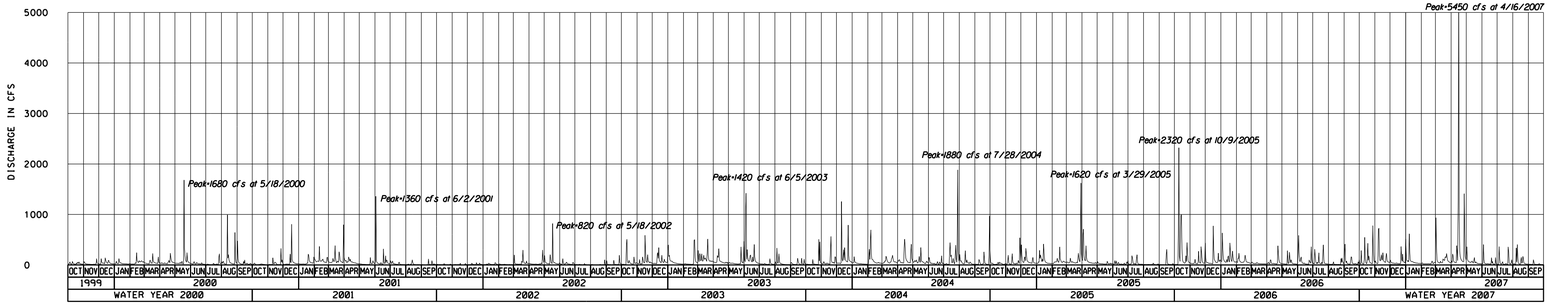
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

BORING LEGEND

SHEET IDENTIFICATION
B-001
SHEET 8 OF 58



STREAM FLOW AT GREEN BROOK AT SEBRINGS MILLS ROAD



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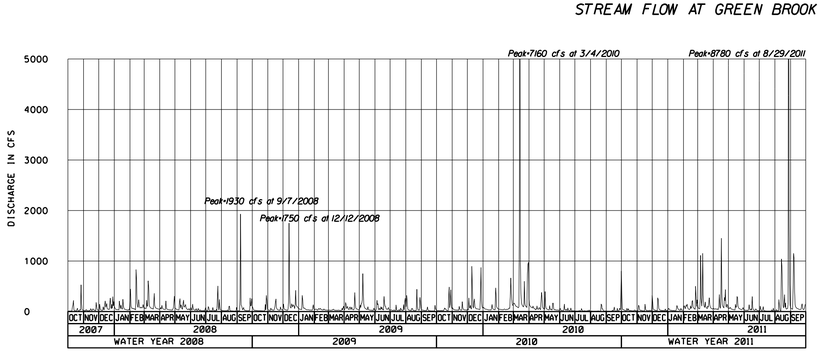
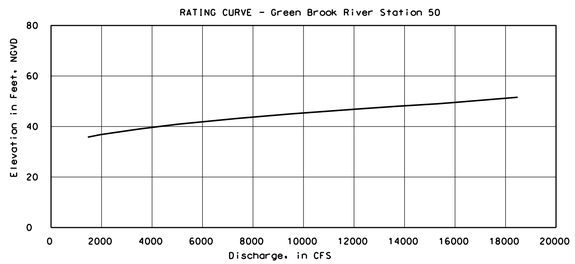
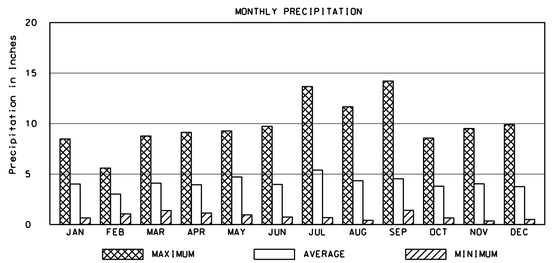
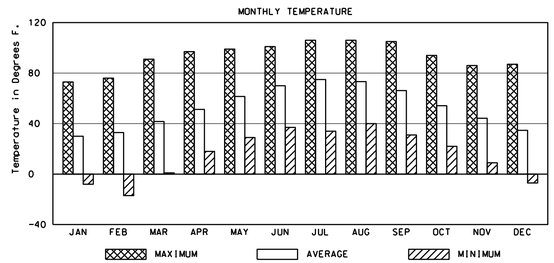


STREAM FLOW AT GREEN BROOK AT SEBRINGS MILLS ROAD







NOTES:

1. Hydrologic data is for the information of the contractor only. The United States is not responsible for its accuracy or interpolation.

2. Discharge hydrographs are from the records of the U.S. Geological Survey stream gages •01403540: Stony Brook at Watchung, New Jersey (drainage area• 5.51 square miles) and •01403900: Bound Brook at Middlesex, New Jersey (drainage area• 48.4 mi2). Discharges from the Stony Brook at Wachung gage were transposed to the Bound Brook at Middlesex gage.

3. The hydrographs shown represent mean daily discharges except for the annual peak streamflow values as indicated.

4. The monthly temperature and precipitation data shown are from the monthly normal records of the station: Plainfield, New Jersey for the period 1971-2000. The temperature extremes shown were derived from the station's available digital record for the period 1931-2001.

5. The rating curve shown is for Green Brook at River Station 50.

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PLOT SCALE: NTS	ISSUE DATE: 8 JANUARY 2016
SIZE: ANSI D	FILE NAME: GB_SEGB1B2X001.dgn

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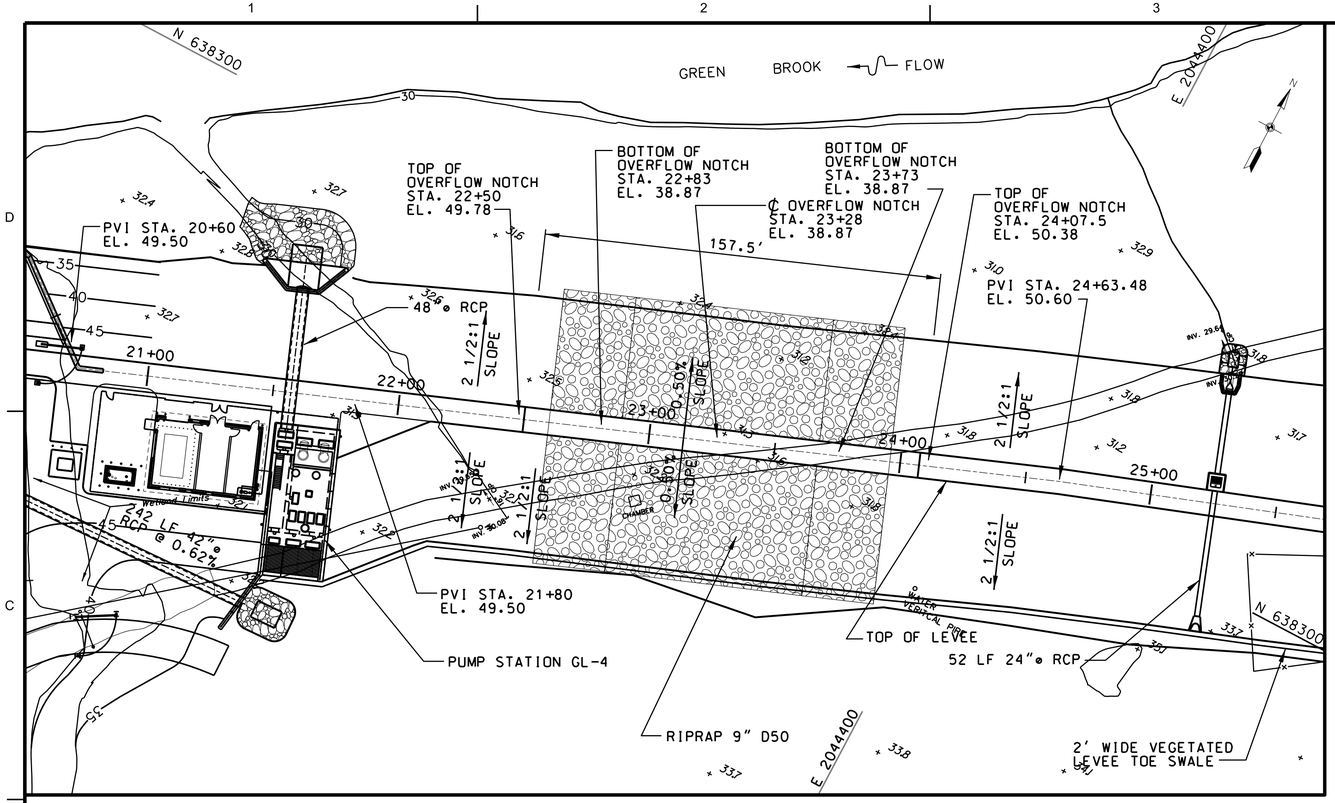
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

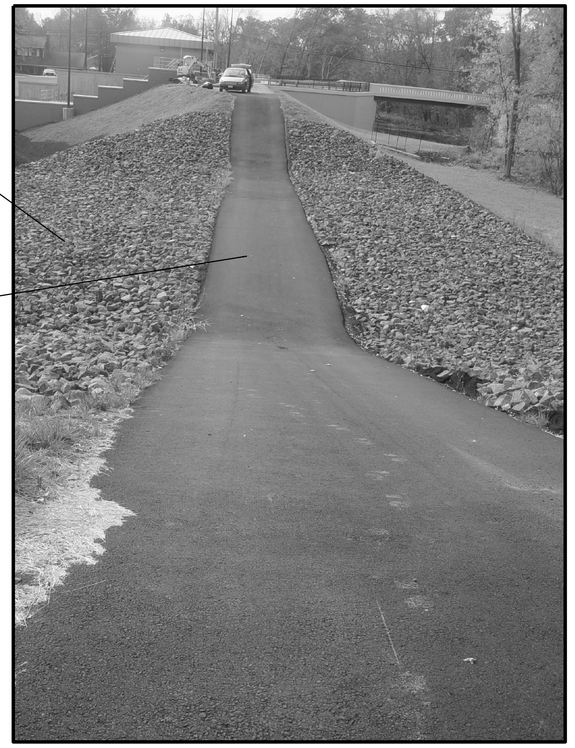
HYDROLOGIC DATA

SHEET IDENTIFICATION
X-001
SHEET 9 OF 58



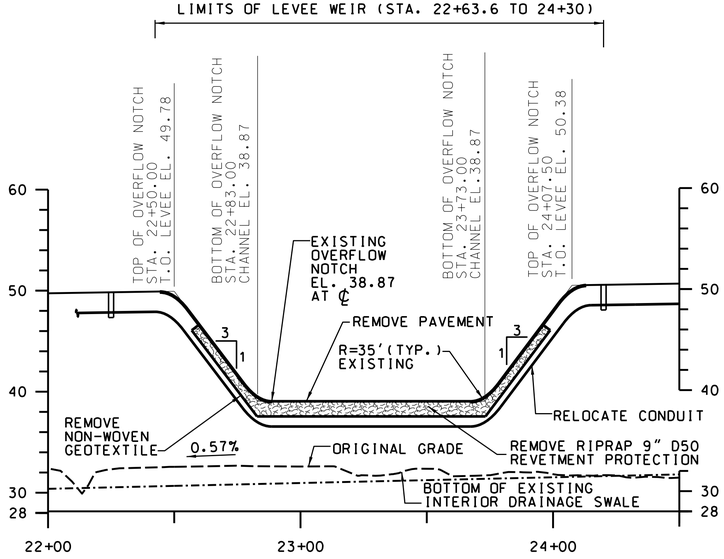
EXISTING SEGMENT B-1 LEVEE WEIR PLAN VIEW
(NOT AS-BUILT)

30 15 0 30 60FT
SCALE: 1"= 30'



EXISTING SEGMENT B-1 LEVEE WEIR ELEVATION VIEW
(LOOKING WEST) NTS

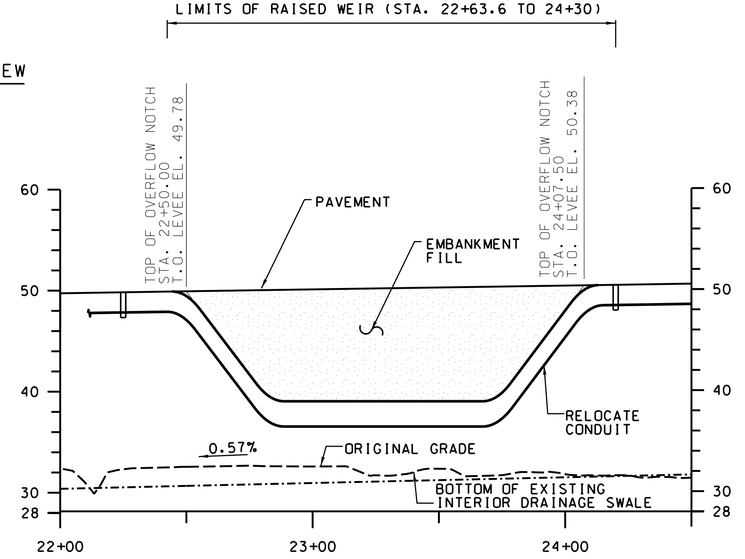
SEGMENT B-1 LEVEE WEIR ELEVATION VIEW
(LOOKING NORTH)



EXISTING

30 15 0 30 60FT
HORIZ SCALE: 1"= 30'

7.5 3.25 0 7.5 15FT
VERT SCALE: 1" = 7.5'



FINAL VIEW

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NEW YORK DISTRICT
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PLOT SCALE: 1" = 30'
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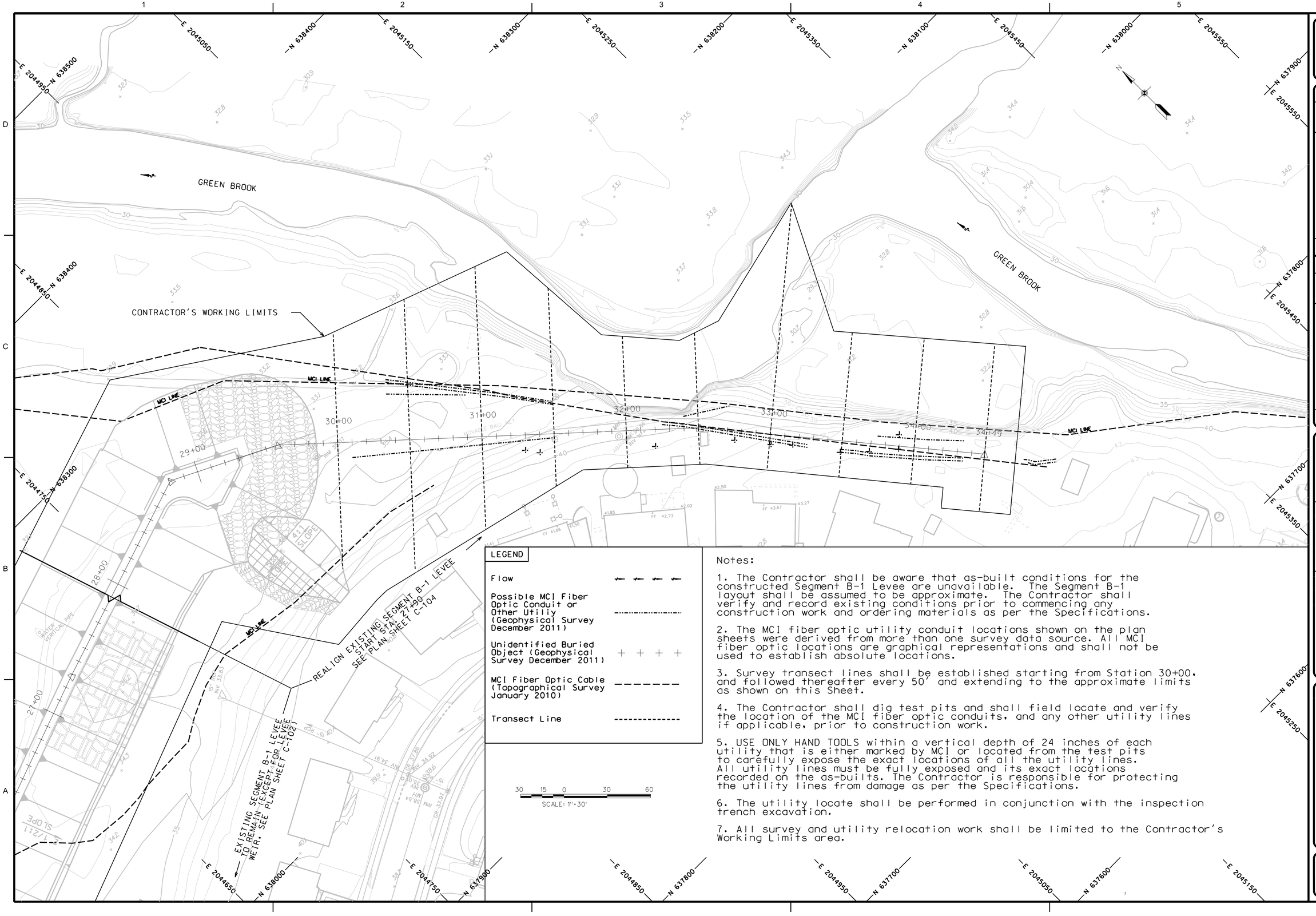
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

PLAN AND PROFILE
SEGMENT B-1
LEVEE WEIR RAISING

SHEET IDENTIFICATION
C-103
SHEET 10 OF 58



LEGEND

Flow	← ← ← ←
Possible MCI Fiber Optic Conduit or Other Utility (Geophysical Survey December 2011)	·····|·····
Unidentified Buried Object (Geophysical Survey December 2011)	+ + + +
MCI Fiber Optic Cable (Topographical Survey January 2010)	———————
Transect Line	----------

30 15 0 30 60
SCALE: 1"=30'

Notes:

1. The Contractor shall be aware that as-built conditions for the constructed Segment B-1 Levee are unavailable. The Segment B-1 layout shall be assumed to be approximate. The Contractor shall verify and record existing conditions prior to commencing any construction work and ordering materials as per the Specifications.

2. The MCI fiber optic utility conduit locations shown on the plan sheets were derived from more than one survey data source. All MCI fiber optic locations are graphical representations and shall not be used to establish absolute locations.

3. Survey transect lines shall be established starting from Station 30+00, and followed thereafter every 50' and extending to the approximate limits as shown on this Sheet.

4. The Contractor shall dig test pits and shall field locate and verify the location of the MCI fiber optic conduits, and any other utility lines if applicable, prior to construction work.

5. USE ONLY HAND TOOLS within a vertical depth of 24 inches of each utility that is either marked by MCI or located from the test pits to carefully expose the exact locations of all the utility lines. All utility lines must be fully exposed and its exact locations recorded on the as-builts. The Contractor is responsible for protecting the utility lines from damage as per the Specifications.

6. The utility locate shall be performed in conjunction with the inspection trench excavation.

7. All survey and utility relocation work shall be limited to the Contractor's Working Limits area.

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DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT SCALE: 1.00'
PLOT DATE: 1/8/2016
SIZE: ANSI D
FILE NAME: GB_SEGB1B2C104.dgn

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GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

SEGMENT B-1 CONTRACT DESIGN
W/ EXISTING SITE CONDITIONS

SHEET IDENTIFICATION
C-104
SHEET 11 OF 58

LEGEND

Grade to Drain		Fill	
Longitudinal Grade (1.51%)		Swale Bottom	
Flow		Slope (Top to Bottom)	
		Levee Toe	

SWALE ALIGNMENT DATA - TRANSITION AREA		
POINT	NORTHING	EASTING
1	638099.14	2045003.90
2	638113.34	2044955.77

R = 22.75

R = 22.75

GREEN BROOK

GREEN BROOK

Grassed Top of Levee
Sta 28+00 to 34+49

Sheetpile Cutoff

TRM

Top of Floodwall

Cutoff Wall

Transition Existing
2' wide swale into
3' wide swale

Restore Existing
Pavement as needed
to Station 28+00

REALIGN EXISTING SEGMENT B-1 LEVEE
START STA. 27+90
SEE PLAN SHEET C-103

EXISTING SEGMENT B-1 LEVEE
TO REMAIN (EXCEPT AT
WEIR. SEE PLAN SHEET C-102)

+El 40.0

27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 34+49

SHEETPILE CUTOFF WITH TURF REINFORCEMENT MAT (MAT)
NTS

SCALE: 1"=30'

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DESIGNED BY: NAS
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SUBMITTED BY: NAS
PLOT SCALE: 1" = 30'
PLOT DATE: 16 JANUARY 2015
SIZE: ANSI D
FILE NAME: GB_SEGB1B2C105.dgn

DATE: 16 JANUARY 2015
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
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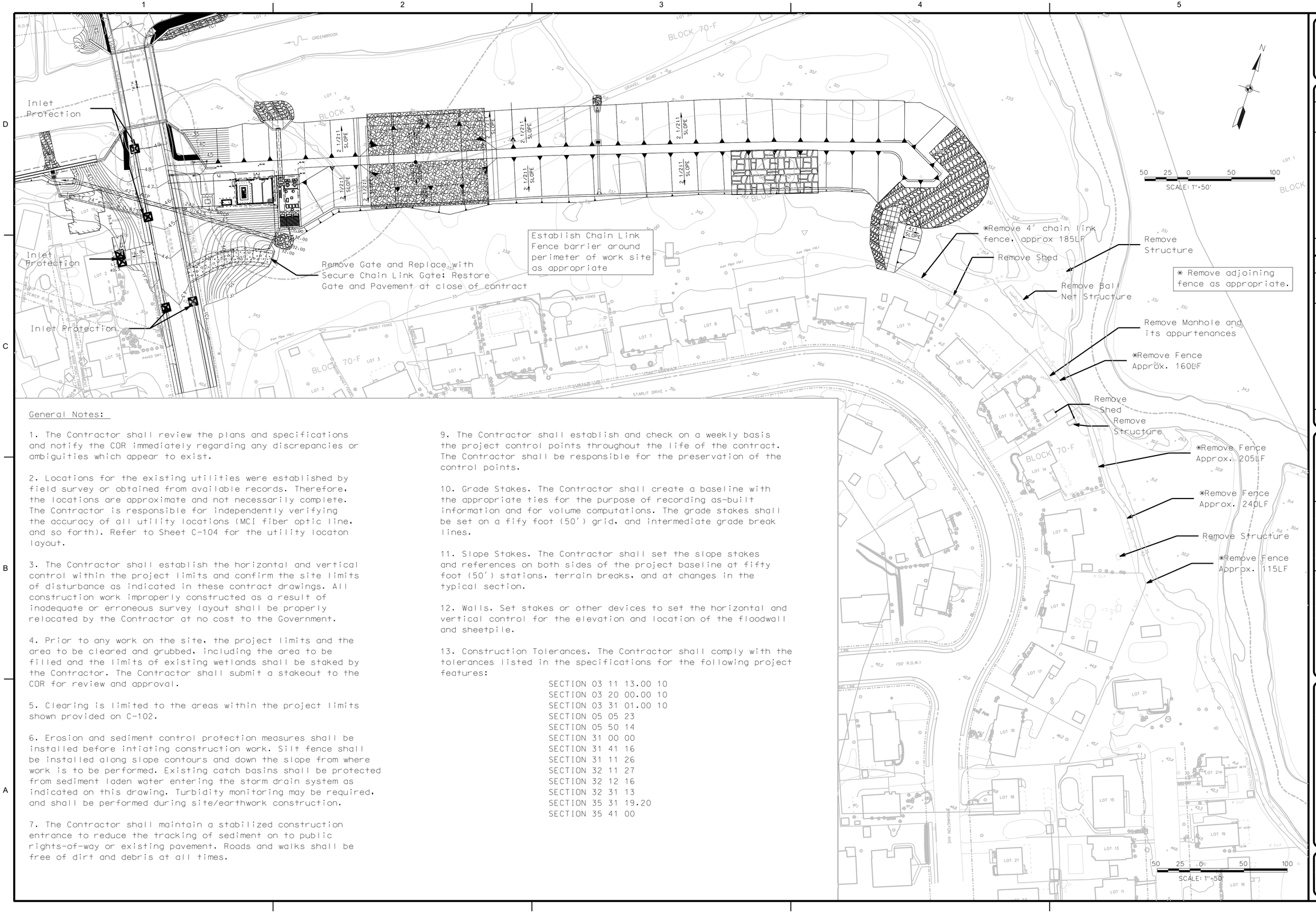
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

LEVEE SYSTEM
SITE PLAN

SHEET IDENTIFICATION
C-105
SHEET 12 OF 45



General Notes:

1. The Contractor shall review the plans and specifications and notify the COR immediately regarding any discrepancies or ambiguities which appear to exist.

2. Locations for the existing utilities were established by field survey or obtained from available records. Therefore, the locations are approximate and not necessarily complete. The Contractor is responsible for independently verifying the accuracy of all utility locations (MCI fiber optic line, and so forth). Refer to Sheet C-104 for the utility locaton layout.

3. The Contractor shall establish the horizontal and vertical control within the project limits and confirm the site limits of disturbance as indicated in these contract drawings. All construction work improperly constructed as a result of inadequate or erroneous survey layout shall be properly relocated by the Contractor at no cost to the Government.

4. Prior to any work on the site, the project limits and the area to be cleared and grubbed, including the area to be filled and the limits of existing wetlands shall be staked by the Contractor. The Contractor shall submit a stakeout to the COR for review and approval.

5. Clearing is limited to the areas within the project limits shown provided on C-102.

6. Erosion and sediment control protection measures shall be installed before intiating construction work. Silt fence shall be installed along slope contours and down the slope from where work is to be performed. Existing catch basins shall be protected from sediment laden water entering the storm drain system as indicated on this drawing. Turbidity monitoring may be required, and shall be performed during site/earthwork construction.

7. The Contractor shall maintain a stabilized construction entrance to reduce the tracking of sediment on to public rights-of-way or existing pavement. Roads and walks shall be free of dirt and debris at all times.

9. The Contractor shall establish and check on a weekly basis the project control points throughout the life of the contract. The Contractor shall be responsible for the preservation of the control points.

10. Grade Stakes. The Contractor shall create a baseline with the appropriate ties for the purpose of recording as-built information and for volume computations. The grade stakes shall be set on a fifty foot (50') grid, and intermediate grade break lines.

11. Slope Stakes. The Contractor shall set the slope stakes and references on both sides of the project baseline at fifty foot (50') stations, terrain breaks, and at changes in the typical section.

12. Walls. Set stakes or other devices to set the horizontal and vertical control for the elevation and location of the floodwall and sheetpile.

13. Construction Tolerances. The Contractor shall comply with the tolerances listed in the specifications for the following project features:

SECTION 03 11 13.00 10
SECTION 03 20 00.00 10
SECTION 03 31 01.00 10
SECTION 05 05 23
SECTION 05 50 14
SECTION 31 00 00
SECTION 31 41 16
SECTION 31 11 26
SECTION 32 11 27
SECTION 32 12 16
SECTION 32 31 13
SECTION 35 31 19.20
SECTION 35 41 00

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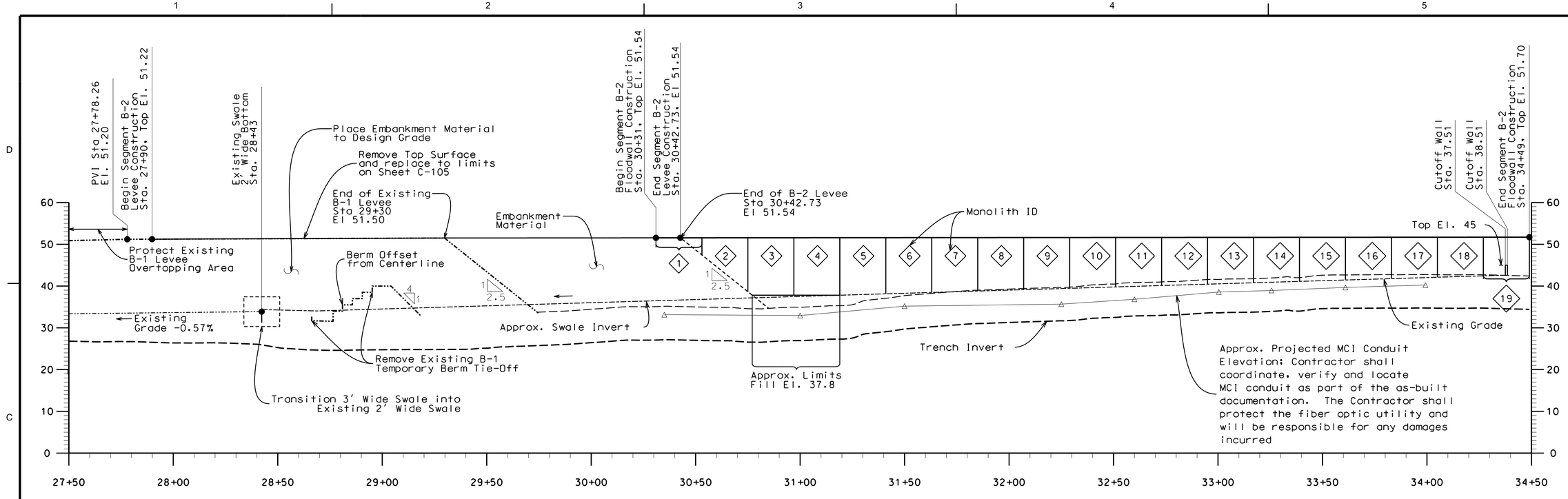
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1:1
PLOT DATE: 8 JANUARY 2016
ISSUE DATE: As noted
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEGB1B2C106.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

DEMOLITION PLAN

SHEET IDENTIFICATION
C-106
SHEET 13 OF 58



25 12.5 0 25 50FT

SCALE: 1"=25'

SEGMENT B-2 GENERAL FLOODWALL DATA

MONOLITH #	BEGIN STATION	BEGIN TOP OF WALL EL. (FT)	BEGIN TOE OF WALL EL. (FT)	END STATION	END TOP OF WALL EL. (FT)	END TOE OF WALL EL. (FT)
1	30+31.00	51.54	--	30+53.00	51.55	47.44
2	30+53.00	51.55	47.44	30+75.00	51.56	38.64
3	30+75.00	51.56	38.64	30+97.00	51.56	37.80
4	30+97.00	51.56	37.80	31+19.00	51.57	37.80
5	31+19.00	51.57	37.80	31+41.00	51.58	38.13
6	31+41.00	51.58	38.13	31+63.00	51.59	38.46
7	31+63.00	51.59	38.46	31+85.00	51.60	38.79
8	31+85.00	51.60	38.79	32+07.00	51.61	39.12
9	32+07.00	51.61	39.12	32+29.00	51.62	39.46
10	32+29.00	51.62	39.46	32+51.00	51.62	39.79
11	32+51.00	51.62	39.79	32+73.00	51.63	40.12
12	32+73.00	51.63	40.12	32+95.00	51.64	40.45
13	32+95.00	51.64	40.45	33+17.00	51.65	40.78
14	33+17.00	51.65	40.78	33+39.00	51.66	41.11
15	33+39.00	51.66	41.11	33+61.00	51.67	41.44
16	33+61.00	51.67	41.44	33+83.00	51.67	41.77
17	33+83.00	51.67	41.77	34+05.00	51.68	42.11
18	34+05.00	51.68	42.11	34+27.00	51.69	42.44
19	34+27.00	51.69	42.44	34+49.00	51.70	42.41

Notes:

1. Components of the existing Segment B-1 Levee and swale are based on the Segment B-1 Contract Drawings. not on as-built survey data. The Contractor is responsible for surveying the as-built conditions as part of the pre-survey and prior to clearing and grubbing operations.

2. Refer to Sheets C-103 and C-104 for Plan View information.

3. Refer to Sheet S-201 for the Structural Profile.

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

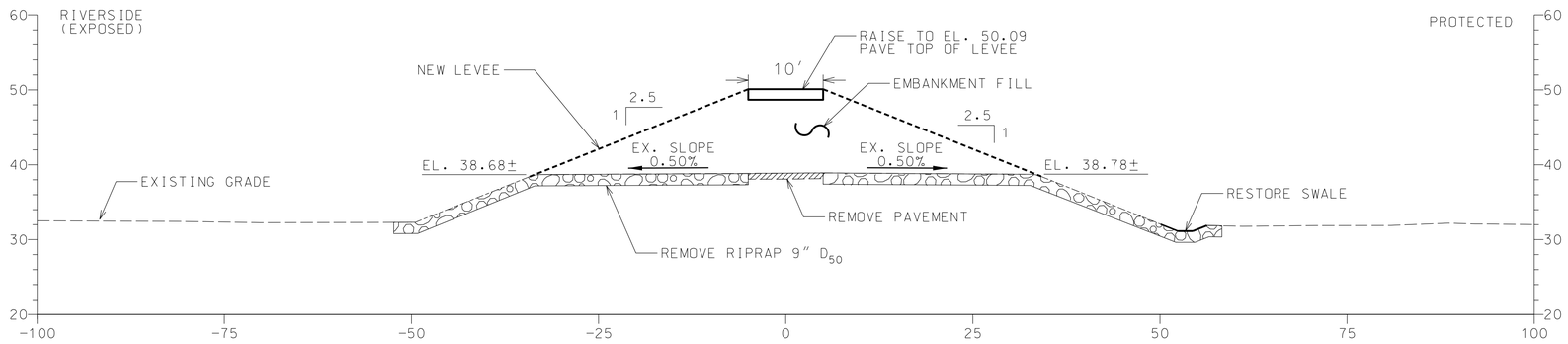
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: —
DWN BY: NAS
SUBMITTED BY: NAS
PLOT SCALE: 1"=25'
SIZE: ANSI D
DATE: 8 JANUARY 2016
CKD BY: NAS
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2C201.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

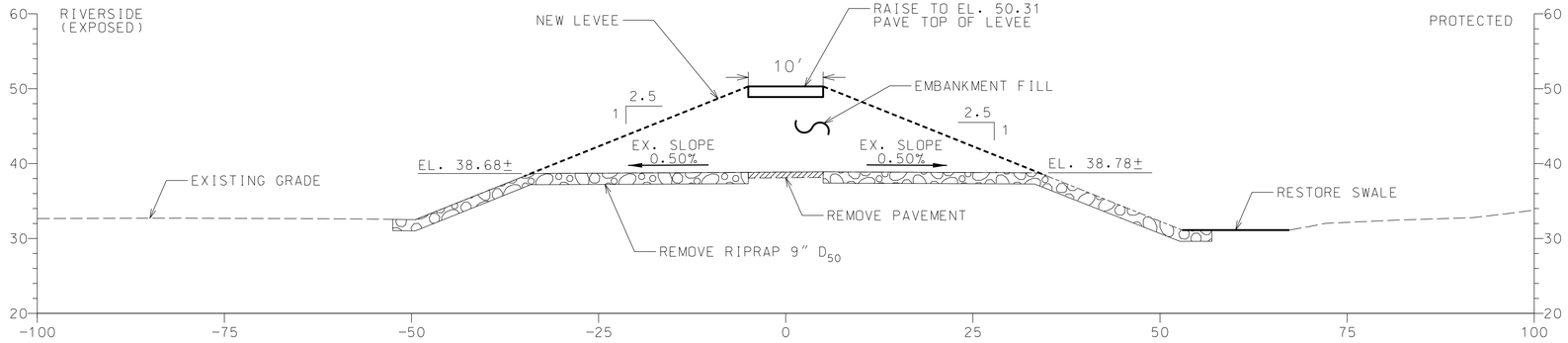
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

LEVEE SYSTEM PROFILE

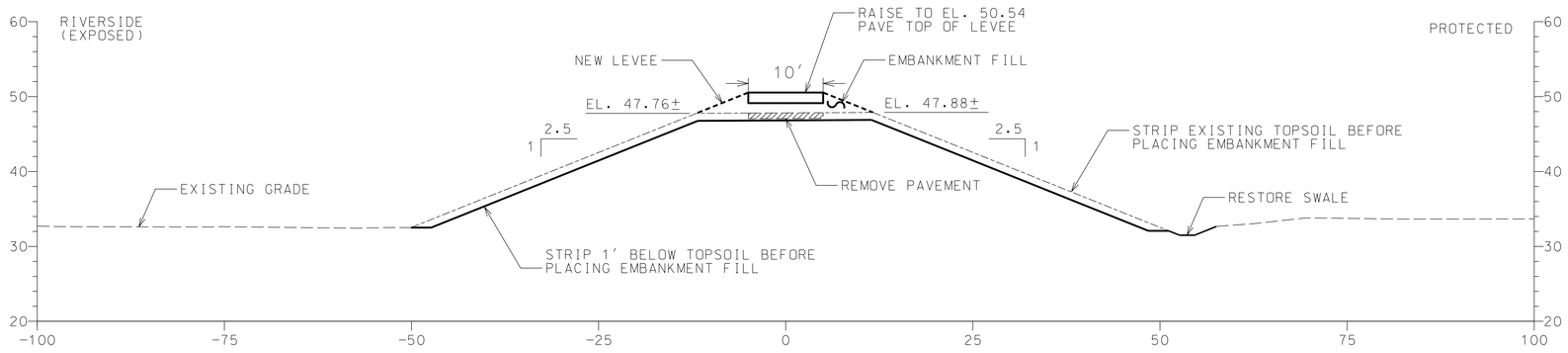
SHEET IDENTIFICATION
C-201
SHEET 14 OF 58



STA 23+00



STA 23+50



STA 24+00

NOTES:

1. Refer to Sheet C-104 for the Site Plan.
2. Refer to the Profile on Sheet C-201 for the levee design elevations.

10 5 0 10 20FT
SCALE: 1"= 10'

US Army Corps of Engineers®
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MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

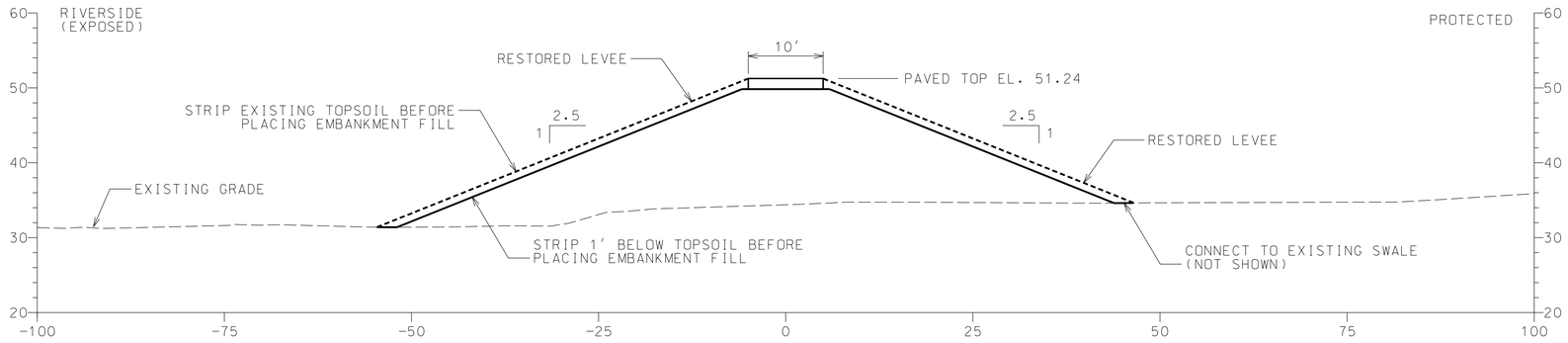
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: NAS
DWN BY: NAS
SUBMITTED BY: NAS
PLOT SCALE: 1" = 10'
SIZE: ANSI D
DATE: 8 JANUARY 2016
CKD BY:
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2C302.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

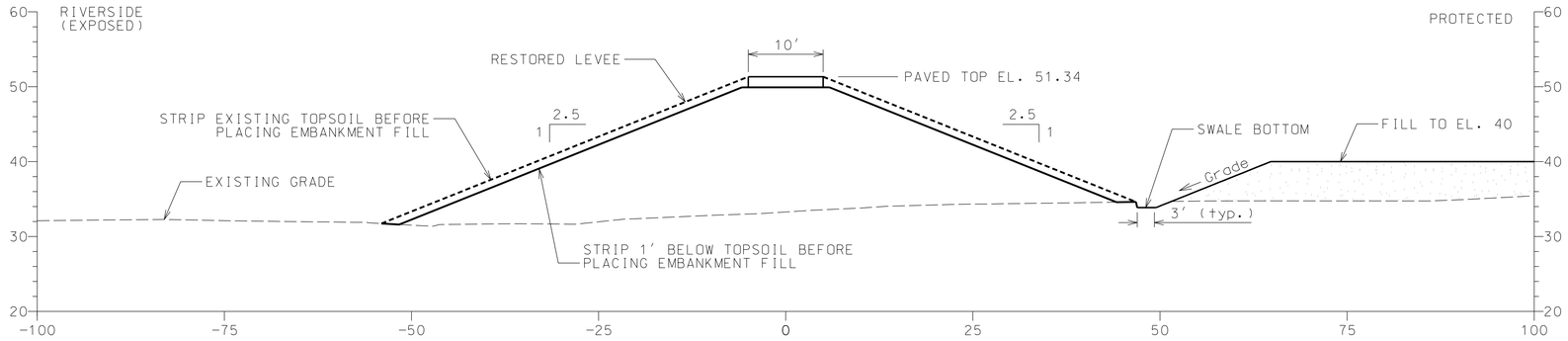
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP., NJ

LEVEE SYSTEM
CROSS-SECTIONS - 1

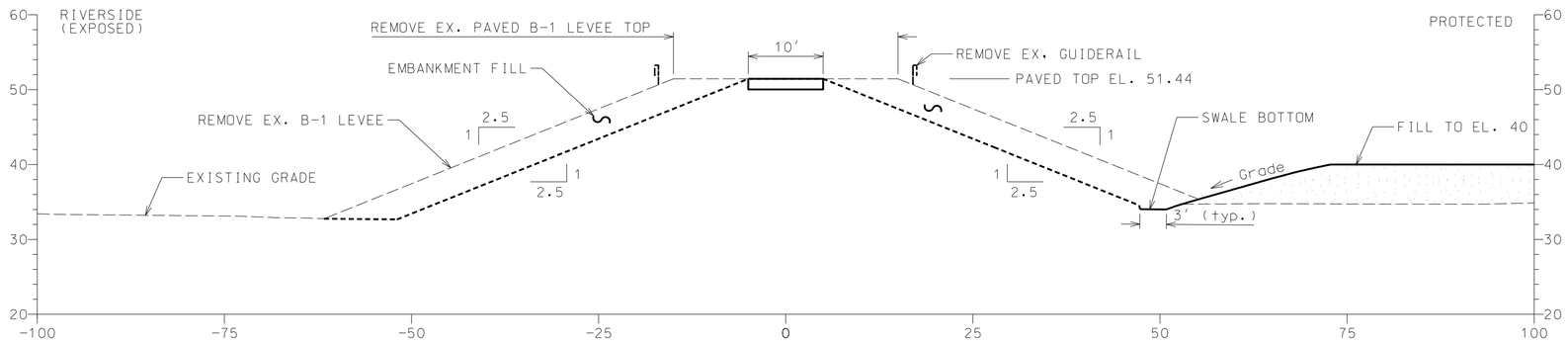
SHEET IDENTIFICATION
C-301
SHEET 15 OF 58



*STA 28+00



*STA 28+50



STA 29+00

NOTES:
1. Refer to Sheet C-104 for the Site Plan.
2. Refer to the Profile on Sheet C-201 for the levee design elevations.

*Implement only if levee is damaged and requires repair.

10 5 0 10 20FT
SCALE: 1"= 10'

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

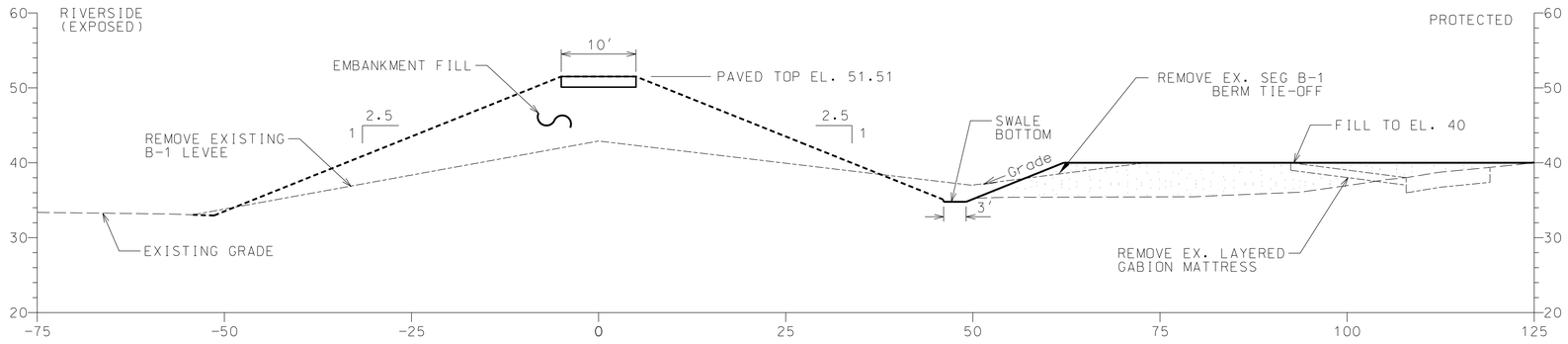
DESIGNED BY: NAS
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1" = 10'
PLOT DATE: 8 JANUARY 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEGB1B2C302.dgn

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

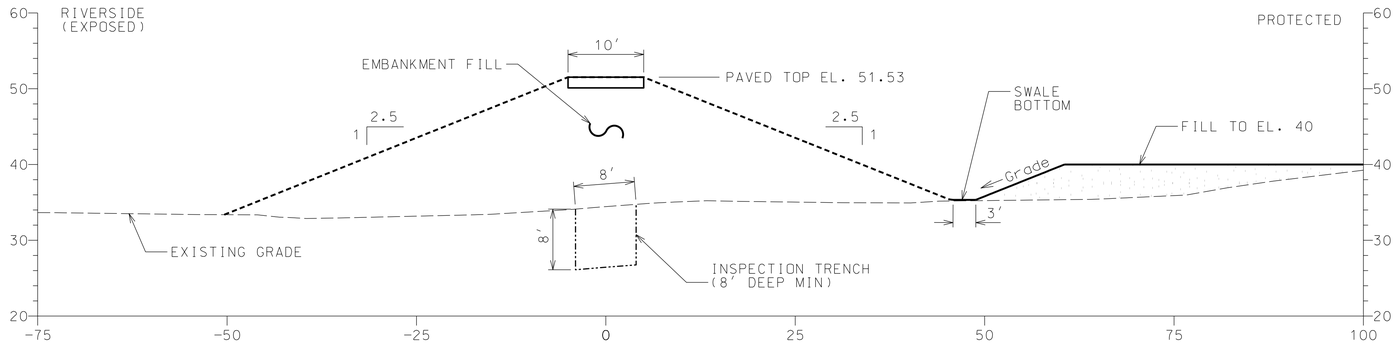
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

LEVEE SYSTEM
CROSS-SECTIONS - 2

SHEET IDENTIFICATION
C-302
SHEET 15 OF 58



STA 29+50



STA 30+00

NOTES:

1. Refer to Sheet C-104 for the Site Plan.
2. Refer to the Profiles on Sheet C-201 and Sheet S-201 for the levee and floodwall design elevations.

10 5 0 10 20FT
SCALE: 1"= 10'

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

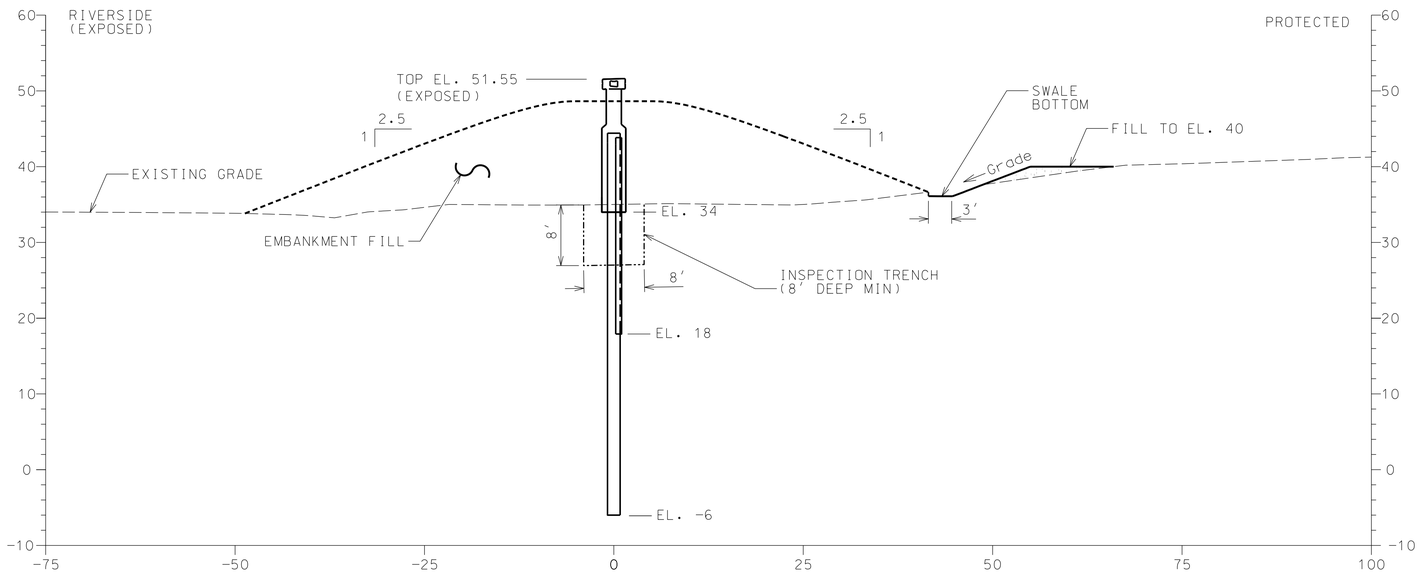
DESIGNED BY: NAS
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
PLOT SCALE: 1:1 = 10'
SIZE: ANSI D
DATE: 8 JANUARY 2016
ISSUE DATE: AS NOTED
FILE NAME: GB_SEGB1B2C302.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

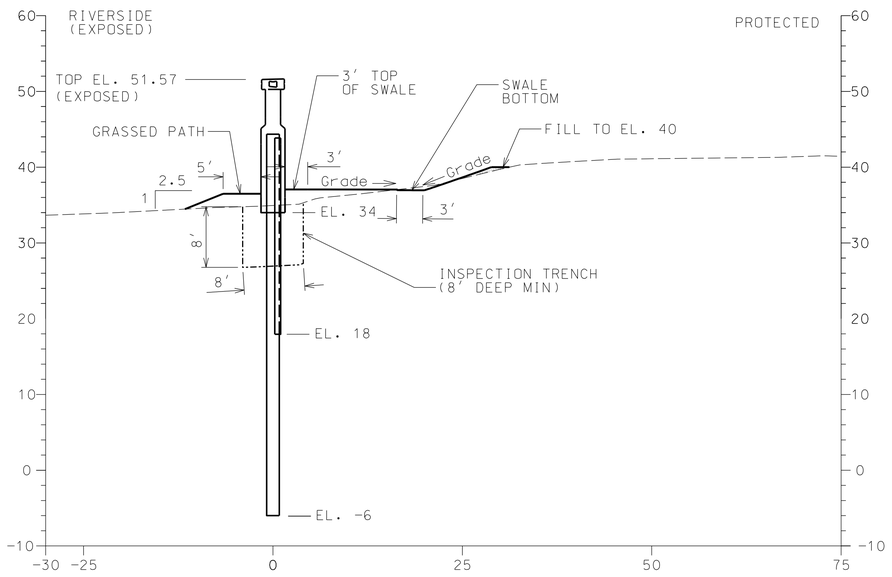
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

LEVEE SYSTEM
CROSS-SECTIONS - 3

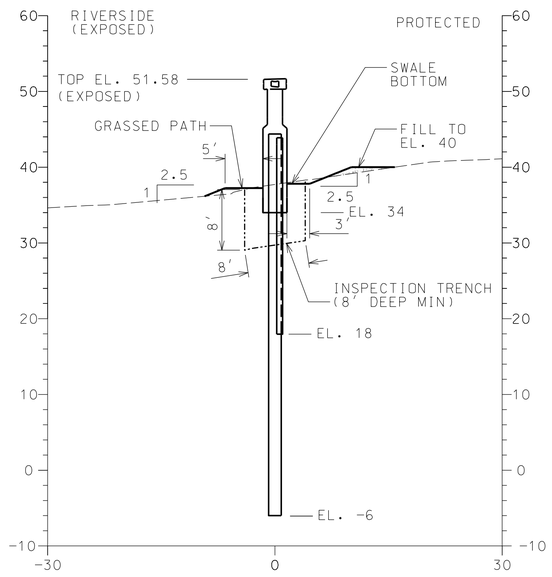
SHEET IDENTIFICATION
C-303
SHEET 15 OF 58



STA 30+50



STA 31+00



STA 31+50

10 5 0 10 20FT

SCALE: 1"= 10'

NOTES:

1. Refer to Sheet C-104 for the Site Plan.
2. Refer to the Profiles on Sheet C-201 and Sheet S-201 for the levee and floodwall design elevations.

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

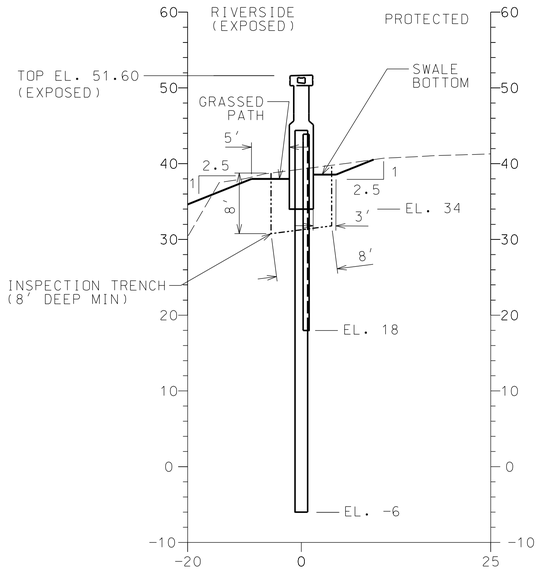
DESIGNED BY: NAS
DRWN BY: NAS
SUBMITTED BY: NAS
PLOT SCALE: 1"=10'
SIZE: ANSI D
DATE: 8 JANUARY 2016
CKD BY:
SOLICITATION NO.:
CONTRACT NO.:
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2C302.dgn
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

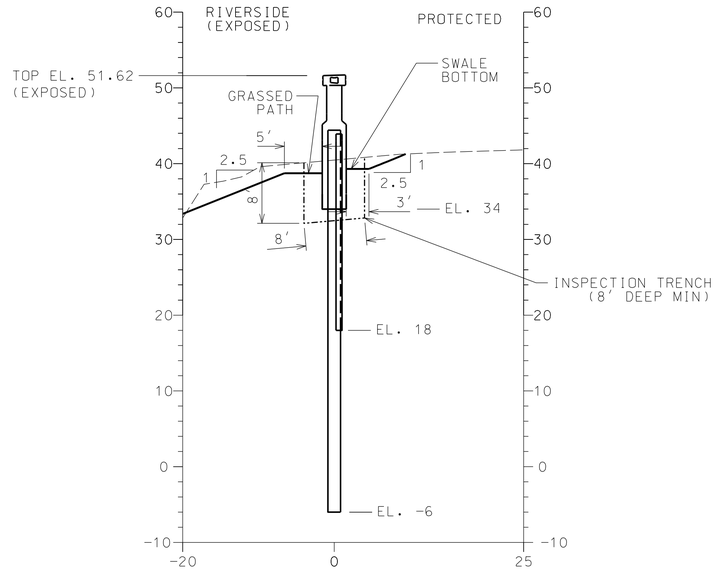
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

LEVEE SYSTEM
CROSS-SECTIONS - 4

SHEET IDENTIFICATION
C-304
SHEET 15 OF 58



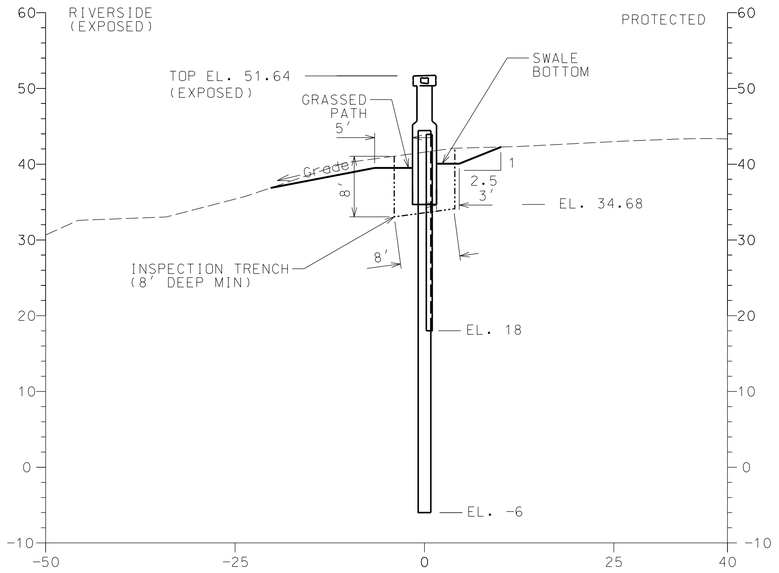
STA 32+00



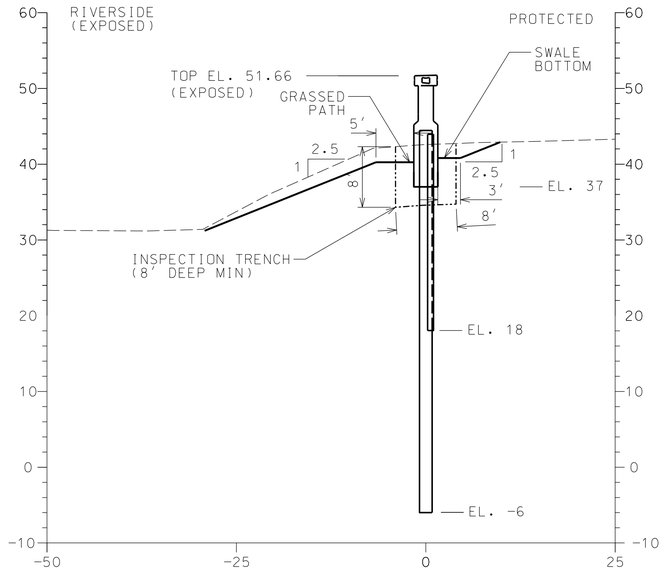
STA 32+50

NOTES:

1. Refer to Sheet C-104 for the Site Plan.
2. Refer to the Profiles on Sheet C-201 and Sheet S-201 for the levee and floodwall design elevations.



STA 33+00



STA 33+50

10 5 0 10 20FT
SCALE: 1"= 10'

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

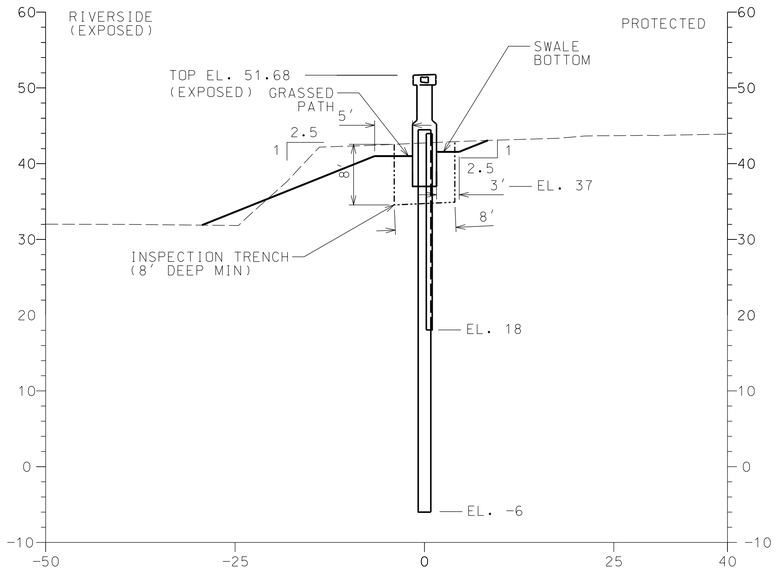
DESIGNED BY: NAS
DRWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT SCALE: 1"=10'
PLOT DATE: 8 JANUARY 2016
SIZE: ANSI D
FILE NAME: GB_SEG4B1B2C302.dgn

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

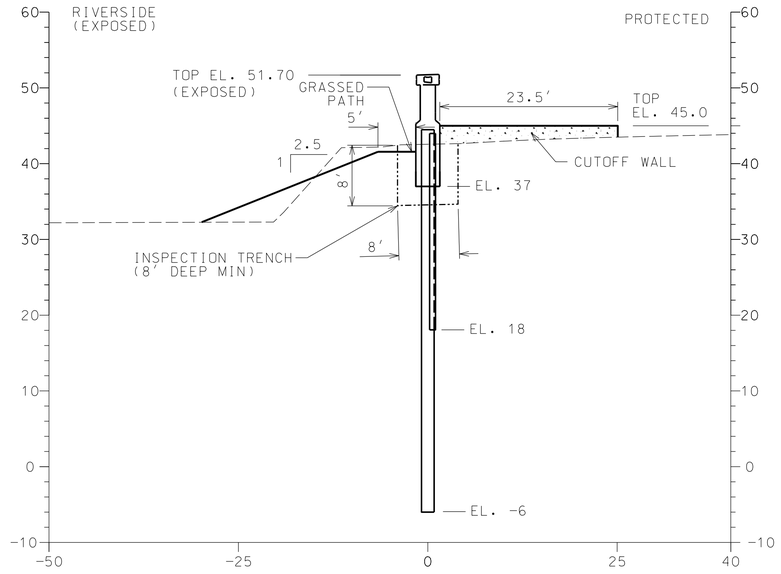
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

LEVEE SYSTEM
CROSS-SECTIONS - 5

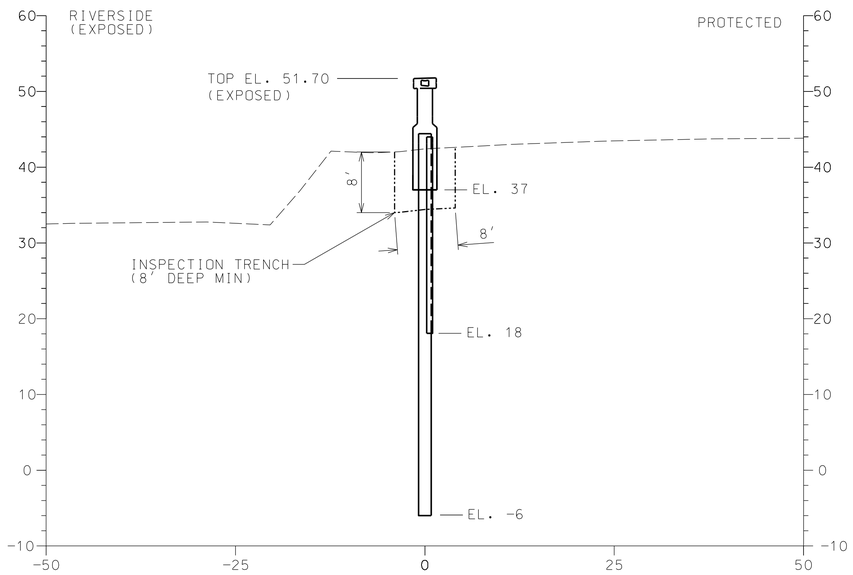
SHEET IDENTIFICATION
C-305
SHEET 15 OF 58



STA 34+00



STA 34+38



STA 34+49

NOTES:

1. Refer to Sheet C-104 for the Site Plan.
2. Refer to the Profiles on Sheet C-201 and Sheet S-201 for the levee and floodwall design elevations.

10 5 0 10 20FT
SCALE: 1"= 10'

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

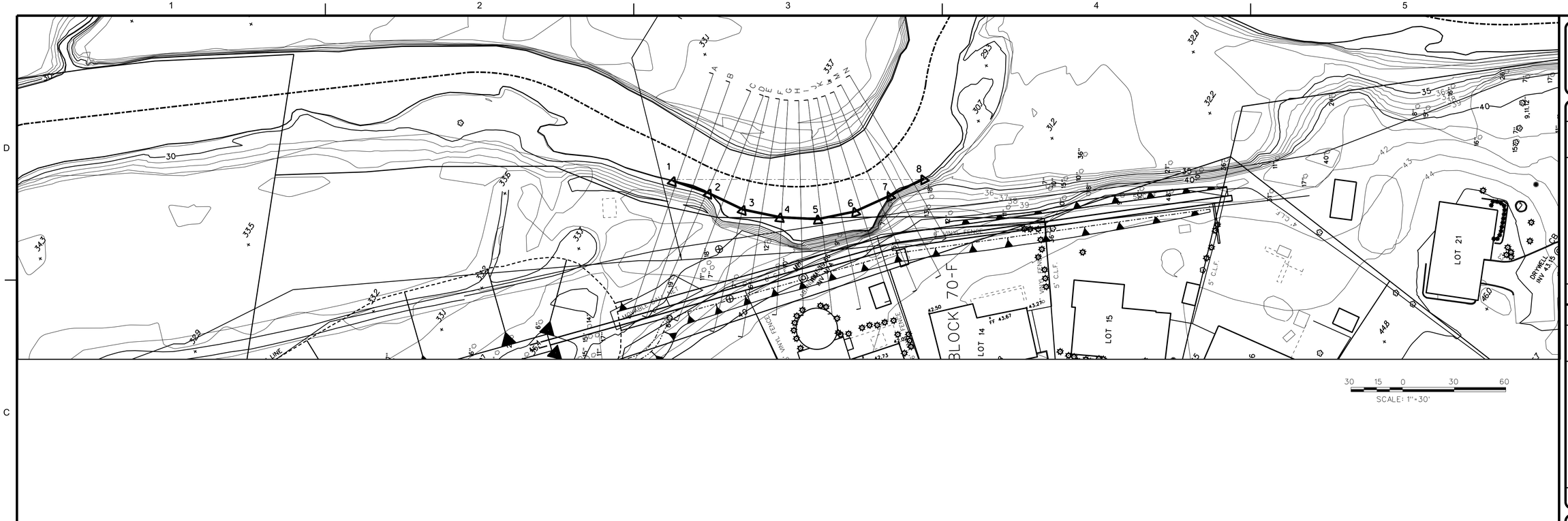
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: NAS
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1"=10'
ISSUE DATE: 8 JANUARY 2016
FILE NUMBER:
SIZE: ANSI D
FILE_NAME: GB_SEGB1B2C302.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

LEVEE SYSTEM
CROSS-SECTIONS - 6

SHEET IDENTIFICATION
C-306
SHEET 15 OF 58



SHEETPILE CUTOFF ALIGNMENT TABLE					
POINT	NORTHING	EASTING	COURSE	DISTANCE (FT)	BEARING
1	638142.72	2045069.58	-----	-----	
2	638121.25	2045074.39	1 - 2	22	S 12°36'40" E
3	638099.38	2045076.72	2 - 3	22	S 6°04'23" E
4	638078.7	2045084.23	3 - 4	22	S 19°58'33" E
5	638059.42	2045094.82	4 - 5	22	S 28°46'53" E
6	638043.42	2045109.92	5 - 6	22	S 43°19'53" E
7	638031.13	2045128.17	6 - 7	22	S 56°02'57" E
8	638019.65	2045146.94	7 - 8	22	S 58°32'15" E

US Army Corps of Engineers®
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MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

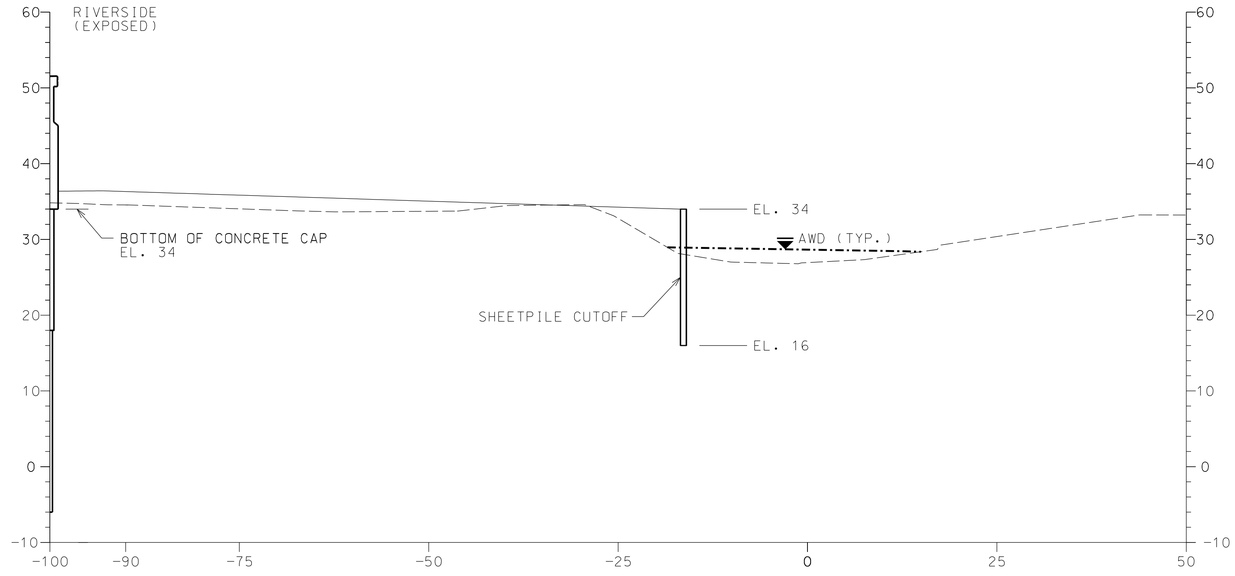
DESIGNED BY: NAS
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
PLOT SCALE: 1" = 30'
SIZE: ANSI D
DATE: 8 JANUARY 2016
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEQB1B2C105.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

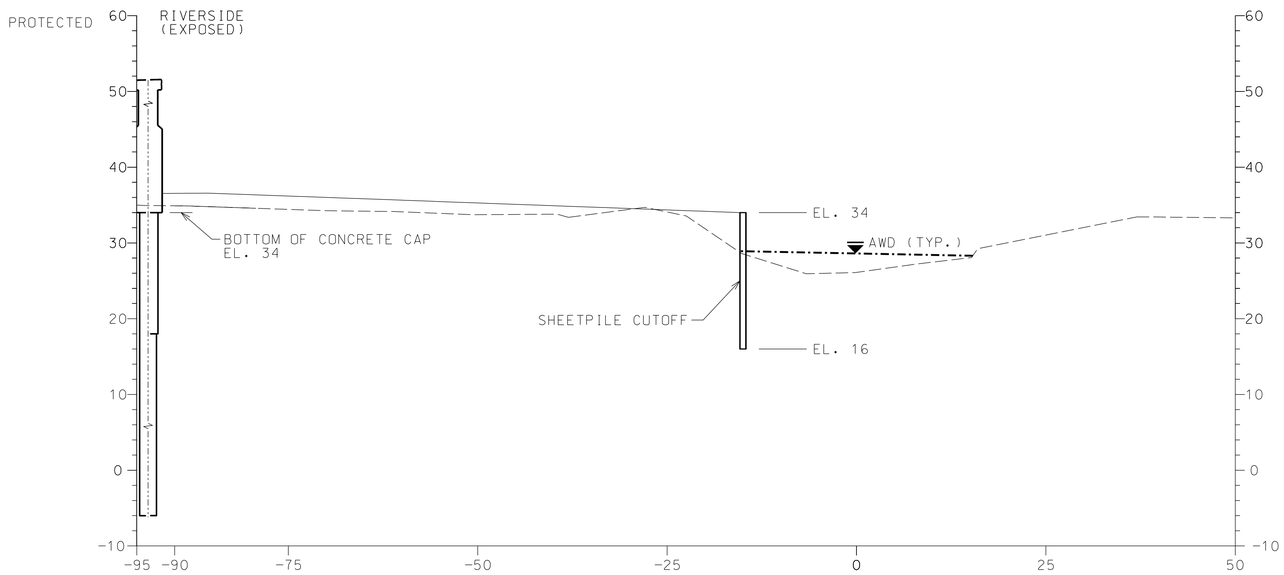
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

SHEETPILE CUTOFF
ALIGNMENT PLAN

SHEET IDENTIFICATION
C-105
SHEET 21 OF 58



SECT A-A 0+60



SECT B-B 0+70

10 5 0 10 20FT
SCALE: 1"= 10'

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

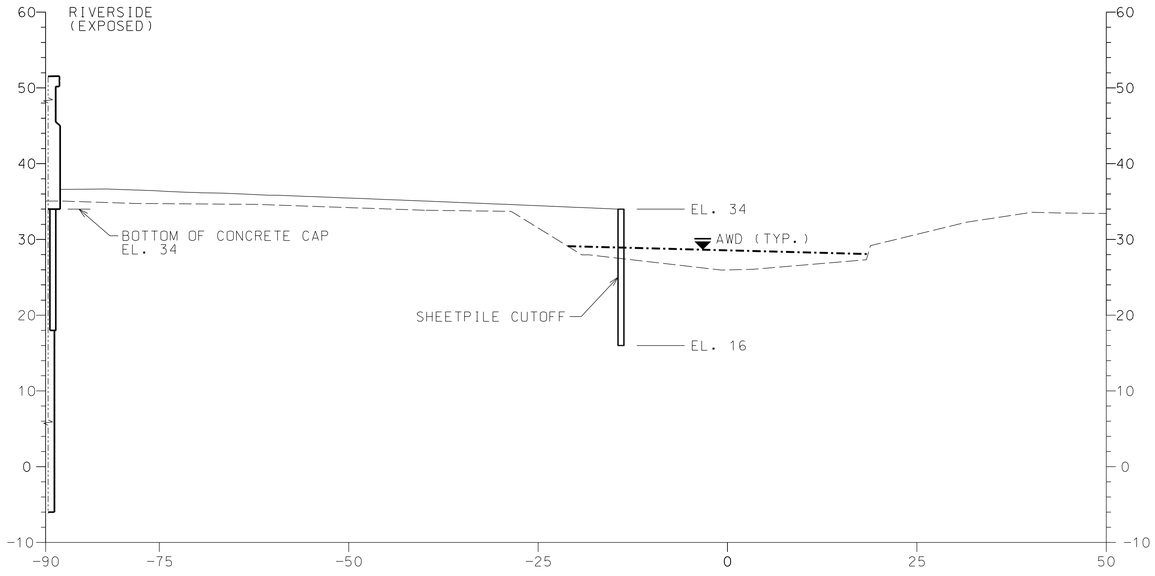
DESIGNED BY: NAS
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
PLOT SCALE: 1" = 10'
SIZE: ANSI D
DATE: 8 JANUARY 2016
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2C302.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

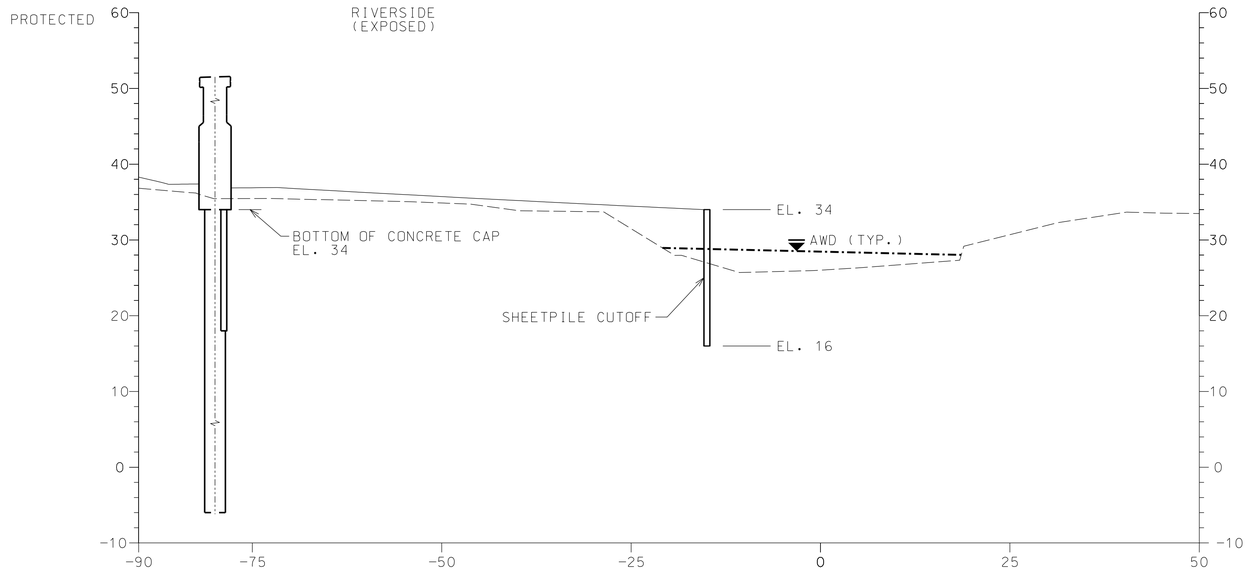
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

CHANNEL BEND TRM
CROSS-SECTIONS - 1

SHEET IDENTIFICATION
C-307
SHEET 22 OF 58



SECT C-C 0+80



SECT D-D 0+90

10 5 0 10 20FT
SCALE: 1"= 10'

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

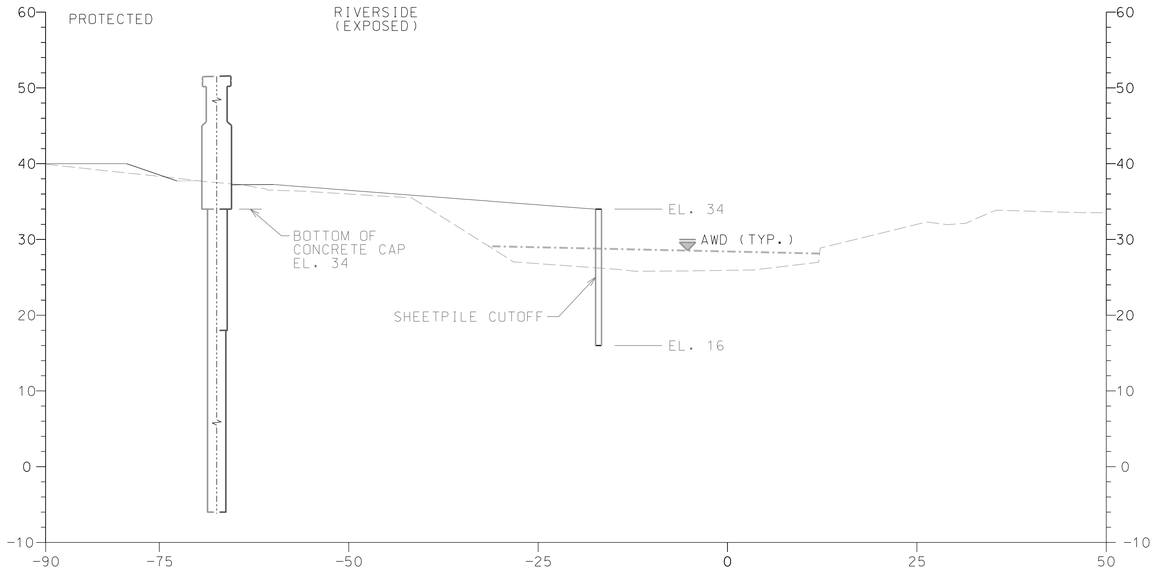
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: NAS
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
PLOT SCALE: 1 = 10'
SIZE: ANSI D
DATE: 8 JANUARY 2016
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2C302.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

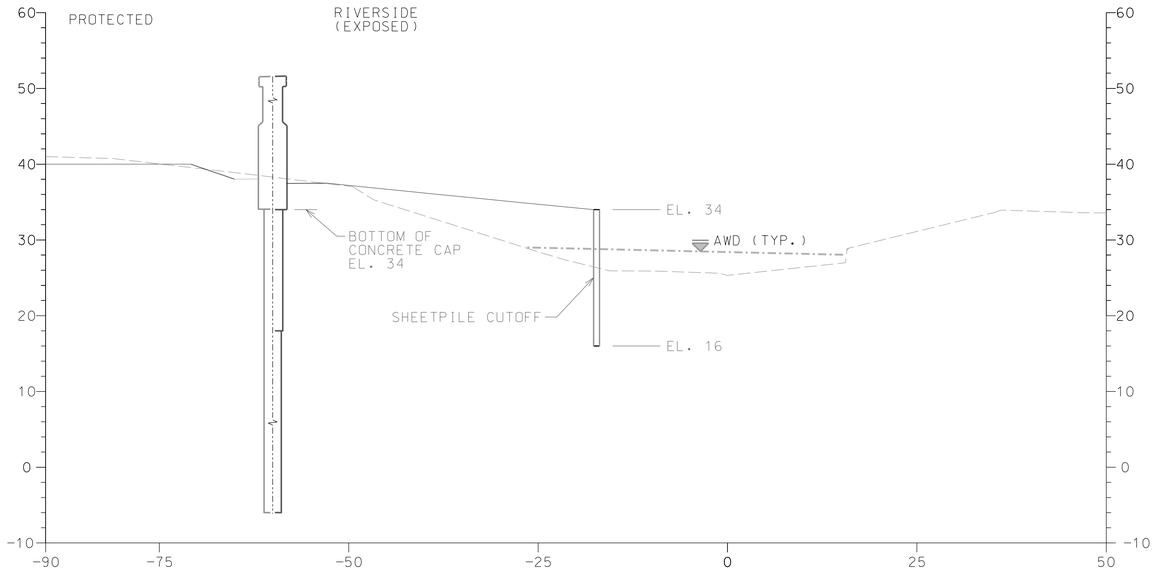
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

CHANNEL BEND TRM
CROSS-SECTIONS - 1

SHEET IDENTIFICATION
C-308
SHEET 23 OF 58



SECT E-E 1+00



SECT F-F 1+10

10 5 0 10 20FT
SCALE: 1"= 10'

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

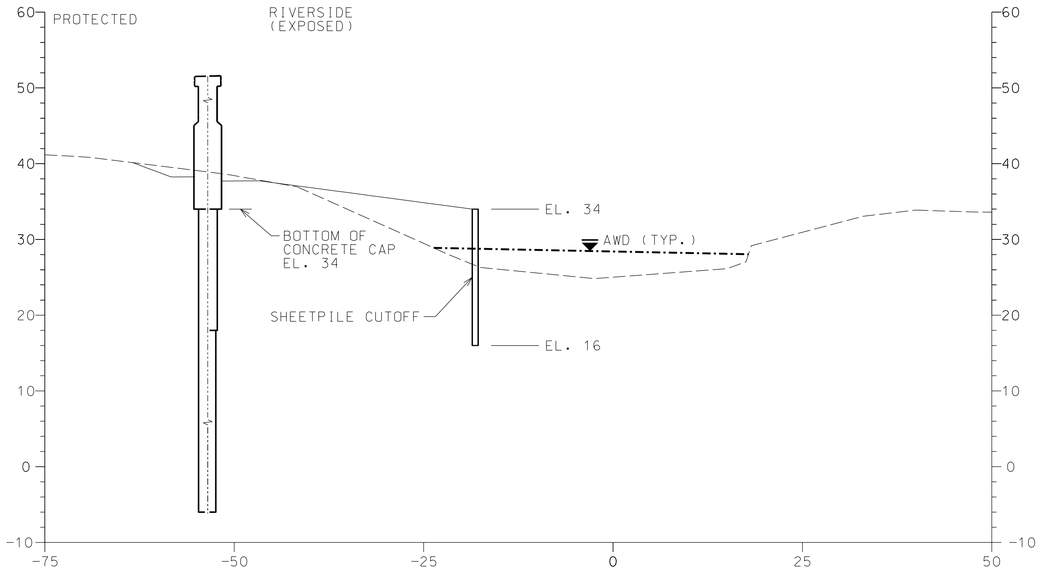
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: NAS
DWN BY: NAS
SUBMITTED BY: NAS
PLOT SCALE: 1" = 10'
ISSUE DATE: 8 JANUARY 2016
SIZE: ANSI D
FILE_NAME: GB_SEGB1B2C302.dgn
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

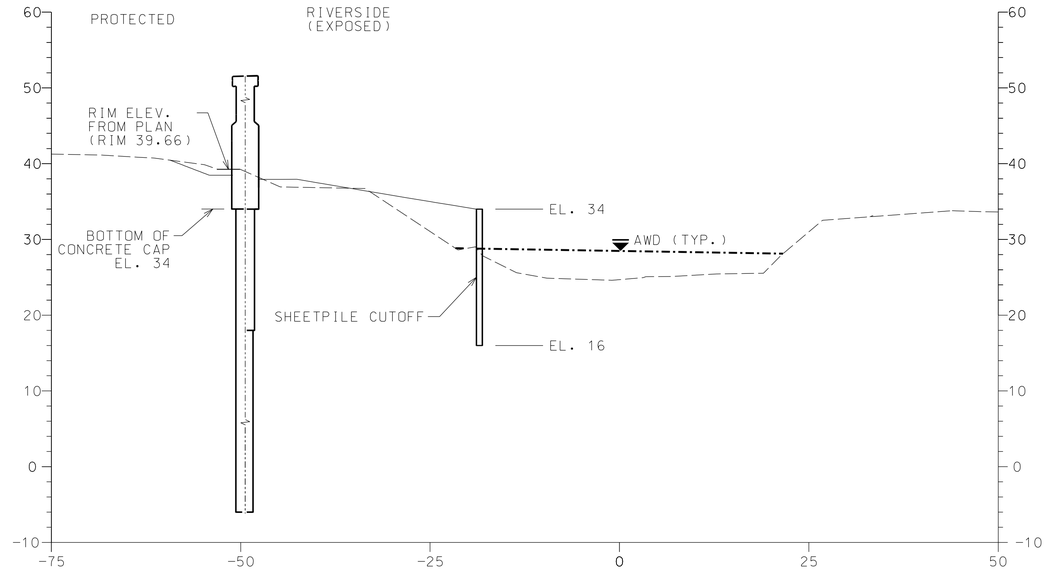
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

CHANNEL BEND TRM
CROSS-SECTIONS - 1

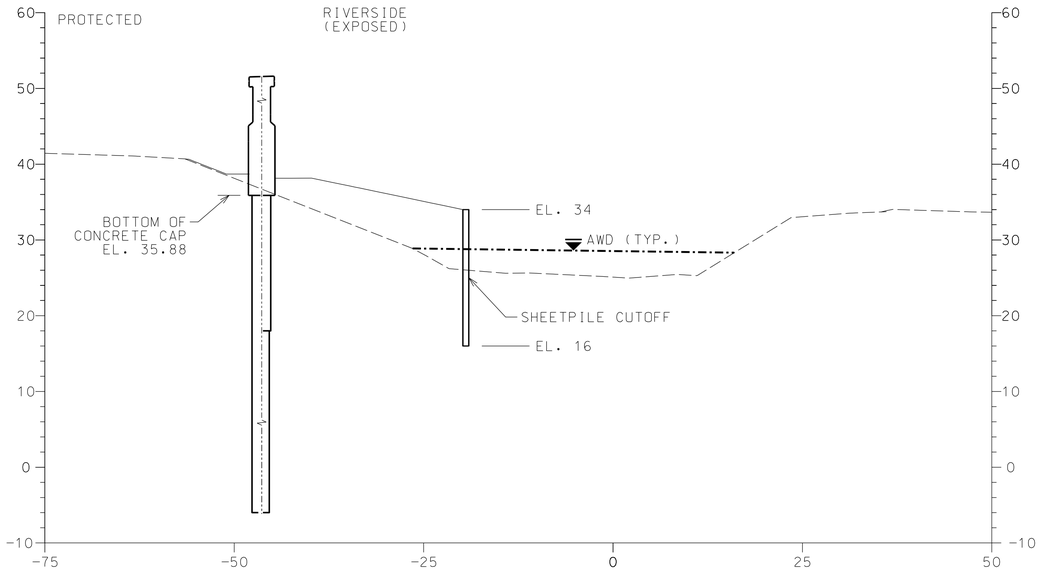
SHEET IDENTIFICATION
C-309
SHEET 24 OF 58



