

Environmental Assessment/Assessment of Effect

Redesign Parkway Drainage Along Papermill Creek Watershed

Colonial National Historical Park James City County, Virginia December 2005

EXECUTIVE SUMMARY

The scenic and historically important Colonial Parkway (Parkway) is a major feature of the Colonial National Historical Park (NHP). The Parkway extends over 23 miles and links the three historic sites of Yorktown, Williamsburg, and Jamestown in southeastern Virginia. Over the past decade, regional development has led to increases in stormwater runoff within the Papermill Creek watershed. Several locations along the historic Parkway experience a recurring flood hazard during periods of heavy rainfall. In order to address the flood hazard, the National Park Service has identified alternatives to redesign the drainage systems at targeted locations along the Parkway.

This Environmental Assessment (EA) analyzes the potential environmental impacts associated with implementing the alternatives in accordance with the National Environmental Policy Act of 1969. The purpose of these alternatives is to maintain the historic Parkway experience while ensuring the safety of Parkway users and the protection of historic design and construction features.

The three project sites are located within the Colonial Parkway corridor about 1.3 miles south of Colonial Williamsburg in James City County. The Environmental Assessment evaluates two action alternatives, in addition to the no action alternative, at each of the three sites (referred to as Sites A, B, and C). At Site A, the National Park Service proposes to upgrade the existing culvert by either: (1) replacing the existing 24-inch pipe with a 30-inch pipe or (2) adding a parallel 24-inch pipe next to the existing 24-inch pipe. At Site B, the existing culvert would be upgraded by either: (1) replacing the existing culvert with a CON-SPAN structure or (2) adding a new culvert system parallel to the existing system. At Site C, the existing culvert would be upgraded by either: (1) replacing the existing 15-inch pipe with a 24-inch pipe or (2) installing a 24-inch pipe adjacent to the existing 15-inch pipe.

For each of the action alternatives, NPS would use construction materials that are compatible with existing materials in order to retain the Parkway's historic character. Efforts would be made to maintain normal operation of the Parkway during construction activities. The use of bioengineering techniques and sustainable stream restoration design would also be incorporated to minimize impacts to natural and cultural resources along the Parkway corridor.

The drainage redesign alternatives were determined to have no or negligible impact on topography, soils, geology, and geohazards; air quality; soundscapes; visual resources and lightscares; marine and estuarine resources; coastal zone management; land use, urban quality, and gateway communities; vegetation and wildlife; special status species; ethnographic resources and museum collections; cultural landscapes; socioeconomics and environmental justice; prime and unique farmlands; and energy resources. Minor, short-term adverse impacts to water quality; hydrology and hydraulics; floodplains; wetlands; visitor experience; and cultural resources may occur as a result of the action alternatives. By reducing erosion and sedimentation, the action alternatives are expected to have minor to moderate long-term benefits for several resource areas, including water quality; hydrology and hydraulics; and visitor experience.

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ACRONYMS

AFD	Agricultural and Forestal District
amsl	above mean sea level
APE	Area of Potential Effects
BMPs	Best Management Practices
CAA	Clean Air Act
CCA	College Creek Alliance
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CMA	Coastal Management Area
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
EA	Environmental Assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highways Administration
FIRM	Flood Insurance Rate Map
GIS	Geographic Information System
GMP	General Management Plan
H&H	hydrology and hydraulics
HDPE	high density polyethylene
JD	jurisdictional determination
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHP	National Historical Park
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resource Conservation Service
ONRWs	Outstanding National Resource Waters

PVC	polyvinyl chloride
RCP	Reinforced Concrete Pipe
RMA _s	Resource Management Areas
RPAs	Resource Protection Areas
sf	square feet
SIP	State Implementation Plan
SOF	Statement of Finding
TDS	total dissolved solids
TMDL _s	Total Maximum Daily Loads
TPY	tons per year
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture's
VAC	Virginia Administrative Code
VCRMP	Virginia Coastal Resources Management Program
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDHR	Virginia Department of Historic Resources
VDOT	Virginia Department of Transportation
VIMS	Virginia Institute of Marine Science
VMRC	Virginia Marine Resources Commission
VPDES	Virginia Pollutant Discharge Elimination System

SECTION 1. PURPOSE AND NEED

INTRODUCTION

The scenic and historically important Colonial Parkway is a major feature of the Colonial National Historical Park (NHP). The Parkway extends over 23 miles and links the three historic sites of Yorktown, Williamsburg, and Jamestown. Over the past decade, development in the Williamsburg area has led to increases in stormwater runoff within the Papermill Creek watershed. Several locations along the historic Parkway experience a recurring flood hazard during periods of heavy rainfall. The National Park Service (NPS) has identified alternatives to address the flood hazard at three locations along the Parkway within the Papermill Creek watershed. The purpose of these alternatives is to maintain the historic Parkway experience while ensuring the safety of Parkway users and the protection of historic design and construction features.

This Environmental Assessment (EA) analyzes the potential environmental impacts associated with implementing drainage upgrades at three targeted locations within the Papermill Creek watershed. For each site, two separate action alternatives are presented in addition to the No Action Alternative. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council of Environmental Quality's (CEQ) implementing regulations, 40 Code of Federal Regulations (CFR) Parts 1500-1508; NPS Director's Order #12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* and Handbook (2003) (DO-12); and Section 106 of the National Historic Preservation Act (NHPA) of 1966 as amended, and implementing regulations, 36 CFR Part 800. As described in more detail in Section 4 the NEPA process also supports compliance with Section 106 of NHPA.

PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The Colonial National Historical Park (Colonial NHP) was created in 1930 to commemorate and preserve the unique historical features of the James-York Peninsula in southeastern Virginia. A central feature of the park is the Parkway that was designed and constructed to offer continuity to the visitor experience of motoring through almost 400 years of American colonial history. Over the past decade, the Parkway has experienced increased use as a commuter corridor for the Williamsburg region. Stormwater flows through Colonial NHP and the Parkway have also increased in response to an increase in regional development. The purpose of the proposed actions contained in this EA is to assist Colonial NHP in meeting its goals of maintaining a historic Parkway experience while ensuring the safety of Parkway users and the protection of historic design and construction features.

To meet the Park's goals and objectives, NPS has identified the need to redesign Parkway drainage features to address the problem of recurring flooding within the Papermill Creek watershed. The Parkway crossing at Paper Mill Creek was subject to significant flooding during Hurricane Floyd in September 1999 and again during Hurricane Isabel in 2003. Additionally, recent development in the Williamsburg area has caused portions of the Parkway to become a popular commuter corridor. This development, most lacking stormwater management facilities, has also led to an increase in stormwater runoff. As a result, culverts, bridges, and other Parkway drainage features have been experiencing an increase in recurring floods. NPS staff have also reported that the Parkway Tunnel under Colonial Williamsburg, approximately three miles north of the proposed drainage improvement sites, has flooded two times approximately 10 years apart, once in the early 1990s and again in the early 2000s (FHA, 2003). Frequent flooding negatively impacts driver safety and can result in Parkway delays and closures that mar the visitor experience. Flooding can also damage historic Parkway structures, including headwalls, culverts, and bridges that are integral parts of the Parkway's historic character.

PURPOSE AND SIGNIFICANCE OF THE PARK

Colonial NHP, known as Colonial National Monument until 1936, was established by an Act of Congress in 1930. The purpose of the park was to preserve the historic structures and sites located within the Colonial NHP boundaries for the benefit and enjoyment of the public. The creation of the park was the final step in a series of events, including the purchase of acreage at Jamestown by the Association for the Preservation of Virginia Antiquities in the 1890s and the establishment of the non-profit Colonial Williamsburg Foundation in 1926. The goals of these activities are to preserve, restore, and interpret the colonial history of Virginia from the establishment of Jamestown in 1607 to the surrender of British forces at Yorktown in 1781.

Colonial NHP was established at a period of increased awareness of America's colonial past that was driven in part by large-scale public interest in the restoration work being done at Williamsburg in the 1920s. Increasing numbers of tourists visited the James River peninsula between 1926 and 1930. The creation of a single, cohesive scenic roadway to facilitate transportation between the communities of Yorktown, Williamsburg, and Jamestown was one of the primary purposes of Colonial NHP.

The Parkway is a significant resource as an intact example of 1930s NPS Parkway design, incorporating characteristics of both suburban Parkway and wilderness road designs from the period. Additionally, the road reflects its setting in the use of materials and the Colonial Revival architectural style to complement the Colonial NHP's setting and the historic character of the surrounding area.

Colonial NHP, including the Parkway, was listed on the National Register of Historic Places (National Register) in October 1966, with documentation completed in August 2001. The General Management Plan (GMP) for Colonial NHP was published in 1993.

PROJECT BACKGROUND

PREVIOUS PLANNING

The proposed actions identified in this EA reflect a multi-year planning process by NPS staff to address the recurring flood hazard along the Parkway within the Papermill Creek watershed. NPS has been actively coordinating with the Eastern Federal Lands Highway Division of the Federal Highways Administration (FHWA) to develop recommendations for strengthening, repairing, and improving the Parkway, including approaches for flood reduction. Between 1985 and 1995, NPS and FHWA participated in a three-phase restoration program to address structural work on bridges, replace construction joints on the pavement, and build safety features such as steel-backed timber guard rails along much of the Parkway. These efforts culminated in the preparation of the Parkway Design Scoping Report (FHWA, 2003).

In response to the recommendations of the Design Scoping Report, NPS prepared the Papermill Creek Watershed Study to identify existing flood causes and outline specific, cost-effective solutions for prevention (NPS, 2005a). The three drainage improvement sites analyzed in this EA were originally proposed in the Papermill Creek Watershed Study and further developed through consultation between members of the NPS and FHWA interdisciplinary planning team. Engineering modeling and forecasting recommends that the pipes be able to accommodate the quantity of water produced during a 25-year storm event without flooding. The drainage improvement sites are identified as Sites A, B, and C.

