ENVIRONMENTAL ASSESSMENT

For

ROADWAY AND TRAIL SAFETY IMPROVEMENTS GEORGE WASHINGTON MEMORIAL PARKWAY

Virginia and Washington, DC

Prepared by the
U.S. Department of Transportation
Federal Highway Administration
Eastern Federal Lands Highway Division
and the
U.S. Department of Interior
National Park Service
George Washington Memorial Parkway Unit
Joint Lead Agencies

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March 2002

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1.0 PURPOSE AND NEED FOR ACTION

A. Introduction

The George Washington Memorial Parkway (GWMP) is a linear park located in Virginia, Maryland and the District of Columbia along the Potomac River. The park is owned by the Federal government and operated by the National Park Service (NPS). The GWMP Unit includes four separate roadway segments – the George Washington Memorial Parkway, the Mt. Vernon Memorial Highway, the Clara Barton Parkway and the Spout Run Parkway – totaling 38.3 miles and 7,248 acres.

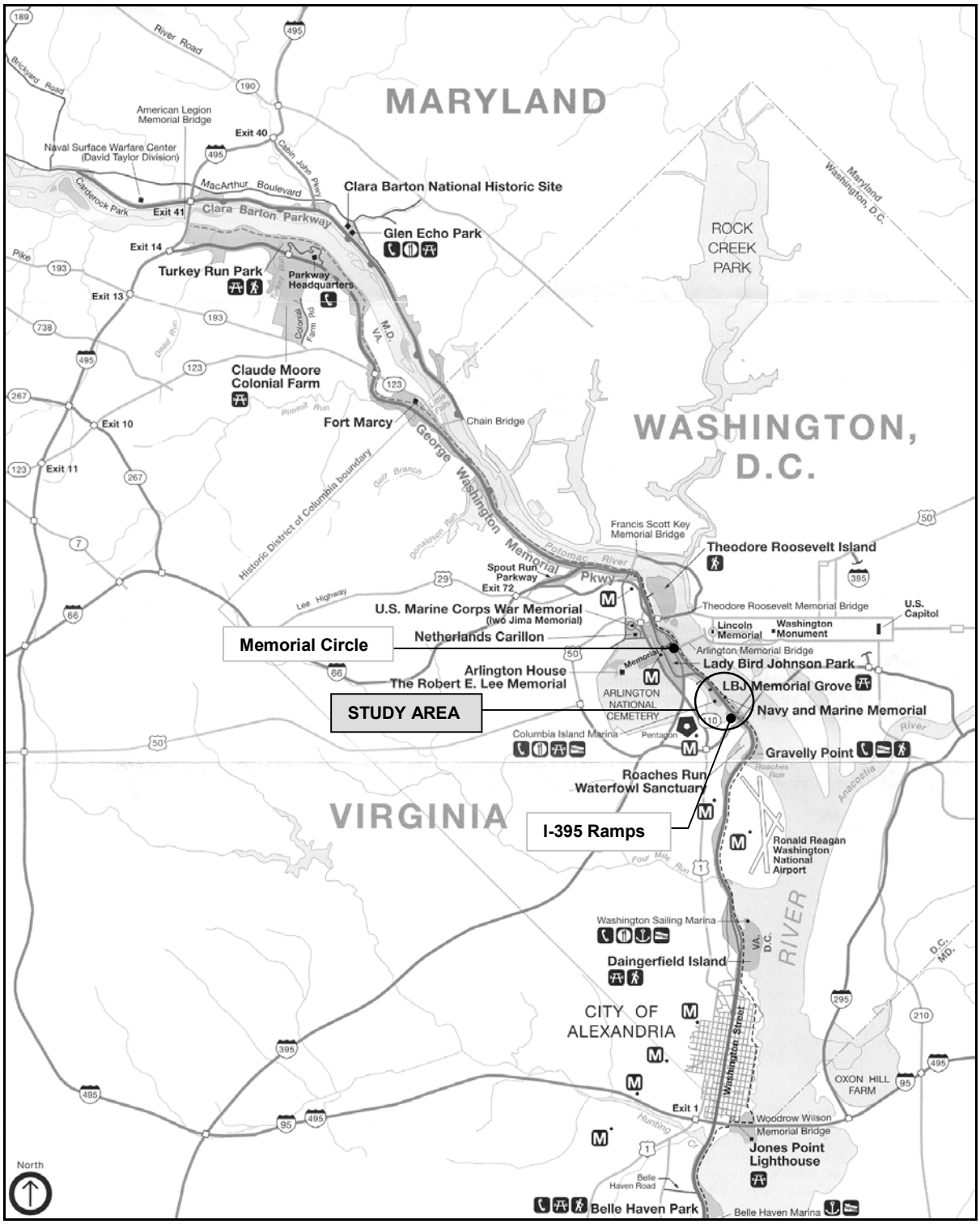
The George Washington Memorial Parkway is mostly located in Virginia, on the west side of the Potomac River (see Figure 1). The parkway extends from the Capital Beltway (I-495) on the northern end to Slaters Lane in the City of Alexandria on the southern end. The Columbia Island portion of the GWMP is located in the District of Columbia. The Mount Vernon Memorial Highway is also on the west side of the Potomac in Virginia and connects Hunting Creek at the south end of Alexandria to Mount Vernon. The Clara Barton Parkway is located in Maryland, on the east side of the Potomac. It extends from MacArthur Boulevard west of Carderock Park on the northwest end to the Chain Bridge across the Potomac River on the southeast end. Finally, the Spout Run Parkway provides a connection between the GWMP and Lee Highway/Interstate 66 (I-66) at Spout Run Creek, north of the Key Bridge. A number of recreational, historical and memorial sites are also part of the GWMP Unit, including Great Falls Park, Glen Echo Park, Arlington House, the Clara Barton National Historic Site, Theodore Roosevelt Island Park and the Lyndon Baines Johnson (LBJ) Memorial Grove. The Mt. Vernon Trail, a bicycle and pedestrian route, extends along the GWMP and the Potomac River from Theodore Roosevelt Island to Mt. Vernon.