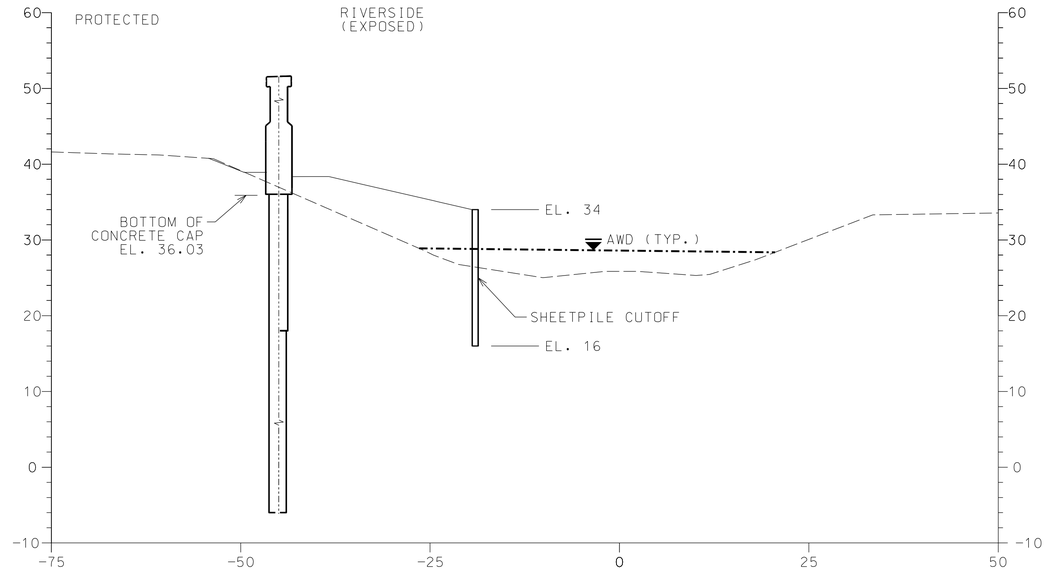
SECT G-G 1+20



SECT H-H 1+30



SECT I-I 1+40



SECT J-J 1+50

10 5 0 10 20FT
SCALE: 1"= 10'

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

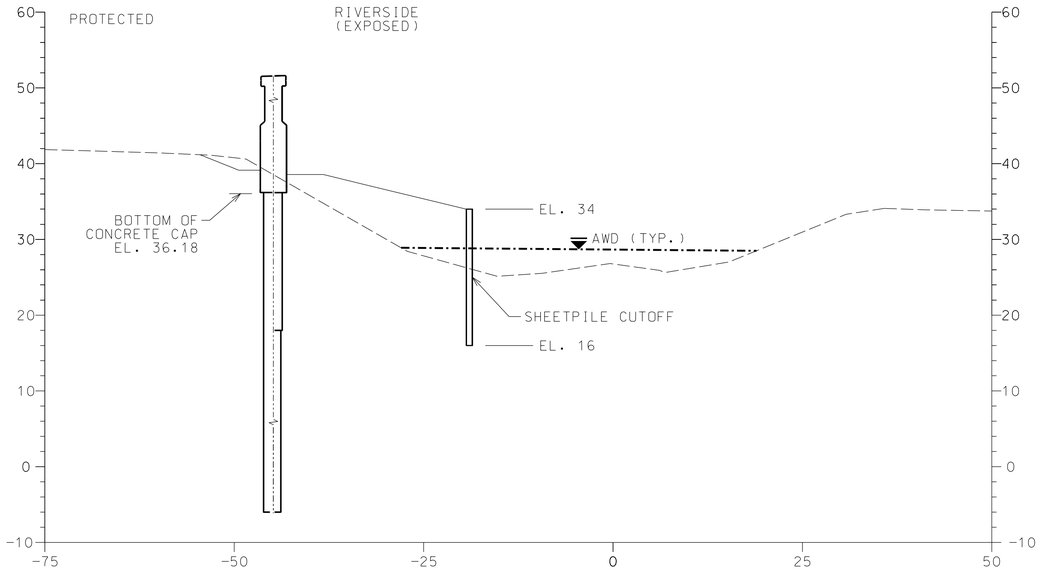
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: NAS
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
PLOT SCALE: 1"=10'
PLOT DATE: 8 JANUARY 2016
SIZE: ANSI D
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME: GB_SEGB1B2C302.dgn

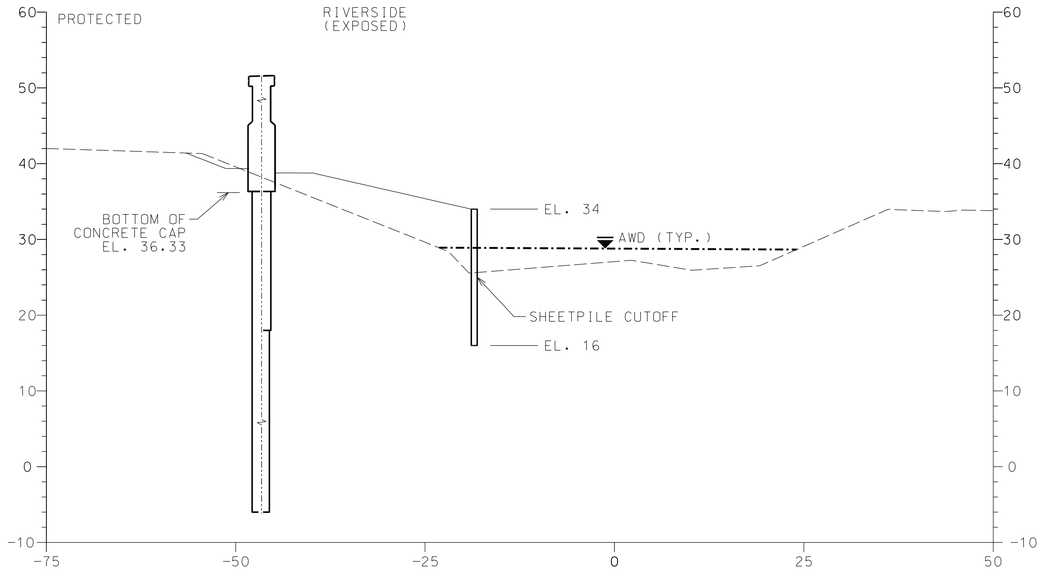
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

CHANNEL BEND TRM
CROSS-SECTIONS - 1

SHEET IDENTIFICATION
C-310
SHEET 25 OF 58



SECT K-K 1+60



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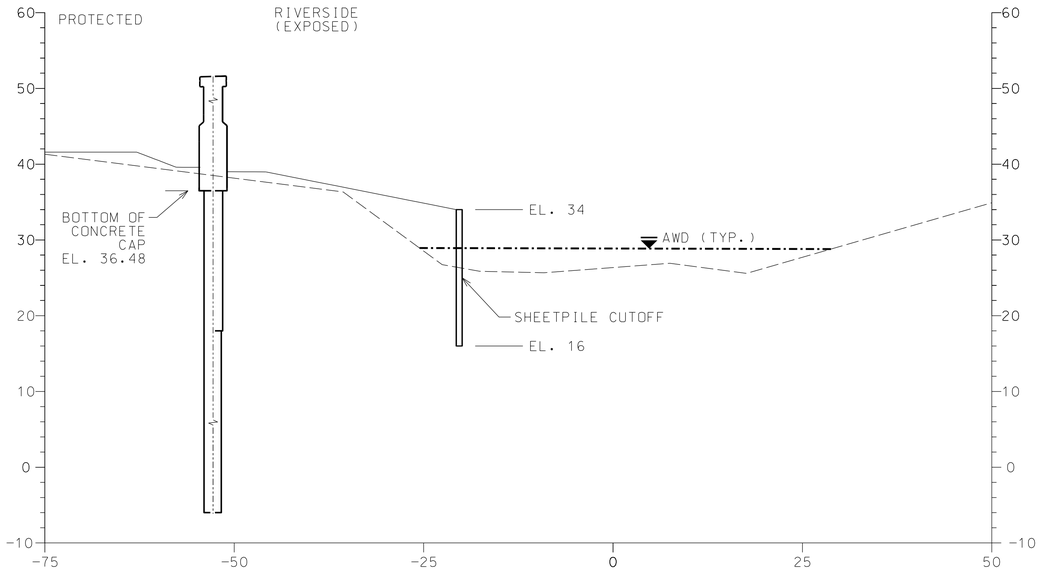

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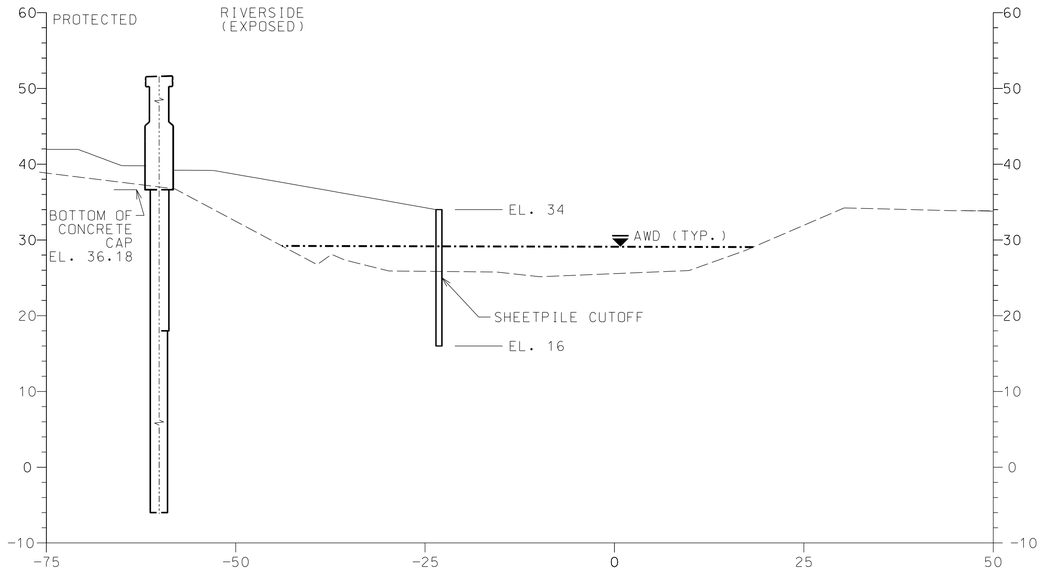

SECT N-N 1+90

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SCALE: 1"= 10'

US Army Corps of Engineers®
New York District

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MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: NAS
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CKD BY:
SUBMITTED BY: NAS
PLOT SCALE: 1:10
SIZE: ANSI D
DATE: 8 JANUARY 2016
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2C302.dgn
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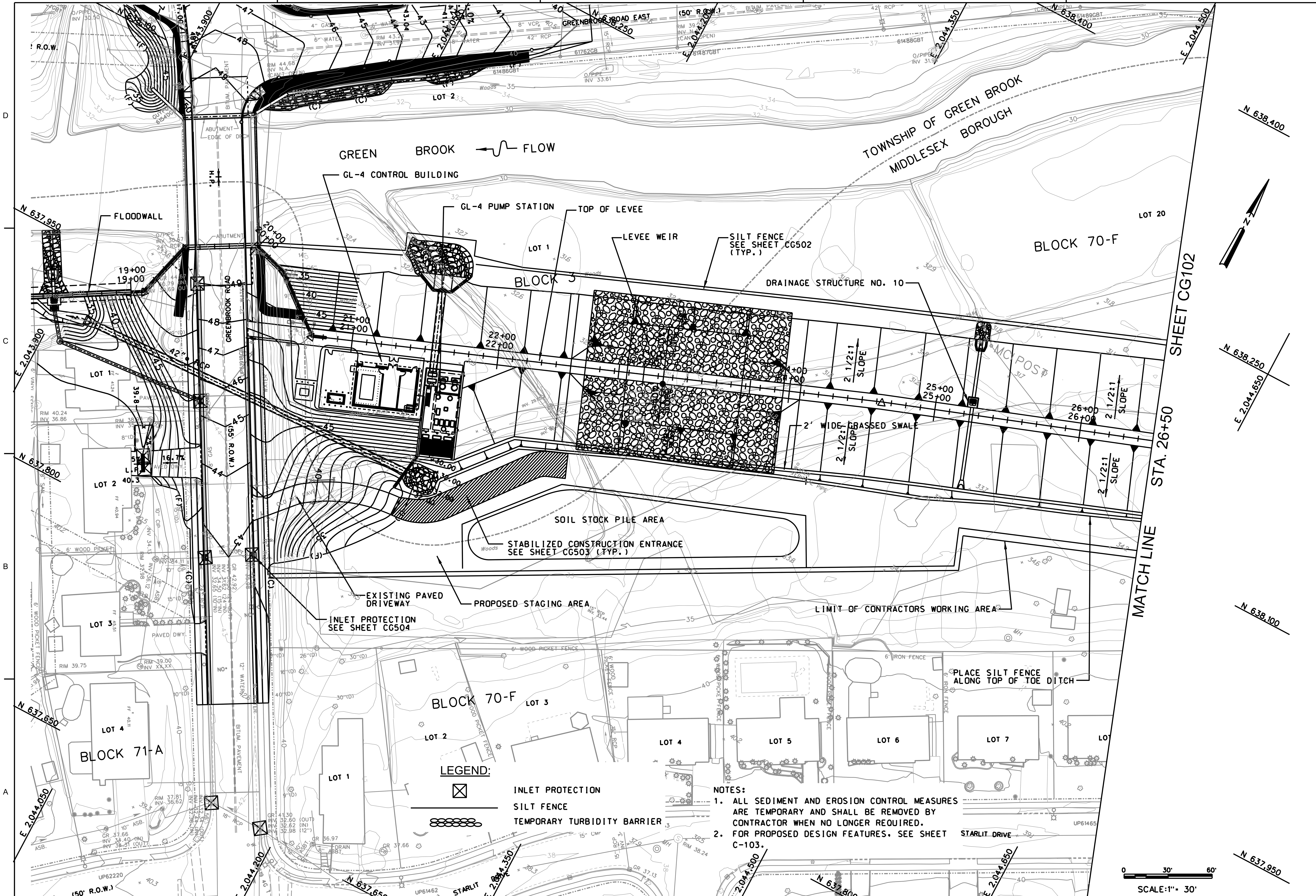
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

CHANNEL BEND TRM
CROSS-SECTIONS - 1

SHEET IDENTIFICATION
C-311
SHEET 26 OF 58



LEGEND:

- INLET PROTECTION
- SILT FENCE
- TEMPORARY TURBIDITY BARRIER

NOTES:

1. ALL SEDIMENT AND EROSION CONTROL MEASURES ARE TEMPORARY AND SHALL BE REMOVED BY CONTRACTOR WHEN NO LONGER REQUIRED.
2. FOR PROPOSED DESIGN FEATURES, SEE SHEET C-103.

SCALE: 1" = 30'

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New York District

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PLOT SCALE: 1" = 30'	ISSUE DATE: 8 JAN 2016	SOLICITATION NO.:	CONTRACT NO.:	FILE NUMBER:
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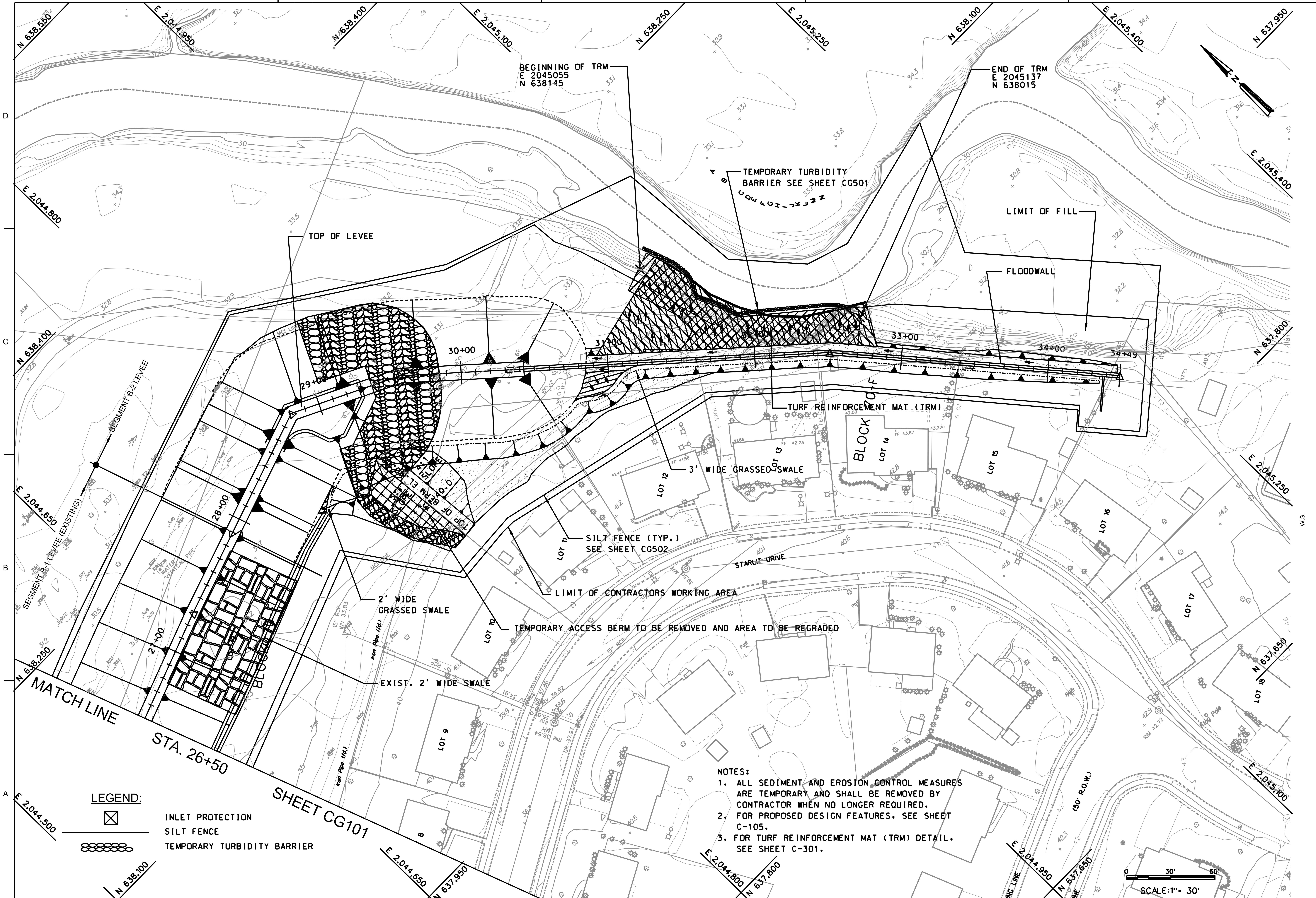
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

EROSION AND SEDIMENT CONTROL PLAN - 1

SHEET IDENTIFICATION
CG101



LEGEND:

- ⊠ INLET PROTECTION
- SILT FENCE
- TEMPORARY TURBIDITY BARRIER

NOTES:

1. ALL SEDIMENT AND EROSION CONTROL MEASURES ARE TEMPORARY AND SHALL BE REMOVED BY CONTRACTOR WHEN NO LONGER REQUIRED.
2. FOR PROPOSED DESIGN FEATURES, SEE SHEET C-105.
3. FOR TURF REINFORCEMENT MAT (TRM) DETAIL, SEE SHEET C-301.

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MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: —	DATE: 8 JANUARY 2016	
DWN BY: —	CKD BY: —	SOLICITATION NO.:
SUBMITTED BY: —		CONTRACT NO.:
PLOT SCALE: 1" = 30'	ISSUE DATE: 8 JAN 2016	FILE NUMBER:
SIZE: ANSI D	FILE NAME: ANSI D.nonPW.dgn	

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP., NJ

EROSION AND SEDIMENT CONTROL PLAN - 1

SHEET IDENTIFICATION
CG102
SHEET 28 OF 58

EROSION AND SEDIMENTATION CONTROL NOTES

FREEHOLD SOIL CONSERVATION DISTRICT

1. THE FREEHOLD SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED FORTY-EIGHT (48) HOURS IN ADVANCE OF ANY SOIL DISTURBING ACTIVITY.
2. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE INSTALLED PRIOR TO SOIL DISTURBANCE, OR IN THEIR PROPER SEQUENCE, AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
3. ANY CHANGES TO THE CERTIFIED SOIL EROSION AND SEDIMENT CONTROL PLANS WILL REQUIRE THE SUBMISSION OFREVISED SOIL EROSION AND SEDIMENT CONTROL PLANS TO THE DISTRICT FOR RE-CERTIFICATION. THE REVISED PLANS MUST MEET ALL CURRENT STATE SOIL EROSION AND SEDIMENT CONTROL STANDARDS.
4. N.J.S.A 4:24-39 ET. SEQ. REQUIRES THAT NO CERTIFICATES OF OCCUPANCY BE ISSUED BEFORE THE DISTRICT DETERMINES THAT A PROJECT OR PORTION THEREOF IS IN FULL COMPLIANCE WITH THE CERTIFIED PLAN AND STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY AND A REPORT OF COMPLIANCE HAS BEEN ISSUED. UPON WRITTEN REQUEST FROM THE APPLICANT, THE DISTRICT MAY ISSUE A REPORT OF COMPLIANCE WITH CONDITIONS ON A LOT-BY-LOT OR SECTION-BY-SECTION BASIS, PROVIDED THAT THE PROJECT OR PORTION THEREOF IS IN SATISFACTORY COMPLIANCE WITH THE SEQUENCE OF DEVELOPMENT AND TEMPORARY MEASURES FOR SOIL EROSION AND SEDIMENT CONTROL HAVE BEEN IMPLEMENTED, INCLUDING PROVISIONS FOR STABILIZATION AND SITE WORK.
5. ANY DISTURBED AREAS THAT WILL BE LEFT EXPOSED MORE THAN SIXTY (60) DAYS, AND NOT SUBJECT TO CONSTRUCTION TRAFFIC, WILL IMMEDIATELY RECEIVE A TEMPORARY SEEDING. IFTHE SEASON PREVENTS THE ESTABLISHMENT OF TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW, OR EQUIVALENT MATERIAL, AT A RATE OF 2 TO 2 YI TONS PER ACRE, ACCORDING TO THE STANDARD FOR STABILIZATION WITH MULCH ONLY.
6. IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING, ALL CRITICAL AREAS SUBJECT TO EROSION (I.E. SOIL STOCKPILES, STEEP SLOPES AND ROADWAY EMBANKMENTS) WILL RECEIVE TEMPORARY SEEDING IN COMBINATION WITH STRAW MULCH OR A SUITABLE EQUIVALENT, AND A MULCH ANCHOR, IN ACCORDANCE WITH STATE STANDARDS.
7. A SUB-BASE COURSE WILL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING AND INSTALLATION OF IMPROVEMENTS TO STABILIZE STREETS, ROADS, DRIVEWAYS, AND PARKING AREAS. IN AREAS WHERE NO UTILITIES ARE PRESENT, THE SUB-BASE SHALL BE INSTALLED WITHIN FIFTEEN (15) DAYS OF THE PRELIMINARY GRADING.
8. THE STANDARD FOR STABILIZED CONSTRUCTION ACCESS REQUIRES THE INSTALLATION OF A PAD OF CLEAN CRUSHED STONE AT POINTS WHERE TRAFFIC WILL BE ACCESSING THE CONSTRUCTION SITE. AFTER INTERIOR ROADWAYS ARE PAVED, INDIVIDUAL LOTS REQUIRE A STABILIZED CONSTRUCTION ACCESS CONSISTING OF ONE INCH TO TWO INCH (1" -2") STONE FOR A MINIMUM LENGTH OF TEN FEET (10') EQUAL TO THE LOT ENTRANCE WIDTH. ALL OTHER ACCESS POINTS SHALL BE BLOCKED OFF.
9. ALL SOIL WASHED, DROPPED, SPILLED, OR TRACKED OUTSIDE THE LIMIT OF DISTURBANCE OR ONTO PUBLIC RIGHT-OF-WAYS WILL BE REMOVED IMMEDIATELY.
10. PERMANENT VEGETATION IS TO BE SEEDED OR SODDED ON ALL EXPOSED AREAS WITHIN TEN (10) DAYS AFTER FINAL GRADING.
11. AT THE TIME THAT SITE PREPARATION FOR PERMANENT VEGETATIVE STABILIZATION IS GOING TO BE ACCOMPLISHED, ANY SOIL THAT WILL NOT PROVIDE A SUITABLE ENVIRONMENT TO SUPPORT ADEQUATE VEGETATIVE GROUND COVER SHALL BE REMOVED OR TREATED IN SUCH A WAY THAT IT WILL PERMANENTLY ADJUST THE SOIL CONDITIONS AND RENDER IT SUITABLE FOR VEGETATIVE GROUND COVER. IFTHE REMOVAL OR TREATMENT OF THE SOIL WILL NOT PROVIDE SUITABLE CONDITIONS, NON-VEGETATIVE MEANS OF PERMANENT GROUND STABILIZATION WILL HAVE TO BE EMPLOYED.
12. IN ACCORDANCE WITH THE STANDARD FOR MANAGEMENT OF HIGH ACID PRODUCING SOILS, ANY SOIL HAVING A PH OF 4 OR LESS OR CONTAINING IRON SULFIDES SHALL BE COVERD ULTIMATELY PLACED OR BURIED WITH LIMESTONE APPLIED AT THE RATE OF 10 TONS/ACRE, (OR 450 LBS/1,000 SQ FT OF SURFACE AREA) AND COVERED WITH A MINIMUM OF 12" OF SETTLED SOIL WITH A PH OF 5 OR MORE, OR 24" WHERE TREES OR SHRUBS ARE TO BE PLANTED.
13. CONDUIT OUTLET PROTECTION MUST BE INSTALLED AT ALL REQUIRED OUTFALLS PRIOR TO THE DRAINAGE SYSTEM BECOMING OPERATIONAL.
14. UNFILTERED DEWATERING IS NOT PERMITTED. NECESSARY PRECAUTIONS MUST BE TAKEN DURING ALL DEWATERING OPERATIONS TO MINIMIZE SEDIMENT TRANSFER. ANY DEWATERING METHODS USED MUST BE IN ACCORDANCE WITH THE STANDARD FOR DEWATERING.
15. SHOULD THE CONTROL OF DUST AT THE SITE BE NECESSARY, THE SITE WILL BE SPRINKLED UNTIL THE SURFACE IS WET. TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED OR MULCH SHALL BE APPLIED AS REQUIRED BY THE STANDARD FOR DUST CONTROL.
16. STOCKPILE AND STAGING LOCATIONS ESTABLISHED IN THE FIELD SHALL BE PLACED WITHIN THE LIMIT OF DISTURBANCE ACCORDING TO THE CERTIFIED PLAN. STAGING AND STOCKPILES NOT LOCATED WITHIN THE LIMIT OF DISTURBANCE WILL REQUIRE CERTIFICATION OF A REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN. CERTIFICATION OF A NEW SOIL EROSION AND SEDIMENT CONTROL PLAN MAY BE REQUIRED FOR THESE ACTIVITIES IF AN AREA GREATER THAN 5,000 SQUARE FEET IS DISTURBED.
17. ALL SOIL STOCKPILES ARE TO BE TEMPORARILY STABILIZED IN ACCORDANCE WITH SOIL EROSION AND SEDIMENT CONTROL NOTE #6.
18. THE PROPERTY OWNER SHALL BE RESPONSIBLE FOR ANY EROSION OR SEDIMENTATION THAT MAY OCCUR BELOW STORMWATER OUTFALLS OR OFFSITE AS A RESULT OF CONSTRUCTION OF THE PROJECT.

SOMERSET – UNION SOIL CONSERVATION DISTRICT

1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE INSTALLED PRIOR TO ANY MAJOR SOIL DISTURBANCES, OR IN THEIR PROPER SEQUENCE AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
2. ANY DISTURBED AREAS THAT WILL BE LEFT EXPOSED MORE THAN 30 DAYS AND NOT SUBJECT TO CONSTRUCTION TRAFFIC, WILL IMMEDIATELY RECEIVE A TEMPORARY SEEDING. IF THE SEASON PREVENTS THE ESTABLISHMENT OF A TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW, OR EQUIVALENT MATERIAL, AT A RATE OF TWO (2) TONS PER ACRE, ACCORDING TO NJ STATE STANDARDS
3. PERMANENT VEGETATION SHALL BE SEEDED OR SODDED ON ALL EXPOSED AREAS WITHIN TEN (10) DAYS AFTER FINAL GRADING. MULCH WILL BE USED FOR PROTECTION UNTIL SEEDING IS ESTABLISHED
4. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NJ STATE STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY.
5. A SUB-BASE COURSE WILL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING AND INSTALLATION OF IMPROVEMENTS IN ORDER TO STABILIZE STREETS, ROADS, DRIVEWAYS AND PARKING AREAS. IN AREAS WHERE NO UTILITIES ARE PRESENT, THE SUB-BASE SHALL BE INSTALLED WITHIN 15 DAYS OR PRELIMINARY GRADING.
6. IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING ALL CRITICAL AREAS SUBJECT TO EROSION (I.E.: STEEP SLOPES, ROADWAY EMBANKMENTS) WILL RECEIVE A TEMPORARY SEEDING IN COMBINATION WITH STRAW MULCH OR A SUITABLE EQUIVALENT, AT A RATE OF TWO (2) TONS PER ACRE, ACCORDING TO THE NJ STATE STANDARDS.
7. ANY STEEP SLOPES RECEIVING PIPELINE INSTALLATION WILL BE BACKFILLED AND STABILIZED DAILY, AS THE INSTALLATION PROCEEDS (I.E.: SLOPES GREATER THAT 3:1)
8. TRAFFIC CONTROL STANDARDS REQUIRE THE INSTALLATION OF A 50'X30'X6"PAD OF 1 1/2" OR 2" STONE, AT ALL CONSTRUCTION DRIVEWAYS, IMMEDIATELY AFTER INITIAL SITE DISTURBANCE.
9. THE SOMERSET-UNION SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED IN WRITING 48 HOURS IN ADVANCE OF ANY LAND DISTURBING ACTIVITY.
10. AT THE TIME WHEN THE SITE PREPARATION FOR PERMANENT VEGETATIVE STABILIZATION IS GOING TO BE ACCOMPLISHED, ANY SOIL THAT WILL NOT PROVIDE A SUITABLE ENVIRONMENT TO SUPPORT ADEQUATE VEGETATIVE GROUND COVER, SHALL BE REMOVED OR TREATED IN SUCH A WAY THAT WILL PERMANENTLY ADJUST THE SOIL CONDITIONS AND RENDER IT SUITABLE FOR VEGETATIVE GROUND COVER. IF THE REMOVAL OR TREATMENT OF THE SOIL WILL NOT PROVIDE SUITABLE CONDITIONS, NON-VEGETATIVE MEANS OF PERMANENT GROUND STABILIZATION WILL HAVE TO BE EMPLOYED.
11. IN THAT NJSA 4:24-39 ET SEQ., REQUIRES THAT NO CERTIFICATE OF OCCUPANCY BE ISSUED BEFORE THE PROVISIONS OF THE CERTIFIED PLAN FOR SOIL EROSION AND SEDIMENT CONTROL HAVE BEEN COMPLIED WITH FOR PERMANENT MEASURES, ALL SITE WORK FOR SITE PLANS AND ALL WORK AROUND INDIVIDUAL LOTS IN SUBDIVISIONS, WILL HAVE TO BE COMPLETED PRIOR TO THE DISTRICT ISSUING A REPORT OF COMPLIANCE FOR THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY BY THE MUNICIPALITY.
12. CONDUIT OUTLET PROTECTION MUST BE INSTALLED AT ALL REQUIRED OUTFALLS PRIOR TO THE DRAINAGE SYSTEM BECOMING OPERATIONAL.
13. ANY CHANGES TO THE CERTIFIED SOIL EROSION AND SEDIMENT CONTROL PLAN WILL REQUIRE THE SUBMISSION OF REVISED SOIL EROSION AND SEDIMENT CONTROL PLANS TO THE DISTRICT FOR RE-CERTIFICATION. THE REVISED PLANS MUST MEET ALL CURRENT NJ STATE SOIL EROSION & SEDIMENT CONTROL STANDARDS.
14. THE SOMERSET-UNION SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED OF ANY CHANGES IN OWNERSHIP.
15. MULCHING TO THE NJ STANDARDS IS REQUIRED FOR OBTAINING A CONDITIONAL REPORT OF COMPLIANCE. CONDITIONALS ARE ONLY ISSUED WHEN THE SEASON PROHIBITS SEEDING.
16. CONTRACTOR IS RESPONSIBLE FOR KEEPING ALL ADJACENT ROADS CLEAN DURING LIFE OF CONSTRUCTION PROJECT.
17. THE DEVELOPER SHALL BE RESPONSIBLE FOR REMEDIATING ANY EROSION OR SEDIMENT PROBLEMS THAT ARISE AS A RESULT OF ONGOING CONSTRUCTION AT THE REQUEST OF THE SOMERSET-UNION SOIL CONSERVATION DISTRICT.
18. HYDRO SEEDING IS A TWO- STEP PROCESS. THE FIRST STEP INCLUDES SEED, FERTILIZER, LIME, ETC., ALONG WITH MINIMAL AMOUNTS OF MULCH TO PROMOTE CONSISTENCY, GOOD SEED TO SOIL CONTACT, AND GIVE A VISUAL INDICATION OF COVERAGE. UPON COMPLETION OF SEEDING OPERATION, HYDRO-MULCH SHOULD BE APPLIED AT A RATE OF 1500 LBS. PER ACRE IN SECOND STEP. THE USE OF HYDRO-MULCH, AS OPPOSED TO STRAW, IS LIMITED TO OPTIMUM SEEDING DATES AS LISTED IN THE NJ STANDARDS.

FREEHOLD SOIL CONSERVATION DISTRICT
(FOR MIDDLESEX COUNTY)
4000 KOZLOSKI ROAD
FREEHOLD, NJ 07728
(732) 683-8500

SOMERSET-UNION SOIL CONSERVATION DISTRICT
SOMERSET COUNTY 4-H CENTER
308 MILLTOWN ROAD
BRIDGEWATER, NJ 08807
(908) 526-2701

ADDITIONAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE CONFIRMATION OF LIME, FERTILIZER, SEED APPLICATION AND RATES OF APPLICATION AT THE REQUEST OF THE CONTRACTING OFFICER REPRESENTATIVE.
2. OFFSITE SEDIMENT DISTURBANCE MAY REQUIRE ADDITIONAL CONTROL MEASURES TO BE DETERMINED BY THE CONTRACTING OFFICER REPRESENTATIVE.
3. THE CONTRACTOR SHALL INFORM THE CONTRACTING OFFICER REPRESENTATIVE PRIOR TO NOTIFYING THE SOIL CONSERVATION DISTRICT.
4. THE CONTRACTOR SHALL SUBMIT APPLICATION FEES AND FINAL SEQUENCING PLAN AS APPROVED BY THE CONTRACTING OFFICER TO THE SOIL CONSERVATION DISTRICTS TO OBTAIN THE REQUIRED CERTIFICATION.

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NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: —
DWN BY: —
CKD BY: —
SUBMITTED BY: —
PLOT SCALE:
DATE: 8 JANUARY 2016
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FILE NAME: ANSI D mod\FW.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

EROSION AND SEDIMENT CONTROL NOTES - 1

SHEET IDENTIFICATION
CG001
SHEET 29 OF 58

REQUIREMENT FOR DUST CONTROL

DEFINITION

THE CONTROL OF DUST ON CONSTRUCTION SITES AND ROADS.

PURPOSE

TO PREVENT BLOWING AND MOVEMENT OF DUST FROM EXPOSED SOIL SURFACES, REDUCE ON– AND OFF–SITE DAMAGE AND HEALTH HAZARDS, AND IMPROVE TRAFFIC SAFETY.

WHERE APPLICABLE

THIS PRACTICE IS APPLICABLE TO AREAS SUBJECT TO DUST BLOWING AND MOVEMENT WHERE ON– AND OFF–SITE DAMAGE IS LIKELY WITHOUT TREATMENT. CONSULT WITH LOCAL MUNICIPAL ORDINANCES ON ANY RESTRICTIONS.

PLANNING CRITERIA

THE FOLLOWING METHODS SHOULD BE CONSIDERED FOR CONTROLLING DUST:

SPRAY–ON ADHESIVES – ON MINERAL SOILS (NOT EFFECTIVE ON MUCK SOILS). KEEP TRAFFIC OFF THESE AREAS.

	WATER DILUTION	TYPE OF NOZZLE	APPLY GALLONS/ACRE
ANIONIC ASPHALT EMULSION LATEX EMULSION RESIN IN WATER	7:1 12.5:1 4:1	COARSE SPRAY FINE SPRAY FINE SPRAY	1,200 235 300
POLYACRYLMIDE (PAM) – SPRY–ON POLYACRYLMIDE (PAM) – DRY–SPREAD	APPLY ACCORDING TO MANUFACTURER'S INSTRUCTIONS.		
ACIDULATED SOY BEAN SOAP STICK	NONE	COARSE SPRAY	1,200

TILLAGE – TO ROUGHEN SURFACE AND BRING CLODS TO THE SURFACE. THIS IS A TEMPORARY EMERGENCY MEASURE WHICH SHOULD BE USED BEFORE SOIL BLOWING STARTS. BEGIN PLOWING ON WINDWARD SIDE OF SITE. CHISEL–TYPE PLOWS SPACED ABOUT 12 INCHES APART, AND SPRING–TOOTHED HARROWS ARE EXAMPLES OF EQUIPMENT WHICH MAY PRODUCE THE DESIRED EFFECT.

SPRINKLING – SITE IS SPRINKLED UNTIL THE SURFACE IS WET.

BARRIERS – SOLID BOARD FENCES, SNOW FENCES, BURLAP FENCES, CRATE WALLS, BALES OF HAY, AND SIMILAR MATERIAL CAN BE USED TO CONTROL AIR CURRENTS AND SOIL BLOWING.

CALCIUM CHLORIDE – SHALL BE IN THE FORM OF LOOSE, DRY GRANULES OR FLAKES FINE ENOUGH TO FEED THROUGH COMMONLY USED SPREADERS AT A RATE THAT WILL KEEP SURFACE MOIST BUT NOT CAUSE POLLUTION OR PLANT DAMAGE. IF USED ON STEEPER SLOPES, THEN USE OTHER PRACTICES TO PREVENT WASHING INTO STREAMS OR ACCUMULATION AROUND PLANTS.

STONE – COVER SURFACE WITH CRUSHED STONE OR COARSE GRAVEL.

REQUIREMENT FOR PERMANENT VEGETATION

1. SEEDBED PREPARATION

A. APPLY GROUND LIMESTONE AND FERTILIZER ACCORDING TO SOIL TEST RECOMMENDATIONS SUCH AS OFFERED BY RUTGERS CO–OPERATIVE EXTENSION. SOIL SAMPLE MAILERS ARE AVAILABLE FROM THE LOCAL RUTGERS COOPERATIVE EXTENSION OFFICES. FERTILIZER SHALL BE APPLIED AT THE RATE OF 500 POUNDS PER ACRE OR 11 POUNDS PER 1,000 SQUARE FEET OF 10–20–10 OR EQUIVALENT WITH 50% WATER INSOLUBLE NITROGEN UNLESS A SOIL TEST INDICATES OTHERWISE. APPLY LIMESTONE IN ACCORDANCE WITH THE TABLE BELOW AND THE RESULTS OF SOIL TESTING. CALCIUM CARBONATE IS THE EQUIVALENT AND STANDARD FOR MEASURING THE ABILITY OF LIMING MATERIALS TO NEUTRALIZE SOIL ACIDITY AND SUPPLY CALCIUM AND MAGNESIUM TO GRASSES AND LEGUMES. THE TABLE BELOW IS A GENERAL GUIDELINE FOR LIMESTONE APPLICATION.

LIMESTONE APPLICATION RATE BY SOIL TEXTURE		
SOIL TEXTURE	TONS/ACRE	LBS/1000 SQ. FT.
CLAY, CLAY LOAM, AND HIGH ORGANIC SOIL	3	135
SANDY LOAM, LOAM, SILT LOAM	2	90
LOAMY SAND, SAND	1	45

B. WORK LIME AND FERTILIZER INTO THE SOIL AS NEARLY AS PRACTICAL TO A DEPTH OF 4 INCHES WITH A DISC, SPRINGTOOTH HARROW, OR OTHER SUITABLE EQUIPMENT. THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON THE GENERAL CONTOUR. CONTINUE TILLAGE UNTIL A REASONABLY UNIFORM SEEDBED IS PREPARED.

C. IMMEDIATELY PRIOR TO SEEDING, THE SURFACE SHALL BE SCARIFIED 6" TO 12" WHERE THERE HAS BEEN SOIL COMPACTION. THIS PRACTICE IS PERMISSIBLE ONLY WHERE THERE IS NO DANGER TO UNDERGROUND UTILITIES (CABLES, IRRIGATION, SYSTEMS, ETC.).

2. SEED MIXTURES, SEEDING RATES AND WOODY VEGETATION SPACING REQUIREMENTS FOR PERMANENT VEGETATION ARE DESCRIBED IN SPECIFICATION 32 92 19 SEEDING.

REQUIREMENT FOR TEMPORARY VEGETATIVE COVER FOR SOIL STABILIZATION

DEFINITION

ESTABLISHMENT OF TEMPORARY VEGETATIVE COVER ON SOILS EXPOSED FOR PERIODS OF 2 TO 6 MONTHS WHICH ARE NOT BEING GRADED, NOT UNDER ACTIVE CONSTRUCTION OR NOT SCHEDULED FOR PERMANENT SEEDING WITHIN 30 DAYS.

PURPOSE

TO TEMPORARILY STABILIZE THE SOIL AND REDUCE DAMAGE FROM WIND AND WATER EROSION UNTIL PERMANENT STABILIZATION IS ACCOMPLISHED.

WHERE APPLICABLE

ON EXPOSED SOILS THAT HAVE THE POTENTIAL FOR CAUSING OFF–SITE ENVIRONMENTAL DAMAGE.

METHODS AND MATERIALS

I. SITE PREPARATION

A. GRADE AS NEEDED AND FEASIBLE TO PERMIT THE USE OF CONVENTIONAL EQUIPMENT FOR SEEDBED PREPARATION, SEEDING, MULCH APPLICATIONS, AND MULCH ANCHORING.
B. INSTALL NEEDED EROSION CONTROL PRACTICES OR FACILITIES SUCH AS DIVERSIONS, GRADE STABILIZATION STRUCTURES, CHANNEL STABILIZATION MEASURES, SEDIMENT BASINS, AND WATERWAYS.
C. IMMEDIATELY PRIOR TO SEEDING, SURFACES SHOULD BE SCARIFIED 6" TO 12" WHERE THERE HAS BEEN SOIL COMPACTION AND THERE IS NO DANGER TO UNDERGROUND UTILITIES.

II. SEEDBED PREPARATION

A. APPLY GROUND LIMESTONE AND FERTILIZER ACCORDING TO SOIL TEST RECOMMENDATIONS SUCH AS OFFERED BY RUTGERS COOPERATIVE EXTENSION. SOIL SAMPLE MAILERS ARE AVAILABLE FROM THE LOCAL RUTGERS COOPERATIVE EXTENSION OFFICES. FERTILIZER SHALL BE APPLIED AT THE RATE OF 500 POUNDS PER ACRE OR 11 POUNDS PER 1000 SQUARE FEET OF 10–20–10 OR EQUIVALENT WITH 50% WATER INSOLUBLE NITROGEN UNLESS A SOIL TEST INDICATES OTHERWISE. APPLY LIMESTONE AT THE RATE OF 2 TONS/ACRE UNLESS SOIL TESTING INDICATES OTHERWISE. CALCIUM CARBONATE IS THE EQUIVALENT AND STANDARD FOR THE ABILITY OF LIMING MATERIALS TO NEUTRALIZE SOIL ACIDITY AND SUPPLY CALCIUM AND MAGNESIUM TO GRASSES AND LEGUMES. SEE THE TABLE BELOW FOR GENERAL GUIDELINEES FOR LIMESTONE APPLICATIONS.

LIMESTONE APPLICATION RATE BY SOIL TEXTURE		
SOIL TEXTURE	TONS/ACRE	LBS./1000 SQ. FT.
CLAY, CLAY LOAM, AND HIGH ORGANIC SOIL	3	135
SANDY LOAM, LOAM, SILT LOAM	2	90
LOAMY SAND, DAND	1	45

B. WORK LIME AND FERTILIZER INTO THE SOIL AS NEARLY AS PRACTICAL TO A DEPTH OF 4 INCHES WITH A DISC, SPRINGTOOTH HARROW, OR OTHER SUITABLE EQUIPMENT. THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON THE GENERAL CONTOUR. CONTINUE TILLAGE UNTIL A REASONABLY UNIFORM SEEDBED IS PREPARED.

C. INSPECT SEEDBED JUST BEFORE SEEDING. IF TRAFFIC HAS LEFT THE SOIL COMPACTED, THE AREA MUST BE REFILLED AS ABOVE.

D. SOILS HIGH IN SULFIDES OR HAVING A PH OF 4.0 OR LESS REFER TO THE STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY, STANDARD MANAGEMENT OF HIGH ACID SOILS.

III. SEEDING

A. SELECT SEED FROM THE TABLE BELOW.

TEMPORARY VEGETATIVE STABILIZATION GRASSES, SEEDING RATES, DATES AND DEPTH				
SEED SELECTIONS	SEEDING RATE (LBS.) [1]		OPTIMUM SEEDING DATE [2]	OPTIMUM SEEDING DEPTH (IN.) [3]
	PER ACRE	PER 1000 SQ FT		
COOL SEASON GRASSES				
1. PERENNIAL RYEGRASS	40	1.0	3/1–5/15 8/15–10/1	0.5
2. SPRING OATES	86	2.0	3/1–5/15 8/15–10/1	1.0
3. WINTER BARLEY	96	2.2	8/15–10/1	1.0
4.WINTER CEREAL RYE1	112	2.6	8/1–11/15	1.0
WARM SEASON GRASSES				
5. PEARL MILLET	20	0.5	5/15– 8/15	1.0
6. MILLET (German or Hungarian)	30	0.7	5/15– 8/15	1.0
7. WEEPING LOVEGRASS	5	0.2	5/15– 8/15	0.25

1. SEEDING RATE FOR WARM SEASON GRASS, SELECTION 5–7 SHALL BE ADJUSTED TO REFLECT THE AMOUNT OF PURE LIME SEED (PLS) AS DETERMINED BY GERMINATION TEST RESULT. NO ADJUSTMENT IS REQUIRED FOR COOL SEASON GRASSES.
2. MAY BE PLANTED THROUGHOUT SUMMER IF SOIL MOISTURE IS ADEQUATE OR SEEDED AREA CAN BE IRRIGATED.
3. TWICE THE DEPTH FOR SANDY SOILS.

B.
CONVENTIONAL SEEDING: APPLY SEED UNIFORMLY BY HAND, CYCLONE (CENTRIFUGAL) SEEDER, DROP SEEDER DRILL CULTIPACKER SEEDER. FOR SEEDING METHODS EXCEPT DRILLED, SEED SHALL BE INCORPORATED INTO THE SOIL TO A DEPTH OF 1/4 TO 1/2 INCH, BY RACKING OR DRAGGING. DEPTH OF SEED PLACEMENT MAY BE 1/4 INCH DEEPER IN COARSE TEXTURED SOIL.

REQUIREMENT FOR TEMPORARY VEGETATIVE COVER FOR SOIL STABILIZATION (CONTINUED)

C. HYDROSEEDING IS A BROADCAST SEEDING METHOD USUALLY INVOLVING A TRUCK OR TRAILER MOUNTED TANK, WITH AN AGITATION SYSTEM AND HYDRAULIC PUMP FOR MIXING SEED, WATER AND FERTILIZER AND SPRAYING THE MIX ONTO THE PREPARED SEEDBED. MULCH SHALL NOT BE INCLUDED IN THE TANK WITH SEED. SHORT FIBERED MULCH MAY BE APPLIED WITH A HYDROSEEDER FOLLOWING SEEDING. HYDROSEEDING IS NOT A PREFERRED SEEDING METHOD BECAUSE SEED AND FERTILIZER ARE APPLIED TO THE SURFACE AND NOT INCORPORATED INTO THE SOIL. POOR SEED TO SOIL CONTACT OCCURS REDUCING SEED GERMINATION AND GROWTH. HYDROSEEDING MAY BE USED FOR AREAS TOO STEEP FOR CONVENTIONAL EQUIPMENT TO TRAVERSE OR TOO OBSTRUCTED WITH ROCKS, STUMPS, ETC.

D. AFTER SEEDING, COMPACT THE SOIL WITH A CORRUGATED ROLLER TO ASSURE GOOD SEED–TO–SOIL CONTACT, RESTORE CAPILLARITY, AND IMPROVE SEEDING EMERGENCE. THIS IS THE PREFERRED METHOD. WHEN PERFORMED ON THE CONTOUR, SHEET EROSION WILL BE MINIMIZED AND WATER CONSERVATION ON SITE WILL BE MAXIMIZED.

IV. MULCHING

MULCHING IS REQUIRED ON ALL SEEDING. MULCH WILL INSURE AGAINST EROSION BEFORE GRASS IS ESTABLISHED AND WILL PROMOTE FASTER AND EARLIER ESTABLISHMENT. THE EXISTENCE OF VEGETATION SUFFICIENT TO CONTROL SOIL EROSION SHALL BE DEEMED COMPLIANCE WITH THIS MULCHING REQUIREMENT.

A. HAY. UNNROTTED SMALL GRAIN STRAW, HAY FREE OF SEEDS, OR SALT HAY TO BE APPLIED AT THE RATE OF 1–1/2 TO 2 TONS PER ACRE (70 TO 90 POUNDS PER 1,000 SQUARE FEET), EXCEPT THAT WHERE A CRIMPER IS USED INSTEAD OF A LIQUID MULCH–BINDER (TACKIFYING OR ADHESIVE AGENT), THE RATE OF APPLICATION IS 3 TONS PER ACRE. MULCH CHOPPER–BLOWERS MUST NOT GRIND THE MULCH. HAY MULCH IS NOT RECOMMENDED FOR ESTABLISHING FINE TURF OR LAWNS DUE TO THE PRESENCE OF WEED SEED.

APPLICATION. SPREAD MULCH UNIFORMLY BY HAND OR MECHANICALLY SO THAT APPROXIMATELY 85% OF THE SOIL SURFACE WILL BE COVERED. FOR UNIFORM DISTRIBUTION OF HAND–SPREAD MULCH, DIVIDE AREA INTO APPROXIMATELY 1,000 SQUARE FEET SECTIONS AND DISTRIBUTE 70 TO 90 POUNDS WITHIN EACH SECTION.

ANCHORING SHALL BE ACCOMPLISHED IMMEDIATELY AFTER PLACEMENT TO MINIMIZE LOSS BY WIND OR WATER. THIS MAY BE DONE BY ONE OF THE FOLLOWING METHODS, DEPENDING UPON THE SIZE OF THE AREA, STEEPNESS OF SLOPES, AND COSTS.

1. PEG AND TWINE. DRIVE 8 TO 10 INCH WOODEN PEGS TO WITHIN 2 TO 3 INCHES OF THE SOIL SURFACE EVERY 4 FEET IN ALL DIRECTIONS. STAKES MAY BE DRIVEN BEFORE OR AFTER APPLYING MULCH. SECURE MULCH TO SOIL SURFACE BY STRETCHING TWINE BETWEEN PEGS IN A CRIS–CROSS AND A SQUARE PATTERN IN CONTACT WITH GROUND SURFACE. SECURE TWINE AROUND EACH PEG, WITH TWO OR MORE ROUND TURNS.

2. MULCH NETTINGS. STAPLE PAPER, JUTE, COTTON, OR PLASTIC NETTINGS TO THE SOIL SURFACE. USE A DEGRADABLE NETTING IN AREAS TO BE MOWED.

3. CRIMPER (MULCH ANCHORING COULTER TOOL). A TRACTOR–DRAWN IMPLEMENT, SOMEWHAT LIKE A DISC HARROW, ESPECIALLY DESIGNED TO PUSH OR CUT SOME OF THE BROADCAST LONG FIBER MULCH 3 TO 4 INCHES INTO THE SOIL SO AS TO ANCHOR IT AND LEAVE PART STANDING UPRIGHT. THIS TECHNIQUE IS LIMITED TO AREAS TRAVERSABLE BY A TRACTOR, WHICH MUST OPERATE ON THE CONTOUR OF SLOPES. STRAW MULCH RATE MUST BE 3 TONS PER ACRE. NO TACKIFYING OR ADHESIVE AGENT IS REQUIRED.

4. LIQUID MULCH–BINDERS. – MAY BE USED TO ANCHOR SALT HAY, HAY, OR STRAW MULCH.

A. APPLICATIONS SHOULD BE HEAVIER AT EDGES WHERE WIND MAY CATCH THE MULCH, IN VALLEYS, AND AT CRESTS OF BANKS. THE REMAINDER OF THE AREA SHOULD BE UNIFORM IN APPEARANCE.

B. USE ONE OF THE FOLLOWING:

(1) EMULSIFIED ASPHALT – (SS– 1, CSS– 1, CMS–2, MS–2, RS– 1, RS–2, CRS– 1, AND CRS–2), APPLY 0.04 GAL./SQ. YD. OR 194 GAL./ACRE ON FLAT AREAS AND ON SLOPES LESS THAN 8 FEET OR MORE HIGH, USE 0.075 GAL./SQ. YD. OR 363 GAL./ACRE. THESE MATERIALS MAY BE DIFICULT TO APPLY UNIFORMLY AND WILL DISCOLOR SURFACES.

(2) ORGANIC AND VEGETABLE BASED BINDERS – NATURALLY OCCURRING, POWDER BASED, HYDROPHILIC MATERIALS WHEN MIXED WITH WATER FORMULATES A GEL AND WHEN APPLIED TO MULCH UNDER SATISFACTORY CURING CONDITIONS WILL FORM MEMBRANED NETWORKS OF INSOLUBLE POLYMERS. THE VEGETABLE GEL SHALL BE PHYSIOLOGICALLY HARMLESS AND NOT RESULT IN A PHYTOTOXIC EFFECT OR IMPEDE GROWTH OF TURFGRASS. USE AT RATES AND PER WEATHER CONDITIONS AS RECOMMENDED BY THE MANUFACTURER TO ANCHOR MULCH MATERIALS.

(3) SYNTHETIC BINDERS – HIGH POLYMER SYNTHETIC EMULSION, MISCIBLE WITH WATER WHEN DILUTED AND FOLLOWING APPLICATION TO MULCH, DRYING AND CURING SHALL NO LONGER BE SOLUBLE OR DISPERSIBLE IN WATER. IT SHALL BE APPLIED AT RATES RECOMMENDED BY THE MANUFACTURER AND REMAIN TACKY UNTIL GERMINATION OF GRASS.

NOTE: ALL NAMES GIVEN ABOVE ARE REGISTERED TRADE NAMES. THIS DOES NOT CONSTITUTE A RECOMMENDATION OF THESE PRODUCTS TO THE EXCLUSION OF OTHER PRODUCTS.

B. WOOD–FIBER OR PAPER–FIBER MULCH: SHALL BE MADE FROM WOOD, PLANT FIBERS OR PAPER CONTAINING NO GROWTH OR GERMINATION INHIBITING MATERIALS, USED AT THE RATE OF 1,500 POUNDS PER ACRE (OR AS RECOMMENDED BY THE PRODUCT MANUFACTURER) AND MAY BE APPLIED BY A HYDROSEEDER. THIS MULCH SHALL NOT BE MIXED IN THE TANK WITH SEED. USE IS LIMITED TO FLATTER SLOPES AND DURING OPTIMUM SEEDING PERIODS IN SPRING AND FALL.

C. PELLETIZED MULCH: COMPRESSED AND EXTRUDED PAPER AND/OR WOOD FIBER PRODUCT, WHICH MAY CONTAIN CO–POLYMERS, TACKIFIERS, FERTILIZERS AND COLORING AGENTS. THE DRY PELLETS, WHEN APPLIED TO A SEEDED AREA AND WATERED, FORM A MULCH MAT. PELLETIZED MULCH SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS. MULCH MAY BE APPLIED BY HAND OR MECHANICAL SPREADER AT THE RATE OF 60–75 LBS/1,000 SQUARE FEET AND ACTIVATED WITH 0.2 TO 0.4 INCHES OF WATER. THIS MATERIAL HAS BEEN FOUND TO BE BENEFICIAL FOR USE ON SMALL LAWN OR RENOVATION AREAS, SEEDED AREAS WHERE WEED–SEED FREE MULCH IS DESIRED OR ON SITES WHERE STRAW MULCH AND TACKIFIER AGENT ARE NOT PRACTICAL OR DESIRABLE. APPLYING THE FULL 0.2 TO 0.4 INCHES OF WATER AFTER SPREADING PELLETIZED MULCH ON THE SEED BED IS EXTREMELY IMPORTANT FOR SUFFICIENT ACTIVATION AND EXPANSION OF THE MULCH TO PROVIDE SOIL COVERAGE.

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NEW YORK, NEW YORK

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DWN BY: —
SUBMITTED BY: —
PLOT SCALE: 1
SIZE: ANSI D

DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
ISSUE DATE: 8 JANUARY 2016
FILE NAME: ANSI D nonPW.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

EROSION AND SEDIMENT CONTROL NOTES - 2

SHEET IDENTIFICATION
CG002
SHEET 30 OF 58

REQUIREMENT FOR STABILIZATION WITH MULCH ONLY

DEFINITION

STABILIZING EXPOSED SOILS WITH NON-VEGETATIVE MATERIALS.

PURPOSE

TO PROTECT EXPOSED SOIL SURFACES FROM EROSION DAMAGE AND TO REDUCE OFFSITE ENVIRONMENTAL DAMAGE.

WHERE APPLICABLE

THIS PRACTICE IS APPLICABLE TO AREAS SUBJECT TO EROSION, WHERE THE SEASON AND OTHER CONDITIONS MAY NOT BE SUITABLE FOR GROWING AN EROSION-RESISTANT COVER OR WHERE STABILIZATION IS NEEDED FOR A SHORT PERIOD UNTIL MORE SUITABLE PROTECTION CAN BE APPLIED.

METHODS AND MATERIALS

I. SITE PREPARATION

A. GRADE, AS NEEDED AND FEASIBLE, TO PERMIT THE USE OF CONVENTIONAL EQUIPMENT FOR APPLYING AND ANCHORING MULCH.

B. EMPLOY NEEDED EROSION CONTROL PRACTICES SUCH AS DIVERSIONS, GRADE STABILIZATION STRUCTURES, CHANNEL STABILIZATION MEASURES, SEDIMENT BASINS AND WATERWAYS.

II. PROTECTIVE MATERIALS

A. UNROTTED SMALL-GRAIN HAY AT 2.0 TO 2.5 TONS PER ACRE IS SPREAD UNIFORMLY AT 90 TO 115 POUNDS PER 1,000 SQUARE FEET AND ANCHORED WITH A MULCH ANCHORING TOOL, LIQUID MULCH BINDERS, OR NETTING TIEDOWN. OTHER SUITABLE MATERIALS MAY BE USED IF APPROVED BY THE SOIL CONSERVATION DISTRICT.

B. ASPHALT EMULSION IS RECOMMENDED AT THE RATE OF 600 TO 1200 GALLONS PER ACRE. THIS IS SUITABLE FOR A LIMITED PERIOD OF TIME WHERE TRAVEL BY PEOPLE, ANIMALS OR MACHINES IS NOT A PROBLEM.

C. SYNTHETIC OR ORGANIC SOIL STABILIZERS MAY BE USED — UNDER SUITABLE CONDITIONS AND IN QUANTITIES RECOMMENDED BY THE MANUFACTURER.

D. WOOD-FIBER OR PAPER-FIBER MULCH AT THE RATE OF 1,500 POUNDS PER ACRE (OR ACCORDING TO THE MANUFACTURER'S REQUIREMENTS) MAY BE APPLIED BY A HYDROSEEDER.

E. MULCH NETTINGS, SUCH AS PAPER JUTE, EXCELSIOR, COTTON, OR PLASTIC MAY BE USED.

F. WOODCHIPS APPLIED UNIFORMLY TO A MINIMUM DEPTH OF 2 INCHES MAY BE USED. WOODCHIPS WILL NOT BE USED ON AREAS WHERE FLOWING WATER COULD WASH THEM INTO AN INLET AND PLUG IT.

G. GRAVEL, CRUSHED STONE, OR SLAG AT THE RATE OF 9 CUBIC YARDS PER 1,000 SQ. FT. APPLIED UNIFORMLY TO A MINIMUM DEPTH OF 3 INCHES MAY BE USED. SIZE 2 OR 3 STONE (ASTM C-33) IS RECOMMENDED.

III. MULCH ANCHORING – SHOULD BE ACCOMPLISHED IMMEDIATELY AFTER PLACEMENT OF HAY OR STRAW MULCH TO MINIMIZE LOSS BY WIND OR WATER. THIS MAY BE DONE BY ONE OF THE FOLLOWING METHODS, DEPENDING UPON THE SIZE OF THE AREA AND STEEPNESS OF SLOPES.

A. PEG AND TWINE – DRIVE 8 TO 10 INCH WOODEN PEGS TO WITHIN 2 TO 3 INCHES OF THE SOIL SURFACE EVERY 4 FEET IN ALL DIRECTIONS. STAKES MAY BE DRIVEN BEFORE OR AFTER APPLYING MULCH. SECURE MULCH TO SOIL SURFACE BY STRETCHING TWINE BETWEEN PEGS IN A CRISS-CROSS AND SQUARE PATTERN AND IN CONTACT WITH THE GROUND. SECURE TWINE AROUND EACH PEG WITH TWO OR MORE ROUND TURNS.

B. MULCH NETTINGS – STAPLE PAPER, COTTON, OR PLASTIC NETTINGS OVER MULCH. USE A DEGRADABLE NETTING IN AREAS TO BE MOWED.

C. MULCH ANCHORING TOOL – USE TRACTOR-DRAWN EQUIPMENT ESPECIALLY DESIGNED TO PUNCH AND ANCHOR MULCH INTO THE SOIL SURFACE. THIS PRACTICE AFFORDS MAXIMUM EROSION CONTROL, BUT ITS USE IS LIMITED TO THOSE SLOPES UPON WHICH THE TRACTOR CAN OPERATE SAFELY. SOIL PENETRATION SHOULD BE ABOUT 3 TO 4 INCHES. ON SLOPING LAND, THE OPERATION SHOULD BE DONE ON THE CONTOUR.

D. LIQUID MULCH-BINDERS

1. APPLICATION SHOULD BE HEAVIER AT EDGES WHERE WIND CATCHES THE MULCH, IN VALLEYS, AND AT CRESTS OF BANKS. REMAINDER OF AREA SHOULD BE UNIFORM IN APPEARANCE.

2. USE ONE OF THE FOLLOWING:

A. EMULSIFIED ASPHALT – (SS-1, CSS-1, CMS-2, MS-2, RS-1, RS-2, CRS-1, AND CRS-2). APPLY 0.04 GAL./SQ. YD OR 194 GAL/ACRE ON FLAT SLOPES AND SLOPES LESS THAN 8 FEET HIGH. ON SLOPES 8 FEET OR MORE HIGH, USE 0.075 GAL./SQ. YD. OR 363 GAL./ACRE. THESE MATERIALS MAY BE DIFFICULT TO APPLY UNIFORMILY AND WILL DISCOLOR SURFACES.

B. ORGANIC AND VEGETABLE BASED BINDERS – NATURALLY OCCURRING POWDER BASED, HYDROPHILIC MATERIALS THAT MIXED WITH WATER FORMULATES A GEL AND WHEN APPLIED TO MULCH UNDER SATISFACTORY CURING CONDITIONS WILL FORM MEMBRANE NETWORKS OF INSOLUBLE POLYMERS. THE VEGETABLE GEL SHALL BE PHYSIOLOGICALLY HARMLESS AND NOT RESULT IN A PHYTOTOXIC EFFECT OR IMPEDE GROWTH OF TURFGRASS. VEGETABLE BASED GELS SHALL BE APPLIED AT RATES AND WEATHER CONDITIONS RECOMMENDED BY THE MANUFACTURER.

C. SYNTHETIC BINDERS – HIGH POLYMER SYNTHETIC EMULSION, MISCIBLE WITH WATER WHEN DILUTED AND FOLLOWING APPLICATION TO MULCH, DRYING AND CURING SHALL NO LONGER BE SOLUBLE OR DISPERSIBLE IN WATER. IT SHALL BE APPLIED AT RATES AND WEATHER CONDITIONS RECOMMENDED BY THE MANUFACTURER AND REMAIN TACKY UNTIL GERMINATION OF GRASS.

GENERAL SEQUENCE OF CONSTRUCTION & SOIL EROSION & SEDIMENTATION CONTROL IMPLEMENTATION SCHEDULE

CONSTRUCTION ACTIVITY	SESC CONSIDERATION	DURATION
1. ADVISE SOIL CONSERVATION DISTRICT		
2. PRIOR TO CLEARING AND GRUBBING	INSTALL SECURITY FENCING AND SILT FENCE.	
3. CLEARING AND GRUBBING		
4. STOCKPILE AREAS	INSTALL SILT FENCING, OR OTHER SESC (SOIL EROSION AND SEDIMENT CONTROL) MEASURES AS NECESSARY.	
5. PRIOR TO SITEWORK CONSTRUCTION	INSTALL FLOATING TURBIDITY BARRIER AROUND THE ACTIVE WORK AREA. CLEAR AND STRIP SITE OR WORK AREA AS REQUIRED TO INSTALL SESC MEASURES IN ACCORDANCE WITH PLANS OR AS NECESSARY.	
6. ROUGH GRADING	PERFORM TEMPORARY SEEDING OR MULCHING AS GRADING IS COMPLETED. TEMPORARY SEEDING SHALL BE APPLIED BETWEEN AUG 1 AND NOV 15. TEMPORARY MULCHING SHALL BE APPLIED BETWEEN NOV 15 AND MAR 1.	
7. CONSTRUCT LEVEE		
8. CONSTRUCT FLOODWALL		
9. RAISE WEIR		
10. SITE GRADING	PERFORM TEMPORARY SEEDING OR MULCHING AS EACH AREA OF WORK IS COMPLETED. TEMPORARY SEEDING SHALL BE APPLIED BETWEEN AUG 1 AND NOV 15. TEMPORARY MULCHING SHALL BE APPLIED BETWEEN NOV 15 AND MAR 1.	
11. ROUTINE MAINTENANCE	MAINTAIN SILT FENCES AND FLOATING TURBIDITY BARRIERS, AND OTHER SESC MEASURES. INSTALL OTHER SESC MEASURES AS NECESSARY.	
12. FINAL STABILIZATION OF WORK AREAS AND COMPLETION OF LANDSCAPING	AFTER STABILIZATION OF GRADED AREAS AND AS APPROVED BY THE C.O.R., THE CONTRACTOR MAY REMOVE AND STABILIZE ALL SESC MEASURES.	
13. REMOVE SILT FENCE, INLET PROTECTION AND OTHER EROSION CONTROL MEASURES		
14. REPORT OF COMPLIANCE FROM FREEHOLD SOIL DISTRICT		
15. TOTAL PROJECT DURATION 1 YEAR		

MAINTENANCE: MAINTENANCE INSPECTIONS SHALL BE IN ACCORDANCE WITH GENERAL PERMIT(S) FOR CONSTRUCTION ACTIVITIES. MAINTENANCE REPAIRS OR ADJUSTMENTS TO SESC MEASURES SHALL BE PERFORMED IMMEDIATELY OR AS DIRECTED BY THE C.O.R. MAINTENANCE WATERING OF GRASSED AREAS SHALL BE IN ACCORDANCE WITH SPEC SECTION 32 92 19.

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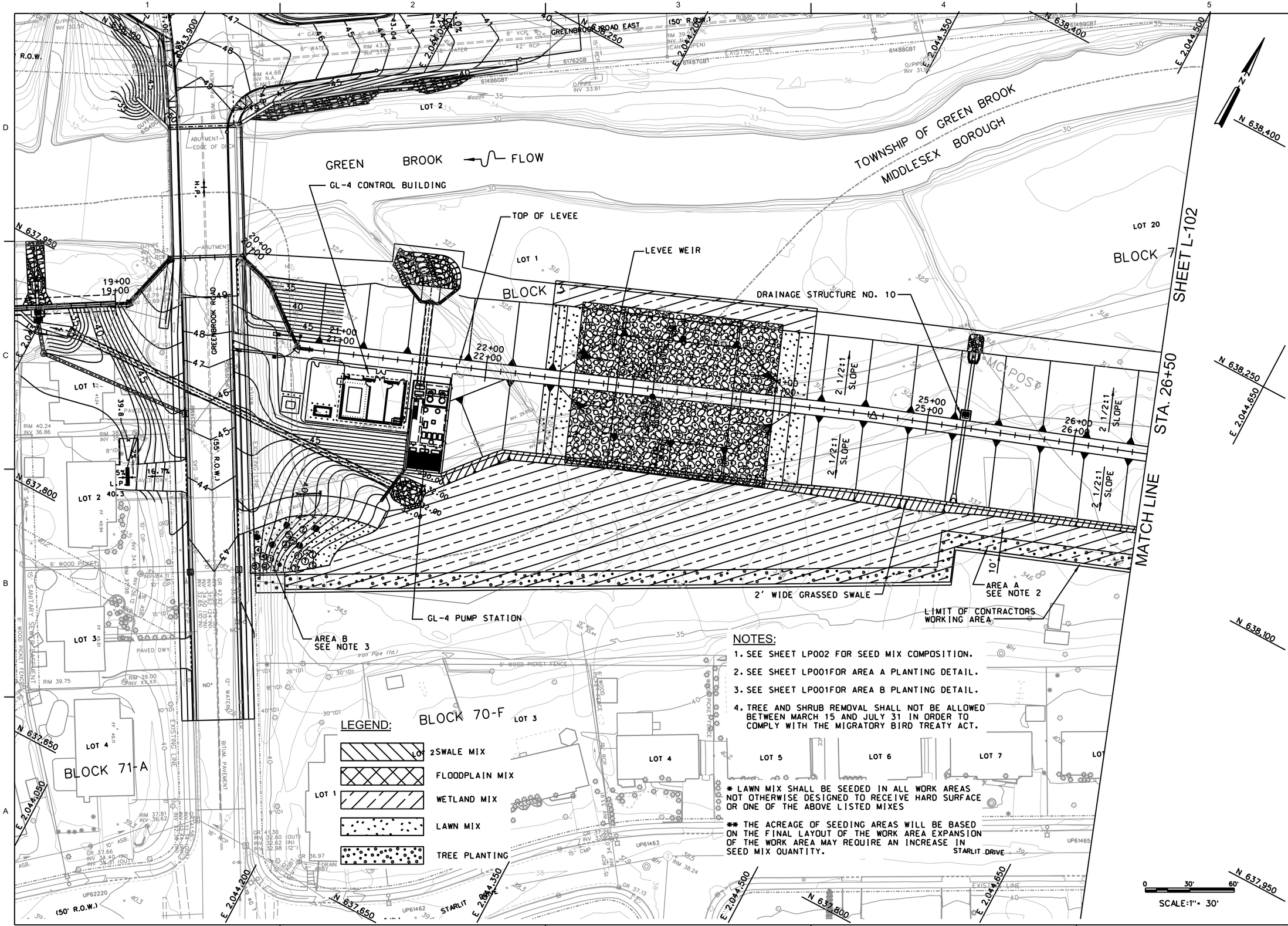
NEW YORK, NEW YORK

DESIGNED BY: —
DWN BY: —
SUBMITTED BY: —
PLOT SCALE:
DATE: 8 JANUARY 2016
OKD BY: —
ISSUE DATE: MAY 2016
FILE NAME: ANSI D mxdPW.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
SIZE: ANSI D

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP., NJ

EROSION AND SEDIMENT CONTROL NOTES - 3

SHEET IDENTIFICATION
CG003
SHEET 31 OF 58



NOTES:

1. SEE SHEET LP002 FOR SEED MIX COMPOSITION.
2. SEE SHEET LP001FOR AREA A PLANTING DETAIL.
3. SEE SHEET LP001FOR AREA B PLANTING DETAIL.
4. TREE AND SHRUB REMOVAL SHALL NOT BE ALLOWED BETWEEN MARCH 15 AND JULY 31 IN ORDER TO COMPLY WITH THE MIGRATORY BIRD TREATY ACT.

* LAWN MIX SHALL BE SEEDED IN ALL WORK AREAS NOT OTHERWISE DESIGNED TO RECEIVE HARD SURFACE OR ONE OF THE ABOVE LISTED MIXES

** THE ACREAGE OF SEEDING AREAS WILL BE BASED ON THE FINAL LAYOUT OF THE WORK AREA EXPANSION OF THE WORK AREA MAY REQUIRE AN INCREASE IN SEED MIX QUANTITY.

LEGEND:

- 2SWALE MIX
- FLOODPLAIN MIX
- WETLAND MIX
- LAWN MIX
- TREE PLANTING

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DESIGNED BY: —
DWN BY: —
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PLOT SCALE: 1 = 30'
PLOT DATE: 8 JANUARY 2016
SIZE: ANSI D
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME: ANSI D mod\PW.dgn

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

PLANTING PLAN - 1

SHEET IDENTIFICATION
L-101
SHEET 32 OF 58

LEGEND:

- SWALE MIX
- FLOODPLAIN MIX
- WETLAND MIX
- LAWN MIX
- TREE PLANTING

TOP OF LEVEE

LIMIT OF FILL

2' WIDE GRASSED SWALE

LIMIT OF CONTRACTORS WORKING AREA

AREA A
SEE NOTE 2

MATCH LINE STA. 26+50

SHEET L-101

STARLIT DRIVE

BLOCK 70 F

LOT 9, LOT 10, LOT 11, LOT 12, LOT 13, LOT 14, LOT 15, LOT 16, LOT 17, LOT 18

NOTES:

1. SEE SHEET LP002 FOR SEED MIX COMPOSITION.
2. SEE SHEET LP001 FOR AREA A PLANTING DETAIL.
3. TREE AND SHRUB REMOVAL SHALL NOT BE ALLOWED BETWEEN MARCH 15 AND JULY 31 IN ORDER TO COMPLY WITH THE MIGRATORY BIRD TREATY ACT.

* LAWN MIX SHALL BE SEEDED IN ALL WORK AREAS NOT OTHERWISE DESIGNED TO RECEIVE HARD SURFACE OR ONE OF THE ABOVE LISTED MIXES

** THE ACREAGE OF SEEDING AREAS WILL BE BASED ON THE FINAL LAYOUT OF THE WORK AREA EXPANSION OF THE WORK AREA MAY REQUIRE AN INCREASE IN SEED MIX QUANTITY.

SCALE:1" = 30'

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NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: —	DATE: 8 JANUARY 2016		
DWN BY: —	CKD BY: —	SOLICITATION NO.:	
SUBMITTED BY: —		CONTRACT NO.:	
PLOT SCALE: 1" = 30'	ISSUE DATE: AS NOTED	FILE NUMBER:	
SIZE: ANSI D	FILE NAME: ANSI D rootPW.dgn		

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

PLANTING PLAN - 2

SHEET IDENTIFICATION
L-102
SHEET 33 OF 58

PLANTING NOTES:

1. PLANT MATERIAL SHALL BE FURNISHED AND INSTALLED AS INDICATED: INCLUDING ALL LABOR, MATERIALS, PLANTS, EQUIPMENT, INCIDENTALS AND CLEAN UP.

2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PLANTING AT CORRECT GRADES AND ALIGNMENT.

3. PLANTS SHALL BE TYPICAL OF THEIR SPECIES AND VARIETY; HAVE NORMAL GROWTH HABITS; WELL DEVELOPED BRANCHES, VIGOROUS ROOT SYSTEMS AND BE FREE FROM PEST, DISEASE, DEFECTS AND INJURIES.

4. CONTRACTOR SHALL REPORT ANY SOIL OR DRAINAGE CONDITIONS CONSIDERED DETRIMENTAL TO THE GROWTH OF PLANT MATERIAL.

5. INSOFAR THAT IT IS PRACTICAL, PLANT MATERIAL SHALL BE PLANTED ON THE DAY OF DELIVERY.

6. QUALITY AND SIZE OF PLANTS, SPREAD OF ROOTS, AND SIZE OF BALLS SHALL BE IN ACCORDANCE WITH ANSI Z60.1-2004 OR CURRENT EDITION, "AMERICAN STANDARD FOR NURSERY STOCK" AS PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC.

7. PLANTS SHALL NOT BE BOUND WITH WIRE OR ROPE AT ANY TIME SO AS TO DAMAGE THE BARK OR BREAK BRANCHES. PLANTS SHALL BE HANDLED BY THE BOTTOM OF THE BALL ONLY.

8. PLANTING OPERATIONS SHALL BE PREFORMED DURING PERIODS OF THE PLANTING SEASON WHEN WEATHER AND SOIL CONDITIONS ARE SUITABLE AND IN ACCORDANCE WITH ACCEPTED LOCAL PRACTICE. ALL PLANT MATERIAL SHALL BE SPRAYED WITH "WILT-PRUF" OR EQUAL AS PER MANUFACTURER'S INSTRUCTION.

9. SET ALL PLANTS PLUMB AND STRAIGHT. SET AT SUCH A LEVEL THAT, AFTER SETTLEMENT, A NORMAL OR NATURAL RELATIONSHIP TO THE CROWN OF THE PLANT WITH THE GROUND SURFACE WILL BE ESTABLISHED. LOCATE PLANT IN THE CENTER OF PIT.

10. ALL INJURED ROOTS SHALL BE PRUNED TO MAKE CLEAN ENDS BEFORE PLANTING.

11. EACH TREE AND SHRUB SHALL BE PRUNED IN ACCORDANCE WITH STANDARD HORTICULTURAL PRACTICE TO PRESERVE NATURAL CHARACTER OF PLANT. PRUNING SHALL BE DONE WITH CLEAN, SHARP TOOLS.

12. TREES SHALL BE SUPPORTED IMMEDIATELY AFTER PLANTING. ALL TREES SHALL BE STAKED AS INDICATED. THE LANDSCAPE CONTRACTOR SHALL REMOVE STAKING, & GUY ATTACHMENTS & LOOPS AT THE END OF ONE (1) YEAR GUARANTEE PERIOD.

13. TO PROTECT FROM BROWSING BY DEER, DECIDUOUS TREES AND SHRUBS (2'-4' HIGHT) AS LISTED ON AND AREA B PLANTING SCHEDULE FOR AREA A SHALL BE FITTED WITH RIGID SEEDLING PROTECTOR TUBES. PROTECTOR TUBES SHALL BE 4" X 36" AND HELD IN PLACE BY BAMBOO STAKES (1/2"X4').

14. NEW PLANTING AREAS AND SEEDED AREAS SHALL BE ADEQUATELY IRRIGATED OR WATERED TO ESTABLISH THE PROPOSED PLANTS.

15. ALL DISTURBED AREAS TO BE TREATED IN ACCORDANCE WITH PERMANENT STABILIZATION METHODS INDICATED ON THE APPROVED EROSION AND SEDIMENTATION CONTROL PLANS.

PLANTING SPECIFICATIONS:

1. SCOPE OF WORK
   A. THE CONTRACTOR AT LEAST ONE WEEK IN ADVANCE MUST NOTIFY THE CORPS OF ENGINEERS AND/OR THEIR REPRESENTATIVES AS TO THE TIME AND DATE OF PLANT STOCK DELIVERY.
   B. THIS WORK SHALL CONSIST OF PERFORMING, CLEARING AND SOIL PREPARATION, FINISH GRADING, PLANTING AND DRAINAGE, INCLUDING ALL LABOR, MATERIALS, TOOLS, EQUIPMENT AND ANY OTHER APPURTENANCES NECESSARY FOR THE COMPLETION OF THIS PROJECT.
   C. ANY CONFLICT SHALL BE RESOLVED SOLELY BY THE CONTRACTING OFFICER REPRESENTATIVE.

2. MATERIALS
   A. GENERAL- ALL MATERIAL SHALL BE BEST OF ITS KIND AVAILABLE. THE CORPS OF ENGINEERS AND/OR THEIR REPRESENTATIVES MAY MANDATE PLANT MATERIAL OR PLANTING INSPECTIONS TO ENSURE PLANT QUALITY.
   B. PLANTS- ALL PLANTS SHALL BE HEALTHY NURSERY GROWN, WELL ROOTED, FREE FROM DISEASE AND INSECTS.
   C. TOPSOIL- MINERAL TOPSOIL WITH ORGANIC MATERIAL CONTENT AS SPECIFIED, FREE OF DEBRIS, ROCKS LARGER THAN TWO INCHES (2"), WOOD, ROOTS, VEGETABLE MATTER AND CLAY CLODS OR OTHER FOREIGN MATTER.

3. WEEDING
   A. BEFORE AND DURING PRELIMINARY GRADING AND FINISH GRADING, ALL WEEDS AND ANVASIVE SHALL BE DUG OUT BY THE ROOTS AND DISPOSED OF.

4. TOPSOILING
   A. CONTRACTOR TO PROVIDE FIVE INCHES (5") MINIMUM THICK TOPSOIL LAYER IN ALL PLANTING AREAS. TOPSOIL SHOULD BE SPREAD OVER A PREPARED SURFACE IN A UNIFORM LAYER TOPSOIL PRESENT AT THE SITE, IF ANY, MAY BE USED IF APPROVED BY THE CONTRACTING OFFICER.

5. PLANTING
   POSITION TREES AND SHRUBS AT THEIR INTENDED LOCATION AS PER THE PLANS AND SECURE THE APPROVAL OF THE CONTRACTING OFFICER PRIOR TO EXCAVATING PITS, MAKING NECESSARY ADJUSTMENTS AS DIRECTED.
   A. PLANTING PITS SHALL BE DUG WITH LEVEL BOTTOMS WHEN PLANTING ON SLOPES; PLANTS SHALL BE POSITIONED SUCH THAT TRUNK IS VERTICAL. BACK FILL AND MULCH AROUND PLANTS SHALL BE LEVEL. SLOPE TO SURROUNDING GRADE BEYOND PLANTING PIT.
   B. PLANTING PIT WIDTH SHALL BE AT LEAST TWICE THE DIAMETER OF THE ROOT BALL OR CONTAINER. EACH PLANT PIT SHALL BE BACKFILLED WITH THE FOLLOWING PREPARED SOIL MIX:
      1 PART PEAT MOSS
      1 PART HUMUS BY VOLUME
      3 PARTS TOPSOIL BY VOLUME
      "AGRIFORM" FERTILIZER TABLETS AS FOLLOWS:
         2 TABLETS PER #2 CONTAINER PLANT
         3 TABLETS PER #5 CONTAINER PLANT LARGER PLANTS TWO (2) TABLETS PER 1/2" DIAM. OF TRUNK CALIPER
   C. ROOT BALL SHALL BE PLACED TO REST ON EXISTING SOIL. FILL PREPARED SOIL AROUND BALL OF PLANT 1/2 WAY, AND INSERT FERTILIZER TABLETS. COMPLETE BACKFILL AND WATER THOROUGHLY. IF SOIL SETTLES FOLLOWING WATERING, ADD ADDITIONAL SOIL IF NECESSARY TO MEET FINAL GRADE.
   D. ALL PLANTS SHALL BE SET SO THAT, WHEN SETTLED, TOP OF SOIL AROUND BALL/ CONTAINER MATCHES FINAL GRADE.
   E. IMMEDIATELY AFTER PLANTING, STAKE ALL TREES TO PREVENT DAMAGE FROM WIND (LODGE POLE STAKES AS REQUIRED). FASTEN TREES TO UPPER END STAKE IN AT LEAST THREE (3) PLACES USING PADDED GUY ATTACHMENTS.
   F. PLACE 3- INCH LAYER OF MULCH AROUND PLANT, EXTENDING APPROXIMATELY 3 TIMES THE DIAMETER OF THE ROOT BALL. CREATE A "DISH" WITH THE MULCH AROUND THE PLANTING PIT TO CONTAIN WATER.

6. FINISH GRADING
   A. ALL PLANTING AREAS SHALL BE GRADED TO A SMOOTH, EVEN AND UNIFORM PLANE WITH NO ABRUPT CHANGE OF SURFACE, UNLESS OTHERWISE DIRECTED BY CONTRACTING OFFICER REPRESENTIVE.
   B. ALL PLANTING AREAS SHALL BE GRADED AND MAINTAINED TO ALLOW FREE FLOW OF SURFACE WATER.

7. GUARANTEE
   A. CONTRACTOR SHALL GUARANTEE ALL PLANTS FOR A PERIOD OF ONE (1) YEAR. CONTAINER STOCK SHALL HAVE A MINIMUM 85% SURVIVAL RATE.
   B. REPLACEMENTS SHALL BE MADE AT THE BEGINNING OF THE FIRST SUCCEEDING PLANTING SEASON. ALL REPLACEMENTS SHALL HAVE A GUARANTEE EQUAL TO THAT STATED ABOVE.

8. CLEANUP AND MAINTENANCE
   A. UPON COMPLETION OF ALL PLANTING WORK AND BEFORE FINAL ACCEPTANCE, THE CONTRACTOR SHALL REMOVE ALL MATERIAL, EQUIPMENT AND DEBRIS RESULTING FROM WORK.
   B. MAINTAIN TREES AND SHRUBS BY PRUNING, CULTIVATING AND WEEDING AS REQUIRED FOR HEALTHY GROWTH. TIGHTEN AND REPAIR STAKE AND GUY SUPPORTS AND RESET TREES AND SHRUBS TO PROPER GRADES OR VERTICAL POSITION AS REQUIRED. RESTORE OR REPLACE DAMAGED WRAPPINGS. SPRAY AS REQUIRED TO KEEP TREES AND SHRUBS FREE OF INSECTS AND DISEASE. MAINTAIN PLANTINGS BY WATERING, FERTILIZING, WEEDING, TRIMMING AND REPLANTING AS REQUIRED TO MEET GUARANTEE.
   C. "PIRONE'S TREE MAINTENANCE" (RECENT EDITION) SHALL BE USED FOR PLANTING AND MAINTENANCE PRACTICES NOT SPECIFICALLY OUTLINED ABOVE.

TREE PLANTING SCHEDULE AREA A

Quantity	Scientific Name	Common Name	Container	Min. Height	Spacing (feet)
12	Acer rubrum	Red Maple	#2	2'- 4'	5' OC
11	Acer rubrum	Red Maple	B&B	8'- 10'	10' OC
11	Acer negundo	Box Elder	#2	2'- 4'	5' OC
11	Acer negundo	Box Elder	B&B	8'- 10'	10' OC
6	Acer saccharinum	Silver Maple	#2	2'- 4'	5' OC
6	Acer saccharinum	Silver Maple	B&B	10'- 12'	10' OC
4	Carya ovata	Shagbark Hickory	#2	2'- 4'	5' OC
4	Carya ovata	Shagbark Hickory	B&B	8'-10'	10' OC
6	Quercus palustris	Pin Oak	#2	5'	5' OC
6	Quercus palustris	Pin Oak	B&B	8'–10'	10' OC
0.18 acres = 77 trees B&B = Balled and Burlaped					OC=On Center

TREE SHRUB PLANTING SCHEDULE AREA B

Quantity	Scientific Name	Common Name	Container	Min. Height	Spacing (feet)	Legend
1	Amelanchier canadensis	Service Berry	B&B	4'-5'	5' OC	1
2	arpinus caroliniana	Ironwood	B&B	4'-5'	5' OC	2
2	Cercis canadensis	Redbud	B&B clumped	5'-6'	5' OC	3
2	Cornus racemosa	Gray Dogwood	#2	2 '-3'	5' OC	4
2	Cratageous crus-galli	Cockspur	B&B	4'-5'	5' OC	5
6	Pinus strobus	Eastern White Pine	B&B	8'-10'	10' OC	●
5	Viburnum dentatum	Arrowwood	B&B	3'-4'	5' OC	7
0.05 acres = 20 trees/shrubs (B&B) Balled and Burlaped				OC=On Center		

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NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: —
DWN BY: —
SUBMITTED BY: —
PLOT SCALE: 1
DATE: 8 JANUARY 2016
CKD BY: —
SOLICITATION NO.:
CONTRACT NO.:
ISSUE DATE: AS NOTED
FILE NAME: ANSI D docPW.dgn
FILE NUMBER:
SIZE: ANSI D

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP., NJ.