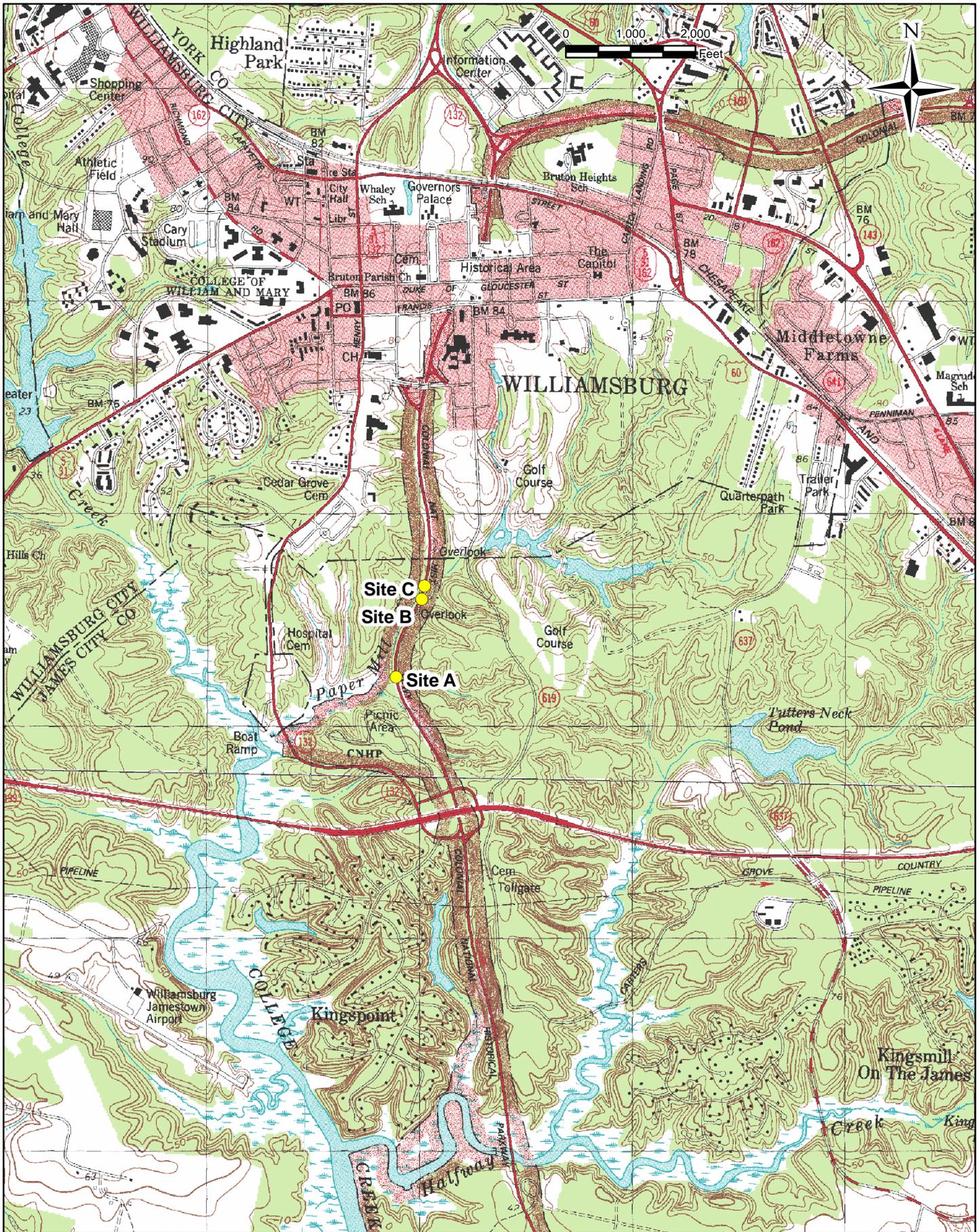
In addition to Parkway-specific planning, NPS staff prepared the 2001-2005 Strategic Plan for Colonial NHP that identifies goals and objectives for achieving the Park's mission during the 2001-2005 planning horizon (NPS, 2000a). The Strategic Plan is currently being updated. Other plans reviewed during development of this EA include the GMP (NPS, 1993) and Water Resources Management Plan (1994).

LOCATION

The three project sites are located within the Parkway corridor about 1.3 miles south of Colonial Williamsburg within Colonial NHP in James City County, Virginia (Figure 1). Sites A, B, and C are north of the Parkway's intersection with Route 199 by about 2,300 feet, 3,600 feet, and 3,800 feet, respectively (Figure 2).



					TITLE		Vicinity and Site Locations Map	
REVISION NO	0	DES BY	JMW	06/23/05			PROJ NO	00000000
SCALE	1" = 10 miles	DR BY	JMW	11/14/05			FIGURE	1
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				TITLE		Project Sites of Proposed Alternatives	
REVISION NO	1	DES BY	JMW	06/23/05	Legend	PROJ NO	00000000
SCALE	1" = 2000'	DR BY	JMW	11/14/05		FIGURE	2
G:\NPS\Colonial\Figure2_Site.mxd				CHK BY		JR	07/20/05
						●	Project Site

SCOPING

As part of the EA process, NPS hosted a scoping meeting on June 8, 2005 at the Yorktown Battlefield Visitors Center at Colonial NHP. The meeting was attended by an interdisciplinary team including a landscape architect, cultural resource specialist, natural resource specialist, chief park ranger, archaeologist, and geographic information system (GIS) specialist from NPS; a project manager, environmental protection specialist, hydraulic engineer, and hydraulic team leader from FHWA; and a NEPA compliance specialist and wetlands ecologist from URS Group, Inc. (URS). The scoping meeting included a field visit to the three project sites, as well as a discussion of drainage redesign alternatives and associated environmental and cultural resources issues. A draft of the Environmental Screening Form prepared by NPS staff for the proposed project was also reviewed by the interdisciplinary team (Appendix A).

On July 13, 2005, NPS mailed letters to Federal, State, and local government agencies and other stakeholder organizations informing them of the proposed project and requesting comments. Responses were received from the Virginia Department of Environmental Quality (VDEQ) (Appendix B). VDEQ commented that federal activities affecting Virginia's coastal resources must be consistent with the Virginia Coastal Resources Management Program (VCRMP) and that NPS must provide a consistency determination. The consistency statement is provided in Section 2 of this EA.

SECTION 2. ISSUES AND IMPACT TOPICS

DERIVATION OF IMPACT TOPICS

Impact topics are resources of concern that could be affected, either beneficially or adversely, by the range of alternatives. Impact topics were identified on the basis of Federal laws, regulations, Executive Orders, *NPS Management Policies* (2000c), the Environmental Screening Form, and from NPS knowledge of limited or easily impacted resources. In completing the Environmental Screening Form, the interdisciplinary team reviewed the proposed alternatives, considered the data needed to describe the affected environment, and predicted impacts of the alternatives. The interdisciplinary planning team also identified specific issue impact topics associated with the proposed alternatives.

IMPACT TOPICS INCLUDED IN THIS DOCUMENT

Based on the results of interdisciplinary team scoping and preparation of the Environmental Screening Form, several impact topics were determined to require additional investigation in order to address the requirements of NEPA and DO-12. As shown in Section 4, the impact topics evaluated for each alternative at the three sites include: water quality, hydrology and hydraulics, floodplains, wetlands, visitor experience and recreation resources, cultural resources, and sustainability.

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

The impact topics listed below were considered, and determined to not be affected by or affected negligibly by the alternatives evaluated in this document. Negligible effects are effects that are localized and immeasurable at the lowest level of detection. A brief discussion of the impact topic and the rationale for its dismissal from further analysis is provided in the following section.

TOPOGRAPHY, SOILS, GEOLOGY, AND GEOHAZARDS

Project Sites A, B, and C are located in the Coastal Plain physiographic province of Virginia, within the Papermill Creek watershed. The topography at Sites A, B, and C consist of mostly level terrain at approximately 40 to 50 feet above mean sea level (amsl) with slopes ranging from 0 to 7 percent. On the east side of the Parkway, the terrain rises slightly to between 50 and 75 feet amsl. Shallow, meandering streams and intermittent depressional wetlands provide additional topographic variation along the Parkway corridor at the project sites. Soils at Sites A, B, and C consist of Emporia complex intermixed with Johnston complex along drainageways (USDA, 1985), as well as fill imported during construction of the Parkway. The soils are characterized by moderate permeability with a high erosion hazard. Flooding commonly occurs in summer and early fall as a result of intense rainstorms. The soils are flooded or ponded from late fall to late spring (USDA, 1985).

The Parkway geology consists of sedimentary clay, sand, and gravel stripped from the Appalachian Mountains and carried eastward by rivers and deposited in deltas during the late Jurassic and Cretaceous periods. Below the sedimentary formations lies an igneous and metamorphic basement (College of William and Mary, 2005).

At Sites A, B, and C, the risk of seismic activity and other geohazards is low because of its location at the center on the North American tectonic plate, away from active faults. Since 1977, Virginia has experienced 160 earthquakes, primarily in southwestern Virginia, of which only 16 percent were felt (Virginia Tech, 2005). Sinkholes, however, are more common in this area, especially along the Parkway between Yorktown and College Creek. The largest known sinkhole in the area is located northeast of US 17 (NPS, 1994).

The proposed alternatives are expected to result in no impacts to topography, geology, and geohazards, and negligible, short-term impacts to soils. The proposed action alternatives would require some excavation;

however, the excavation would not exceed 10 feet and would not impact the geologic character of the site. Excavated fill would be stored on site and replaced, or removed altogether. The use of construction Best Management Practices (BMPs), such as covering fill piles and using silt fences and straw bales, would minimize the movement of soils during construction activities. Impacts related to soil and water quality are analyzed more fully in Section 4. As the proposed actions would result in no or negligible impacts to topography, soils, geology, and geohazards, this impact topic was dismissed from further consideration.

AIR QUALITY

The Clean Air Act (CAA), as amended, requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The CAA established two types of national air quality standards. Primary standards set limits to protect public health, including the health of “sensitive” populations, such as asthmatics, children, and the elderly, and secondary standards set limits to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, or buildings.

The proposed actions would not result in any long-term impacts, as there would be no detectable emissions increases greater than 50 tons per year (TPY) of any pollutant (NPS, 2003). As a result of construction activities, emissions from fuel-burning internal combustion engines could temporarily increase the localized levels of some pollutants. In order to reduce the emission of pollutants, fuel-burning equipment running times would be kept to a minimum and engines would be properly maintained. This impact was dismissed from further consideration because proposed actions are expected to have negligible impacts on air quality.

SOUNDSCAPES

An important objective of the NPS mission, as outlined in the *NPS Management Policies* (2000c) and Director’s Order #47, *Soundscape Preservation and Noise Management* (NPS, 2000b), is the preservation of the natural soundscapes associated with an NPS unit. The natural ambient soundscape is defined by NPS as the natural sound conditions which exist in a park unit in the absence of any human-produced noises. Natural sounds are further defined by NPS as those sounds associated with a park’s natural setting, which may include sounds produced by wildlife, geothermal activity, or geomorphic processes such as wind or water acting on landscape features (creeks).

Noise, defined by NPS as a human-made noise inappropriate to the particular time and place in a park unit, can adversely affect the natural soundscape of a park unit. The frequencies, magnitudes, and duration of acceptable human-caused sound vary among NPS units. Generally, acceptable levels are greater for park units located in urban or developed areas, while the acceptable levels are lower for park units located in rural or undeveloped areas.