The area being investigated focuses on the GWMP in the vicinity of its intersection with Interstate 395 (I-395), just west of the 14th Street Bridge over the Potomac River. While collectively referred to as the 14th Street Bridge, the crossing consists of three bridges: the George Mason Bridge, which carries the southbound lanes of I-395 from the District of Columbia to Virginia; the Rochambeau Bridge that connects northbound I-395 to 14th Street; and the Arland D. Williams Jr. Memorial Bridge (Williams Bridge), which also carries northbound I-395 across the Potomac River from Virginia. The general boundaries of the Study Area are the Potomac River to the east, the Williams Bridge to the south, Boundary Channel Drive to the west, and Columbia Island Marina to the north (see Figure 2).

B. Purpose of the Action

The purpose of the proposed action is to identify and evaluate a series of roadway and bicycle/pedestrian trail modifications to more safely and efficiently accommodate motorists, bicyclists and pedestrians using the GWMP in the vicinity of the 14th Street Bridge and Columbia Island Marina. Potential modifications to meet current public roadway design and NPS Park Road Standards will also be investigated. The modifications are intended to address safety concerns in the Study Area and would not result in any increase in the existing roadway capacity.

Figure 1: Location Map



Source: National Park Service, George Washington Memorial Parkway

Figure 2: Study Area

Legend

Study Area

① Intersection of the GWMP and the Columbia Island Marina and Navy-Marine Corps Memorial/Lady Bird Johnson parking lot entrance

② Southbound I-395/George Mason Bridge ramp to northbound GWMP and Humpback Bridge

③ Northbound I-395/Williams Bridge ramp to northbound GWMP

④ Southbound GWMP ramp to southbound I-395

⑤ GWMP and northbound I-395/Rochambeau Bridge

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C. Need for the Action

1. Background

The segment of the GWMP within the Study Area was constructed in 1932, although a number of modifications have been made to the roadway and adjacent parklands since that time. The parkway was originally constructed to commemorate the first president, preserve the natural setting along the Potomac River and provide a fittingly grand and scenic entryway for visitors to the nation's capital. Those factors, as well as its significance as the first parkway constructed and maintained by the U.S. Government, led to the listing of the GWMP on the National Register of Historic Places (National Register) in 1981[1]. Contributing elements of the GWMP historic resource within the Study Area include the Boundary Channel Bridge (No. 3300-020P), commonly referred to as the "Humpback Bridge", and the Navy-Marine Memorial, located just north of the Humpback Bridge.