PLANTING NOTES - 1

SHEET IDENTIFICATION
LP001
SHEET 34 OF 58

WETLAND MIX

PERCENT BY WEIGHT	SCIENTIFIC NAME	COMMON NAME	PURITY SEED	MAXIMUM GERMINATION	WEED
22	CAREX VULPINOIDES	FOX SEDGE	95%	80%	0.25%
12	ANDROPOGON SCOPARIUS	LITTLE BLUESTEM	98%	80%	0.25%
12	AGROSTIS STOLONIFERA	CREEPING BENTGRASS	98%	80%	0.25%
6.5	VERBENA HASTATA	BLUE VERVAIN	95%	80%	0.25%
6	JUNCUS EFFUSUS	SOFT RUSH	95%	80%	0.25%
6	SCIRPUS ALTROVIRENS	GREEN BULRUSH	98%	80%	0.25%
6	EUTHAMIA GRAMINIFOLIA	GRASS-LEAVED GOLDENROD	95%	80%	0.25%
5	GLYCERIA GRANDIS	AMERICAN MANNAGRASS	98%	80%	0.25%
3.5	CAREX LURIDA	LURID SEDGE	95%	80%	0.25%
3.5	SCIRPUS POLYPHYLLUS	MANY-LEAVED BULRUSH	95%	80%	0.25%
2.5	CAREX COMOSA	COSMOS SEDGE	95%	80%	0.25%
2.5	CAREX LUPULINA	HOP SEDGE	95%	80%	0.25%
2.5	SCIRPUS CYPERINUS	WOOLGRASS	95%	80%	0.25%
2.0	VERATRUM VIRIDE	FALSE HELLEBORE	87%	80%	0.25%
1	BROMUS LATIGLUMIS	WILD BROME GRASS	84%	80%	0.25%
1	CAREX SCOPARIA	BLUNT BROOM SEDGE	95%	80%	0.25%
1	GEUM LACINIATUM	ROUGH AVENS	84%	80%	0.25%
1	HELENIUM AUTUMNALE	COMMON SNEEZEWEED	84%	80%	0.25%
1	ZIZIA AUREA	GOLDEN ALEXANDERS	87%	80%	0.25%
0.5	CINNA ARUNDINACEA	WOOD REEDGRASS	84%	80%	0.25%
0.5	LUDWIGIA ALTERNIFLORA	SEEDBOX	84%	80%	0.25%
0.5	MIMULUS RINGENS	SQUARE STEMMED MONKEY FLOWER	84%	80%	0.25%
0.5	PENTHORUM SEDOIDES	DITCH STONECROP	84%	80%	0.25%
0.5	PYCNANTHEMUM TENUIFOLIUM	NARROWLEAF MOUNTAIN MINT	84%	80%	0.25%
0.25	JUNCUS ACUMINATUS	SHARP FRUITED RUSH	84%	80%	0.25%
0.25	SANGUISORBA CANADENSIS	CANADIAN BURNET	84%	80%	0.25%

FLOODPLAIN MIX

PERCENT BY WEIGHT	SCIENTIFIC NAME	COMMON NAME	PURITY SEED	MAXIMUM GERMINATION	WEED
16	ANDROPOGON SCOPARIUS	LITTLE BLUESTEM	98%	80%	0.25%
16	ARGOSTIS SCABRA	ROUGH BENTGRASS	98%	80%	0.25%
16	ARGOSTIS STOLONIFERA	CREEPING BENTGRASS	98%	80%	0.25%
6	LEERSIA ORYZOIDES	RICE CUTGRASS	98%	80%	0.25%
6	CAREX CRINITA	FRINGED SEDGE	95%	80%	0.25%
6	CAREX LUPULINA	HOP SEDGE	95%	80%	0.25%
6	SCIRPUS CYPERINUS	WOOLGRASS	85%	80%	0.25%
6	SCIRPUS EXPANSUS	WOOD BULRUSH	95%	80%	0.25%
4	EUPATORIUM FISTULOSUM	JOE PYE WEED	87%	80%	0.25%
4	RUDBEKIA HIRTA	BLACK-EYED SUSAN	84%	80%	0.25%
4	ASCLEPIAS SYRIACA	COMMON MILKWEED	85%	80%	0.25%
4	VERONIA NOVEBORACENSIS	NEW YORK IRONWEED	84%	80%	0.25%
3	ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	84%	80%	0.25%
3	BIDENS ARISTOSA	SHOWY TICKSEED SUNFLOWER	87%	80%	0.25%

LAWN MIX

PERCENT BY WEIGHT	COMMON NAME	VARIETIES –ONE OR MORE OF THE FOLLOWING:	PURITY SEED	MAXIMUM GERMINATION	WEED
60	TALL FESCUE	APACHE, FIDELITY, BLACKWATCH, FALCON, ESCALADE, MUSTANG 3, REBEL EXEDA	98%	85%	0.25%
20	BLUEGRASS	AVALANCHE, BRISTOL, TOTAL ECLIPSE, P-105, TOUCHDOWN	98%	80%	0.25%
20	PERRENIAL RYEGRASS	ALL STAR2, PALMERIII, PENNANTII PIZZAZZ, PREMIERII, YORKTOWN II	98%	85%	0.25%

2.1.2 SEEDING RATES

GRASS SEEDING RATES ARE AS FOLLOWS:

LAWN MIX	263 LBS/ACRE OR 6 LBS/1000 SF
SWALE MIX	20 LBS/ACRE
FLOODPLAIN MIX	15 LBS/ACRE
WETLAND MIX	15 LBS/ACRE

SWALE MIX

PERCENT BY WEIGHT	SCIENTIFIC NAME	COMMON NAME	PURITY SEED	MAXIMUM GERMINATION	WEED
22	POA PALUSTRIS	FOWL BLUEGRASS	98%	80%	0.25%
22	ANDROPOGON SCOPARIUS	LITTLE BLUESTEM	98%	80%	0.25%
12	ARGOSTIS SCABRA	ROUGH BENTGRASS	98%	80%	0.25%
12	ARGOSTIS STOLONIFERA	CREEPING BENTGRASS	98%	80%	0.25%
12	CAREX VULPINOIDEA	FOX SEDGE	95%	80%	0.25%
5	ASTER PUNICEUS	PURPLE STEMMED ASTER	84%	80%	0.25%
5	VERBENA HASTATA	BLUE VERVAIN	85%	80%	0.25%
5	CAREX LUPULINA	HOP SEDGE	95%	80%	0.25%
2	BIDENS ARISTOSA	SHOWY TICKSEED SUNFLOWER	87%	80%	0.25%
2	ASTER UMBELLATUS	FLAT-TOP ASTER	84%	80%	0.25%
1	SOLIDAGO PATULA	ROUGH-LEAF GOLDENROD	84%	80%	0.25%

SEEDING SPECIFICATIONS/NOTES

1. SCOPE OF WORK
THIS WORK SHALL CONSIST OF SOIL PREPARATION, FINISH GRADING (RAKING), SEEDING, AND MULCHING, AND ALL LABOR, MATERIALS, EQUIPMENT, AND ANY OTHER INCIDENTALS REQUIRED FOR FURNISHING AND INSTALLING SEED, STRAW MULCHING AND MULCH BINDER IN A WAY THAT OBTAINS OPTIMAL GERMINATION AND LONG TERM SUCCESS ACCORDING TO THE CONTRACT PLANS AND SPECIFICATIONS AND AS DIRECTED BY THE ENGINEER.

2. MATERIALS
GENERAL - ALL MATERIAL SHALL BE THE BEST OF ITS KIND AVAILABLE. THE ENGINEER AND/OR THEIR REPRESENTATIVE MAY MANDATE SEED MATERIAL OR SEEDING INSPECTIONS TO INSURE QUALITY.

3. GENERAL WORK PROCEDURES
LANDSCAPE WORK SHALL BE ACCORDING TO THE WORKMANLIKE STANDARDS ESTABLISHED FOR LANDSCAPE CONSTRUCTION AND PLANTING.

4. WEEDING
BEFORE AND DURING PRELIMINARY GRADING AND FINISH GRADING, ALL WEEDS AND INVASIVES SHALL BE DUG OUT BY THE ROOTS AND DISPOSED.

5. FINISH GRADING
ALL SEEDING AREAS SHALL BE SMOOTH, EVEN AND UNIFORM WITH NO ABRUPT CHANGE OF SURFACE, UNLESS OTHERWISE DIRECTED BY THE ENGINEER OR FINAL PLANS. PRIOR TO SEEDING, FINAL GRADE SHALL BE RAKED OR FURROWED TO LOOSEN THE SOIL AND CREATE A TEXTURED SURFACE FOR SEEDING.

6. SEED
SEED SHALL BE CLEAN AND FRESH AND DELIVERED TO THE SITE IN THE ORIGINAL, UNOPENED BAGS SHOWING THE NET WEIGHT, COMPOSITION OF MIX, SUPPLIERS NAME AND GUARNATEE OF ANALYSIS. SEED SHALL BE DELIVERED AND STORED IN ORIGINAL UNOPENED PACKAGES, KEPT DRY, AND NOT OPENED UNTIL NEEDED FOR USE. DAMAGES OR FAULTY PACKAGES SHALL NOT BE USED AND WILL BE REJECTED. SEED SHALL HAVE BEEN HARVESTED FROM THE PREVIOUS GROWING SEASON. THE SED MIXTURES SHALL MEET THE FOLLOWING REQUIREMENTS:

7. SEEDING
ALL SEEDING SHALL BE CONDUCTED DURING THE DORMANT SEASON. SEEDING SHALL BE DONE IN THE DRY; FLOODED AREAS SHALL NOT BE SEEDED. SEEDING SHALL BE DONE BY BROADCAST METHODS OR HYDROSEEDING IN ACCORDANCE WITH SEED SUPPLIERS RECOMMENDATIONS. ALL SEEDED AREAS SHALL BE COVERED WITH A LIGHT LAYER OF STRAW MULCH OR HYDROMULCH. BROADCAST SEEDED AREAS SHALL BE ADEQUATELY WATERED TO ESTABLISH THE VEGETATIVE COVER.

8. STRAW MULCH
THE MATERIAL FOR MULCH SHALL BE STRAW OR OTHER ACCEPTABLE NATIVE GRASSES, WELL CURED TO LESS THAN 20% MOISTURE, BY WEIGHT. HAY IS NOT ACCEPTABLE, DUE TO ITS HIGH WEED CONTENT. STRAW SHALL BE STALKS OF OAT OR WHEAT, FREE FROM NOXOIUS WEDS AND OTHER MATERIAL. ALL SEEDED AREAS MUST BE ADEQUATELY COVERED ACCORDING TO THE SPECIFICATIONS CONTAINED HEREIN WITHIN (2) DAYS OF SEEDING. SEEDING IS NOT PERMITTED WHEN STRAW MULCH CANNOT BE APPLIED WITHIN (2) DAYS. HOWEVER, IN THE EVENT OF ANTICIPATED RAINFALL (WITHIN 24 HOURS), SEEDING WILL NOT BE PERMITTED WHEN STRAW MULCH CANNOT BE IMMEDIATELY APPLIED AFTER SEEDING.

9. SEEDING PERIODS

SPRING SEASON - APRIL 1 TO JUNE 1 - SEEDING ALLOWED

LATE SUMMER SEASON - AUGUST 22 TO SEPTEMBER 10- SEEDING ALLOWED

GROWING SEASON - JUNE 2 TO AUGUST 21 - NO PERMANENT SEEDING ALLOWED. SEED WITH EROSION CONTROL MIX. REFER TO NOTES ON SHEET CG002 EROSION AND SEDIMENT CONTROL

MID FALL (DORMANT PERIOD) OCTOBER 15 TO NOVEMBER 15- SEEDING ALLOWED (WITH EROSION CONTROL MATS ONLY)

WINTER (DORMANT PERIOD) NOVEMBER 16 TO MARCH 31- NO PERMANENT SEEDING ALLOWED. SEED WITH EROSION CONTROL MIX. REFER TO NOTES ON SHEET CG002 EROSION AND SEDIMENT CONTROL

NOTE: SEEDING TIMES ARE DETERMINED BY CONSISTENT AVERAGE SOIL TEMPERATURES REQUIRED FOR GERMINATION: 55°F FOR COOL-SEASON GRASS GERMINATION AND 65°F FOR WARM-SEASON GRASS GERMINATION.

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NEW YORK DISTRICT
NEW YORK, NEW YORK

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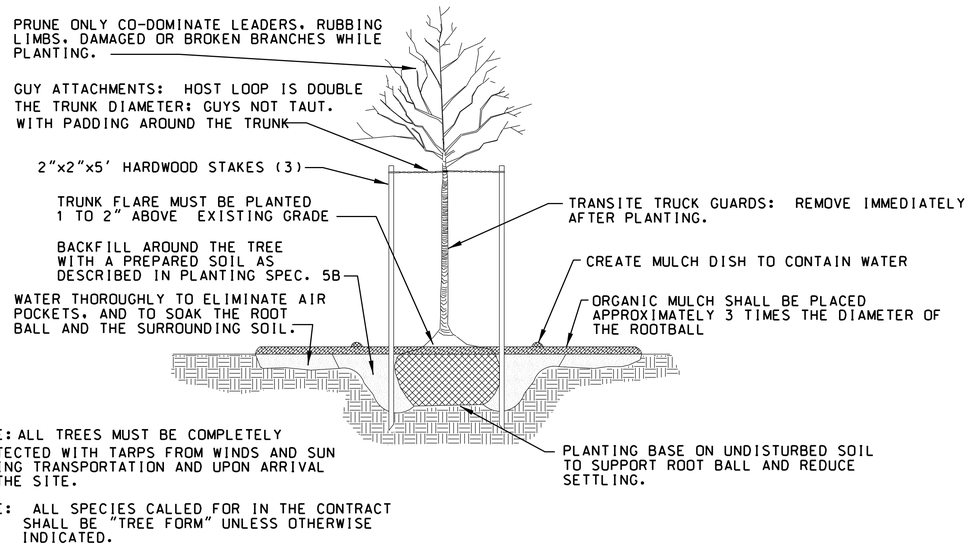
DWN BY: —
SUBMITTED BY: —
DATE: 8 JANUARY 2016
CKD BY: —
PLOT SCALE: 1
ISSUE DATE: 8 JANUARY 2016
SIZE: ANSI D
FILE NAME: ANSI D docxPW.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

PLANTING NOTES - 2

SHEET IDENTIFICATION
LP002
SHEET 35 OF 58

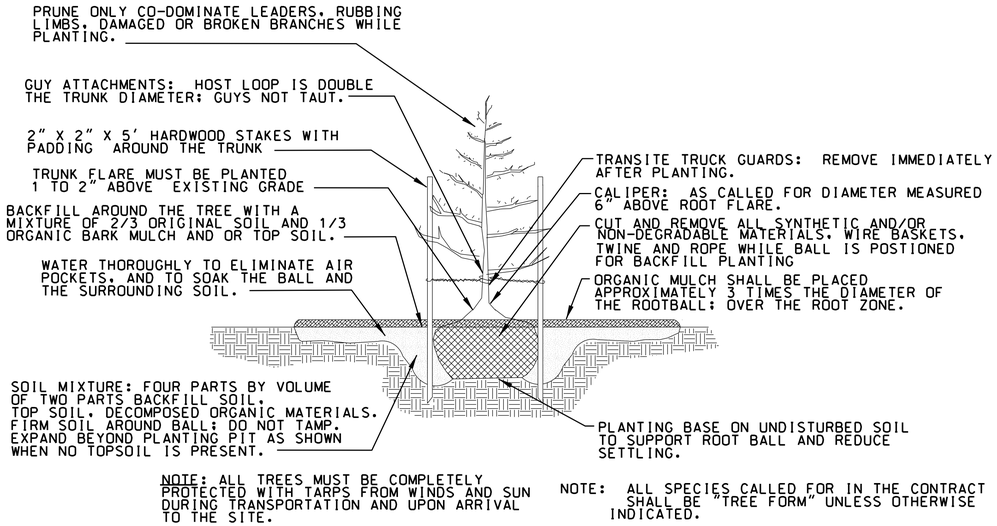


NOTE: ALL TREES MUST BE COMPLETELY PROTECTED WITH TARPS FROM WINDS AND SUN DURING TRANSPORTATION AND UPON ARRIVAL TO THE SITE.

NOTE: ALL SPECIES CALLED FOR IN THE CONTRACT SHALL BE "TREE FORM" UNLESS OTHERWISE INDICATED.

PLANTING AND STAKING DETAIL, DECIDUOUS TREES

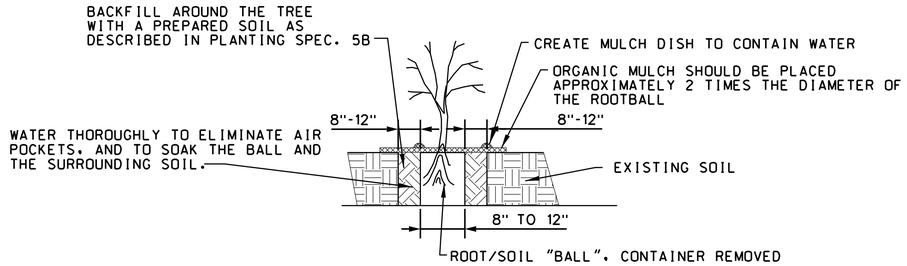
NTS



NOTE: ALL TREES MUST BE COMPLETELY PROTECTED WITH TARPS FROM WINDS AND SUN DURING TRANSPORTATION AND UPON ARRIVAL TO THE SITE.

NOTE: ALL SPECIES CALLED FOR IN THE CONTRACT SHALL BE "TREE FORM" UNLESS OTHERWISE INDICATED.

PLANTING AND STAKING DETAILS, EVERGREEN TREES

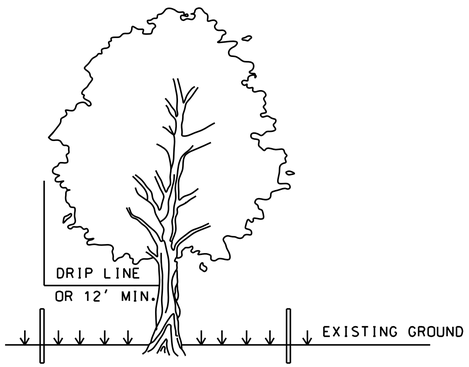


SHRUB PLANTING DETAIL (TYPICAL)

NTS

PLANTING NOTE:

1. TREES/SHRUBS PLANTING LOCATIONS SHOWN ARE APPROXIMATE: ACTUAL LOCATIONS TO BE SELECTED IN THE FIELD.



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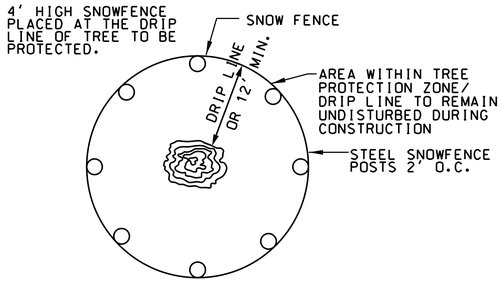

PLAN

EXISTING TREE PROTECTION

NTS

NOTES:

1. TREE PROTECTION SHALL BE PROVIDED FOR ANY AND ALL TREES TO BE PRESERVED DURING AND AFTER CONSTRUCTION. THE CONTRACTOR SHALL TAKE WHATEVER ADDITTIONAL MEASURES NECESSARY TO PROTECT EXISTING TREES TO REMAIN AGAINST UNNECESSARY CUTTING. BREAKING OR SKINNING OF ROOTS. SKINNING AND BRUISING OF BARK. SMOTHERING OF TREES BY STOCKPILING CONSTRUCTION MATERIALS OR EXCAVATED MATERIAL WITHIN DRIP LINE. EXCESS FOOT OR VEHICULAR TRAFFIC. OR PARKING OF VEHICLES WITHIN DRIP LINE.
2. 4 FOOT HIGH SNOW FENCE SHALL BE PLACED AT THE DRIP LINE OF THE INDIVIDUAL TREE TO BE PRESERVED AND SHALL ENCIRCLE THE ENTIRE TREE.
3. BOARDS OR FENCING SHALL NOT BE NAILED TO TREES DURING CONSTRUCTION.
4. ROOTS EXPOSED AND/OR DAMAGED DURING GRADING AND CONSTRUCTION OPERATIONS SHALL BE CUT OFF CLEANLY INSIDE THE EXPOSED OR DAMAGED AREA. AND THE TOPSOIL PLACED OVER THE ROOTS IMMEDIATELY. ANY DAMAGE DONE TO EXISTING TREE CROWNS OR ROOT SYSTEMS SHALL BE REPAIRED IMMEDIATELY. FEEDER ROOTS SHALL NOT BE CUT IN AN AREA INSIDE THE DRIP LINE OF TREE BRANCHES. EXCEPT AS PERMITTED BY CONTRACTING OFFICER REPRESENTATIVE.
5. TREE LIMB REMOVAL. WHERE NECESSARY. WILL BE TARGET PRUNED WITH TRUNK OR MAIN LIMB. ALL PRUNING SHALL BE DONE IN ACCORDANCE WITH GOOD HORTICULTURAL PRACTICE BY A CERTIFIED TREE EXPERT. TREES MAY BE PRUNED FOR AESTHETICS. SAFETY REASONS OR TO IMPROVE THE HEALTH OF AN EXISTING TREE. EXCEPT AS PERMITTED BY CONTRACTING OFFICER REPRESENTATIVE.
6. TREES WITHIN THE LIMITS OF THE CONTRACT WORK SHALL BE WATERED AS REQUIRED TO MAINTAIN THEIR HEALTH.
7. UTILITIES WILL BE TUNNELED UNDER TREES TO PREVENT CUTTING OF IMPORTANT FEEDER ROOTS.

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GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

PLANTING DETAILS

SHEET IDENTIFICATION
L-501
SHEET 36 OF 58

GENERAL NOTES:

1. FLOATING TURBIDITY BARRIERS (ALSO KNOWN AS SILT CURTAINS) CREATE A BARRIER TO PREVENT TURBID WATER FROM ENTERING CLEAR WATER. THEY SHALL BE USED TO ISOLATE ACTIVE CONSTRUCTION AREAS WITHIN OR ADJACENT TO A BODY OF WATER TO MINIMIZE THE MIGRATION OF SILT LADEN WATER CAUSED BY THE DISCHARGE OF STORM SEWERS, DEWATERING BASINS, CONSTRUCTION, DREDGING OR FILLING OPERATIONS, OR OTHER ACTIVITIES THAT COULD CAUSE TURBIDITY.

2. TURBIDITY BARRIERS SHALL NOT BE INSTALLED PERPENDICULAR ACROSS THE MAIN FLOW OF THE CHANNEL.

3. CONCENTRATED FLOWS SHALL NOT DISCHARGE BEYOND THE FLOATING TURBIDITY BARRIER. THE BARRIER IS NOT TO BE INSTALLED ACROSS A FLOWING BODY OF WATER.

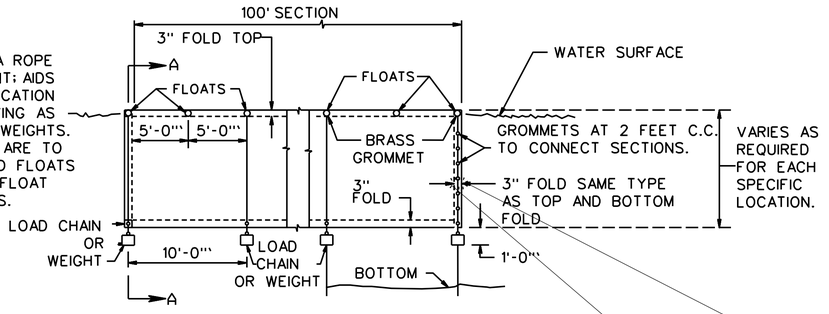
4. THE FLOATING TURBIDITY BARRIER SHALL BE ANCHORED TO PREVENT DRIFT BANKWARD OR DOWNSTREAM. EXACT PLACEMENT OF TURBIDITY BARRIER SHALL BE SO AS TO EFFECTIVELY CONTROL SILT DISPERSION UNDER THE CONDITIONS PRESENT ON A PARTICULAR PROJECT.

5. THE TURBIDITY CURTAIN AND ADJACENT WORK AREAS SHALL NOT BE DISTURBED 12 HOURS PRIOR TO REMOVAL FROM THE CHANNEL. MAINTENANCE SHALL BE PERFOMED AS REQUIRED. DURING REMOVAL, EXTREME CARE SHALL BE UTILIZED TO ENSURE SEDIMENT DEPOSITS ARE NOT DISTURBED.

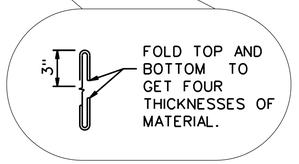
6. THE DETAILS SHOWN ON THIS SHEET ARE SUGGESTED METHODS ONLY. ALTERNATE SOLUTION AND USAGE OF MATERIALS MAY BE USED AS APPROVED. DESIGN OF THE BARRIER AND ANCHORAGE SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

7. WHEN ESTIMATING THE LENGTH OF THE TURBIDITY BARRIER, ALLOW FOR A 10 - 20% VARIANCE IN STRAIGHT LINE MEASUREMENT.

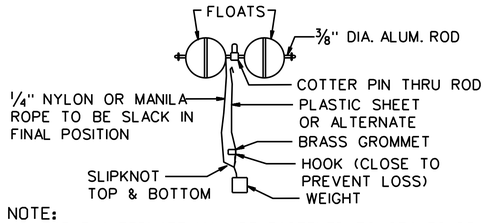
NOTE:
1/4" NYLON OR MANILA ROPE FORMS REINFORCEMENT: AIDS IN REMOVAL OR RELOCATION OF BARRIER BY SERVING AS A PICK-UP LINE FOR WEIGHTS. ROPES AND WEIGHTS ARE TO BE ATTACHED TO END FLOATS AND EVERY SECOND FLOAT BETWEEN END FLOATS.



FRONT VIEW

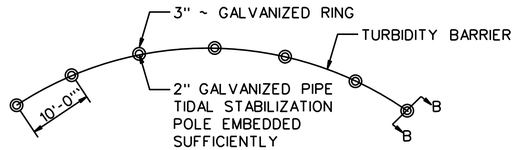


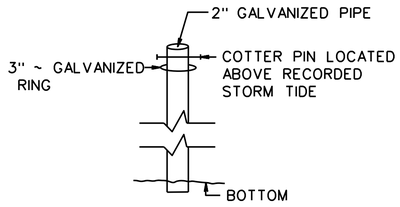
SIDE VIEW
FOLDING DETAIL



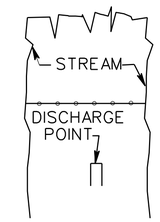
NOTE:
SUITABLE ALTERNATE MAY BE FASTENED TO STAKES DRIVEN INTO THE BOTTOM IN LIEU OF FLOATS AND WEIGHTS

SECTION A-A

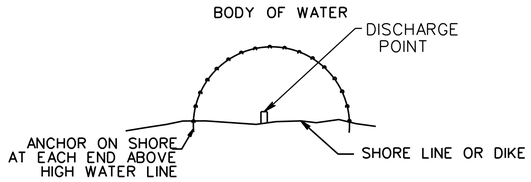




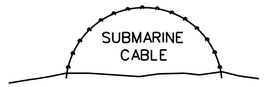
SECTION B-B



STREAM
TYPICAL APPLICATION



BODY OF WATER
TYPICAL APPLICATION



EXCAVATION OF
WET AREAS

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DATE: 8 JANUARY 2016
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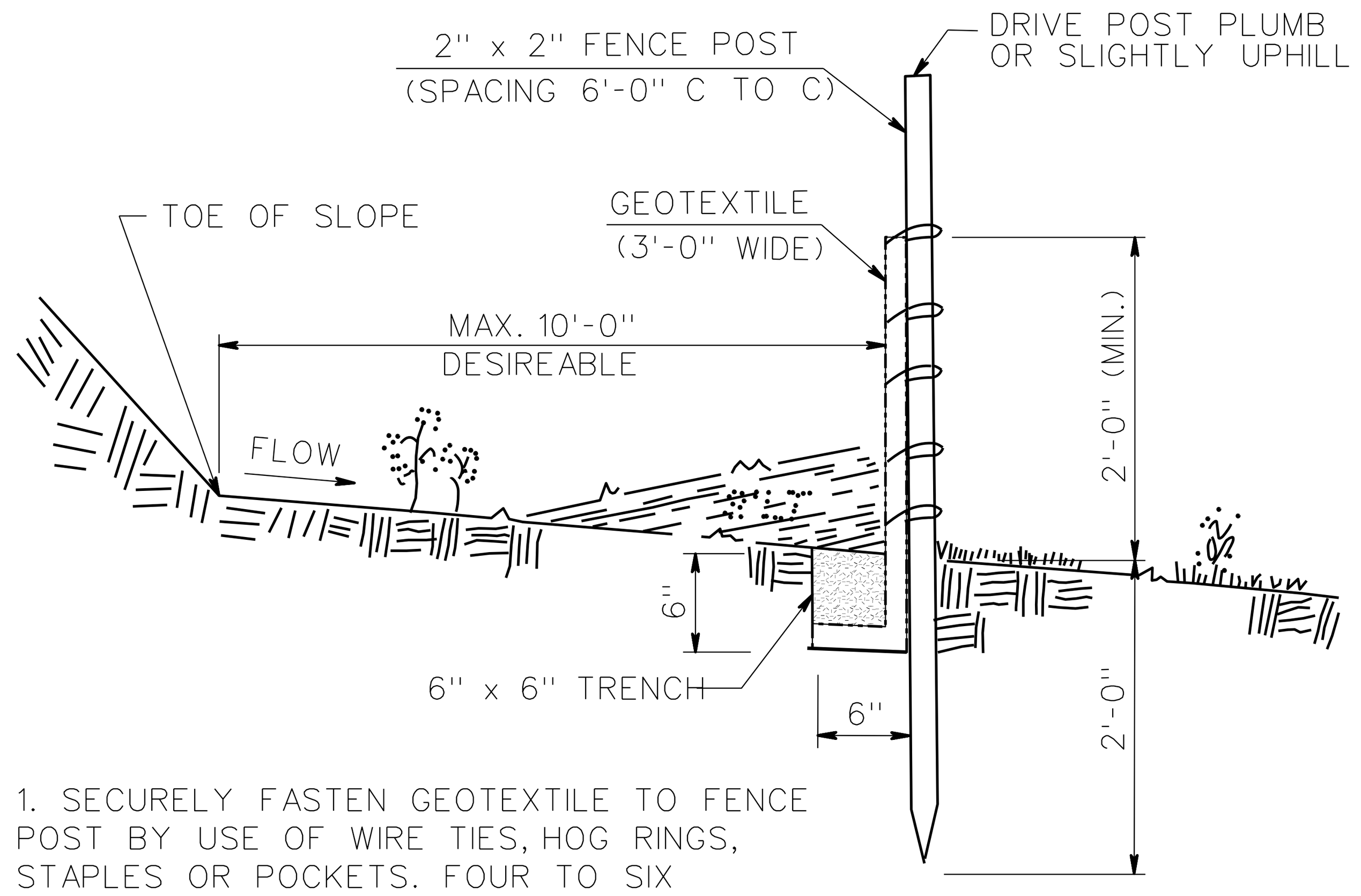
CONTRACT NO.:
ISSUE DATE: 8 JANUARY 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEGB1B2C501.dgn

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP., NJ

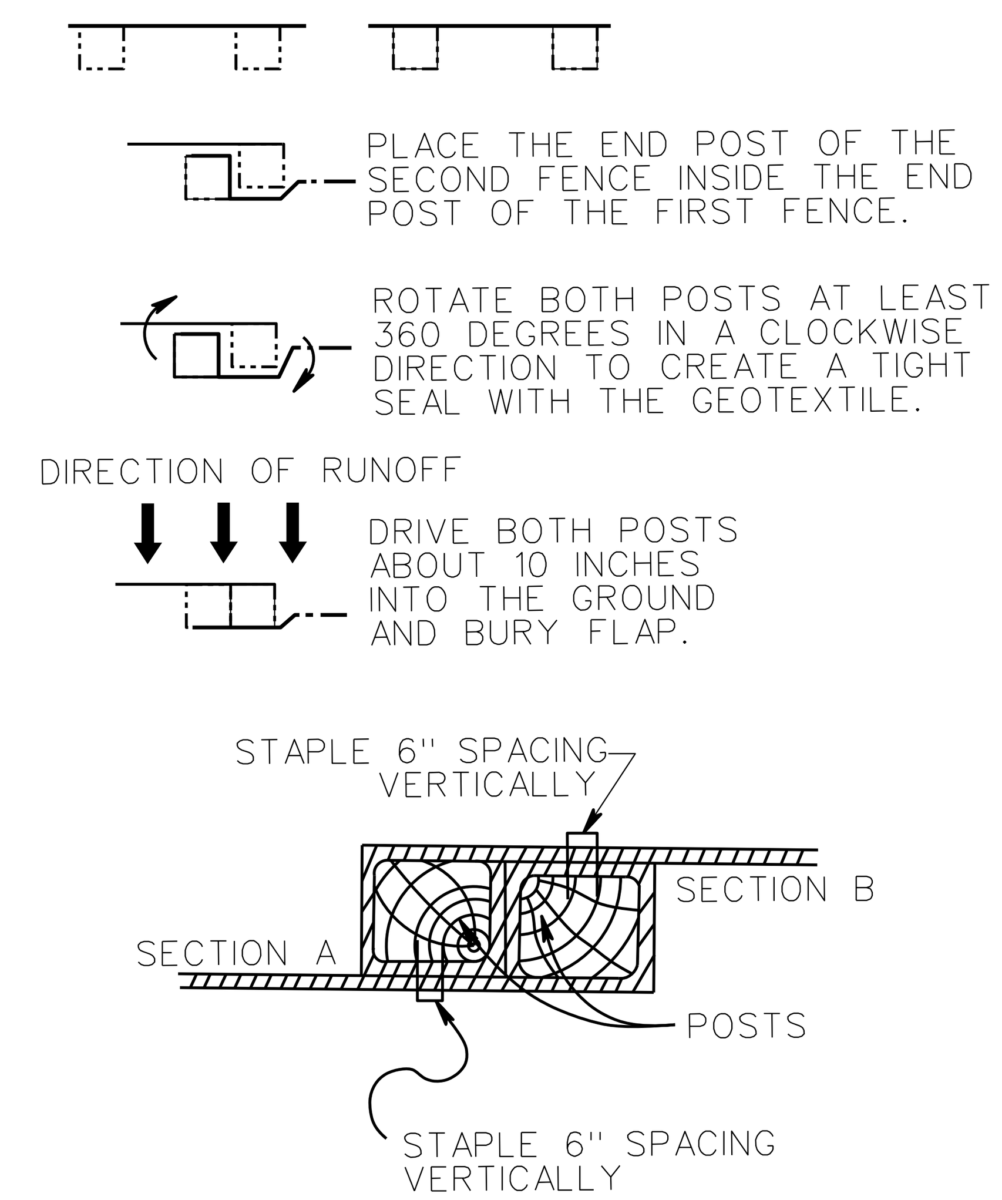
FLOATING TURBIDITY BARRIER DETAILS

SHEET IDENTIFICATION
C-501
SHEET 37 OF 58



1. SECURELY FASTEN GEOTEXTILE TO FENCE POST BY USE OF WIRE TIES, HOG RINGS, STAPLES OR POCKETS. FOUR TO SIX FASTENERS PER POST.
2. BURY BOTTOM 1'-0" OF GEOTEXTILE AND TAMP IN PLACE.
3. SECURELY FASTEN ENDS OF INDIVIDUAL ROLLS OF GEOTEXTILE TO A POST BY WRAPPING EACH END OF THE GEOTEXTILE AROUND THE POST TWICE AND ATTACHING AS SPECIFIED IN NOTE 1 ABOVE. SPLICING OF INDIVIDUAL ROLLS SHALL NOT OCCUR AT LOW POINTS.
4. SET SILT FENCE WITHIN PROJECT LIMITS. 10'-0" IS DESIREABLE.

SILT FENCE



ATTACHING TWO SILT FENCES

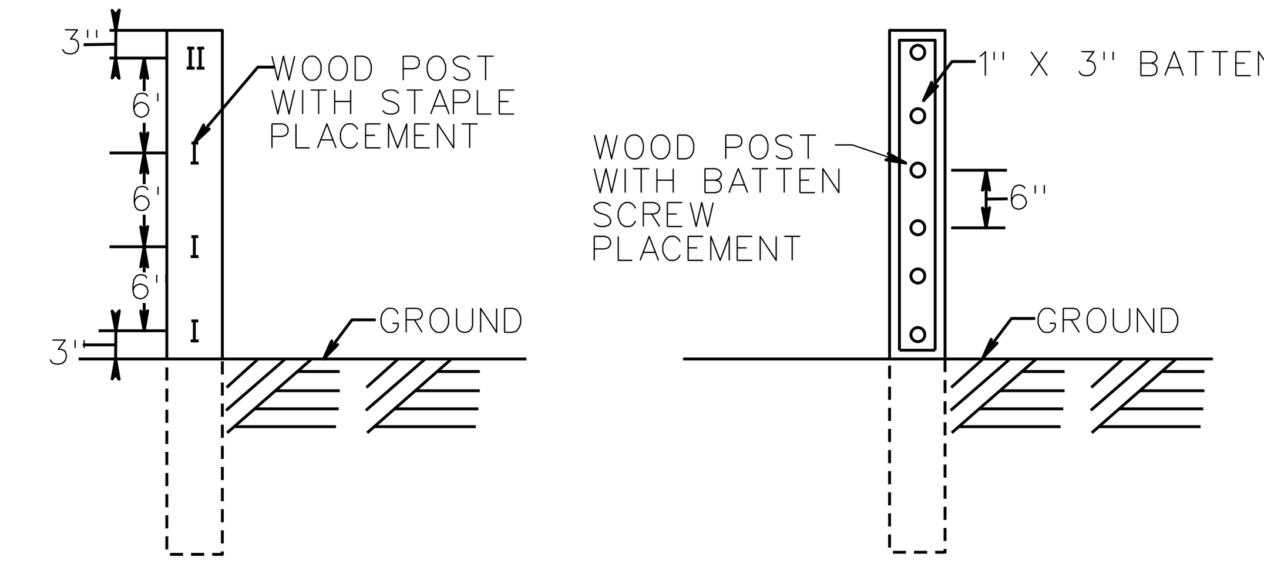
FASTENERS FOR WOOD POSTS

	GAUGE	CROWN	LEGS	STAPLES/POST
WIRE STAPLES	17 MIN.	3/4" WIDE	1/2" LONG	5 MIN.

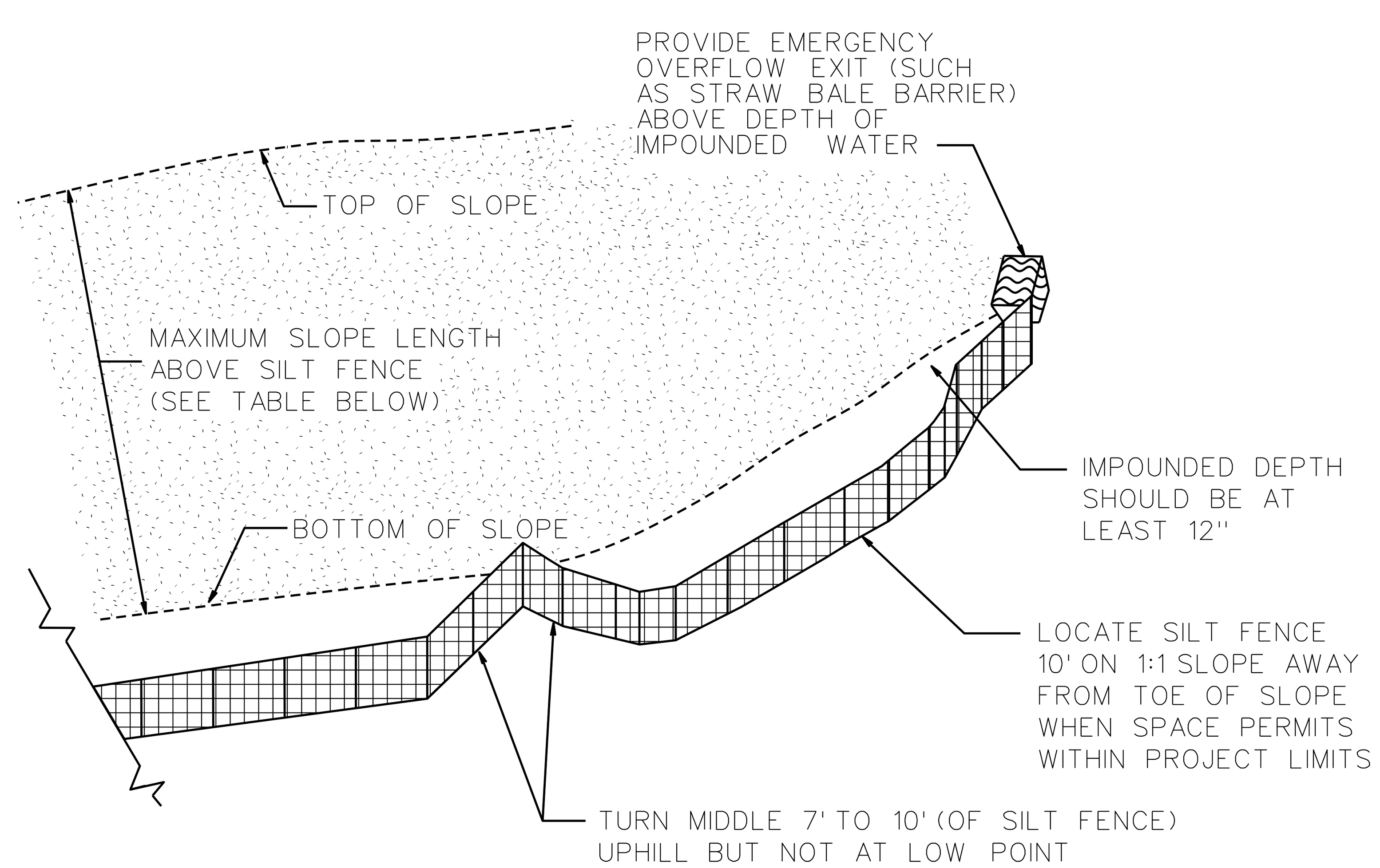
	LENGTH	PHILLIPS HEADS	SCREW/POST
SCREWS	2"	2"	6 MIN.

SOURCE: GA SWCC

FASTENER PLACEMENT



SILT FENCE FASTENER REQUIREMENTS



CRITERIA FOR SILT FENCE PLACEMENT

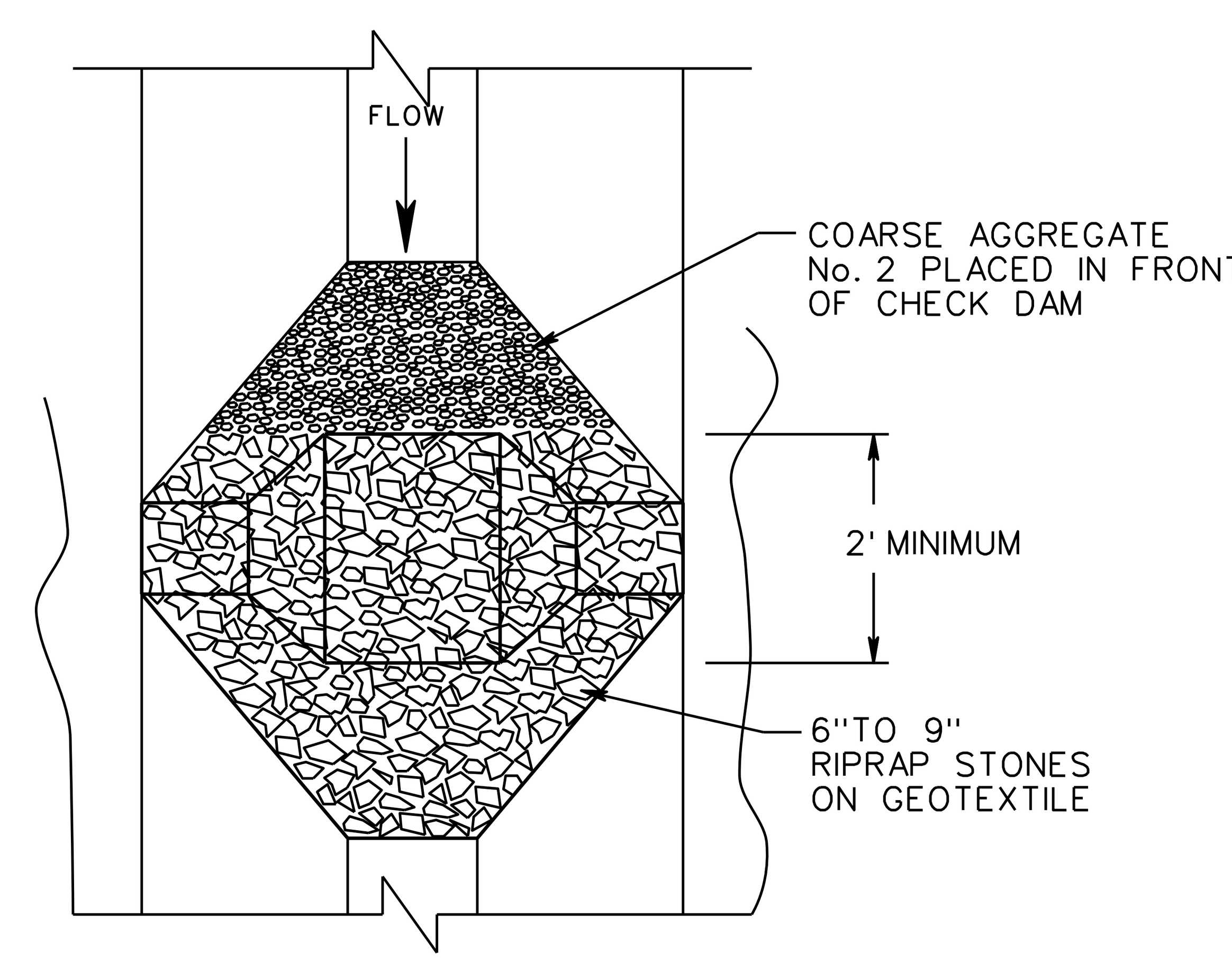
LAND SLOPE (PERCENT)	MAXIMUM SLOPE LENGTH ABOVE FENCE (FEET)
<2	100
2 TO 5	75
5 TO 10	50
10 TO 20	25
>20 *	15

* IN AREAS WHERE THE SLOPE IS GREATER THAN 20%, A FLAT AREA LENGTH OF 10 FEET BETWEEN THE TOE OF THE SLOPE AND THE FENCE SHOULD BE PROVIDED.

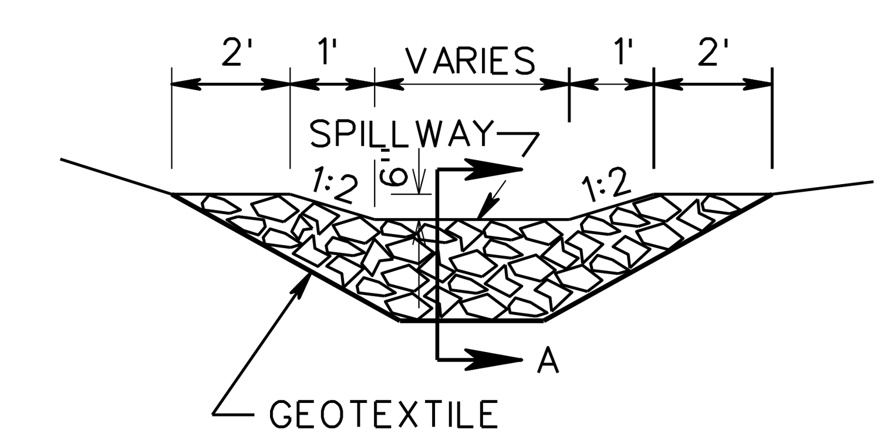
SILT FENCE ON A STEEP OR LONG GRADE

SILT FENCE

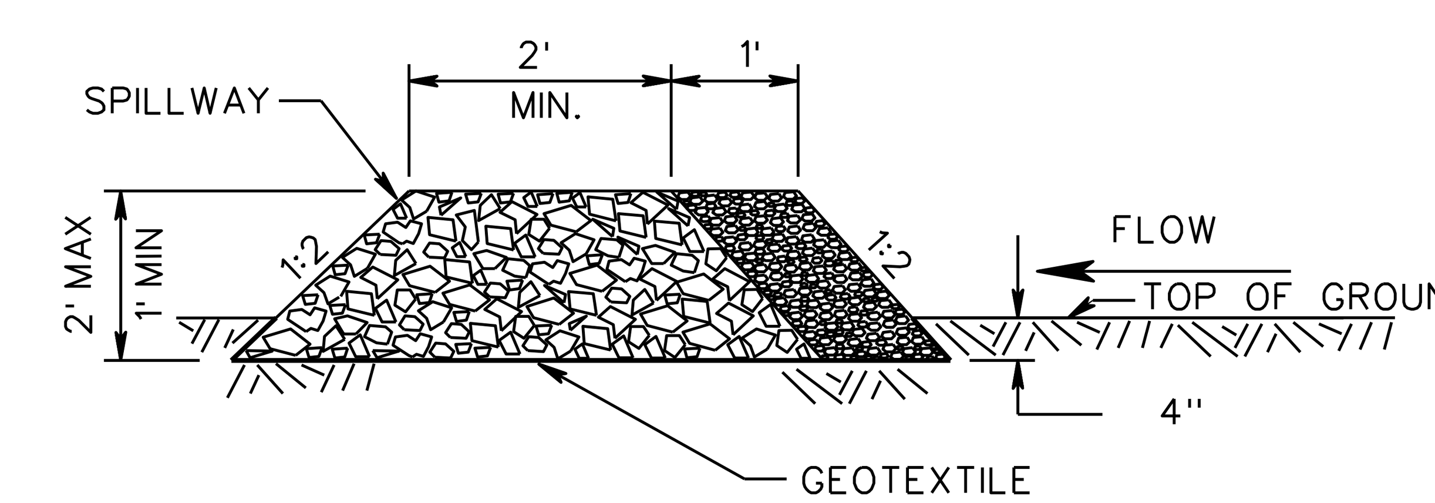
N.T.S.



PLAN



ELEVATION



SECTION A

TEMPORARY STONE CHECK DAM

N.T.S.

(IF REQUIRED)

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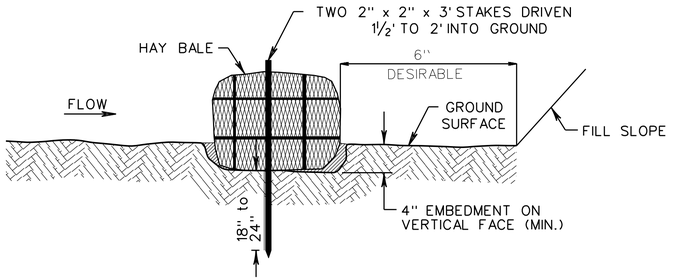
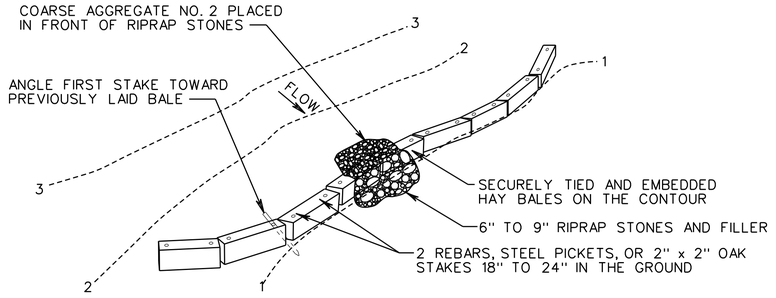
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

SILT FENCE/
CHECK DAM DETAILS

SHEET IDENTIFICATION
C-502
SHEET 38 OF 58



EMBEDDING DETAIL

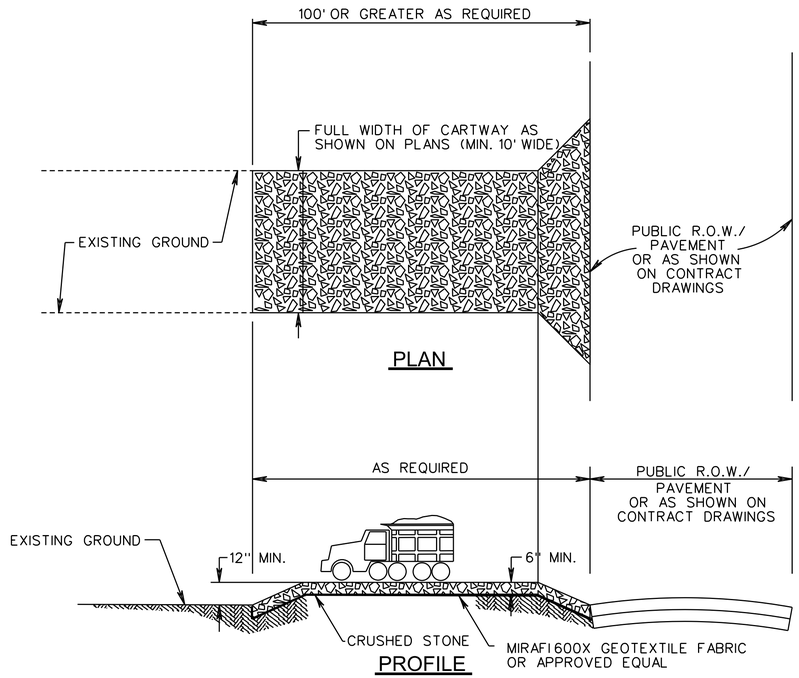


PLACEMENT AND ANCHORING DETAIL

NOTES:

1. HAY BALES SHALL BE INSTALLED SO WATER CANNOT BYPASS THE ENDS OF THE BARRIER.
2. INSPECTION SHALL BE FREQUENT, AFTER EVERY STORM AND REPAIR OR REPLACEMENT SHALL BE MADE AS PROMPTLY AS POSSIBLE.
3. HAY BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
4. HAY BALES SHALL REMAIN IN PLACE FOR THE DURATION OF THE PROJECT UNLESS OTHERWISE INSTRUCTED BY THE CONTRACTING OFFICER.

HAY BALES SEDIMENT BARRIERS



NOTES:

1. PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND PUBLIC R.O.W.
2. PLACE STABILIZED CONSTRUCTION ENTRANCE AT LOCATION(S) AS SHOWN ON THE EROSION AND SEDIMENTATION CONTROL PLANS.
3. STONE SIZE SHALL BE ASTM C-33, SIZE NO. 2 OR 3, CRUSHED STONE.
4. THE THICKNESS OF THE STABILIZED CONSTRUCTION ENTRANCE SHALL NOT BE LESS THAN 6".
5. THE WIDTH AT THE EXISTING PAVEMENT SHALL NOT BE LESS THAN THE FULL WIDTH OF POINTS OF INGRESS AND EGRESS.
6. THE STABILIZED CONSTRUCTION DRIVEWAY SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO THE PUBLIC R.O.W./PAVEMENT. THIS REQUIRES PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURE USED TO TRAP SEDIMENT OR AS MAY BE REQUIRED BY THE SOIL CONSERVATION DISTRICT AS CONDITIONS DEMAND.
7. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO THE PUBLIC R.O.W./PAVEMENT MUST BE REMOVED IMMEDIATELY AND AT THE DAYS END.
8. WHERE TRACKING OF SOIL ONTO ROADWAYS IS A CONTINUAL OCCURRENCE, THE CONTRACTOR WILL BE REQUIRED TO BROOMSWEEP THE ROADWAY AT TWO-HOUR INTERVALS MINIMUM AND PRIOR TO LEAVING THE CONSTRUCTION SITE AT THE DAYS END. IF TRACKING PADS AND SWEEPING DO NOT CONTROL TRACKING, A TRUCK WASH SHALL BE ESTABLISHED OR HAULING OPERATIONS WILL BE STOPPED

STABILIZED CONSTRUCTION ENTRANCE

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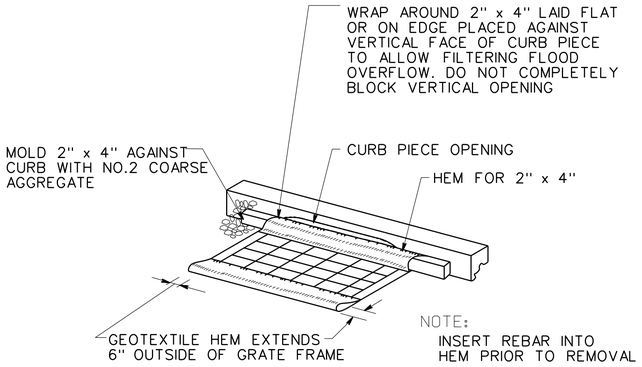
PLOT SCALE: 1
SIZE: ANSI D
DATE: 8 JANUARY 2016
CKD BY:
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEQB1B2c503.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

HAYBALES/
CONSTRUCTION FENCE
DETAILS

SHEET IDENTIFICATION
C-503
SHEET 39 OF 58



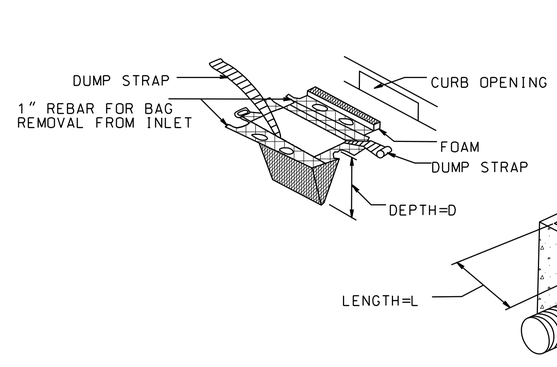
EXISTING INLET

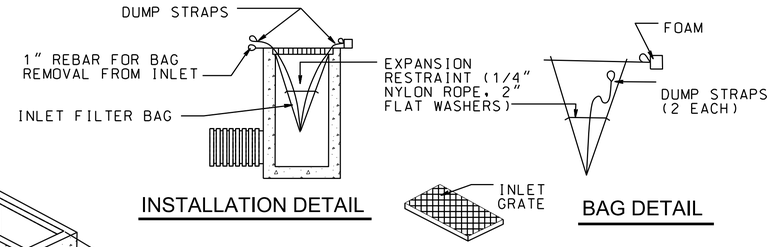
INLET FILTER TYPE 1

N.T.S.

NOTES:

1. CONTRACTOR TO CLEAN INLET FILTERS AFTER EVERY STORM.
2. FILTER FABRIC, WOOD PIECE TO BE REMOVED AFTER PAVING OR FINAL GRADING AND ESTABLISHMENT OF VEGETATION.





INSTALLATION DETAIL

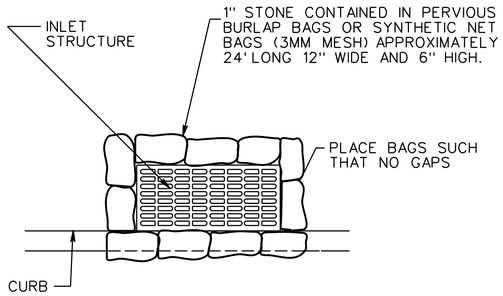
BAG DETAIL

INLET FILTER - TYPE 2

N.T.S.

NOTES:

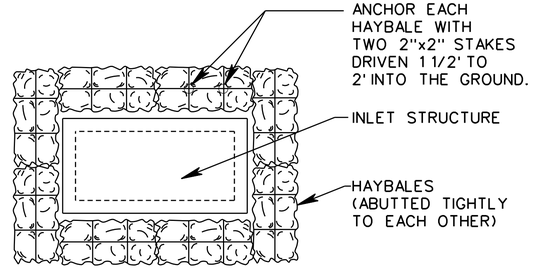
1. CONTRACTOR TO CLEAN INLET FILTERS AFTER EVERY STORM.
2. FILTER FABRIC, WOOD PIECE TO BE REMOVED AFTER PAVING OR FINAL GRADING AND ESTABLISHMENT OF VEGETATION.



INLET PROTECTION, STONE BARRIER BAGS

N.T.S.

NOTE:
WHERE INLET PROTECTION MAY INTERFERE WITH TRAFFIC, A COMMERCIALLY AVAILABLE CATCH BASIN INSERT SHALL BE USED. SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.



INLET PROTECTION, HAYBALE BARRIER

N.T.S.

NOTE:
WHERE STAKING IS NOT PRACTICAL, HAY BALES SHALL BE TIED TOGETHER TO PREVENT MOVEMENT.

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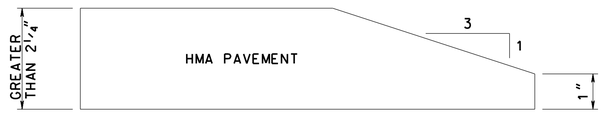
SUBMITTED BY: NAS
PLOT SCALE: 1.000000
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
ISSUE DATE: 8 JANUARY 2016
FILE NAME: CB_SEQBTB2c504.dgn
FILE NUMBER:
SIZE: ANSI D

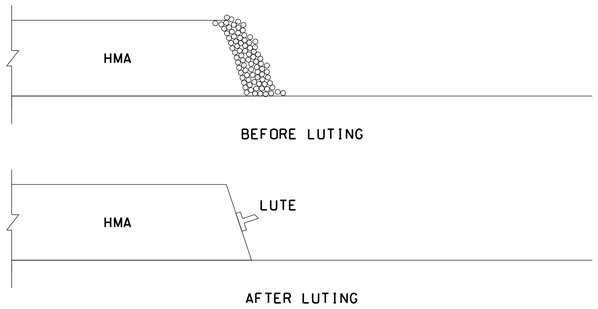
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

INLET PROTECTION DETAILS

SHEET IDENTIFICATION
C-504
SHEET 40 OF 58



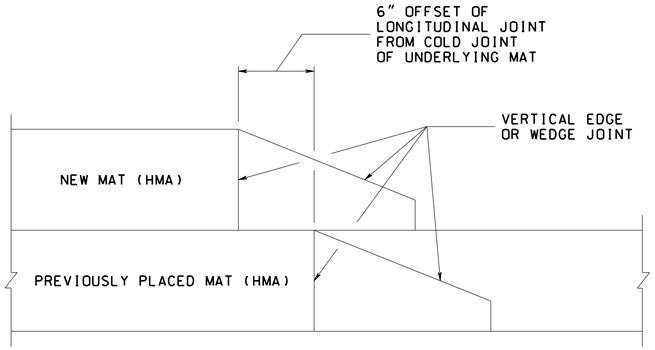
WEDGE JOINT
(NOTE 1)
N.T.S.



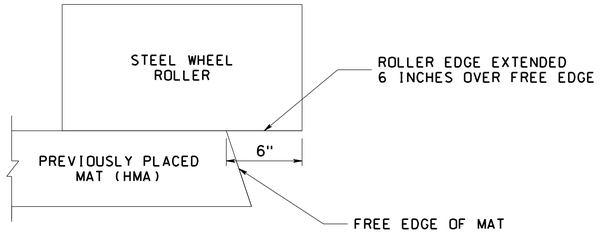
COMPACTION OF UNCONFINED VERTICAL EDGE
(NOTE 3)
N.T.S.

NOTES:

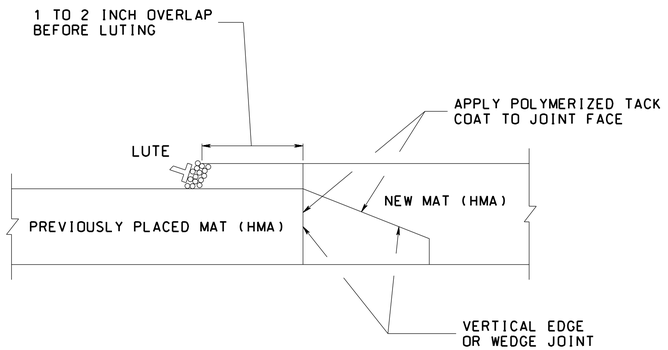
1. WHEN HMA LIFT THICKNESS IS GREATER THEN 2¼ INCHES AND WHEN TRAFFIC IS TO BE MAINTAINED, CONSTRUCT A WEDGE JOINT.
2. ENSURE THAT THE JOINT IN THE HMA SURFACE COURSE IS OFFSET FROM THE LANE LINES BY 6 INCHES. IN THE CENTERLINE OF A ROADWAY, ENSURE THAT THE JOINT FALLS BETWEEN THE DOUBLE YELLOW TRAFFIC STRIPE.
3. ENSURE THE LUTE OPERATOR MANUALLY BUMPS THE EDGE TO OBTAIN A TRUE VERTICAL AND DENSE UNCONFINED EDGE.
4. ENSURE THAT THE OVERLAPPED HMA MATERIAL AT THE JOINT IS TIGHTLY CROWDED (BUMPED) OVER THE JOINT ONTO THE NEWLY PLACED LANE LEAVING A SMALL MOUND OF MIX HUMPED UP FOR THE ROLLERS TO COMPACT.
5. FOR THE WEDGE JOINT, ENSURE THAT COARSE AGGREGATE PARTICLES ARE KEPT AWAY FROM THE POINT WHERE THE WEDGE MEETS THE SURFACE OF THE PREVIOUSLY PLACED LANE.
6. TO PREVENT LATERAL DISPLACEMENT OF THE UNCONFINED EDGE, ENSURE THAT THE EDGE OF THE ROLLER WHEEL EXTENDS OVER THE FREE EDGE OF THE HMA MAT BY AT LEAST 6 INCHES.



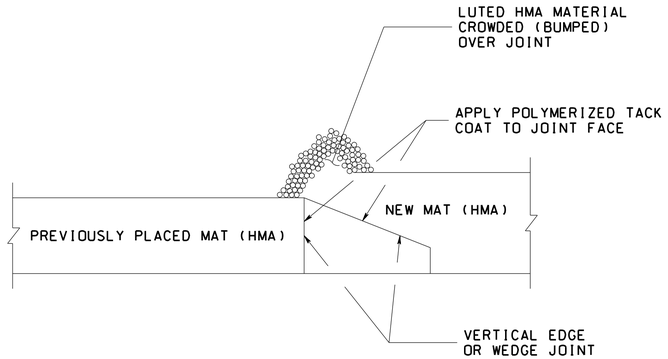
OFFSET OF JOINTS
(NOTE 2)
N.T.S.



ROLLER PLACEMENT FOR COMPACTING ALONG THE UNCONFINED VERTICAL EDGE
(NOTE 6)
N.T.S.



OVERLAPPED HMA BEFORE LUTING
(NOTES 4 & 5)



HMA AFTER LUTING
(NOTE 4)

HMA PAVEMENT
N.T.S.

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PLOT SCALE:
DATE: 8 JANUARY 2016
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FILE NAME: GB_SEGB1B2c505.dgn
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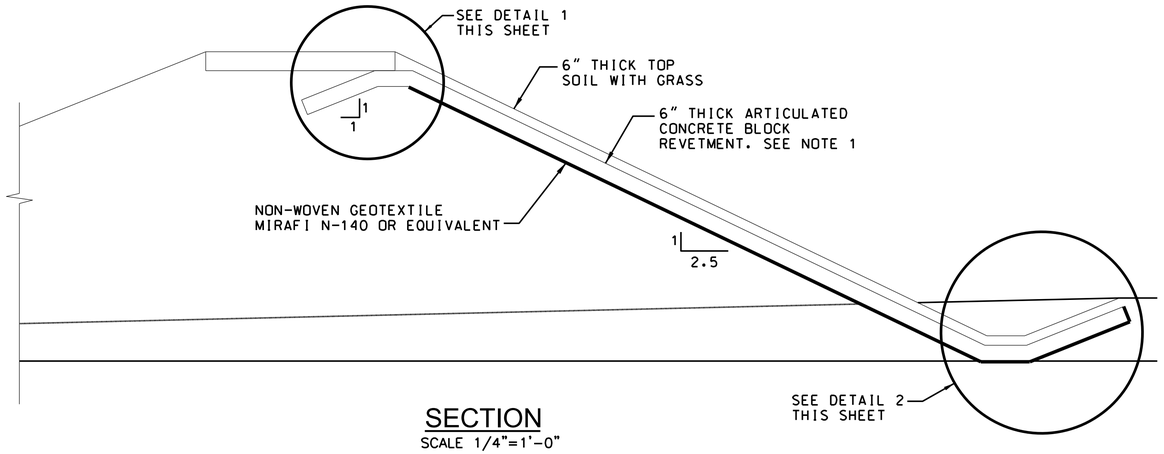
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

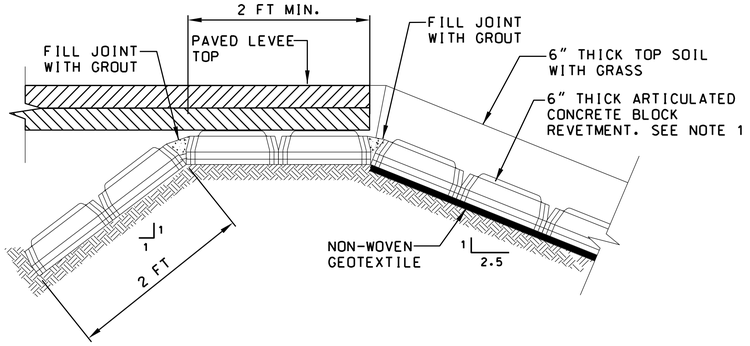
HMA PAVEMENT DETAILS

SHEET IDENTIFICATION
C-505
SHEET 41 OF 58

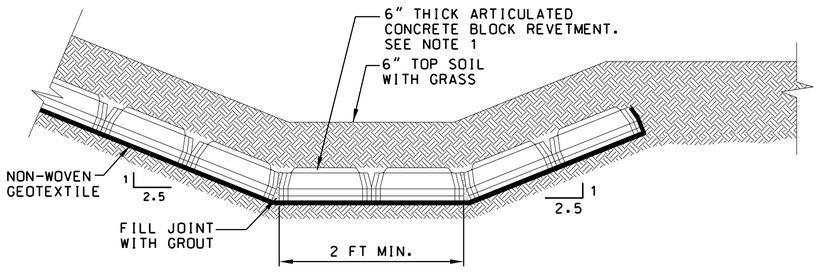


SECTION
SCALE 1/4"=1'-0"

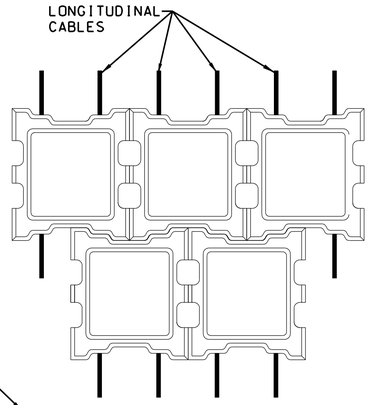
NOTES:
1. FOR OVERTOPPING MATERIAL SPECIFICATION. SEE THE TECHNICAL SPECIFICATIONS. FOR DETAILS. SEE THIS SHEET.



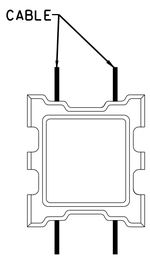
ANCHORING DETAIL 1-FOR MAT ANCHORED TO EXISTING GROUND
NOT TO SCALE

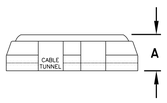


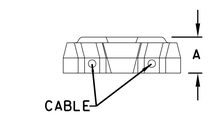
ANCHORING DETAIL 2 - FOR MAT ANCHORED TO SWALE
NOT TO SCALE



PLAN



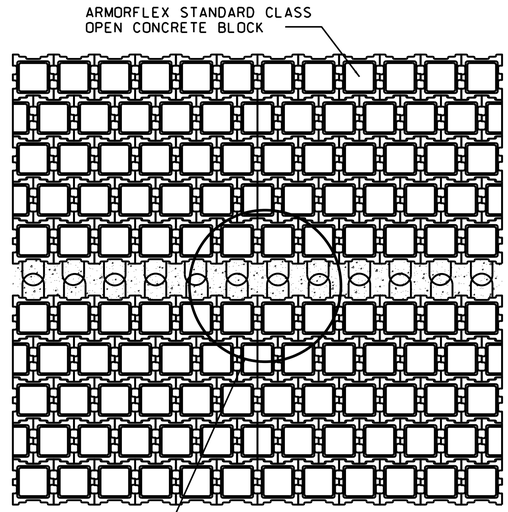




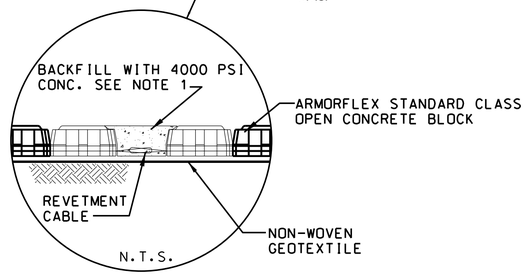
TOP VIEW SIDE VIEW END VIEW

OVERTOPPING PROTECTION UNIT
NOT TO SCALE

SOURCE:
ARMORFLEX DETAILS OBTAINED FROM ARMORTEC. DRAWINGS ENTITLED "ARMORFLEX STANDARD DETAIL", DATED JAN. 12, 2000 AND JAN. 14, 2000.



DETAIL 3 – GROUT SEAM BETWEEN MATS
N.T.S.



NOTES:
1. AT THE UPSTREAM AND DOWNSTREAM CREST OF THE DAM AND AT ALL OTHER LOCATIONS WHERE THE INSTALLATION OF BLOCK CAUSES THE JOINT BETWEEN THE BLOCKS TO BE OPEN MORE THAN TWO (2) INCHES. GROUT SHALL BE INSTALLED IN THE JOINT AS SHOWN ON THE CONTRACT DRAWINGS.

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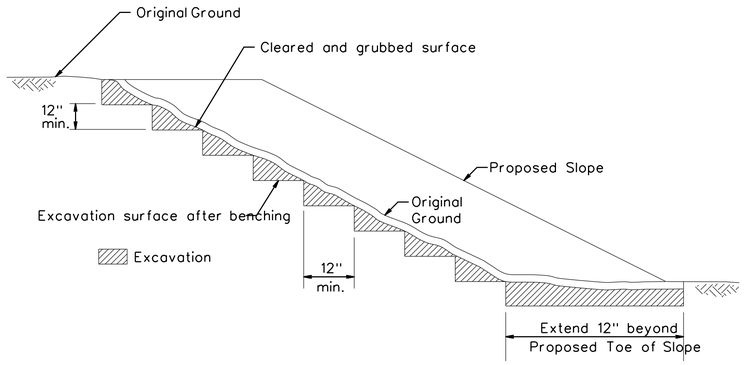
MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: NAS
DWN BY: NAS
SUBMITTED BY: NAS
PLOT SCALE:
SITE: ANSI D
DATE: 8 JANUARY 2016
CKD BY:
ISSUE DATE: 8 JANUARY 2016
FILE NAME: C06_SEGBTB2C506.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

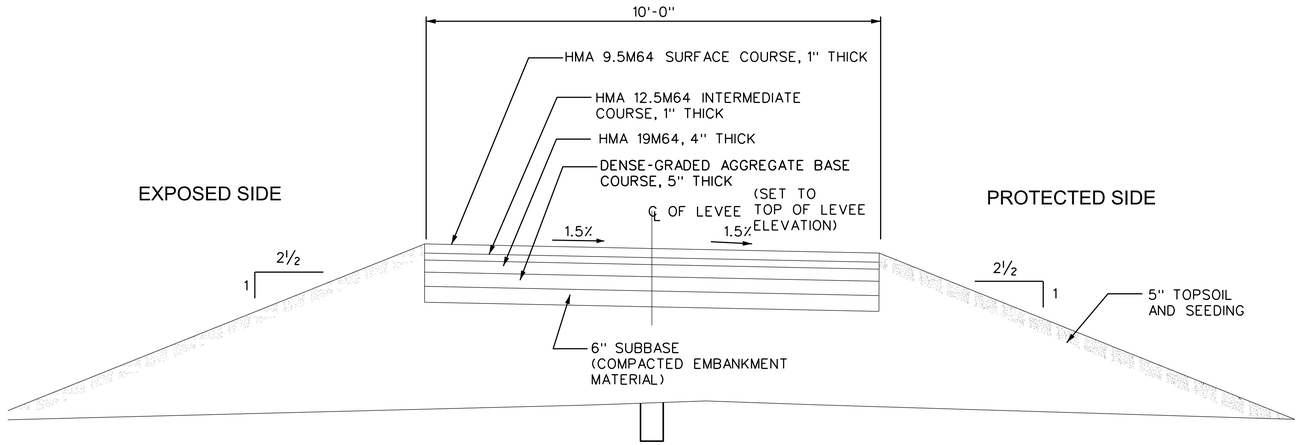
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ
ARTICULATED CONCRETE BLOCK DETAILS (OPTION)

SHEET IDENTIFICATION
C-506
SHEET 42 OF 58



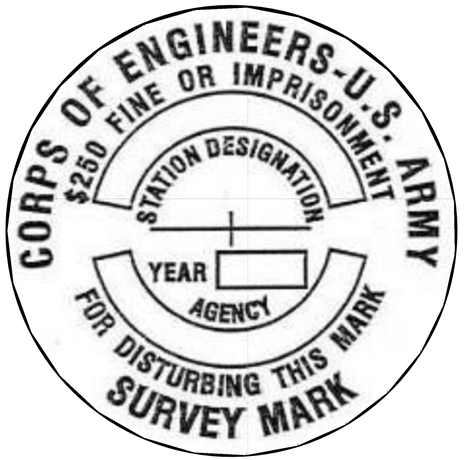
BENCHING FOR LEVEE AND STREAMBANK

NOT TO SCALE



TYPICAL LEVEE SURFACING SECTION

NOT TO SCALE



TYPICAL USACE LOGO ON BENCHMARK

NOT TO SCALE

GENERAL NOTES:

1. THE VERTICAL CONTROL BENCHMARKS FOR THE PROJECT ELEVATION GRADES ON SHEET G-101 SHALL BE REFERENCED ACCORDING TO THE GUIDELINES ESTABLISHED IN ER 1110-2-8160 (Policies for Referencing Project Elevation Grades to Nationwide Vertical Datums) AND IN EM 1110-2-6056 (Standards and Procedures for Referencing Project Elevation Grades to Nationwide Vertical Datums).

2. THE CONTRACTOR SHALL ESTABLISH THE APPROPRIATE PHYSICAL PERMANENT SURVEY MONUMENTATION IN ACCORDANCE WITH EM 1110-1-1002 (Survey Markers and Monumentation), IN COORDINATION WITH THE NEW YORK DISTRICT DATUM COORDINATOR (DDC), AND WITH APPROVAL FROM THE COR.

3. BARE RODS, NAILS (PK, 60d, ETC.), RAILROAD SPIKES, WOODEN HUBS, AND SO FORTH SHALL NOT BE CONSIDERED PERMANENT MONUMENTS UNDER ANY CIRCUMSTANCES.

4. PERMANENT MONUMENTS SHALL BE STABLE AND SELF-IDENTIFYING, AND SHALL INCORPORATE THE PROPERTIES BASED ON LOCAL SITE CONDITIONS PER EM 1110-1-1002.

5. CONSTRUCTION WORK UNDER THIS CONTRACT IS CONTROLLED BY THE PROJECT LEGACY HORIZONTAL NAD27 DATUM AND THE VERTICAL NGVD29 DATUM. THE PERMANENT MONUMENTS SHALL ADHERE TO THE FEDERALLY MANDATED HORIZONTAL NORTH AMERICAN DATUM OF 1983 (NAD83) AND TO THE NORTH AMERICAL VERTICAL DATUM OF 1988 (NGVD88) AT A 95% CONFIDENCE LEVEL OF .25 FEET. THE CONTRACTOR SHALL COORDINATE WITH THE DDC THE CONVERSION BETWEEN THE LEGACY DATA (PLURAL OF DATUM) AND THE FEDERALLY MANDATED DATA.

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NEW YORK, NEW YORK

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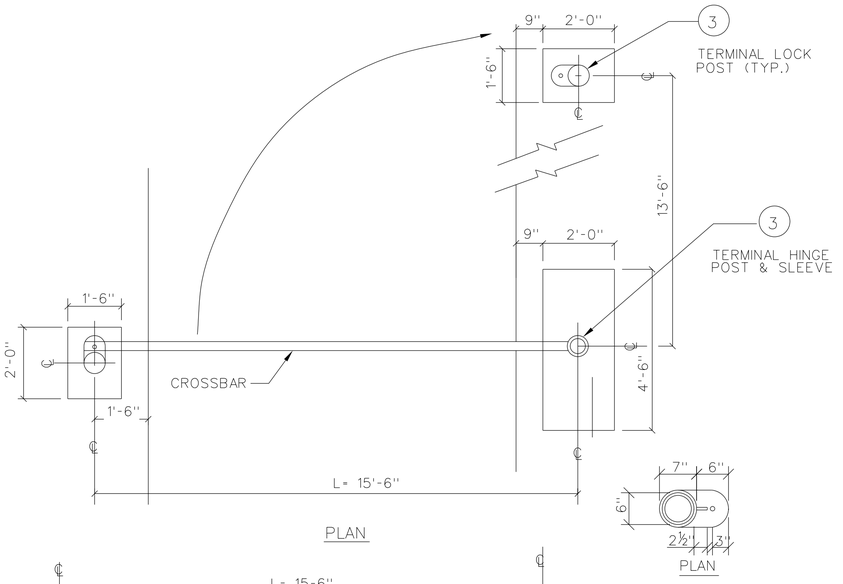
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
PLOT SCALE: 1
PLOT SIZE: ANSI D
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
ISSUE DATE: 8 JANUARY 2016
FILE NAME: CB_SEGB1B2c507.dgn
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

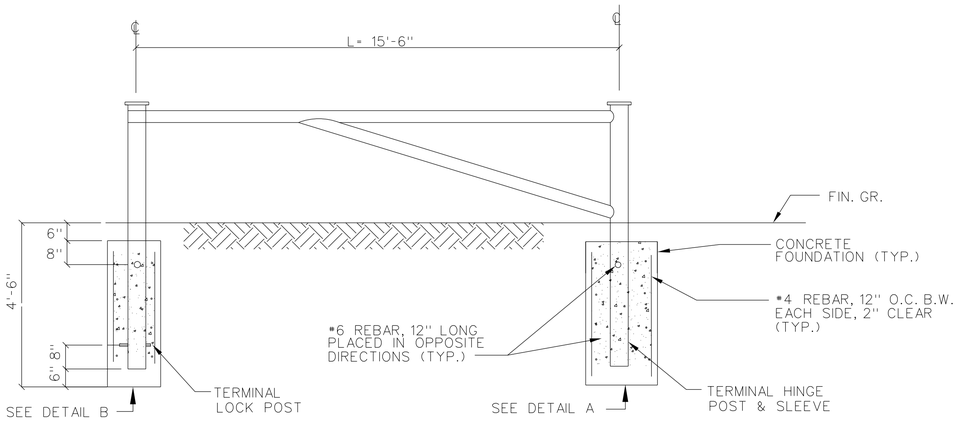
EXCAVATION AND NSRS BENCHMARK DETAILS

SHEET IDENTIFICATION
C-507
SHEET 43 OF 58



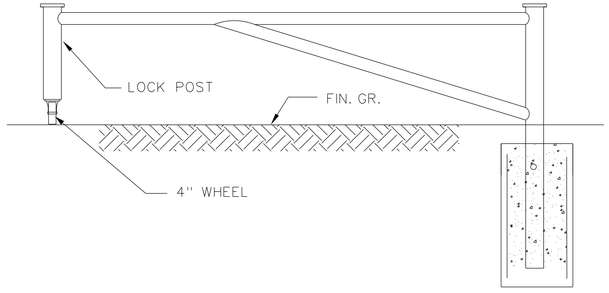
PLAN

PLAN

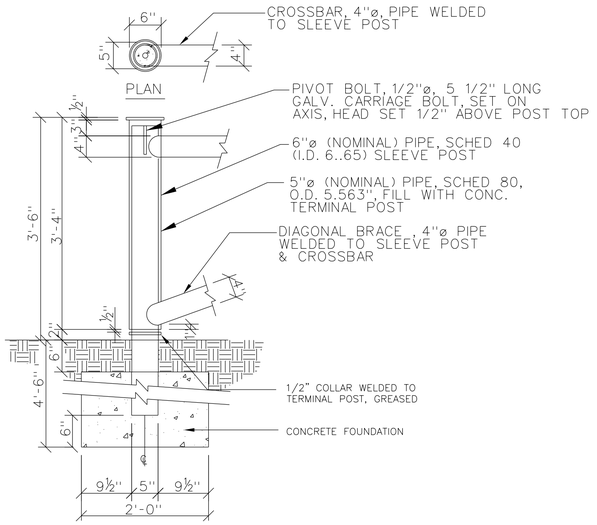


ELEVATION

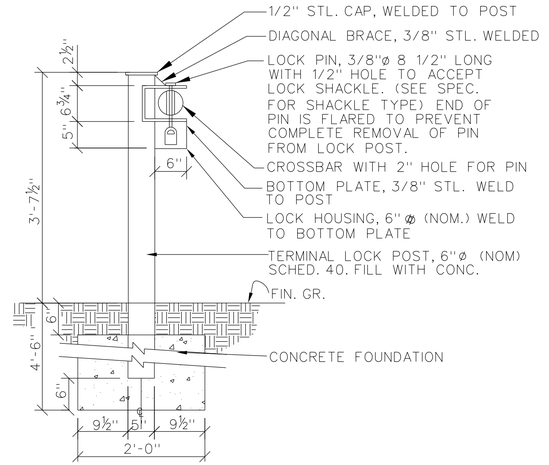
NOTES
1. BACKFILL & COMPACT SOIL AROUND FOOTINGS BEFORE INSTALLING GATE.