The proposed drainage improvements would result in no long-term differences in noise frequencies, magnitudes, or durations and would not impact Colonial NHP. The associated construction activities would have a short-term, negligible impact on the noise levels along a segment of the Parkway during the construction period. As the proposed action would not result in a long-term change to the existing noise levels for Colonial NHP or create a long-term impact to soundscape management activities at Colonial NHP, this impact topic was dismissed from further consideration.

VISUAL RESOURCES AND LIGHTSCAPES

A part of the NPS mission, as outlined in the *NPS Management Policies* (2001), the agency works to understand, maintain, restore, and protect the inherent integrity of the natural resources, processes, systems, and values of the parks. Scenic views and visual resources are considered important characteristics that are individual to each park unit and that NPS should make a priority to protect. As a part of efforts to preserve the

visual resources of a park unit, NPS looks to preserve the natural ambient landscapes, or lightscares, of an area. Lightscares are defined as natural resources and values that exist in the absence of human-caused light.

The proposed drainage improvements would result in no long-term changes to visual resources and would not impact the existing lightscape of Colonial NHP. The associated construction activities would have a short-term, negligible, adverse impact on the visual resources of Colonial NHP during the construction period through the addition of construction equipment and personnel to the viewscape. During excavation activities, piles of excavated fill may be visible to Parkway users in the short-term. If project activities occur during nighttime hours with the use of floodlights, additional light pollution would be created along the subject segment of the Parkway; however, the impacts would be short-term and negligible. As the proposed action would not result in a long-term change to the existing scenic views and visual resources at Colonial NHP or create a long-term impact to lightscares at Colonial NHP, this impact topic was dismissed from further consideration.

MARINE AND ESTUARINE RESOURCES

Sites A, B, and C are located in the watershed of Papermill Creek, which is a tributary of the James River. Approximately 27 percent of the Colonial NHP lands are covered by wetlands. Estuarine emergent intertidal wetlands are found along both the York and James Rivers and adjacent tributaries, including the lower reaches of Papermill Creek. Wetlands and rivers serve as important nursery grounds for both commercial and recreational fish, including striped bass, Atlantic croaker, and the American eel. The various water bodies located in and around Colonial NHP also support oyster beds, crabs, clams, crayfish, perch, sunfish, bluegill, and bass. The York and James Rivers feed into the nation's largest and most productive estuary, the Chesapeake Bay (NPS, 1994). Over the last century, the productivity of marine and estuarine resources in the Chesapeake Bay has been in decline due to a variety of environmental pollution factors.

There are no marine or estuarine resources present at Sites A, B, or C. The closest tidal wetlands are about 0.3 miles from the project site. Non-tidal, freshwater wetland resources are present at the three sites, and are discussed in more detail in Section 4. The proposed drainage improvement projects would contribute to short-term turbidity downstream of the project locations in Papermill Creek. The extent of turbidity would be the result of excavation methods, tidal cycles, winds, and sediment size. Short-term increases in turbidity would not significantly degrade water quality nor cause harm to marine and estuarine resources in Colonial NHP. Additional information about impacts to water quality is more fully described in Section 4. Due to the location and limited extent of the proposed drainage improvement projects, they are not likely to affect marine and estuarine resources; therefore this impact topic was dismissed from further consideration.

COASTAL ZONE MANAGEMENT

Any Federal agency development in Virginia's Coastal Management Area (CMA) must be consistent with the enforceable policies of the Virginia Coastal Resources Management Program. The NPS sent a coordination letter and the EA to VDEQ in December 2005, stating that, in accordance with 15 CFR 923.33 and after review of the VCRMP, the NPS has determined that the proposed drainage redesign projects are consistent with the VCRMP and are not likely to affect coastal resources due to compliance with Sections 401 and 404 of the Clean Water Act, the use of best management practices, and implementation of an erosion and sediment control plan during construction (see Section 4, Impacts on Water Quality). Furthermore, improvements to the drainage system on Papermill Creek would potentially improve water quality downstream of the project site by reducing erosion and sedimentation over time

LAND USE, URBAN QUALITY, AND GATEWAY COMMUNITIES

Sites A, B, and C are located within the boundaries of federally owned NPS lands. The NPS owns and manages the 10,500-acre Colonial NHP. The Papermill Creek watershed occupies a total of 1,051 acres. The areas surrounding Colonial NHP are owned by other Federal, State, and private entities. The project area is rural in character with limited development occurring throughout the Papermill Creek watershed. Impervious surfaces comprise approximately 10 percent of the watershed. The project sites are located within the boundaries of Colonial NHP; therefore, the local zoning authorities of York County and James City do not directly apply to the project area.

Most of the developed land and recreational activity in the Papermill Creek watershed takes place near the Parkway. Running north to south through the project area, the Parkway is the primary visitor resource between Williamsburg and Jamestown. In addition to its use as a transportation corridor between these two communities, the Parkway also has parking overlooks with scenic vistas and interpretive signs. The NPS determined the entire length of the Parkway to be eligible for inclusion in the National Register of Historic Places in June 2000.

NPS works with gateway communities to identify and address gateway and adjacent land issues as well as to assess and respond to changes to these communities due to NPS activities. Gateway communities are defined as communities located at the entrance to a park unit and which support park unit activities through private industry, such as providing food, fuel, or accommodations. Colonial NHP and the Parkway were designed to link the communities of Yorktown, Williamsburg, and Jamestown.

The proposed drainage improvements would result in no changes to the land use of Colonial NHP. The rural character of the area would not change, and the proposed project would not impact the developed land or recreation uses of the park. The gateway communities of Yorktown, Williamsburg, and Jamestown are all located outside of the project area, and the proposed drainage improvements would not affect these communities. As the proposed action would not result in changes to the existing land use of Colonial NHP or the project area, this impact topic was dismissed from further consideration.

VEGETATION AND WILDLIFE

The segment of the Parkway that includes the three project sites is surrounded by upland and wetland forest communities. Upland vegetation in the immediate vicinity of the three project sites are associated with the road bank fill that was placed in the Papermill Creek floodplain during the Parkway's original construction. NPS maintains a 10-foot wide strip of routinely mowed turf grass (*Gramineae* spp.) along both sides of the Parkway. Immediately beyond the grassy area, a strip of mature upland woods, approximately 20 to 40 feet wide, has become established along the road bank fill. The dominant vegetation is composed mainly of pioneer species adapted to disturbed soil conditions, such as those found along roadsides. Dominant tree species include pawpaw (*Asimina triloba*), hackberry (*Celtis occidentalis*), black locust (*Robinia pseudoacacia*), tree-of-heaven (*Ailanthus altissima*), eastern red cedar (*Juniperus virginiana*), and tulip tree (*Liriodendron tulipifera*). Understory shrubs include privet (*Ligustrum* sp.), bayberry (*Myrica cerifera*), choke cherry (*Prunus* sp.), and autumn olive (*Elaeagnus umbellata*). Trumpet creeper (*Campsis radicans*), Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), English ivy (*Hedera helix*), and Japanese honeysuckle (*Lonicera japonica*) are the dominant vines. Japanese stilt grass (*Microstegium vimineum*), an invasive, non-native species, is dominant in the herbaceous layer.

Forested wetlands occur adjacent to Papermill Creek and its tributaries (see Section 2 for a description of the dominant vegetation). Furthest from the project sites, the higher elevations contain mature second-growth upland forest. The dominant canopy species include white oak (*Quercus alba*), American beech (*Fagus grandifolia*), and tulip tree.

The complex of roadside edge habitat, wetland forest habitat associated with streams, and adjacent upland forest provides important local habitat to aquatic and terrestrial wildlife and serves as a movement corridor for fish, birds, and larger mammals. Mammals observed during a site visit conducted by a URS biologist on June

28 and June 29, 2005 include white-tailed deer (*Odocoileus virginianus*), eastern chipmunk (*Tamias striatus*), woodchuck (*Marmota monax*), muskrat (*Ondatra zibethicus*), and white-footed mouse (*Peromyscus leucopus*). Observed birds include wood thrush (*Hlyocichla mustelina*), American robin (*Turdus migratorius*), tufted titmouse (*Parus bicolor*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), red-eyed vireo (*Vireo olivaceus*), red-bellied woodpecker (*Melanerpes carolinus*), and hairy woodpecker (*Picoides villosus*). In addition, green frog (*Rana clamitans melanota*) and minnow-sized fish were observed within Papermill Creek and its tributaries. Other wildlife species expected to utilize the project site would be typical woodland and edge community species adapted to continuous low-impact human intrusions associated with the Parkway (e.g., traffic noise).

The proposed drainage improvements would result in negligible long-term impacts to the vegetation communities and the wildlife using them. The associated construction activities would have unavoidable short-term adverse impacts to vegetation and wildlife during the construction period. Upland and wetland vegetation within the project areas would be removed to accommodate the placement of construction equipment. It is estimated that 1,000 to 6,000 square feet (sf) (0.023 to 0.137 acres) of land would be temporarily disturbed at each site depending on the chosen action alternative (see Section 4). The primary types of vegetation to be disturbed are pioneer species along the Parkway road bank. Upland and wetland vegetation would naturally re-establish immediately after the construction period. Additionally, construction activities would include the planting of native vegetation to assist in site restoration, as well as prevention of non-native species establishment. In addition, riprap underlain with geotechnical fabric, would be permanently placed within the stream bed and extend approximately ten feet, immediately upstream and downstream of the culvert improvements. As the proposed action would result in negligible changes to the existing vegetation and wildlife communities at Colonial NHP, this impact topic was dismissed from further consideration.

SPECIAL STATUS SPECIES (THREATENED, ENDANGERED, SPECIES OF CONCERN, DESIGNATED CRITICAL HABITAT)

The Endangered Species Act (ESA) of 1973 requires Federal agencies to consider impacts of their actions on threatened and endangered species and their habitats, and take steps to conserve and protect these species. On June 7, 2005, the Virginia Natural Heritage Program Database was queried for Federal- and State-listed species with the potential to occur in James City and York Counties (Table 1).