As the Washington, DC region has become increasingly urban in character, the GWMP has become a primary commuter route between Virginia, Maryland and the District of Columbia. The scenic experience intended by the parkway's originators is unfortunately lost to most commuters.

With the increase in traffic volumes and speeds, the GWMP now exhibits interstate traffic characteristics. Regular users of the parkway commonly display high-speed driving habits. These habits can result in unsafe traffic maneuvers and accidents. Visitors to the Washington, DC area, while in the minority in the traffic stream, are also frequent users of the GWMP. They can be characterized by slower driving speeds and are typically being pushed along at faster speeds than they would normally go by the prevailing commuter traffic flows.

2. Prior Studies

Safety hazards and deficiencies on the GWMP have been documented in numerous studies conducted over the past 15 years, including four studies focusing on the Study Area: *Traffic Safety Study* (National Park Service, 1998), *14th Street Bridge Corridor Improvement Feasibility Study* (Virginia Department of Transportation, 1998), *Columbia Island Conceptual Study, George Washington Memorial Parkway* (Federal Highway Administration, 1993, revised 1994), and *Feasibility Study of Measures to Improve the Safety, Capacity and Operation of the 14th Street Bridge on I-395 and the I-395 and George Washington Memorial Parkway Interchange* (Federal Highway Administration, 1986).

3. Motorist Safety Concerns

According to the *Traffic Safety Study*, over the period of time from 1994 to 1996, the George Washington Memorial Parkway system (which includes the GWMP, the Mt. Vernon Memorial Highway, the Clara Barton Parkway, and other adjacent parklands operated by National Park Service) had a total accident rate of 2.25 accidents per million vehicle miles traveled. This accident rate is average when compared to other similar roadways. However, the area of the parkway between Memorial Circle and the I-395 ramps (see Figure 1) was identified as a "high accident location", where the accident rates were significantly higher than other segments of the GWMP. Seven of the top ten accident sites on the GWMP system are located in this segment of the GWMP. The southbound I-395/George Mason Bridge ramp to northbound GWMP (see Figure 2) was identified as the site of the most accidents. The

[1] The initial Mt. Vernon Highway segment of the GWMP, from the Arlington Memorial Bridge to Mt. Vernon, was listed on the National Register in 1981. The remaining portions of the GWMP were listed on the National Register in 1995.

Columbia Island Marina entrance at the GWMP was the seventh most frequent accident site. Also in the top ten are the northbound GWMP at the ramp to northbound I-395 (Williams Bridge) and the southbound GWMP at the ramp from northbound I-395. The majority of the accidents involved only property damage, although some also resulted in personal injuries.

The *14th Street Bridge Corridor Improvement Feasibility Study* identified the southbound GWMP ramp to southbound I-395 as a frequent accident location as well. Other frequent accident locations within the Study Area, documented in the *14th Street Bridge Corridor Improvement Feasibility Study*, include the left side exit ramp from northbound I-395 to northbound GWMP.

In addition to the frequency of accidents, a number of the study locations exhibit operational and design deficiencies that create a safety hazard and/or result in regular traffic delays and congestion. Specific locations are summarized below:

- Southbound I-395 ramp to the northbound GWMP
- Mainline GWMP at the Humpback Bridge
- Northbound I-395/Williams Bridge ramp to northbound GWMP
- Northbound GWMP ramp to southbound I-395
- Southbound GWMP ramp to southbound I-395
- Southbound GWMP ramp to northbound I-395
- Northbound I-395 ramp to southbound GWMP

Safety concerns related to vehicle turning movements are the primary issue at the intersection of the GWMP and the Columbia Island Marina entrance. The marina entrance and a large parking area are located on the western side of the GWMP, just north of the Humpback Bridge. Vehicles coming out of the marina parking lot can turn left or right onto the GWMP. Northbound parkway traffic can also turn left into the marina parking lot. A small parking area serving the Lady Bird Johnson Park and Navy-Marine Memorial is located on the eastern side of the GWMP, opposite the Columbia Island Marina entrance. Although vehicles leaving that parking lot are limited to “Right Turn Only”, southbound GWMP traffic can turn left into the parking lot. Short deceleration and acceleration lanes are provided on each side of the parkway in both directions into and out of the parking areas. A left-turn bay is provided in the northbound direction of the parkway for access to the Columbia Island Marina. A short acceleration lane on the left side of the northbound lanes of the parkway, just north of this intersection, accommodates traffic turning left onto the GWMP from the marina entrance.