ELEVATION



ELEVATION
DETAIL A



ELEVATION
DETAIL B

SINGLE LEAF GATE

Not to Scale

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
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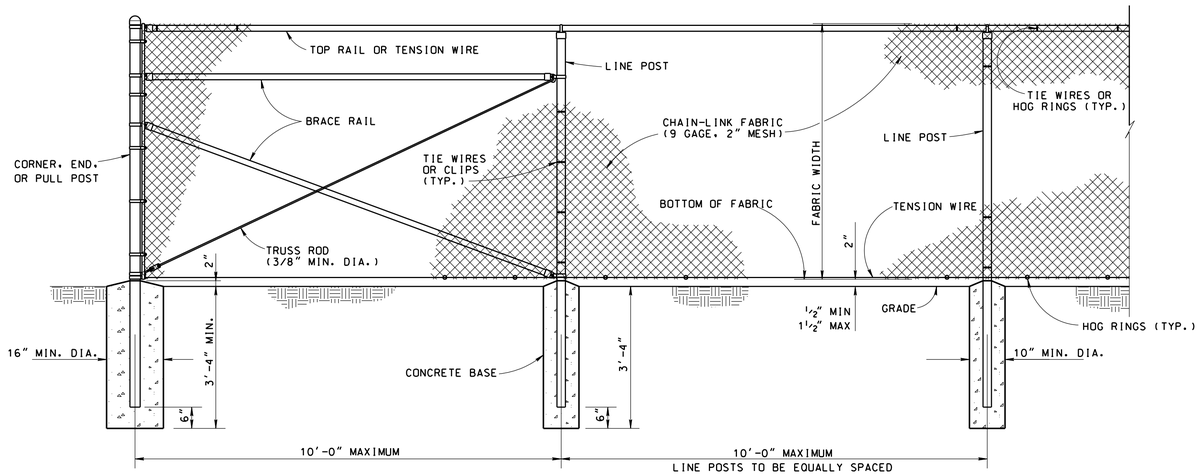
PLOT SCALE:
DATE: 8 JANUARY 2016
SOLICITATION NO.:
CONTRACT NO.:
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2c508.dgn
FILE NUMBER:
SIZE: ANSI D

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

SINGLE LEAF GATE DETAILS

SHEET IDENTIFICATION
C-508
SHEET 44 OF 58



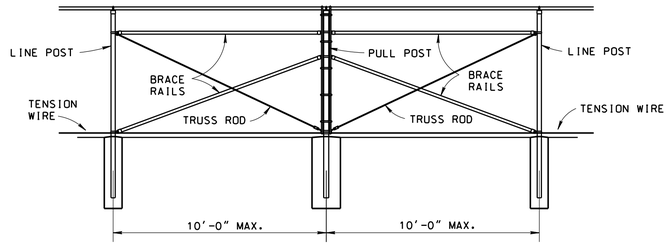
① **FE5 CHAIN-LINK SECURITY FENCE DETAIL**

NO SCALE

USE AND SECTION	STEEL POST SCHEDULE MINIMUM OUTSIDE DIMENSIONS (NOMINAL) FABRIC WIDTH 72" OR LESS	FABRIC WIDTH 84" TO 96"	FABRIC WIDTH 108" AND OVER
CORNER, END & PULL POSTS			
TUBULAR - ROUND	2.375" O.D.	2.875" O.D.	4.00" O.D.
TUBULAR - SQUARE	2.00" SQ.	2.50" SQ.	3.00" SQ.
C-SECTION (ROLL-FORMED)	3.50" x 3.50"	3.50" x 3.50"	———
LINE POSTS			
TUBULAR - ROUND	1.90" O.D.	2.375" O.D.	2.875" O.D.
H-SECTION	2.25" x 1.70"	2.25" x 1.70"	2.25" x 1.70"
C-SECTION (ROLL-FORMED)	1.875" x 1.625"	2.25" x 1.70"	———
TOP, BOTTOM & BRACE RAILS			
TUBULAR - ROUND	1.66" O.D.		
TUBULAR - SQUARE	1.50" SQ.		
H-SECTION	1.625" x 1.50"		
C-SECTION (ROLL-FORMED)	1.625" x 1.25"		

NOTES:

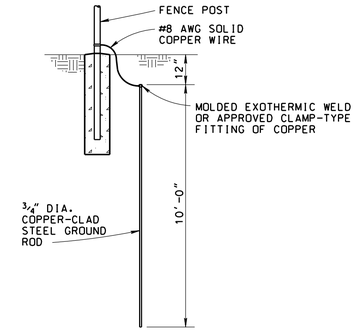
1. WIRE TIES, RAILS, POSTS, AND BRACES SHALL BE CONSTRUCTED ON THE SECURE SIDE OF THE FENCE ALIGNMENT. CHAIN-LINK FABRIC SHALL BE PLACED ON THE SIDE OPPOSITE THE SECURED AREA.
2. C-SECTION POSTS SHALL BE INSTALLED SO THAT THE VOID INSIDE THE POST IS COMPLETELY FILLED WITH CONCRETE UP TO THE TOP OF THE FOUNDATION.



BRACE PANEL DETAIL

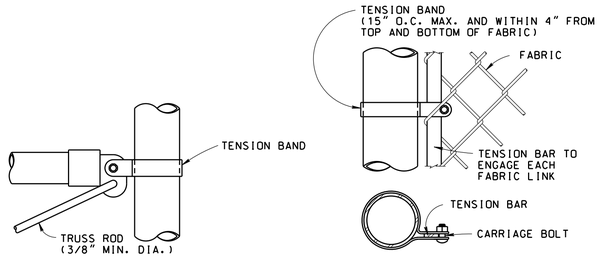
NO SCALE

NOTE: PROVIDE BRACE PANEL WHENEVER STRAIGHT RUNS EXCEED 500 FEET.



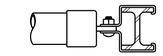
GROUNDING DETAIL

NO SCALE



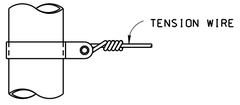
ROUND POST

END OR GATE POST DETAIL



H-BEAM

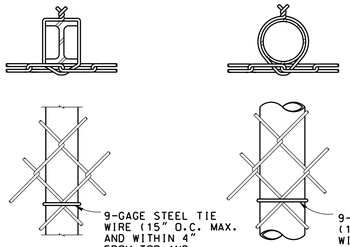
BRACE RAIL CLAMP DETAILS



TENSION BAND DETAIL

FASTENING DETAILS

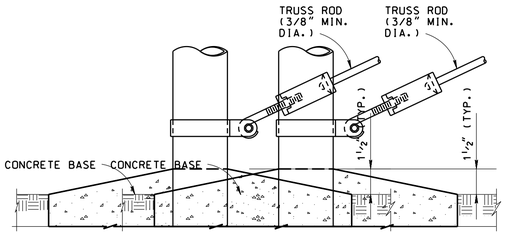
NO SCALE



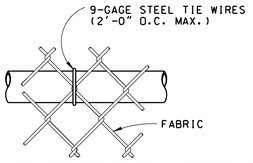
H-BEAM **ROUND POST**

LINE POST ATTACHMENTS

NO SCALE



TRUSS ROD AND BAND



TOP OR BRACE RAIL ATTACHMENT

NO SCALE

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MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: NAS
DWN BY: NAS
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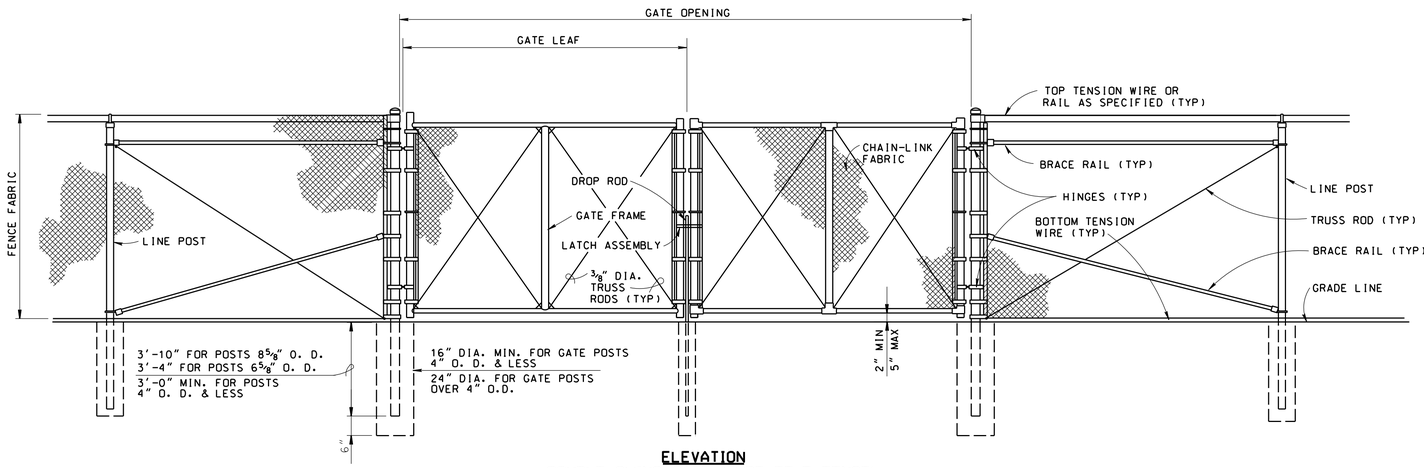
PLOT SCALE:
SIZE: ANSI D
DATE: 8 JANUARY 2016
ISSUE DATE: MAY 2016
FILE NAME: GB_SEGB1B2C509.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

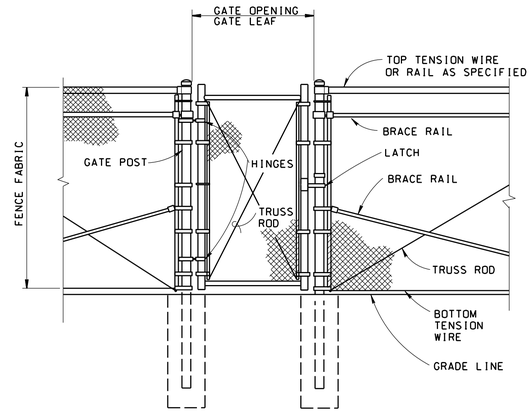
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP., NJ

CHAIN LINK FENCE DETAILS

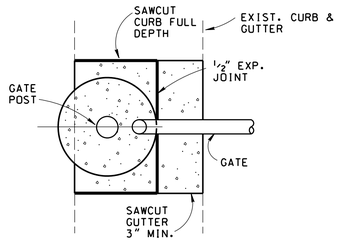
SHEET IDENTIFICATION
C-509
SHEET 45 OF 58



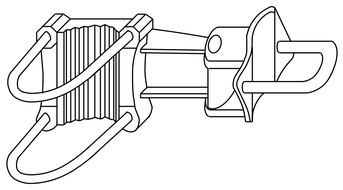
ELEVATION
DOUBLE SWING GATE (TYPE FE-5 FENCE)
NO SCALE



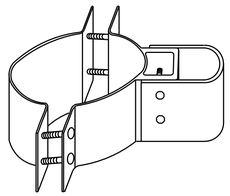
PERSONNEL GATE
TYPE FE-5 FENCE
NO SCALE



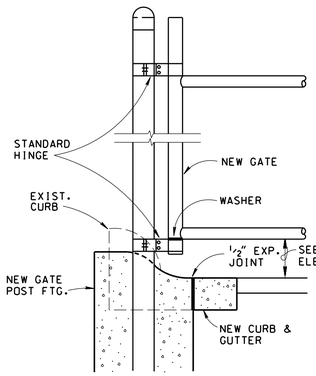
PLAN



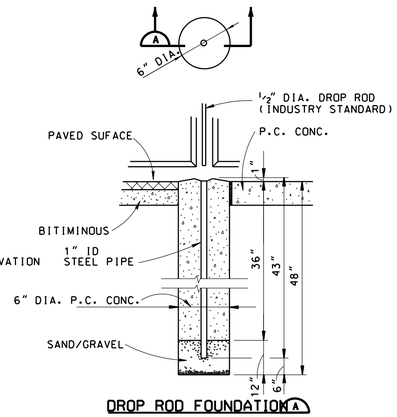
OFFSET HINGE



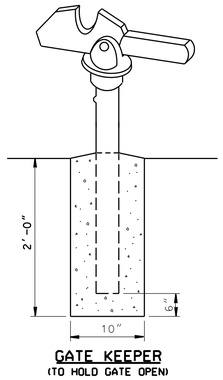
STANDARD HINGE



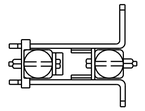
GATE POST SECTION AT CURB AND GUTTER
NO SCALE



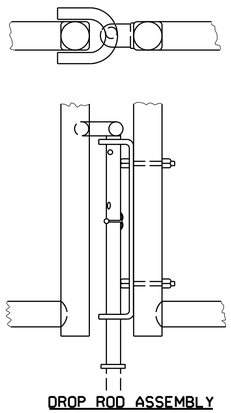
DROP ROD FOUNDATION A



GATE KEEPER
(TO HOLD GATE OPEN)



LATCH ASSEMBLY



DROP ROD ASSEMBLY

SWING GATE DETAILS
NO SCALE

NOTES:
1. DETAILS SHOWN ARE TO CLARIFY REQUIREMENTS AND ARE NOT INTENDED TO LIMIT OTHER TYPE OF FENCE SECTIONS AND METHODS OF INSTALLATION THAT COMPLY WITH THE SPECIFICATIONS.
2. SWING GATES SHALL BE CONSTRUCTED WITH DROP RODS, PADLOCKS, LATCH ASSEMBLY AND GATE KEEPERS EXCEPT AS NOTED.
3. ALL GATE FRAMES SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM F900 1.90" NOMINAL (ROUND) OR 2.00" NOMINAL (SQUARE). GATE FRAMES SHALL BE OF WELDED CONSTRUCTION OR SHALL BE ASSEMBLED USING HEAVY FITTINGS. AT CONTRACTOR'S OPTION A WELDED HORIZONTAL BRACE MAY BE USED IN LIEU OF TRUSS RODS TO BRACE ALL-WELDED GATE FRAMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER RIGID CONSTRUCTION OF ALL GATES SUPPLIED.

GATE POST SCHEDULE	
GATE LEAF WIDTH (NOMINAL)	OUTSIDE DIMENSION (NOMINAL)
6' OR LESS	2.875" OD 2.5" SQ
MORE THAN 6' TO 12'	4.0" OD
MORE THAN 12' TO 18'	6.625" OD
MORE THAN 18'	8.625" OD

US Army Corps of Engineers®
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MARK	DESCRIPTION	DATE	APPR.

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NEW YORK, NEW YORK

DESIGNED BY: NAS
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
PLOT SCALE:
SIZE: ANSI D
DATE: 8 JANUARY 2016
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2C510.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

CHAIN LINK GATE DETAILS

SHEET IDENTIFICATION
C-510
SHEET 46 OF 58

GENERAL NOTES:

1. DESIGN CRITERIA AND REFERENCES:
EM1110-2-1913, DESIGN AND CONSTRUCTION OF LEVEES
EM1110-2-2504, DESIGN OF SHEET PILE WALLS
EM1110-2-2502, ENGINEERING AND DESIGN - RETAINING AND FLOOD WALLS
EM1110-2-2906, DESIGN OF PILE FOUNDATIONS
EM1110-2-2104, STRENGTH DESIGN FOR REINFORCED CONCRETE HYDRAULIC STRUCTURES
EC1110-2-6066, DESIGN OF I-WALLS
ER1110-2-1806, EARTHQUAKE DESIGN AND EVALUATION OF CIVIL WORKS PROJECTS
NAVFAC DM-7.2 FOUNDATIONS AND EARTH STRUCTURES
ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
ACI 318-11 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE.
REFER TO PROJECT SPECIFICATIONS FOR OTHER PERTINENT CODES AND CRITERIA.
ETL 1110-2-577 USE OF SPIRAL WELDED PIPE PILES

DESIGN LOADS:

MONOLITHS 1 TO 13
APPROXIMATE LOAD TO EACH PIPE SOLDIER PILE WITH A 7.33' TRIBUTARY AREA:
WATER TO TOP OF FLOODWALL LOAD - 44,793 LBS (HORIZONTAL RESULTANT AT ONE THIRD HEIGHT OF WALL).
WEIGHT OF CONCRETE CAP - 48,502 LBS
MONOLITHS 14 TO 19
APPROXIMATE LOAD TO EACH PIPE SOLDIER PILE WITH A 7.33' TRIBUTARY AREA:
WATER TO TOP OF FLOODWALL LOAD - 29,195 LBS (HORIZONTAL RESULTANT AT ONE THIRD HEIGHT OF WALL).
WEIGHT OF CONCRETE CAP - 40,023 LBS

SEISMIC PARAMETERS FROM USGS:

Ss	.255g
S1	.069g
Sms	.407g
Sm1	.165g
Sds	.271g
Sd1	.110g

RISK CATEGORY IV DESIGN CATEGORY C
SITE CLASS D FROM URS GEOTECHNICAL REPORT

2. GENERAL REQUIREMENTS:
(A) ALL DIMENSIONS AND DETAILS SHALL BE VERIFIED AND COORDINATED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
(B) THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALL NECESSARY SAFEGUARDS TO PROTECT PUBLIC SAFETY AND ADJOINING PROPERTIES.
(C) NO SEPARATE PAYMENT WILL BE MADE FOR PROVIDING AND MAINTAINING ALL NECESSARY EQUIPMENT AND METHODS TO KEEP EXCAVATIONS FREE OF WATER AND TO PROTECT FROM DAMAGE BY WATER DURING ALL PHASES OF CONSTRUCTION. ALL COSTS THEREOF TO BE INCLUDED IN THE PRICE BID FOR THE VARIOUS ITEMS IN THE PROPOSAL.
(D) NO SEPARATE PAYMENT WILL BE MADE FOR FURNISHING, PLACING, AND MAINTAINING ALL SHEETING, BRACING, SHORING, AND OTHER SUPPORTS REQUIRED BY THE WORK. ALL COSTS THEREOF TO BE INCLUDED IN THE PRICE BID FOR THE VARIOUS ITEMS IN THE PROPOSAL.
(E) THE CONTRACTOR SHALL FURNISH, PLACE, AND MAINTAIN ALL SHEETING, BRACING, SHORING, AND OTHER SUPPORTS REQUIRED BY THE WORK.
(F) DETAILS AS SHOWN IN ANY SECTION SHALL APPLY TO ALL SIMILAR SECTIONS UNLESS OTHERWISE NOTED.
(G) THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH ALL FEDERAL, STATE, COUNTY, AND MUNICIPAL LAWS, ORDINANCES, AND REGULATIONS.
(H) THE CONTRACTOR SHALL UTILIZE APPLICABLE DIVISIONS OF THE UFGS SPECIFICATIONS FOR ALL STRUCTURAL WORK INCLUDING:

DIVISION	03	CONCRETE
	05	METALS
	06	WOOD, PLASTICS, AND COMPOSITES
	09	FINISHES
	31	EARTHWORK

3. UTILITIES:

(A) THE LOCATIONS OF ALL UTILITIES INDICATED ON THE PLANS ARE APPROXIMATE AND ARE NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR SHALL CONTACT THE RESPECTIVE UTILITY COMPANIES FOR FIELD MARK-OUTS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL UTILITIES BOTH HORIZONTALLY AND VERTICALLY PRIOR TO THE START OF ANY WORK TO DETERMINE IF ANY CONFLICTS WILL OCCUR. SEPARATE PAYMENT WILL NOT BE MADE FOR THIS TASK. COSTS THEREOF SHALL BE INCLUDED IN PRICES BID FOR THE VARIOUS ITEMS IN THE PROPOSAL.

(B) KNOWN UTILITIES HAVE BEEN IDENTIFIED IN FIELD SURVEY. THE CONTRACTOR SHALL VERIFY THE DEPTH AND LOCATIONS OF THESE AND ALL UTILITIES AND PROTECT THEM FROM DAMAGE.

(C) THE CONTRACTOR SHALL COORDINATE THE NEED OF ANY UTILITY LINE RELOCATIONS WITH THE U.S.A.C.E. AND THE RESPECTIVE UTILITY OWNERS.

FLOODWALL GENERAL NOTES:

1. WALL LINE REFERS TO CENTERLINE OF WALL STEM.

2. ARCHITECTURAL TREATMENT IS REQUIRED FOR C.I.P. CONCRETE WALL PANELS UNLESS OTHERWISE NOTED. SEE DWG NO. S-503 & S-504 FOR FLUTE PATTERN. ALL VISIBLE CONCRETE AREAS SHALL BE STAINED UTILIZING A PENETRATING CONCRETE STAIN IN ACCORDANCE WITH SECTION 09 90 00 "PAINT AND COATING". THE WALLS SHALL BE STAINED FROM 1 FT. MIN. BELOW THE GROUND SURFACE. ALL AREAS NOT TO RECEIVE THE STAIN SHALL BE MASKED TO AVOID OVERSPRAY.

3. EXPOSED WALL SURFACES ARE TO BE PROTECTED WITH A COATING OF ANTI GRAFFITTI PAINT FROM 1 FT. MINIMUM BELOW THE GROUND SURFACE.

4. CONCRETE NOTES:
(A) CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 4000 PSI AT 28 DAYS, 56 DAYS IF POZZOLAN OR SLAG IS USED, UNLESS OTHERWISE NOTED.

(B) REINFORCING STEEL SHALL HAVE A MINIMUM YIELD STRENGTH (Fy) OF 60,000 PSI.

(C) CONSTRUCTION JOINTS SHALL BE PROVIDED WHERE SHOWN ON THE DRAWINGS. WHERE NOT SHOWN, CONSTRUCTION JOINTS SHALL BE PLACED AT LOCATIONS LEAST LIKELY TO IMPAIR THE INTEGRITY OF THE CONCRETE STRUCTURE. THESE ADDITIONAL CONSTRUCTION JOINT LOCATIONS SHALL BE APPROVED BY THE CONTRACTING OFFICER.

(D) UNLESS OTHERWISE NOTED, PROVIDE CHAMFER AT ALL EXPOSED JOINTS, EDGES, EXTERNAL CORNERS, AND VERTICAL EXPANSION JOINTS.

(E) ALL PRIMARY REINFORCEMENT SHALL HAVE A MINIMUM COVER OF 4" UNLESS OTHERWISE NOTED. (3" AT LOW TEMPORARY CUT OFF WALL)

(F) ALL BENDS OF REINFORCEMENT AND ALL BAR SPACERS AND SUPPORTS SHALL BE IN ACCORDANCE WITH SP-66, AMERICAN CONCRETE INSTITUTE DETAILING MANUAL - 2008.

(G) REINFORCING BAR DESIGNATION NUMBERS CONFORM TO THE NUMBERING SYSTEM OF THE CONCRETE REINFORCING STEEL INSTITUTE.

(H) REINFORCING BARS SHALL BE CONTINUOUS AT ALL CORNERS UNLESS OTHERWISE NOTED.

(I) REINFORCEMENT, WHERE NECESSARY TO AVOID OPENINGS, PIPES, EMBEDDED ITEMS AND OTHER OBSTRUCTIONS, SHALL BE BENT OR SHIFTED AS DIRECTED BY THE CONTRACTING OFFICER.

(J) ALL EXTERIOR FORMED SURFACES NOT COVERED BY BACKFILL SHALL BE CLASS "A" FINISH AND SURFACES COVERED BY BACKFILL SHALL BE CLASS "D" FINISH, UNLESS OTHERWISE NOTED.

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GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

GENERAL NOTES - 1

SHEET IDENTIFICATION
S-001
SHEET 48 OF 58

4. STEEL NOTES:

(A) TO PREVENT CORROSION BY MOISTURE BETWEEN STEEL SURFACES IN CONTACT, ALL SUCH CONTACTS SHALL BE SEALED WATERTIGHT BY RUNNING A CONTINUOUS FILLET WELD ALONG ALL EDGES OF THE CONTACT, UNLESS OTHERWISE NOTED.

(B) ALL WELDING SHALL BE ELECTRIC WELDING. WORKMANSHIP AND TECHNIQUE, WHERE APPLICABLE, SHALL CONFORM TO THE AMERICAN WELDING SOCIETY STRUCTURAL WELDING CODE.

(C) WELDING SYMBOLS SHOWN ARE THOSE ADOPTED BY THE AMERICAN WELDING SOCIETY AND INDICATE ONLY SIZE AND TYPE OF WELDS REQUIRED.DETAILED INFORMATION SHALL BE SHOWN ON THE SHOP DRAWINGS AND SUBMITTED BY THE CONTRACTOR FOR APPROVAL.

(D) DIMENSIONS SHOWN OR CALLED FOR ARE THE FINAL DIMENSIONS; ALLOWANCES SHALL BE MADE FOR MACHINING.

(E) ALL WELDING TO MILD STEEL SHALL COMPLY WITH AWS D1.1 CYCLIC CRITERIA UNLESS NOTED OTHERWISE.

5. SHEET PILING NOTES:

(A) EXCEPT AS NOTED, ALL SHEET PILES SHALL BE PZ-22, ASTM A572 AND GRADE 60.

6. PIPE SOLDIER PILE NOTES:

(A) ALL SOLDIER PILES SHALL BE 20" ERW STRAIGHT SEAM PIPE ASTM A252 GRADE 3 (MOD) 50 KSI THICKNESS .625".

(B) CONCRETE FILL FOR PIPE SOLDIER PILES SHALL BE F'c = 6,000 PSI.

(C) ALL SOLDIER PILES SHALL BE DRILLED MINIMUM 10' INTO BEDROCK AS NOTED ON S-201.

7. COMPOSITE WALL NOTES:

(A) THE CONTRACTOR SHALL REVIEW THE GEOTECHNICAL DATA TAKEN FROM THE URS GEOTECHNICAL AND HTRW INVESTIGATION FINAL REPORT DATED DECEMBER 5, 2012. THE CONTRACTOR IS CAUTIONED THAT SOIL AND ROCK ELEVATIONS MAY VARY FROM THAT INDICATED ON THE BORING LOGS AS WELL AS THE COMPACTNESS OR STIFFNESS OF SOIL AND STRENGTH OF THE ROCK. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REMOVE ANY OBSTRUCTIONS AND LOCATE TOP OF BEDROCK ACCORDING TO NOTES ON S-201 FOR SOLDIER PILE INSTALLATION.

(B) IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SELECT SUITABLE DRILL RIGS AND PILE DRIVING HAMMERS CONSIDERING THE SITE CONDITIONS AND LAYOUT OF THE SOLDIER PILES AND SHEET PILES. IF APPLICABLE, THE CONTRACTOR SHALL ESTIMATE THE LENGTH OF THE SHEET PILES CONSIDERING THE DRIVABILITY OF SHEET PILES NEXT TO SOLDIER PILES OR SHALL CONSIDER SUITABLE ACCESSORIES.

(C) THE CONTRACTOR SHALL PERFORM PRE-TRENCHING FOR SHEET PILES AS REQUIRED IN ORDER TO REDUCE THE VIBRATIONS BELOW THE ACCEPTABLE LIMITS OR AS DIRECTED BY THE CONTRACTING OFFICER.

(D) THE CONTRACTOR SHALL COMPLY WITH THE VIBRATION MONITORING REQUIREMENTS ON THE CONTRACT SPECIFICATIONS.

(E) THE DRILL RIG FOR SOLDIER PILE INSTALLATION SHALL BE CAPABLE OF DRILLING THROUGH HARD MATERIALS AND ROCK.

(F) CONTRACTOR IS RESPONSIBLE FOR VARIATIONS IN SHEET PILE QUANTITY NEEDED DUE TO DEFLECTION OFF LINE DURING INSTALLATION.

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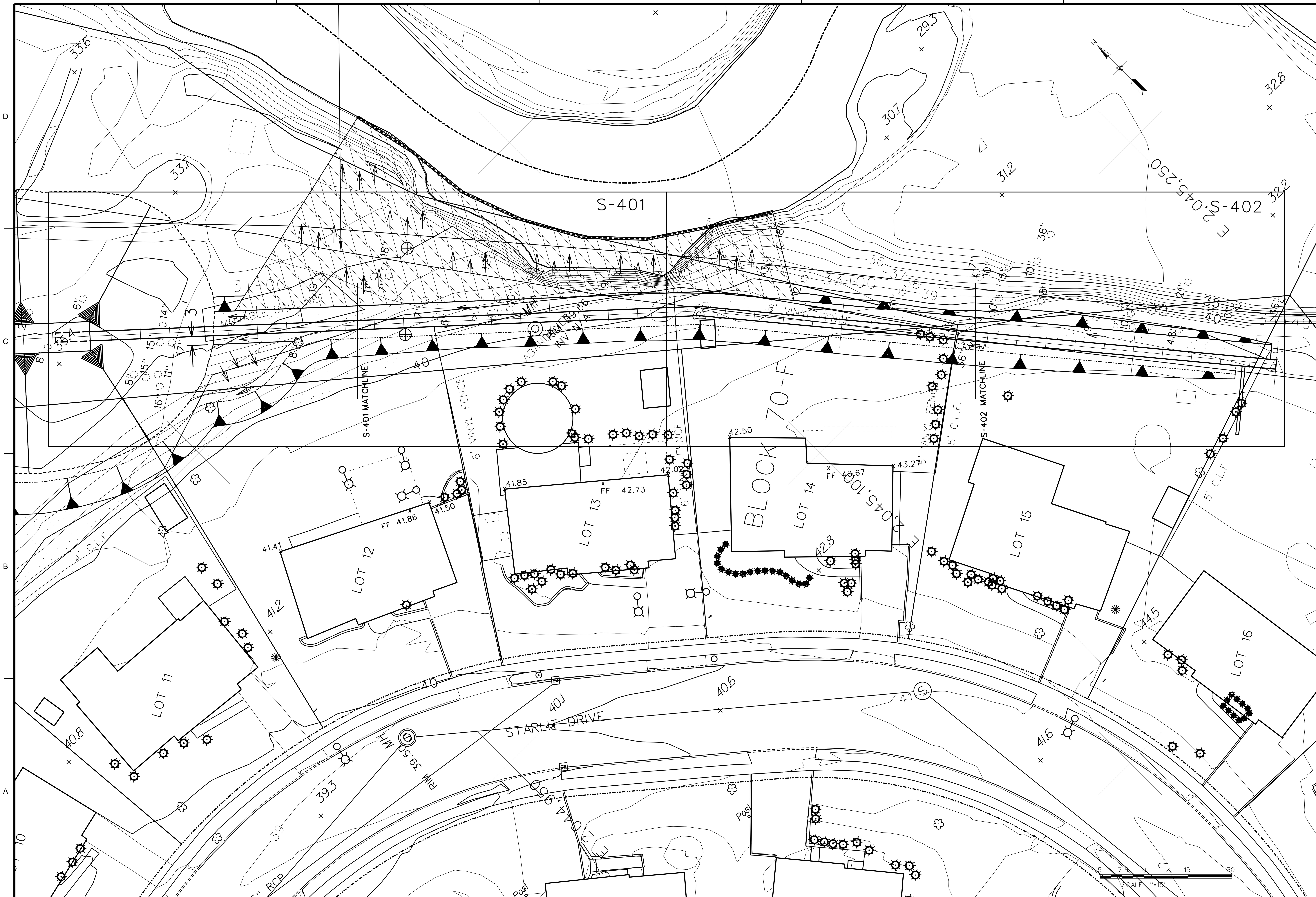
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

GENERAL NOTES -2

SHEET IDENTIFICATION
S-002
SHEET 49 OF 58



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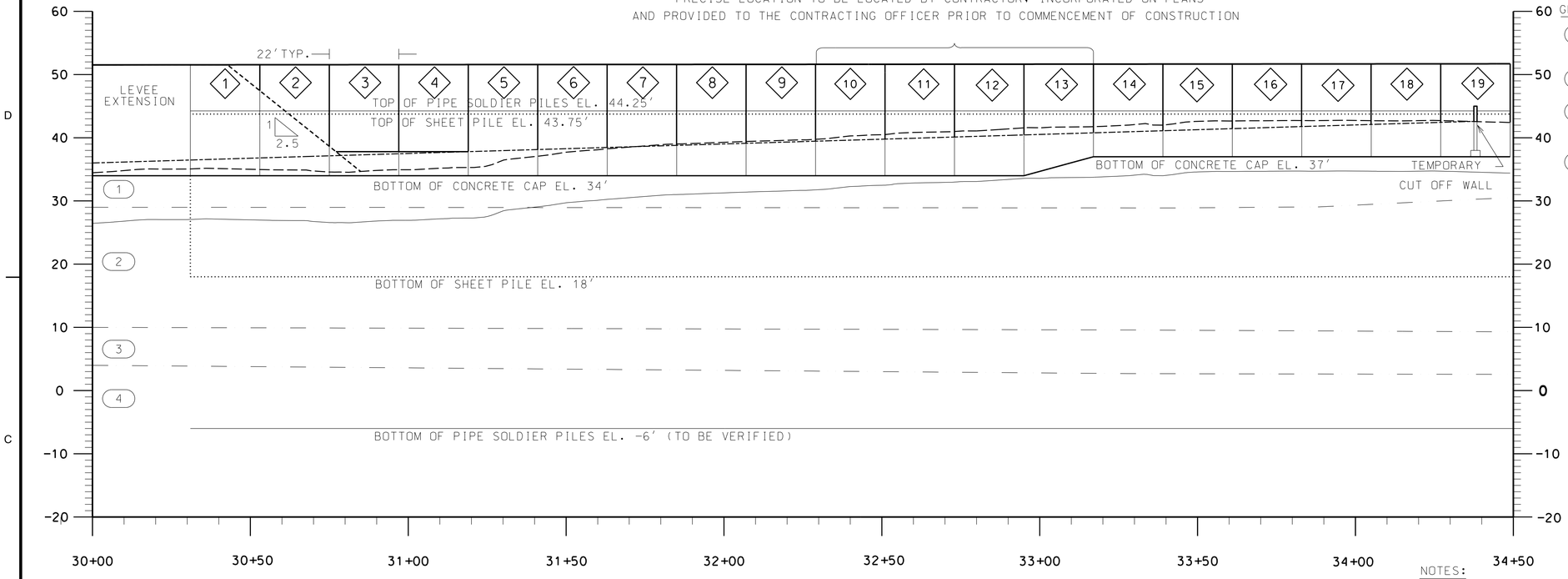
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

FLOODWALL GENERAL PLAN VIEW

SHEET IDENTIFICATION
S-101
SHEET 50 OF 58

APPROXIMATE LOCATION WHERE MCI CONDUIT CROSSES FLOODWALL.
PRECISE LOCATION TO BE LOCATED BY CONTRACTOR, INCORPORATED ON PLANS
AND PROVIDED TO THE CONTRACTING OFFICER PRIOR TO COMMENCEMENT OF CONSTRUCTION



GENERAL SOIL RANGE DESCRIPTION:

1. FILL: DARK BROWN SAND, WITH VARYING AMOUNTS OF SILT, GRAVEL, ORGANIC MATERIAL, AND WOOD.
2. SAND: RED-BROWN SAND WITH VARYING AMOUNTS OF SILT, CLAY, AND GRAVEL.
3. COMPLETELY WEATHERED ROCK: RED-BROWN, COMPLETELY WEATHERED, VERY WEAK, SILTSTONE.
4. SILTSTONE: RED-BROWN, SLIGHTLY WEATHERED,MEDIUM STRONG, CLOSELY FRACTURED SILTSTONE.

SEGMENT B-2 DETAILED FLOODWALL DATA

MONOLITH #	WALL TYPE	APPROX. WALL HEIGHT (FT) FROM SWALE/GRADE	BOTTOM EL. (FT) CONCRETE CAP	TOP EL. (FT) SHEETPILE	BOTTOM EL. (FT) SHEETPILE	TOP EL. (FT) PIPE SOLDIER PILE	APPROXIMATE BOTTOM EL. (FT) PIPE SOLDIER PILE
1	COMPOSITE WALL	4.1	34	43.75	18	44.25	-6
2	COMPOSITE WALL	12.9	34	43.75	18	44.25	-6
3	COMPOSITE WALL	13.3	34	43.75	18	44.25	-6
4	COMPOSITE WALL	13.8	34	43.75	18	44.25	-6
5	COMPOSITE WALL	13.6	34	43.75	18	44.25	-6
6	COMPOSITE WALL	13.3	34	43.75	18	44.25	-6
7	COMPOSITE WALL	13.0	34	43.75	18	44.25	-6
8	COMPOSITE WALL	12.6	34	43.75	18	44.25	-6
9	COMPOSITE WALL	12.3	34	43.75	18	44.25	-6
10	COMPOSITE WALL	12.0	34	43.75	18	44.25	-6
11	COMPOSITE WALL	11.7	34	43.75	18	44.25	-6
12	COMPOSITE WALL	11.4	34	43.75	18	44.25	-6
13	COMPOSITE WALL	11.0	TRANSITION 34-37	43.75	18	44.25	-6
14	COMPOSITE WALL	10.7	37	43.75	18	44.25	-6
15	COMPOSITE WALL	10.4	37	43.75	18	44.25	-6
16	COMPOSITE WALL	10.1	37	43.75	18	44.25	-6
17	COMPOSITE WALL	9.7	37	43.75	18	44.25	-6
18	COMPOSITE WALL	9.4	37	43.75	18	44.25	-6
19	COMPOSITE WALL	9.3	37	43.75	18	44.25	-6

NOTES:

1. GEOTECHNICAL DATA TAKEN FROM URS GEOTECHNICAL AND HTRW INVESTIGATION FINAL REPORT DATED DEC. 5, 2012. SEE SEGMENT B-2 GEOTECHNICAL ANALYSIS.
2. PRIOR TO CONSTRUCTION, THE PRECISE LOCATION OF THE MCI CONDUIT IS TO BE SURVEYED, PLOTTED AND COORDINATED WITH THE FLOODWALL DESIGN AT THE CROSSING. ANY ANTICIPATED IMPACTS TO THE CONDUIT OR FLOOD WALL DESIGN ARE TO BE REPORTED TO THE CONTRACTING OFFICER IMMEDIATELY.
3. SEE PRELIMINARY SECTIONS OF PIPE PASSING THROUGH CONCRETE WALL ON DWG. S-505. SECTIONS ARE TO BE MODIFIED OR REPLACED IN ACCORDANCE WITH MCI/VERIZON'S DIRECTIVES AND MCI TYPICAL DETAILS FOR THIS CONDITION. ADJUST BOTTOM OF CONCRETE CAP ELEVATION AS REQUIRED TO ACCOMMODATE PIPE CROSSING.
4. BOTTOM OF PIPE SOLDIER PILES ARE TO BE DRILLED 10' INTO BEDROCK. THE CONTRACTOR WILL VERIFY THE TOP OF BEDROCK WHEN THE N VALUES ARE GREATER THAN 50 BLOWS/IN OR REFUSAL OF ANY SAMPLING. AT THIS DEPTH OF REFUSAL THE BEDROCK WILL HAVE TO BE CORED WITH A ROCK CORE BARREL.
5. ROCK ELEVATIONS SHOWN ON THIS DRAWING ARE BASED ON URS BORING LOG B1 SHOWN ON THE CIVIL DWGS. THE PROFILE ROCK ELEVATIONS ARE APPROXIMATE AND ARE TO BE VERIFIED.
6. SHEET PILE SHALL BE PZ-22, ASTM A572 GRADE 60.
7. PIPE SOLDIER PILES SHALL BE ERW STRAIGHT SEAM PIPE A252 GRADE 3(MOD) 50 KSI MINIMUM YIELD-THICKNESS .625"
8. CONCRETE:
   CONCRETE CAP - F'c 4,000 PSI
   INSIDE PIPE SOLDIER PILES - F'c 6,000 PSI
9. SEE CIVIL PROFILE DRAWING FOR MONOLITH STATIONS AND WALL ELEVATIONS

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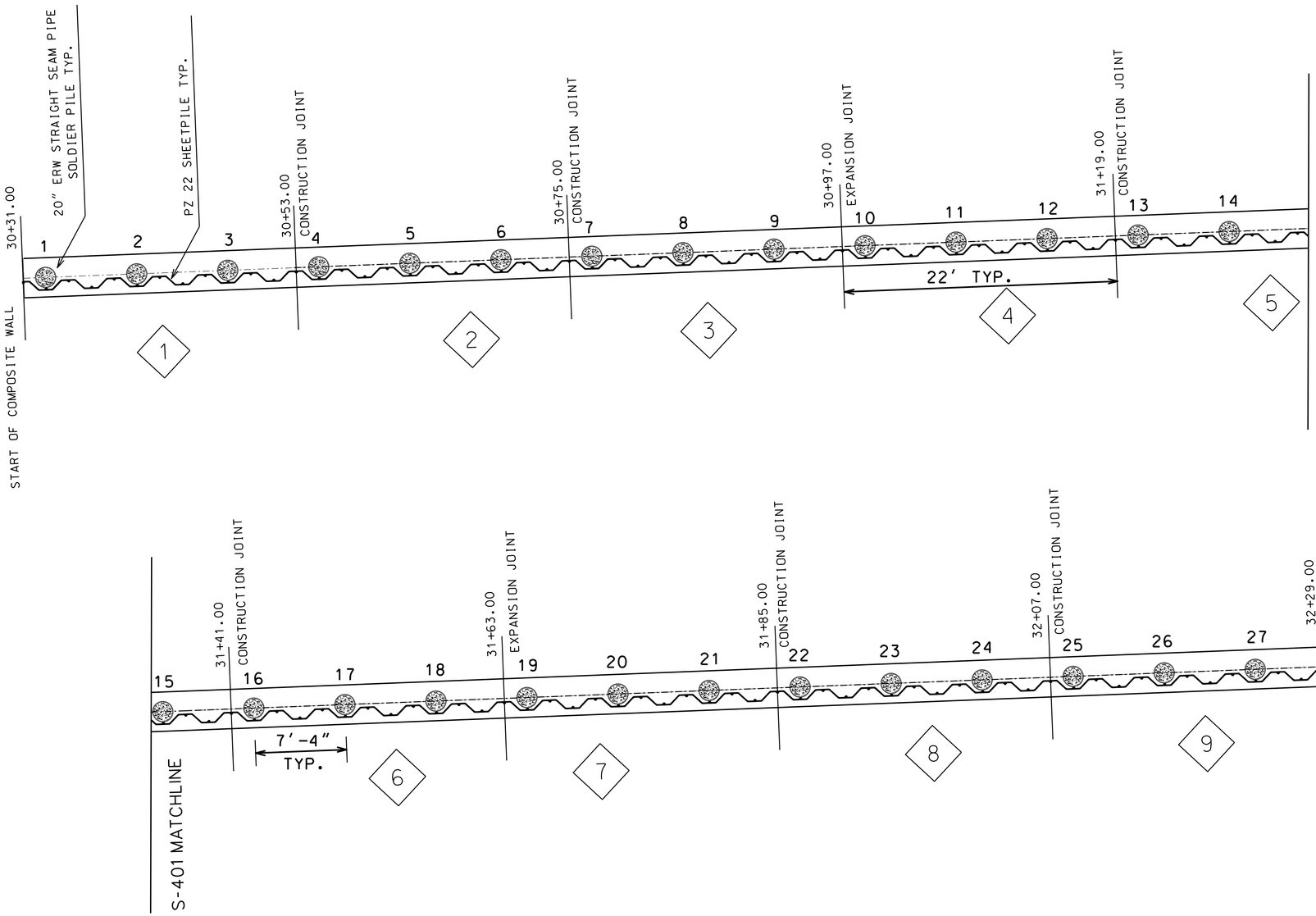
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

FLOODWALL PROFILE

SHEET IDENTIFICATION
S-201
SHEET 51 OF 58



LEGEND:

- MONOLITH NUMBER
- SHEET PILE PZ 22
- 20" ERW STRAIGHT SEAM PIPE SOLDIER PILE

NOTES:

1. FOR PROFILE SEE SHEET S-201
2. FOR CROSS-SECTIONS SEE SHEETS S-501 AND S-502

5 0 5 10FT
SCALE: 1"= 5'

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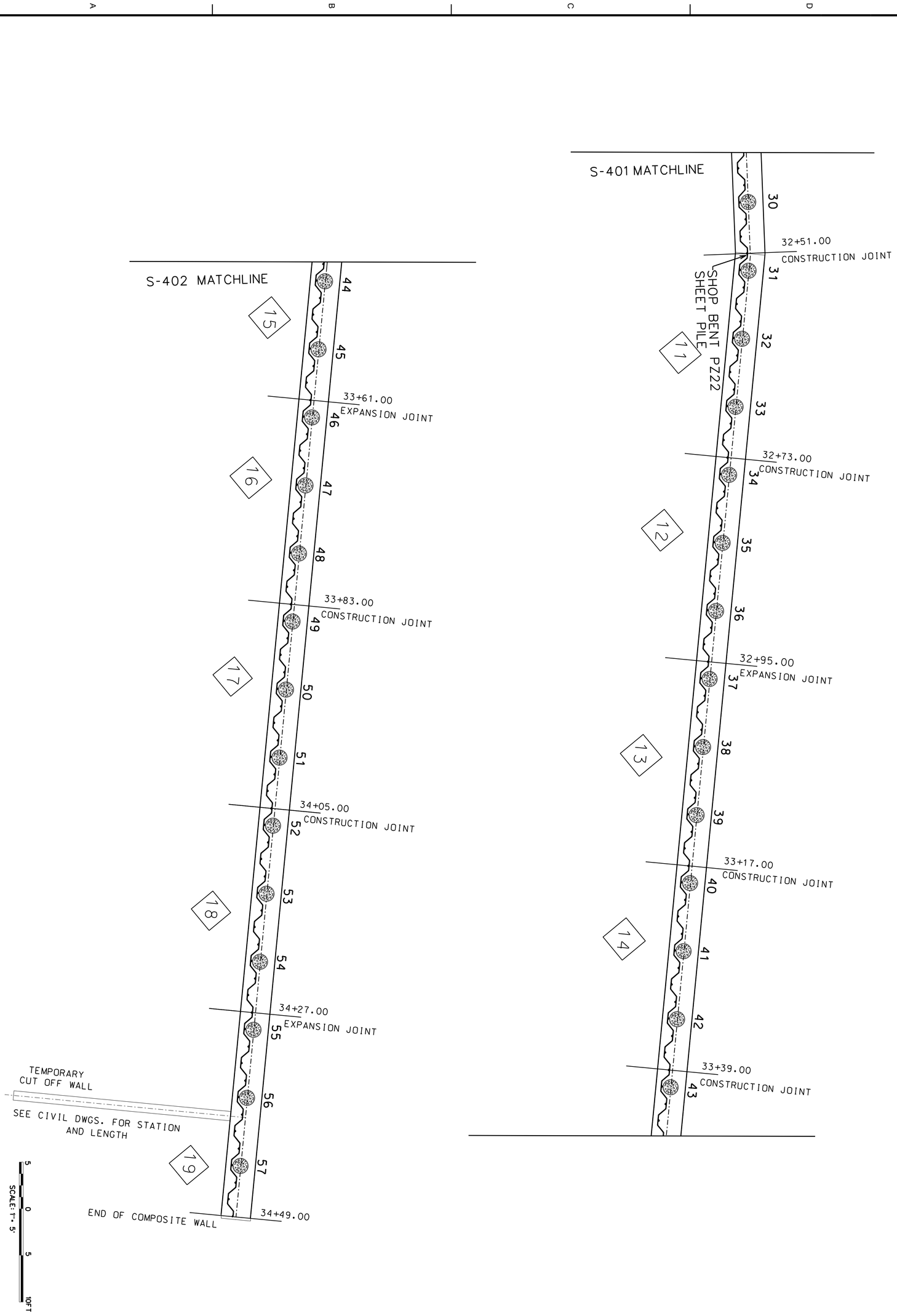
FLOODWALL DETAIL PLAN - 1

SHEET IDENTIFICATION
S-401
SHEET 52 OF 58



SHEET IDENTIFICATION
S-402
SHEET 15 OF 86

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SUB-BASIN OF THE RARITAN RIVER
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FLOODWALL DETAIL PLAN - 2

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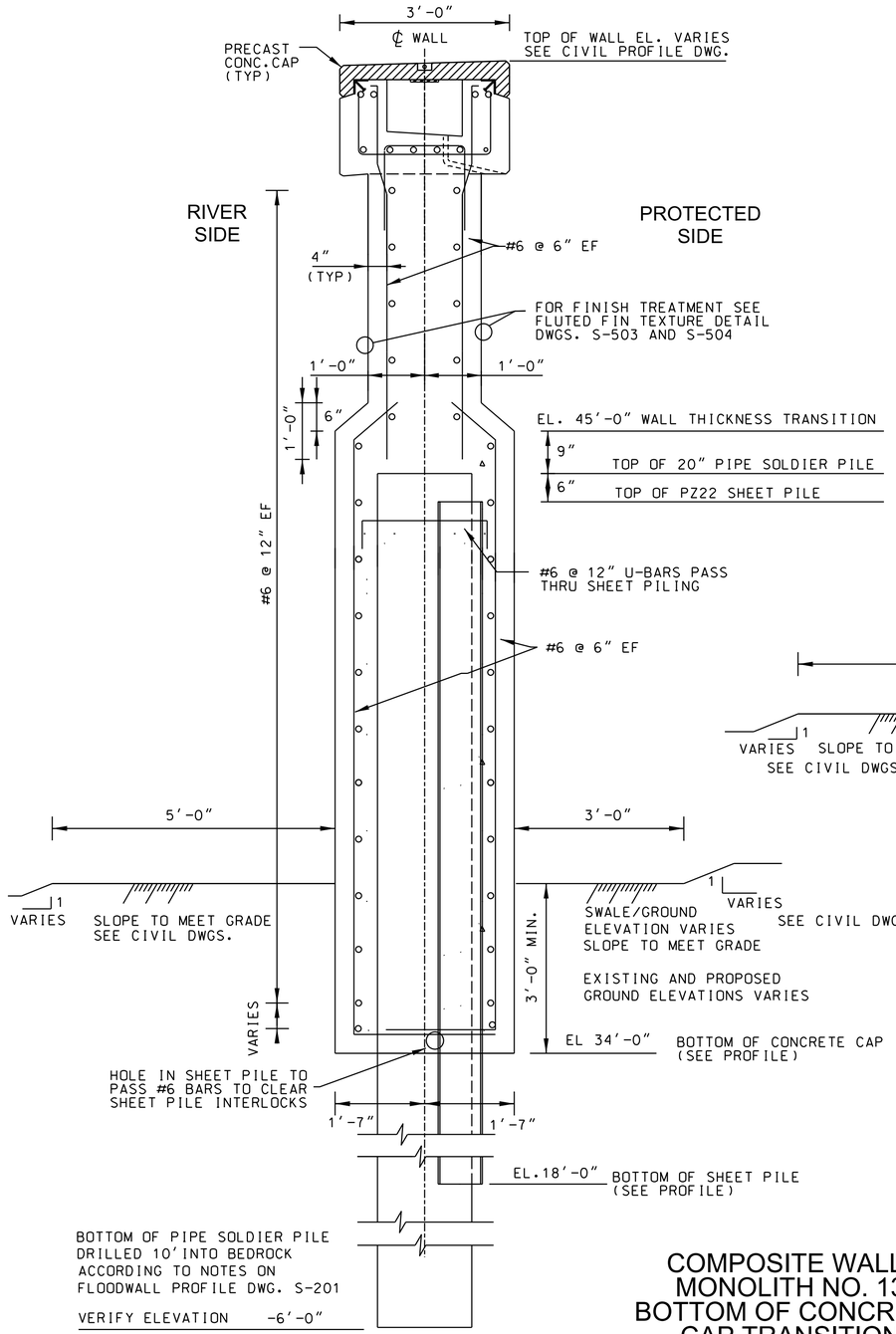
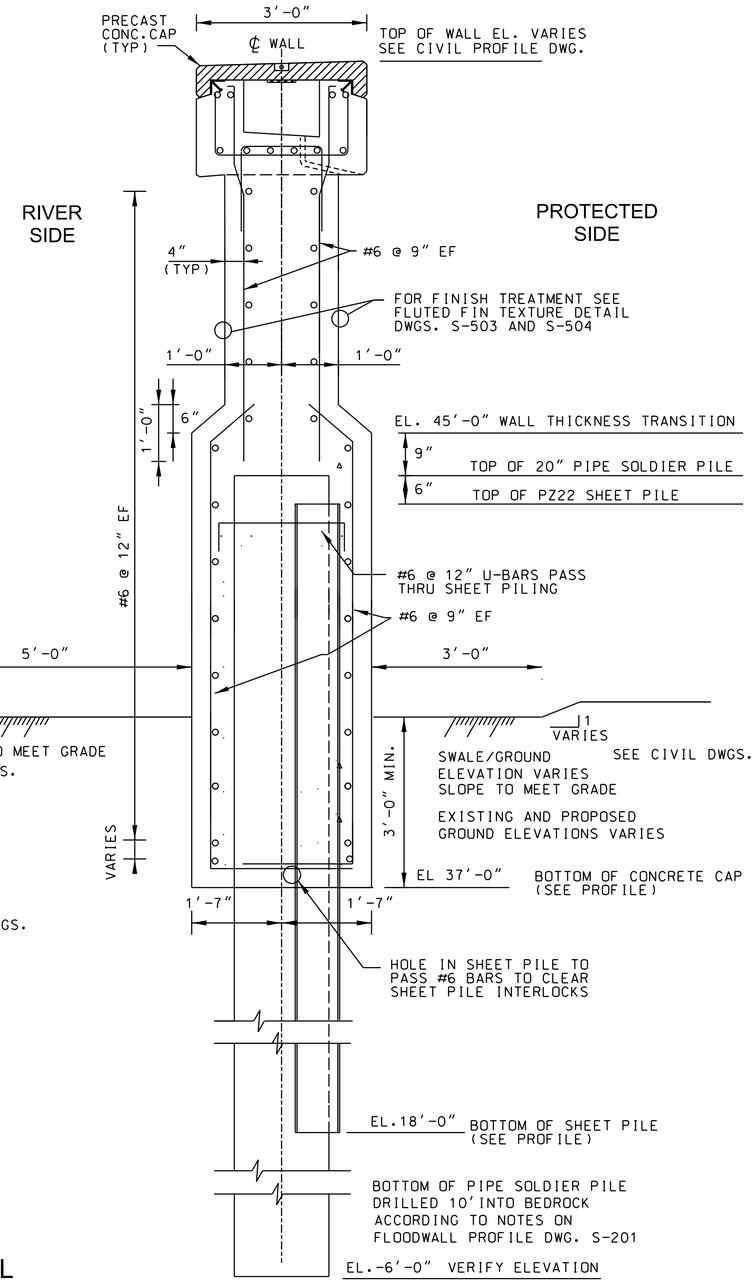


COMPOSITE WALL MONOLITHS NO. 1 TO 12

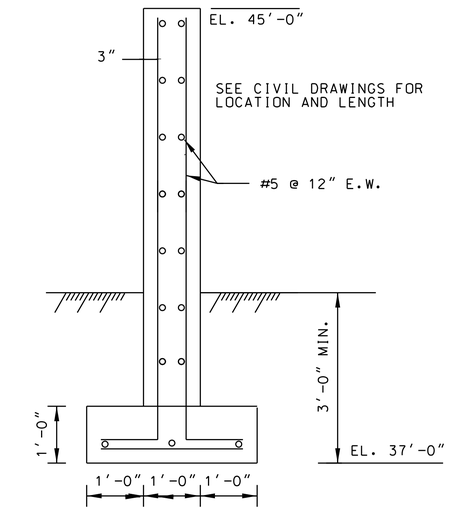
SCALE: 3/4″ = 1′-0″

COMPOSITE WALL MONOLITH NO. 13 BOTTOM OF CONCRETE CAP TRANSITION FROM 34' TO 37'



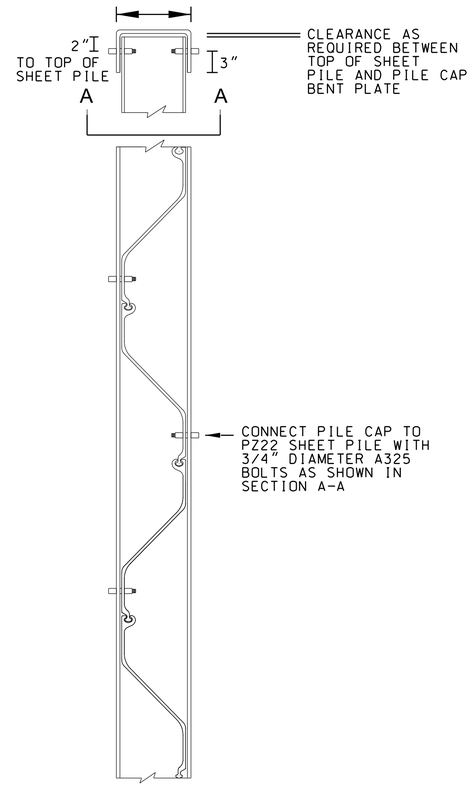
COMPOSITE WALL MONOLITHS NO. 14 TO 19

SCALE: 3/4″ = 1′-0″



TEMPORARY CUT OFF WALL

SCALE: 3/4″ = 1′-0″



SHEET PILE CUT OFF AT CHANNEL BEND PILE CAP SECTION A - A

NTS

NOTE: SEE CIVIL DRAWINGS FOR TURF REINFORCING MAT AND SHEET PILE CUT OFF AT CHANNEL BEND TO PROTECT THE CHANNEL FROM FURTHER EROSION.

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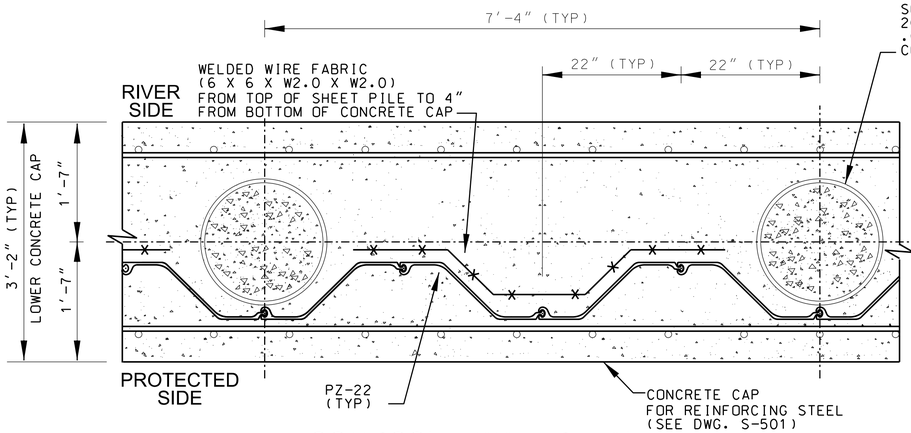
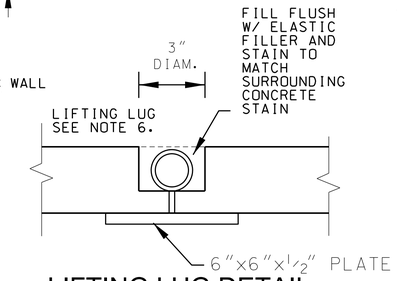
FLOODWALL SECTIONS - 1

SHEET IDENTIFICATION
S-501
SHEET 54 OF 58



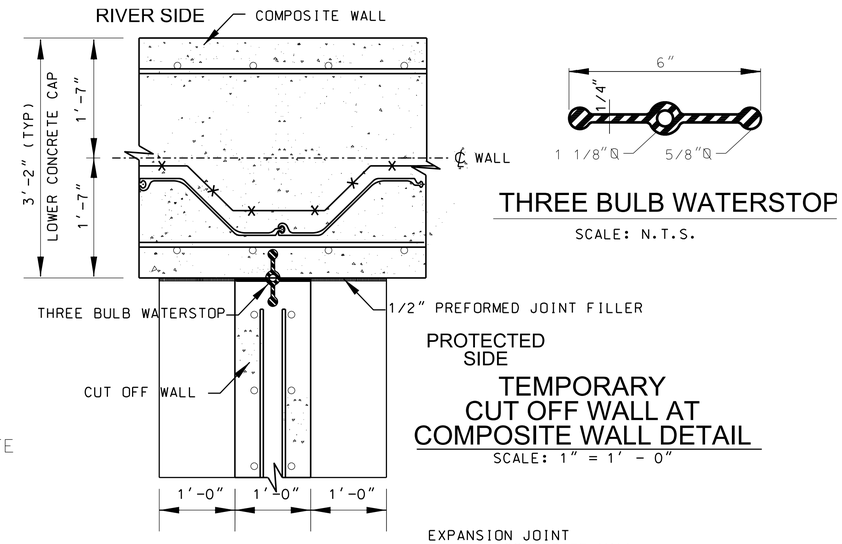
COMPOSITE WALL DETAIL

SCALE: 1" = 1' - 0"



LIFTING LUG DETAIL

NOT TO SCALE

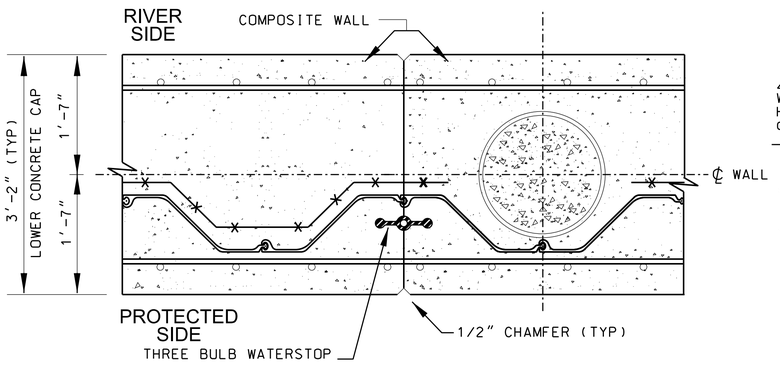


THREE BULB WATERSTOP

SCALE: N.T.S.

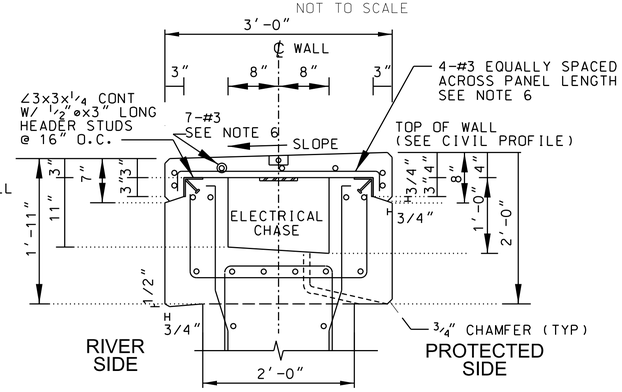
TEMPORARY CUT OFF WALL AT COMPOSITE WALL DETAIL

SCALE: 1" = 1' - 0"



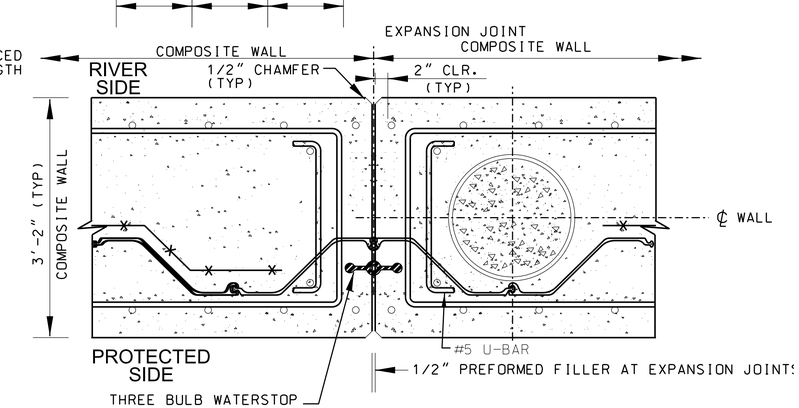
TYPICAL CONSTRUCTION JOINTS AT SHEET PILE INTERLOCKS

SCALE: 1" = 1' - 0"



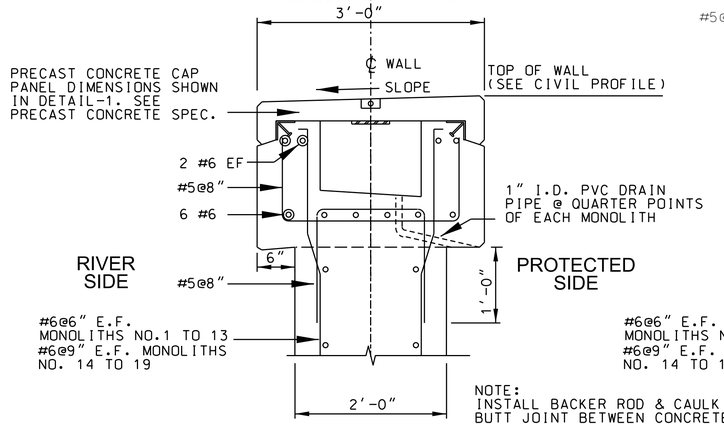
COMPOSITE CAP WALL DETAIL - 1

SCALE: 1" = 1' - 0"



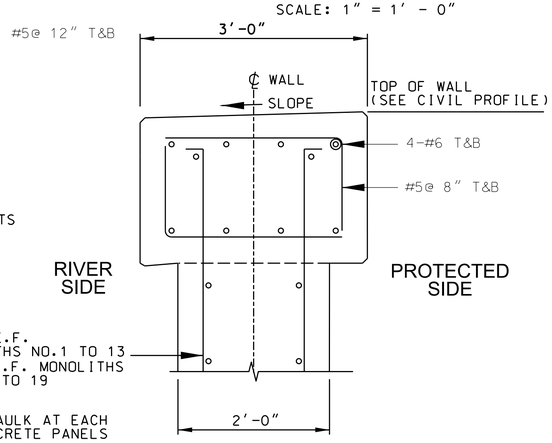
TYPICAL EXPANSION JOINTS AT SHEET PILE INTERLOCKS

SCALE: 1" = 1' - 0"



COMPOSITE CAP WALL DETAIL - 2

SCALE: 1" = 1' - 0"



TRANSITION CAP DETAIL

SCALE: 1" = 1' - 0"

VERIFY LOCATION OF TRANSITION FOR ELECTRICAL CHASE

COMPOSITE WALL NOTES:

1. HOLES CUT IN STEEL SHEET PILING FOR PASSING REINFORCING BARS SHALL NOT EXCEED 2" DIA. WHERE HOLES FALL WITHIN THE WEB OF THE STEEL SHEET PILE, THE HOLE MAY BE SLOTTED 4" HORIZONTALLY TO ACCOMMODATE PASSING THE REINFORCING BARS.
2. ANY SUBSTITUTIONS SHALL BE SUBMITTED TO THE CONTRACTING OFFICER REPRESENTATIVE FOR APPROVAL.
3. STEEL SHEET PILE SURFACE PREPARATION AND PAINTING SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
4. COMPOSITE WALL MONOLITHS SHALL BE 22'-0" UNLESS OTHERWISE INDICATED ON THE PROFILE. EACH MONOLITH SHALL END AT THE CENTER OF THE NEAREST SHEET PILE INTERLOCK.
5. CONCRETE STRENGTH:
   CAP: 4,000 PSI.
   FILL IN SOLDIER PIPE PILES: 6,000 PSI.
6. THE PRECAST PANEL FABRICATOR IS RESPONSIBLE FOR THE DESIGN OF THE CAP AND LIFTING DEVICE FOR HANDLING AND TRANSPORT. THE REINFORCING SHOWN IN THE CAP DETAIL SHALL BE CONSIDERED AS THE MINIMUM REQUIRED, SUBJECT TO DESIGN REQUIREMENTS. THE LIFTING DEVICE SHOWN IS FOR CONCEPT ONLY. SEE PRECAST CONCRETE SPECIFICATION.
7. ALIGN PRECAST CONCRETE CAP JOINT WITH 1/2" MONOLITH EXPANSION JOINTS.

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

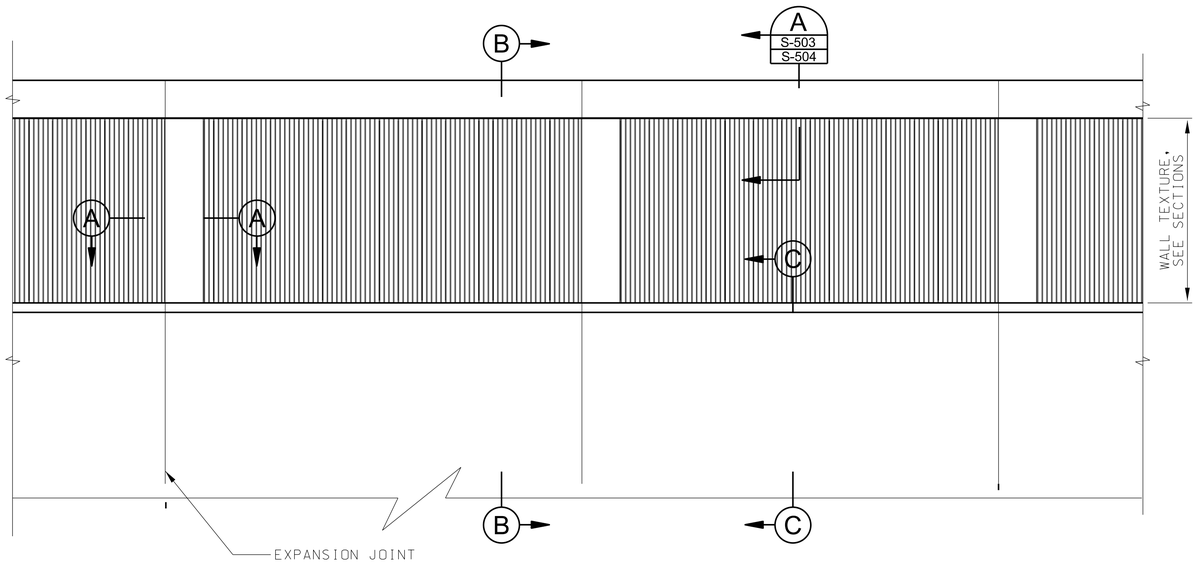
DESIGNED BY: JALW
DWN BY: JALW
SUBMITTED BY: JALW
CKD BY: XMC
PLOT SCALE: As noted
SIZE: ANSI D
DATE: 8 JANUARY 2016
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2S502.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ

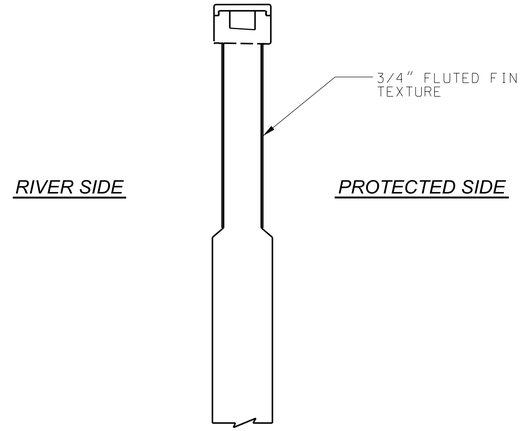
FLOODWALL SECTIONS - 2

SHEET IDENTIFICATION
S-502
SHEET 55 OF 58



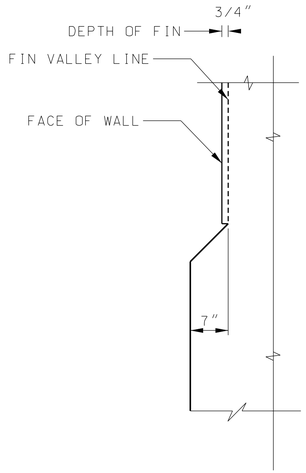
FLUTED FIN TEXTURE ELEVATION VIEW

SCALE: N.T.S.



SECTION (B)

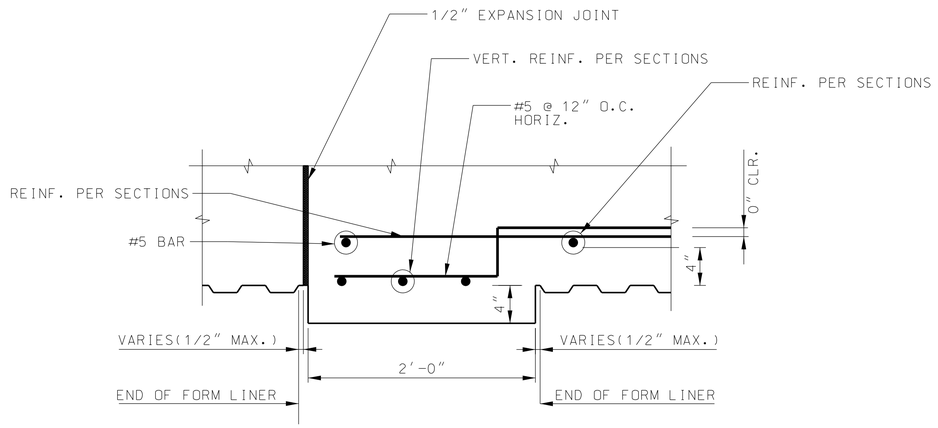
SCALE: N.T.S.



FLUTED FIN DETAIL AT BOTTOM OF WALL

SECTION (C)

SCALE: N.T.S.



SECTION (A)

SCALE: N.T.S.

NOTES:

1. FLUTING PATTERN TO MATCH SEGMENT B1 WALL TREATMENT. SEE SPECIFICATIONS FOR FLUTING PATTERN NUMBER 1707, LINCOLN FLUTE 3/4" DEEP SMOOTH RIB 6" PATTERN REPEAT MANUFACTURED BY SPEC FORMLINERS, INC. THERMOSPEC - MULTI-USE PLASTIC.

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NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY: JALW
DWN BY: JALW
CKD BY: XMC
SUBMITTED BY: JALW
PLOT SCALE: NTS
SIZE: ANSI D
DATE: 8 JANUARY 2016
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SOLICITATION NO.:
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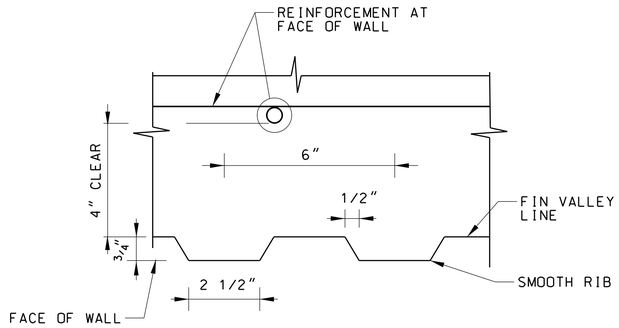
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

FLUTED FIN WALL TEXTURE DETAILS - 1

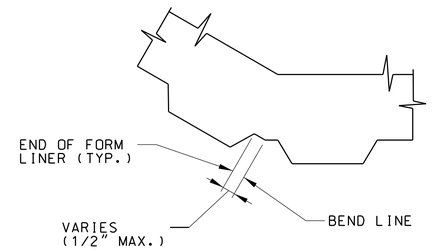
SHEET IDENTIFICATION
S-503
SHEET 56 OF 58



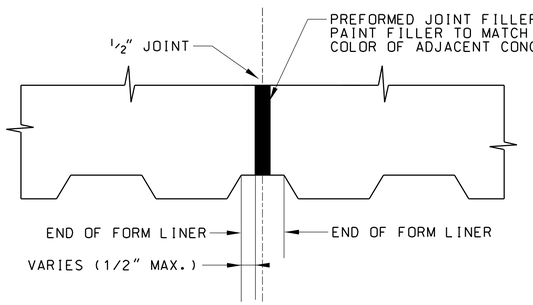
NOTE:

1. THE CONTRACTOR SHALL MAKE SURE THAT THE STRIATION FINS ARE PLUMB AND THAT THE FINS LINE UP VERTICALLY FROM PANEL TO PANEL FOR THE FULL HEIGHT OF THE WALL.
2. THE HORIZONTAL JOINT MAY BE OMITTED IF THE CONTRACTOR CAN DEMONSTRATE THAT THE FORM LINER PANELS CAN BE INSTALLED END TO END WITHOUT CREATING A VISIBLE SEAM IN THE FINAL CAST CONCRETE.

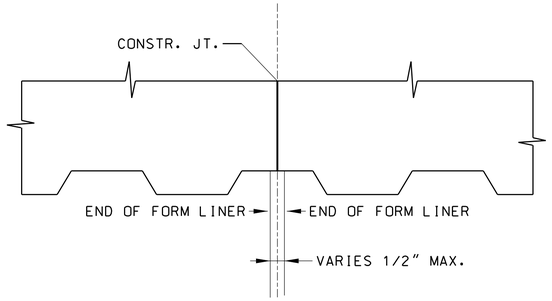
TYPICAL FLUTED FIN DETAIL
SCALE: N.T.S.



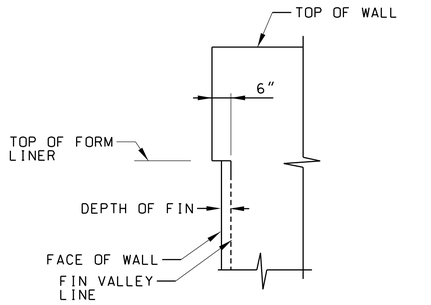
FLUTED FIN DETAIL AT CHANGE IN ALIGNMENT
SCALE: N.T.S.



FLUTED FIN DETAIL AT EXPANSION JOINT
SCALE: N.T.S.



FLUTED FIN DETAIL AT CONSTRUCTION JOINT
SCALE: N.T.S.



FLUTED FIN DETAIL AT TOP OF WALL

SECTION A (S-504 / S-503)

SCALE: N.T.S.

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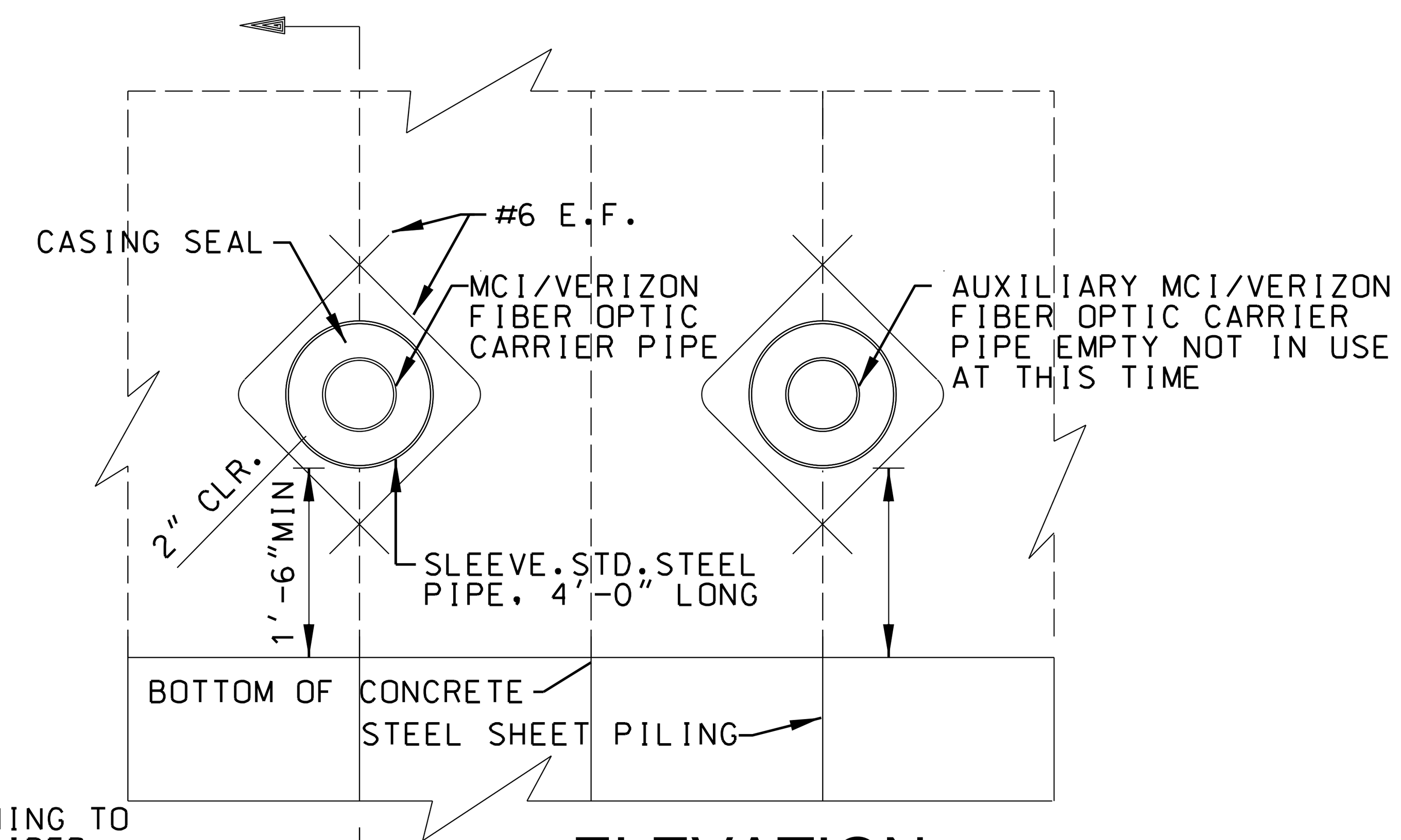
DRWN BY: JALW
SUBMITTED BY: JALW
PLOT SCALE:
SIZE: ANSI D
DATE: 8 JANUARY 2016
CKD BY: XMC
ISSUE DATE: 8 JANUARY 2016
FILE NAME: GB_SEGB1B2S504.dgn
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP. NJ

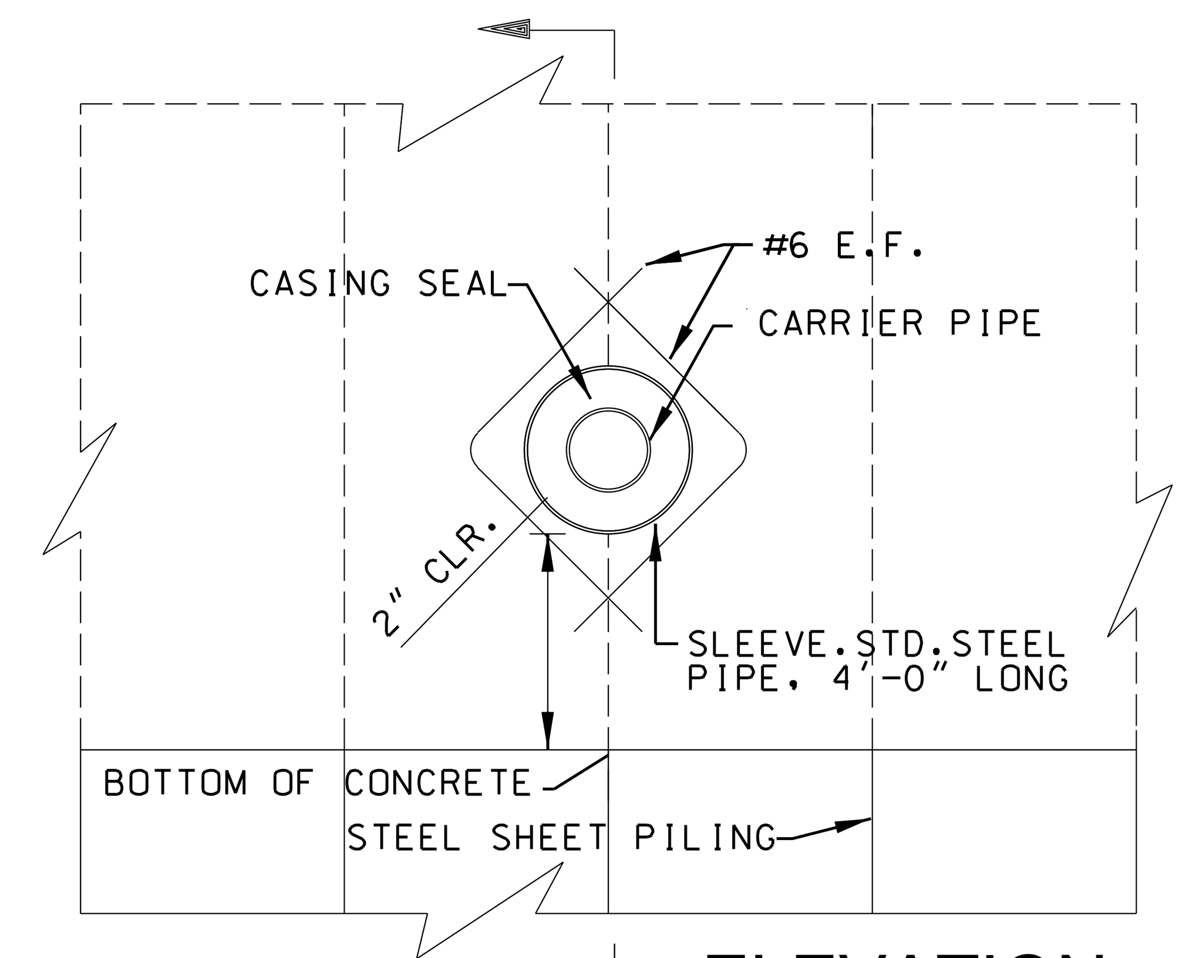
FLUTED FIN WALL TEXTURE DETAILS - 2

SHEET IDENTIFICATION
S-504
SHEET 57 OF 58



ELEVATION

A COMPOSITE WALL



ELEVATION

B COMPOSITE WALL

NOTES PERTAINING TO MCI/VERIZON FIBER OPTIC LINE:

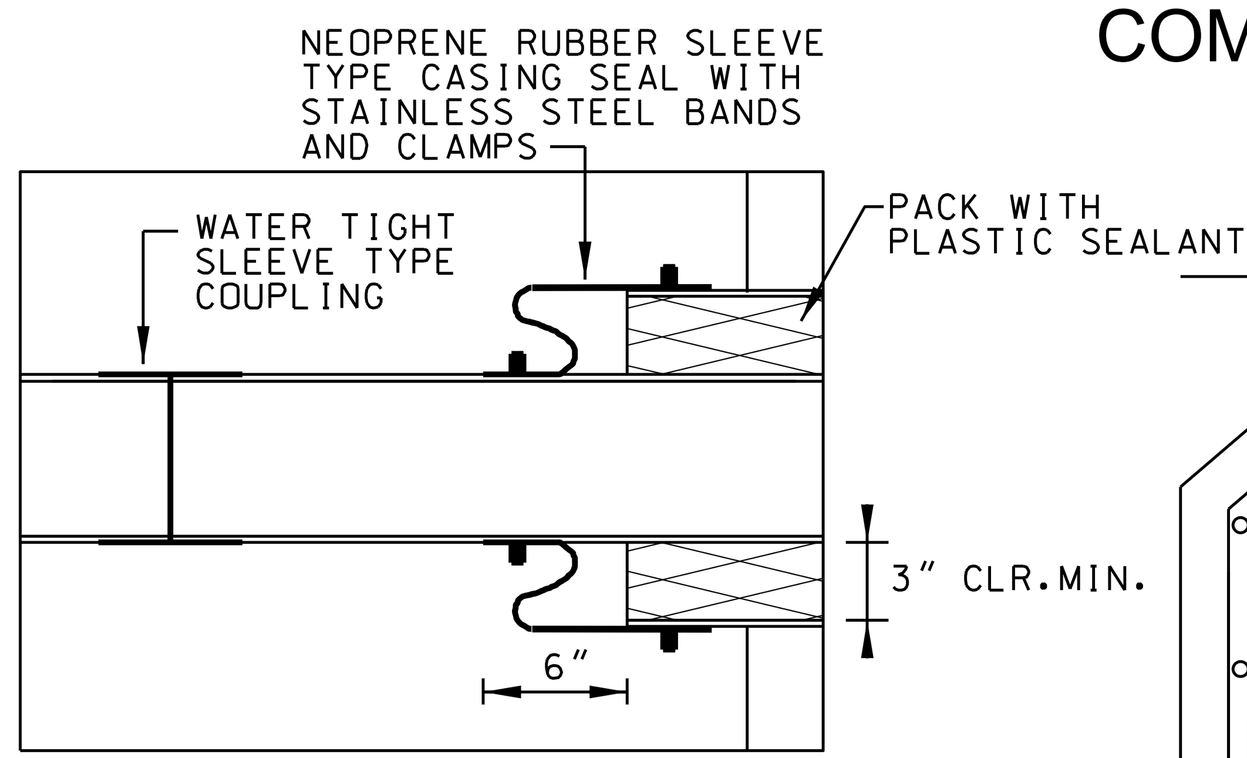
1. CONTRACTOR IS TO SURVEY AND COORDINATE THE PRECISE LOCATION OF THE EXISTING MCI/VERIZON FIBER OPTIC LINE AT THE FLOODWALL CROSSING WITH MCI/VERIZON, NY DISTRICT ENGINEERS AND THE CONTRACTING OFFICER PRIOR TO CONSTRUCTION.

2. THE PRECISE LOCATION IS TO BE INCORPORATED ON THE DESIGN DRAWINGS AND COORDINATED WITH THE FLOODWALL DESIGN AT THE CROSSING. IMPACTS TO THE CONDUIT AND FLOODWALL DESIGN ARE TO BE DETERMINED TO ESTABLISH AN APPROPRIATE COURSE OF ACTION.