Table 1: Federal and State Species Classified as Threatened, Endangered, or Species of Concern

<u>Federal</u>		
Common Name	<i>Scientific Name</i>	Federal Status
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened
Harper’s Fimbristylis	<i>Fimbristylis perpusilla</i>	Species of Concern
Mabee’s Salamander	<i>Ambystoma mabeei</i>	Threatened
Narrow-leaved Spatterdock	<i>Nuphar sagittifolia</i>	Species of Concern
New Jersey Rush	<i>Juncus caesariensis</i>	Species of Concern
Rare Skipper	<i>Problema bulenta</i>	Species of Concern
Sensitive Joint-vetch	<i>Aeschynomene virginica</i>	Threatened
Small Whorled Pogonia	<i>Isotria medeoloides</i>	Threatened
Virginia Least Trillium	<i>Trillium pusillum var. virginianum</i>	Species of Concern

<u>State</u>		
Common Name	Scientific Name	State Status
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened
Barking Treefrog	<i>Hyla gratiosa</i>	Threatened
Canebrake Rattlesnake	<i>Crotalus horridus atricaudatus</i>	Endangered
Gret Egret	<i>Ardea alba</i>	Special Concern
Harper's Fimbristylis	<i>Fimbristylis perpusilla</i>	Endangered
Mabee's Salamander	<i>Ambystoma mabeei</i>	Threatened
Narrow-leaved Spatterdock	<i>Nuphar sagittifolia</i>	Threatened
New Jersey Rush	<i>Juncus caesariensis</i>	Threatened
Sensitive Joint-vetch	<i>Aeschynomene virginica</i>	Threatened
Small Whorled Pogonia	<i>Isotria medeoloides</i>	Endangered
Tiger Salamander	<i>Ambystoma tigrinum</i>	Endangered

(Department of Conservation and Recreation, Nature Heritage Resources, 2005)

The Colonial National Historic Park has not documented the presence of threatened or endangered species along the Parkway. On June 28 and 29, 2005, a URS biologist surveyed the project sites to determine the potential for special status species or their habitats to occur at the proposed project sites. No special status plant or wildlife species, or their habitats, were observed during the reconnaissance survey. As described in Section 2, the vegetation along the Parkway corridor consists primarily of ruderal pioneer species, which possess low habitat value for special status species. Some wildlife species may occur in the vicinity of Sites A, B, and C as transient visitors. During construction activities, these transient wildlife species may be startled by the temporary construction noise and choose alternate resting and forage locations; however, the effects would be short-term, trivial, and within natural variability. Because there would be no or negligible impacts to special status species, this impact topic was dismissed from further analysis.

ETHNOGRAPHIC RESOURCES AND MUSEUM COLLECTIONS

An ethnographic resource is defined by NPS in Director's Order #28, *Cultural Resource Management Guideline* (2004), as "any site, structure, object, landscape or natural resource feature assigned traditional legendary, religious, subsistence or other significance in the cultural system of a group traditionally associated with it." In accordance with Director's Order #28 and Executive Order 13007, *Indian Sacred Sites*, the NPS makes every effort to preserve and protect ethnographic resources.

No ethnographic resources are located within the project area; therefore, this impact topic was dismissed from further consideration.

CULTURAL LANDSCAPES

In Director's Order #28, *Cultural Resource Management Guideline* (NPS, 2004), NPS defines cultural landscapes as complex resources that are a reflection of human adaptation of the natural environment. The use of natural features such as landforms, soils, and vegetation and the way that the land has been organized and divided, patterns of settlement, land use history, and circulation systems help to provide an understanding of

the evolution of the cultural landscape. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.

The Parkway, which is part of the National Register-listed Colonial National Historic District, was determined by NPS to be a cultural landscape during the 2001 documentation process. The Parkway is an intact example of 1930s Parkway design, incorporating characteristics of both suburban Parkway and wilderness road designs from the period. The surrounding area is heavily wooded and does not display the characteristics of land adapted to a human use such as farming or mining.

The proposed drainage improvements would not impact the cultural landscape of Colonial NHP. Changes would be limited to the roadway itself, and there would be no cumulative effects of the surrounding landscape due to the construction. The characteristics that make the Parkway eligible for the National Register as a cultural landscape, such as the curving roadway and the use of vegetation to direct the motorist views of the Parkway and surrounding area, would not be altered by the proposed project. As the cultural landscape of Colonial NHP would not be adversely impacted, this impact topic was dismissed from further consideration.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Socioeconomic issues are defined as actions that have the potential to create a significant negative change to the demographics, housing, employment, and economy of an area. Where local economies are dependent on a single industry, there is substantial potential for economic effects due to fluctuations in activity in this industry. In 2000, the median household income for the Williamsburg area was \$37,093 and the median family income was \$52,358.

The proposed drainage improvements would not appreciably change local and regional land use or measurably impact local businesses or other agencies. The proposed project may have a negligible short-term beneficial impact to the local economy, through the employment of construction contractors, equipment rentals, fuel usage, and other necessary resources associated with project completion. As the proposed action would not result in a long-term change to the socioeconomic environment at Colonial NHP, this impact topic was dismissed from further consideration.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that all Federal agencies identify and address, as appropriate, any disproportionately high and/or adverse human health or environmental effects due to their programs and activities on minority and low-income populations.

The proposed drainage improvements at Colonial NHP would not have a health or environmental effect on minority or low-income populations; therefore, this impact topic was dismissed from further consideration.

PRIME AND UNIQUE FARMLANDS

Prime and unique farmlands are protected under the Farmland Protection Policy Act (7 USC 4201 et seq.), which states that Federal agency programs must assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS) as prime or unique. Prime farmland is defined in the Act as "land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion," while unique farmlands are lands "other than prime farmland that is used for the production of specific high-value food and fiber crops."

The proposed drainage improvements are not located on land suitable for agricultural use due to the gently sloping terrain. Therefore, none of the soils located on the project site are regulated under the Farmland Protection Policy Act. Additionally, the Emporia-Johnston soil types found in the project area are not classified by NRCS or USDA as prime farmland soil, soil of statewide importance, or unique farmland soil. As none of the soils in located within the project area meet the definition of a prime or unique farmland, this impact topic was dismissed from further consideration.

ENERGY RESOURCES

Energy resources include power generation facilities, transmission and distribution systems, and energy resources such as coal, hydropower, natural gas, and oil. Energy resources also include energy-consuming practices related to a park unit's mission and construction activities.

The proposed drainage improvements would not impact power generation facilities or power transmission and distribution systems, as none are located within the project area. Similarly, there would be no impact to energy resources such as natural gas and oil because there are no known deposits located within the project area. Construction activities requiring the use of machinery would be kept to a minimum in order to conserve energy resources during construction activities and the proposed improvements would not lead to an increase in energy consumption due to park activities. As energy resources in Colonial NHP would not be adversely impacted, this impact topic was dismissed from further consideration.

SECTION 3. ALTERNATIVES

Three areas along the Parkway within the Papermill Creek watershed have been targeted for drainage improvements based on the recommendations of the Design Scoping Report prepared by the FHWA and the Papermill Creek Watershed Study prepared by the NPS. The three sites are defined as Site A, Site B, and Site C (Figures 1 and 2). For each site, two separate action alternatives are presented in addition to the No Action Alternative. Project activities common to all action alternatives are also described.

PROJECT ACTIVITIES COMMON TO ALL ACTION ALTERNATIVES

Construction activities for replacing the drainage structures would last from 6 to 12 weeks. Efforts would be made to maintain normal operation of this segment of the Parkway. When necessary, one lane of traffic would be closed and flaggers would be utilized. During construction, a portion of the Parkway may be temporarily closed. Parkway closures, if needed, would occur at night during off-peak hours.

Where brick headwalls and other culvert design features are modified or replaced, the replacement materials would be compatible with existing materials in order to retain the historic character of the Parkway's drainage features.

Where feasible, drainage structures would be jacked underneath the existing road surface. At some project locations, construction activities may include the installation of timber piles in order to support the drainage structures. This would be determined on a case-by-case basis once geotechnical studies have been completed.

The main staging area for personnel and equipment would be located along U.S. 17 adjacent to the Parkway maintenance facility. Short-term staging areas would be located at the overlooks just north and south of the project sites along the Parkway. The use of a rubber-tired front-end loader with backhoe attachment would likely be used as part of the open cut excavation activities at the project sites. Pile drivers may also be used to install piles below headwalls. Mobile cranes may be used for installing RCPs, culverts and/or CON-SPAN systems. Equipment trailers, and haul trucks for removing excavated material would also be used.

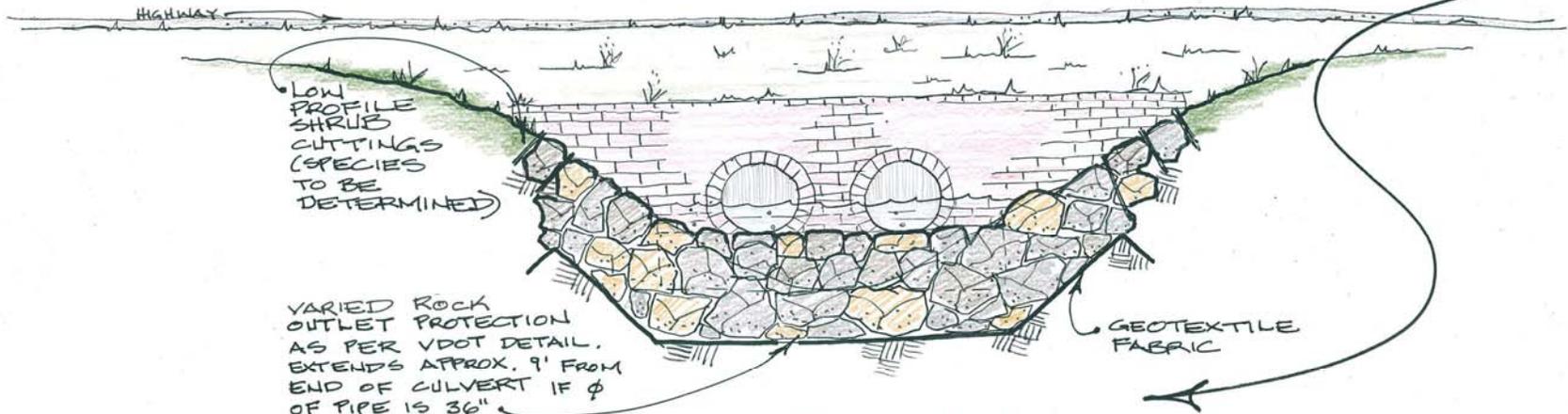
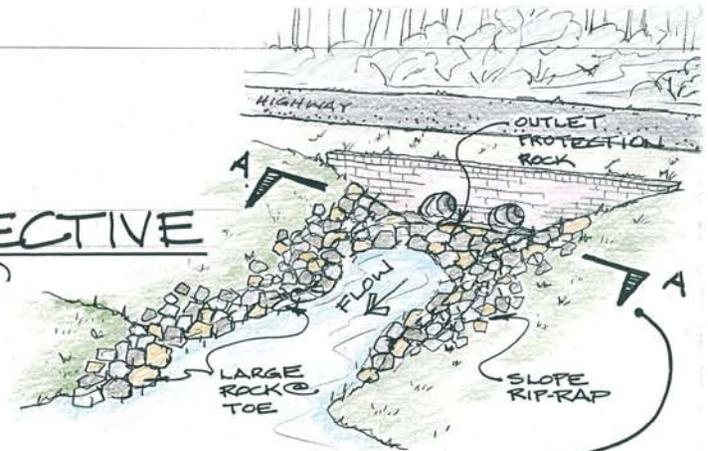
In order to provide slope protection, bank armoring, and erosion control at the pipe outlets, rock riprap would be placed at the toe of the stream slope. According to preliminary design plans, riprap would be underlain with geotextile fabric and extend about 9 feet from the culvert. To further protect and stabilize the stream channel, sustainable design and bioengineering techniques would be employed. Upland and wetland vegetation would be immediately re-established, using native species, after the drainage improvements are completed. Bioengineering techniques may also include the use of live cribwalls, joint plantings in riprap, live stakes and fascines, and branch packings. Plantings would be composed of native material and be placed during periods of dormancy in late fall or early spring. Conceptual drawings of the bioengineered slope protection are shown in Figures 3a, 3b, and 3c.