4. Bicyclist and Pedestrian Safety Concerns

A shared-use bicycle and pedestrian trail system, the Mt. Vernon Trail, parallels the Potomac River along the eastern edge of the GWMP. For the most part it is separated from the vehicular roadway by a considerable distance. At the Humpback Bridge the trail narrows from about eight feet in width to approximately six feet and is located adjacent to the vehicle travel lanes. The parkway approaches to the bridge are steep, resulting in poor sight distance for the motorist and the bicycle trail user at this location. Only a concrete curb separates bicyclists and pedestrians from vehicle traffic. The situation is aggravated by the location of the I-395/George Mason Bridge exit ramp to the northbound GWMP just south of the Humpback Bridge. Ramp traffic is frequently backed up at this location and motor vehicle accidents are common, rendering the adjacent trail an unsafe and unpleasant experience for users.

The intersection of the GWMP and the Columbia Island Marina entrance poses an additional hazard for bicycle and pedestrian users of the parkway. A marked, at-grade crosswalk is located north of the intersection. It is not used most of the time by trail users traveling back and forth between the Columbia Island Marina and LBJ Grove on the western side of the GWMP and the Navy-Marine Memorial on the eastern side of the parkway. There are no guidance signs leading to the crosswalk from the main trail or the parking areas on either side of the road. The crosswalk is connected to the main trail by a narrow asphalt path along the side of the road. Many bicyclists and pedestrians cross at the marina entrance, often stopping in the median to wait for a break in the traffic, where they conflict with oncoming vehicles and turning vehicles.

D. Description of the Proposed Action

The NPS and Federal Highway Administration (FHWA) propose to modify access ramps, roadway, pedestrian/bicycle trails and parking areas within the GWMP to correct design deficiencies and satisfy safety concerns associated with the design and location of the various Parkway features. The GWMP/I-395 interchange and access ramps, Humpback Bridge, Columbia Island Marina entrance on the GWMP and other areas within the Study Area (see Figure 2) will be evaluated for potential modification and improvement.

E. Decision To Be Made

The National Environmental Policy Act of 1969 (NEPA) requires consideration of the environmental effects of proposed Federal actions. This Environmental Assessment (EA) has been prepared to assist NPS and FHWA decision-makers in developing solutions to address the GWMP safety concerns through the evaluation of various options for accomplishing the safety improvements and the environmental effects of the preferred action(s).

F. Scoping and Issues

Issues and concerns related to the proposed safety improvements were identified by NPS and FHWA staff, by other Federal and local agencies and members of the public consulted during EA development, and by review of prior investigations within the Study Area.

A set of issues was identified that influenced the development of alternatives and analysis process. Each of the major issues is discussed in the following sections.

1. GWMP Historic Resource

The designation of the GWMP as a historic resource, and the prominence of the Humpback Bridge and Navy-Marine Memorial as contributing elements of that resource, significantly influences the development of potential safety improvement alternatives. The State Historic Preservation Officers (SHPO) for Virginia and the District of Columbia and Advisory Council on Historic Preservation were consulted early in the investigations to discuss options for addressing the safety concerns associated with this segment of the GWMP. Beginning with those initial discussions, emphasis was placed on minimizing any impacts to the Humpback Bridge and the vistas of the bridge as seen from the Potomac River and District of Columbia. As a result, any expansion or replacement of the Humpback Bridge would take place to the west, with the eastern edge of the existing bridge as the outer boundary for any improvements.

2. Humpback Bridge Condition

Boundary Channel Bridge No. 3300-020P or the Humpback Bridge is a 244-foot long, 67-foot wide concrete cantilever-arch structure with center, suspended span on piled spread footings. It was constructed in 1932 as an original feature of the Parkway and was reconstructed in 1993, consisting of the replacement of the concrete deck and sidewalk and repair of the concrete tee beams. Four GWMP vehicle travel lanes cross the bridge, two in each direction. A six-foot wide sidewalk is also located on each side of the bridge. The east sidewalk connects the bridge to the Mt. Vernon Trail bicycle and pedestrian route. There are no connecting sidewalks or paths to the GWMP from the bridge's west sidewalk.