3. MCI/VERIZON'S AUXILIARY EMPTY FIBER OPTIC CARRIER PIPE MAY BE RELOCATED TO ACCOMMODATE FLOODWALL ALIGNMENT.

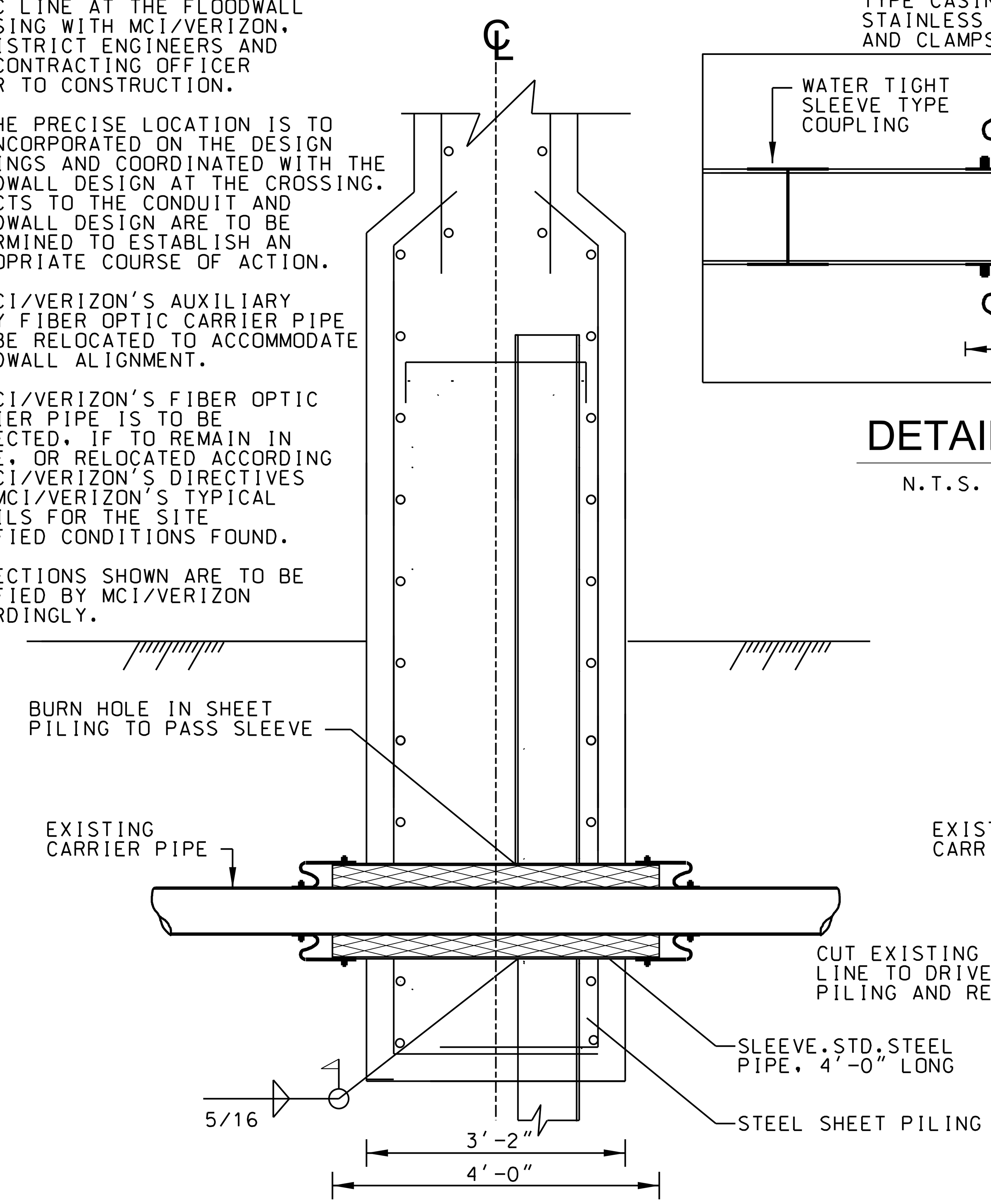
4. MCI/VERIZON'S FIBER OPTIC CARRIER PIPE IS TO BE PROTECTED, IF TO REMAIN IN PLACE, OR RELOCATED ACCORDING TO MCI/VERIZON'S DIRECTIVES AND MCI/VERIZON'S TYPICAL DETAILS FOR THE SITE VERIFIED CONDITIONS FOUND.

5. SECTIONS SHOWN ARE TO BE MODIFIED BY MCI/VERIZON ACCORDINGLY.



DETAIL 1

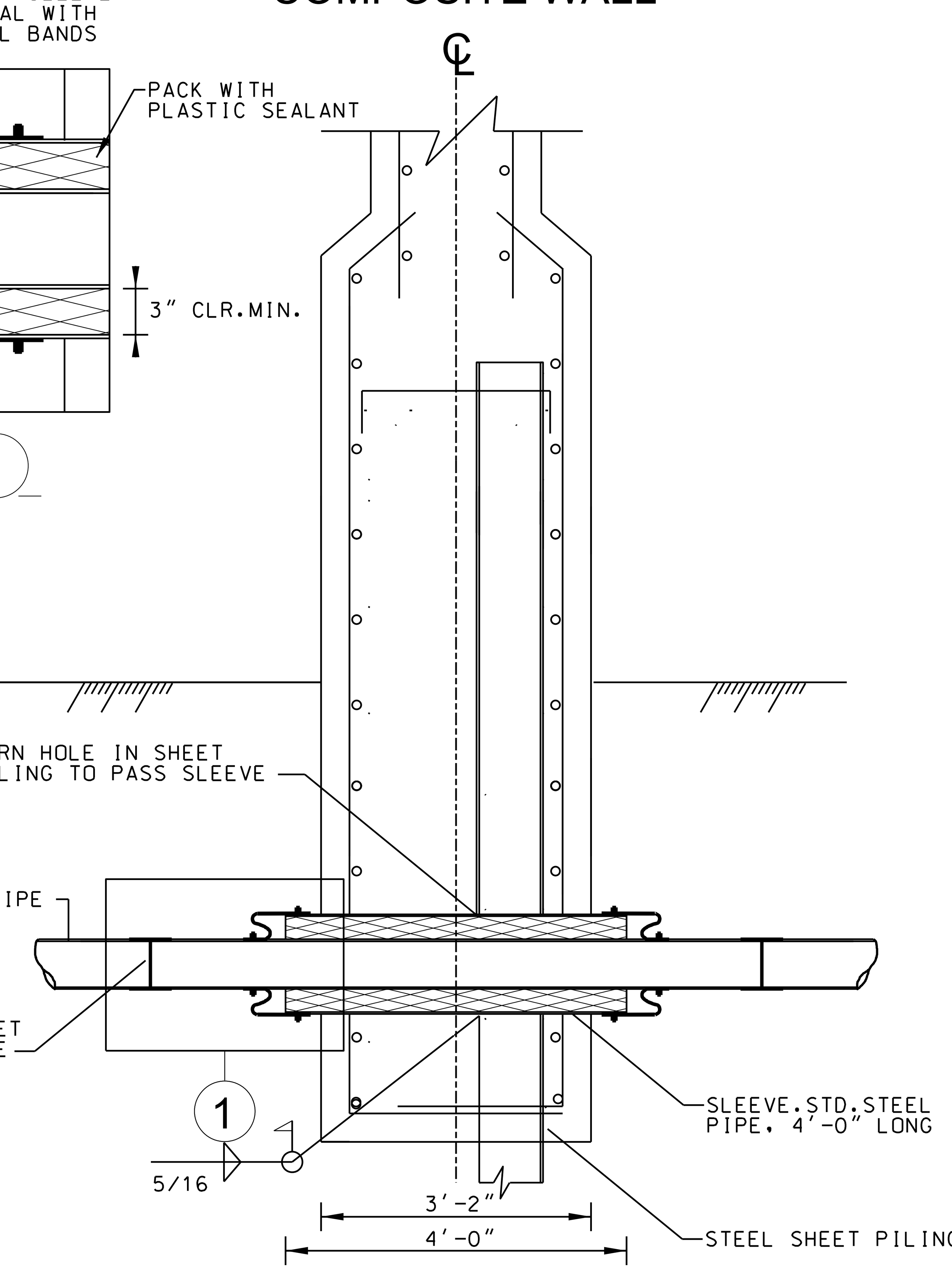
N.T.S.



MCI/VERIZON FIBER OPTIC LINE WITHIN PIPE WITH EMPTY AUXILIARY PIPE THROUGH COMPOSITE WALL

SECTION A

SCALE: 3/4" = 1'-0"



TYPICAL PIPE THROUGH COMPOSITE WALL

SECTION B

SCALE: 3/4" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION
DESIGN TO BE FIELD COORDINATED WITH MCI
PRIOR TO CONSTRUCTION

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR

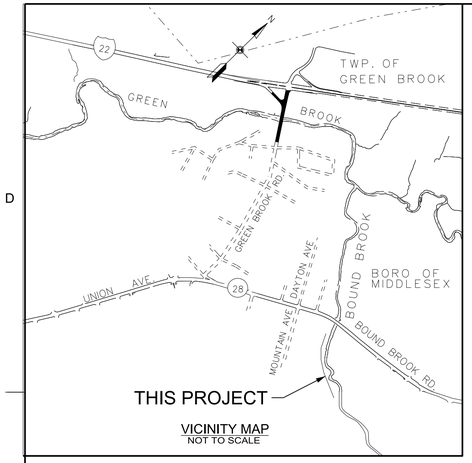
MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

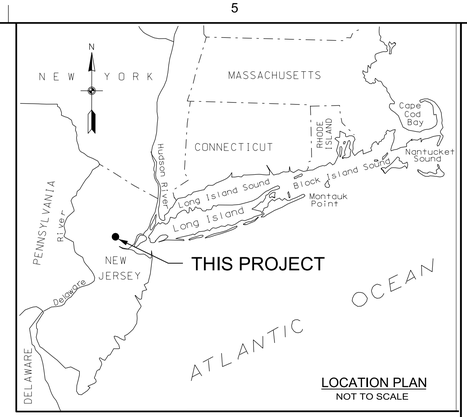
DESIGNED BY: JALW
DATE: 8 JANUARY 2016
DWN BY: JALW
CKD BY: XMC
SOLICITATION NO.:
SUBMITTED BY: JALW
CONTRACT NO.:
PLOT SCALE: 3/4" = 1'
ISSUE DATE: 8 JAN 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEGB182S505.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SEGMENT B-2 CONTRACT
SUB-BASIN OF THE RARITAN RIVER
BOR. OF MIDDLESEX AND GREEN BROOK TWP, NJ
FLOODWALL MCI SECTIONS

SHEET IDENTIFICATION
S-505
SHEET 58 OF 58



VICINITY MAP
NOT TO SCALE



LOCATION PLAN
NOT TO SCALE

GREEN BROOK
FLOOD RISK MANAGEMENT PROJECT
GREEN BROOK SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT

BOROUGH OF MIDDLESEX AND GREEN BROOK TOWNSHIP, NEW JERSEY

100% SUBMITTAL

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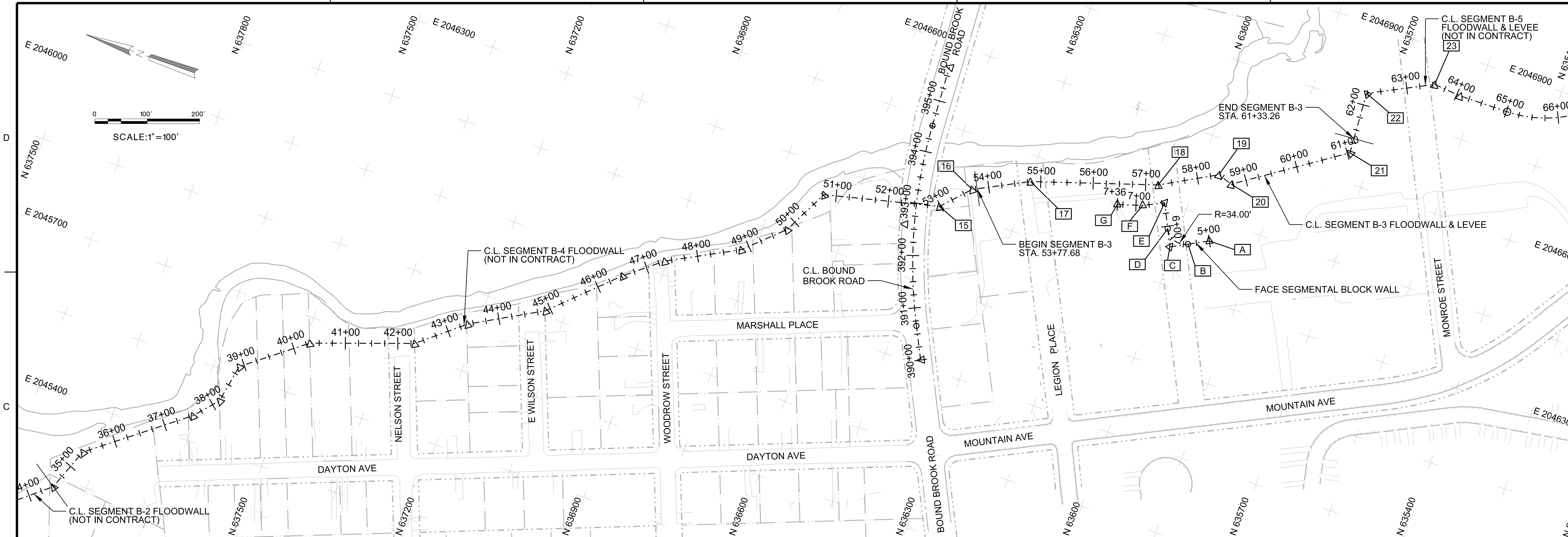
JOINT VENTURE

DESIGNED BY:		DATE: 18-FEB-2016	
DWN BY::	CKD BY::	SOLICITATION NO.::	
SUBMITTED BY:		CONTRACT NO.: W912PS-##-X-####	
PLOT SCALE: 1=X"	ISSUE DATE: FEB 2016	FILE NUMBER:	
SIZE: ANSI D	FILE NAME: GB_SEG B3_G101XXX.dgn		

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

COVER SHEET

SHEET IDENTIFICATION
G-101
SHEET 1 OF 147



CIVIL ABBREVIATIONS

ALUM.	ALUMINUM
APPROX.	APPROXIMATE
BIT.	BITUMINOUS
B.L.	BASELINE
BLDG.	BUILDING
C.L.	CENTERLINE
CULV.	CULVERT
DIA.	DIAMETER
DND	DO NOT DISTURB
EL.	ELEVATION
ELEV.	ELEVATION
EXT.	EXTERIOR
FF	FINISHED FLOOR ELEVATION
F.L.	FLOW LINE
FT.	FEET
HMA	HOT MIX ASPHALT
HORIZ.	HORIZONTAL
HP	HIGH POINT
INV.	INVERT
LBS	POUNDS
LF	LINEAL FEET
LP	LOW POINT
MRF	MANUFACTURER
MAX.	MAXIMUM
MIN.	MINIMUM
NJDOT	NEW JERSEY DEPARTMENT OF TRANSPORTATION
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
P.C.	POINT OF CUVATURE
P.I.	POINT OF INTERSECTION
P.O.B.	POINT OF BEGINNING
P.O.E.	POINT OF END
P.T.	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
P.V.C.	POINT OF VERTICAL CURVATURE
P.V.I.	POINT OF VERTICAL INTERSECTION
P.V.T.	POINT OF VERTICAL TANGENCY

R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RECP	ROLLED EROSION CONTROL PRODUCT
RELOC.	RELOCATED
R.O.W.	RIGHT OF WAY
SEC.	SECOND
SF	SQUARE FEET
SQ. FT.	SQUARE FEET
STA.	STATION
TBA	TO BE ABANDONED
TBR	TO BE REMOVED
T.O.W.	TOP OF WALL
TRM	TURF REINFORCEMENT MAT
TYP.	TYPICAL
VERT.	VERTICAL

CIVIL LEGEND

- SS — NEW SANITARY SEWER
- × — NEW CHAIN LINK FENCE
- NEW WATER LINE
- C — NEW COMMUNICATIONS LINE
- SF — SILT FENCE
- FS — FIBER ROLLS OR HAY BALES
- FLOATING TURBIDITY BARRIER
- CONTRACTOR WORKING LIMITS
- PROPOSED RIGHT-OF-WAY LINE

PROJECT ALIGNMENT DATA - FLOODWALL & LEVEE

POINT	STATION	NORTHING	EASTING	COURSE	DISTANCE (FT.)	BEARING
15	52+97.85	636445.71	2046298.39	---	---	---
16	53+68.29	636397.69	2046349.92	15 - 16	70.44	S 47°00'55.9811" E
17	54+80.38	636297.92	2046401.01	16 - 17	112.09	S 27°06'54.5268" E
18	57+24.14	636066.01	2046476.11	17 - 18	243.76	S 17°56'40.4464" E
19	58+41.37	635963.46	2046532.90	18 - 19	117.23	S 28°58'34.9315" E
20	58+71.04	635935.24	2046523.76	19 - 20	29.67	S 17°56'51.7104" W
21	61+05.20	635741.77	2046655.67	20 - 21	234.16	S 34°17'10.5008" E
22	62+22.77	635749.65	2046772.97	21 - 22	117.57	N 86°09'15.7788" E
23	63+53.67	635632.97	2046832.31	22 - 23	130.90	S 26°57'11.1944" E

PROJECT ALIGNMENT DATA - SEGMENTAL BLOCK WALL

POINT	POINT	STATION	NORTHING	EASTING	COURSE	DISTANCE (FT.)	BEARING
A	P.O.B.	5+00.00	635938.54	2046407.77	---	---	---
B	P.C.	5+41.13	635974.91	2046388.57	A - B	41.13	N 27°49'57.0337" W
C	P.I.	5+76.09	636005.83	2046372.25	B - C	34.97	N 27°49'57.0337" W
D	P.T.	5+95.49	636021.28	2046403.61	C - D	34.97	N 63°46'31.8028" E
E	P.I.	6+45.01	636043.17	2046448.04	D - E	49.52	N 63°46'31.8028" E
F	P.I.	6+87.16	636080.98	2046429.41	E - F	42.15	N 26°13'26.4211" W
G	P.O.E.	7+35.54	636127.16	2046415.01	F - G	48.38	N 17°19'19.5039" W

NOTES:

1. THE HORIZONTAL CONTROL IS BASED ON SURFACE COORDINATES APPLIED TO THE NORTH AMERICAN DATUM OF 1927 (NAD27).

2. THE VERTICAL CONTROL IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).

US Army Corps of Engineers

MARK	DESCRIPTION	DATE	APPR

DESIGNED BY: | DATE: 19-FEB-2016
DWN BY: | CKD BY: | SOLICITATION NO.:
SUBMITTED BY: | CONTRACT NO.:
PLOT SCALE: XXX | ISSUE DATE: FEB. 2016 | FILE NUMBER:
SIZE: ANSI D | FILE NAME: GB_SEG B3_C-100XX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

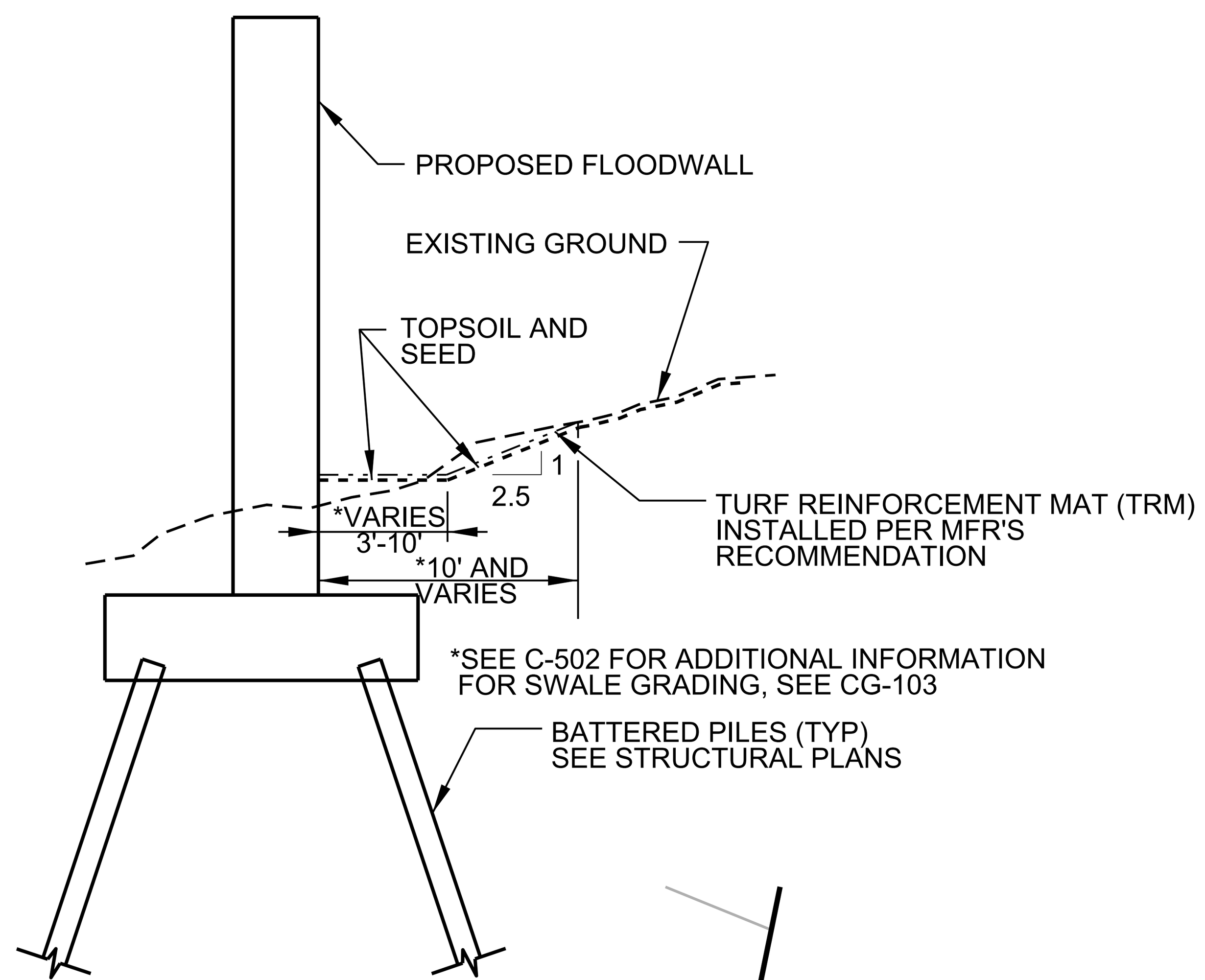
JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

PROJECT ALIGNMENT SHEET

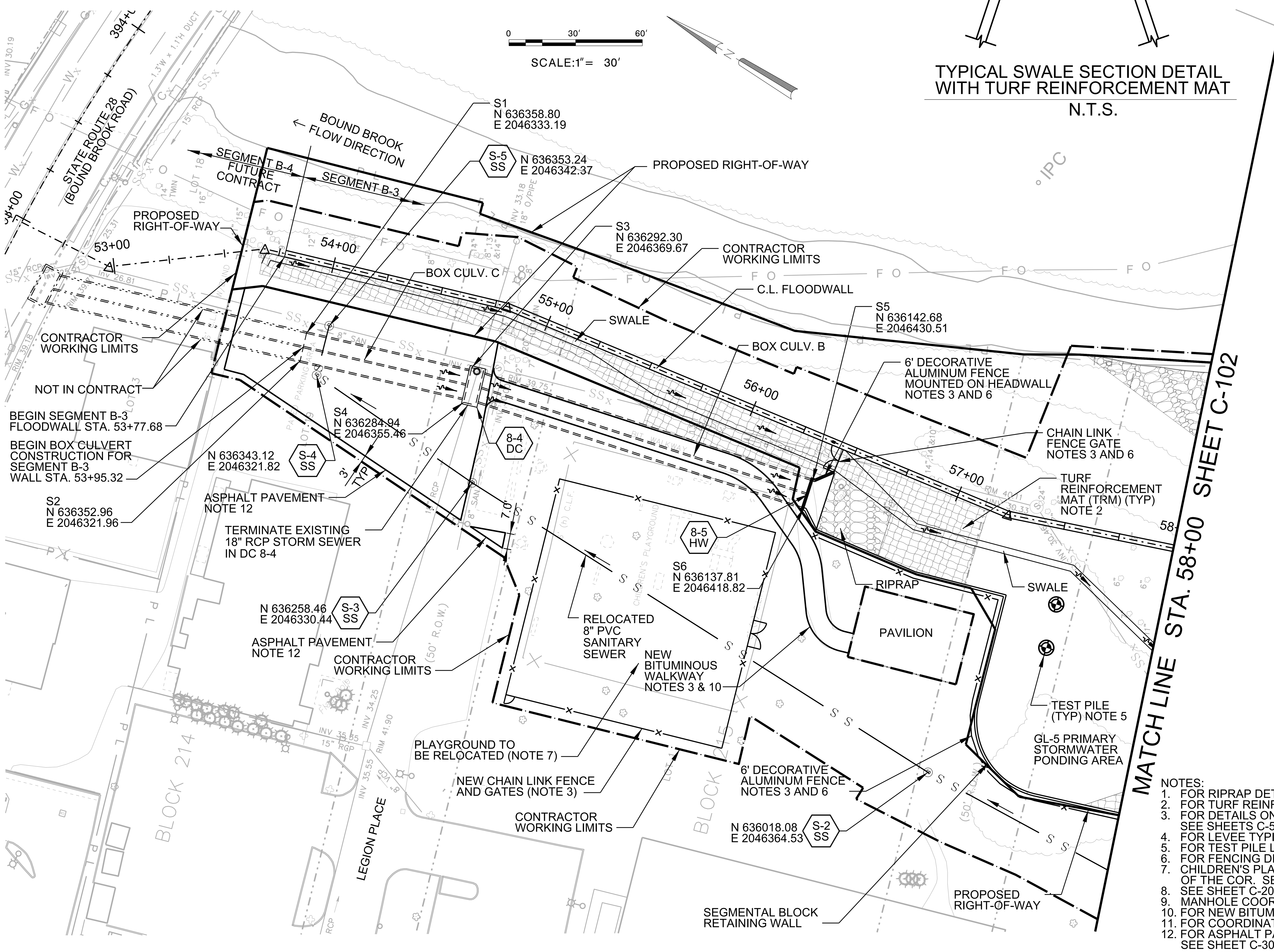
SHEET IDENTIFICATION
C-100
SHEET 10 OF 147

100% SUBMITTAL



TYPICAL SWALE SECTION DETAIL WITH TURF REINFORCEMENT MAT

N.T.S.



LEGEND

Symbol	Description
X-X DC	DRAINAGE CHAMBER
X-X HW	HEADWALL
S-X SS	RELOCATED SANITARY SEWER

NOTES:
1. FOR RIPRAP DETAILS, SEE SHEET C-501
2. FOR TURF REINFORCEMENT MAT DETAILS, SEE SHEET CG-502
3. FOR DETAILS ON WALKWAY, FENCE, GATES AND PUMP STATION SITE, SEE SHEETS C-502 & C-503
4. FOR LEVEE TYPICAL SECTION, SEE SHEET C-301
5. FOR TEST PILE LOCATIONS, SEE SHEET C-503
6. FOR FENCING DETAILS, SEE SHEETS C-504, C-505 & C-506
7. CHILDREN'S PLAYGROUND EQUIPMENT SHALL BE RELOCATED AT THE DIRECTION OF THE COR. SEE SHEETS C-502 AND CD-101 AND SPECIFICATIONS.
8. SEE SHEET C-205 FOR SEGMENTAL BLOCK WALL PROFILE
9. MANHOLE COORDINATES ARE TO CENTER OF STRUCTURE UNLESS OTHERWISE NOTED.
10. FOR NEW BITUMINOUS WALKWAY PROFILE, SEE SHEET C-202
11. FOR COORDINATE LOCATIONS ON CULVERT HEADWALLS, SEE STRUCTURAL DRAWINGS.
12. FOR ASPHALT PAVING LIMITS, SEE SHEET CD-101. FOR PAVEMENT SECTION, SEE SHEET C-301

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NEW YORK, NEW YORK

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DESIGNED BY:	DATE: 19-FEB-2016	
DWN BY:	CKD BY:	SOLICITATION NO.:
SUBMITTED BY:		CONTRACT NO.: W912PM-##-X-####
PLOT SCALE: XXX	ISSUE DATE: FEB. 2016	FILE NUMBER:
SIZE: ANSI D	FILE NAME: GB_SEG B3_C-101XX.dgn	

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

GENERAL PLAN SHEET
STA. 53+77.68 TO STA. 58+00

SHEET IDENTIFICATION
C-101
SHEET 11 OF 147

100% SUBMITTAL

NOTES:
1. FOR RIPRAP DETAILS, SEE SHEET C-501
2. FOR TURF REINFORCEMENT MAT DETAILS, SEE SHEET CG-502
3. FOR DETAILS ON WALKWAY AND PUMP STATION SITE, SEE SHEET C-503
4. FOR LEVEE TYPICAL SECTION, SEE SHEET C-301
5. FOR SCOUR HOLE DETAILS, SEE SHEET C-501
6. FOR FENCING DETAILS, SEE SHEETS C-504, C-505 & C-506
7. COORDINATE CONNECTION TO EXISTING DOMESTIC WATER SUPPLY WITH BOROUGH OF MIDDLESEX.
8. FOR DETAILS SEE SHEET C-503 AND MECHANICAL DWGS
9. COORDINATE CONNECTION TO EXISTING TELECOMMUNICATION CABLE WITH BOROUGH OF MIDDLESEX.
10. PUMPS TO BE INSTALLED IN FUTURE CONTRACT.
11. FOR LEVEE SURFACING INFORMATION, SEE SHEETS C-301 AND L-102.
12. FOR ASPHALT PAVEMENT LIMITS, SEE SHEET CD-102. FOR TYPICAL SECTION, SEE SHEET C-301.
13. FOR ADDITIONAL CONDUITS AND DUCT BANKS, SEE SHEET E-401.

US Army Corps of Engineers®

MARK | DATE | APPR | DESCRIPTION

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
AMMANN & WHITNEY
JOINT VENTURE

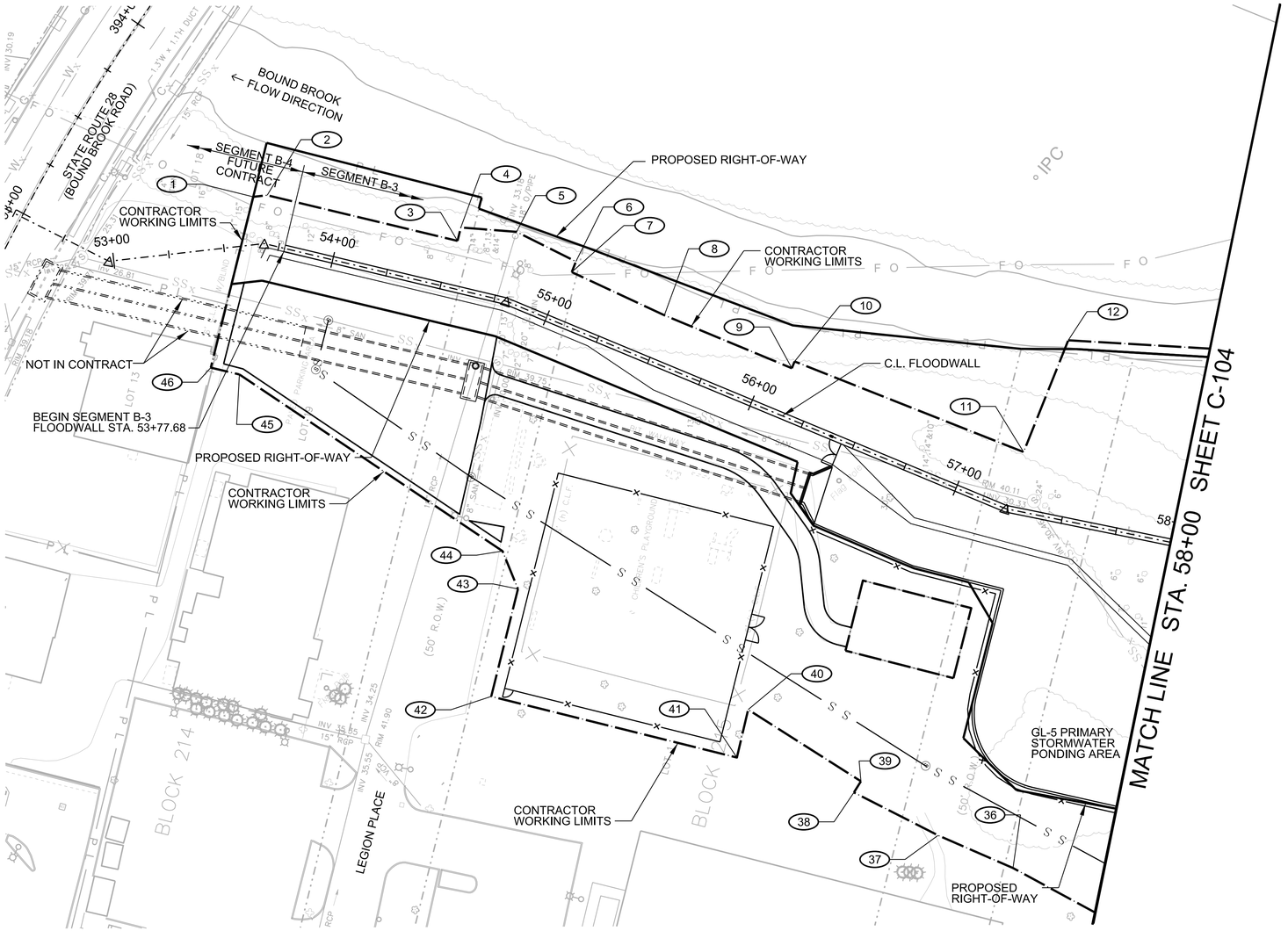
DESIGNED BY:		DATE: 19-FEB-2016
DWN BY:	CKD BY:	SOLICITATION NO.:
SUBMITTED BY:		CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: XXX	ISSUE DATE: FEB. 2016	FILE NUMBER:
SIZE: ANSI D	FILE NAME: GB_SEG B3_C-102XXX.dgn	

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

GENERAL PLAN SHEET
STA. 58+00 TO STA. 63+20

SHEET IDENTIFICATION
C-102
SHEET 12 OF 147

100% SUBMITTAL



0 30′ 60′

SCALE:1″= 30′

CONTRACTOR WORKING LIMITS
COORDINATE TABLE

POINT	NORTHING	EASTING
1	636415.15	2046362.71
2	636410.84	2046367.34
3	636332.25	2046407.43
4	636335.03	2046412.99
5	636314.66	2046427.80
6	636285.63	2046435.02
7	636283.95	2046430.17
8	636239.57	2406442.50
9	636180.35	2046461.66
10	636181.42	2046464.79
11	636076.40	2046500.79
12	636093.82	2046552.18
36	635958.19	2046355.10
37	635993.44	2046344.35
38	636034.86	2046334.43
39	636035.73	2046340.30
40	636095.38	2046331.85
41	636085.20	2046312.12
42	636187.28	2046261.14
43	636209.59	2046305.81
44	636225.99	2046314.27
45	636367.88	2046297.78
46	636379.67	2046291.74

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
PLOT SCALE: 1:1
PLOT STYLE TABLE: FULL.CTB
SIZE: ANSI D
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
FILE NUMBER:
FILE NAME: GB_SEG B3_ C-103XXX.dgn

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

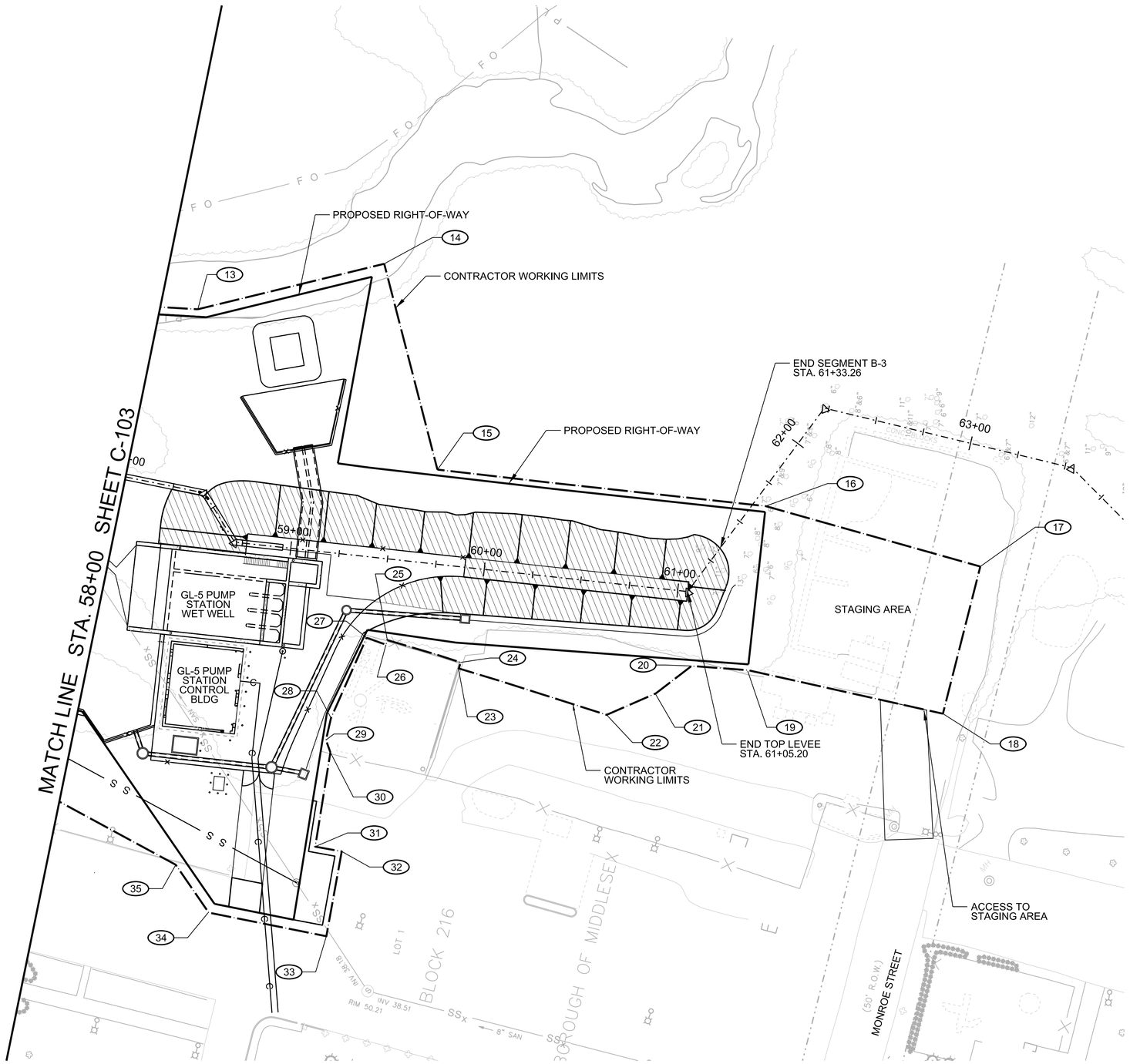
JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

CONTRACTOR WORKING LIMITS
COORDINATE TABLE - SHEET 1
STA. 53+77.68 TO STA. 58+00

SHEET IDENTIFICATION
C-103
SHEET 13 OF 147

100% SUBMITTAL



CONTRACTOR WORKING LIMITS COORDINATE TABLE

POINT	NORTHING	EASTING
13	636027.41	2046602.47
14	635969.78	2046682.45
15	635880.29	2046619.78
16	635739.86	2046715.07
17	635635.86	2046763.08
18	635601.32	2046693.10
19	635692.00	2046645.06
20	635715.45	2046627.86
21	635720.25	2046605.23
22	635732.31	2046580.41
23	635805.53	2046549.22
24	635806.83	2046552.20
25	635842.94	2046536.45
26	635841.94	2046534.19
27	635851.82	2046530.44
28	635838.93	2046487.20
29	635833.56	2046476.92
30	635827.67	2046473.55
31	635802.15	2046431.66
32	635790.19	2046438.63
33	635767.88	2046400.37
34	635821.74	2046370.33
35	635850.56	2046378.04

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MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
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DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
PLOT SCALE: AS NOTED
PLOT DATE: 19-FEB-2016
SIZE: ANSI D
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
FILE NUMBER:
ISSUE DATE:
FILE NAME: GB_SEG B3_C-104XXX.dgn

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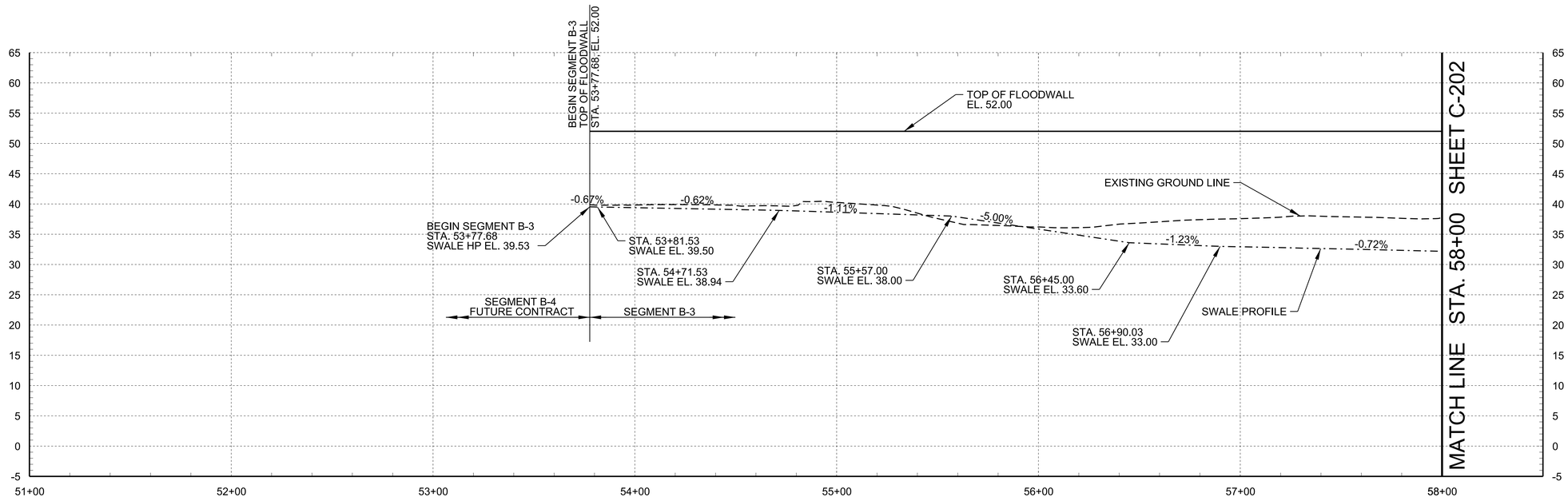
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
BORO. OF MIDDLESEX AND GREEN BROOK TWP. NJ

CONTRACTOR WORKING LIMITS
COORDINATE TABLE - SHEET 2
STA. 58+00 TO STA. 63+20

SHEET IDENTIFICATION
C-104
SHEET 14 OF 147

100% SUBMITTAL



NOTE: SWALE ALIGNMENT IS NOT PARALLEL WITH FLOODWALL ALIGNMENT BEYOND STA. 56+45.00. GRADES SHOWN ARE ALONG CENTERLINE OF SWALE.

0 10′ 20′
VERT. SCALE: 1″= 10′

0 30′ 60′
HORIZ. SCALE:1″= 30′

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY: CKD BY:
SUBMITTED BY:
PLOT SCALE: 1=1
PLOT DATE: ###
SIZE: ANSI D
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
FILE NUMBER:
ISSUE DATE: ##/##/2016
FILE NAME: GB_SEG B3_C-201XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
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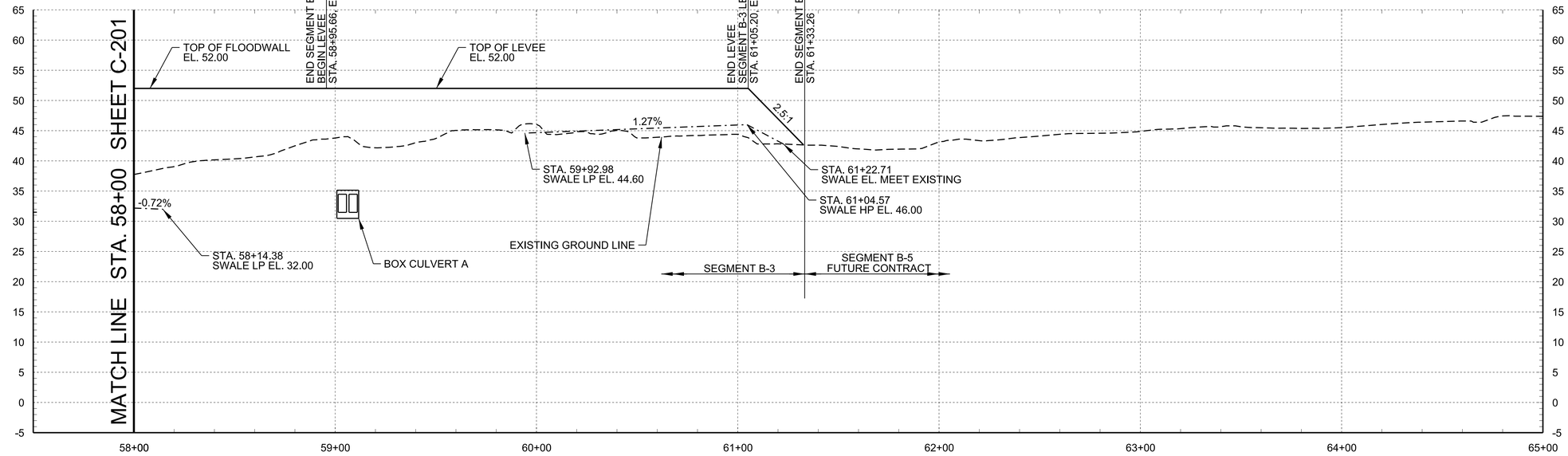
JOINT VENTURE

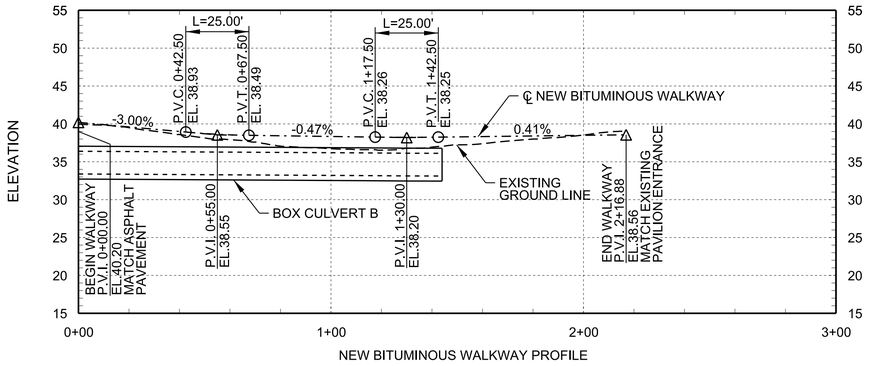
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

DRAINAGE PROFILE SHEET
STA. 53+77.68 TO STA. 58+00

SHEET IDENTIFICATION
C-201
SHEET 15 OF 147

100% SUBMITTAL





NEW BITUMINOUS WALKWAY PROFILE

NOTE: SWALE ALIGNMENT IS NOT PARALLEL WITH FLOODWALL/LEVEE ALIGNMENT. GRADES SHOWN ARE ALONG CENTERLINE OF SWALE.

0 10′ 20′
VERT. SCALE: 1″= 10′

0 30′ 60′
HORIZ. SCALE:1″= 30′

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: RSB
DRWN BY:
CKD BY:
SUBMITTED BY:
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: AS K
ISSUE DATE: FEB 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEG B3_C-202XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
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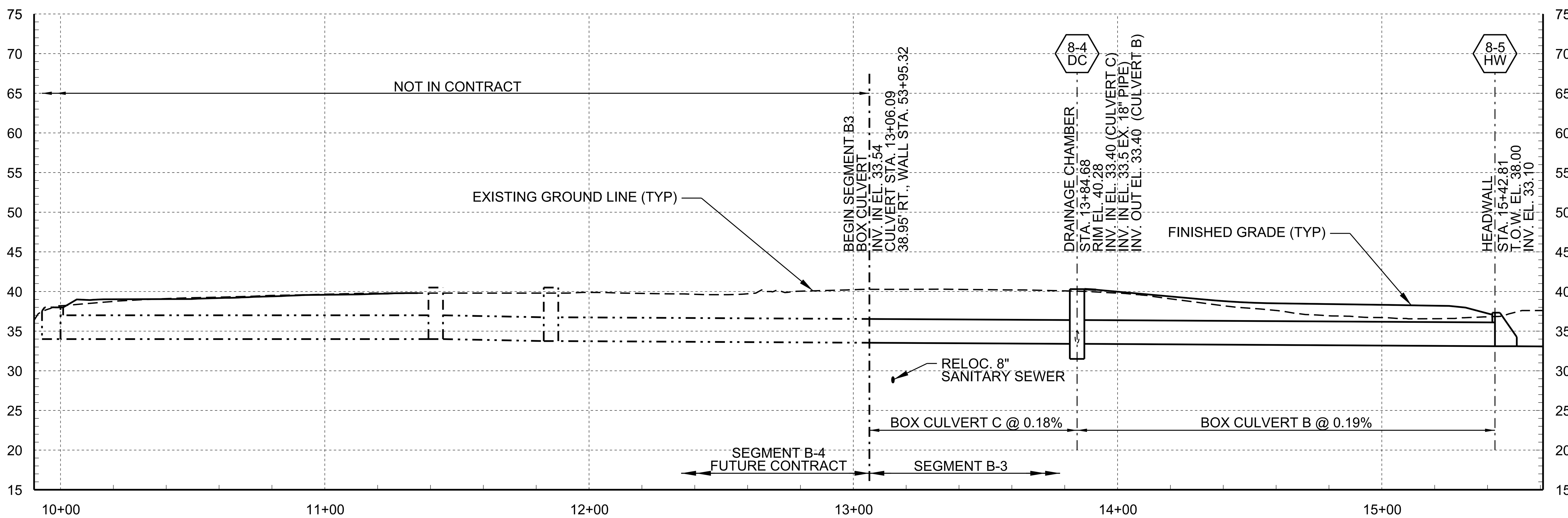
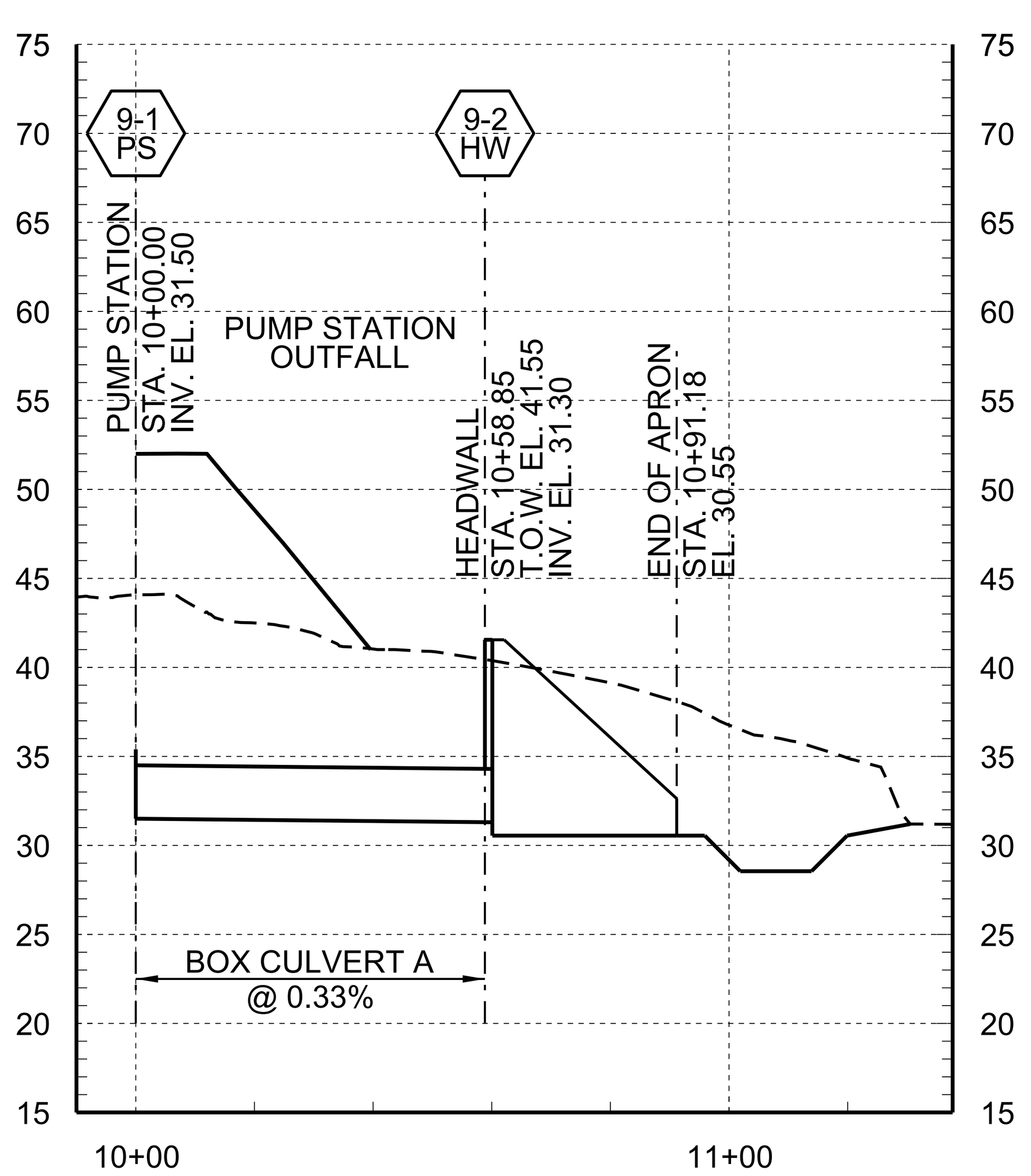
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

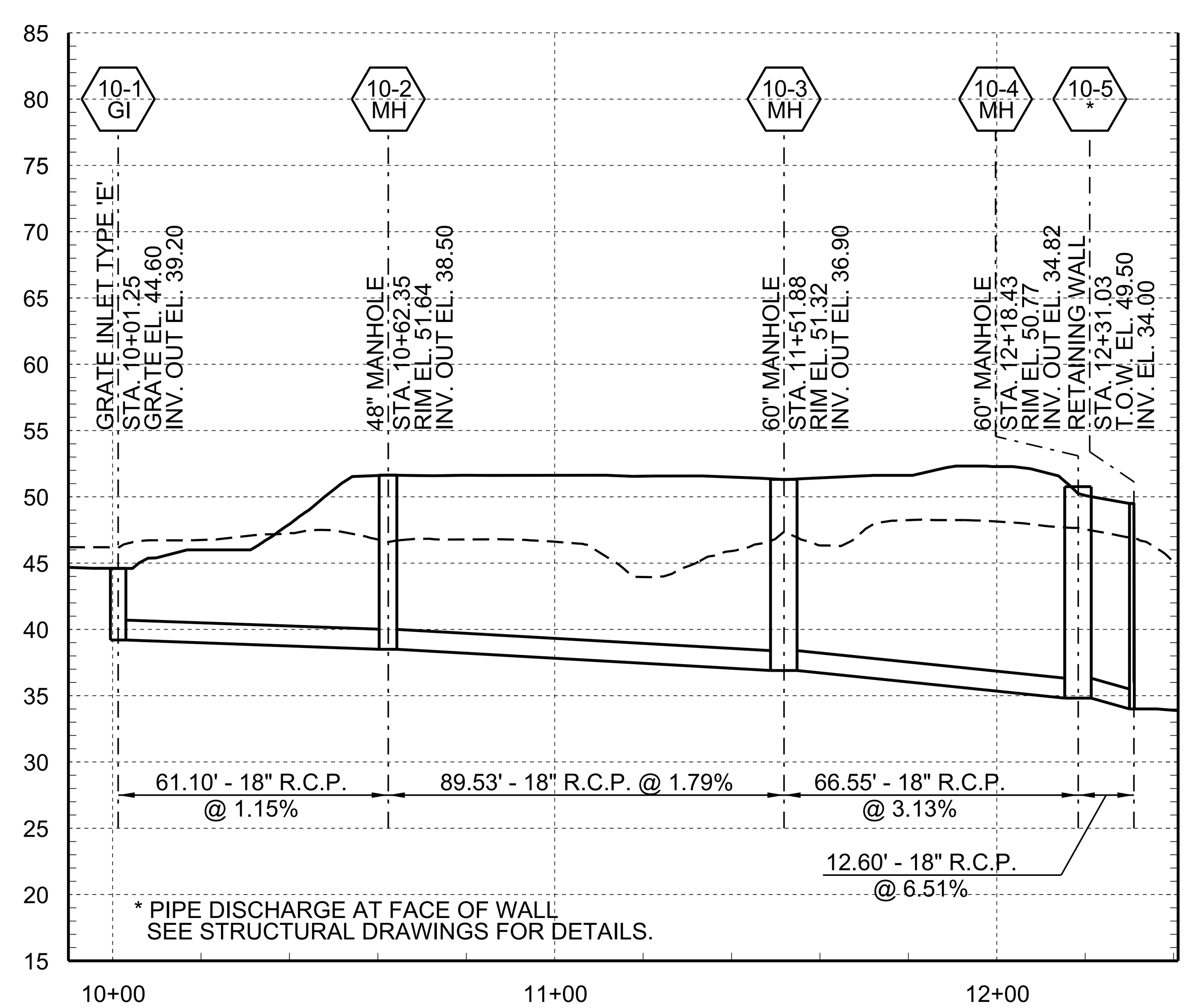
DRAINAGE PROFILE SHEET
STA. 58+00 TO STA. 61+33.26

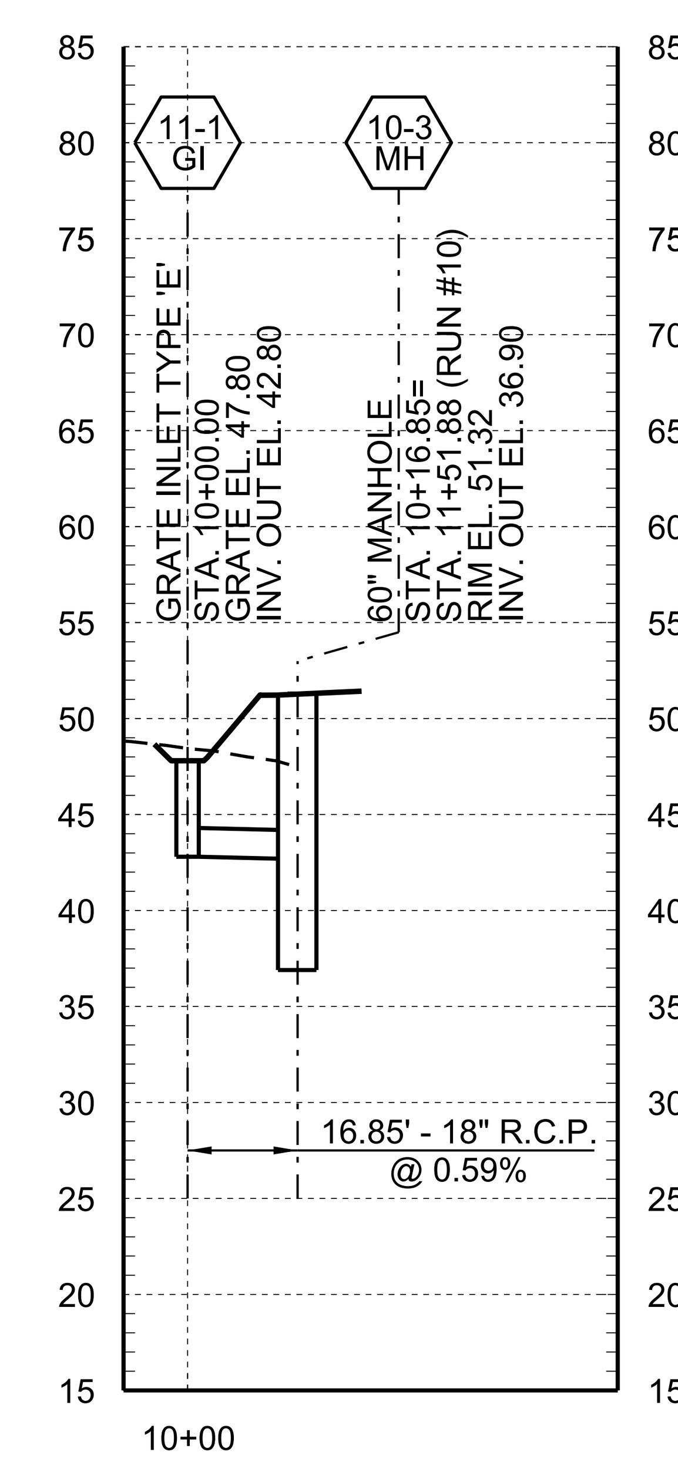
SHEET IDENTIFICATION
C-202
SHEET 16 OF 147

100% SUBMITTAL









GENERAL NOTES:
1. MANHOLES TO BE CONSTRUCTED PER NEW JERSEY DOT STANDARDS. SEE STANDARD DRAWING CD-602-9.
2. INLETS, TYPE E, TO BE CONSTRUCTED PER NEW JERSEY DOT STANDARDS. SEE STANDARD DRAWING CD-602-4.

VERT. SCALE: 1"= 10'

HORIZ. SCALE:1"= 30'

US Army Corps of Engineers

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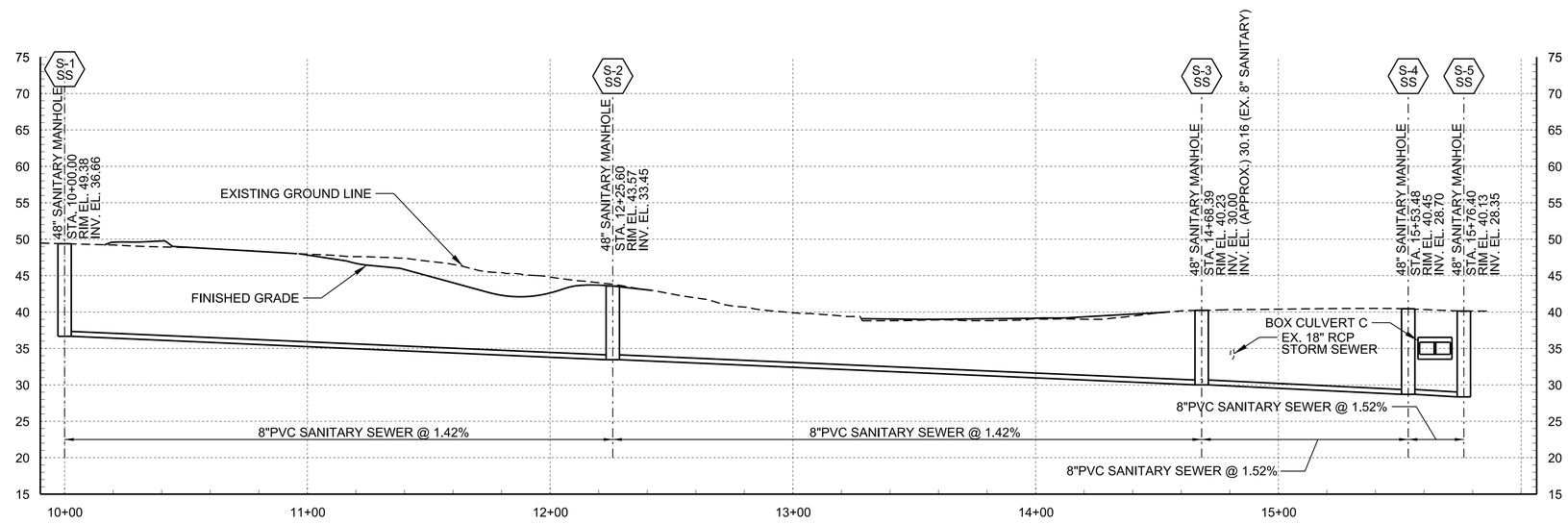
DESIGNED BY: | DWN BY: | CKD BY: | SUBMITTED BY: | DATE: 19-FEB-2016 | SOLICITATION NO.: | CONTRACT NO.: W912PM-##-X-#### | FILE NUMBER:
PLOT SCALE: XXX | SIZE: ANSI D | ISSUE DATE: FEB. 2016 | FILE NAME: GB_SEG B3_C-203XXX.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

STORM SEWER PROFILES
SHEET 1

SHEET IDENTIFICATION
C-203
SHEET 17 OF 147

100% SUBMITTAL



GENERAL NOTES:
1. MANHOLES TO BE CONSTRUCTED PER NEW JERSEY DOT STANDARDS. SEE STANDARD DRAWING CD-602-9.
2. INLETS, TYPE E, TO BE CONSTRUCTED PER NEW JERSEY DOT STANDARDS. SEE STANDARD DRAWING CD-602-4.

0 10′ 20′
VERT. SCALE: 1″= 10′

0 30′ 60′
HORIZ. SCALE:1″= 30′

100% SUBMITTAL

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
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DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P5-##-X-####
PLOT SCALE: XXX
PLOT DATE: FEB 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEC B3_C-204XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
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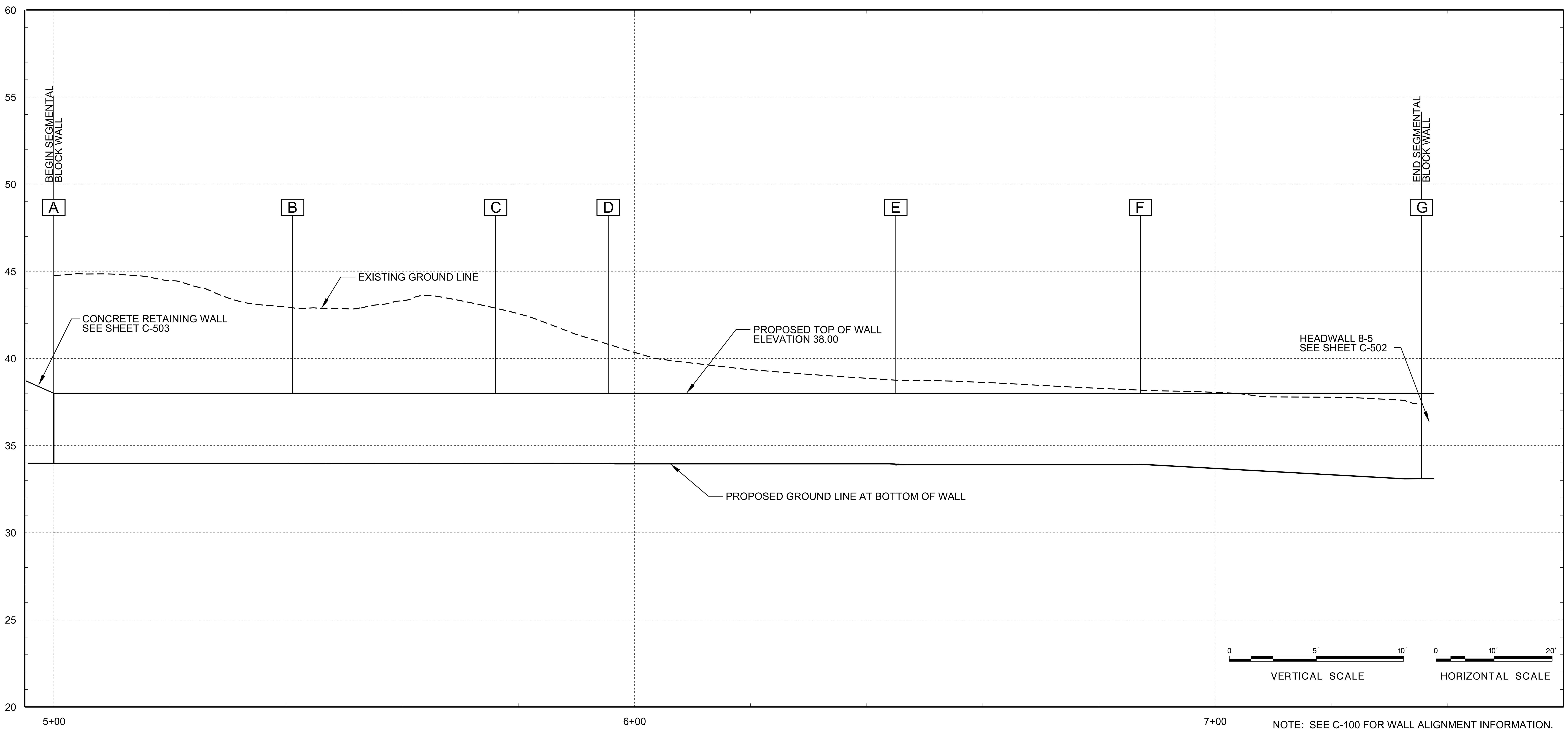
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SOMERSET & MIDDLESEX COUNTY
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

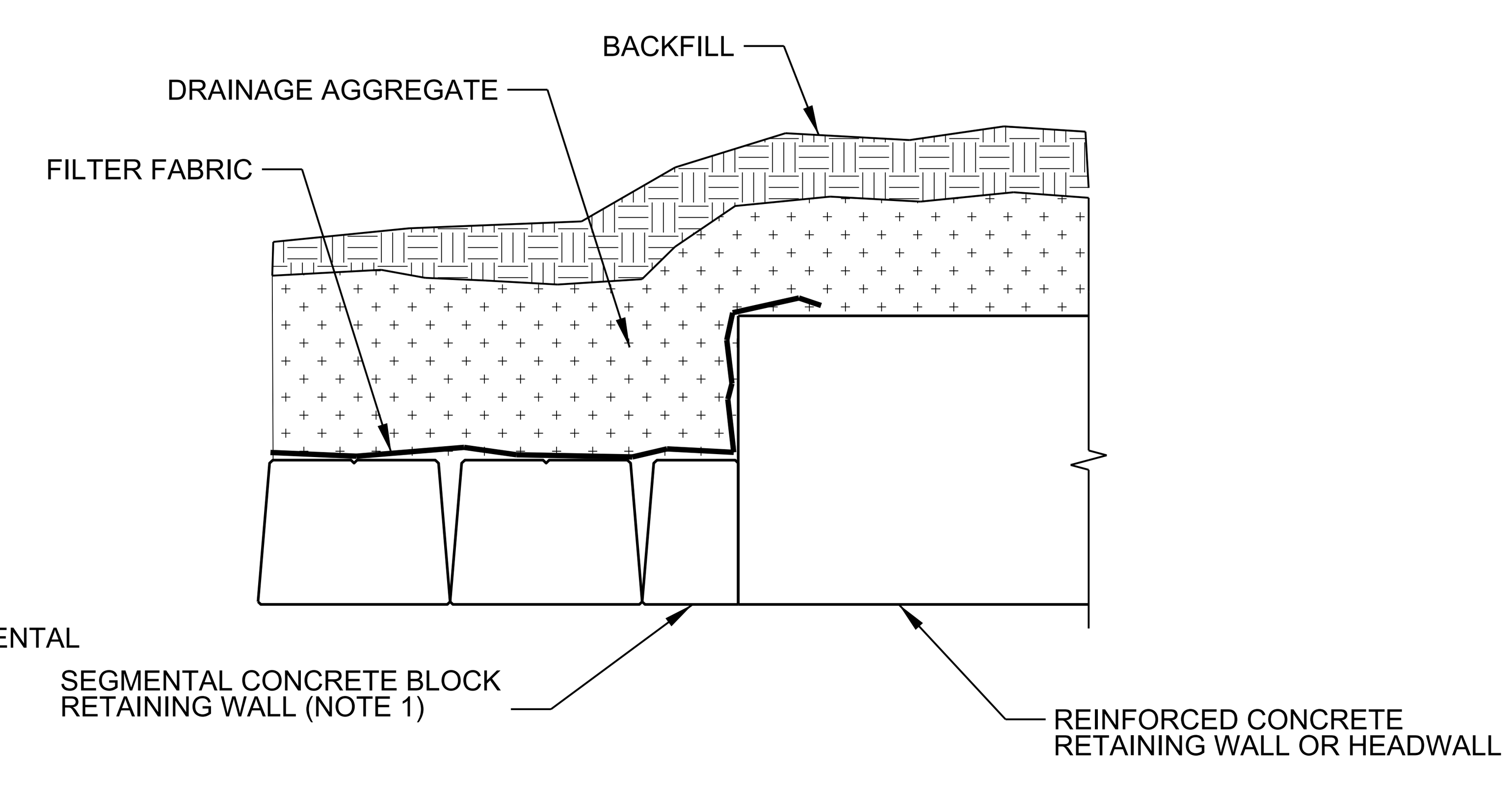
RELOCATED SANITARY SEWER PROFILE
SHEET 1

SHEET IDENTIFICATION
C-204
SHEET 18 OF 147



NOTE: SEE C-100 FOR WALL ALIGNMENT INFORMATION.

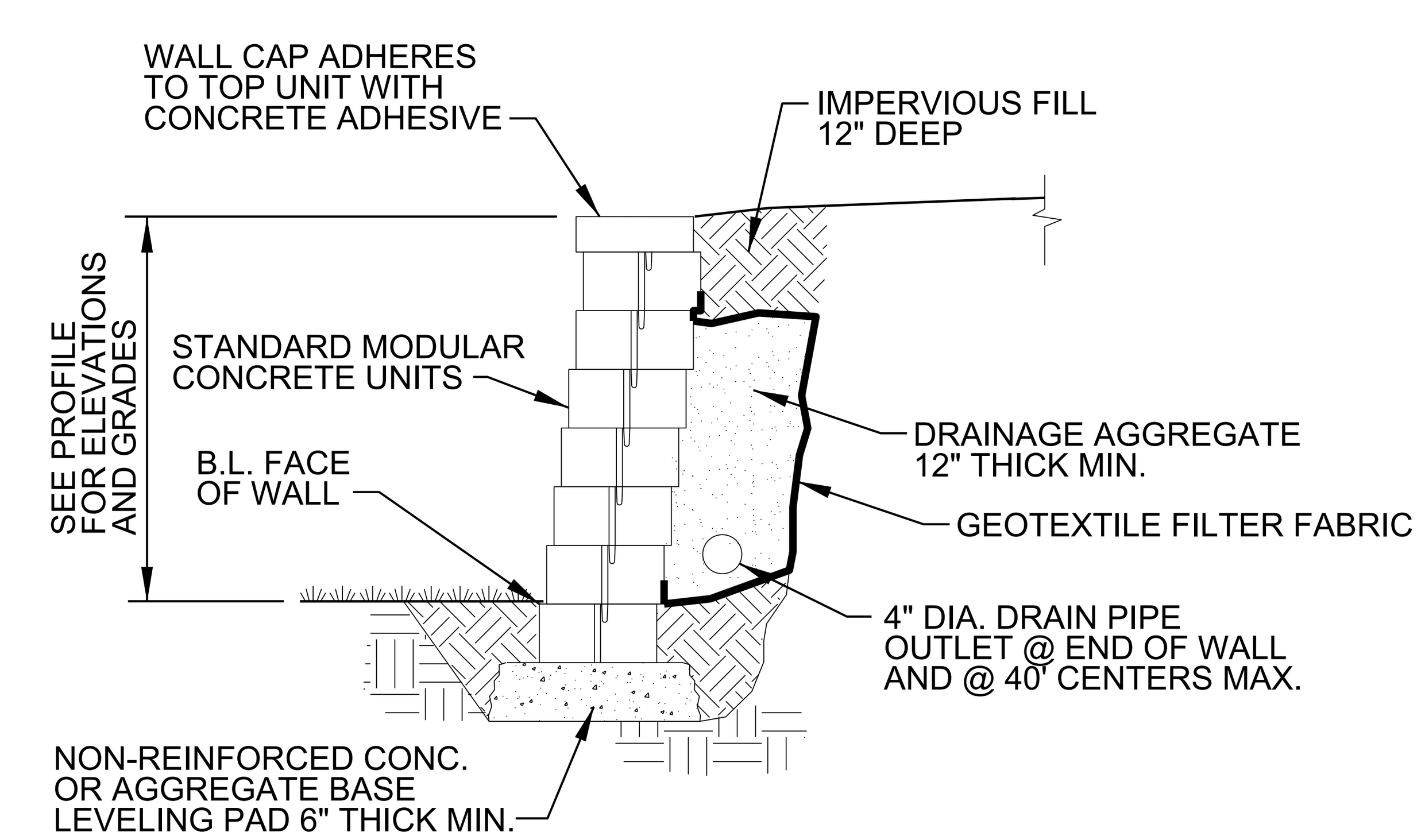
PROFILE- SEGMENTAL CONCRETE BLOCK RETAINING WALL



NOTE 1:
WHERE SEGMENTAL BLOCK WALL ABUTS REINFORCED CONCRETE RETAINING WALL, ALTERNATE FULL SEGMENTAL UNIT WITH HALF SEGMENTAL UNIT EVERY OTHER COURSE.

SEGMENTAL BLOCK TO CAST-IN-PLACE CONCRETE RETAINING WALL INTERFACE

N.T.S.



SEGMENTAL CONCRETE BLOCK RETAINING WALL - UNREINFORCED TYPICAL SECTION

N.T.S.

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NEW YORK DISTRICT
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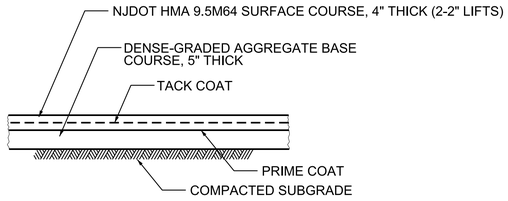
DESIGNED BY: | DATE: 19-FEB-2016
DWN BY: | CKD BY: | SOLICITATION NO.:
SUBMITTED BY: | CONTRACT NO.: W912PM-##-X-####
PLOT SCALE: XXX | ISSUE DATE: FEB. 2016 | FILE NUMBER:
SIZE: ANSI D | FILE NAME: GB_SEG B3_C-205XX.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

SEGMENTAL BLOCK WALL PROFILE

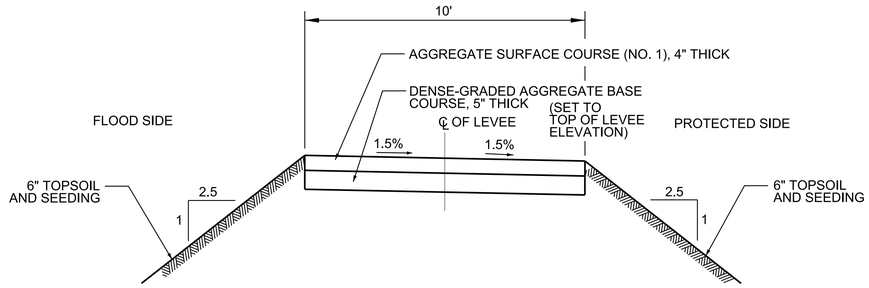
SHEET IDENTIFICATION
C-205
SHEET 19 OF 147

100% SUBMITTAL



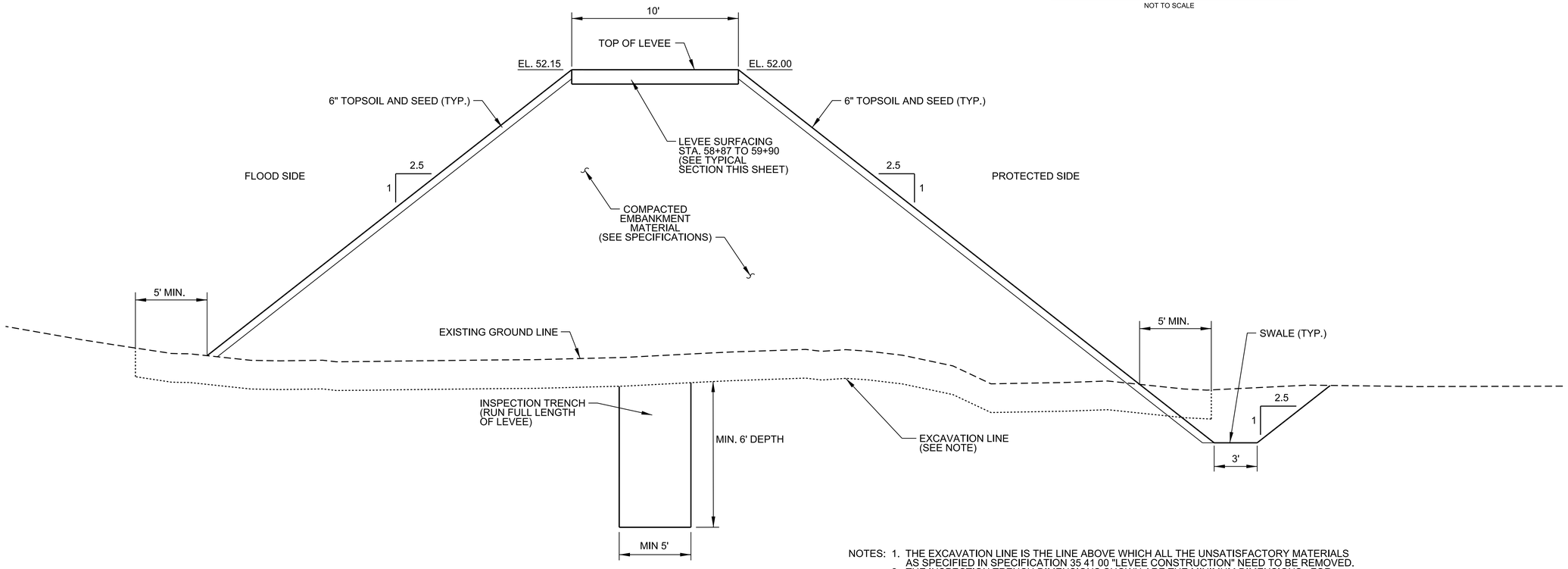
TYPICAL ASPHALT PAVEMENT SECTION

NOT TO SCALE



TYPICAL LEVEE SURFACING SECTION

NOT TO SCALE



LEVEE TYPICAL SECTION

NOT TO SCALE

NOTES: 1. THE EXCAVATION LINE IS THE LINE ABOVE WHICH ALL THE UNSATISFACTORY MATERIALS AS SPECIFIED IN SPECIFICATION 35 41 00 "LEVEE CONSTRUCTION" NEED TO BE REMOVED.
2. THE INSPECTION TRENCH DIMENSIONS SHOWN ARE THE MINIMUM DIMENSIONS. FOR EXCAVATION AND BACKFILL REQUIREMENTS OF THE INSPECTION TRENCH SEE SPECIFICATION 35 41 00.