Following construction, the concrete road would be reconstructed with an exposed aggregate surface to conform to the style of existing historical Parkway. Areas of off-road disturbance would be contoured and re-vegetated with native species following construction.

NOTE: THIS SHOWS RIP-RAP BEFORE SHRUB CUTTINGS MATURE & LEAF OUT. ALSO PERSPECTIVE HAS WATER @ LOW LEVEL TO REVEAL ROCKS.

PERSPECTIVE

(NO SCALE)



SECTION A-A

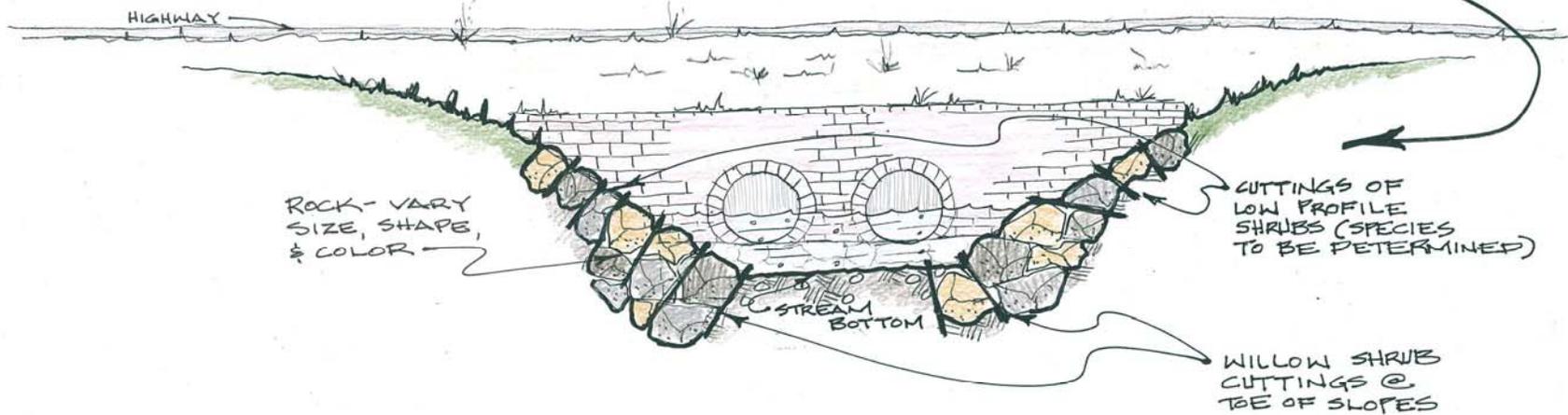
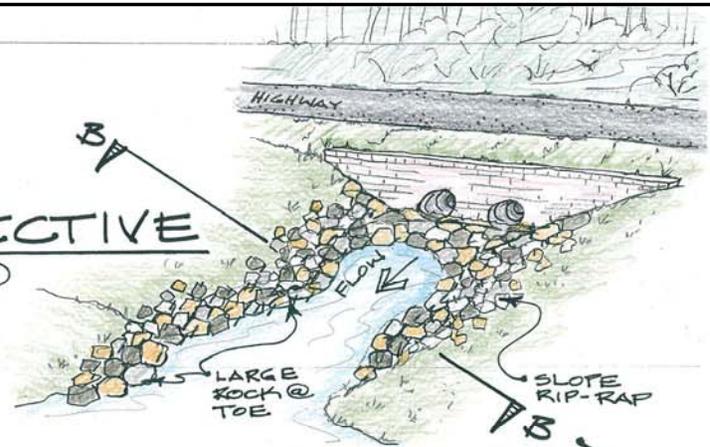
(NO SCALE)

DESIGN CONCEPT (PART A): EROSION CONTROL @ HISTORIC COLONIAL NAT'L HISTORICAL PARK JUN '05
HEADWALLS & CULVERTS

CLIENT	NATIONAL PARK SERVICE				TITLE	SITE LOCATION PLAN	
PROJ	Colonial NHP Environmental Assessment				PROJ NO	xxx	
REVISION NO		DES BY	LAL	12-7-05	FIGURE	3a	
SCALE	NOT TO SCALE		DR BY	JR			
FILE	P:\GTBFig2.PPT		GJK BY	JR			

NOTE: THIS SHOWS RIP-RAP WITH SHRUB CUTTINGS IN-PLACE, BUT BEFORE THEY ARE LEAFED OUT. PERSPECTIVE HAS WATER @ LOW LEVEL TO REVEAL ROCKS.

PERSPECTIVE
(NO SCALE)



SECTION B-B
(NO SCALE)

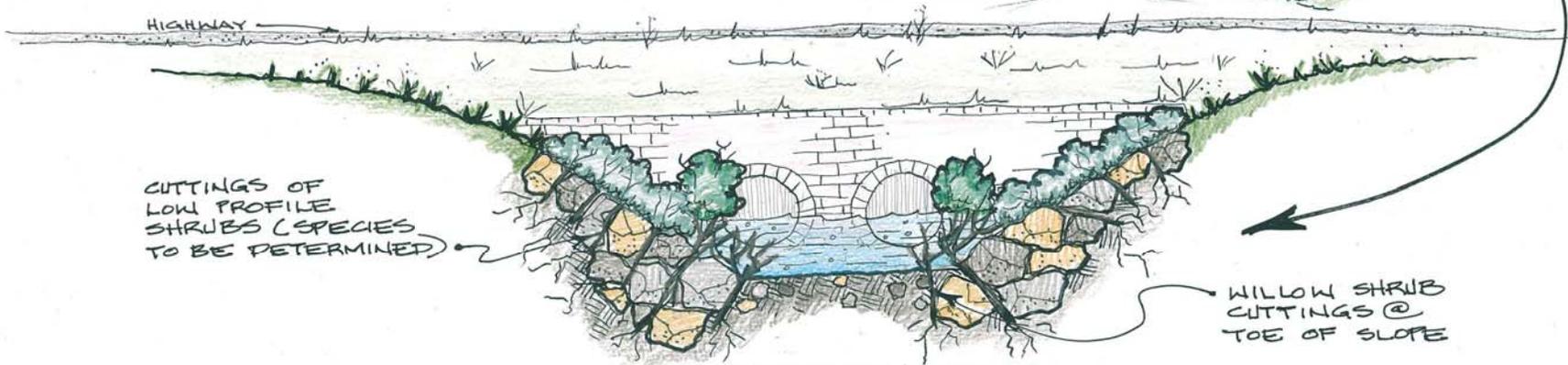
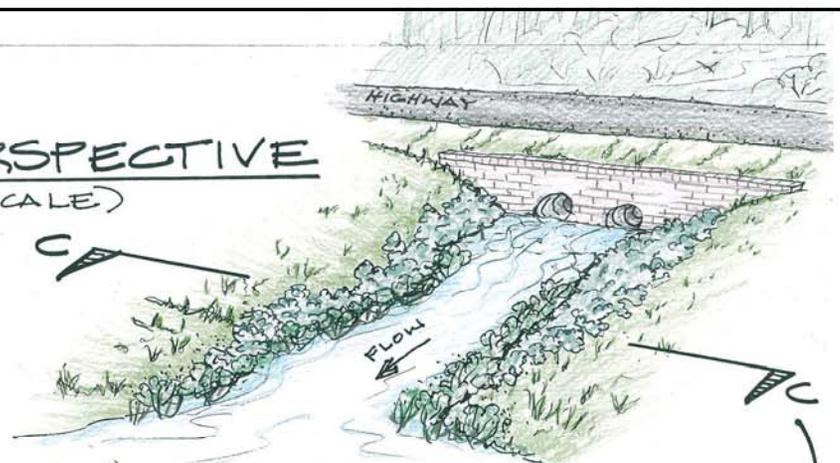
DESIGN CONCEPT (PART B): EROSION CONTROL @ HISTORIC HEADWALLS & CULVERTS
COLONIAL NAT'L HISTORICAL PARK JUN. '05

CLIENT	NATIONAL PARK SERVICE				TITLE	SITE LOCATION PLAN	
PROJ	Colonial NHP Environmental Assessment				PROJ NO	xxx	
REVISION NO		DES BY			FIGURE		
SCALE	NOT TO SCALE	DR BY	LAL	12-7-05			
FILE	P:\GTBFig2.PPT	GK BY	JR	12-7-05		3b	

NOTE: THIS SHOWS RIP-RAP WITH JOINT PLANTINGS WHICH, OVER TIME, VISUALLY SCREEN OUT ROCKS. ADDITIONALLY, LOW PROFILE SHRUBS WILL MAKE THE ROCK ARMORING MORE SECURE, THIS LESS LIKELY TO WASH OUT DURING FLOODING. PERSPECTIVE SHOWS WATER @ HIGHER LEVEL THAN IN "PART(S) A & B" SKETCHES.