The FHWA performed the last bridge inspection and load rating of the Humpback Bridge on May 12, 1999. The bridge was given a good condition rating with minor deterioration, no load restrictions, and with an approximate useful life of 25 to 30 years. A visual survey of the Humpback Bridge was conducted in conjunction with this Environmental Assessment and related engineering investigations. The complete survey results are documented in the *GWMP Safety Improvements Existing Conditions Report* (August 2001).

Based upon the visual survey, the concrete main span deck and sidewalks are in good condition. Minor transverse cracks were noticed in the deck, curb median and sidewalk. These cracks are minor shrinkage cracks and pose no structural or serviceability threat to the deck. Evidence of efflorescence throughout the underside of the slab was noticed for the main span. Overall the bottom of the slab and soffit are in fair condition.

The bridge supporting members, consisting of steel beams encased in concrete to form composite tee beams that cantilever out from each bridge pier and a short concrete tee beam "suspended span" bridge section connecting the two cantilevered bridge sections, appear to be in fair condition. The concrete on select tee beams is beginning to spall and chip, exposing the reinforcing steel. It doesn't appear that this minor beam deterioration is structurally threatening. However, patching and repairing the spalls in the tee beams is important in maintaining the serviceability of the bridge. The supporting floor beams and girders adjacent to the expansion joints show moderate concrete spalls with exposed reinforcing bar. The concrete spalls in the tee beams and suspended span should be repaired to prevent further deterioration that could affect the serviceability of the bridge. The concrete diaphragms between the tee beams appear to be in good condition, although efflorescence was observed on several of these elements.

The condition of the concrete in the existing abutments and walls could not be determined during the survey due to the stone facing. The earth filled (closed) pier/abutment acts as a gravity retaining wall, which supports the embankment on both sides of the channel and appears to be in fair/good condition. Further investigation/inspection is needed to analyze the condition of the existing abutment and wing walls with consideration given to any modifications of the structure. A visual inspection of the bridge piers did not reveal any evidence of foundation settlement.

Without additional analysis, it is recommended that no additional loads be added to the Humpback Bridge structure. Any widening of the Humpback Bridge should be supported by a separate bridge structure and foundation, but could be attached to the existing bridge. Other modifications to the Humpback Bridge should not result in any additional dead loads.

3. Maintenance of Traffic

The maintenance of traffic flow on the GWMP during the construction of any safety improvements was identified by the NPS and FHWA as a key requirement, due to the parkway's role as a primary commuter route for the region. This requirement applies to both vehicular traffic and pedestrian, bicycle and other traffic on the Mt. Vernon Trail.

2.0 AFFECTED ENVIRONMENT

A detailed description of existing conditions within the Study Area is included in the *GWMP Safety Improvements Existing Conditions Report* (August 2001), prepared in conjunction with this Environmental Assessment. The components of the existing environment that may be affected by the proposed action are summarized below.

A. Roadways and Ramps

1. Physical Characteristics and Description

Overall, the mainline GWMP consists primarily of asphalt pavement and concrete curbs with minor sections of concrete surfacing on bridge decks. There are two vehicle travel lanes in each direction within the Study Area, separated by a raised grass median, guardrail, or stone wall, depending on the location. The intersections of the GWMP and I-395/14th Street Bridge are grade-separated interchanges with ramp access and egress with the mainline GWMP. Access and egress ramps are located at the GWMP and southbound I-395/Mason Bridge and the GWMP and northbound I-395/Williams Bridge. There are no ramps connecting the GWMP and the Rochambeau Bridge.

Two prior studies – *Traffic Safety Study* (National Park Service, August 1998) and *George Washington Memorial Parkway: Virginia, Maryland, District of Columbia, Engineering Study for Roads and Bridges* (National Park Service, April 1999) – respectively describe the physical characteristics of the Parkway and the physical condition of the roadways, ramps and bridges in detail. These resources may be referenced for further information regarding the physical characteristics of the GWMP.

2. Traffic Counts

There are two sources of historical count data that are useful in this study – the 1998 *Traffic Safety Study* and the *14th Street Bridge Corridor Improvement Feasibility Study* (Virginia Department of Transportation, 1998). The latter study included a thorough analysis of the traffic activities within the Study Area and will be the primary source of comparison for this study.