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: AJK
DWN BY:
CKD BY:
SUBMITTED BY:
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: 1:1
PLOT DATE: 19-FEB-2016
ISSUE DATE:
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEC B3_C-301XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

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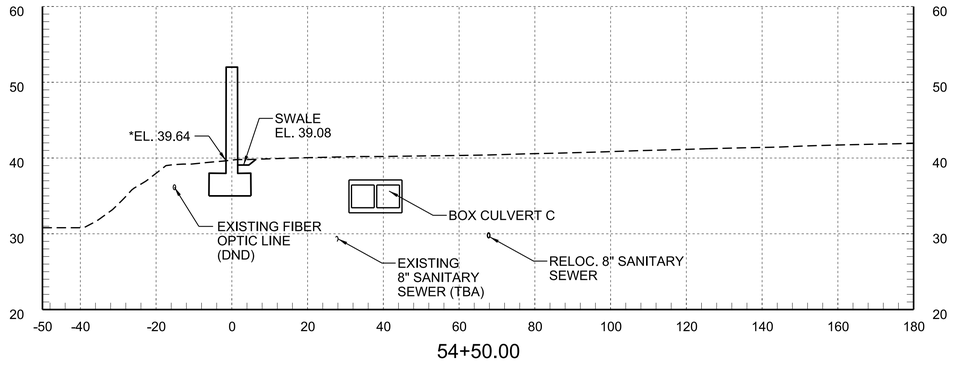
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SECTION 205 FEASIBILITY STUDY
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

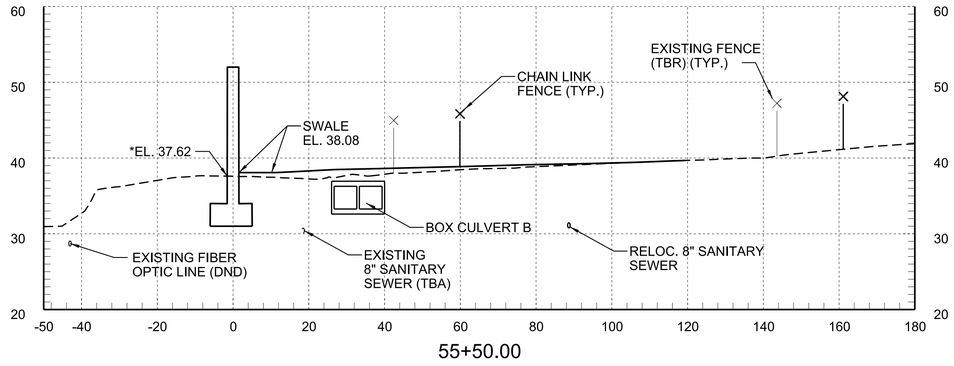
LEVEE TYPICAL SECTIONS

SHEET IDENTIFICATION
C-301
SHEET 20 OF 147

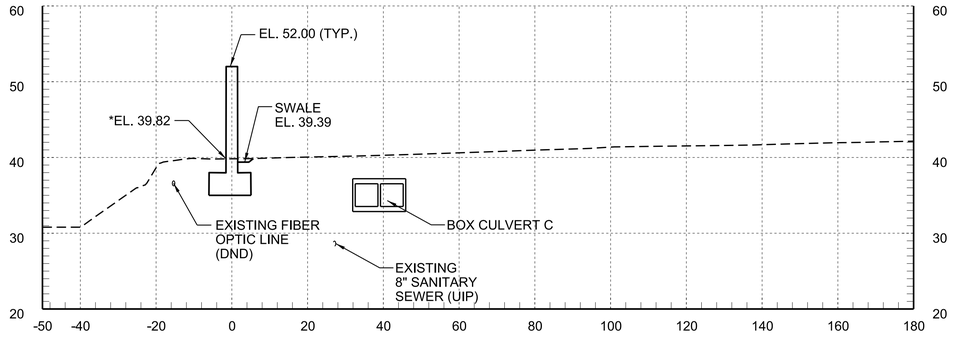
100% SUBMITTAL



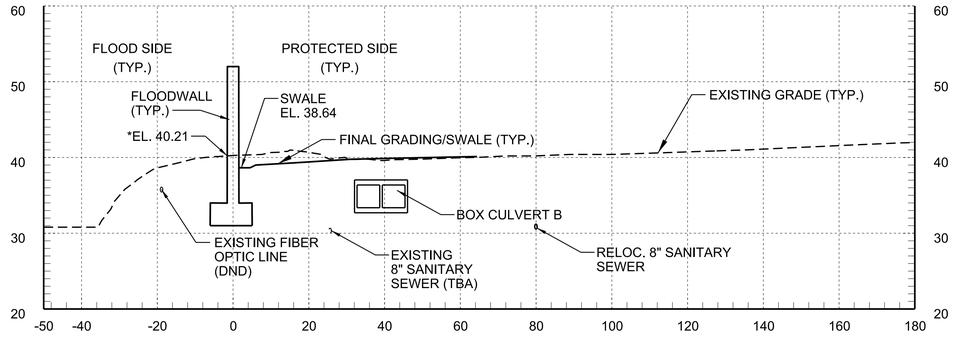
54+50.00



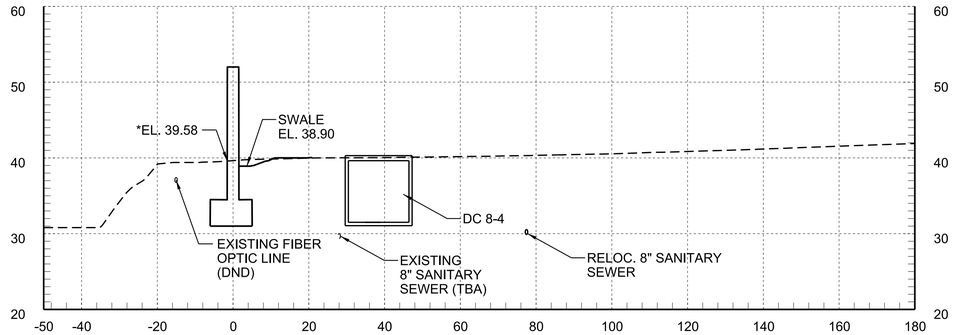
55+50.00



54+00.00



55+00.00



54+74.25

* RESTORE EXISTING GRADE FOLLOWING CONSTRUCTION

NOTES:
1. SOME ITEMS HAVE NOT BEEN DISPLAYED ON CROSS SECTIONS. ITEMS NOT SHOWN INCLUDE RIPRAP, TURF REINFORCEMENT MAT, MANHOLES, OUTFALL STRUCTURES, ROADWAYS, BATTERED PILES AND PUMP STATION.
2. SEE SHEET C-101 FOR TYPICAL SECTION OF SWALE

VERT. SCALE:1″= 10′ (0, 10′, 20′)

HORIZ. SCALE:1″= 20′ (0, 20′, 40′)

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
SUBMITTED BY:
CKD BY:
PLOT SCALE: 1:1
PLOT DATE: AS SHOWN
SIZE: ANSI D
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
ISSUE DATE: ##-###-2016
FILE NUMBER:
FILE NAME: GB_SEC B3_C-302XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
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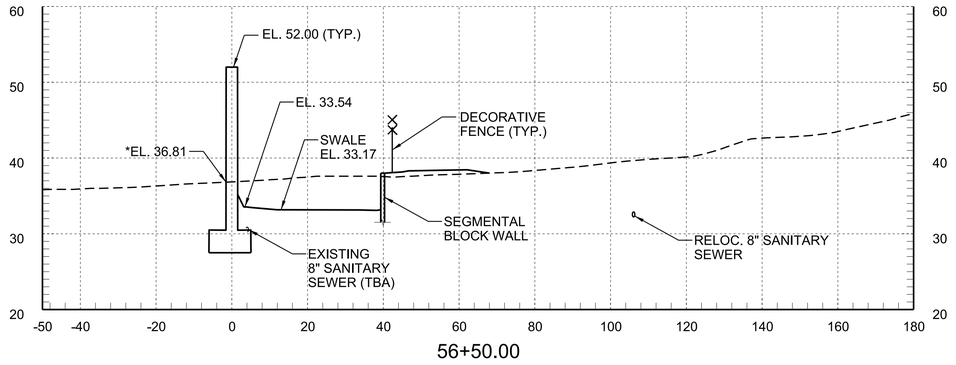
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SCHEME B3, CONTRACT B
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

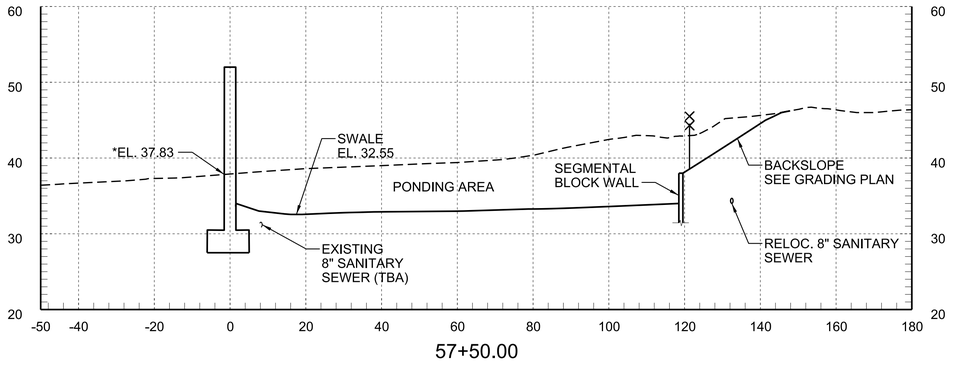
CROSS SECTIONS
STA. 54+00 TO STA. 55+50

SHEET IDENTIFICATION
C-302
SHEET 21 OF 147

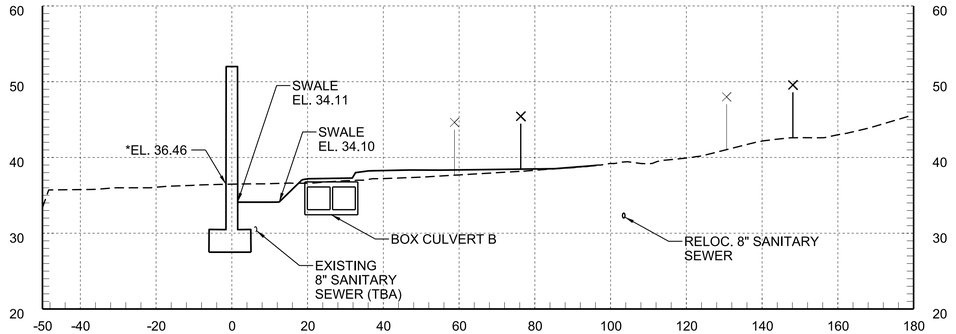
100% SUBMITTAL



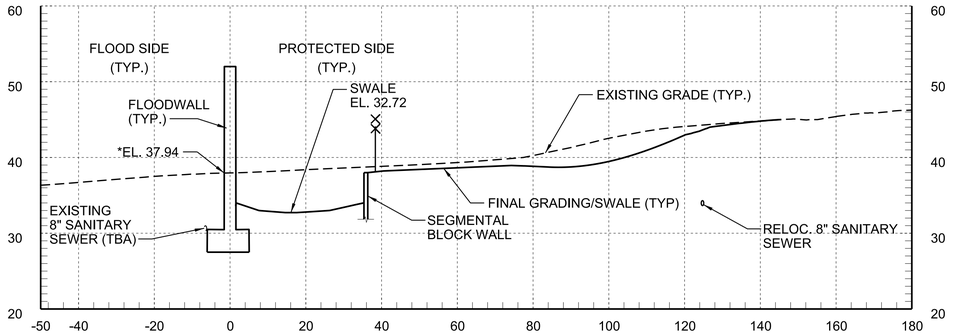
56+50.00



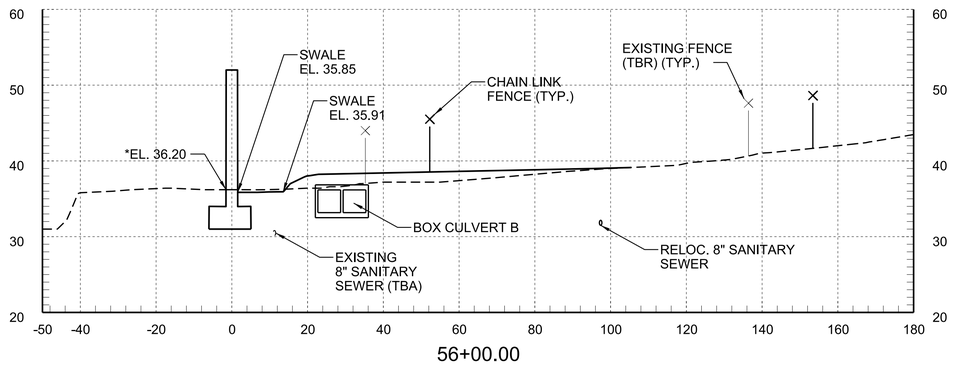
57+50.00



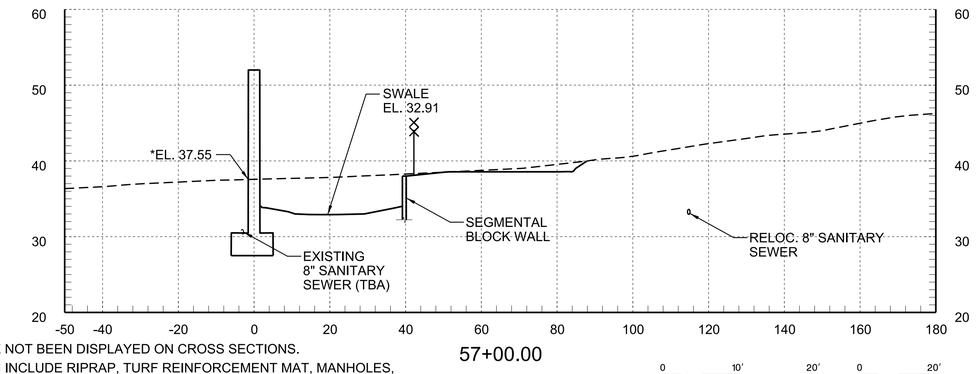
56+35.00



57+25.00



56+00.00



57+00.00

* RESTORE EXISTING GRADE FOLLOWING CONSTRUCTION

NOTES:
1. SOME ITEMS HAVE NOT BEEN DISPLAYED ON CROSS SECTIONS. ITEMS NOT SHOWN INCLUDE RIPRAP, TURF REINFORCEMENT MAT, MANHOLES, OUTFALL STRUCTURES, ROADWAYS, BATTERED PILES AND PUMP STATION.
2. SEE SHEET C-101 FOR TYPICAL SECTION OF SWALE

VERT. SCALE:1"= 10'

HORIZ. SCALE:1"= 20'

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: 1:1
ISSUE DATE: FEB 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: 08_SEG B3_C-303XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

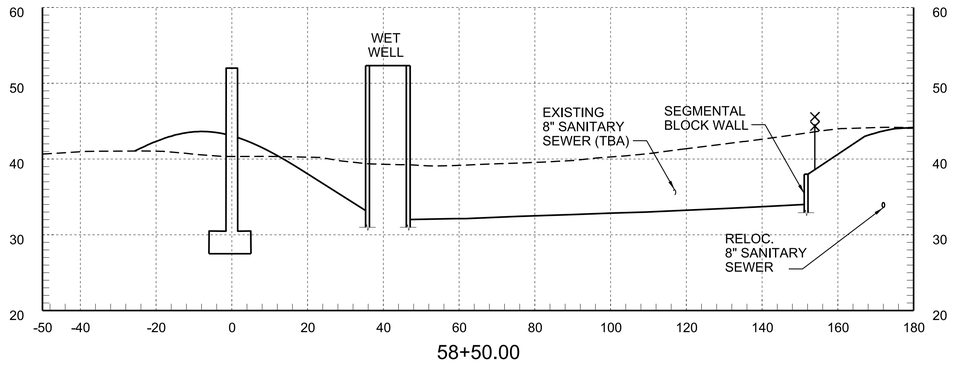
JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
FEASIBILITY STUDY
BORO. OF MIDDLESEX AND GREEN BROOK TWP. NJ

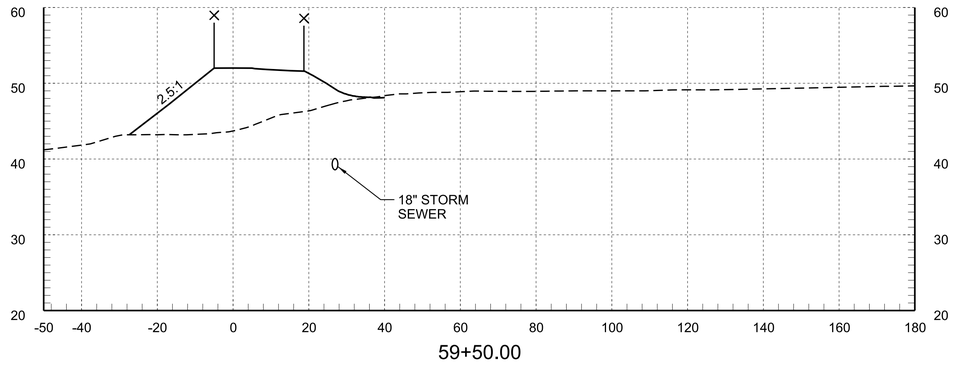
CROSS SECTIONS
STA. 56+00 TO STA. 57+50

SHEET IDENTIFICATION
C-303
SHEET 22 OF 147

100% SUBMITTAL



58+50.00



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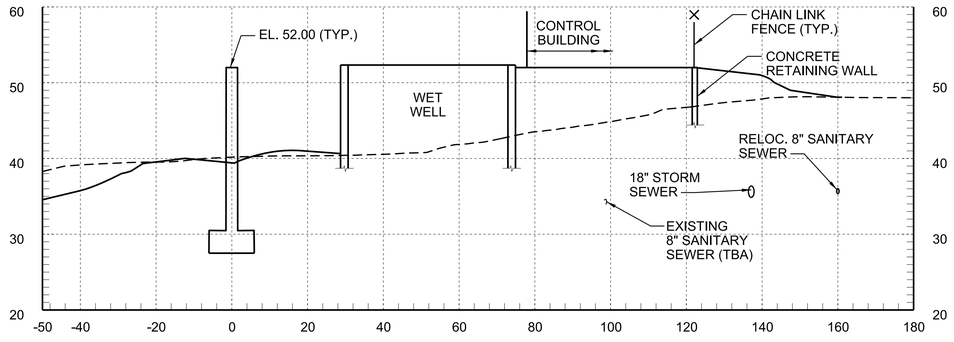

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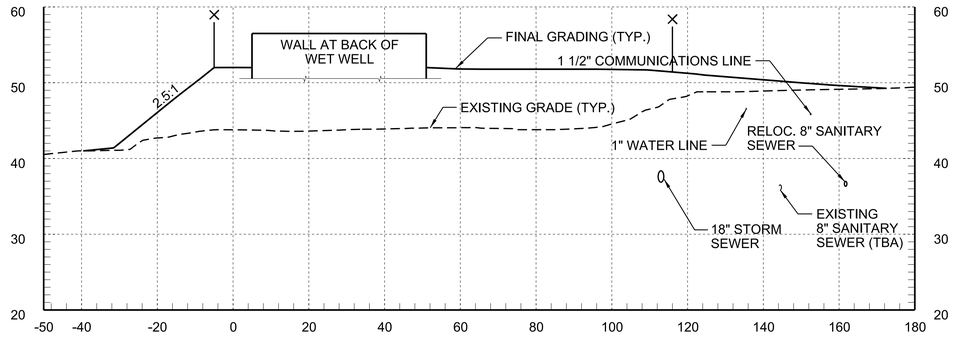
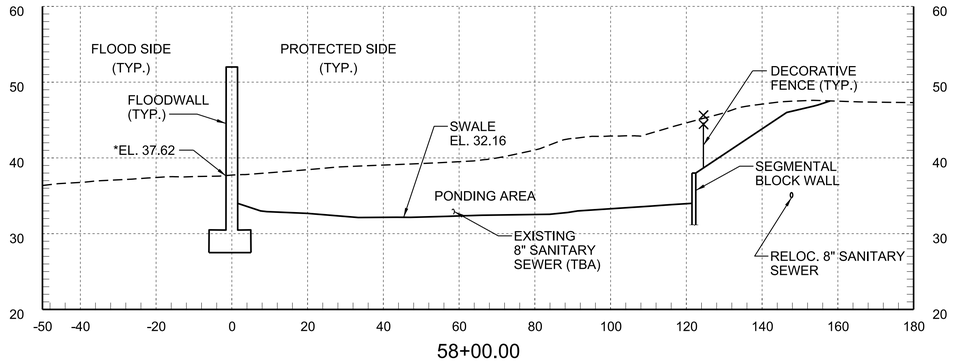
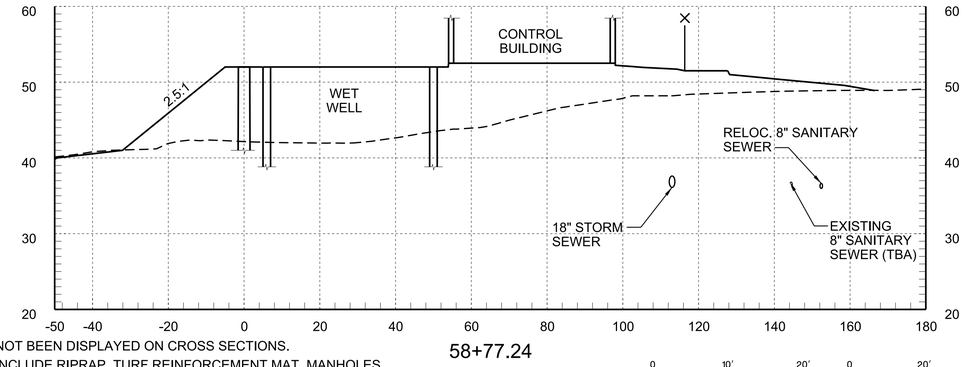


59+00.00



58+00.00



58+77.24

* RESTORE EXISTING GRADE FOLLOWING CONSTRUCTION

NOTES:
1. SOME ITEMS HAVE NOT BEEN DISPLAYED ON CROSS SECTIONS.
   ITEMS NOT SHOWN INCLUDE RIPRAP, TURF REINFORCEMENT MAT, MANHOLES,
   OUTFALL STRUCTURES, ROADWAYS, BATTERED PILES AND PUMP STATION.
2. SEE SHEETS C-101 AND C-301 FOR TYPICAL SECTION OF SWALE

VERT. SCALE:1″= 10′ (0, 10′, 20′)

HORIZ. SCALE:1″= 20′ (0, 20′, 40′)

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MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
PLOT SCALE: 1:1
SIZE: ANSI D
ISSUE DATE: FEB 2016
FILE NAME: GB_SEG B3_C-304XXX.dgn
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
FILE NUMBER:
304XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
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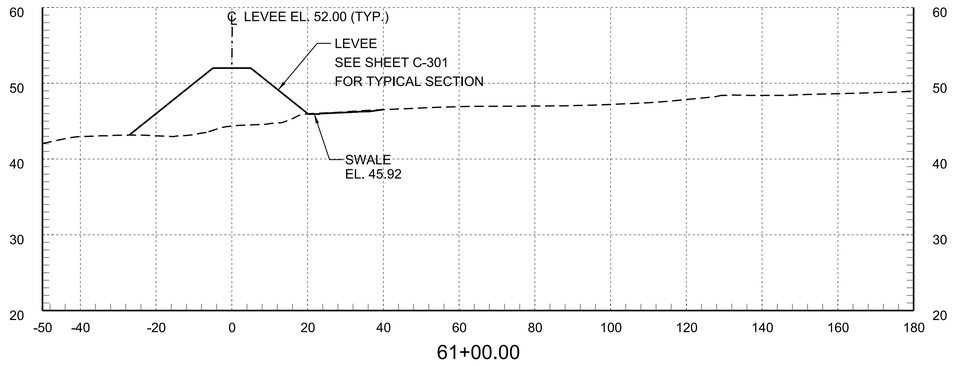
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

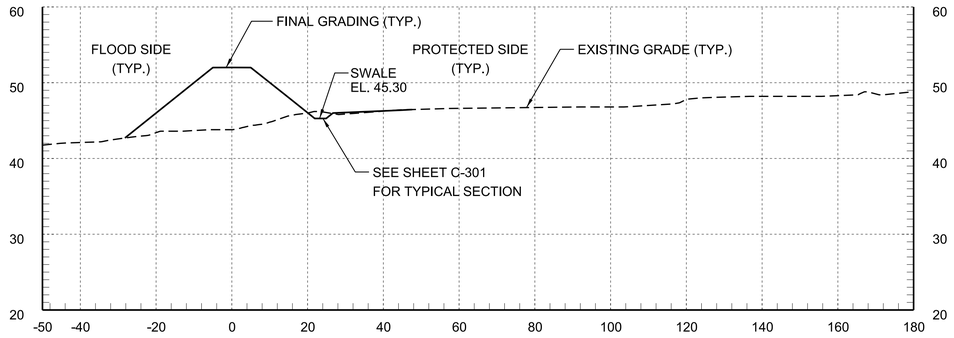
CROSS SECTIONS
STA. 58+00 TO STA. 59+50

SHEET IDENTIFICATION
C-304
SHEET 23 OF 147

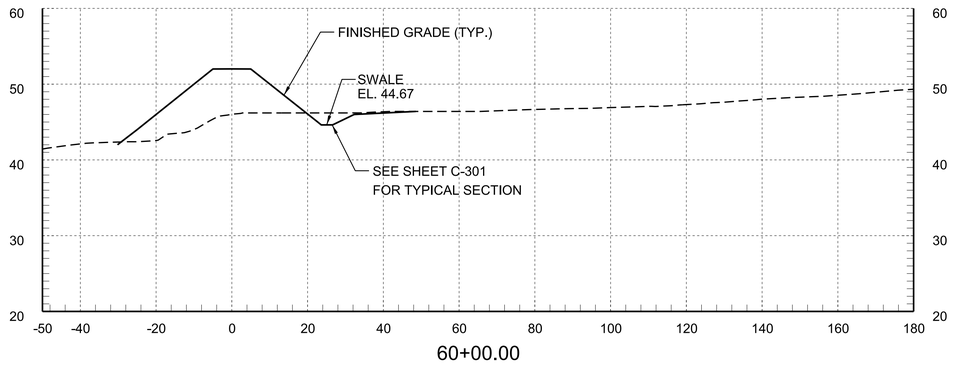
100% SUBMITTAL



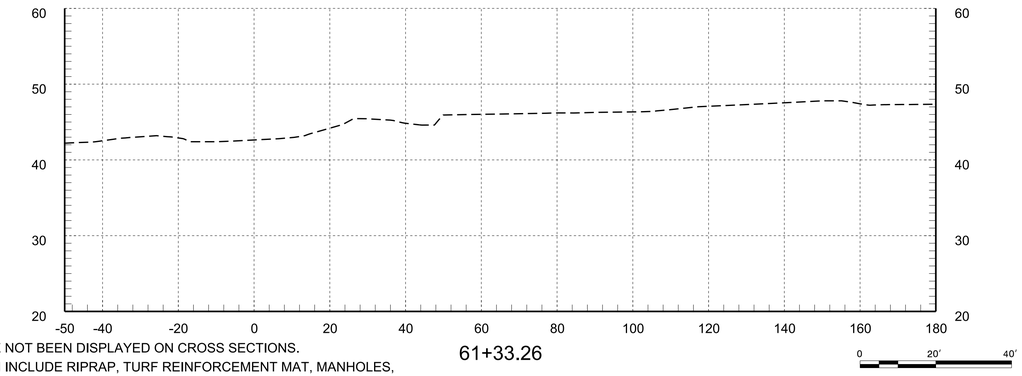
61+00.00



60+50.00



60+00.00



61+33.26

NOTES:
1. SOME ITEMS HAVE NOT BEEN DISPLAYED ON CROSS SECTIONS. ITEMS NOT SHOWN INCLUDE RIPRAP, TURF REINFORCEMENT MAT, MANHOLES, OUTFALL STRUCTURES, ROADWAYS, BATTERED PILES AND PUMP STATION.
2. SEE SHEET C-301 FOR TYPICAL SECTION OF SWALE

0 20′ 40′
SCALE:1″= 20′

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MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
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SUBMITTED BY:
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912PS-##-X-####
PLOT SCALE: 1'=1'
PLOT DATE: FEB 2016
ISSUE DATE:
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEG B3_C-305XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
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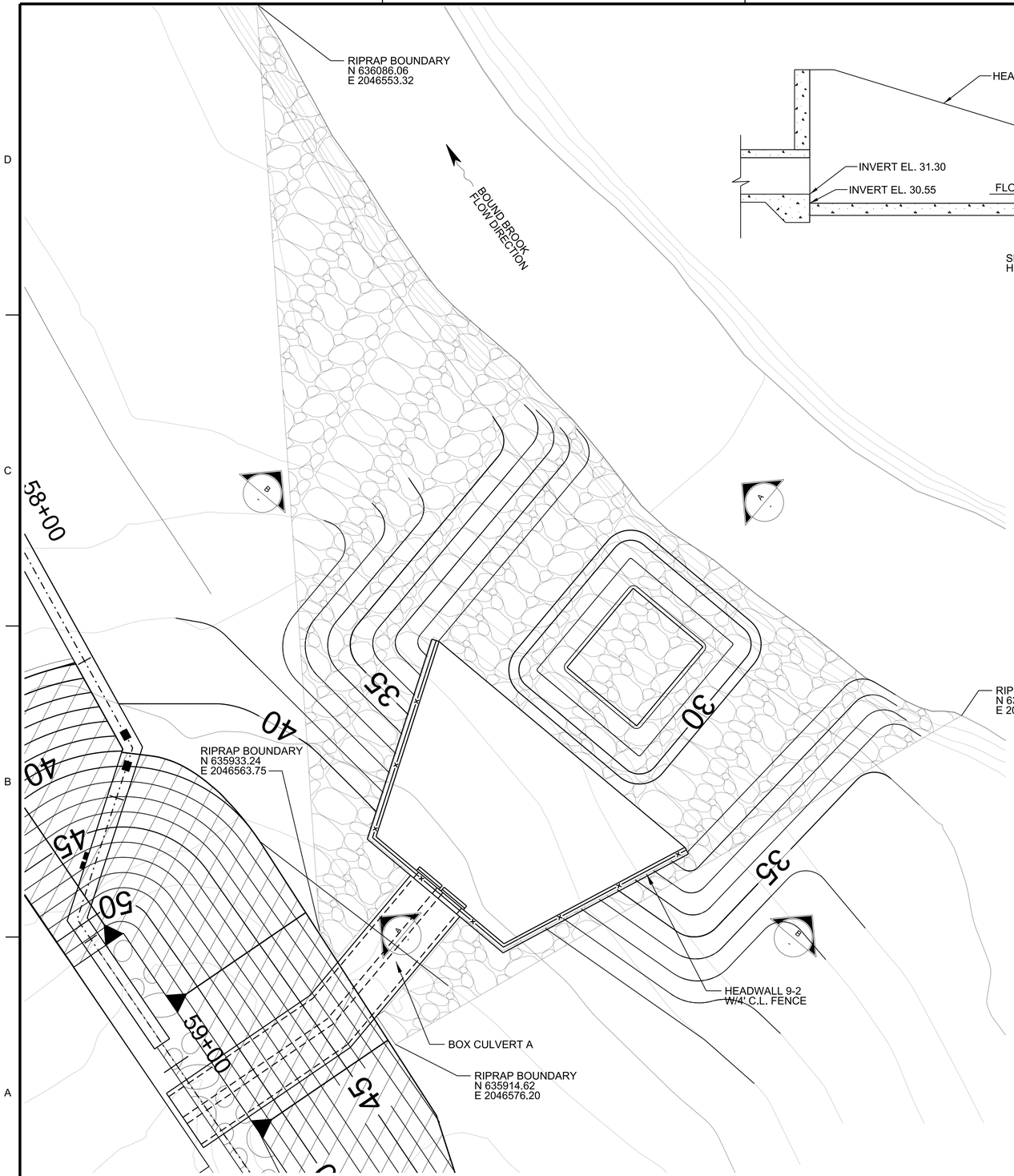
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SOMERSET & SOMERSET COUNTY
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

CROSS SECTIONS
STA. 60+00 TO STA. 61+33.26

SHEET IDENTIFICATION
C-305
SHEET 24 OF 147

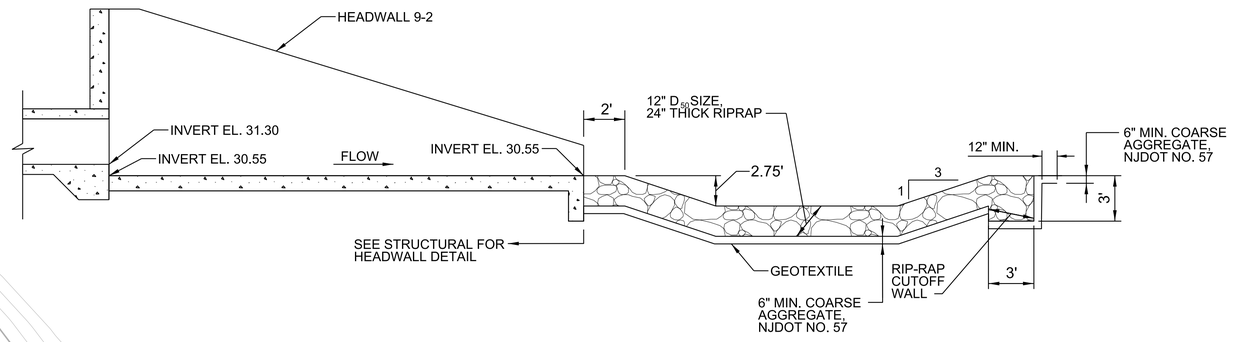
100% SUBMITTAL



PLAN VIEW OF PUMP STATION OUTLET PROTECTION DETAILS

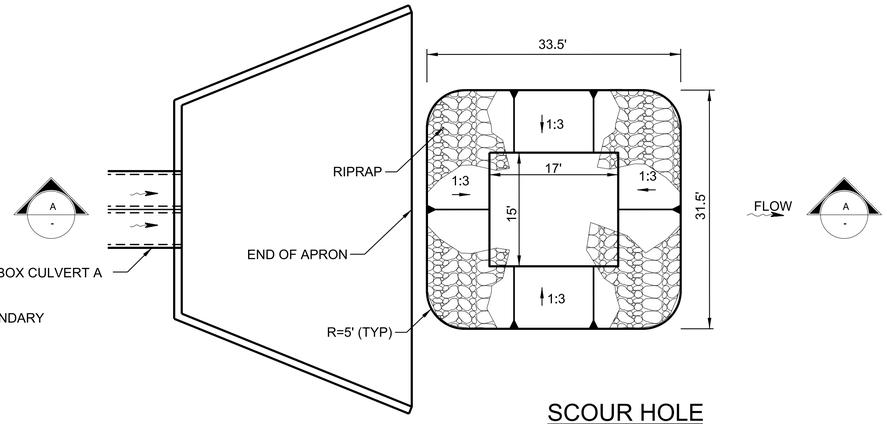
SCALE: 1"=10'

SCALE:1"= 10'



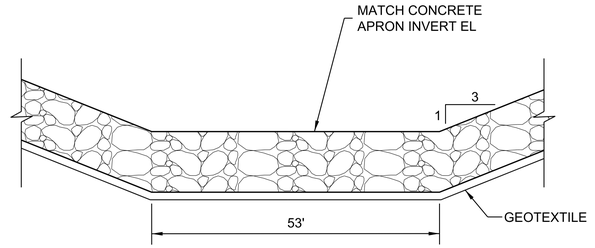
A SECTION - STORMWATER OUTFALL PROTECTION

N.T.S.



SCOUR HOLE

N.T.S.



B SECTION - RIPRAP PROTECTION SECTION VIEW

N.T.S.

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MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
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SUBMITTED BY:
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: AS IS
PLOT DATE: AS IS
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEQ B3_C-501XXX.dgn

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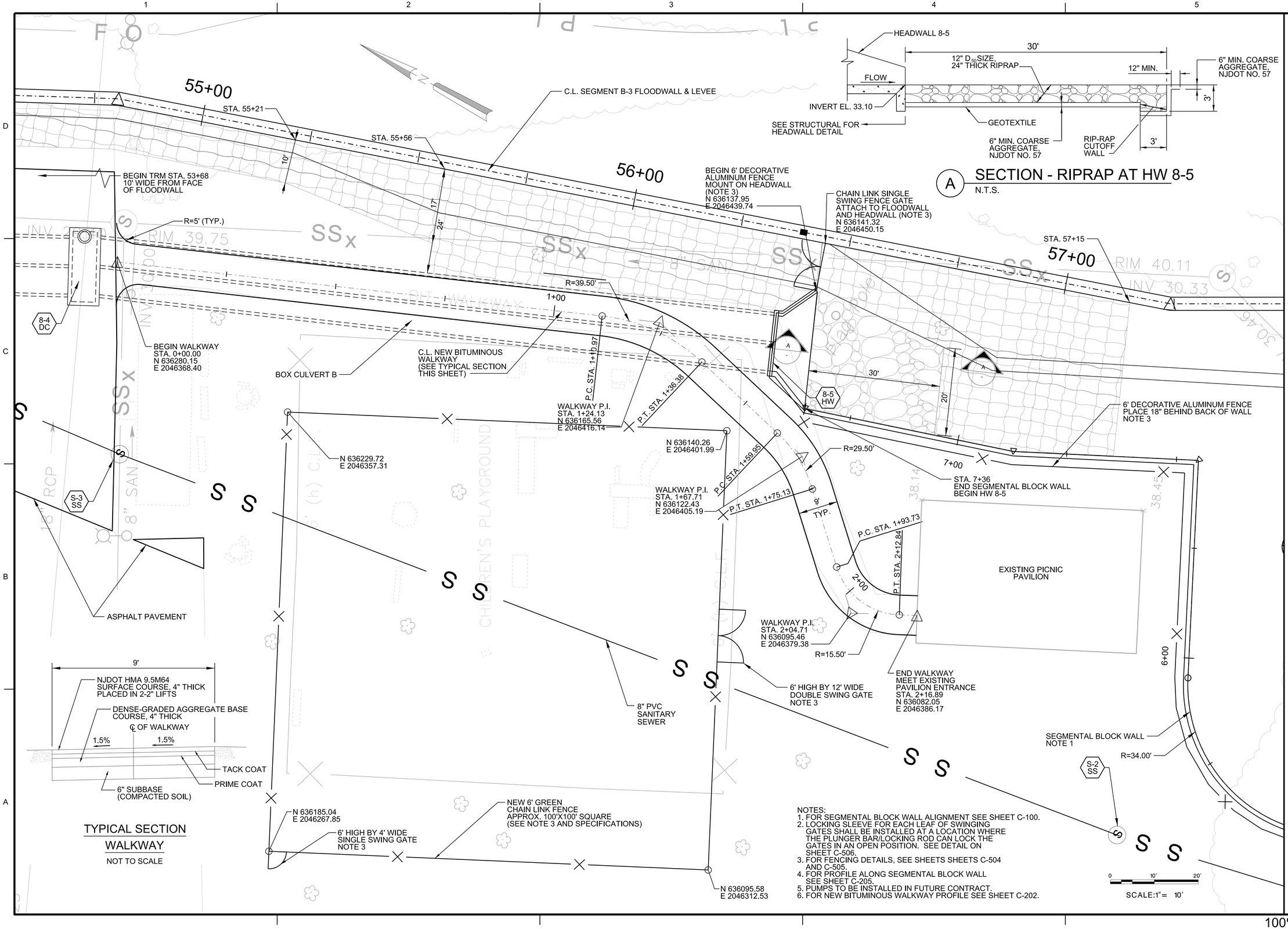
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SOMERSET, MIDDLESEX AND
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

PUMP STATION OUTFLOW DETAILS

SHEET IDENTIFICATION
C-501
SHEET 25 OF 147

100% SUBMITTAL



TYPICAL SECTION
WALKWAY
NOT TO SCALE

NOTES:
1. FOR SEGMENTAL BLOCK WALL ALIGNMENT SEE SHEET C-100.
2. LOCKING SLEEVE FOR EACH LEAF OF SWINGING GATES SHALL BE INSTALLED AT A LOCATION WHERE THE PLUNGER BAR/LOCKING ROD CAN LOCK THE GATES IN AN OPEN POSITION. SEE DETAIL ON SHEET C-506.
3. FOR FENCING DETAILS, SEE SHEETS SHEETS C-504 AND C-505.
4. FOR PROFILE ALONG SEGMENTAL BLOCK WALL SEE SHEET C-205.
5. PUMPS TO BE INSTALLED IN FUTURE CONTRACT.
6. FOR NEW BITUMINOUS WALKWAY PROFILE SEE SHEET C-202.

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DESIGNED BY:
DWN BY:
SUBMITTED BY:
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PLOT DATE:
SIZE: ANSI D
DATE: 19-FEB-2016
ISSUE DATE: FEB 2016
FILE NAME: GB_SEG B3_ C-502XXX.dgn
SOLICITATION NO.:
CONTRACT NO.: W912PS-##-X-####
FILE NUMBER:

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GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
BASIN, SOMERSET COUNTY AND
BORO. OF MIDDLESEX AND GREEN BROOK TWP. NJ.

PUMP STATION SITE DETAILS
SHEET 1

SHEET IDENTIFICATION
C-502
SHEET 26 OF 147

100% SUBMITTAL

MATCH LINE STA. 57+50 SHEET C-502

C.L. FLOODWALL

6' CHAIN LINK FENCE SEE NOTE 3

9-1 PS

BEGIN LEVEE SURFACING STA. 58+87 SEE NOTE 7

END 6' CHAIN LINK FENCE N 635926.70 E 2046522.25

59+00

END LEVEE SURFACING STA. 59+90

60+00

15' TYP.

10'

TOP OF LEVEE

EDGE OF AGGREGATE SURFACE N 635884.19 E 2046586.60

AGGREGATE SURFACE NOTE 8

TEST PILE 1 (NOTE 9) N 636023.29 E 2046459.42

INT. CORNER WET WELL N 635972.68 E 2046489.76

SWALE

TEST PILE 2 (NOTE 9) N 636014.03 E 2046441.69

GL-5 PUMP STATION WET WELL

P.I. BACK OF WALL AT PUMP STATION N 635933.59 E 2046463.16

4'

END ASPHALT BEGIN AGGREGATE SURFACE N 635860.83 E 2046547.87

N 635881.61 E 2046533.70

10-2 MH

YARD HYDRANT N 635880.14 E 2046497.18

18" RCP

R=65'

3' SWALE

TOE OF LEVEE

10-1 GI

INT. CORNER WET WELL N 635949.02 E 2046455.06

EDGE OF ASPHALT N 635860.08 E 2046515.05

ASPHALT SURFACE NOTE 7

BOLLARD (TYP) NOTE 6 N 635877.08 E 2046495.36

EXT. CORNER CONTROL BLDG. N 635926.94 E 2046464.06

18" RCP

GUARDRAIL ON RETAINING WALL SEE STRUCTURAL DRAWINGS

GL-5 PUMP STATION CONTROL BUILDING FF 52.5

DITCH LINE/ TOE OF SLOPE

BEGIN 6' CHAIN LINK FENCE 6" FROM BEGINNING AND CENTER ON TOP OF CONCRETE RETAINING WALL

EXT. CORNER CONTROL BLDG. N 635902.15 E 2046427.70

6' CHAIN LINK FENCE

TOP OF SLOPE

SEGMENTAL BLOCK WALL NOTE 1

STA. 5+00 BEGIN SEGMENTAL BLOCK WALL END CONC. RETAINING WALL FACE OF WALL N 635938.54 E 2046407.77

CORNER OF FENCE N 635905.51 E 2046425.52

N 635907.11 E 2046424.32 FACE OF WALL

5+00

20'

6' CHAIN LINK FENCE

EDGE OF ASPHALT N 635846.94 E 2046469.05

10-3 MH

R=167.50'

18" RCP

11-1 GI

6' DECORATIVE ALUMINUM FENCE PLACE 18" BEHIND BACK OF WALL

END 6' DECORATIVE FENCE WITHIN 6" OF CONCRETE RETAINING WALL N 635935.58 E 2046405.95

N 635920.11 E 2046402.85 FACE OF WALL

10-5 *

18" RCP

CORNER OF FENCE AT EDGE OF ASPHALT N 635839.74 E 2046448.47

* PIPE DISCHARGE AT FACE OF WALL

10-4 MH

6' CHAIN LINK FENCE

FUEL TANK AND PAD NOTE 6

6' CHAIN LINK 16' DOUBLE SWING GATE (SEE NOTES)

TRANSFORMER PAD NOTE 5 N 635860.86 E 2046424.16

EDGE OF ASPHALT CORNER OF FENCE N 635895.32 E 2046410.58

EDGE OF ASPHALT N 635855.63 E 2046437.64

8" PVC SANITARY SEWER

LOCATE 8 BOLLARDS UNIFORMLY AROUND TRANSFORMER PAD. NOTE 6

16'

EDGE OF ASPHALT

S-1 SS

TELECOMMUNICATIONS CABLE

1" WATER LINE

EDGE OF ASPHALT N 635824.36 E 2046391.77

EDGE OF ASPHALT N 635810.36 E 2046399.64

0 10' 20'

SCALE:1"= 10'

NOTES:
1. FOR SEGMENTAL BLOCK WALL ALIGNMENT SEE SHEET C-100.
2. LOCKING SLEEVE FOR EACH LEAF OF SWINGING GATES SHALL BE INSTALLED AT A LOCATION WHERE THE PLUNGER BAR/LOCKING ROD CAN LOCK THE GATES IN AN OPEN POSITION. SEE DETAIL ON SHEET C-506.
3. FOR FENCING DETAILS, SEE SHEETS C-504 AND C-505.
4. FOR PROFILE ALONG SEGMENTAL BLOCK WALL SEE SHEET C-205.
5. SEE ELECTRICAL DRAWINGS AND SF-824.
6. SEE ARCHITECTURAL DRAWINGS AND SF-824.
7. FOR DETAIL OF ASPHALT SURFACING, SEE TYPICAL SECTION ON SHEET C-301.
8. FOR DETAIL OF AGGREGATE SURFACE COURSE, SEE TYPICAL SECTION ON SHEET C-301.
9. ONE PILE IS FOR A COMPRESSION TEST AND THE OTHER IS FOR A TENSION TEST. SEE SPECIFICATIONS.

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MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
DATE: 22-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: 1:1
PLOT DATE:
ISSUE DATE: FEB 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEG B3_ C-503XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
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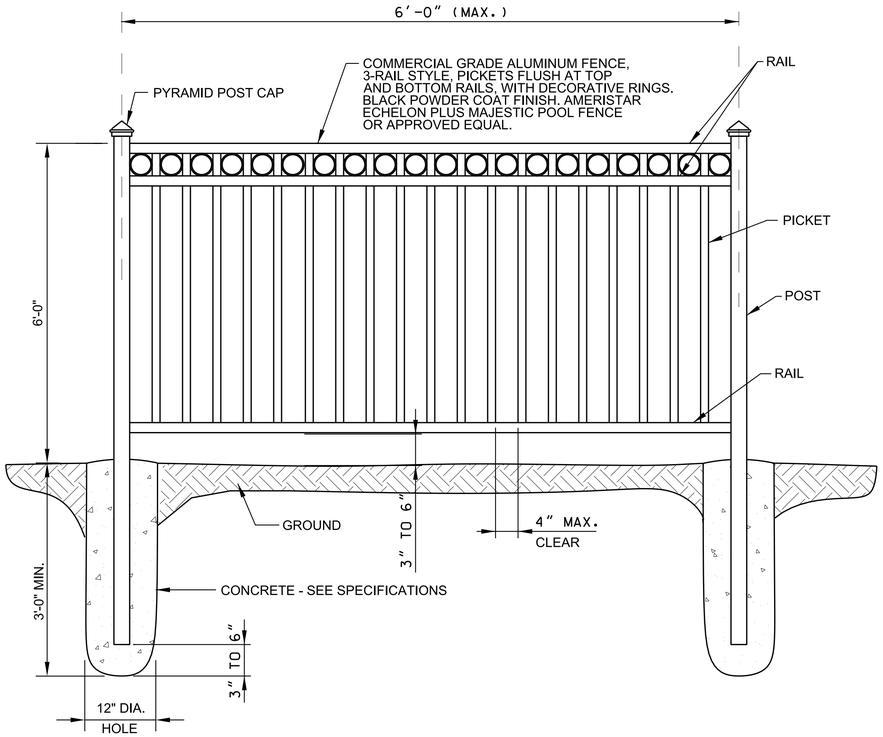
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
BASIN, SOMERSET COUNTY
BORO. OF MIDDLESEX AND GREEN BROOK TWP. NJ.

PUMP STATION SITE DETAILS
SHEET 2

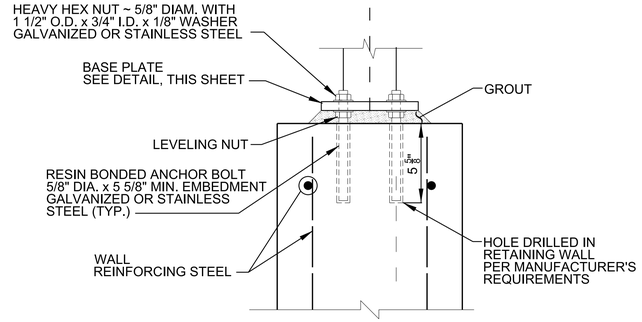
SHEET IDENTIFICATION
C-503
SHEET 27 OF 147

100% SUBMITTAL

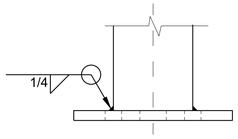


DECORATIVE ALUMINUM FENCE

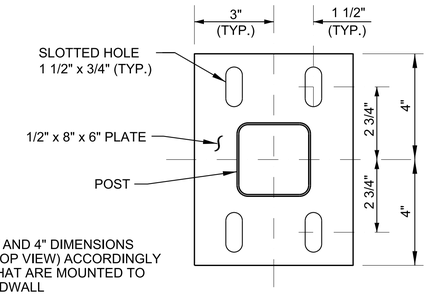
N.T.S.



ELEVATION



DETAIL



NOTE:
ADJUST 2 3/4" AND 4" DIMENSIONS (SHOWN ON TOP VIEW) ACCORDINGLY ON PLATES THAT ARE MOUNTED TO SLOPING HEADWALL

TOP VIEW

BASE PLATE DETAIL

N.T.S.

NOTES:
1. BASE PLATES TO BE USED IN LOCATIONS WHERE ALUMINUM FENCE IS MOUNTED TO CONCRETE WALLS.

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MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: KWK
DRWN BY:
SUBMITTED BY:
DATE: 19-FEB-2016
CKD BY:
PLOT SCALE: 1=1
ISSUE DATE: FEB 2016
SIZE: ANSI D
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
FILE NUMBER:
FILE NAME: GB_SEG B3_C-504XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
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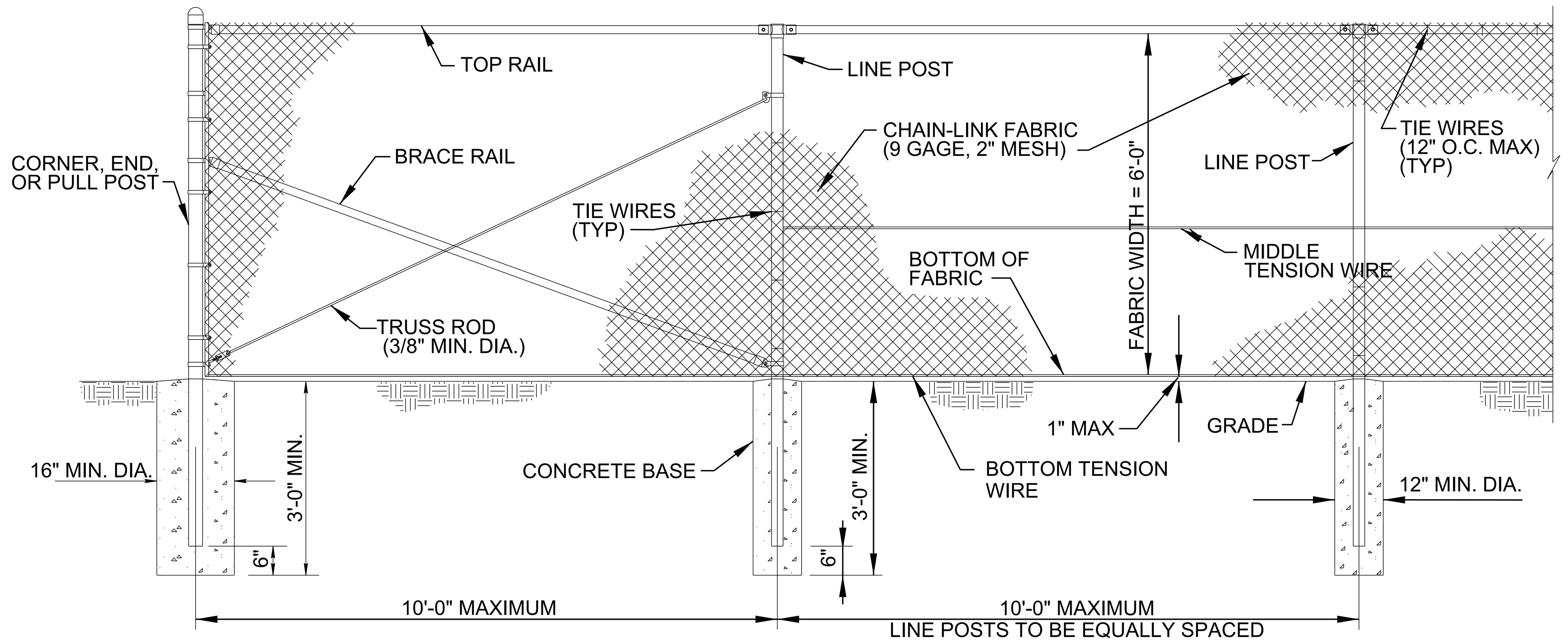
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

PUMP STATION SITE DETAILS
SHEET 3

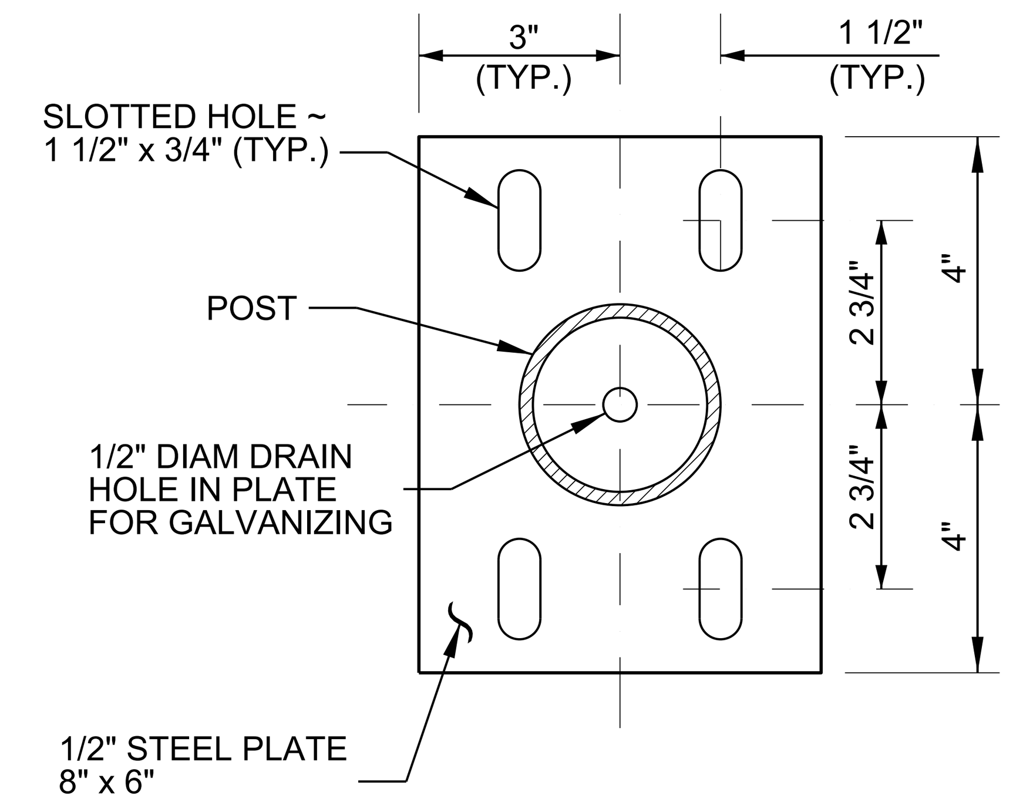
SHEET IDENTIFICATION
C-504
SHEET 28 OF 147

100% SUBMITTAL

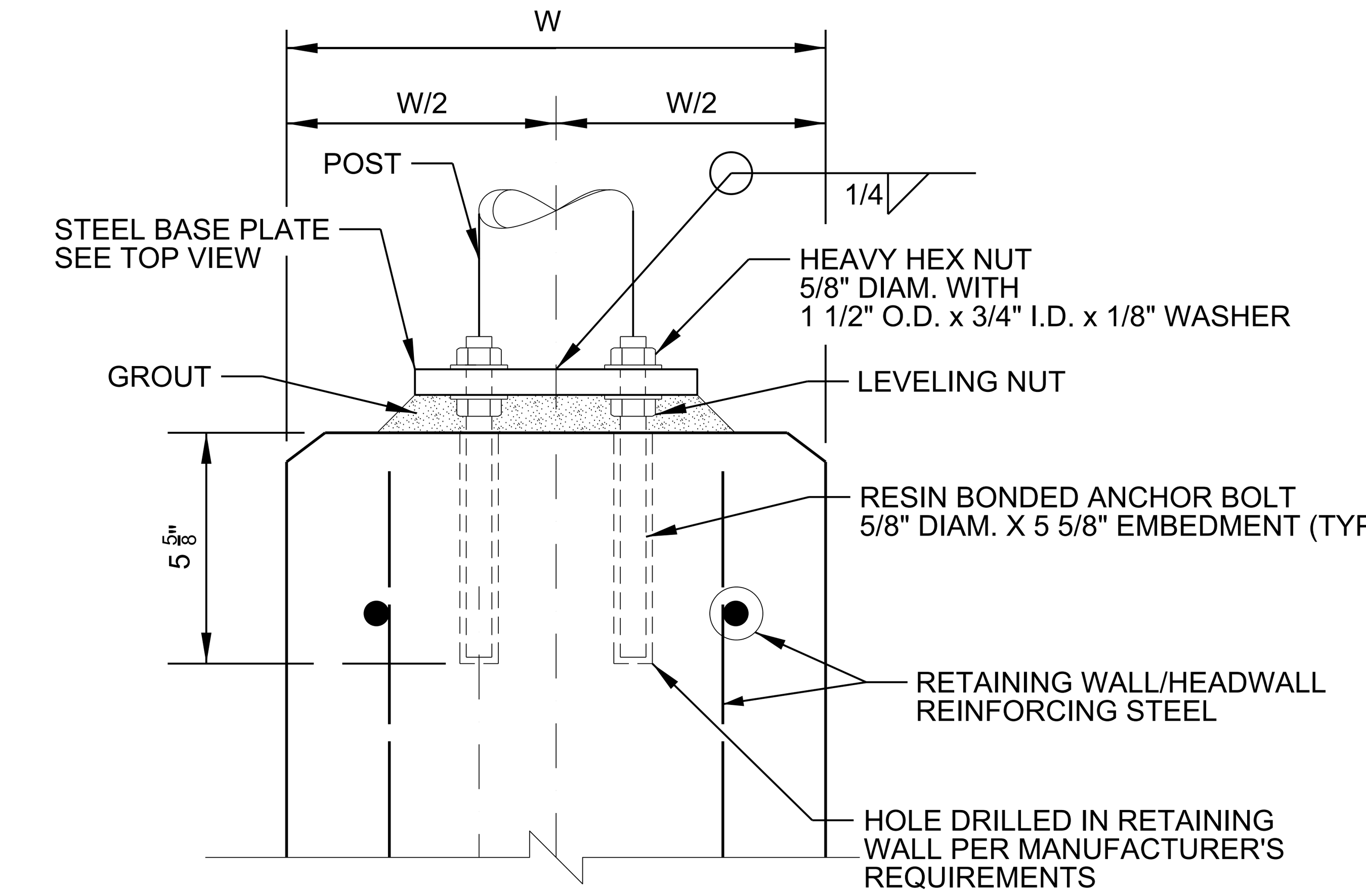


CHAIN-LINK FENCE DETAIL

NO SCALE



TOP VIEW
STEEL BASE PLATE DETAIL
(SEE NOTE)



ELEVATION

GENERAL NOTES:

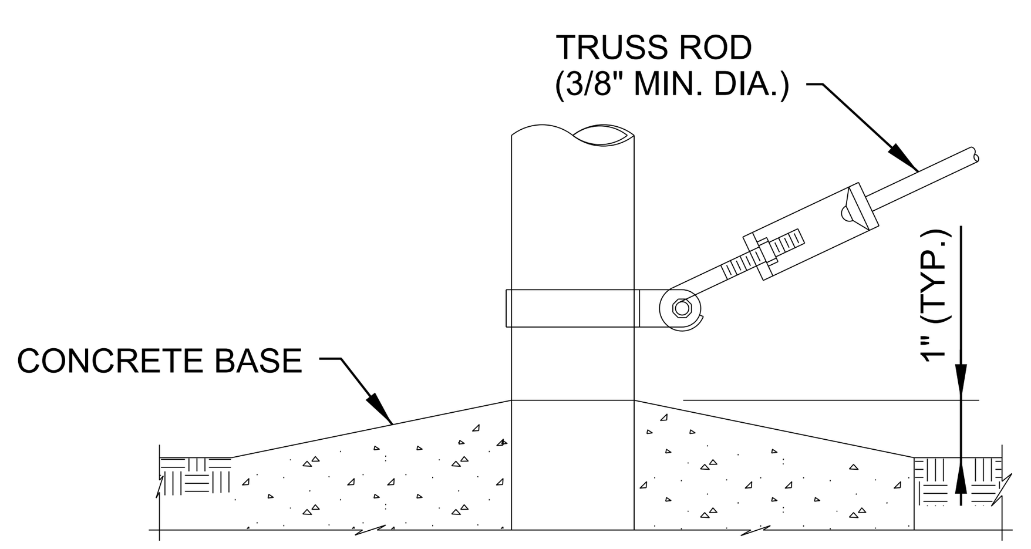
1. WIRE TIES, RAILS, POSTS, AND BRACES SHALL BE CONSTRUCTED ON THE SECURE SIDE OF THE FENCE ALIGNMENT. CHAIN-LINK FABRIC SHALL BE PLACED ON THE SIDE OPPOSITE THE SECURE AREA.
2. ONLY 9-GAGE GALVANIZED STEEL TIE WIRES SHALL BE USED FOR FASTENING THE FENCE FABRIC TO FENCE POSTS AND RAILS. 16-GAGE, 6.5 INCH LONG, STAINLESS STEEL DOUBLE LOOP BAR TIE WIRES SHALL BE USED FOR FASTENING FENCE FABRIC TO TENSION WIRES.
3. POSTS SHALL BE INSTALLED SO AS THAT THE VOID INSIDE THE POST IS COMPLETELY FILLED WITH CONCRETE UP TO THE TOP OF THE FOUNDATION.
4. FENCE HEIGHT TO BE 48" TALL AT HEADWALL 9-2.

STEEL POST SCHEDULE	
USE AND SECTION	MINIMUM OUTSIDE DIMENSIONS (NOMINAL)
	FABRIC WIDTH UP TO 96"
CORNER, END & PULL POSTS TUBULAR - ROUND	2.875" O.D.
LINE POSTS TUBULAR - ROUND	2.375" O.D.
TOP & BRACE RAILS TUBULAR - ROUND	1.66" O.D.

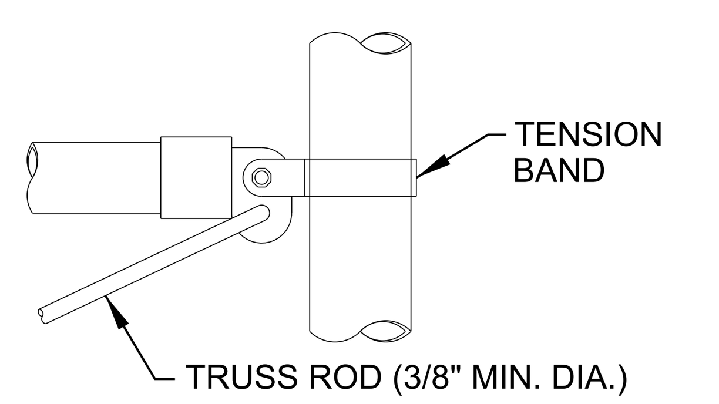
NOTE:
ADJUST 2 3/4" AND 4" DIMENSIONS (SHOWN ON TOP VIEW) AS REQUIRED ON PLATES THAT ARE MOUNTED TO SLOPING WALLS (POSTS ARE ALWAYS VERTICAL.)

CHAIN LINK FENCE ON RETAINING WALL AND HEADWALL

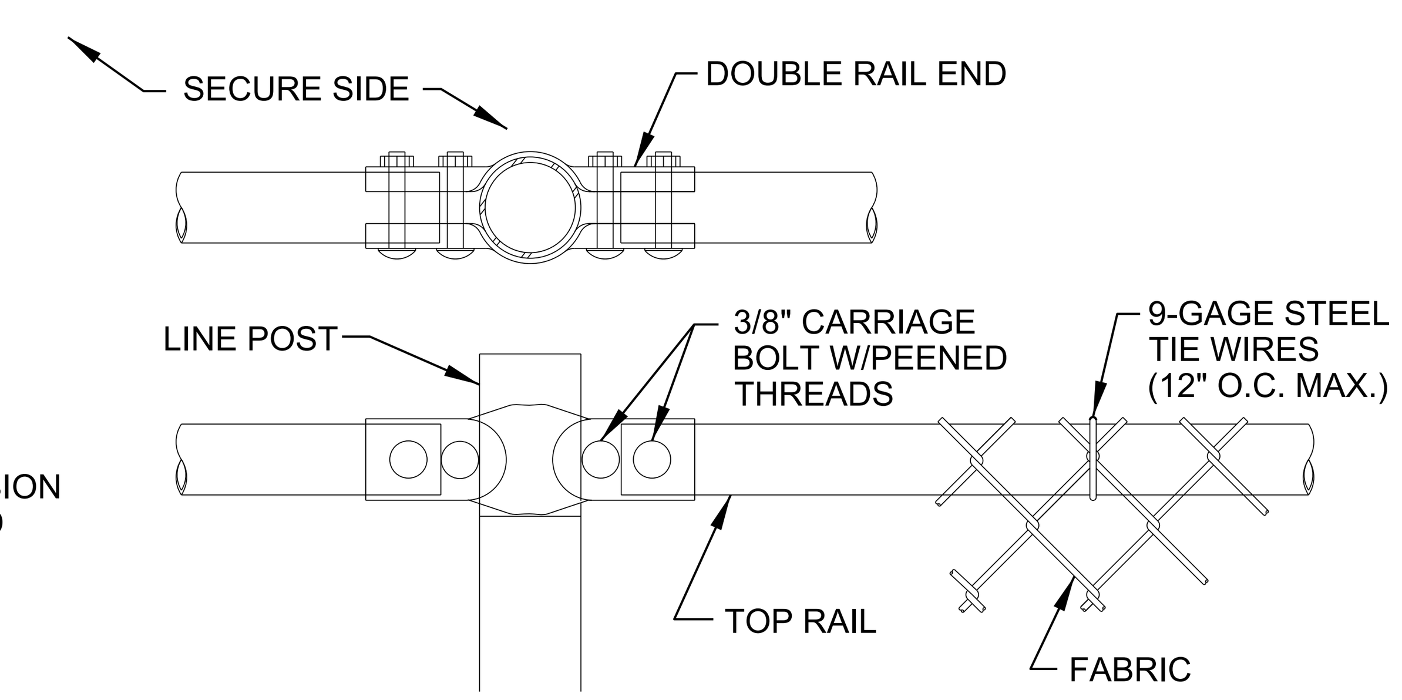
N.T.S.



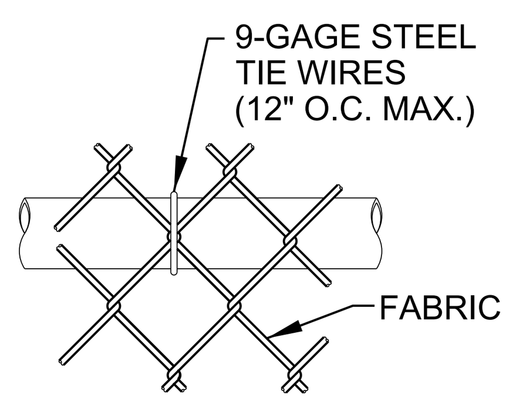
TRUSS ROD AND BAND



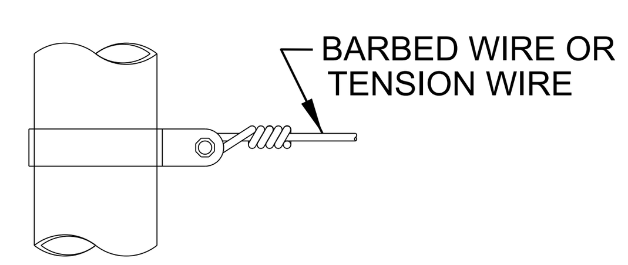
BRACE RAIL CLAMP DETAIL



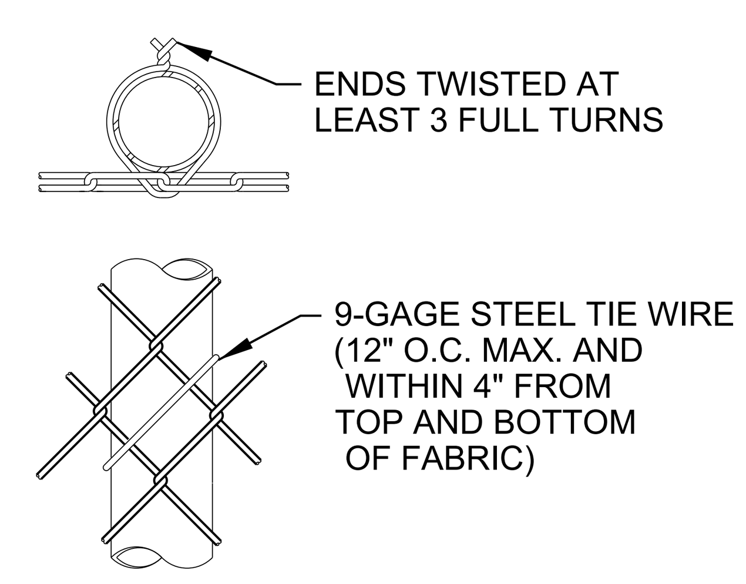
TOP RAIL DETAILS



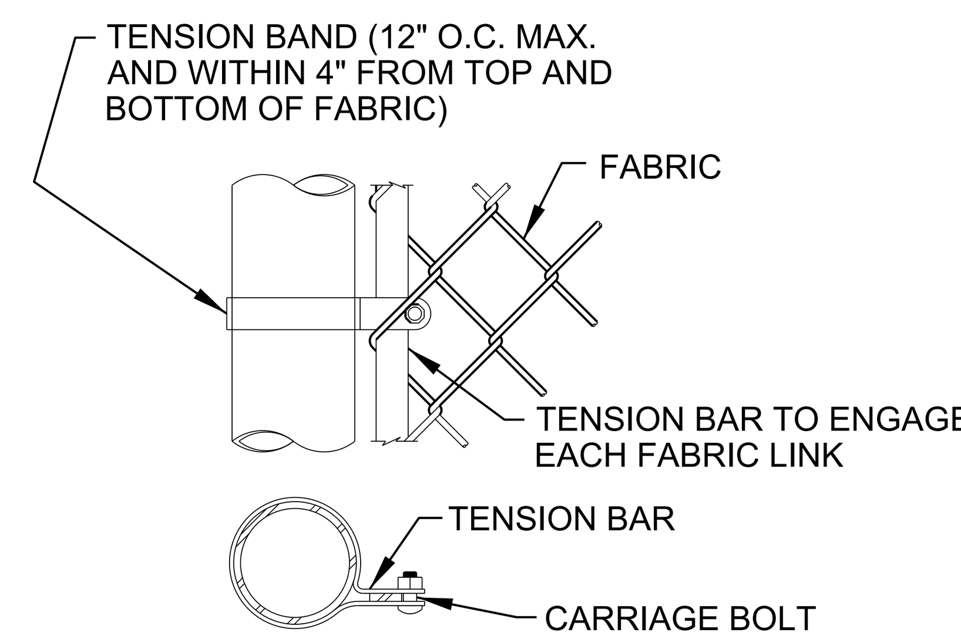
BRACE RAIL ATTACHMENT



TENSION BAND DETAIL



LINE POST ATTACHMENTS



END OR GATE POST DETAIL

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
AMMANN & WHITNEY
JOINT VENTURE

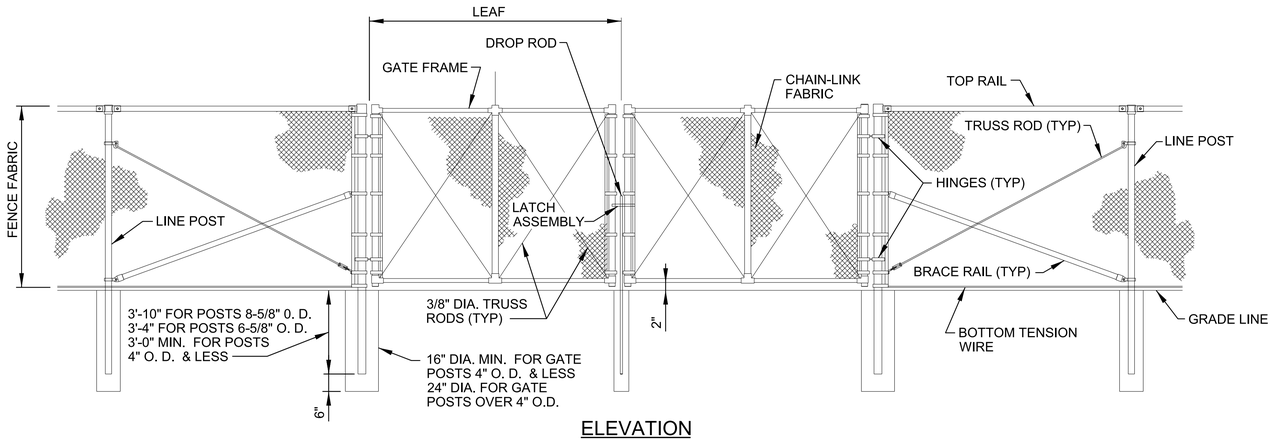
DESIGNED BY: | DATE: 19-FEB-2016 | SOLICITATION NO.:
DWN BY: | CKD BY: | CONTRACT NO.: W912DS-##-X-####
SUBMITTED BY: | FILE NUMBER:
PLOT SCALE: XXX | ISSUE DATE: FEB. 2016
SIZE: ANSI D | FILE NAME: GB_SEG B3_C-505XX.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

PUMP STATION SITE DETAILS
SHEET 4

SHEET IDENTIFICATION
C-505
SHEET 29 OF 147

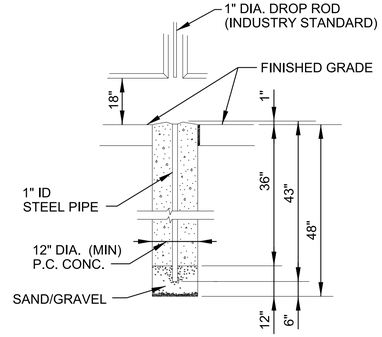
100% SUBMITTAL



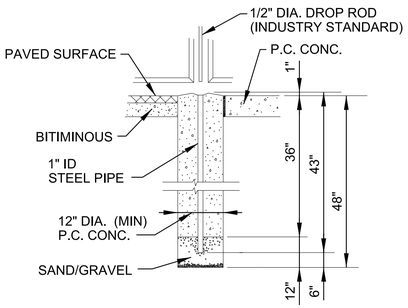
ELEVATION
DOUBLE SWING GATE
N.T.S.

GENERAL NOTES:

1. SWING GATES SHALL BE CONSTRUCTED WITH DROP RODS, PADLOCKS, LATCH ASSEMBLY AND GATE KEEPERS EXCEPT AS NOTED.
2. ALL GATE FRAMES SHALL BE A MINIMUM 1.90" NOMINAL (ROUND). GATE FRAMES SHALL BE OF WELDED CONSTRUCTION . AT CONTRACTOR'S OPTION A WELDED HORIZONTAL BRACE MAY BE USED IN LIEU OF TRUSS RODS TO BRACE ALL-WELDED GATE FRAMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER RIGID CONSTRUCTION OF ALL GATES SUPPLIED.

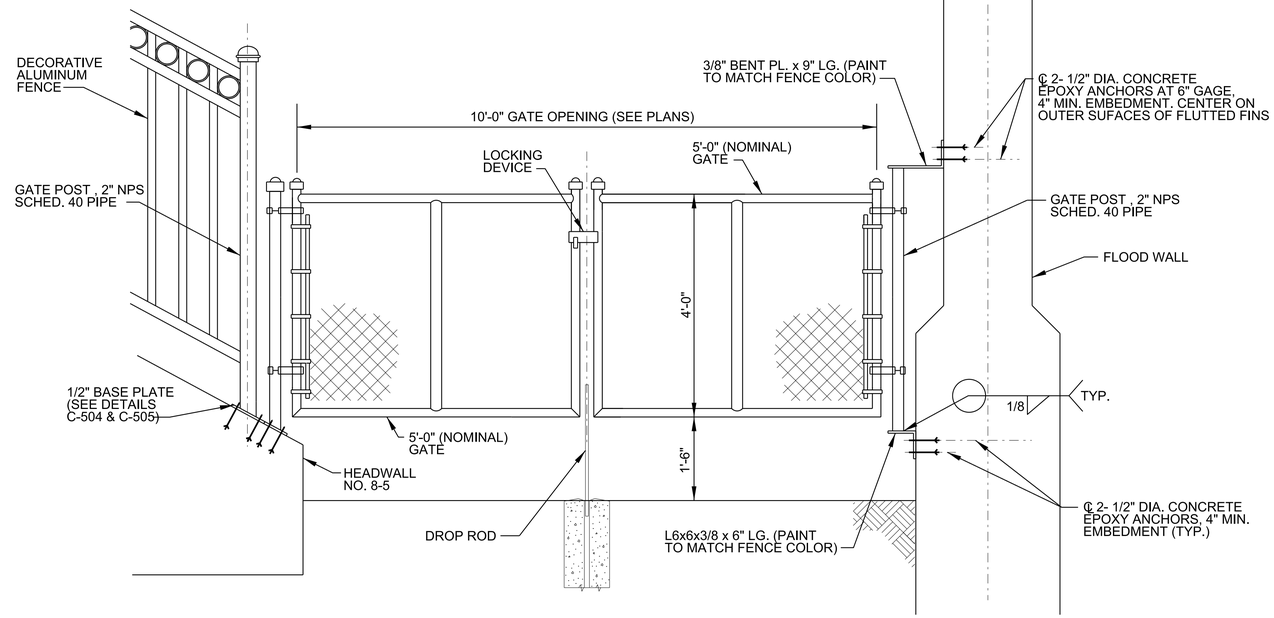


DROP ROD FOUNDATION FOR VEHICLE GATE
N.T.S.

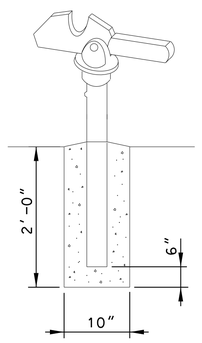


DROP ROD FOUNDATION
N.T.S.

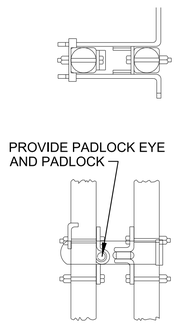
GATE POST SCHEDULE	
GATE LEAF WIDTH (NOMINAL)	OUTSIDE DIMENSION (NOMINAL)
6' OR LESS	2.875" OD
GREATER THAN 6' TO 13'	4.0" OD
GREATER THAN 13' TO 18'	6.625" OD
MORE THAN 18'	8.625" OD



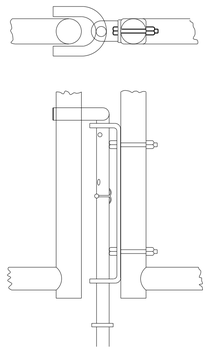
VEHICLE GATE DETAILS AT GL-5 PRIMARY STORMWATER PONDING AREA
N.T.S.



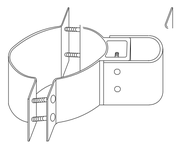
GATE KEEPER
(TO HOLD GATE OPEN)
N.T.S.



LATCH ASSEMBLY
N.T.S.



DROP ROD ASSEMBLY
N.T.S.



STANDARD HINGE
N.T.S.

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

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DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: AS X
PLOT DATE: FEB 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEC B3_C-506XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

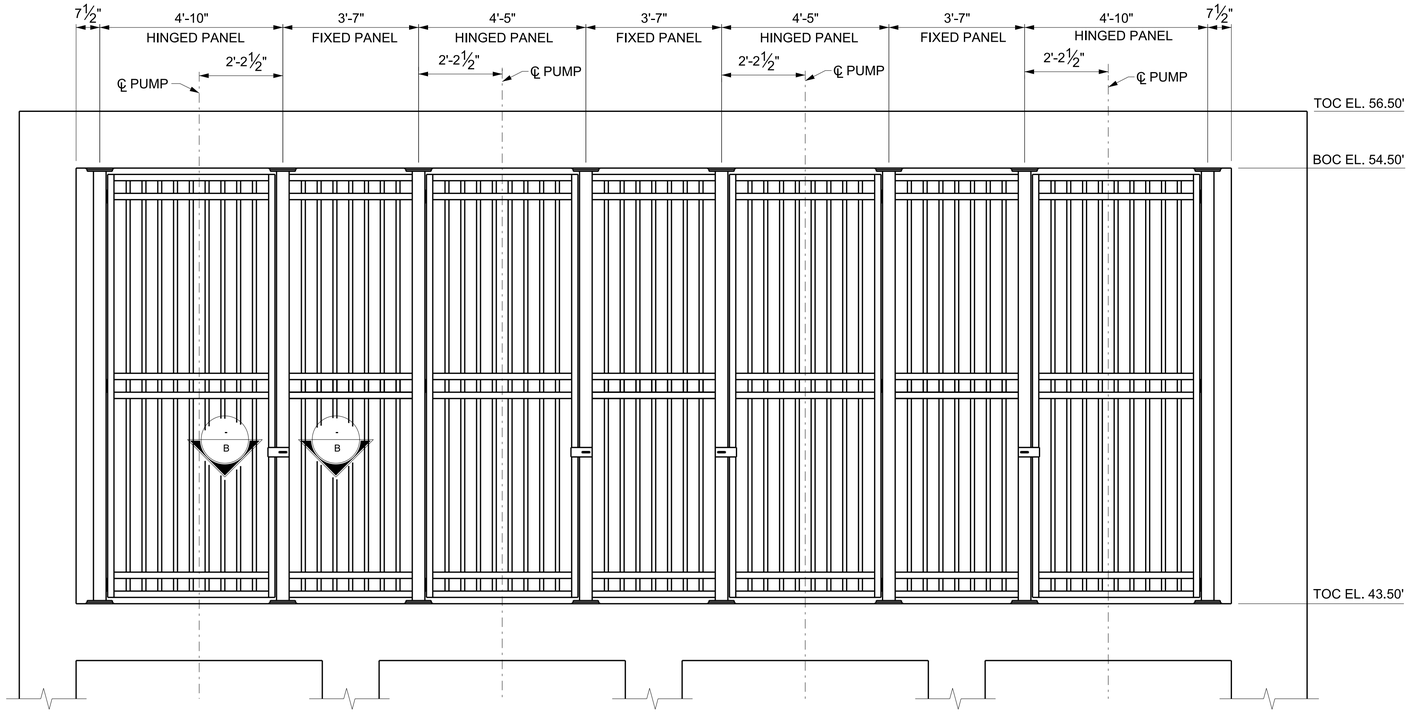
JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SECTION 205 FLOOD CONTROL PROJECT
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

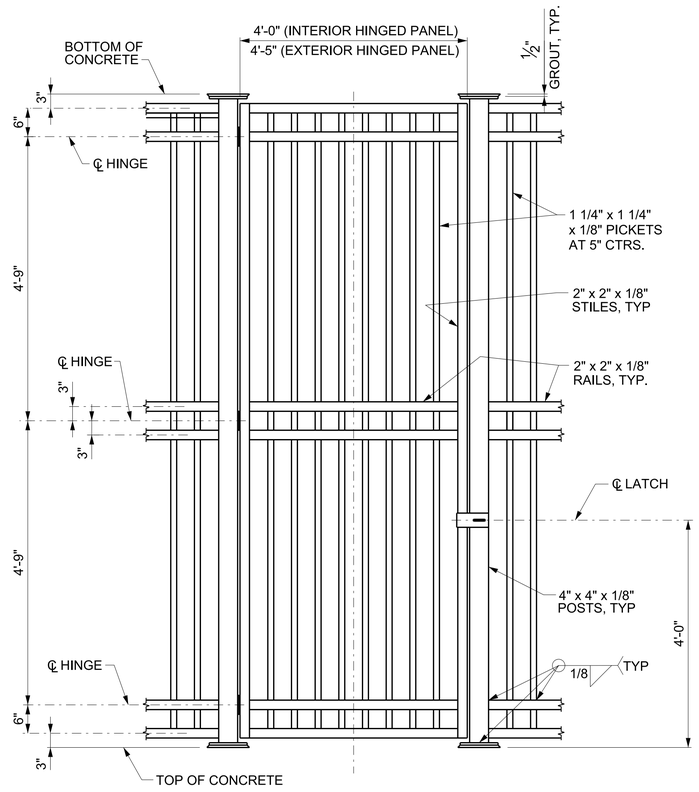
PUMP STATION SITE DETAILS
SHEET 5

SHEET IDENTIFICATION
C-506
SHEET 30 OF 147

100% SUBMITTAL

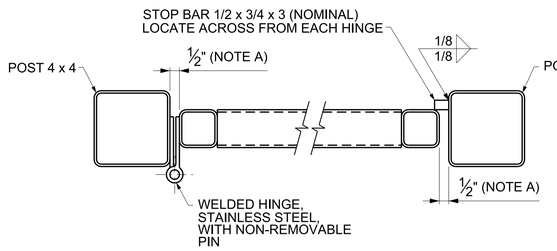


ELEVATION
PUMP SECURITY FENCE
SCALE: 1/2"=1'-0"



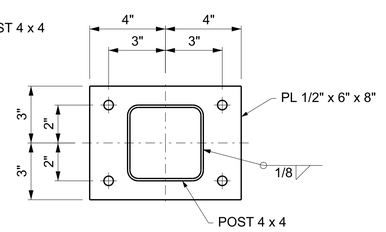
PANEL DETAIL
SCALE: 3/4"=1'-0"

NOTES:
1. HOLLOW STEEL MEMBERS SHALL CONFORM TO ASTM A500, GRADE A OR B, ASTM A501 GRADE A OR B, OR ASTM A1085.
2. SEE STRUCTURAL DRAWINGS FOR STRUCTURAL ABBREVIATIONS.

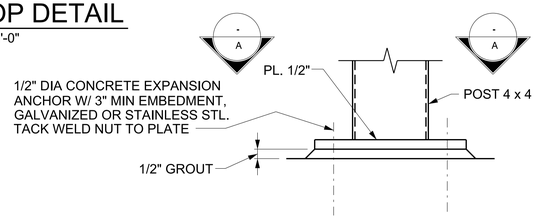


NOTES
A. ADJUST HINGED PANEL-TO-POST GAPS AND STOP BAR SIZE TO ACCOMMODATE HINGES.

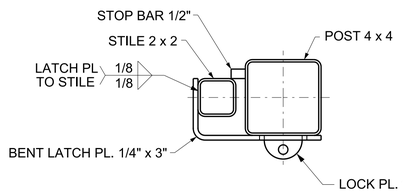
HINGED PANEL
HINGE & STOP DETAIL
SCALE: 3"=1'-0"



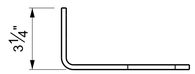
A SECTION
SCALE: 3"=1'-0"



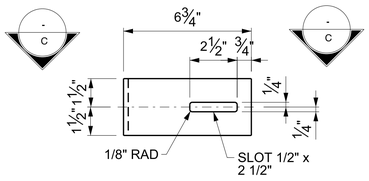
POST CAP & BASE PLATE
SCALE: 3"=1'-0"



B SECTION
SCALE: 3"=1'-0"

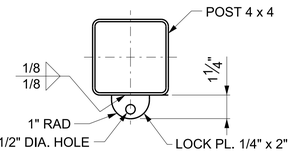


C SECTION
SCALE: 3"=1'-0"

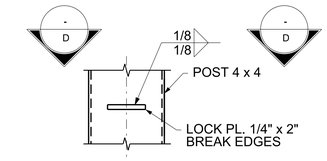


LATCH PL

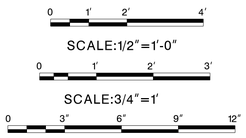
GATE LATCH
SCALE: 3"=1'-0"



D SECTION
SCALE: 3"=1'-0"



LOCK PL



US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: G.M.S.
DWN BY: S.E.M.
SUBMITTED BY:
DATE: 19-FEB-2016
CKD BY: G.M.S.
PLOT SCALE: 1:1
ISSUE DATE: FEB 2016
SIZE: ANSI D
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
FILE NUMBER:
FILE NAME: GB_SEC B3_C-507XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

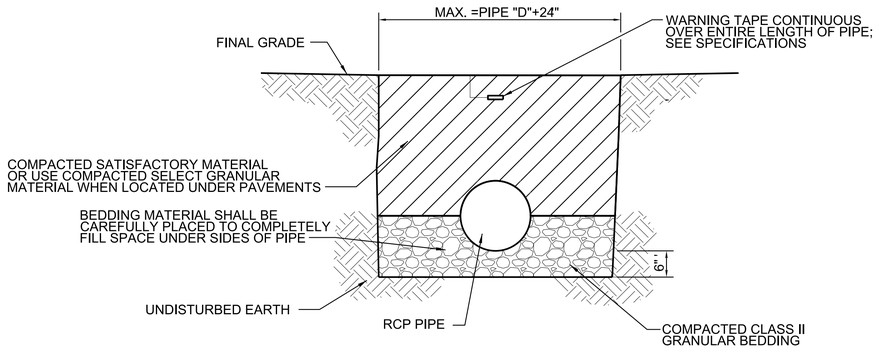
JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SOMERSET & MIDDLESEX COUNTY
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

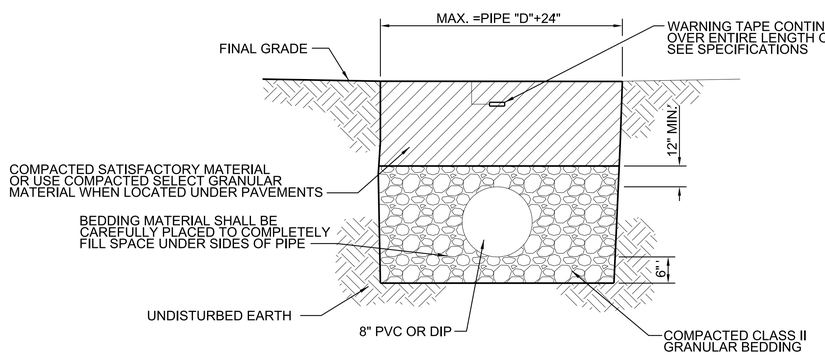
PUMP STATION SITE DETAILS
SHEET 6

SHEET IDENTIFICATION
C-507
SHEET 31 OF 147

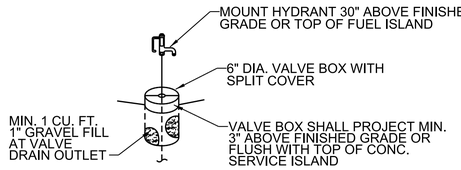
100% SUBMITTAL



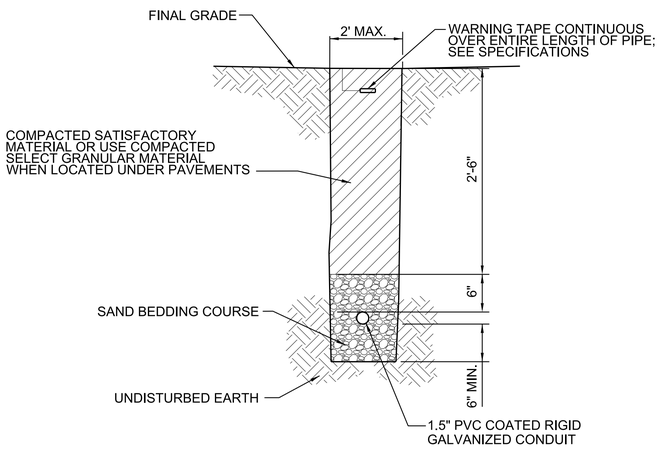
STORM SEWER
EMBEDMENT DETAIL
N.T.S.



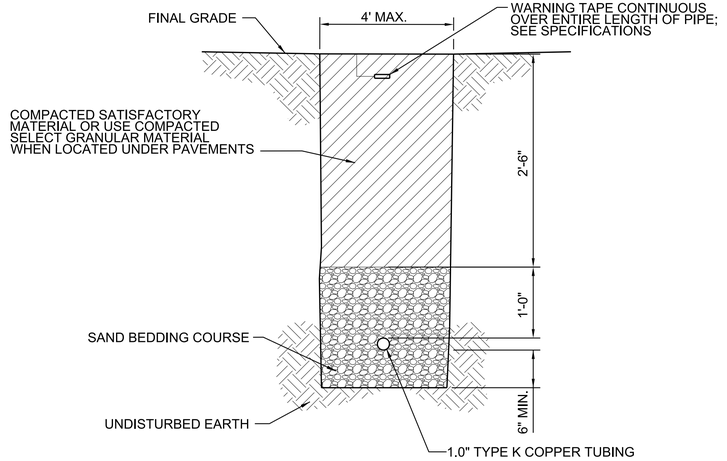
SANITARY SEWER
EMBEDMENT DETAIL
N.T.S.