PERSPECTIVE

(NO SCALE)



SECTION C-C

(NO SCALE)

REFERENCE: "STREAM CORRIDOR RESTORATION" BY FEDERAL INTERAGENCY STREAM RESTORATION WORK GROUP-1998

DESIGN CONCEPT (PART C): EROSION CONTROL @ HISTORIC HEADWALLS & CULVERTS
 COLONIAL NAT'L HISTORICAL PARK, JUN. '05

CLIENT	NATIONAL PARK SERVICE				TITLE	SITE LOCATION PLAN	
PROJ	Colonial NHP Environmental Assessment				PROJ NO	xxx	
REVISION NO		DES BY	LAL	12-7-05	FIGURE	3c	
SCALE	NOT TO SCALE		DR BY	JR			
FILE	P:\GTBFig2.PPT		GHK BY	JR			

MITIGATION MEASURES OF THE ACTION ALTERNATIVES

NPS would implement on-site mitigation measures to minimize the potential adverse impacts to natural and cultural resources associated with the action alternatives (Alternatives 2 and 3). The following mitigation measures and permits would apply to both Alternatives 2 and 3:

1. Excavated fill would be stored on site and replaced, or removed altogether.
2. In order to reduce the emission of air pollutants, fuel-burning equipment running times would be kept to a minimum and engines would be properly maintained.
3. Construction activities requiring the use of machinery would be kept to a minimum in order to conserve energy resources during construction activities.
4. BMPs such as silt fences and revegetation of bare soils would be implemented to minimize erosion and sedimentation.
5. NPS would obtain a joint Section 401/404 permit from the U.S. Army Corps of Engineers (USACE) and VDEQ for construction in a waterway and would abide by all permit conditions.
6. Construction contractor would prepare an erosion and sediment control plan per the requirements of the Virginia Department of Conservation and Recreation (VDCR).
7. Where construction activities would temporarily disturb an area greater than 2,500 sf, the construction contractor would be required to register for a VPDES general permit from VDCR.
8. Construction activities would be scheduled to minimize traffic impacts during peak hours and reduce traffic delays.
9. Materials compatible with the existing historic and prehistoric structures and that comply with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* would be used for the repair of the road surface and construction of the new conveyance structures.
10. Planting plan would be required and upland and wetland vegetation would be immediately re-established using native species after the drainage improvements are completed.
11. Riprap would be used to stabilize the stream bank while maintaining the water absorption capacity of the underlying soil.

SITE A

Site A is located approximately 2,300 feet north of the Parkway's intersection with Route 199 (Figure 2). At present, the drainage system consists of a culvert composed of two roughly parallel high density polyethylene (HDPE) pipes that are approximately 5 feet apart. Both pipes extend from existing brick headwalls in a roughly east-west direction below the Parkway for about 64 feet. The northern pipe is 30 inches in diameter and the southern pipe is 24 inches in diameter. The southern, 24-inch pipe is believed to have been installed within a 30-inch Reinforced Concrete Pipe (RCP), which has likely deteriorated or completely failed. The current culvert system does not have the capacity to convey floodwaters from 25-year storm events. Photographs of the existing drainage structures at Site A are included in Appendix C.

ALTERNATIVE 1 - NO ACTION

No action would be taken to alleviate drainage problems at the project site in the Papermill Creek Watershed. The recurring flood hazard would lead to continued risks to health and human safety, as well as periodic Parkway closures. As the Williamsburg area continues to experience rapid regional growth, the associated stormwater runoff would continue to cause downstream erosion and sedimentation. Adverse flooding impacts to the Parkway would not be mitigated.

ALTERNATIVE 2 - REPLACE EXISTING 24-INCH CULVERT WITH 30-INCH RCP

The culvert system would be upgraded by replacing the existing 24-inch HDPE pipe with a 30-inch RCP. The installation of the 30-inch RCP would require the removal of the road surface, as well as excavation below the road surface to remove the pre-existing pipe. The existing brick headwall would be removed, and replaced or modified to accommodate the larger pipe. The approximate area of temporary disturbance would be about 0.022 acres based on the assumption that construction workers would disturb an area 80 feet by 12 feet. Excavation would occur to a depth of about 9 feet.

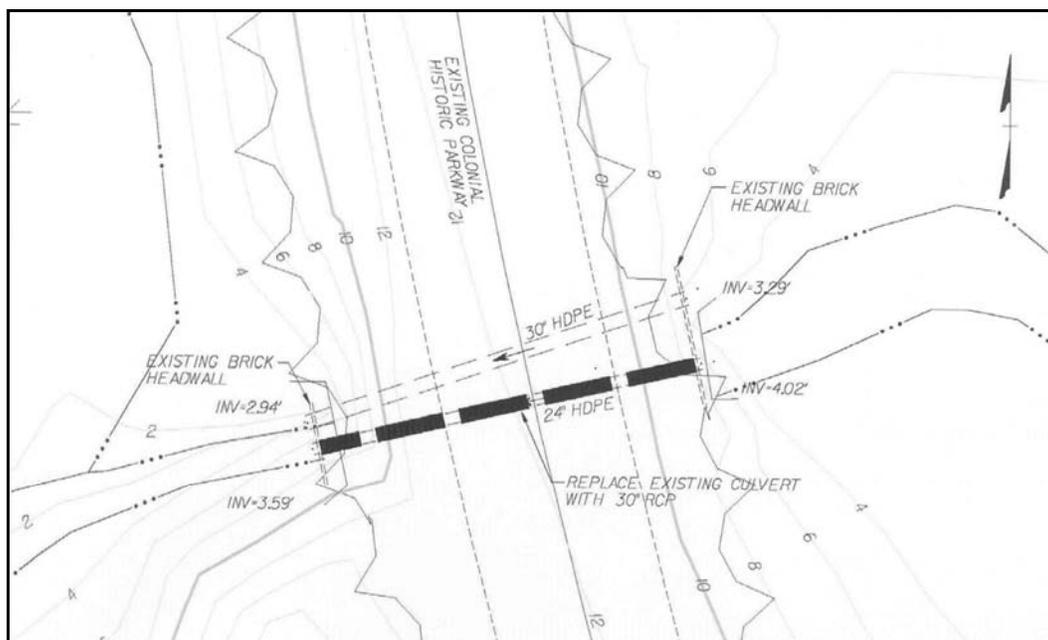


Figure 4. Concept Plan of Alternative 2 at Site A (Replace Existing 24-inch Culvert with 30-inch RCP); Source: NPS, 2005

ALTERNATIVE 3 - ADD PARALLEL 24-INCH RCP

The existing system would be upgraded by adding a parallel 24-inch RCP next to the existing 24-inch pipe to accommodate storm water runoff during peak 25-year storm events. The installation of the parallel 24-inch RCP would require the removal of the road surface, as well as excavation below the road surface. The headwall required for this alternative would be incorporated into the existing brick headwall. The approximate area of temporary disturbance would be about 0.018 acres based on the assumption that construction workers would disturb an area 60 feet by 10 feet. Excavation would occur to a depth of about 9 feet.

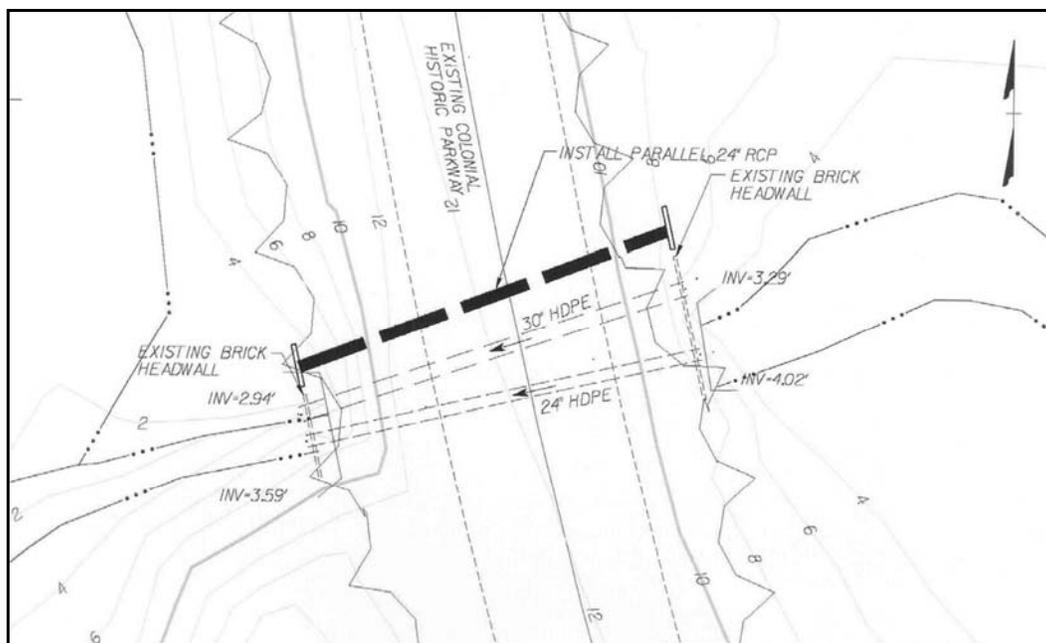


Figure 5. Concept Plan of Alternative 3 at Site A (Add Parallel 24-inch RCP); Source: NPS, 2005

SITE B

Site B is located approximately 3,600 feet north of the Parkway's intersection with Route 199 (Figure 2). At present, the culvert system consists of double 36-inch RCPs with existing brick headwalls at the inlet and outlet. This culvert system currently drains stormwater runoff from about 80 percent of the entire Papermill Creek watershed. Under current conditions, the culvert system at Site B is critically undersized and unable to accommodate storm water runoff from a 2-year storm event. Existing analysis indicates that during peak flow, the basin outflow overtops the roadway. Photographs of the existing drainage structures at Site B are included in Appendix C.

ALTERNATIVE 1 - NO ACTION

No action would be taken to alleviate drainage problems at the project site in the Papermill Creek Watershed. The recurring flood hazard would lead to continued risks to health and human safety, as well as periodic Parkway closures. As the Williamsburg area continues to experience rapid regional growth, the associated stormwater runoff would continue to cause downstream erosion and sedimentation. Adverse flooding impacts to the Parkway would not be mitigated.

ALTERNATIVE 2 - REPLACE EXISTING CULVERT WITH CON-SPAN STRUCTURE

The existing culvert system would be upgraded by replacing the existing double pipe system with a 4-foot by 28-foot CON-SPAN system. A CON-SPAN is a custom-designed, pre-cast concrete bridge with an arch design. The installation of the CON-SPAN would require the removal of the road surface, as well as excavation below the road surface to remove the pre-existing culvert system. An aesthetic colonial-style brick treatment would be used on the headwalls, wingwalls and other exposed portions of the system to provide consistency with the historical context of the Parkway. Erosion control stone would be placed behind the headwall at the outlet for outlet protection. Bioengineered slopes would be installed both upstream and downstream of the CON-SPAN system. This may include the use of live cribwalls, joint plantings in riprap, live stake and fascines and branch packings. Plants would be composed of native materials and planted during periods of dormancy in late fall or early summer. The approximate area of temporary disturbance would be about 0.037 acres based on the assumption that construction workers would disturb an area 60 feet by 10 feet. Excavation would occur to a depth of about 8 feet.