FREEZEPROOF YARD HYDRANT-BOX TYPE
N.T.S.



TELEPHONE CABLE CONDUIT
EMBEDMENT DETAIL
N.T.S.



COPPER TUBING WATER LINE
EMBEDMENT DETAIL
N.T.S.

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: AJK
DRWN BY:
SUBMITTED BY:
CKD BY:
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: FULL SIZE
ISSUE DATE: FEB 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEC B3_C-508XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

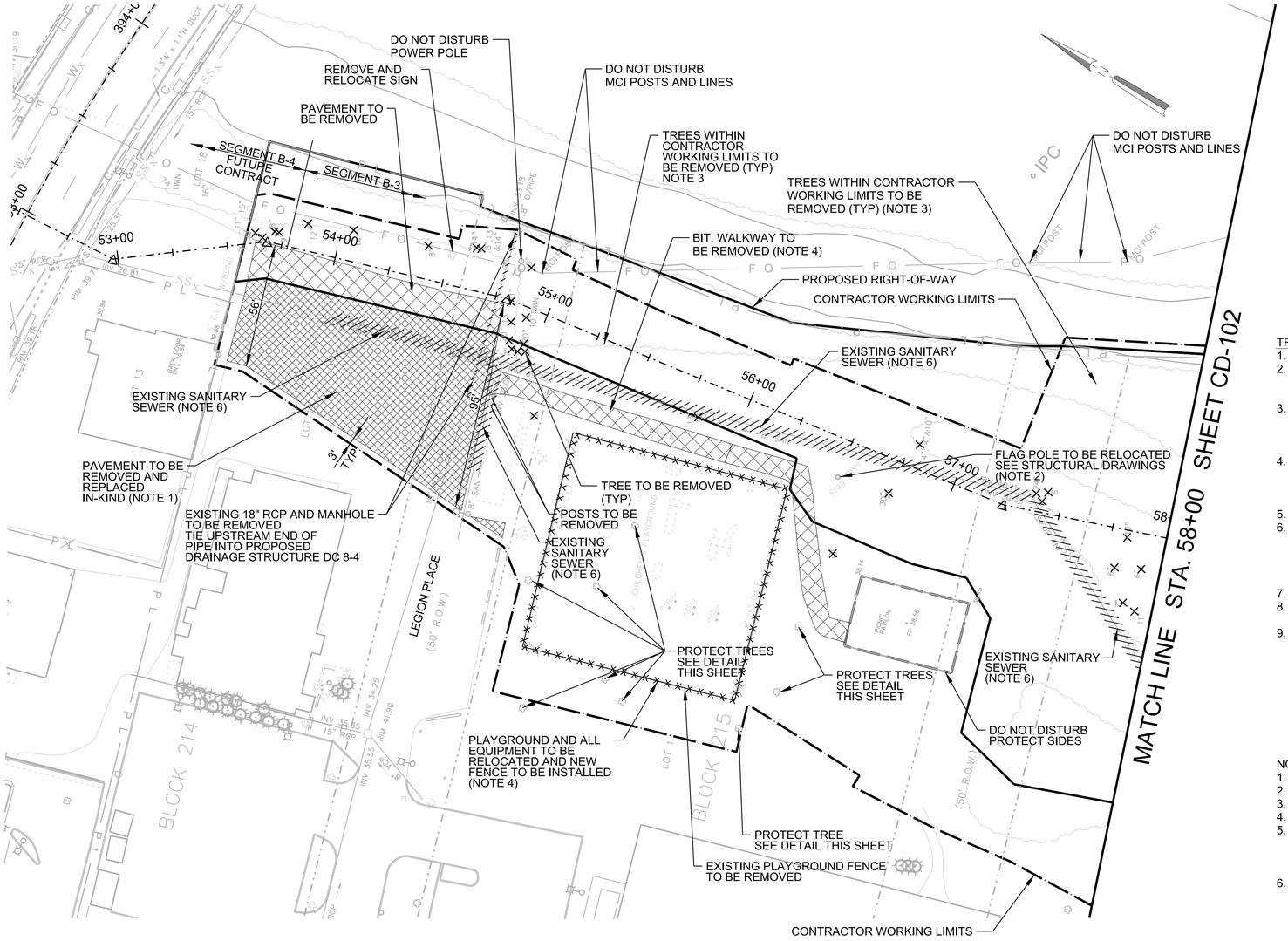
JACOBS
AMMANN & WHITNEY
JOINT VENTURE

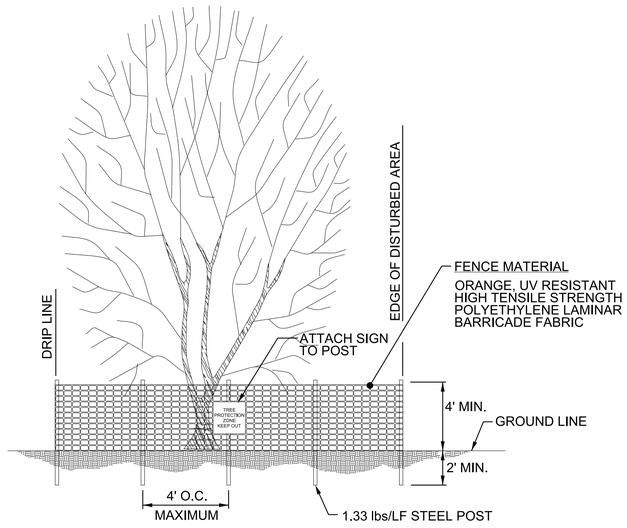
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SECTION 205 FEASIBILITY STUDY
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

BEDDING DETAILS

SHEET IDENTIFICATION
C-508
SHEET 32 OF 147

100% SUBMITTAL





TREE PROTECTION NOTES:

1. ALL PLANTS DESIGNATED TO BE SAVED SHALL BE PROTECTED BY FENCING, AS ILLUSTRATED.
2. INSTALL TREE PROTECTION FENCE AT TREE DRIP LINE OR AT EDGE OF DISTURBED AREA, AS SHOWN ON PLANS, PRIOR TO COMMENCEMENT OF CONSTRUCTION. AVOID DRIVING STAKES INTO MAJOR ROOTS.
3. SPACE TREE PROTECTION ZONE SIGNS A MINIMUM OF ONE EVERY 300 FEET. THE SIZE OF EACH SIGN MUST BE A MINIMUM OF 2' x 2' AND BE VISIBLE FROM BOTH SIDES OF THE FENCE. THE SIGN MUST CONTAIN THE FOLLOWING LANGUAGE IN BOTH ENGLISH AND SPANISH: "TREE PROTECTION ZONE, KEEP OUT"
4. THERE SHALL BE NO STORAGE OF MATERIAL, STOCKPILING OF MATERIALS, OR VEHICULAR TRAFFIC WITHIN THE BOUNDARIES OF THE TREE PROTECTION ZONE. IF MATERIAL STOCKPILING OCCURS, WORK SHALL NOT COMMENCE UNTIL STOCKPILE MATERIAL IS REMOVED AND TREE REMEDIATION IS SATISFACTORY TO THE COR.
5. TREE PROTECTION FENCING SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT.
6. TREATMENT OF ROOTS EXPOSED DURING CONSTRUCTION:
   FOR ROOTS OVER 1 INCH IN DIAMETER DAMAGED DURING CONSTRUCTION, MAKE A CLEAN STRAIGHT CUT TO REMOVE DAMAGED PORTION OF ROOT. ALL EXPOSED ROOTS SHOULD BE TEMPORARILY COVERED WITH DAMP BURLAP AND COVERED WITH SOIL OR MULCH AS SOON AS POSSIBLE TO PREVENT DRYING.
7. FOR PRUNING GUIDELINES, SEE ANSI #300.
8. NO EQUIPMENT OR MACHINERY SHALL BE USED WITHIN PROTECTION FENCE. WORK WITHIN THE PROTECTION ZONE SHALL BE DONE MANUALLY.
9. ANY DAMAGE TO EXISTING TREES DURING CONSTRUCTION SHALL BE THE CONTRACTORS' RESPONSIBILITY. THE CONTRACTOR SHALL PERFORM REMEDIAL WORK TO DAMAGED TREES AT THE CONTRACTORS' EXPENSE AND SUBJECT TO THE APPROVAL OF THE COR.

TREE PROTECTION DETAIL

N.T.S.

NOTES:

1. SEE SHEET C-301 FOR PAVEMENT SECTION.
2. ITEM TO BE REMOVED, REPLACED OR RELOCATED AS DIRECTED BY THE COR.
3. TREES TO BE REMOVED.
4. FOR ADDITIONAL INFORMATION, SEE SHEETS C-101, C-202 AND C-502 AND SPECIFICATIONS.
5. ANY DAMAGE TO EXISTING OR SURROUNDING CURBS, SIDEWALKS, OR ROADWAYS (THAT ARE TO REMAIN IN PLACE) IS THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL REPAIR OR REPLACE AS DIRECTED BY THE COR AT NO COST TO THE GOVERNMENT.
6. EXISTING SANITARY SEWERS, STORM SEWERS AND ASSOCIATED MANHOLES MARKED ON THE PLAN, AS SHOWN IN KEY BELOW, ARE TO BE REMOVED AND BACKFILLED OR ABANDONED IN PLACE AND GROUTED. LIMITS OF THE REMOVAL OR ABANDONMENT ARE DETERMINED BY THE LOCATION OF THE NEW PIPES, MANHOLES AND DRAINAGE STRUCTURES. REFER TO SHEETS C-101 AND C-102.

KEY

- × TREES TO BE REMOVED
- EXISTING SANITARY SEWER SEE NOTE 6
- EXISTING STORM SEWER SEE NOTE 6
- x x x x x x x x x x x FENCE REMOVAL
- ASPHALT REMOVAL
- ASPHALT REMOVAL AND REPLACEMENT

US Army Corps of Engineers®

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U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
AMMANN & WHITNEY
JOINT VENTURE

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:

DATE: 24-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: 1:1
ISSUE DATE: FEB 2016
SIZE: ANSI D
FILE NAME: GB_SEC B3_CD101XXX.dgn
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SECTION B, SCHEME B3
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

DEMOLITION PLAN SHEET
STA. 53+77.68 TO STA. 58+00

SHEET IDENTIFICATION
CD-101
SHEET 33 OF 147

100% SUBMITTAL

NOTES:
1. SEE SHEET C-301 FOR PAVEMENT SECTION.
2. ITEM TO BE REMOVED, REPLACED OR RELOCATED AS DIRECTED BY THE COR.
3. TREES TO BE REMOVED.
4. NOT USED.
5. ANY DAMAGE TO EXISTING OR SURROUNDING CURBS, SIDEWALKS, OR ROADWAYS (THAT ARE TO REMAIN IN PLACE) IS THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL REPAIR OR REPLACE AS DIRECTED BY THE COR AT NO COST TO THE GOVERNMENT.
6. EXISTING SANITARY SEWERS, STORM SEWERS AND ASSOCIATED MANHOLES MARKED ON THE PLAN, AS SHOWN IN KEY BELOW, ARE TO BE REMOVED AND BACKFILLED OR ABANDONED IN PLACE AND GROUTED. LIMITS OF THE REMOVAL OR ABANDONMENT ARE DETERMINED BY THE LOCATION OF THE NEW PIPES, MANHOLES AND DRAINAGE STRUCTURES. REFER TO SHEETS C-101 AND C-102.
7. ITEM TO BE RELOCATED BY BOROUGH. COORDINATE AT THE DIRECTION OF THE COR WITH BOROUGH CONTACT. PROVIDE BOROUGH WITH 30 DAY NOTICE PRIOR TO COMMENCING WITH CONSTRUCTION ACTIVITIES IN THIS AREA.

KEY

× TREES TO BE REMOVED

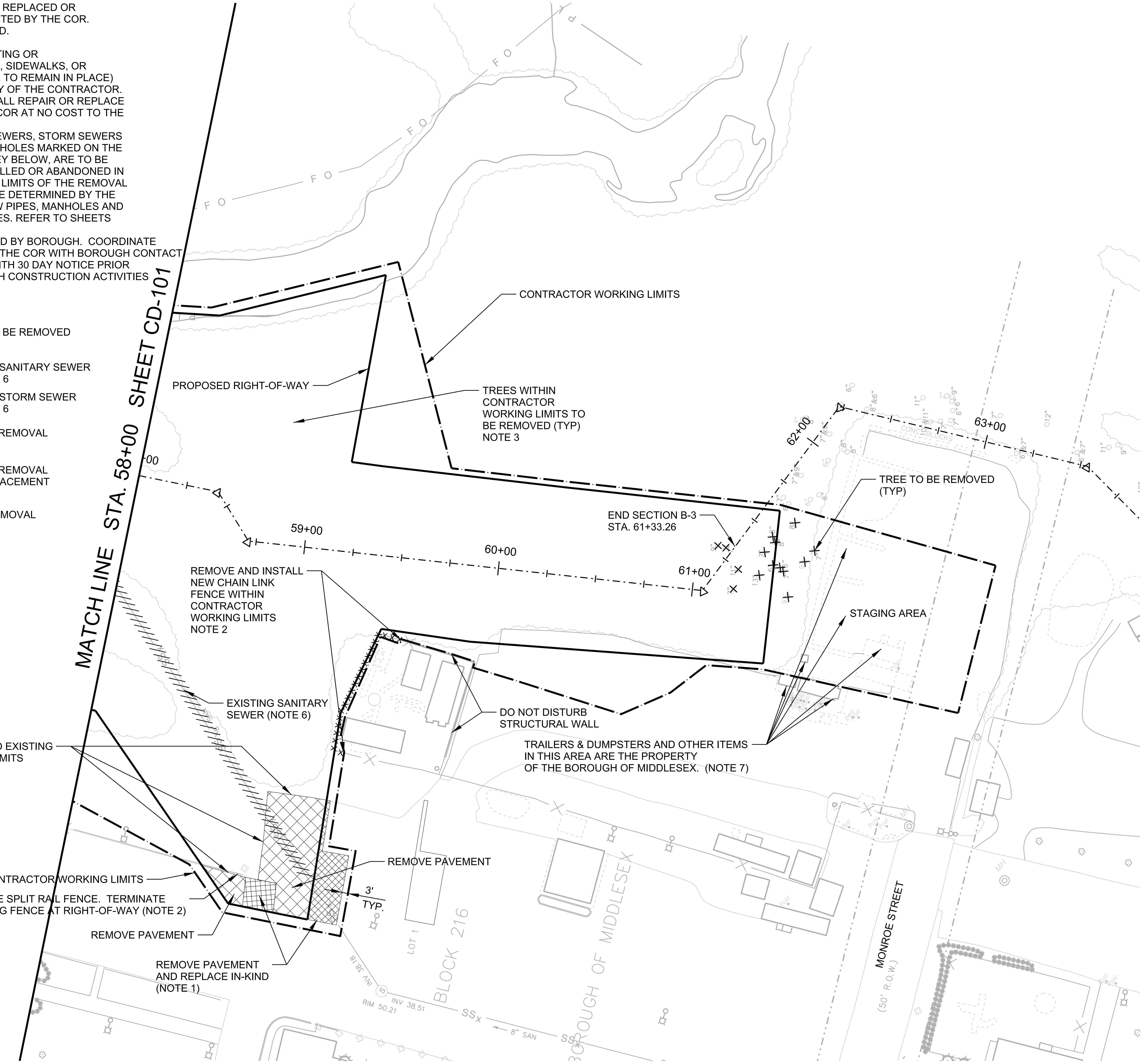
EXISTING SANITARY SEWER SEE NOTE 6

EXISTING STORM SEWER SEE NOTE 6

ASPHALT REMOVAL

ASPHALT REMOVAL AND REPLACEMENT

X X X X X X X X X X X FENCE REMOVAL



0 30' 60'

SCALE:1"= 30'

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
AMMANN & WHITNEY
JOINT VENTURE

DESIGNED BY: | DATE: 24-FEB-2016
DWN BY: | CKD BY: | SOLICITATION NO.:
SUBMITTED BY: | CONTRACT NO.: W912PM-##-X-####
PLOT SCALE: XXX | ISSUE DATE: FEB. 2016 | FILE NUMBER:
SIZE: ANSI D | FILE NAME: GB_SEG B3_CD102XXX.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

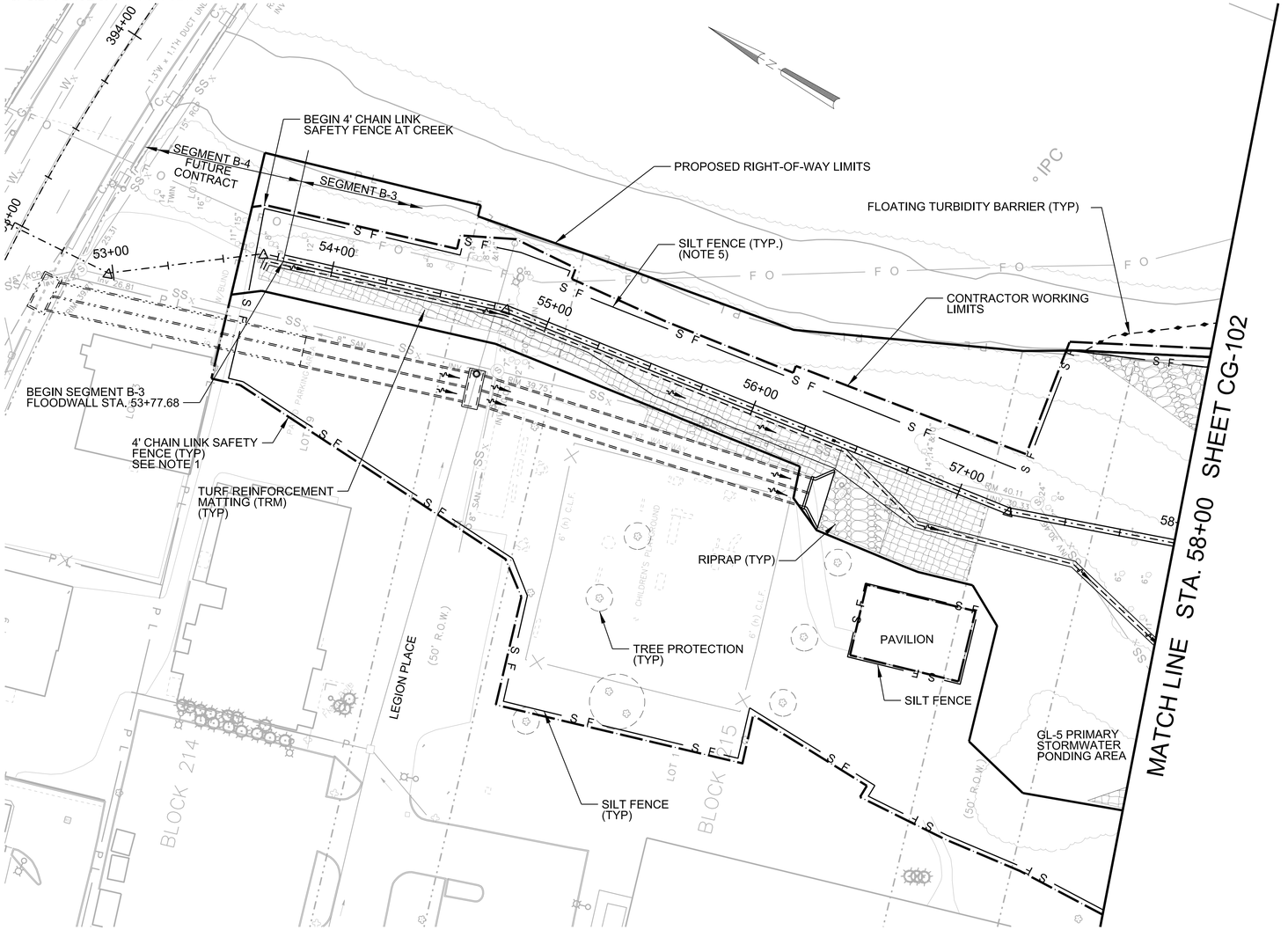
DEMOLITION PLAN SHEET
STA. 58+00 TO STA. 63+20

SHEET IDENTIFICATION
CD-102
SHEET 34 OF 147

100% SUBMITTAL

NOTES:
1. 4' CHAIN LINK SAFETY FENCE TO BE INSTALLED ADJACENT TO CONTRACTOR WORKING LIMITS ALONG ALL RESIDENTIAL/COMMERCIAL PROPERTY BOUNDARIES AND PROVIDE GATE AT CONSTRUCTION ENTRANCES.
2. EROSION CONTROL BLANKET AND SILT FENCING SHOWN ON THE PLANS SHALL BE INSTALLED BY THE CONTRACTOR AS NECESSARY TO STABILIZE SOIL UNTIL VEGETATION IS ESTABLISHED. EROSION CONTROL BLANKET IS A SHORT TERM SOIL STABILIZATION MEASURE. SEE SHEET CG-502 FOR DETAILS.
3. SOIL CONSERVATION DISTRICTS MAY REQUIRE ADDITIONAL SILT FENCE AND/OR TURBIDITY BARRIERS WHERE DEEMED NECESSARY IN ORDER TO OBTAIN APPROVAL OF EROSION CONTROL PERMITS.
4. ADDITIONAL TURF REINFORCEMENT MAT (TRM) MAY NEED TO BE INSTALLED BY THE CONTRACTOR TO ACHIEVE SOIL STABILIZATION AND VEGETATION THROUGHOUT THE PROJECT IF NORMAL SEEDING PROCEDURES DO NOT RESULT IN STABILIZATION SATISFACTORY TO THE CONTRACTING OFFICER. TRM IS A LONG TERM PERMANENT BMP. SEE SHEET CG-502 FOR DETAILS.
5. SILT FENCE SHOWN OFFSET FROM CONTRACTOR WORKING LIMITS FOR DRAWING CLARITY.

KEY
- S F — SILT FENCE - SEE SHEET CG-503
- FLOATING TURBIDITY BARRIER - SEE SHEET CG-501
- TREE PROTECTION - SEE SHEET CD-101
- INLET PROTECTION - SEE SHEET CG-501
- TURF REINFORCEMENT MATTING (TRM) - SEE SHEET CG-502



0 30' 60'
SCALE:1"= 30'

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
PLOT SCALE: XX" = 1'-0"
SIZE: ANSI D
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
FILE NUMBER:
REVISED DATE:
FILE NAME: CB_SEG B3_CG101XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT 1
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

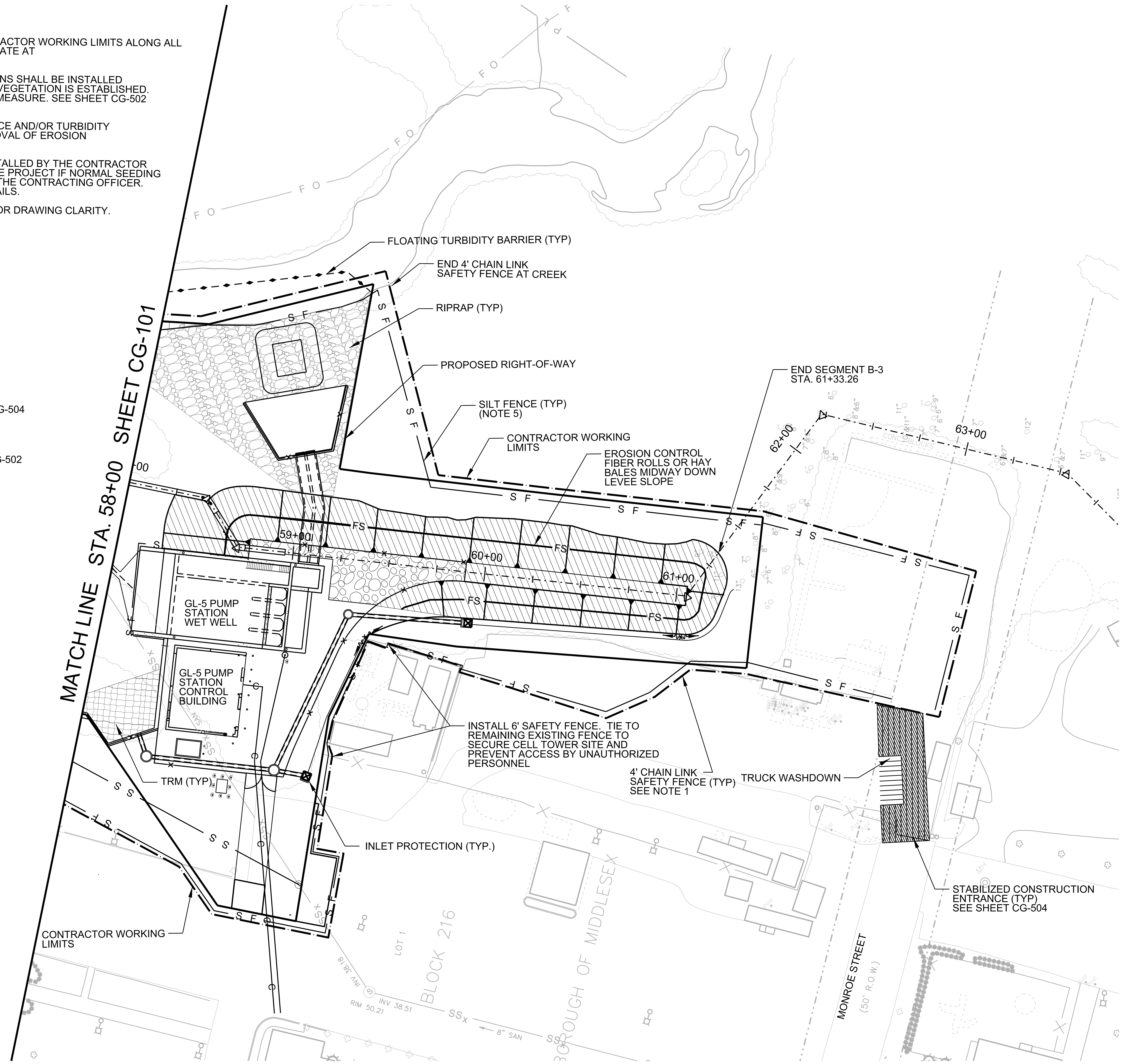
EROSION CONTROL PLAN SHEET
STA. 53+77.68 TO STA. 58+00

SHEET IDENTIFICATION
CG-101
SHEET 35 OF 147

100% SUBMITTAL

NOTES:
1. 4' CHAIN LINK SAFETY FENCE TO BE INSTALLED ADJACENT TO CONTRACTOR WORKING LIMITS ALONG ALL RESIDENTIAL/COMMERCIAL PROPERTY BOUNDARIES AND PROVIDE GATE AT CONSTRUCTION ENTRANCES.
2. EROSION CONTROL BLANKET AND SILT FENCING SHOWN ON THE PLANS SHALL BE INSTALLED BY THE THE CONTRACTOR AS NECESSARY TO STABILIZE SOIL UNTIL VEGETATION IS ESTABLISHED. EROSION CONTROL BLANKET IS A SHORT TERM SOIL STABILIZATION MEASURE. SEE SHEET CG-502 FOR DETAILS.
3. SOIL CONSERVATION DISTRICTS MAY REQUIRE ADDITIONAL SILT FENCE AND/OR TURBIDITY BARRIERS WHERE DEEMED NECESSARY IN ORDER TO OBTAIN APPROVAL OF EROSION CONTROL PERMITS.
4. ADDITIONAL TURF REINFORCEMENT MAT (TRM) MAY NEED TO BE INSTALLED BY THE CONTRACTOR TO ACHIEVE SOIL STABILIZATION AND VEGETATION THROUGHOUT THE PROJECT IF NORMAL SEEDING PROCEDURES DO NOT RESULT IN STABILIZATION SATISFACTORY TO THE CONTRACTING OFFICER. TRM IS A LONG TERM PERMANENT BMP. SEE SHEET CG-502 FOR DETAILS.
5. SILT FENCE SHOWN OFFSET FROM CONTRACTOR WORKING LIMITS FOR DRAWING CLARITY.

KEY
- S F — SILT FENCE - SEE SHEET CG-503
- FLOATING TURBIDITY BARRIER - SEE SHEET CG-501
- FS — EROSION CONTROL FIBER ROLLS - SEE SHEET CG-503
- TREE PROTECTION - SEE SHEET CD-101
- TRUCK WASHDOWN LOCATION - SEE SHEET CG-504
- STABILIZED CONSTRUCTION ENTRANCE - SEE SHEET CG-504
- INLET PROTECTION - SEE SHEET CG-501
- TURF REINFORCEMENT MATTING (TRM) - SEE SHEET CG-502



SCALE: 1" = 30'

US Army Corps of Engineers

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
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DESIGNED BY:		DATE: 19-FEB-2016
DWN BY:	CKD BY:	SOLICITATION NO.:
SUBMITTED BY:		CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: XXX	ISSUE DATE: FEB. 2016	FILE NUMBER:
SIZE: ANSI D	FILE NAME: GB_SEG B3_CG102XXX.dgn	

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

EROSION CONTROL PLAN SHEET
STA. 58+00 TO STA. 63+20

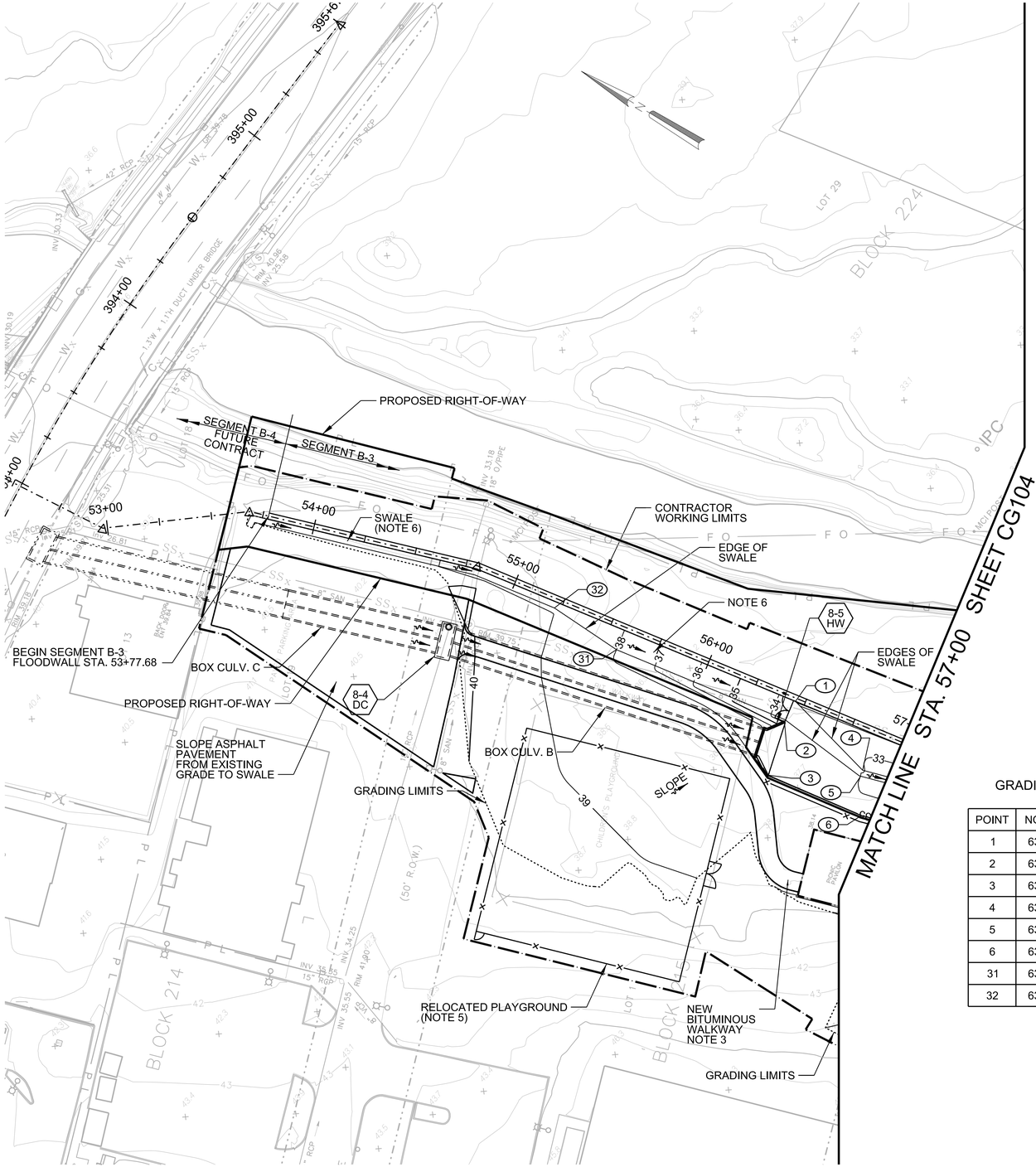
SHEET IDENTIFICATION
CG-102
SHEET 36 OF 147

100% SUBMITTAL

GRADING PLAN NOTES:
1. FOR RIPRAP DETAILS, SEE SHEET C-501
2. FOR TURF REINFORCEMENT MAT DETAILS, SEE SHEET CG-502
3. FOR DETAILS ON WALKWAY AND PUMP STATION SITE, SEE SHEET C-502
4. FOR LEVEE TYPICAL SECTION, SEE SHEET C-301
5. FOR NEW PLAYGROUND, SEE SHEET C-502
6. SEE SHEETS C-201 AND C-202 FOR SWALE PROFILE
7. GRADES ON FLOOD SIDE OF WALL SHALL BE RESTORED TO EXISTING UPON COMPLETION OF CONSTRUCTION ACTIVITIES. SEE CROSS SECTIONS FOR ELEVATION AT FACE OF FLOODWALL. GRADE UNIFORMLY FROM ELEVATION SHOWN TO EXISTING GROUND.

LEGEND

- X-X DS — DRAINAGE STRUCTURE
- X-X DC — DRAINAGE CHAMBER
- X-X HW — HEADWALL



GRADING IN PUMP STATION AREA
SPOT ELEVATIONS

POINT	NORTHING	EASTING	ELEVATION
1	636140.39	2046450.45	33.60
2	636138.39	2046439.96	33.60
3	636127.35	2046415.21	33.10
4	636094.65	2046446.28	33.00
5	636093.49	2046443.50	33.00
6	636081.02	2046429.50	34.00
31	636221.47	2046413.67	38.00
32	636256.95	2046409.55	38.39

0 30′ 60′
SCALE:1″= 30′

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SUBMITTED BY:
DATE: 19-FEB-2016
CKD BY:
PLOT SCALE: 1=1
PLOT STYLE TABLE: ANSI D
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
ISSUE DATE:
REVISIONS
FILE NUMBER:
SIZE: D
FILE NAME: GB_SEG B3_ CG103XXX.dgn

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GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

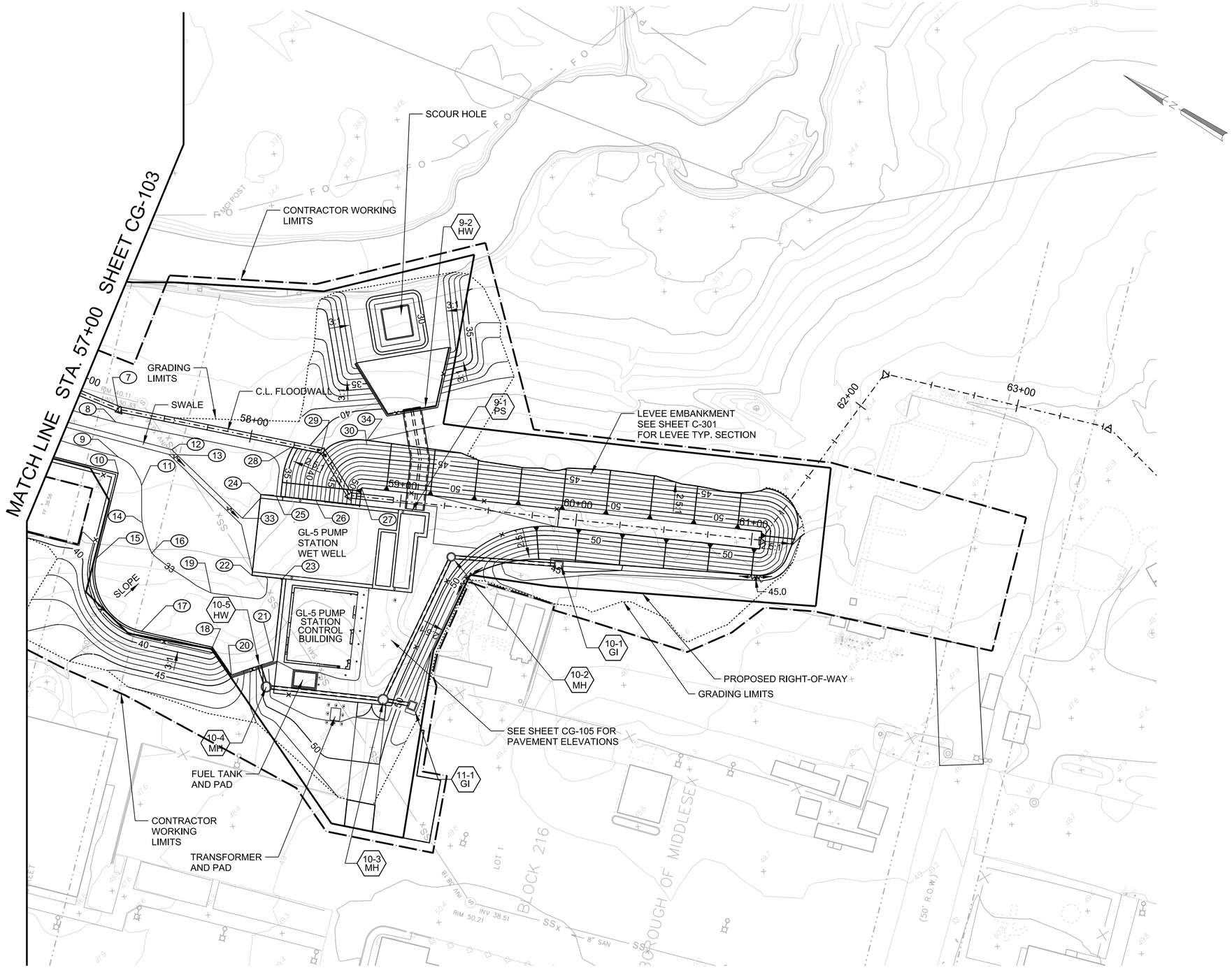
GRADING PLAN
STA. 53+77.68 TO STA. 57+00

SHEET IDENTIFICATION
CG-103
SHEET 37 OF 147

100% SUBMITTAL

GRADING IN PUMP STATION AREA
SPOT ELEVATIONS

POINT	NORTHING	EASTING	ELEVATION
7	636065.41	2046474.73	33.60
8	636062.77	2046469.22	33.00
9	636049.21	2046455.14	33.00
10	636043.12	2046448.17	34.00
11	636028.57	2046451.52	33.00
12	636028.73	2046477.94	32.50
13	636028.13	2046474.90	32.50
14	636014.87	2046435.52	33.00
15	636021.19	2046403.66	34.00
16	635999.37	2046425.66	33.00
17	635974.95	2046388.66	34.00
18	635938.55	2046407.88	34.00
19	635958.98	2046430.62	33.00
20	635920.16	2046402.96	34.00
21	635907.23	2046424.32	34.00
22	635947.92	2046453.26	32.00
23	635933.62	2046463.02	34.00
24	635973.95	2046491.42	32.00
25	635966.60	2046496.45	33.00
26	635948.01	2046509.13	42.00
27	635932.93	2046531.39	52.00
28	635978.20	2046523.02	33.60
29	635963.29	2046531.31	39.86
30	635946.60	2046551.88	42.00
33	635973.10	2046474.39	32.13
34	635948.11	2046553.84	41.00



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PLOT SCALE: 1:1
PLOT STYLE TABLE: Full.ctb
SIZE: ANSI D

ISSUE DATE: 25-FEB-2016
FILE NAME: GB_SEG B3_CG104XXX.dgn

DATE: 25-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B3 CONTRACT 7
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

GRADING PLAN
STA. 57+00 TO STA. 63+20

SHEET IDENTIFICATION
CG-104
SHEET 38 OF 147

100% SUBMITTAL

C.L. FLOODWALL

GL-5 PRIMARY STORMWATER PONDING AREA

GL-5 PUMP STATION WET WELL

GL-5 PUMP STATION CONTROL BUILDING FF 52.50

52.5 PAD

51.5 PAD

SEGMENTAL BLOCK WALL

CONCRETE RETAINING WALL

TOP OF LEVEE

TOE OF LEVEE

GRADING LIMITS

EDGE OF ASPHALT

MATCH EXISTING

59+00

60+00

5+00

SCALE:1"= 10'

NOTES:
1. SEE STRUCTURAL DRAWINGS FOR DETAILS OF THE PUMP STATION AND CONTROL BUILDING.
2. FOR CLARITY, NEW FENCING, STORM SEWERS, SANITARY SEWERS AND SOME EXISTING TOPOGRAPHICAL FEATURES ARE NOT SHOWN ON THIS PLAN.
3. SEE ELECTRICAL DRAWINGS FOR DETAILS OF THE TRANSFORMER PAD.
4. SEE SF STRUCTURAL DRAWINGS FOR DETAILS OF THE FUEL TANK PAD.

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SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: 1:1
PLOT STYLE TABLE: FEMA.ctb
ISSUE DATE: FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEG B3_CG105XXX.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B3 CONTRACT 1
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

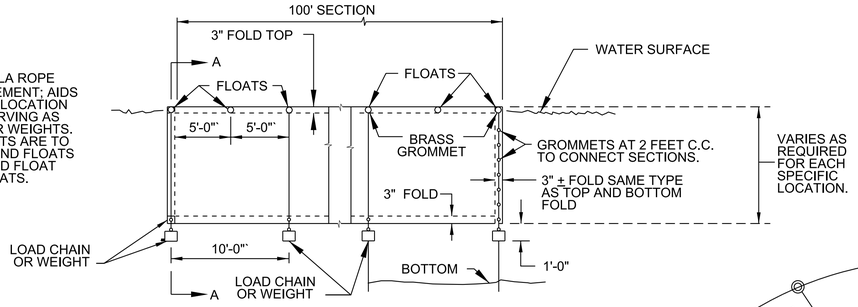
PAVEMENT ELEVATIONS

SHEET IDENTIFICATION
CG-105
SHEET 39 OF 147

100% SUBMITTAL

NOTE:

¼" NYLON OR MANILA ROPE FORMS REINFORCEMENT; AIDS IN REMOVAL OR RELOCATION OF BARRIER BY SERVING AS A PICK-UP LINE FOR WEIGHTS. ROPES AND WEIGHTS ARE TO BE ATTACHED TO END FLOATS AND EVERY SECOND FLOAT BETWEEN END FLOATS.

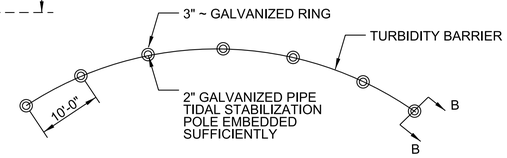


FRONT VIEW

TYPE 2 TURBIDITY BARRIER TO FIT EXISTING CONDITION AS APPROVED BY THE CONTRACTING OFFICER.

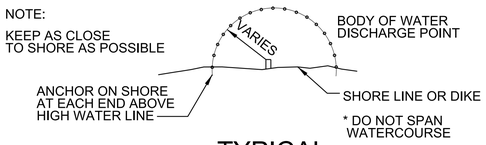
SIDE VIEW

FOLDING DETAIL

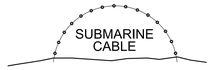


NOTE:

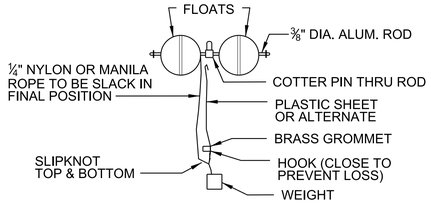
KEEP AS CLOSE TO SHORE AS POSSIBLE



TYPICAL APPLICATION



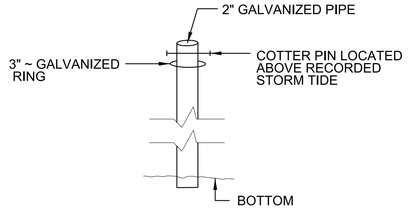
EXCAVATION OF WET AREAS



NOTE:

SUITABLE ALTERNATE MAY BE FASTENED TO STAKES DRIVEN INTO THE BOTTOM IN LIEU OF FLOATS AND WEIGHTS

SECTION A-A

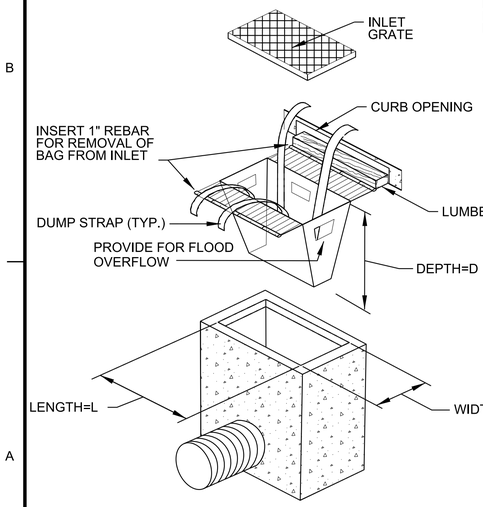


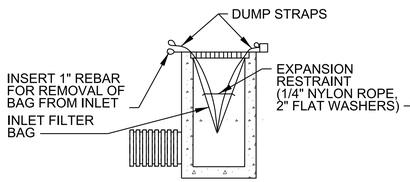
SECTION B-B

GENERAL NOTES:

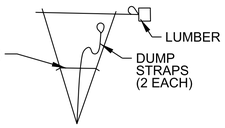
1. INSTALL TURBIDITY BARRIER TO PREVENT DRIFTING OF SILT CAUSED BY DISCHARGE OF STORM SEWERS, DEWATERING BASINS, CONSTRUCTION, DREDGING OR FILLING OPERATIONS, OR OTHER ACTIVITIES THAT COULD CAUSE TURBIDITY.
2. EXACT PLACEMENT OF TURBIDITY BARRIER SHALL BE SO AS TO EFFECTIVELY CONTROL SILT DISPERSION UNDER THE CONDITIONS PRESENT ON A PARTICULAR PROJECT.
3. THE DETAILS SHOWN ON THIS SHEET ARE SUGGESTED METHODS ONLY. ALTERNATE SOLUTION AND USAGE OF MATERIALS MAY BE USED AS APPROVED.
4. TYPE 2 BARRIERS SHALL BE USED WHICH ARE APPROPRIATE FOR LAKES, STREAMS, INTERCOASTAL & TIDAL AREAS WITH CURRENT VELOCITIES UP TO 5 FT./SEC.

FLOATING TURBIDITY BARRIER





INSTALLATION DETAIL



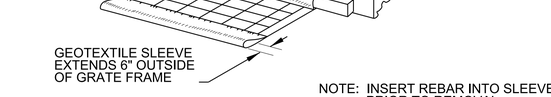
BAG DETAIL

SOIL EROSION AND SEDIMENT CONTROL MEASURES

N.T.S.

INLET FILTERS, TYPE 2

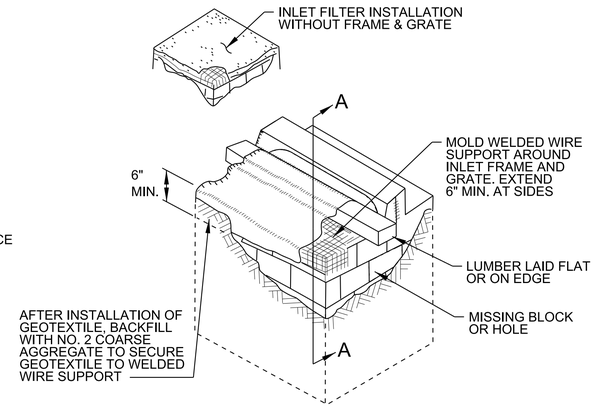
N.T.S.



NOTE: INSERT REBAR INTO SLEEVE PRIOR TO REMOVAL

EXISTING INLET

N.T.S.



SECTION A-A

NEW CONSTRUCTION

N.T.S.

INLET FILTERS, TYPE 1

N.T.S.

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MARK	DESCRIPTION	DATE	APPR.

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CONTRACT NO.: W912P5-##-X-####
PLOT SCALE: AS PLOTTED
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FILE NUMBER:
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FILE NAME: GB_SEG B3_CG501XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

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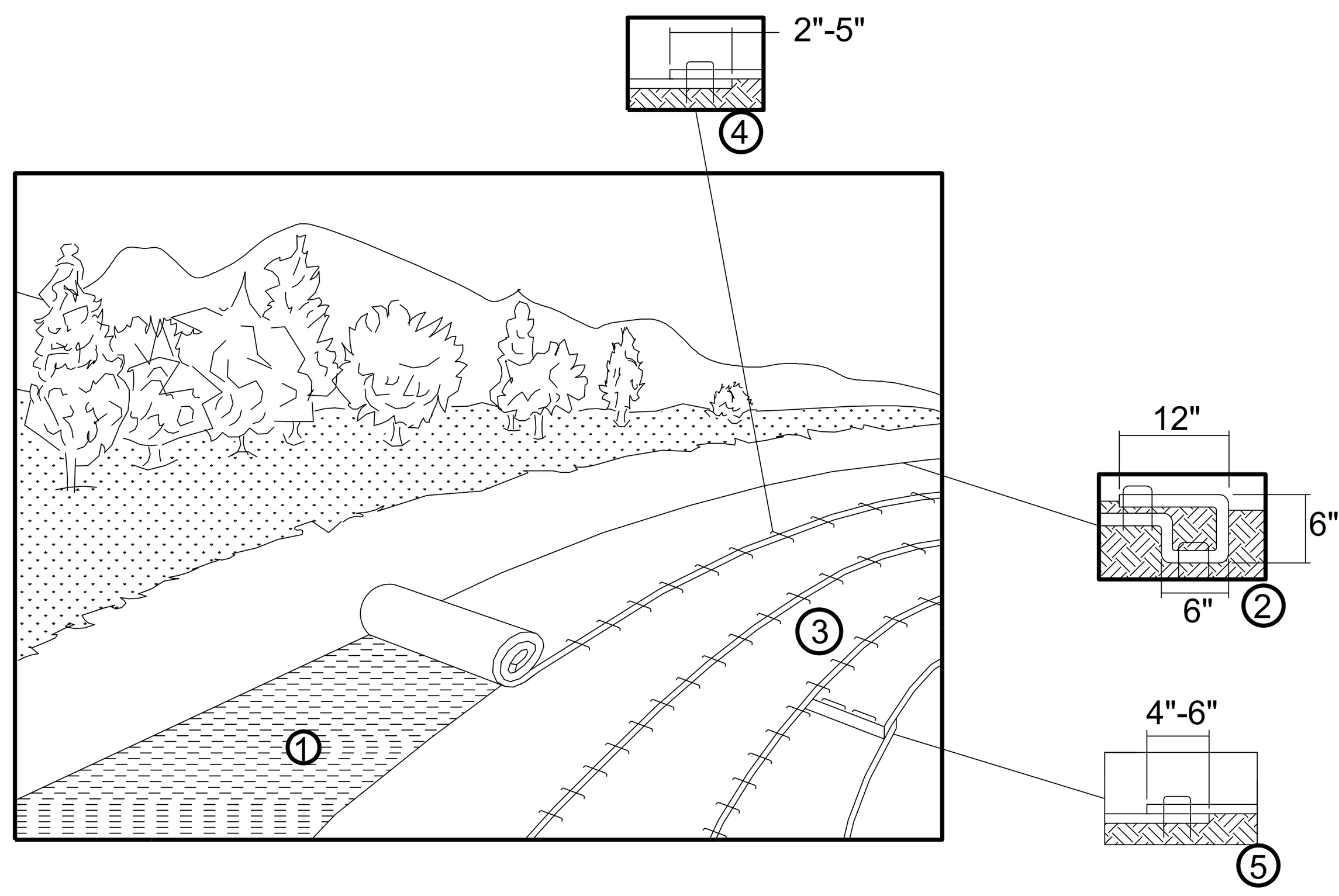
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
BASIN-SEGMENT B3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

EROSION CONTROL DETAILS
SHEET 1

SHEET IDENTIFICATION
CG-501
SHEET 40 OF 147

100% SUBMITTAL

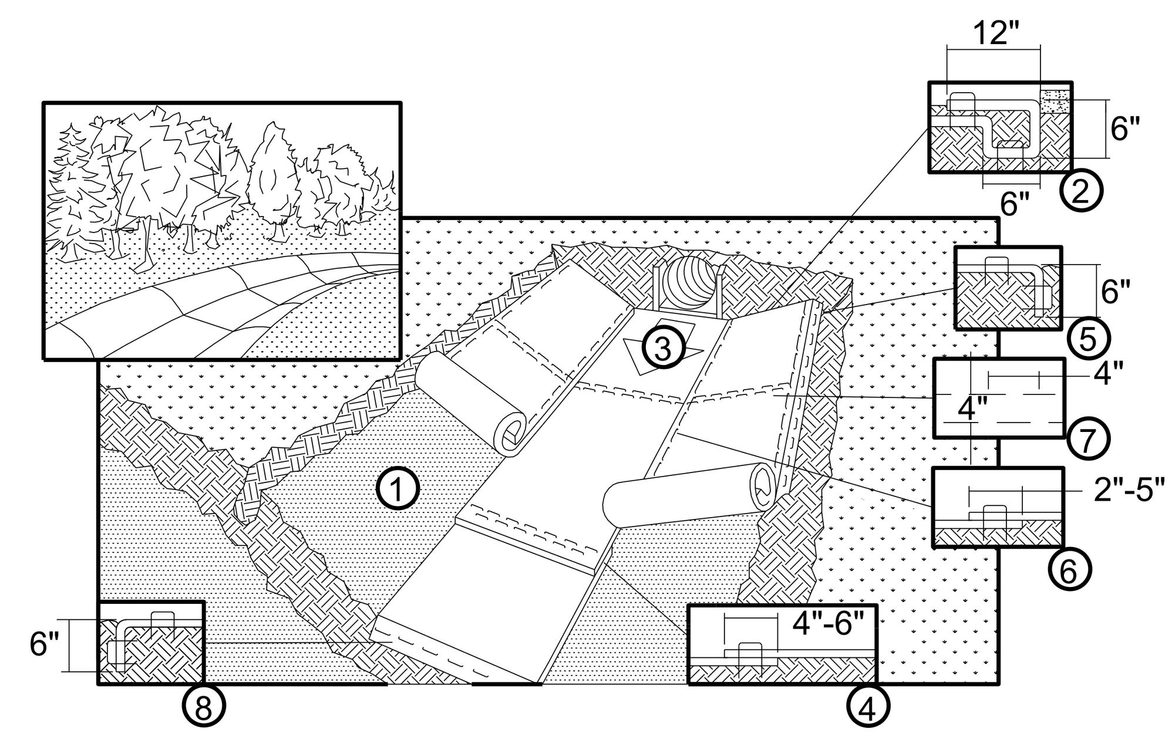


NOTES:

1. INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTIONS OR AS FOLLOWS IF MANUFACTURER DOES NOT HAVE INSTALLATION INSTRUCTIONS
2. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP'S), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
3. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECP'S IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF RECP'S EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP'S WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF RECP'S BACK OVER SEED AND COMPACTED SOIL. SECURE RECP'S OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART.
4. ROLL THE RECP'S HORIZONTALLY ACROSS THE SLOPE. RECP'S WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP'S MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
5. THE EDGES OF PARALLEL RECP'S MUST BE STAPLED WITH APPROXIMATELY 2" - 5" OVERLAP DEPENDING ON RECP'S TYPE.
6. PLACE CONSECUTIVE RECP'S END OVER END (SHINGLE STYLE) WITH A 4" - 6" OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE RECP'S.
7. IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" MAY BE NECESSARY TO PROPERLY SECURE THE RECP'S.

TEMPORARY EROSION CONTROL BLANKETS AND TURF REINFORCEMENT MATTING SLOPE APPLICATION

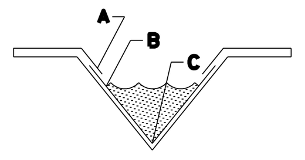
N.T.S



NOTES:

1. INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTIONS OR AS FOLLOWS IF MANUFACTURER DOES NOT HAVE INSTALLATION INSTRUCTIONS
2. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP'S), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
3. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE RECP'S IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF RECP'S EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP'S WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF RECP'S BACK OVER SEED AND COMPACTED SOIL. SECURE RECP'S OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART THE WIDTH OF THE RECP'S.
4. ROLL THE RECP'S IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. RECP'S WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP'S MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
5. PLACE CONSECUTIVE RECP'S END OVER END (SHINGLE STYLE) WITH A 4" - 6" OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE RECP'S.
6. FULL LENGTH EDGE OF RECP'S AT THE TOP OF SIDE SLOPE MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
7. ADJACENT RECP'S MUST BE OVERLAPPED APPROXIMATELY 2" -5" (DEPENDING ON RECP'S TYPE) AND STAPLED.
8. IN HIGH FLOW CHANNEL APPLICATION, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
9. THE TERMINAL END OF THE RECP'S MUST BE ANCHORED WITH A ROW STAPLES/STAKES APPROXIMATELY 12" APART IN A 6" DEEP X 6" WIDTH TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
10. IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" MAY BE NECESSARY TO PROPERLY ANCHOR THE RECP'S.
11. HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE

CRITICAL POINTS
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM / SIDE SLOPE VERTICES



TEMPORARY EROSION CONTROL BLANKETS AND TURF REINFORCEMENT MATTING CHANNEL APPLICATION

N.T.S

GENERAL NOTES:

TURF REINFORCEMENT MATTING (TRM) REQUIREMENTS:

PROVIDE A MACHINE-PRODUCED, 3-DIMENSIONAL MATRIX OF UV STABILIZED, PRE- OR POST- CONSUMER, NON-DEGRADABLE SYNTHETIC FIBERS, FILAMENTS, NETTINGS, AND/OR WIRE MESH DESIGNED FOR PERMANENT AND CRITICAL HYDRAULIC APPLICATIONS WHERE DESIGN DISCHARGE VELOCITIES AND SHEAR STRESS EXCEED THE LIMITS OF MATURE, NATURAL VEGETATION. ENSURE THAT THE TRM PROVIDES SUFFICIENT THICKNESS, STRENGTH AND VOID SPACE TO ALLOW SOIL FILLING OR RETENTION AND THE DEVELOPMENT OF VEGETATION WITHIN THE MATRIX. MANUFACTURER SHALL PROVIDE CERTIFICATION THAT THE TRM IS A PERMANENT BMP. ENSURE THAT THE TRM CONFORMS TO THE PROPERTY VALUES SPECIFIED IN THE TABLE BELOW.

REQUIREMENTS FOR TRM

PROPERTY	TEST METHOD	MINIMUM REQUIREMENT
THICKNESS	ASTM D 6525	0.25 INCHES
PERFORMANCE AT SHEAR STRESS OF 10.0 LB/SF	ASTM D 6460	ACCEPTABLE
BREAKING FORCE	ASTM D 6818	175 LB/FT
UV STABILITY @ 500 HOURS	ASTM D 4355	80

DESIGN PERMISSIBLE VELOCITY SHALL BE 5'/SECOND OR GREATER.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING MANUFACTURER SPECIFICATIONS AND DETAILS FOR APPROVAL.

US Army Corps of Engineers

MARK	DESCRIPTION	DATE	APPR

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U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

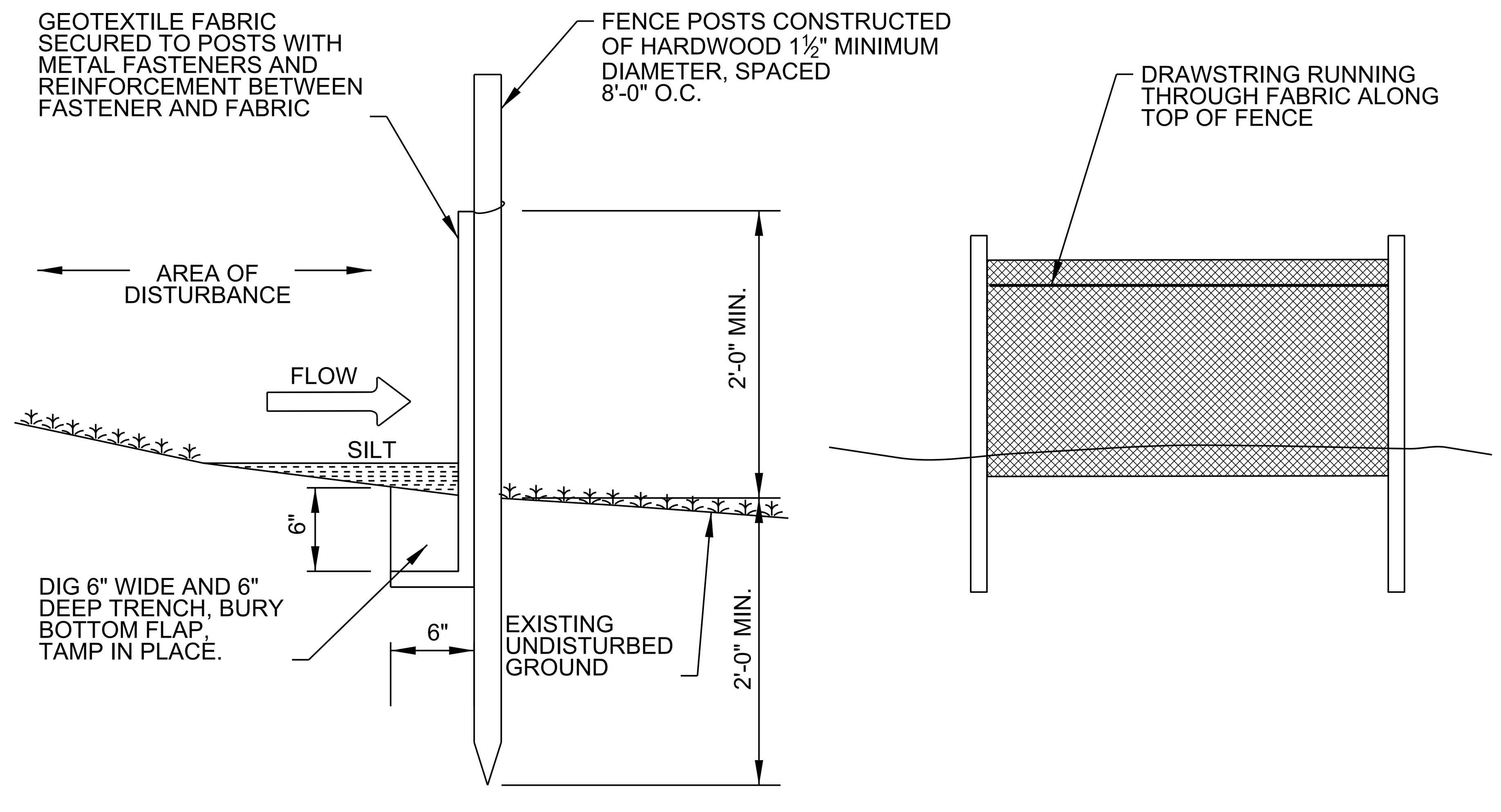
JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

EROSION CONTROL DETAILS
SHEET 2

SHEET IDENTIFICATION
CG-502
SHEET 41 OF 147

100% SUBMITTAL

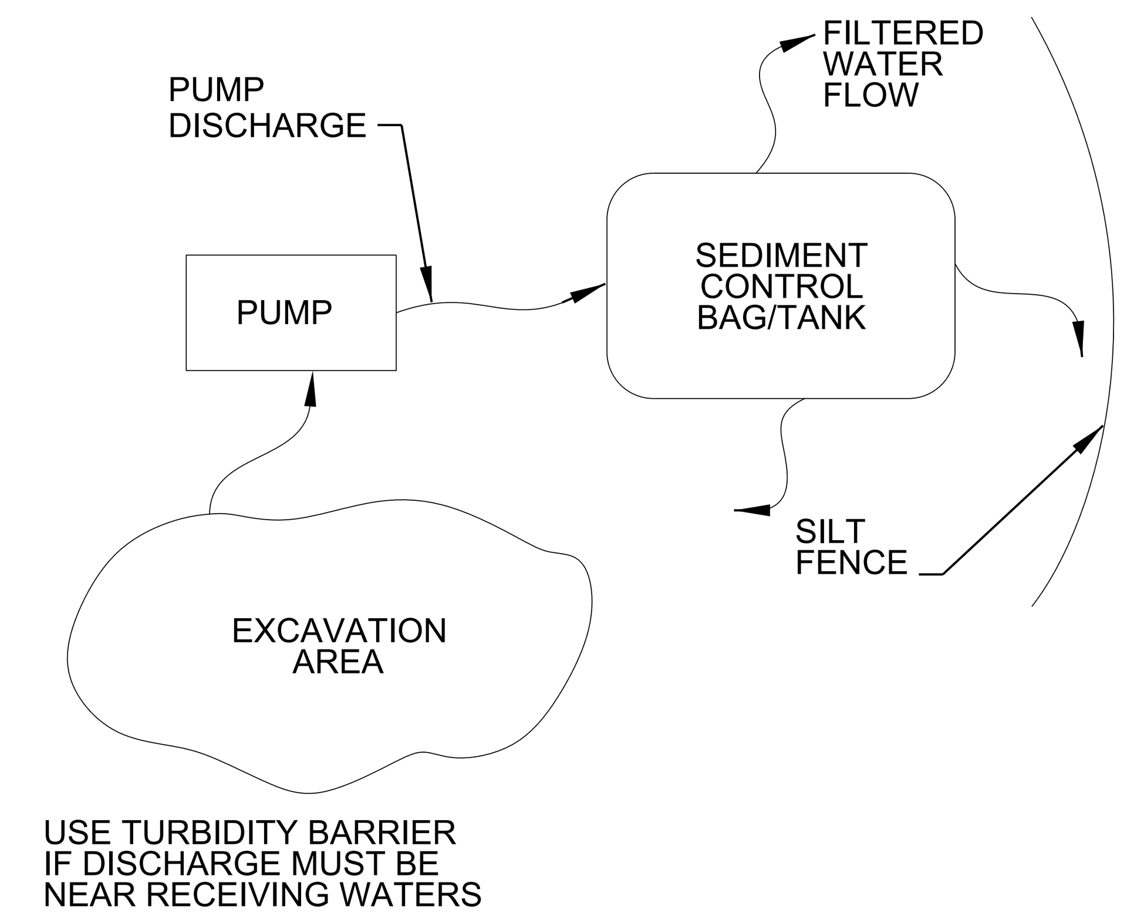


SILT FENCE NOTES:

1. PLACE SILT FENCE AT LOCATIONS AS SHOWN ON THE EROSION AND SEDIMENTATION CONTROL PLANS.
2. SILT FENCE SHALL BE INSTALLED SO WATER CANNOT BYPASS THE ENDS OF THE BARRIER
3. THE GEOTEXTILE FABRIC SHALL BE RECOMMENDED BY THE MANUFACTURER FOR SUCH USE.
4. THE FABRIC SHALL BE SECURELY FASTENED TO THE POSTS USING A SYSTEM OF METAL FASTENERS (NAILS OR STAPLES) AND A HIGH STRENGTH REINFORCEMENT MATERIAL (NYLON WEBBING, GROMMETS, WASHERS ETC.) PLACED BETWEEN THE FASTENER AND THE GEOTEXTILE FABRIC. THE FASTENING SYSTEM SHALL RESIST TEARING AWAY FROM THE POST. THE FABRIC SHALL INCORPORATE A DRAWSTRING IN THE TOP PORTION OF THE FENCE FOR ADDED STRENGTH.
5. ENDS OF INDIVIDUAL ROLLS OF GEOTEXTILE FABRIC SHALL BE SECURELY FASTENED TO A COMMON POST BY WRAPPING EACH END OF THE FABRIC AROUND THE POST TWICE AND ATTACHING AS SPECIFIED IN NOTE 4 ABOVE. SPLICING OF INDIVIDUAL ROLLS SHALL NOT OCCUR AT LOW POINTS.
6. INSPECTION SHALL BE FREQUENT AND AFTER EVERY STORM AND REPAIR OR REPLACEMENT SHALL BE MADE AS PROMPTLY AS POSSIBLE.
7. SILT FENCE SHALL REMAIN IN PLACE FOR THE DURATION OF THE PROJECT UNLESS OTHERWISE INSTRUCTED BY THE CONTRACTING OFFICER.

SILT FENCE CONSTRUCTION AND INSTALLATION DETAIL

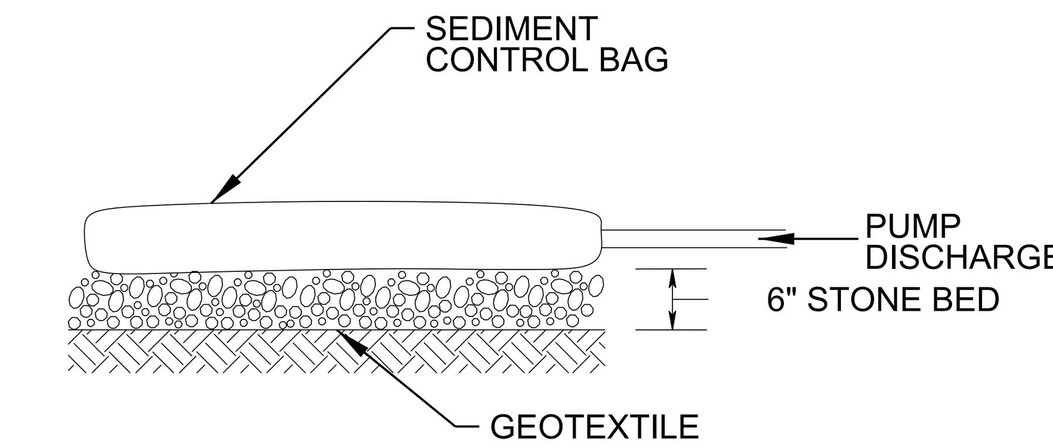
N.T.S.



PLAN VIEW

NOTES:

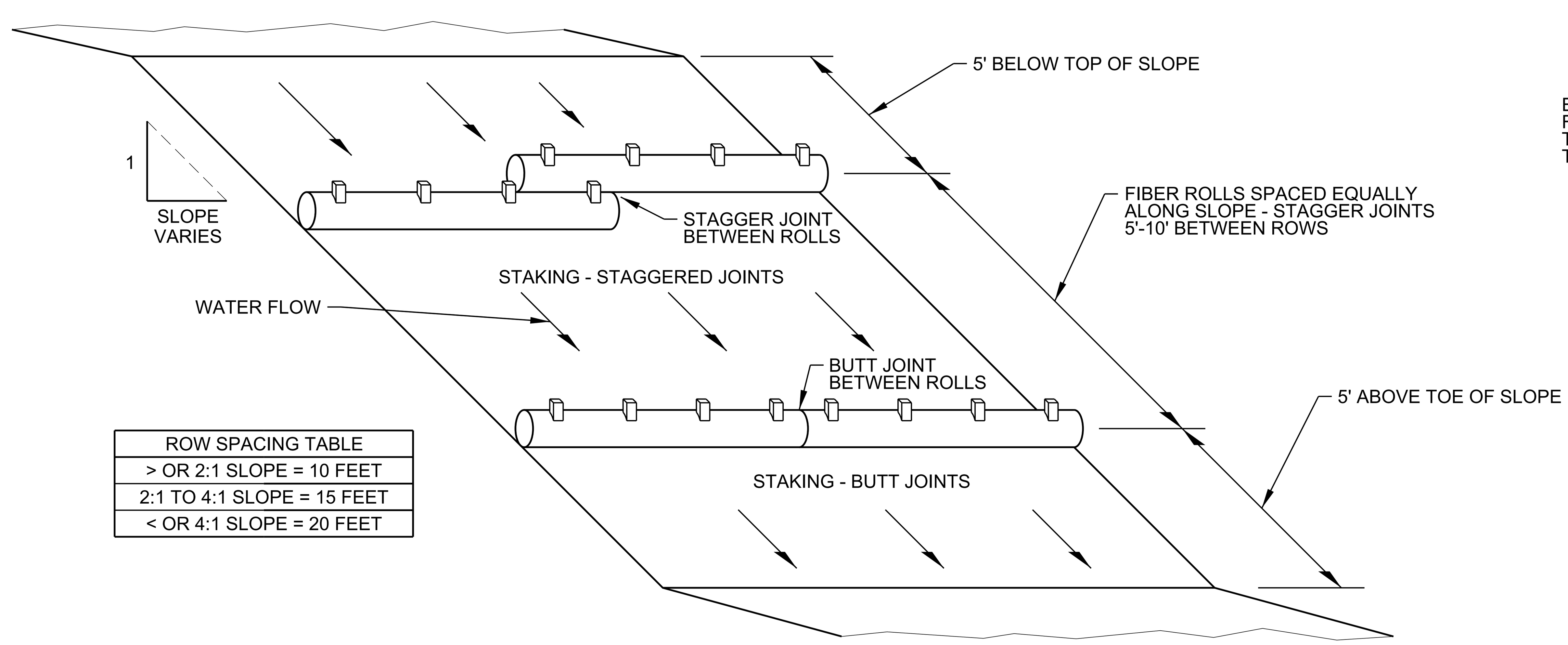
1. BAG MUST BE LOCATED AWAY FROM RECEIVING WATERS, OTHER ENVIRONMENTALLY SENSITIVE AREAS, AND/OR CONSTRUCTION ACTIVITIES.
2. BAGS MUST BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
3. BAGS MAY NOT BE REUSED.
4. BAGS MUST BE DISPOSED OF ACCORDING TO MANUFACTURER'S INSTRUCTIONS.



ELEVATION

SEDIMENT CONTROL BAG

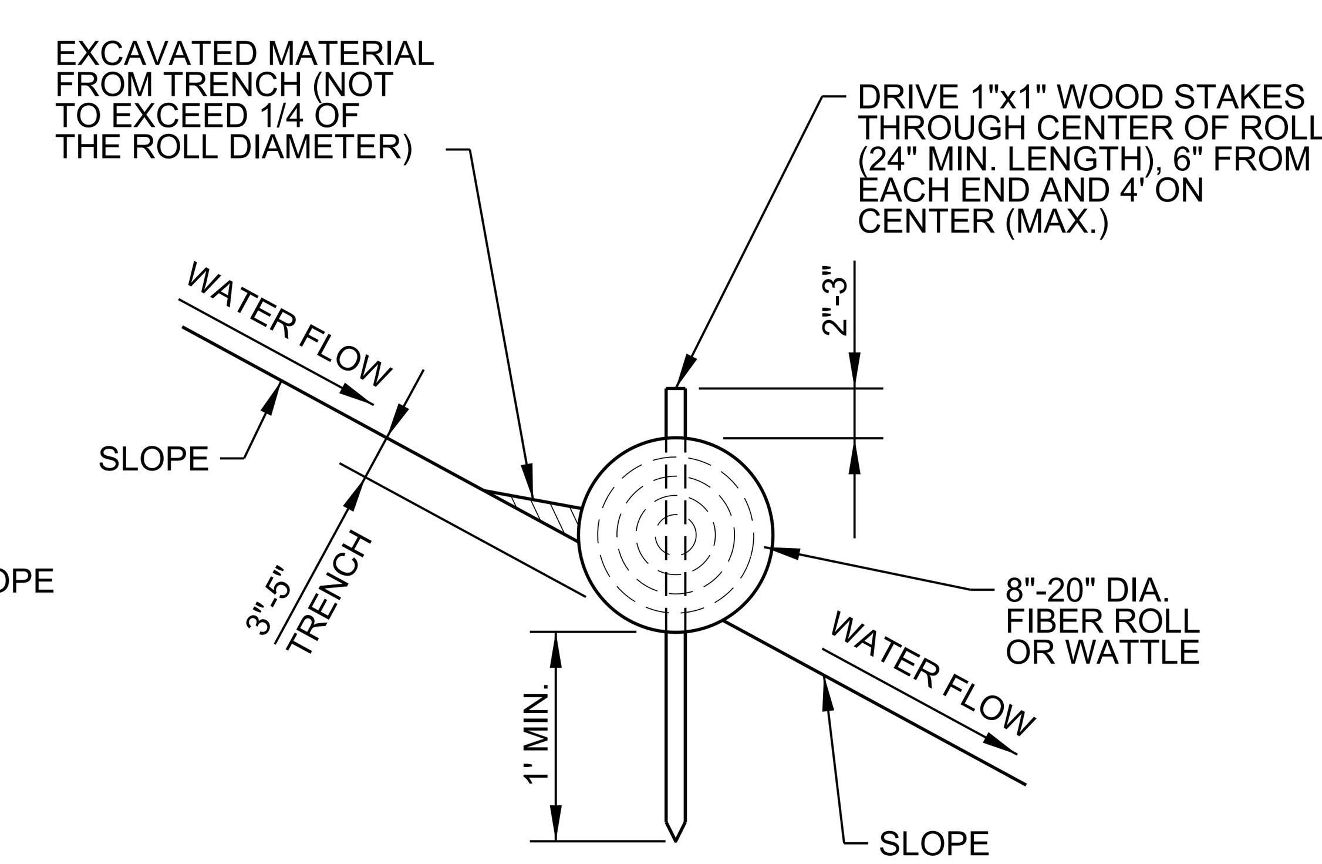
N.T.S.



ROW SPACING TABLE
> OR 2:1 SLOPE = 10 FEET
2:1 TO 4:1 SLOPE = 15 FEET
< OR 4:1 SLOPE = 20 FEET

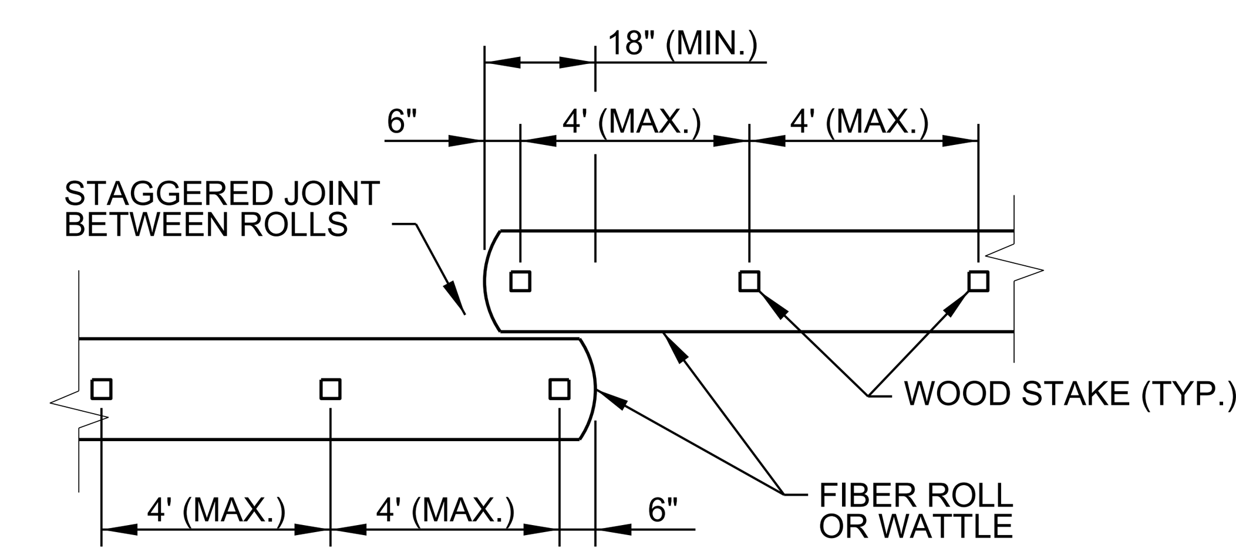
INSTALLATION AND SPACING

N.T.S.



FIBER ROLL SECTION & STAKING

N.T.S.



STAKING WITH STAGGERED JOINTS

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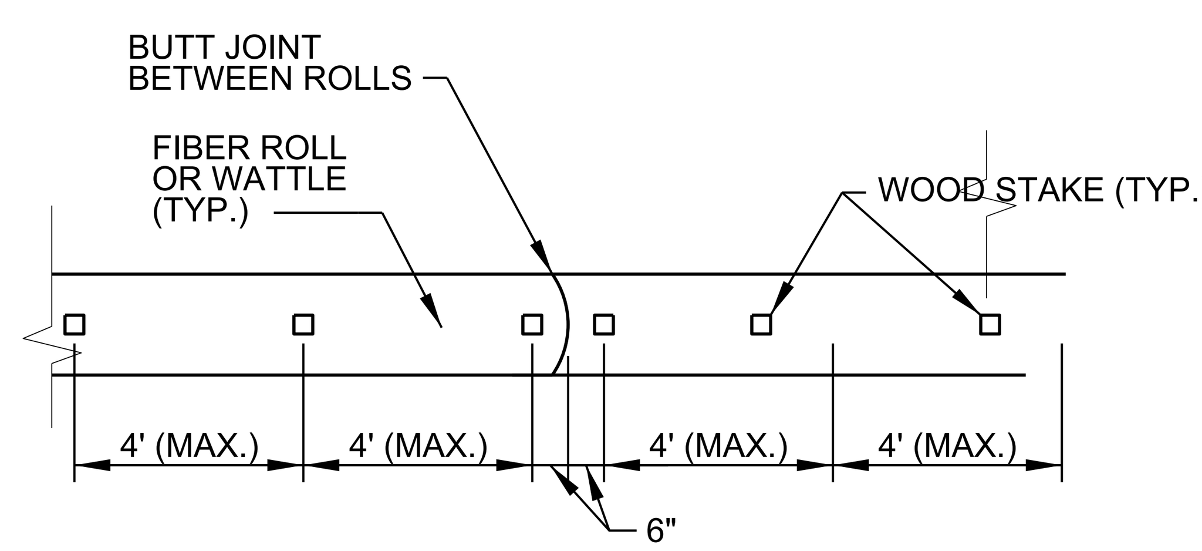

STAKING WITH BUTT JOINTS

N.T.S.

NOTES:

1. ROW SPACING FOR SLOPE INSTALLATIONS SHOULD BE DETERMINED BY SITE CONDITIONS SUCH AS SLOPE GRADIENT AND SOIL TYPE (SEE TABLE ABOVE).
2. INSTALLATIONS AS SHOWN ABOVE ARE DESIGNED FOR SLOPES OF 10:1 OR STEEPER.
3. NETTING, FILTER SOCK OR OUTER COVER OF ROLLS MUST BE CONSTRUCTED OF PHOTODEGRADABLE OR BIODEGRADABLE MATERIAL.
4. FIBER ROLLS AND WATTLES SHALL CONTAIN STRAW, FLAX, COCONUT FIBER (COIR), RICE STRAW OR ASPEN EXCELSIOR, IN A TIGHT TUBULAR ROLL, SPECIFICALLY DESIGNED FOR REMOVAL OF SOLIDS FROM STORM WATER RUNOFF. FILL MATERIAL MUST BE BIODEGRADABLE AND CONTAIN NO CHEMICAL ADDITIVES.
5. FIBER ROLLS OR WATTLES MAY BE WEIGHED FOR USE AROUND STREET INLETS (INTERNAL ROLL WEIGHT OR BY PLACING A WEIGHT, SUCH AS A CONCRETE BLOCK, ON THE DOWNSTREAM SIDE OF THE ROLL). WEIGHT MUST NOT BE PLACED ON TOP OF THE ROLL, SMASHING OR FLATTENING THE ROLL.
6. FOLLOW THE ROLL MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS FOR SIZING, INSTALLATION AND MAINTENENCE OF ALL FIBER ROLLS OR WATTLES.

EROSION CONTROL FIBER ROLL DETAILS

N.T.S.

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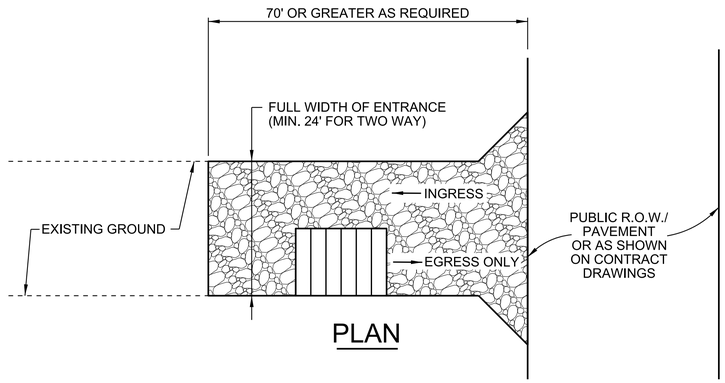
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

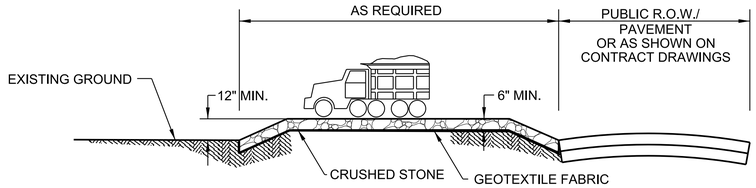
EROSION CONTROL DETAILS
SHEET 3

SHEET IDENTIFICATION
CG-503
SHEET 42 OF 147

100% SUBMITTAL



PLAN



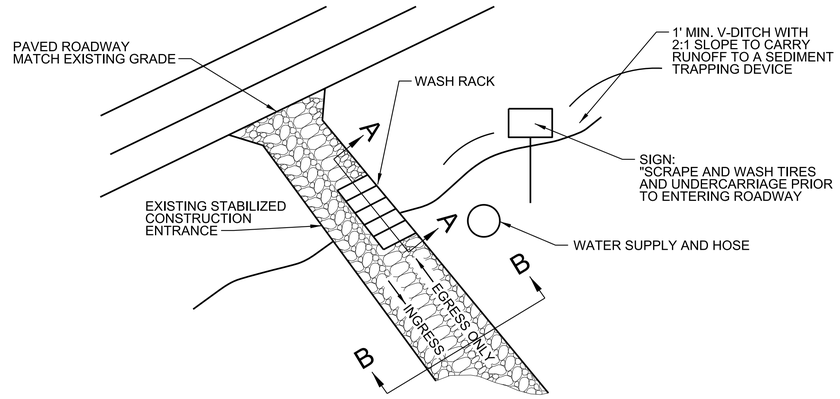
PROFILE

NOTES:

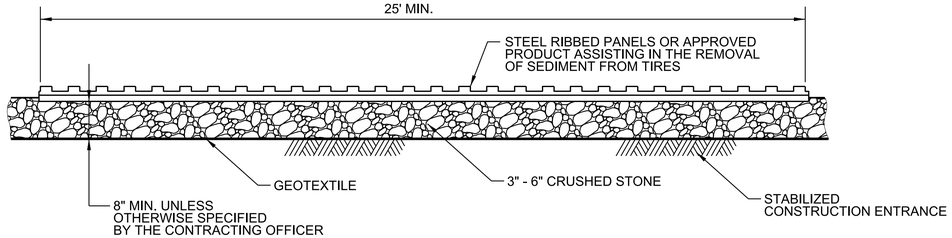
1. PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND PUBLIC R.O.W.
2. PLACE STABILIZED CONSTRUCTION ENTRANCE AT LOCATION(S) AS SHOWN ON THE EROSION AND SEDIMENTATION CONTROL PLANS.
3. STONE SIZE SHALL BE ASTM C-33, SIZE NO. 2 OR 3, CRUSHED STONE.
4. THE THICKNESS OF THE STABILIZED CONSTRUCTION ENTRANCE SHALL NOT BE LESS THAN 8".
5. NOT USED.
6. THE STABILIZED CONSTRUCTION DRIVEWAY SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO THE PUBLIC R.O.W./PAVEMENT. THIS REQUIRES PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURE USED TO TRAP SEDIMENT OR AS MAY BE REQUIRED BY THE SOIL CONSERVATION DISTRICT AS CONDITIONS DEMAND.
7. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO THE PUBLIC R.O.W./PAVEMENT MUST BE REMOVED IMMEDIATELY AND AT THE DAYS END.
8. WHERE TRACKING OF SOIL ONTO ROADWAYS IS A CONTINUAL OCCURRENCE, THE CONTRACTOR WILL BE REQUIRED TO BROOMSWEEP THE ROADWAY AT TWO-HOUR INTERVALS MINIMUM AND PRIOR TO LEAVING THE CONSTRUCTION SITE AT THE DAYS END. IF TRACKING PADS AND SWEEPING DO NOT CONTROL TRACKING, A TRUCK WASHDOWN SHALL BE ESTABLISHED OR HAULING OPERATIONS WILL BE STOPPED
9. WASH WATERS FROM WASHDOWN SHALL BE COLLECTED IN SETTLEMENT CONTAINERS.

STABILIZED CONSTRUCTION ENTRANCE

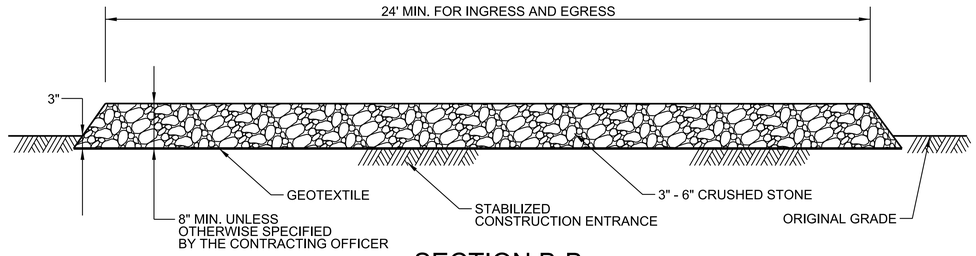
N.T.S.



PLAN VIEW



SECTION A-A



SECTION B-B

VEHICLE WASHDOWN DETAIL

N.T.S.

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PLOT SCALE: XXX
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DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
ISSUE DATE:
FILE NUMBER:
FILE NAME: GB_SEQ B3_CG504XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SOMERSET & SOMERSET COUNTY
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

EROSION CONTROL DETAILS
SHEET 4

SHEET IDENTIFICATION
CG-504
SHEET 43 OF 147

100% SUBMITTAL

EROSION AND SEDIMENTATION CONTROL NOTES

1. EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARDS FOR EROSION AND SEDIMENT CONTROL IN NEW JERSEY.
2. THE FREEHOLD SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED FORTY-EIGHT (48) HOURS IN ADVANCE OF ANY SOIL DISTURBING ACTIVITY.
3. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE INSTALLED PRIOR TO SOIL DISTURBANCE OR IN THEIR PROPER SEQUENCE AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
4. ANY CHANGES TO THE CERTIFIED SOIL EROSION AND SEDIMENT CONTROL PLANS WILL REQUIRE THE SUBMISSION OF REVISED SOIL EROSION AND SEDIMENT CONTROL PLANS TO THE DISTRICT FOR RE-CERTIFICATION. THE REVISED PLANS MUST MEET ALL CURRENT NEW JERSEY STATE SOIL EROSION AND SEDIMENT CONTROL STANDARDS.
5. N.J.S.A 4:24-39 ET. SEQ. REQUIRES THAT NO CERTIFICATES OF OCCUPANCY BE ISSUED BEFORE THE DISTRICT DETERMINES THAT A PROJECT OR PORTION THEREOF IS IN FULL COMPLIANCE WITH THE CERTIFIED PLAN AND STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY AND A REPORT OF COMPLIANCE HAS BEEN ISSUED. UPON WRITTEN REQUEST FROM THE APPLICANT, THE DISTRICT MAY ISSUE A REPORT OF COMPLIANCE WITH CONDITIONS ON A LOT-BY-LOT OR SECTION-BY-SECTION BASIS, PROVIDED THAT THE PROJECT OR PORTION THEREOF IS IN SATISFACTORY COMPLIANCE WITH THE SEQUENCE OF DEVELOPMENT AND TEMPORARY MEASURES FOR SOIL EROSION AND SEDIMENT CONTROL HAVE BEEN IMPLEMENTED, INCLUDING PROVISIONS FOR STABILIZATION AND SITE WORK.
6. ANY DISTURBED AREAS THAT WILL BE LEFT EXPOSED MORE THAN SIXTY (60) DAYS, AND NOT SUBJECT TO CONSTRUCTION TRAFFIC, WILL IMMEDIATELY RECEIVE A TEMPORARY SEEDING. IF THE SEASON PREVENTS THE ESTABLISHMENT OF TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW, OR EQUIVALENT MATERIAL, AT A RATE OF 2 TO 2 ½TONS PER ACRE, ACCORDING TO THE NEW JERSEY STANDARD FOR STABILIZATION WITH MULCH ONLY.
7. IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING, ALL CRITICAL AREAS SUBJECT TO EROSION (I.E. SOIL STOCKPILES, STEEP SLOPES AND ROADWAY EMBANKMENTS) WILL RECEIVE TEMPORARY SEEDING IN COMBINATION WITH STRAW MULCH OR A SUITABLE EQUIVALENT, AND A MULCH ANCHOR, IN ACCORDANCE WITH NEW JERSEY STATE STANDARDS.
8. A SUB-BASE COURSE WILL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING AND INSTALLATION OF IMPROVEMENTS TO STABILIZE STREETS, ROADS, DRIVEWAYS, AND PARKING AREAS. IN AREAS WHERE NO UTILITIES ARE PRESENT, THE SUB-BASE SHALL BE INSTALLED WITHIN FIFTEEN (15) DAYS OF THE PRELIMINARY GRADING.
9. THE NEW JERSEY STANDARD FOR STABILIZED CONSTRUCTION ACCESS REQUIRES THE INSTALLATION OF A PAD OF CLEAN CRUSHED STONE AT POINTS WHERE TRAFFIC WILL BE ACCESSING THE CONSTRUCTION SITE. AFTER INTERIOR ROADWAYS ARE PAVED, INDIVIDUAL LOTS REQUIRE A STABILIZED CONSTRUCTION ACCESS CONSISTING OF ONE INCH TO TWO INCH (1" 2") STONE FOR A MINIMUM LENGTH OF TEN FEET (10') EQUAL TO THE LOT ENTRANCE WIDTH. ALL OTHER ACCESS POINTS SHALL BE BLOCKED OFF.
10. ALL SOIL WASHED, DROPPED, SPILLED, OR TRACKED OUTSIDE THE LIMIT OF DISTURBANCE OR ONTO PUBLIC RIGHT-OF-WAYS WILL BE REMOVED IMMEDIATELY.
11. PERMANENT VEGETATION IS TO BE SEEDED OR SODDED ON ALL EXPOSED AREAS WITHIN TEN (10) DAYS AFTER FINAL GRADING.
12. AT THE TIME THAT SITE PREPARATION FOR PERMANENT VEGETATIVE STABILIZATION IS GOING TO BE ACCOMPLISHED, ANY SOIL THAT WILL NOT PROVIDE A SUITABLE ENVIRONMENT TO SUPPORT ADEQUATE VEGETATIVE GROUND COVER SHALL BE REMOVED OR TREATED IN SUCH A WAY THAT IT WILL PERMANENTLY ADJUST THE SOIL CONDITIONS AND RENDER IT SUITABLE FOR VEGETATIVE GROUND COVER. IF THE REMOVAL OR TREATMENT OF THE SOIL WILL NOT PROVIDE SUITABLE CONDITIONS, NON-VEGETATIVE MEANS OF PERMANENT GROUND STABILIZATION WILL HAVE TO BE EMPLOYED.
13. IN ACCORDANCE WITH THE NEW JERSEY STANDARD FOR MANAGEMENT OF HIGH ACID PRODUCING SOILS, ANY SOIL HAVING A PH OF 4 OR LESS OR CONTAINING IRON SULFIDES SHALL BE ULTIMATELY PLACED OR BURIED WITH LIMESTONE APPLIED AT THE RATE OF 10 TONS/ACRE, (OR 450 LBS/1,000 SQ FT OF SURFACE AREA) AND COVERED WITH A MINIMUM OF 12"OF SETTLED SOIL WITH A PH OF 5 OR MORE, OR 24" WHERE TREES OR SHRUBS ARE TO BE PLANTED.
14. CONDUIT OUTLET PROTECTION MUST BE INSTALLED AT ALL REQUIRED OUTFALLS PRIOR TO THE DRAINAGE SYSTEM BECOMING OPERATIONAL.
15. UNFILTERED DEWATERING IS NOT PERMITTED. NECESSARY PRECAUTIONS MUST BE TAKEN DURING ALL DEWATERING OPERATIONS TO MINIMIZE SEDIMENT TRANSFER. ANY DEWATERING METHODS USED MUST BE IN ACCORDANCE WITH THE NEW JERSEY STANDARD FOR DEWATERING.
16. SHOULD THE CONTROL OF DUST AT THE SITE BE NECESSARY, THE SITE WILL BE SPRINKLED UNTIL THE SURFACE IS WET, TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED OR MULCH SHALL BE APPLIED AS REQUIRED BY THE NEW JERSEY STANDARD FOR DUST CONTROL.
17. STOCKPILE AND STAGING LOCATIONS ESTABLISHED IN THE FIELD SHALL BE PLACED WITHIN THE LIMIT OF DISTURBANCE ACCORDING TO THE CERTIFIED PLAN. STAGING AND STOCKPILES NOT LOCATED WITHIN THE LIMIT OF DISTURBANCE WILL REQUIRE CERTIFICATION OF A REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN. CERTIFICATION OF A NEW SOIL EROSION AND SEDIMENT CONTROL PLAN MAY BE REQUIRED FOR THESE ACTIVITIES IF AN AREA GREATER THAN 5,000 SQUARE FEET IS DISTURBED.
18. ALL SOIL STOCKPILES ARE TO BE TEMPORARILY STABILIZED IN ACCORDANCE WITH SOIL EROSION AND SEDIMENT CONTROL NOTE #7.
19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY EROSION OR SEDIMENTATION THAT MAY OCCUR BELOW STORMWATER OUTFALLS OR OFFSITE AS A RESULT OF CONSTRUCTION OF THE PROJECT.
20. THE CONTRACTOR SHALL SUBMIT AN APPLICATION FEE AND FINAL SEQUENCING PLAN AS APPROVED BY THE CONTRACTING OFFICER TO THE SOIL CONSERVATION DISTRICT TO OBTAIN THE REQUIRED CERTIFICATION.

FREEHOLD SOIL CONSERVATION DISTRICT
(FOR MIDDLESEX COUNTY)
4000 KOZLOSKI ROAD
FREEHOLD, NJ 07728
(732)683-8500

REQUIREMENT FOR DUST CONTROL

DEFINITION

THE CONTROL OF DUST ON CONSTRUCTION SITES AND ROADS.

PURPOSE

TO PREVENT BLOWING AND MOVEMENT OF DUST FROM EXPOSED SOIL SURFACES, REDUCE ON- AND OFF-SITE DAMAGE AND HEALTH HAZARDS, AND IMPROVE TRAFFIC SAFETY.

WHERE APPLICABLE

THIS PRACTICE IS APPLICABLE TO AREAS SUBJECT TO DUST BLOWING AND MOVEMENT WHERE ON- AND OFF-SITE DAMAGE IS LIKELY WITHOUT TREATMENT. CONSULT WITH LOCAL MUNICIPAL ORDINANCES ON ANY RESTRICTIONS.

PLANNING CRITERIA

THE FOLLOWING METHODS SHOULD BE CONSIDERED FOR CONTROLLING DUST:

SPRAY-ON ADHESIVES - ON MINERAL SOILS (NOT EFFECTIVE ON MUCK SOILS). KEEP TRAFFIC OFF THESE AREAS.

	WATER DILUTION	TYPE OF NOZZLE	APPLY GALLONS/ACRE
ANIONIC ASPHALT EMULSION	7:1	COARSE SPRAY	1,200
LATEX EMULSION	12.5:1	FINE SPRAY	235
RESIN IN WATER	4:1	FINE SPRAY	300
POLYACRYLMIDE (PAM) - SPRAY-ON POLYACRYLMIDE (PAM) - DRY-SPREAD	APPLY ACCORDING TO MANUFACTURER'S INSTRUCTIONS.		
ACIDULATED SOY BEAN SOAP STICK	NONE	COARSE SPRAY	1,200

TILLAGE - TO ROUGHEN SURFACE AND BRING CLODS TO THE SURFACE. THIS IS A TEMPORARY EMERGENCY MEASURE WHICH SHOULD BE USED BEFORE SOIL BLOWING STARTS. BEGIN PLOWING ON WINDWARD SIDE OF SITE. CHISEL-TYPE PLOWS SPACED ABOUT 12 INCHES APART, AND SPRING-TOOTHED HARROWS ARE EXAMPLES OF EQUIPMENT WHICH MAY PRODUCE THE DESIRED EFFECT.

SPRINKLING - SITE IS SPRINKLED UNTIL THE SURFACE IS WET.

BARRIERS - SOLID BOARD FENCES, SNOW FENCES, BURLAP FENCES, CRATE WALLS, BALES OF HAY, AND SIMILAR MATERIAL CAN BE USED TO CONTROL AIR CURRENTS AND SOIL BLOWING.

CALCIUM CHLORIDE - SHALL BE IN THE FORM OF LOOSE, DRY GRANULES OR FLAKES FINE ENOUGH TO FEED THROUGH COMMONLY USED SPREADERS AT A RATE THAT WILL KEEP SURFACE MOIST BUT NOT CAUSE POLLUTION OR PLANT DAMAGE. IF USED ON STEEPER SLOPES, THEN USE OTHER PRACTICES TO PREVENT WASHING INTO STREAMS OR ACCUMULATION AROUND PLANTS.

STONE - COVER SURFACE WITH CRUSHED STONE OR COARSE GRAVEL.

REQUIREMENT FOR PERMANENT VEGETATION

1. SEEDBED PREPARATION

A. APPLY GROUND LIMESTONE AND FERTILIZER ACCORDING TO SOIL TEST RECOMMENDATIONS SUCH AS OFFERED BY RUTGERS CO-OPERATIVE EXTENSION. SOIL SAMPLE MAILERS ARE AVAILABLE FROM THE LOCAL RUTGERS COOPERATIVE EXTENSION OFFICES. FERTILIZER SHALL BE APPLIED AT THE RATE OF 500 POUNDS PER ACRE OR 11 POUNDS PER 1,000 SQUARE FEET OF 10-20-10 OR EQUIVALENT WITH 50% WATER INSOLUBLE NITROGEN UNLESS A SOIL TEST INDICATES OTHERWISE. APPLY LIMESTONE IN ACCORDANCE WITH THE TABLE BELOW AND THE RESULTS OF SOIL TESTING. CALCIUM CARBONATE IS THE EQUIVALENT AND STANDARD FOR MEASURING THE ABILITY OF LIMING MATERIALS TO NEUTRALIZE SOIL ACIDITY AND SUPPLY CALCIUM AND MAGNESIUM TO GRASSES AND LEGUMES. THE TABLE BELOW IS A GENERAL GUIDELINE FOR LIMESTONE APPLICATION.

LIMESTONE APPLICATION RATE BY SOIL TEXTURE		
SOIL TEXTURE	TONS/ACRE	LBS/1000 SQ. FT.
CLAY, CLAY LOAM, AND HIGH ORGANIC SOIL	3	135
SANDY LOAM, LOAM, SILT LOAM	2	90
LOAMY SAND, SAND	1	45

B. WORK LIME AND FERTILIZER INTO THE SOIL AS NEARLY AS PRACTICAL TO A DEPTH OF 4 INCHES WITH A DISC, SPRINGTOOTH HARROW, OR OTHER SUITABLE EQUIPMENT. THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON THE GENERAL CONTOUR. CONTINUE TILLAGE UNTIL A REASONABLE UNIFORM SEEDBED IS PREPARED.

C. IMMEDIATELY PRIOR TO SEEDING, THE SURFACE SHALL BE SCARIFIED 6" TO 12" WHERE THERE HAS BEEN SOIL COMPACTION. THIS PRACTICE IS PERMISSIBLE ONLY WHERE THERE IS NO DANGER TO UNDERGROUND UTILITIES (CABLES, IRRIGATION, SYSTEMS, ETC.).

2. SEED MIXTURES AND SEEDING RATES FOR PERMANENT VEGETATION ARE DESCRIBED IN SPECIFICATION 32 92 19 SEEDING.

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EROSION CONTROL NOTES
SHEET 1

SHEET IDENTIFICATION
CG-505
SHEET 44 OF 147

100% SUBMITTAL

REQUIREMENT FOR TEMPORARY VEGETATIVE COVER FOR SOIL STABILIZATION

DEFINITION

ESTABLISHMENT OF TEMPORARY VEGETATIVE COVER ON SOILS EXPOSED FOR PERIODS OF 2 TO 6 MONTHS WHICH ARE NOT BEING GRADED, NOT UNDER ACTIVE CONSTRUCTION OR NOT SCHEDULED FOR PERMANENT SEEDING WITHIN 30 DAYS.

PURPOSE

TO TEMPORARILY STABILIZE THE SOIL AND REDUCE DAMAGE FROM WIND AND WATER EROSION UNTIL PERMANENT STABILIZATION IS ACCOMPLISHED.

WHERE APPLICABLE

ON EXPOSED SOILS THAT HAVE THE POTENTIAL FOR CAUSING OFF–SITE ENVIRONMENTAL DAMAGE.

METHODS AND MATERIALS

I. SITE PREPARATION

A. GRADE AS NEEDED AND FEASIBLE TO PERMIT THE USE OF CONVENTIONAL EQUIPMENT FOR SEEDBED PREPARATION, SEEDING, MULCH APPLICATIONS, AND MULCH ANCHORING.
B. INSTALL NEEDED EROSION CONTROL PRACTICES OR FACILITIES SUCH AS DIVERSIONS, GRADE STABILIZATION STRUCTURES, CHANNEL STABILIZATION MEASURES, SEDIMENT BASINS, AND WATERWAYS.
C. IMMEDIATELY PRIOR TO SEEDING, SURFACES SHOULD BE SCARIFIED 6" TO 12" WHERE THERE HAS BEEN SOIL COMPACTION AND THERE IS NO DANGER TO UNDERGROUND UTILITIES.

II. SEEDBED PREPARATION

A. APPLY GROUND LIMESTONE AND FERTILIZER ACCORDING TO SOIL TEST RECOMMENDATIONS SUCH AS OFFERED BY RUTGERS COOPERATIVE EXTENSION. SOIL SAMPLE MAILERS ARE AVAILABLE FROM THE LOCAL RUTGERS COOPERATIVE EXTENSION OFFICES. FERTILIZER SHALL BE APPLIED AT THE RATE OF 500 POUNDS PER ACRE OR 11 POUNDS PER 1000 SQUARE FEET OF 10–20–10 OR EQUIVALENT WITH 50% WATER INSOLUBLE NITROGEN UNLESS A SOIL TEST INDICATES OTHERWISE. APPLY LIMESTONE AT THE RATE OF 2 TONS/ACRE UNLESS SOIL TESTING INDICATES OTHERWISE. CALCIUM CARBONATE IS THE EQUIVALENT AND STANDARD FOR THE ABILITY OF LIMING MATERIALS TO NEUTRALIZE SOIL ACIDITY AND SUPPLY CALCIUM AND MAGNESIUM TO GRASSES AND LEGUMES. SEE THE TABLE BELOW FOR GENERAL GUIDELINES FOR LIMESTONE APPLICATIONS.

LIMESTONE APPLICATION RATE BY SOIL TEXTURE		
SOIL TEXTURE	TONS/ACRE	LBS./1000 SQ. FT.
CLAY, CLAY LOAM, AND HIGH ORGANIC SOIL	3	135
SANDY LOAM, LOAM, SILT LOAM	2	90
LOAMY SAND, SAND	1	45

B. WORK LIME AND FERTILIZER INTO THE SOIL AS NEARLY AS PRACTICAL TO A DEPTH OF 4 INCHES WITH A DISC, SPRINGTOOTH HARROW, OR OTHER SUITABLE EQUIPMENT. THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON THE GENERAL CONTOUR. CONTINUE TILLAGE UNTIL A REASONABLY UNIFORM SEEDBED IS PREPARED.

C. INSPECT SEEDBED JUST BEFORE SEEDING. IF TRAFFIC HAS LEFT THE SOIL COMPACTED, THE AREA MUST BE REFILLED AS ABOVE.

D. SOILS HIGH IN SULFIDES OR HAVING A PH OF 4.0 OR LESS REFER TO THE STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY, STANDARD MANAGEMENT OF HIGH ACID SOILS.

III. SEEDING

A. SELECT SEED FROM THE TABLE BELOW.

TEMPORARY VEGETATIVE STABILIZATION GRASSES, SEEDING RATES, DATES AND DEPTH				
SEED SELECTIONS	SEEDING RATE (LBS.) [1]		OPTIMUM SEEDING DATE [2]	OPTIMUM SEEDING DEPTH (IN.) [3]
	PER ACRE	PER 1000 SQ FT		
COOL SEASON GRASSES				
1. PERENNIAL RYEGRASS	40	1.0	3/1–5/15 8/15–10/1	0.5
2. SPRING OATES	86	2.0	3/1–5/15 8/15–10/1	1.0
3. WINTER BARLEY	96	2.2	8/15–10/1	1.0
4.WINTER CEREAL RYE	112	2.6	8/1–11/15	1.0
WARM SEASON GRASSES				
5. PEARL MILLET	20	0.5	5/15– 8/15	1.0
6. MILLET (German or Hungarian)	30	0.7	5/15– 8/15	1.0
7. WEEPING LOVEGRASS	5	0.2	5/15– 8/15	0.25

1. SEEDING RATE FOR WARM SEASON GRASS, SELECTION 5–7 SHALL BE ADJUSTED TO REFLECT THE AMOUNT OF PURE LIME SEED (PLS) AS DETERMINED BY GERMINATION TEST RESULT. NO ADJUSTMENT IS REQUIRED FOR COOL SEASON GRASSES.
2. MAY BE PLANTED THROUGHOUT SUMMER IF SOIL MOISTURE IS ADEQUATE OR SEEDED AREA CAN BE IRRIGATED.
3. TWICE THE DEPTH FOR SANDY SOILS.

B. CONVENTIONAL SEEDING: APPLY SEED UNIFORMLY BY HAND, CYCLONE (CENTRIFUGAL) SEEDER, DROP SEEDER DRILL CULTIPACKER SEEDER. FOR SEEDING METHODS EXCEPT DRILLED, SEED SHALL BE INCORPORATED INTO THE SOIL TO A DEPTH OF 1/4 TO 1/2 INCH, BY RACKING OR DRAGGING. DEPTH OF SEED PLACEMENT MAY BE 1/4 INCH DEEPER IN COARSE TEXTURED SOIL.

REQUIREMENT FOR TEMPORARY VEGETATIVE COVER FOR SOIL STABILIZATION (CONTINUED)

C. HYDROSEEDING IS A BROADCAST SEEDING METHOD USUALLY INVOLVING A TRUCK OR TRAILER MOUNTED TANK, WITH AN AGITATION SYSTEM AND HYDRAULIC PUMP FOR MIXING SEED, WATER AND FERTILIZER AND SPRAYING THE MIX ONTO THE PREPARED SEEDBED. MULCH SHALL NOT BE INCLUDED IN THE TANK WITH SEED. SHORT FIBERED MULCH MAY BE APPLIED WITH A HYDROSEEDER FOLLOWING SEEDING. HYDROSEEDING IS NOT A PREFERRED SEEDING METHOD BECAUSE SEED AND FERTILIZER ARE APPLIED TO THE SURFACE AND NOT INCORPORATED INTO THE SOIL. POOR SEED TO SOIL CONTACT OCCURS REDUCING SEED GERMINATION AND GROWTH. HYDROSEEDING MAY BE USED FOR AREAS TOO STEEP FOR CONVENTIONAL EQUIPMENT TO TRAVERSE OR TOO OBSTRUCTED WITH ROCKS, STUMPS, ETC.

D. AFTER SEEDING, COMPACT THE SOIL WITH A CORRUGATED ROLLER TO ASSURE GOOD SEED–TO–SOIL CONTACT, RESTORE CAPILLARITY, AND IMPROVE SEEDING EMERGENCE. THIS IS THE PREFERRED METHOD. WHEN PERFORMED ON THE CONTOUR, SHEET EROSION WILL BE MINIMIZED AND WATER CONSERVATION ON SITE WILL BE MAXIMIZED.

IV. MULCHING

MULCHING IS REQUIRED ON ALL SEEDING. MULCH WILL INSURE AGAINST EROSION BEFORE GRASS IS ESTABLISHED AND WILL PROMOTE FASTER AND EARLIER ESTABLISHMENT. THE EXISTENCE OF VEGETATION SUFFICIENT TO CONTROL SOIL EROSION SHALL BE DEEMED COMPLIANT WITH THIS MULCHING REQUIREMENT.

A. HAY, UNNROTTED SMALL GRAIN STRAW, HAY FREE OF SEEDS, OR SALT HAY TO BE APPLIED AT THE RATE OF 1–1/2 TO 2 TONS PER ACRE (70 TO 90 POUNDS PER 1,000 SQUARE FEET), EXCEPT WHERE A CRIMPER IS USED INSTEAD OF A LIQUID MULCH–BINDER (TACKIFYING OR ADHESIVE AGENT), THE RATE OF APPLICATION IS 3 TONS PER ACRE. MULCH CHOPPER–BLOWERS MUST NOT GRIND THE MULCH. HAY MULCH IS NOT RECOMMENDED FOR ESTABLISHING FINE TURF OR LAWNS DUE TO THE PRESENCE OF WEED SEED.

APPLICATION. SPREAD MULCH UNIFORMLY BY HAND OR MECHANICALLY SO THAT APPROXIMATELY 95% OF THE SOIL SURFACE WILL BE COVERED. FOR UNIFORM DISTRIBUTION OF HAND–SPREAD MULCH, DIVIDE AREA INTO APPROXIMATELY 1,000 SQUARE FEET SECTIONS AND DISTRIBUTE 70 TO 90 POUNDS WITHIN EACH SECTION.

ANCHORING SHALL BE ACCOMPLISHED IMMEDIATELY AFTER PLACEMENT TO MINIMIZE LOSS BY WIND OR WATER. THIS MAY BE DONE BY ONE OF THE FOLLOWING METHODS, DEPENDING UPON THE SIZE OF THE AREA, STEEPNESS OF SLOPES, AND COSTS.

1. PEG AND TWINE. DRIVE 8 TO 10 INCH WOODEN PEGS TO WITHIN 2 TO 3 INCHES OF THE SOIL SURFACE EVERY 4 FEET IN ALL DIRECTIONS. STAKES MAY BE DRIVEN BEFORE OR AFTER APPLYING MULCH. SECURE MULCH TO SOIL SURFACE BY STRETCHING TWINE BETWEEN PEGS IN A CRIS–CROSS AND A SQUARE PATTERN IN CONTACT WITH GROUND SURFACE. SECURE TWINE AROUND EACH PEG, WITH TWO OR MORE ROUND TURNS.

2. MULCH NETTINGS. STAPLE PAPER, JUTE, COTTON, OR PLASTIC NETTINGS TO THE SOIL SURFACE. USE A DEGRADABLE NETTING IN AREAS TO BE MOWED.

3. CRIMPER (MULCH ANCHORING COULTER TOOL). A TRACTOR–DRAWN IMPLEMENT, SOMEWHAT LIKE A DISC HARROW, ESPECIALLY DESIGNED TO PUSH OR CUT SOME OF THE BROADCAST LONG FIBER MULCH 3 TO 4 INCHES INTO THE SOIL SO AS TO ANCHOR IT AND LEAVE PART STANDING UPRIGHT. THIS TECHNIQUE IS LIMITED TO AREAS TRAVERSABLE BY A TRACTOR, WHICH MUST OPERATE ON THE CONTOUR OF SLOPES. STRAW MULCH RATE MUST BE 3 TONS PER ACRE. NO TACKIFYING OR ADHESIVE AGENT IS REQUIRED.

4. LIQUID MULCH–BINDERS. – MAY BE USED TO ANCHOR SALT HAY, HAY, OR STRAW MULCH.

A. APPLICATIONS SHOULD BE HEAVIER AT EDGES WHERE WIND MAY CATCH THE MULCH, IN VALLEYS, AND AT CRESTS OF BANKS. THE REMAINDER OF THE AREA SHOULD BE UNIFORM IN APPEARANCE.

B. USE ONE OF THE FOLLOWING:

(1) ORGANIC AND VEGETABLE BASED BINDERS – NATURALLY OCCURRING, POWDER BASED, HYDROPHILIC MATERIALS WHEN MIXED WITH WATER FORMULATE A GEL, AND WHEN APPLIED TO MULCH UNDER SATISFACTORY CURING CONDITION WILL FORM MEMBRANED NETWORKS OF INSOLUBLE POLYMERS. THE VEGETABLE GEL SHALL BE PHYSIOLOGICALLY HARMLESS AND NOT RESULT IN A PHYTOTOXIC EFFECT OR IMPEDE GROWTH OF TURFGRASS. USE AT RATES AND PER WEATHER CONDITIONS AS RECOMMENDED BY THE MANUFACTURER TO ANCHOR MULCH MATERIALS.

(2) SYNTHETIC BINDERS – HIGH POLYMER SYNTHETIC EMULSION, MISCIBLE WITH WATER WHEN DILUTED AND FOLLOWING APPLICATION TO MULCH, DRYING AND CURING SHALL NO LONGER BE SOLUBLE OR DISPERSIBLE IN WATER, IT SHALL BE APPLIED AT RATES RECOMMENDED BY THE MANUFACTURER AND REMAIN TACKY UNTIL GERMINATION OF GRASS.

NOTE: ALL NAMES GIVEN ABOVE ARE REGISTERED TRADE NAMES. THIS DOES NOT CONSTITUTE A RECOMMENDATION OF THESE PRODUCTS TO THE EXCLUSION OF OTHER PRODUCTS.

B. WOOD–FIBER OR PAPER–FIBER MULCH: SHALL BE MADE FROM WOOD, PLANT FIBERS OR PAPER CONTAINING NO GROWTH OR GERMINATION INHIBITING MATERIALS, USED AT THE RATE OF 1,500 POUNDS PER ACRE (OR AS RECOMMENDED BY THE PRODUCT MANUFACTURER) AND MAY BE APPLIED BY A HYDROSEEDER. THIS MULCH SHALL NOT BE MIXED IN THE TANK WITH SEED. USE IS LIMITED TO FLATTER SLOPES AND DURING OPTIMUM SEEDING PERIODS IN SPRING AND FALL.

C. PELLETIZED MULCH: COMPRESSED AND EXTRUDED PAPER AND/OR WOOD FIBER PRODUCT, WHICH MAY CONTAIN CO–POLYMERS, TACKIFIERS, FERTILIZERS AND COLORING AGENTS. THE DRY PELLETS, WHEN APPLIED TO A SEEDED AREA AND WATERED, FORM A MULCH MAT. PELLETIZED MULCH SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS. MULCH MAY BE APPLIED BY HAND OR MECHANICAL SPREADER AT THE RATE OF 60–75 LBS/1,000 SQUARE FEET AND ACTIVATED WITH 0.2 TO 0.4 INCHES OF WATER. THIS MATERIAL HAS BEEN FOUND TO BE BENEFICIAL FOR USE ON SMALL LAWN OR RENOVATION AREAS, SEEDED AREAS WHERE WEED–SEED FREE MULCH IS DESIRED OR ON SITES WHERE STRAW MULCH AND TACKIFIER AGENT ARE NOT PRACTICAL OR DESIRABLE. APPLYING THE FULL 0.2 TO 0.4 INCHES OF WATER AFTER SPREADING PELLETIZED MULCH ON THE SEED BED IS EXTREMELY IMPORTANT FOR SUFFICIENT ACTIVATION AND EXPANSION OF THE MULCH TO PROVIDE SOIL COVERAGE.

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
FILE NUMBER:
PLOT SCALE: 1:1
PLOT DATE: 19-FEB-2016
ISSUE DATE:
FILE NAME: GB_SEQ B3_CS506XXX.dgn
SIZE: ANSI D

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

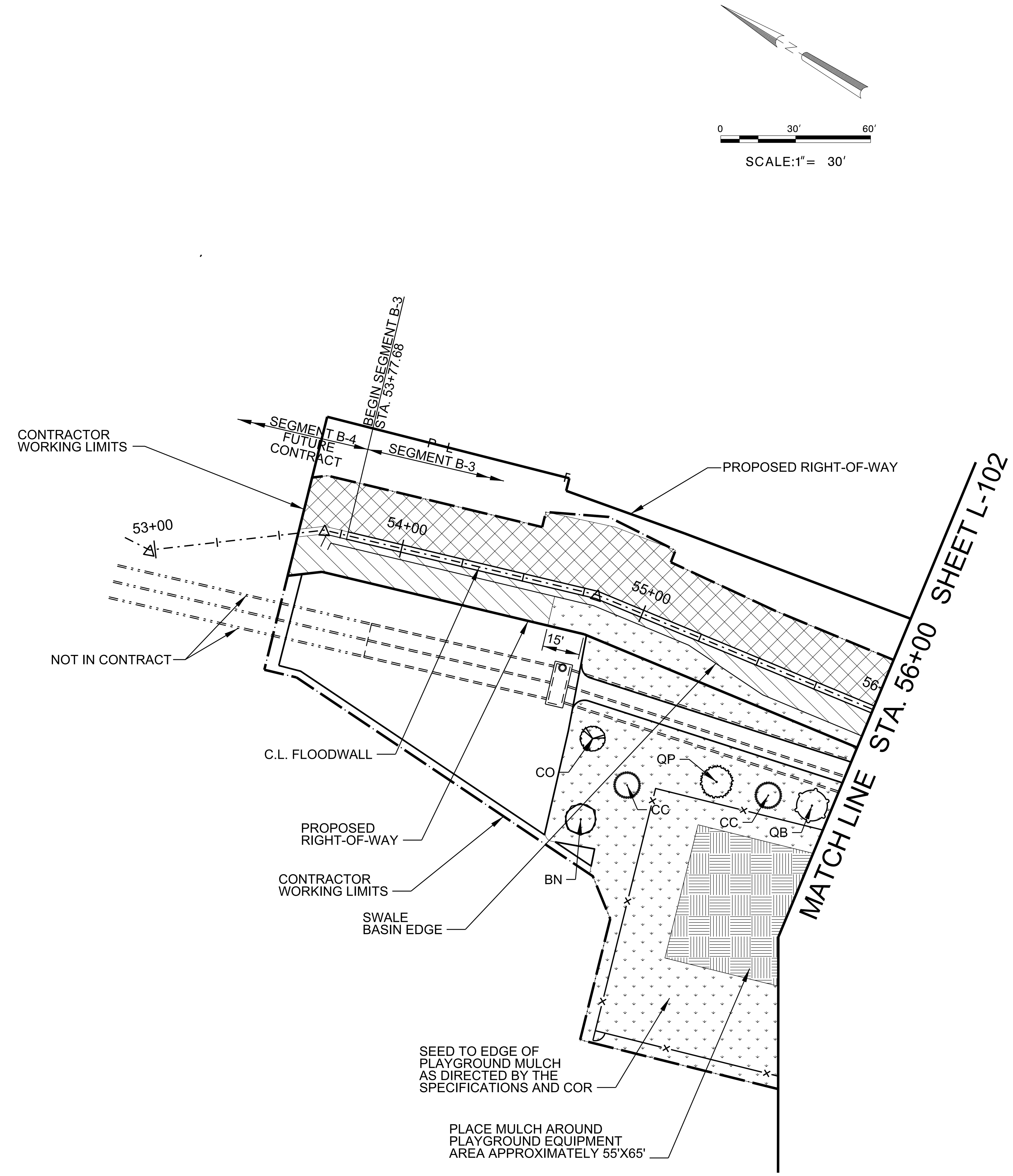
JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SOMERSET COUNTY
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

EROSION CONTROL NOTES
SHEET 2

SHEET IDENTIFICATION
CG-506
SHEET 45 OF 147

100% SUBMITTAL



GENERAL NOTES:

1. SEE TOPSOIL AND SEEDING SPECIFICATIONS FOR SEED MIX COMPOSITION.
2. ON FLOOD SIDE OF THE FLOOD WALL, FLOODPLAIN MIX SHALL BE SEEDED IN ALL WORK AREAS DISTURBED DURING CONSTRUCTION ACTIVITIES OTHER THAN RIP RAP, HARDSCAPE, OR STRUCTURE.
3. ON COMMUNITY SIDE OF FLOOD WALL, LAWN MIX SHALL BE SEEDED IN ALL WORK AREAS DISTURBED DURING CONSTRUCTION ACTIVITIES OTHER THAN MULCH, RIP RAP, HARDSCAPE, OR STRUCTURE.
4. CONTRACTOR SHALL SEED ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES AS DETERMINED BY CONTRACTING OFFICER.
5. THE ACREAGE OF SEEDING AREAS SHALL BE BASED ON THE EXTENT OF THE WORK AREA. EXPANSION OF THE WORK AREA MAY REQUIRE AN INCREASE IN SEED MIX QUANTITY.
6. AFTER CONSTRUCTION ACTIVITIES ARE COMPLETE, REMOVE CONSTRUCTION STRUCTURES, EQUIPMENT AND TEMPORARY PAVEMENT. SCARIFY CONSTRUCTION STAGING AREAS DETERMINED BY CONTRACTING OFFICER TO A DEPTH OF 12 INCHES PRIOR TO PLACING TOPSOIL, INSTALLING PLANTS AND SEEDING.
7. PLAYGROUND MULCH SHALL CONFORM TO ASTM F1292 WITH MINIMUM FALL PROTECTION ZONES PER EACH PLAYGROUND EQUIPMENT MANUFACTURER'S STANDARDS.

LEGEND

SWALE MIX pattern	SWALE MIX 40 LBS / ACRE
FLOODPLAIN MIX pattern	FLOODPLAIN MIX 10 LBS / ACRE
LAWN MIX pattern	LAWN MIX 263 LBS / ACRE 6 LBS / 1000 SF
MULCH pattern	MULCH

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
AMMANN & WHITNEY
JOINT VENTURE

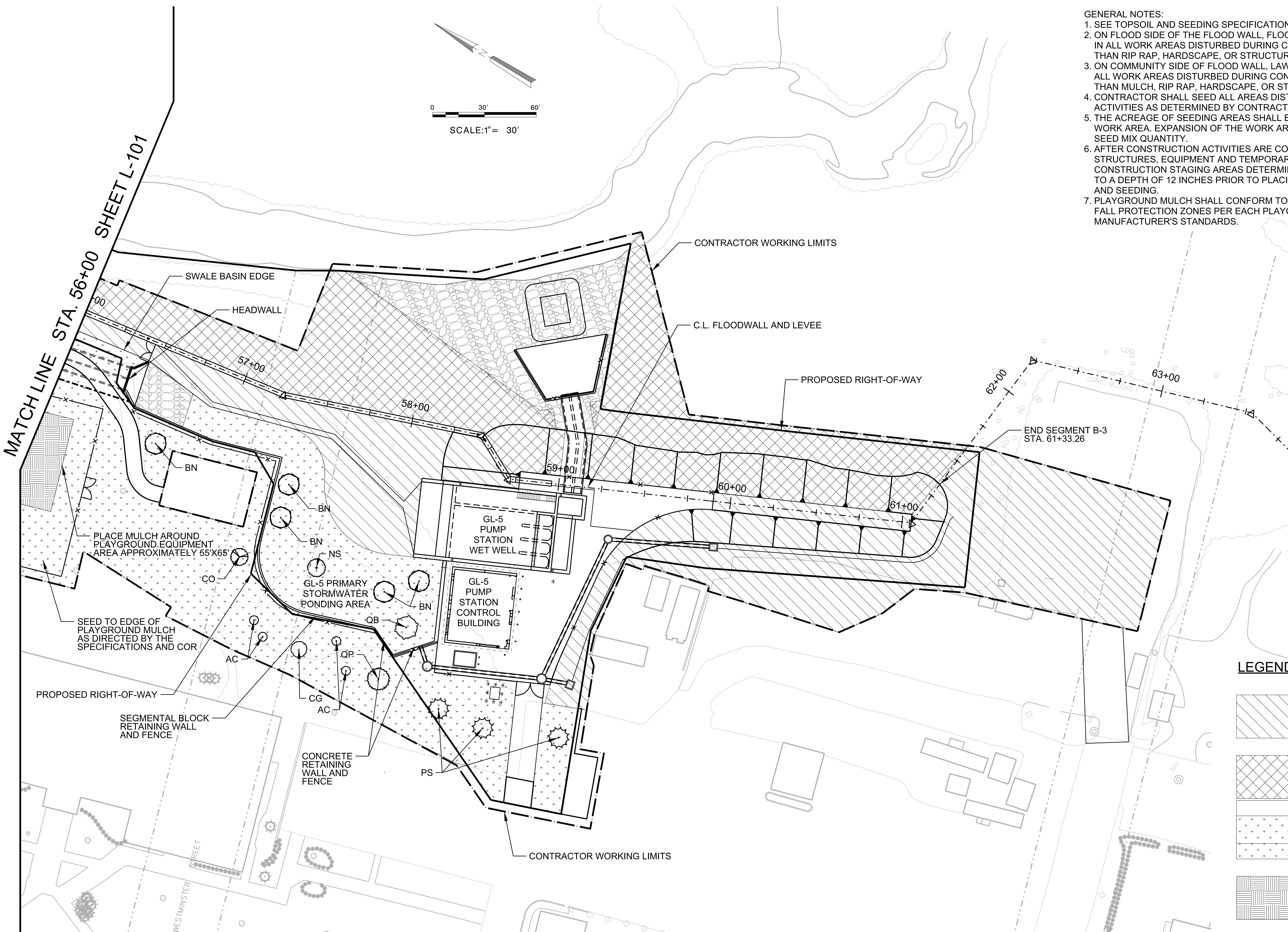
DESIGNED BY: AJD
DWN BY: LGW
CKD BY:
SUBMITTED BY:
PLOT SCALE: XXX
ISSUE DATE: FEB. 2016
SIZE: ANSI D
FILE NAME: GB_SEG B3_L-101XXX.dgn
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912P8-##-X-####
FILE NUMBER:

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

LANDSCAPE PLAN SHEET
STA. 53+77.68 TO STA. 56+00

SHEET IDENTIFICATION
L-101
SHEET 46 OF 147

100% SUBMITTAL



GENERAL NOTES:

1. SEE TOPSOIL AND SEEDING SPECIFICATIONS FOR SEED MIX COMPOSITION.
2. ON FLOOD SIDE OF THE FLOOD WALL, FLOODPLAIN MIX SHALL BE SEEDED IN ALL WORK AREAS DISTURBED DURING CONSTRUCTION ACTIVITIES OTHER THAN RIP RAP, HARDSCAPE, OR STRUCTURE.
3. ON COMMUNITY SIDE OF FLOOD WALL, LAWN MIX SHALL BE SEEDED IN ALL WORK AREAS DISTURBED DURING CONSTRUCTION ACTIVITIES OTHER THAN MULCH, RIP RAP, HARDSCAPE, OR STRUCTURE.
4. CONTRACTOR SHALL SEED ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES AS DETERMINED BY CONTRACTING OFFICER.
5. THE ACREAGE OF SEEDING AREAS SHALL BE BASED ON THE EXTENT OF THE WORK AREA. EXPANSION OF THE WORK AREA MAY REQUIRE AN INCREASE IN SEED MIX QUANTITY.
6. AFTER CONSTRUCTION ACTIVITIES ARE COMPLETE, REMOVE CONSTRUCTION STRUCTURES, EQUIPMENT AND TEMPORARY PAVEMENT. SCARIFY CONSTRUCTION STAGING AREAS DETERMINED BY CONTRACTING OFFICER TO A DEPTH OF 12 INCHES PRIOR TO PLACING TOPSOIL, INSTALLING PLANTS AND SEEDING.
7. PLAYGROUND MULCH SHALL CONFORM TO ASTM F1292 WITH MINIMUM FALL PROTECTION ZONES PER EACH PLAYGROUND EQUIPMENT MANUFACTURER'S STANDARDS.

LEGEND

- SWALE MIX 40 LBS / ACRE
- FLOODPLAIN MIX 10 LBS / ACRE
- LAWN MIX 263 LBS / ACRE 6 LBS / 1000 SF
- MULCH
- RIPRAP

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

DESIGNED BY: AJD | DATE: 19-FEB-2016
DWN BY: LGW | CKD BY: | SOLICITATION NO.:
SUBMITTED BY: | CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: XXX | ISSUE DATE: FEB. 2016 | FILE NUMBER:
SIZE: ANSI D | FILE NAME: GB_SEG B3_L-102XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

LANDSCAPE PLANTING DETAILS
STA. 56+00 TO STA. 63+20

SHEET IDENTIFICATION
L-102
SHEET 47 OF 147

100% SUBMITTAL

FLOODPLAIN MIX

	Scientific Name	Common Name	Indicator Status	Purity Seed	Minimum Germination	Weed	% of Mix by Weight
Grasses	*Argostis scabra*	Rough Bentgrass	FAC	98%	80%	0.25%	12.5
	Calamagrostis canadensis	Blue-joint Grass	OBL	98%	80%	0.25%	1.0
	Elymus villosus	Silky Wild Rye	FACU	98%	80%	0.25%	8.0
	Elymus virginicus	Wild Rye, Virginia	FACW-	98%	80%	0.25%	15.0
	Glyceria grandis	Manna Grass, Reed	OBL	98%	80%	0.25%	3.0
	Glyceria striata	Manna Grass, Fowl	OBL	98%	80%	0.25%	2.0
	Leersia Oryzoides	Rice Cutgrass	OBL	98%	80%	0.25%	4.0
	Poa palustris	Bluegrass, Fowl	FACW	98%	80%	0.25%	30.0
Graminoids	*Carex crinita*	Fringed Sedge	OBL	95%	80%	0.25%	3.0
	Carex lupulina	Hop Sedge	OBL	95%	80%	0.25%	2.5
	Carex vulpinoidea	Fox Sedge	OBL	95%	80%	0.25%	5.0
	Scirpus cyperinus	Woolgrass	OBL	85%	80%	0.25%	0.1
	Scirpus expansus	Wood Bulrush	OBL	95%	80%	0.25%	4.0
Forbs	*Asclepias incarnata*	Marsh Milkweed	OBL	85%	80%	0.25%	2.0
	Aster novae-angliae	New England Aster	FACW	84%	80%	0.25%	0.2
	Bidens aristosa	Showy Tickseed Sunflower	FACW	87%	80%	0.25%	2.0
	Eupatorium fistulosum	Joe Pye Weed	FACW	87%	80%	0.25%	2.5
	Rudbeckia hirta	Black-eyed Susan	FACW	84%	80%	0.25%	0.2
	Veronia noveboracensis	New York Ironweed	FACW	84%	80%	0.25%	3.0

SWALE MIX

	Scientific Name	Common Name	Purity Seed	Minimum Germination	Weed	% of Mix by Weight
Grasses & Graminoids	*Andropogon gerardii*	Big Bluestem	98%	80%	0.25%	4.0
	Argostis scabra	Rough Bentgrass	98%	80%	0.25%	10.0
	Carex lupulina	Hop Sedge	95%	80%	0.25%	2.5
	Carex vulpinoidea	Fox Sedge	95%	80%	0.25%	3.5
	Elymus villosus	Silky Wild Rye	98%	80%	0.25%	27.0
	Panicum virgatum	Switchgrass	98%	80%	0.25%	1.0
	Poa palustris	Bluegrass, Fowl	98%	80%	0.25%	6.0
	Schizachyrium scoparium	Little Bluestem	98%	80%	0.25%	27.0
	Sorghastrum nutans	Indian Grass	98%	80%	0.25%	4.0
Forbs	*Asclepias incarnata*	Marsh Milkweed	85%	80%	0.25%	0.2
	Asclepias tuberosa	Butterfly Milkweed	85%	80%	0.25%	0.3
	Aster novae-angliae	New England Aster	84%	80%	0.25%	0.3
	Bidens aristosa	Showy Tickseed Sunflower	87%	80%	0.25%	1.0
	Eupatorium fistulosum	Joe Pye Weed	87%	80%	0.25%	2.0
	Oligoneuron rigidum	Stiff Goldenrod	84%	80%	0.25%	0.5
	Rudbeckia hirta	Black-eyed Susan	84%	80%	0.25%	0.2
	Solidago patula	Rough-leaf Goldenrod	84%	80%	0.25%	1.0
	Symphyotrichum puniceum	Purple Stemmed Aster	84%	80%	0.25%	4.5
	Verbena hastata	Blue Verbain	85%	80%	0.25%	5.0

LAWN MIX

	Scientific Name	Common Name	Purity Seed	Minimum Germination	Weed	% of Mix by Weight
Grasses	*Festuca sp.*	Tall Fescue - Apache, Fidelity, Blackwatch, Falcon, Escalade, Mustang 3, Rebel Exeda	98%	85%	0.25%	60.0
	Poa sp.	Bluegrass - Avalanche, Bristol, Total Eclipse, P-105, Touchdown	98%	80%	0.25%	20.0
	Elymus sp.	Perrenial Ryegrass - All Star2, Palmer II, Pennant III, Pizzazz, Premier II, Yorktown II	95%	85%	0.25%	20.0

SEEDING SPECIFICATIONS AND NOTES

1. SCOPE OF WORK

   THIS WORK SHALL CONSIST OF SOIL PREPARATION, FINISH GRADING, SEEDING, MULCHING, AND ALL LABOR, MATERIALS, EQUIPMENT, AND ANY OTHER INCIDENTALS REQUIRED FOR FURNISHING AND INSTALLING SEED, STRAW MULCHING AND MULCH BINDER IN A WAY THAT OBTAINS OPTIMAL GERMINATION AND LONG TERM SUCCESS ACCORDING TO THE CONTRACT PLANS AND SPECIFICATIONS AND AS DIRECTED BY THE ENGINEER.

2. MATERIALS

   ALL SEED MATERIALS SHALL BE THE BEST OF ITS KIND AVAILABLE. THE COR MAY MANDATE SEED MATERIAL OR SEED INSPECTIONS TO INSURE QUALITY.

3. GENERAL WORK PROCEDURES

   LANDSCAPE WORK SHALL BE IN ACCORDANCE WITH WORKMANLIKE STANDARDS ESTABLISHED FOR LANDSCAPE CONSTRUCTION AND PLANTING. THE CONSTRUCTION SITE SHALL BE KEPT IN A NEAT AND ORDERLY FASHION.

4. WEEDING

   BEFORE AND DURING PRELIMINARY GRADING AND FINISH GRADING, ALL WEEDS AND INVASIVES SHALL BE DUG OUT BY THE ROOT AND DISPOSED AS DIRECTED BY COR.

5. FINISH GRADING

   AFTER FLOOD WALL, PUMP STATION STRUCTURES, PAVEMENTS, FOOTINGS, WALLS, AND GENERAL CONSTRUCTION IS COMPLETE AND PRIOR TO ANY FINISH GRADING ACTIVITIES, REMOVE STONES LARGER THAN 3 INCHES IN ANY DIMENSION AND STICKS, ROOTS, RUBBISH, CONSTRUCTION MATERIALS, FORMS, SLAG, AND ANY OTHER DELETERIOUS MATERIAL AND LEGALLY DISPOSE OF THEM OFF SITE AS DIRECTED BY THE COR. ALL SOIL AMENDING AND TOPSOIL PLACEMENT SHALL BE CONDUCTED PRIOR TO FINISH GRADING. ALL SEEDING AREAS SHALL BE SMOOTH, EVEN AND UNIFORM WITH NO ABRUPT CHANGE OF SURFACE, UNLESS OTHERWISE DIRECTED BY THE COR OR FINAL PLANS. PRIOR TO SEEDING, FINAL GRADE SHALL BE RAKED OR FURROWED TO LOOSEN THE SOIL AND CREATE A TEXTURED SURFACE FOR SEEDING.

6. SEED

   SEED SHALL BE PURE LIVE SEED, CLEAN TO BARE SEED, FRESH AND DELIVERED TO THE SITE IN ORIGINAL, UNOPENED BAGS SHOWING THE NET WEIGHT, COMPOSITION OF MIX, SUPPLIER'S NAME AND GUARANTEE OF ANALYSIS. IN STATE SUPPLIERS ARE PREFERRED. SEED SHALL BE DELIVERED AND STORED IN ORIGINAL, UNOOPENED PACKAGES, KEPT DRY, AND NOT OPENED UNTIL NEEDED FOR USE. DAMAGES OR FAULTY PACKAGES SHALL NOT BE USED AND WILL BE REJECTED. SEED SHALL HAVE BEEN HARVESTED FROM THE PREVIOUS GROWING SEASON.

7. SEEDING

   ALL SEEDING SHALL BE CONDUCTED DURING THE DORMANT SEASON. SEEDING SHALL BE CONDUCTED IN DRY AREAS. FLOODED AREAS SHALL NOT BE SEEDED. SEEDING SHALL BE DONE BY BROADCAST METHODS OR HYDROSEEDING IN ACCORDANCE WITH SEED SUPPLIERS' RECOMMENDATIONS. ALL SEEDED AREAS SHALL BE COVERED WITH A LIGHT LAYER OF STRAW MULCH OR HYDROMULCH. SEEDED AREAS SHALL BE ADEQUATELY WATERED TO ESTABLISH VEGETATIVE COVER.

8. SEEDING RATES

   SEEDING RATES SHALL BE AS FOLLOWS:
   - FLOODPLAIN MIX 10 LBS/ACRE
   - SWALE MIX 40 LBS/ACRE
   - LAWN MIX 6 LBS/1000 SF

9. SEEDING PERIODS

   SPRING SEASON: APRIL 1 TO MAY 31 - SEEDING ALLOWED
   GROWING SEASON: JUNE 1 TO AUGUST 21 - NO PERMANENT SEEDING ALLOWED. SEED WITH TEMPORARY/EROSION CONTROL MIX. REFER TO SPECIFICATION SECTION 01 57 19.00
   LATE SUMMER SEASON: AUGUST 22 TO SEPTEMBER 10 SEEDING ALLOWED
   MID FALL (DORMANT PERIOD): OCTOBER 15 TO NOVEMBER 15 SEEDING ALLOWED (WITH EROSION CONTROL MATS ONLY)
   WINTER (DORMANT PERIOD): NOVEMBER 16 TO MARCH 31 NO PERMANENT SEEDING ALLOWED. SEED WITH TEMPORARY/EROSION CONTROL MIX. REFER TO SPECIFICATION SECTION 01 57 19.00

   NOTE: SEEDING TIMES ARE DETERMINED BY CONSISTENT AVERAGE SOIL TEMPERATURES REQUIRED FOR GERMINATION: 55°F FOR COOL-SEASON GRASS GERMINATION AND 65°F FOR WARM-SEASON GRASS GERMINATION.

10. STRAW MULCH

    THE MATERIAL FOR MULCH SHALL BE STRAW DERIVED FROM THRESHED, UNROTTED STALKS OF OAT, WHEAT, RYE, BARLEY, OR OTHER ACCEPTABLE NATIVE GRASSES WELL CURED TO LESS THAN 20% MOISTURE BY WEIGHT. STRAW SHALL BE FREE FROM SEED, NOXIOUS WEEDS, AND OTHER FOREIGN MATERIALS. ALL SEEDED AREAS SHALL BE COVERED AT A RATE OF TWO TONS PER ACRE ACCORDING TO SPECIFICATIONS WITHIN 48 HOURS OF SEEDING. HOWEVER, IN THE EVENT OF ANTICIPATED RAINFALL WITHIN 24 HOURS, SEEDING WILL NOT BE PERMITTED WHEN STRAW MULCH CANNOT BE IMMEDIATELY APPLIED AFTER SEEDING. MULCH SHOULD BE CRIMPED IN.

US Army Corps of Engineers®

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MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: AJD
DRN BY: LGW
CKD BY:
SUBMITTED BY:
DATE: 19-FEB-2016
SOLICITATION NO.:
CONTRACT NO.: W912PS-##-X-####
ISSUE DATE: FEB 2016
PLOT SCALE: AS PLOTTED
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEQ B3_L-103XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
AMMANN & WHITNEY
JOINT VENTURE

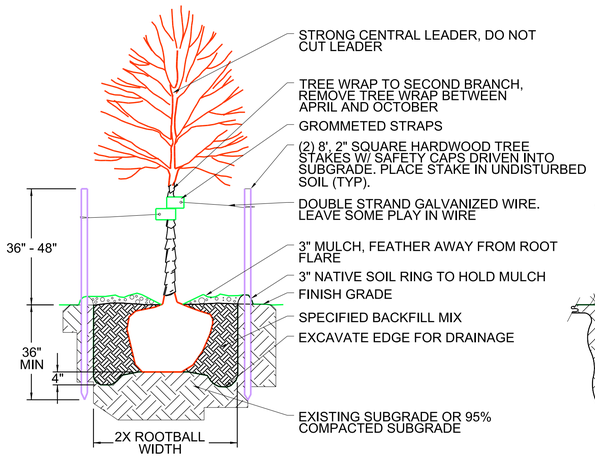
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SOMERSET AND MIDDLESEX COUNTIES
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

LANDSCAPING NOTES
AND SEED MIX TABLES

SHEET IDENTIFICATION
L-103
SHEET 48 OF 147

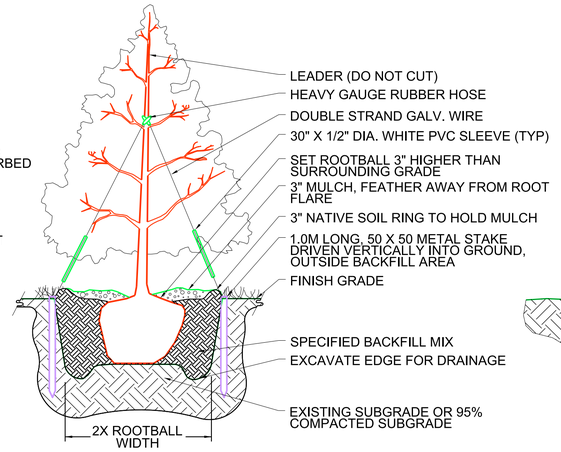
100% SUBMITTAL

NOTES:
1. PRUNE DAMAGED OR DEAD WOOD ONLY EXCEPT PRUNE TO ELIMINATE WEAK CROTCH OR DOUBLE LEADER
2. PROVIDE TWO-GUY SYSTEM AS SHOWN. REMOVE AFTER 1 YEAR
3. SCARIFY SURFACES OF TREE PIT TO ENCOURAGE ROOT GROWTH OUT OF PIT
4. CUT AND REMOVE TWINE AND BURLAP FROM TOP 1/3 OF ROOTBALL. REMOVE TWO-THIRDS OF WIRE BASKET.



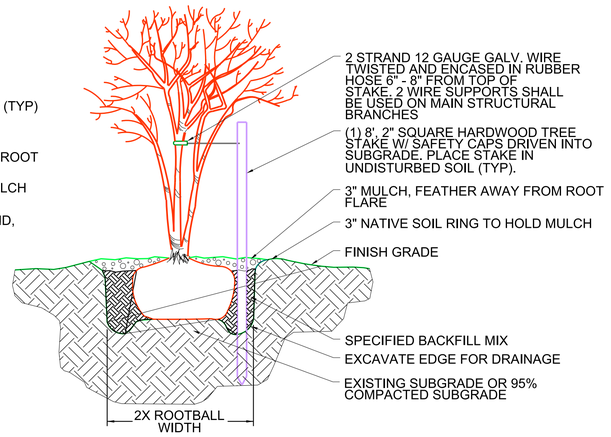
TREE PLANTING DETAIL
N.T.S.

NOTES:
1. SET ROOTBALL ON UNDISTURBED SOIL
2. REMOVE BURLAP, WIRE, TWINE FROM TOP 1/3 OF ROOTBALL
3. PRUNE DAMAGED OR DEAD WOOD ONLY, EXCEPT PRUNE TO ELIMINATE WEAK CROTCH OR DOUBLE LEADER
4. PROVIDE THREE-GUY SYSTEM EQUI-DISTANT AROUND TREE AT 120 DEG. REMOVE AFTER 1 YEAR
5. SCARIFY SURFACES OF TREE PIT TO ENCOURAGE ROOT GROWTH OUT OF PIT



CONIFEROUS TREE PLANTING DETAIL
N.T.S.

NOTES:
1. STAKE BRANCHES AS NECESSARY FOR SUPPORT
2. WIRE SHALL NOT TOUCH OR RUB ADJACENT TRUNKS OR BRANCHES
3. SCARIFY SURFACES OF TREE PIT TO ENCOURAGE ROOT GROWTH OUT OF PIT
4. SET ROOTBALL ON UNDISTURBED SOIL
5. REMOVE BURLAP WIRE TWINE FROM TOP 1/3 OF ROOTBALL
6. PRUNE DAMAGED OR DEAD WOOD ONLY



MULTI-STEM TREE PLANTING DETAIL
N.T.S.

PLANTING SCHEDULE

SYM	ID	QTY	Scientific Name	Common Name	Wetland Indicator	Caliper	Container	Min. Height	Spacing	Notes
	TREES									
⊙	AC	12	*Amelanchier canadensis 'Glennform'*	Rainbow Pillar Serviceberry	FAC	2-1/2 inch	B&B	10'	See Plan	Multi-stem
⬡	BN	14	*Betula nigra 'Heritage'*	Heritage River Birch	FACW	2-1/2 inch	B&B	10'	See Plan	Multi-stem
⊗	CO	12	*Celtis occidentalis 'Magnifica'*	Hackberry	FACU	2-1/2 inch	B&B	10'	See Plan	
○	CC	17	*Cercis canadensis*	Redbud	UPL	2-1/2 inch	B&B	8'	See Plan	
○	CG	1	*Crategus crus-galli*	Cockspur	FAC	2-1/2 inch	B&B	8'	See Plan	
⊕	NS	1	*Nyssa sylvatica*	Blackgum	FAC	2-1/2 inch	#3	10'	See Plan	
✳	PS	11	*Pinus Strobus*	Eastern White Pine	FACU	2-1/2 inch	B&B	12-14'	See Plan	Coniferous Tree
⬡	QB	6	*Quercus bicolor*	Swamp White Oak	FACW	2-1/2 inch	B&B	12'	See Plan	Plant in spring only
✳	QP	10	*Quercus phellos*	Willow Oak	FACW	2-1/2 inch	B&B	12'	See Plan	Strong Central Leader

NOTE: TREE LOCATIONS OF QUANTITIES NOT INDICATED ON PLANS SHALL BE COORDINATED WITH THE COR.

PLANTING SPECIFICATIONS

1. SCOPE OF WORK

A. THIS WORK SHALL CONSIST OF PERFORMING CLEARING AND SOIL PREPARATION, FINISH GRADING, AND PLANTING INCLUDING ALL LABOR, MATERIALS, TOOLS, EQUIPMENT AND INCIDENTALS NECESSARY FOR THE COMPLETION OF THIS PROJECT

2. MATERIALS

A. GENERAL - ALL MATERIALS SHALL BE BEST OF ITS KIND AVAILABLE. THE CORPS OF ENGINEERS AND/OR THEIR REPRESENTATIVES MAY MANDATE PLANT MATERIAL AND PLANTING INSPECTIONS TO ENSURE PLAN QUALITY.

B. PLANTS - ALL PLANTS SHALL BE HEALTHY NURSERY GROWN, WELL ROOTED, FREE OF DEBRIS, ROCKS LARGER THEN TWO INCHES (2") IN ANY DIRECTION, WOOD, ROOTS, VEGETABLE MATTER AND CLAY CLODS OR FOREIGN MATTER.

3. WEEDING

A. BEFORE AND DURING PRELIMINARY GRADING AND FINISH GRADING, ALL WEEDS AND INVASIVE PLANTS SHALL BE DUG OUT BY THE ROOTS AND DISPOSED OF OFF SITE.

4. TOPSOIL

A. SEE SECTION 32 92 19 SEEDING FOR TOPSOIL MIX AND DEPTHS.

5. PLANTING

A. POSITION TREES AND SHRUBS AT THEIR INTENDED LOCATION AS PER THE PLANS AND SECURE THE APPROVAL OF THE CONTRACTING OFFICER PRIOR TO EXCAVATING PITS MAKING NECESSARY ADJUSTMENTS AS DIRECTED.

B. EXCAVATE CIRCULAR PLANTING PIT WITH SIDES SLOPED AT INWARD 45 DEGREE ANGLE. TRIM PERIMETER OF BOTTOM LEAVING CENTER AREA SLIGHTLY RAISED TO SUPPORT ROOT BALL AND ASSIST IN DRAINAGE. SCARIFY SIDES OF PLANTING PIT.

C. PLANTS SHALL BE POSITIONED SUCH THAT THE TRUNK IS VERTICAL.

D. ROOT BALL SHALL BE PLACED AT REST ON EXISTING SOIL. BACKFILL IN LIFTS OF SIX TO EIGHT INCHES (6-8") AND THOROUGHLY SETTLED WITH WATER.

E. SEE SECTION 32 93 00 EXTERIOR PLANTING FOR FERTILIZER AND INOCCULANT SCHEDULES.

F. IMMEDIATELY AFTER PLANTING, STAKE ALL TREES TO PREVENT DAMAGE FROM WIND.

G. DEVELOP THREE INCH (3") TALL NATIVE SOIL RING WITH PLANT CENTERED IN 4.5 FOOT DIAMETER. PLACE MULCH AT DEPTH OF THREE INCHES (3") AND WATER THOROUGHLY.

6. FINISH GRADING

A. ALL PLANTING AREAS SHALL BE GRADED TO A SMOOTH, EVEN AND UNIFORM PLANE WITH NO ABRUPT CHANGE OF SURFACE, UNLESS OTHERWISE DIRECTED BY CONTRACTING OFFICER OR GOVERNMENT REPRESENTATIVE.

B. ALL PLANTING AREAS SHALL BE GRADED AND MAINTAINED TO ALLOW FREE FLOW OF SURFACE WATER.

7. GUARANTEE

A. CONTRACTOR SHALL GUARANTEE ALL PLANTS FOR A PERIOD OF TWO (2) YEARS.

B. REPLACEMENT SHALL BE MADE AT BEGINNING OF SUCCEEDING PLANTING SEASON. ALL REPLACEMENTS SHALL HAVE A GUARANTEE EQUAL TO ABOVE STATEMENT.

8. CLEAN-UP AND MAINTENANCE

A. CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING THE ENTIRE AREA WITHIN THE CONTRACT LIMIT NEAT IN APPEARANCE UNTIL THE FINAL ACCEPTANCE OF THE WHOLE WORK OF CONTRACT.

B. MAINTAIN TREES AND SHRUBS BY PRUNING, WATERING, FERTILIZING, CULTIVATING AND WEEDING AS REQUIRED FOR HEALTHY GROWTH. REPAIR STAKE AND GUY SUPPORTS AND RESET TREES AND SHRUBS TO PROPER GRADE AND VERTICAL POSITION AS REQUIRED. REPLANT AS REQUIRED TO MEET GUARANTEE.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL TREE STAKES, NON-BIODEGRADABLE ANCHORS, AND TREE TUBES ONE (1) YEAR POST INITIAL INSTALLATION OR RE-PLANTING.

D. THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER REMOVAL OF VEGETATION SUPPORT AND PRORTECTION MATERIAL SO AS TO NOT DAMAGE THE PLANT MATERIAL. CONTRACTOR SHALL BE RESPONSIBLE FOR RESTITUTION/REPLACEMENT FOR PLANT MATERIAL DAMAGES CAUSED BY RECKLESS STAKING OR TREE ANCHORING REMOVAL.

PLANTING NOTES

1. PLANT MATERIAL SHALL BE FURNISHED AND INSTALLED AS INDICATED: INCLUDING ALL LABOR, MATERIALS, PLANTS, EQUIPMENT, INCIDENTALS AND CLEAN UP NECESSARY TO ACCOMPLISH WORK.
2. PLANTS SHALL BE TYPICAL OF THEIR SPECIES AND VARIETY, HAVE NORMAL GROWTH HABITS, WELL DEVELOPED BRANCHES, VIGOROUS ROOT SYSTEMS AND FREE OF PESTS, DISEASE, DEFECTS AND INJURIES.
3. INSOFAR THAT IT IS PRACTICAL, PLANT MATERIAL SHALL BE PLANTED ON THE DAY OF DELIVERY.
4. QUALITY AND SIZE OF PLANTS, SPREAD OF ROOTS, AND SIZE OF BALLS SHALL BE IN ACCORDANCE WITH MOST CURRENT ANSI Z60.1 OR CURRENT EDITION OF "AMERICAN STANDARD FOR NURSERY STOCK" AS PUBLISJED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC.
5. PLANTS SHALL BE HANDLED BY THE BOTTOM OF THE ROOT BALL ONLY. DAMAGED PLANTS WILL NOT BE ACCEPTED.
6. PLANTING OPERATIONS SHALL BE PREFORMED DURING PERIODS OF THE PLANTING SEASON WHEN WEATHER AND SOIL CONDITIONS ARE SUITABLE AND IN ACCORDANCE WITH ACCEPTED LOCAL PRACTICE. ALL PLANT MATERIAL SHALL BE SPRAYED WITH 'WILT-PRUF" OR EQUAL AS PER MANUFACTURER'S INSTRUCTION.
7. SET ALL PLANTS PLUMB AND STRAIGHT. SET AT SUCH A LEVEL THAT, AFTER SETTLEMENT, A NORMAL OR NATURAL RELATIONSHIP TO THE CROWN OF THE PLANT WITH THE GROUND SURFACE WILL BE ESTABLISHED. LOCATE PLANT IN THE CENTER OF PIT, WITH APPROPRIATE SOLAR ORIENTATION PER SPECIFICATIONS.
8. ALL INJURED ROOTS SHALL BE PRUNED TO MAKE CLEAN ENDS BEFORE PLANTING.
9. EACH TREE AND SHRUB SHALL BE PRUNED IN ACCORDANCE WITH STANDARD HORTICULTURAL PRACTICE TO PRESERVE NATURAL CHARACTER OF PLANT. PRUNING SHALL BE DONE WITH CLEAN, SHARP TOOLS.
10. TREES SHALL BE SUPPORTED IMMEDIATELY AFTER PLANTING. ALL TREES SHALL BE STAKED AS INDICATED. THE LANDSCAPE CONTRACTOR SHALL REMOVE STAKING AND GUY ASSEMBLIES AT THE END OF TWO (2) YEAR GUARANTEE PERIOD.
11. NEW PLANTING AREAS AND SEEDED AREAS SHALL BE ADEQUATELY WATERED TO ESTABLISH PLANTINGS.
12. ALL DISTURBED AREAS TO BE TREATED IN ACCORDANCE WITH PERMANENT STABILIZATION METHODS INDICATED ON THE EROSION AND SEDIMENT CONTROL PLANS.

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
SUBMITTED BY:
DATE: 19-FEB-2016
CKD BY:
SOLICITATION NO.:
CONTRACT NO.: W912P5-##-X-####
PLOT SCALE: FULL SCALE
ISSUE DATE: FEB 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: GB_SEG B3_ L-104XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

JACOBS
AMMANN & WHITNEY
JOINT VENTURE

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B3, CONTRACT 2
BORO. OF MIDDLESEX AND GREEN BROOK TWP., NJ

LANDSCAPING DETAILS AND PLANTING SCHEDULE

SHEET IDENTIFICATION
L-104
SHEET 49 OF 147

100% SUBMITTAL

0 30' 60'

SCALE:1"= 30'

THE HORIZONTAL CONTROL IS BASED ON SURFACE COORDINATES APPLIED TO THE NORTH AMERICAN DATUM OF 1927 (NAD27).

THE VERTICAL CONTROL IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).

TOPOGRAPHIC MAPPING PREPARED BY:
BET CONSULTANT, INC.
36 ROUTE 10
EAST HANOVER, NJ
NJ PLS 19943
DATE OF PHOTOGRAPHY 1-14-2010

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DESIGNED BY:		DATE: 19-FEB-2016	
DWN BY:	CKD BY:	SOLICITATION NO.:	
SUBMITTED BY:		CONTRACT NO.: W912PB-##-X-####	
PLOT SCALE: XXX	ISSUE DATE: FEB. 2016	FILE NUMBER:	
SIZE: ANSI D	FILE NAME: GB_SEG B3_V-101XXX.dgn		

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

EXISTING SURVEY PLAN
STA. 53+77.68 TO STA. 58+00

SHEET IDENTIFICATION
V-101
SHEET 50 OF 147

100% SUBMITTAL

THE HORIZONTAL CONTROL IS BASED ON SURFACE COORDINATES APPLIED TO THE NORTH AMERICAN DATUM OF 1927 (NAD27).

THE VERTICAL CONTROL IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).

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DATE OF PHOTOGRAPHY 1-14-2010

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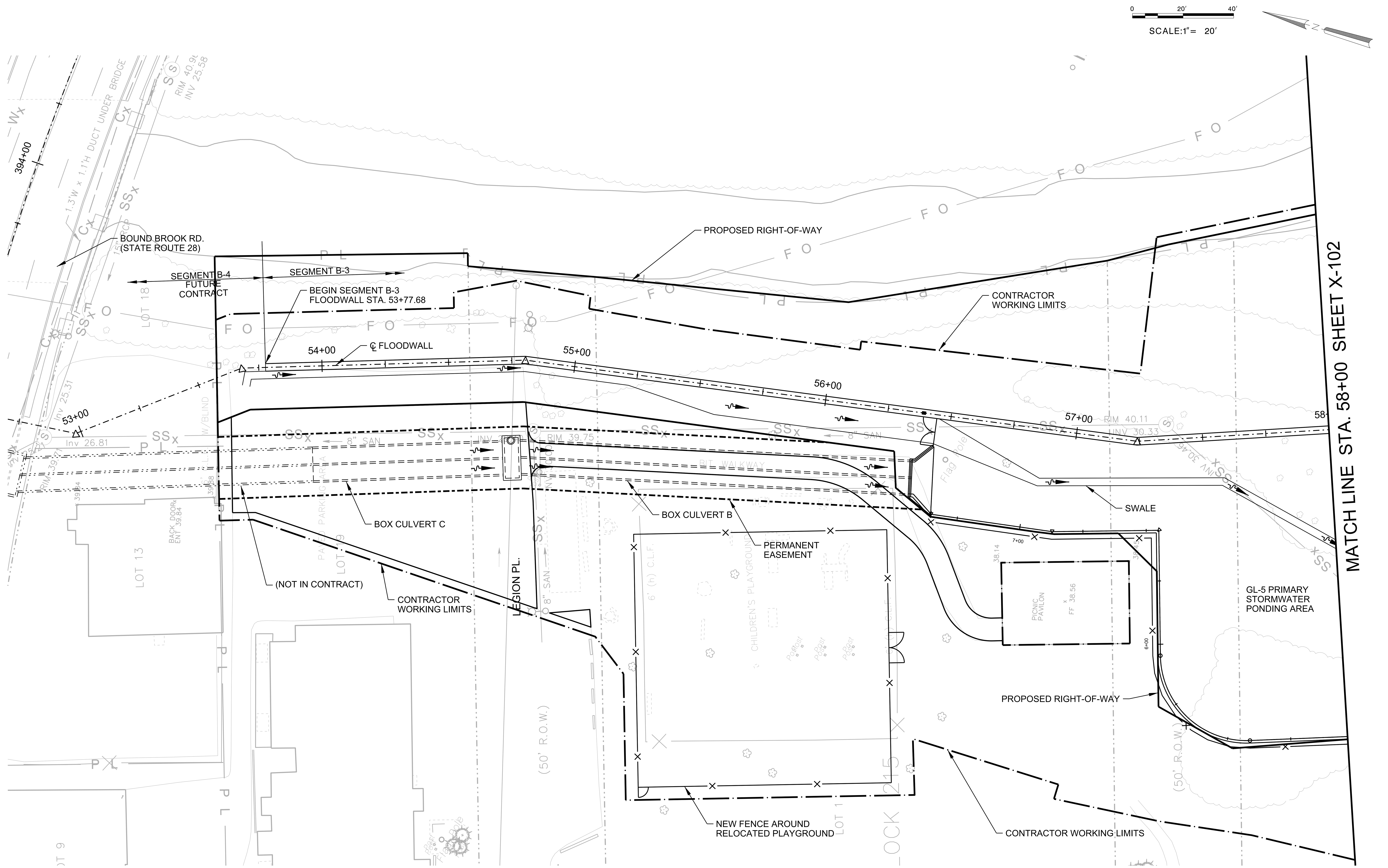
DWN BY:	CKD BY:	SOLICITATION NO.:
SUBMITTED BY:	CONTRACT NO.: W912PM-##-X-####
PLOT SCALE: XXX	ISSUE DATE: FEB. 2016	FILE NUMBER:
SIZE: ANSI D	FILE NAME: GB_SEG B3_V-102XXX.dgn

GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

EXISTING SURVEY PLAN
STA. 58+00 TO STA. 63+20

SHEET IDENTIFICATION
V-102
SHEET 51 OF 147

100% SUBMITTAL



SCALE:1"= 20'
0
20'
40'
BOUND BROOK RD.
(STATE ROUTE 28)
SEGMENT B-4
FUTURE
CONTRACT
SEGMENT B-3
BEGIN SEGMENT B-3
FLOODWALL STA. 53+77.68
PROPOSED RIGHT-OF-WAY
CONTRACTOR
WORKING LIMITS
℄ FLOODWALL
53+00
54+00
55+00
56+00
57+00
394+00
BOX CULVERT C
BOX CULVERT B
PERMANENT
EASEMENT
(NOT IN CONTRACT)
CONTRACTOR
WORKING LIMITS
LEGION PL.
SWALE
GL-5 PRIMARY
STORMWATER
PONDING AREA
PICNIC
PAVILON
PROPOSED RIGHT-OF-WAY
NEW FENCE AROUND
RELOCATED PLAYGROUND
CONTRACTOR WORKING LIMITS
LOT 13
LOT 18
MATCH LINE STA. 58+00 SHEET X-102

US Army Corps
of Engineers®

MARK	DESCRIPTION	DATE	APPR

DESIGNED BY: | DATE: 19-FEB-2016
DWN BY: | CKD BY: | SOLICITATION NO.:
SUBMITTED BY: | CONTRACT NO.: W912P8-##-X-####
PLOT SCALE: XXX | ISSUE DATE: FEB. 2016 | FILE NUMBER:
SIZE: ANSI D | FILE NAME: GB_SEG B3_X-101XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

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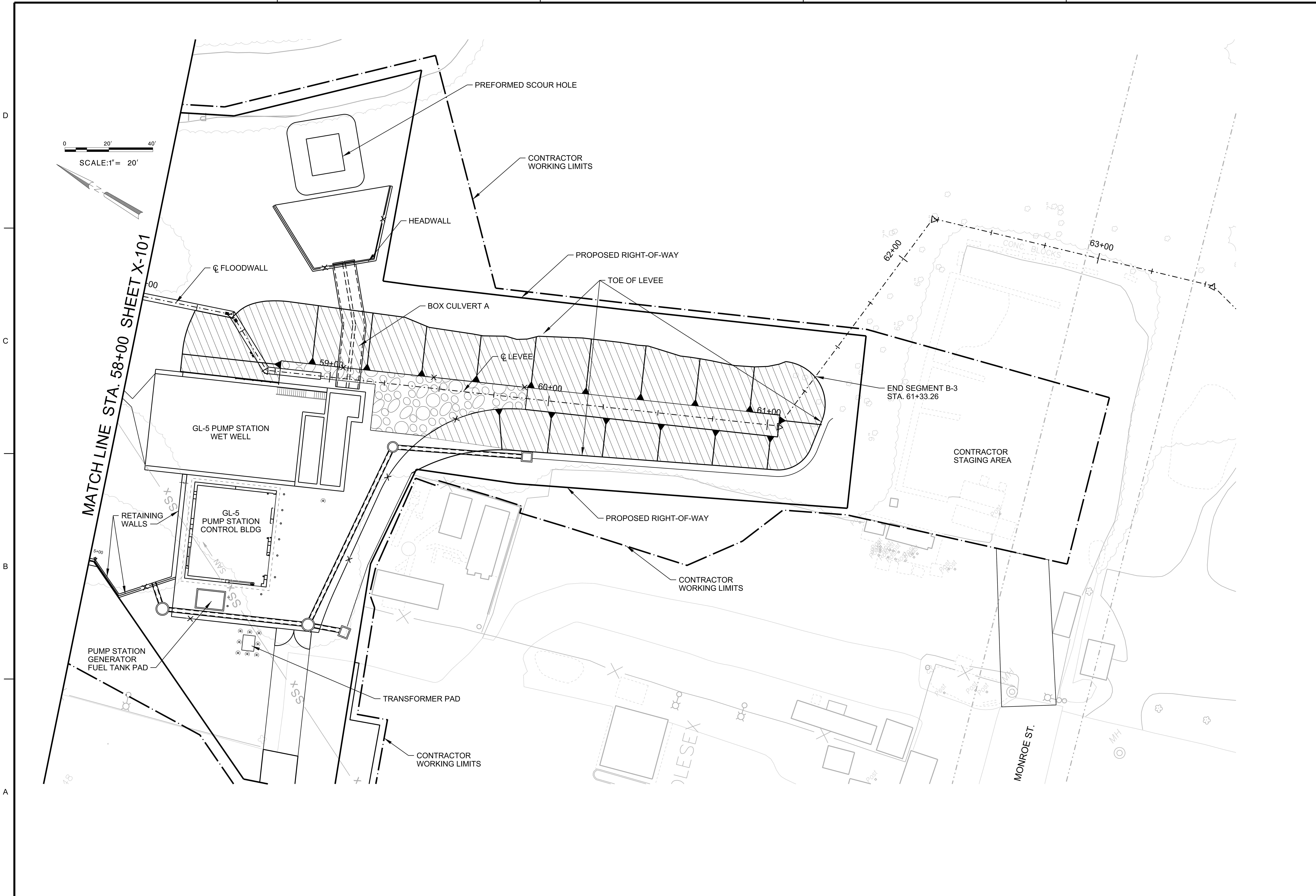
GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

PROPOSED RIGHT-OF-WAY
PLAN SHEET
STA. 53+77.68 TO STA. 58+00

SHEET
IDENTIFICATION
X-101
SHEET 52 OF 147

100% SUBMITTAL



PREFORMED SCOUR HOLE
CONTRACTOR WORKING LIMITS
HEADWALL
PROPOSED RIGHT-OF-WAY
℄ FLOODWALL
TOE OF LEVEE
BOX CULVERT A
℄ LEVEE
59+00
60+00
61+00
62+00
63+00
END SEGMENT B-3
STA. 61+33.26
CONC. BLOCKS
CONTRACTOR STAGING AREA
MATCH LINE STA. 58+00 SHEET X-101
GL-5 PUMP STATION WET WELL
GL-5 PUMP STATION CONTROL BLDG
RETAINING WALLS
PUMP STATION GENERATOR FUEL TANK PAD
TRANSFORMER PAD
MONROE ST.
SCALE:1"= 20'
0
20'
40'

US Army Corps of Engineers

DESIGNED BY:	DWN BY:	CKD BY:	SUBMITTED BY:
DATE: 19-FEB-2016	SOLICITATION NO.:	CONTRACT NO.: W912PM-##-X-####	FILE NUMBER:
PLOT SCALE: XXX	ISSUE DATE: FEB. 2016	SIZE: ANSI D	FILE NAME: GB_SEG B3_X-102XXX.dgn

U. S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

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GREEN BROOK FLOOD RISK MANAGEMENT PROJECT
SUB-BASIN OF THE RARITAN RIVER
SEGMENT B-3 CONTRACT
BORO. OF MIDDLESEX AND GREEN BROOK TWP, NJ

PROPOSED RIGHT-OF-WAY
PLAN SHEET
STA. 58+00 TO STA. 63+20

SHEET IDENTIFICATION
X-102
SHEET 53 OF 147

100% SUBMITTAL

APPENDIX E

DRAFT FINDING OF NO SIGNIFICANT IMPACT

Draft Finding of No Significant Impact
Environmental Assessment for Segments B2 and B3 Levee and Floodwall
Green Brook Flood Damage Reduction Project
Middlesex Borough, Middlesex County, NJ

I. DESCRIPTION OF ACTION

The U.S. Army Corps of Engineers, New York District (District) and the New Jersey Department of Environmental Protection (NJDEP) are proposing to construct approximately 923 feet of floodwall and 334 feet of levee and raise the Sebring's Mills Bridge along the Green Brook. The project is being referred to as Segments B2 and Segments B3 which are part of the overall Green Brook Flood Damage Reduction Project (GBFDRP). The floodproofing component is located in the Green Brook Township, Somerset County. The levee, floodwall and structure buyout is located in Middlesex Borough in Middlesex County. The bridge straddles the two municipalities.

The Environmental Assessment for which this Finding of No Significant Impact was prepared specifically addresses the significance of potential impacts the construction of Segments B2 and B3 will have on Indiana bat (*Myotis sodalis*), a federal and state endangered species, northern long-eared bat (*Myotis septentrionalis*) a federal threatened species, and on General Conformity of the Clean Air Act. At the time the 1980 FEIS and 1997 FSEIS were filed, the Indiana bat was not identified as occurring within the GBFDR project area. The northern long-eared bat was listed by the U.S. Fish and Wildlife Service (USFWS) as threatened under the Endangered Species Act in April 2015. The U.S. Environmental Protection Agency revised the General Conformity rules of the Clean Air Act in April 2010, requiring an updated General Conformity analysis for the project.

II. ALTERNATIVES

A complete evaluation of alternatives and potential environmental impacts were previously addressed in the U.S. Army Corps of Engineers (Corps), New York District, *Final Environmental Impact Statement* (*FEIS) for the Proposed Plan for the Green Brook Flood Control in the Green Brook Sub-Basin, Somerset, Middlesex and Union Counties, New Jersey*, filed August, 1980 and the *Final Supplemental Environmental Impact Statement* (*FSEIS*) *for the Proposed Plan for the Green Brook Flood Control in the Green Brook Sub-Basin, Somerset, Middlesex and Union Counties, New Jersey*, filed in May 1997.

III. ANTICIPATED ENVIRONMENTAL CONSEQUENCES

A full assessment of impacts associated with the Proposed Action was evaluated in the attached *Environmental Assessment for Segments B2 and B3 Levee and Floodwall, Green Brook Flood Damage Reduction Project, Middlesex Borough, Middlesex County, NJ.* A summary of anticipated environmental consequences is as follows:

- The project will not negatively impact public health or safety. Rather, the project serves to improve public health and safety through the acquisition and removal of flood prone homes.
- The project will not negatively impact the quality of the human environment.

- The project is not expected to have significant long-term impact on endangered, threatened or special concern State and Federal species. To comply with Section 7 of the Endangered Species Act, a tree clearing restriction window of 15 April through 30 September will be established during construction as a precautionary measure to protect the northern long-eared bat, a federally threatened species. Based on coordination with USFWS, Indiana bat is not expected to inhabit the project area.
- A restriction on the clearing of woody vegetation from 15 March through 31 July will be implemented during construction to comply with the Migratory Bird Treaty Act.
- A restriction from conducting in-channel work will be implemented from May 1 through June 30 to protect any spawning fish species.
- Standard erosion control techniques employed during construction will minimize excess sedimentation to the Bound Brook.
- No known archaeological or historical resources will be affected by this project. The District has coordinated a Programmatic Agreement with the New Jersey Historic Preservation Office, the Advisory Council on Historic Preservation.
- The anticipated emission levels for NOx emissions from construction equipment are below the de minimis levels established for General Conformity and have been documented with a Record of Non-Applicability.
- No adverse cumulative impacts are associated with project implementation. When assessed in conjunction with other past, present or future flood risk management initiatives within the Green Brook Sub-Basin, the proposed action has positive cumulative impacts to provide a regional long term risk reduction to loss of life and property/infrastructure damages resulting from flood events.

IV. COORDINATION

The New York District has coordinated this project with Federal and State resource agencies and the interested public and issued a Notice of Availability of the draft Environmental Assessment (EA) in order to:

a. Inform agencies and stakeholders of the proposed work and the environmental evaluation contained in the draft EA, and
b. Provide an opportunity for comments on that evaluation and findings.

V. CONCLUSION

Based on my review and evaluation of the environmental effects as presented in the Environmental Assessment, I have determined that the Passaic River Floodway Buyout Project is not a major federal action significantly affecting the quality of the human environment. Therefore, I have determined that this project is exempt from the requirement to prepare an Environmental Impact Statement.

_____ _____

Date

David A. Caldwell
Colonel, U.S. Army
District Commander