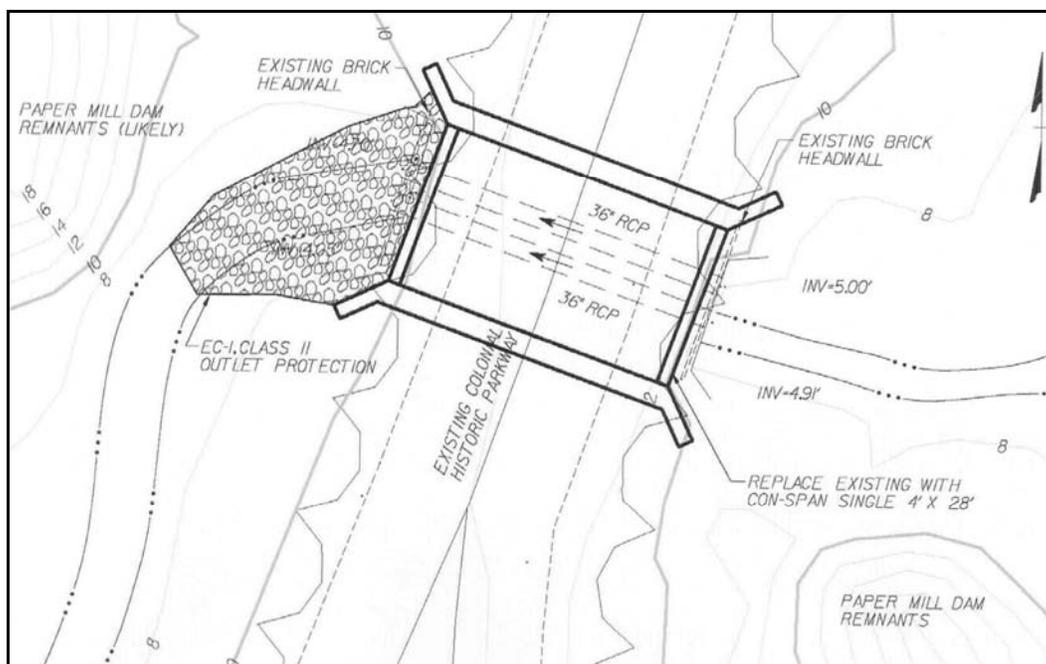


Figure 6. Concept Plan of Alternative 2 at Site B (Replace Existing Culvert with CON-SPAN Structure); Source: NPS, 2005

ALTERNATIVE 3 - ADD PARALLEL CULVERT SYSTEM

The existing culvert system would be augmented with the addition of a second, parallel culvert system. The existing culvert system would remain in place. The new, parallel system involves the installation of double 9-foot by 5-foot reinforced concrete box culverts. New brick headwalls and wingwalls would be constructed to match existing historical headwalls. The installation of the parallel culvert system would require the removal of the road surface, as well as excavation below the road surface. In order to protect historic Papermill Dam remnants on the east side of the Parkway from further erosion near the culvert inlet, bioengineered bank protection would be installed to the extent feasible to achieve slope stability. Bioengineered bank protection consists of the use of live cribwalls, joint plantings in riprap, live stake and fascines and branch packings. Plants would be composed of native materials and planted during periods of dormancy in late fall or early summer. During periods of low to moderate flow, the existing 36-inch RCP would drain stormwater runoff.

The new culvert would pass additional flows during high-flow storm events. The approximate area of temporary disturbance would be about 0.14 acres. This is based on 40 feet by 100 feet disturbance for the box culvert cast in place, as well as, 100 feet by 20 feet for the installation of bank protection. Excavation would occur to a depth of about 8 feet.

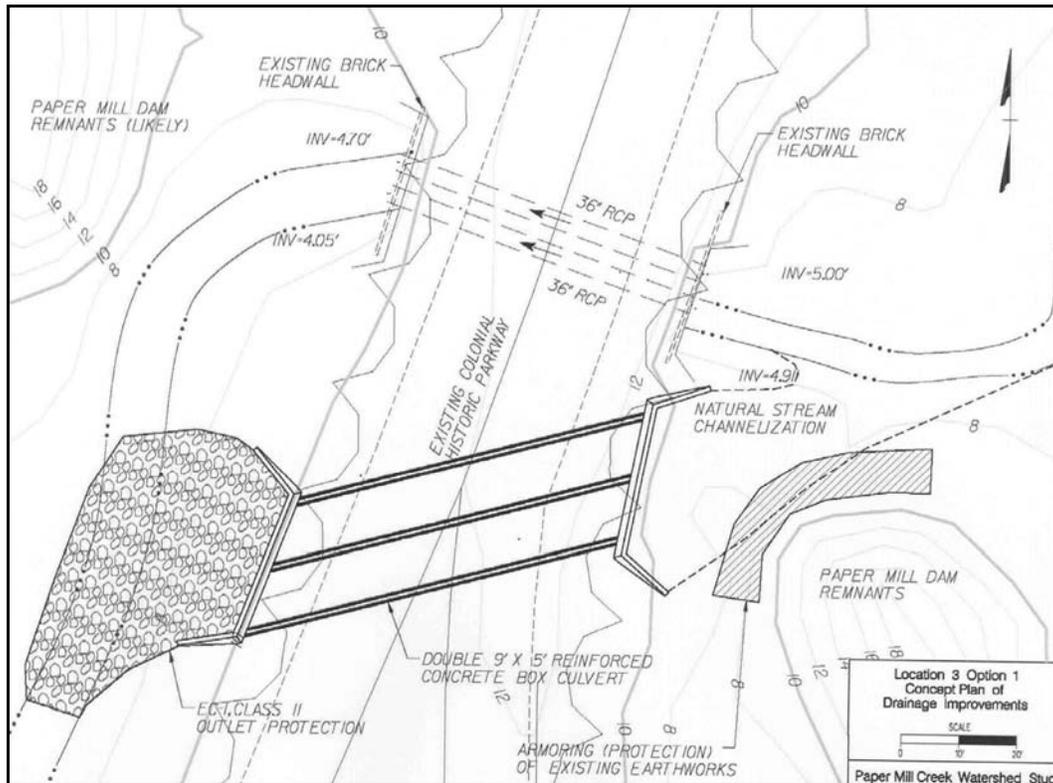


Figure 7. Concept Plan of Alternative 3 at Site B (Add Parallel Culvert System); Source: NPS, 2005

SITE C

Site C is located approximately 3,800 feet north of the Parkway's intersection with Route 199 (Figure 2). At present, the culvert system consists of a 15-inch RCP. At this time the existing culvert is unable to accommodate the flood waters of a 5-year storm event standard. Photographs of the existing drainage structures at Site C are included in Appendix C.

ALTERNATIVE 1 - NO ACTION

No action would be taken to alleviate drainage problems at the project site in the Papermill Creek Watershed. The recurring flood hazard would lead to continued risks to health and human safety, as well as periodic Parkway closures. As the Williamsburg area continues to experience rapid regional growth, the associated stormwater runoff would continue to cause downstream erosion and sedimentation. Adverse flooding impacts to the Parkway would not be mitigated.

ALTERNATIVE 2 - REPLACE EXISTING CULVERT WITH 24-INCH RCP

The culvert system would be upgraded by replacing the existing 15-inch polyvinyl chloride (PVC) pipe with a 24-inch RCP. The installation of a 24-inch RCP incorporates an open cut excavation and modifications to the existing brick headwalls to accommodate the new, larger pipe. The approximate area of temporary disturbance would be about 0.018 acres based on the assumption that construction workers would disturb an area 80 feet by 10 feet. Excavation would occur to a depth of about 8 feet.

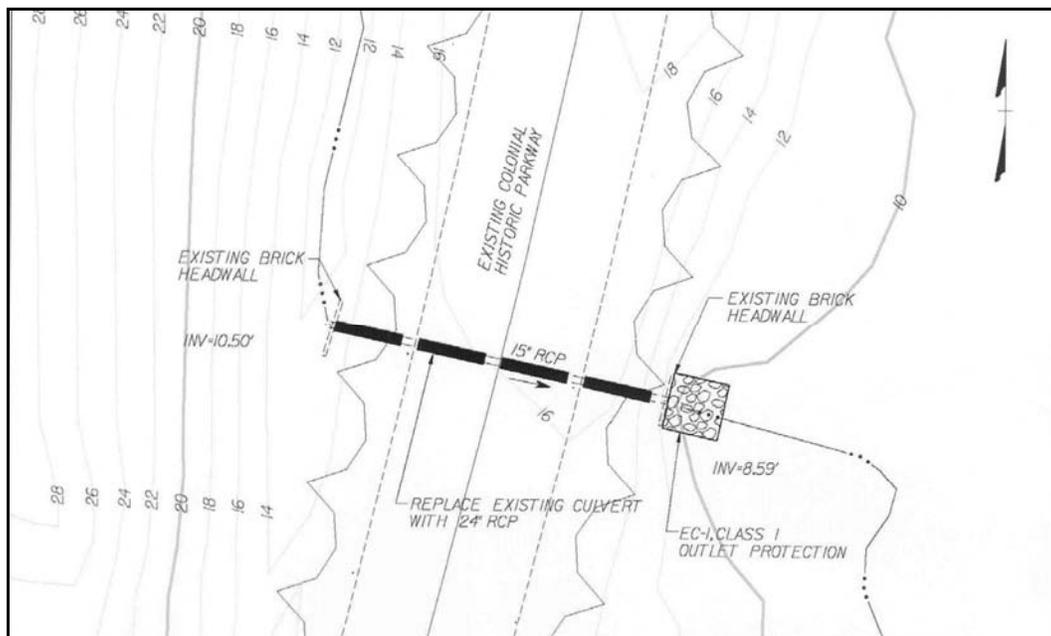


Figure 8. Concept Plan of Alternative 2 at Site C (Replace Existing Culvert with 24-inch RCP); Source: NPS, 2005

ALTERNATIVE 3 - ADD PARALLEL 24-INCH RCP

The existing culvert system would be upgraded by installing an additional 24-inch RCP adjacent to the existing culvert. The headwall required for this alternative would be incorporated into the existing brick headwall. The installation of the parallel 24-inch RCP would require the removal of the road surface, as well as excavation below the road surface. The approximate area of temporary disturbance would be about 0.018 acres based on the assumption that construction workers would disturb an area 80 feet by 10 feet. Excavation would occur to a depth of about 8 feet.

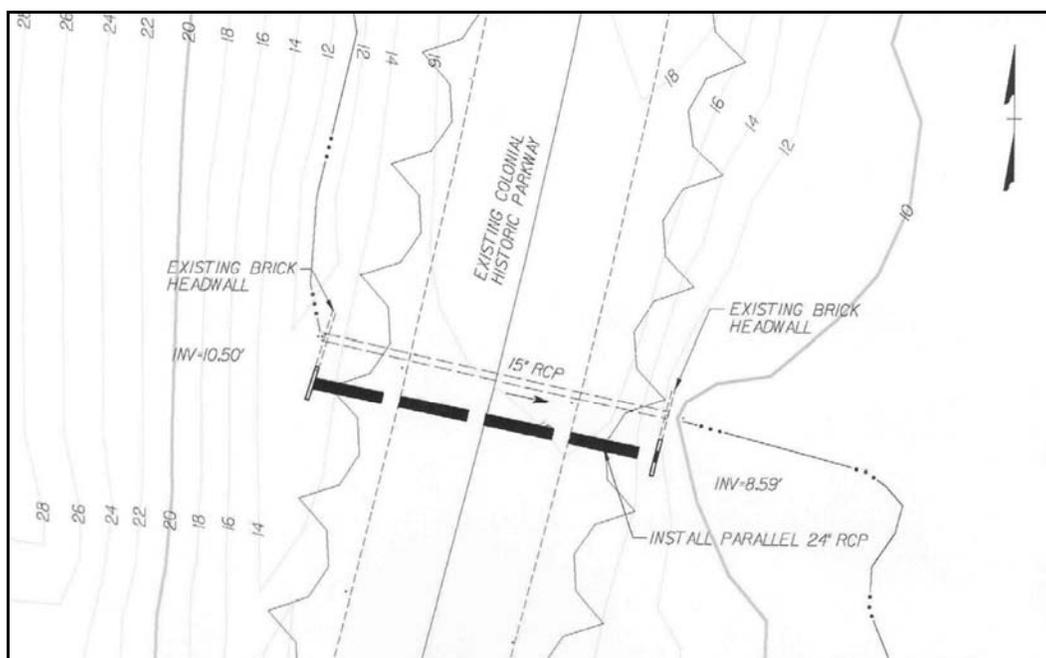


Figure 9. Concept Plan of Alternative 3 at Site C (Install Parallel 24-inch RCP); Source: NPS, 2005

THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

As defined by the CEQ: “The environmentally preferred alternative is the alternative that would promote the national environmental policy as expressed in NEPA’s Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources” (CEQ, 2005). Based on an analysis of the potential environmental impacts of the three alternatives, NPS has determined the following alternatives to be environmentally preferred: Alternative 3 at Site A; Alternative 3 at Site B; and Alternative 3 at Site C. At Sites A, B and C, the addition of secondary culverts, parallel to the existing culverts, is environmentally preferred because it allows the existing historic headwalls to remain intact and undisturbed. The environmentally preferred alternative at Site B (i.e., installation of a parallel box culvert) would prevent adverse impacts to the base of the historic dam and allow the natural stream channel to flow without impediment. The environmentally preferred alternatives are also the Park’s preferred alternatives.

ALTERNATIVES CONSIDERED BUT DISMISSED

The proposed action alternatives at Sites A, B, and C were developed as part of the Design Scoping Report (FHWA, 2003), the Papermill Creek Watershed Study (NPS, 2005a), and the result of interdisciplinary team scoping activities. Several additional alternatives were also considered but dismissed for various reasons, including failure to meet the stated purpose and need, environmental impact, engineering feasibility, and benefit-cost considerations.

The construction of bridges at Sites A, B, and C was considered with the advantage being that they are less susceptible to clogging with drift and debris. This alternative was eliminated, however, because it requires higher cost and more maintenance than culverts. The CON-SPAN alternative considered in Alternative 2 at Site B has the advantage of additional increased clearance similar to a bridge, however, the cost and maintenance requirements are lower.

In addition to bridges, the project team also considered raising the grade of the roadway. This would increase the vertical clearance over the culvert crossing and allow for the installation of a new, more efficient culvert system. This alternative was dismissed because it would require extensive reconstruction of the existing Parkway, resulting in considerable impacts to cultural and environmental resources. The cost of raising the grade of the roadway would also be prohibitive.

A third alternative considered but dismissed is the use of a reduced design criterion at the project sites where drainage would be redesigned to accommodate the 10-year design storm instead of the 25-year design storm. The use of a reduced design criterion was dismissed because it would still allow for roadway overtopping during higher storm events, and therefore would not adequately meet the purpose and need.

At Site B, the installation of an upstream retention basin was considered to attenuate peak stormwater flows. The basin size needed to attenuate the 2-year design storm peak flow was estimated to be about 2.4 acres. This option was dismissed from further consideration because it would require the extensive clear-cutting of trees and vegetation in the Parkway corridor and would require the acquisition of land that extends outside of the Parkway corridor to Golden Horseshoe Golf Course. Furthermore, Site B is located in proximity to a historic village, thus increasing the chance that the construction of a retention basin could adversely affect cultural resources. Additionally, the high cost and regular inspection and maintenance requirements were considered prohibitive.

Table 2 shows the three alternatives as they relate to project objectives.

Table 2: Alternatives Comparison Table

SITE A		
Alternative 1 - No Action	Alternative 2 – Replace Existing 24-inch Culvert with 30-inch RCP	Alternative 3 (Environmentally Preferred Alternative) – Add Parallel 24-inch RCP
No action would be taken to alleviate drainage problems at the project site in the Papermill Creek Watershed. The recurring flood hazard would lead to continued risks to health and human safety, as well as periodic Parkway closures. As the Williamsburg area continues to experience rapid regional growth, the associated stormwater runoff would continue to cause downstream erosion and sedimentation. Adverse flooding impacts to the Parkway would not be mitigated.	The culvert system would be upgraded by replacing the existing 24-inch HDPE pipe with a 30-inch RCP. The installation of the 30-inch RCP would require the removal of the road surface, as well as excavation below the road surface to remove the pre-existing pipe. The existing brick headwall would be removed, and replaced or modified to accommodate the larger pipe.	The existing system would be upgraded by adding a parallel 24-inch RCP next to the existing 24-inch pipe to accommodate stormwater runoff during peak 25-year storm events. The installation of the parallel 24-inch RCP would require the removal of the road surface, as well as excavation below the road surface. The headwall required for this alternative would be incorporated into the existing brick headwall or offset as another headwall.
Meets Project Objectives? No The No Action Alternative does not meet the purpose and need for the project. It does not mitigate the flooding problems in the area.	Meets Project Objectives? Yes Alternative 2 would reduce the flood hazard at Site A in order to ensure the safety of Parkway users and protect historic Parkway design features.	Meets Project Objectives? Yes Alternative 3 would reduce the flood hazard at Site A in order to ensure the safety of Parkway users and protect historic Parkway design features.

*Colonial National Historical Park
Redesign Parkway Drainage along Papermill Creek Watershed
Environmental Assessment/Assessment of Effect*

SITE B		
Alternative 1 - No Action	Alternative 2– Replace Existing Culvert with CON-SPAN Structure	Alternative 3 (Environmentally Preferred Alternative) – Add Parallel Culvert System
<p>No action would be taken to alleviate drainage problems at the project site in the Papermill Creek Watershed. The recurring flood hazard would lead to continued risks to health and human safety, as well as periodic Parkway closures. As the Williamsburg area continues to experience rapid regional growth, the associated stormwater runoff would continue to cause downstream erosion and sedimentation. Adverse flooding impacts to the Parkway would not be mitigated.</p>	<p>The existing culvert system would be upgraded by replacing the existing double pipe system with a 4-foot by 28-foot CON-SPAN system. A CON-SPAN is a custom-designed, pre-cast concrete bridge with an arch design. The installation of the CON-SPAN would require the removal of the road surface, as well as excavation below the road surface to remove the pre-existing culvert system. An aesthetic colonial-style brick treatment would be used on the headwalls, wingwalls, and other exposed portions of the system to provide consistency with the historical context of the Parkway. Erosion control stone would be placed downstream of the headwall for outlet protection.</p>	<p>The existing culvert system would be upgraded by adding an additional culvert system parallel to the existing pipes. The new, parallel system involves the installation of double 9-foot by 5-foot reinforced concrete box culverts. New brick headwalls and wingwalls would be constructed to match existing historical headwalls. The installation of the parallel culvert system would require the removal of the road surface where jacking under the road is not feasible. In order to protect historic Paper Mill Dam remnants on the east side of the Parkway from further erosion near the culvert inlet, bioengineered bank protection would be installed. Erosion control stone would be placed downstream of the headwall for outlet protection. During periods of low to moderate flow, the existing 36-inch RCP would drain stormwater runoff. The new culvert would pass additional flows during high-flow storm events.</p>
<p>Meets Project Objectives? No</p> <p>The No Action Alternative does not meet the purpose and need for the project. It does not mitigate the flooding problems in the area.</p>	<p>Meets Project Objectives? Yes</p> <p>Alternative 2 would reduce the flood hazard at Site B in order to ensure the safety of Parkway users and protect historic Parkway design features.</p>	<p>Meets Project Objectives? Yes</p> <p>Alternative 3 would reduce the flood hazard at Site B in order to ensure the safety of Parkway users and protect historic Parkway design features.</p>

SITE C		
Alternative 1 - No Action	Alternative 3 – Replace Existing Culvert with 24-inch RCP	Alternative 3 (Environmentally Preferred Alternative) – Add Parallel 24-inch RCP
<p>No action would be taken to alleviate drainage problems at the project site in the Papermill Creek Watershed. The recurring flood hazard would lead to continued risks to health and human safety, as well as periodic Parkway closures. As the Williamsburg area continues to experience rapid regional growth, the associated stormwater runoff would continue to cause downstream erosion and sedimentation. Adverse flooding impacts to the Parkway would not be mitigated.</p>	<p>The culvert system would be upgraded by replacing the existing 15-inch PVC pipe with a 24-inch RCP. The installation of a 24-inch RCP incorporates an open cut excavation and modifications to the existing brick headwalls to accommodate the new, larger pipe.</p>	<p>The existing culvert system would be upgraded by installing an additional 24-inch RCP adjacent to the existing culvert. The headwall required for this alternative would be incorporated into the existing brick headwall or offset as another headwall. The installation of the parallel 24-inch RCP would require the removal of the road surface, as well as excavation below the road surface.</p>
<p>Meets Project Objectives? No The No Action Alternative does not meet the purpose and need for the project. It does not mitigate the flooding problems in the area.</p>	<p>Meets Project Objectives? Yes Alternative 2 would reduce the flood hazard at Site C in order to ensure the safety of Parkway users and protect historic Parkway design features.</p>	<p>Meets Project Objectives? Yes Alternative 3 would reduce the flood hazard at Site C in order to ensure the safety of Parkway users and protect historic Parkway design features.</p>