Based on the historic traffic data, there are well-defined morning and evening peaks in average traffic volume reflecting heavy commuter traffic. The busiest hours for traffic on the GWMP are from 7:00 AM to 10:00 AM, and from 3:00 PM to 7:00 PM. Average traffic volumes on the Parkway are extremely light between midnight and 6:00 AM and are markedly less on the weekends.

An extensive new traffic count program was performed for the Study Area in March 2001, to supplement historic count data. Eighteen (18) tube counts were conducted, with the count locations designed to replicate the 1996 count locations used for the *14th Street Bridge Corridor Improvement Feasibility Study*. The March 2001 counts were then compared with several other sources: actual counts and year 2000 projections used in the 14th Street Bridge Study, actual counts in the 1998 *Traffic Safety Study*, and VDOT data on primary and interstate routes in the area. The locations of the tube counts that were conducted for this study are displayed in Appendix B, Figure B-1.

The 2001 raw traffic counts were balanced across the interchange at GWMP and I-395 so that the volumes add up appropriately across the interchange. These volumes were then compared to the year 2000 projections from the *14th Street Bridge Corridor Improvement*

Feasibility Study. Most of the 2001 volumes were within a reasonable margin (15%) of the year 2000 projections. Appendix B, Figure B-2 displays the existing traffic volumes (Daily/AM Peak Hour/PM Peak Hour).

3. Operational Analysis

The Corridor-microscopic Simulation (CORSIM) traffic simulation model originally developed for the *14th Street Bridge Corridor Improvement Feasibility Study* was modified to incorporate the new traffic volumes in the Study Area. CORSIM is a traffic simulation model that allows the user to analyze complex roadway and/or freeway networks. The output for this model provides the resulting average density of each link (road segment) in order to analyze the level of service (LOS) for the freeway segments. The limits of the simulation model extend to north and south of the GWMP / I-395 interchange, as well as to the west on I-395 near the Route 27 underpass, and to the east on I-395 to the Potomac River Bridges.

The LOS rating of a roadway assigns a value ranging from A for segments with completely free-flow conditions, to F, which represents a breakdown in the traffic flow. The levels of service for the AM and PM peak hours determined by the CORSIM analysis are shown in Appendix B, Figure B-3. These service levels are very similar to those reported for the year 2000 in the 1998 *14th Street Study*. Along northbound I-395, there are eight merge, diverge, and/or weave areas; five of which operate at unacceptable levels of service of E or F in the AM peak. Along southbound I-395, there are nine merge, diverge, and/or weave areas; two of which operate at unacceptable levels of service of E or F in the PM peak.

The specific problem locations reported in the *14th Street Bridge Corridor Improvement Feasibility Study* and 1998 *Traffic Safety Study* still apply to 2001 traffic, notably:

- <u>Northbound I-395 at the off-ramp to northbound GWMP in the AM peak hour</u>
  Only 200 feet downstream from the southbound GWMP on-ramp to northbound I-395, traffic exiting I-395 to northbound GWMP must slow to meet the left exit ramp, which has no auxiliary lane to separate the decelerating vehicles from the interstate traffic. Although the traffic volume on this ramp is fairly low (3800 vehicles per day [vpd]), the maneuver is hazardous due to the lack of a deceleration lane as well as the limited sight distance, which causes vehicles to slow even more on the interstate before they exit.

- <u>Northbound GWMP at the southbound I-395 off-ramp in the AM and PM peak hours</u>
  Queues develop on this ramp back to I-395 due to the lack of acceleration lane on the Parkway.

- <u>Northbound and southbound mainline GWMP at Columbia Island Marina</u>
  Currently, northbound GWMP through movements operate at LOS F during the AM peak and LOS E during the PM peak. Southbound GWMP through movements operate at LOS D for both the AM and PM peaks. The traffic entering and exiting the Columbia Island Marina and Navy-Marine Memorial parking lots operate at or near unacceptable levels of service. It is important to note that although the LOS for left turns is poor, the traffic volumes are extremely low for left-turning turning vehicles at this intersection. Additionally, unsignalized intersections on urban roadways frequently operate at LOS E or F in the peak hour. Unlike at signalized intersections, this can be acceptable since it represents operations for a single movement and not the overall intersection.

- <u>Northbound I-395 at the on-ramp from southbound GWMP in the AM peak hour</u>
  The operational deficiencies at this location are due to the lack of acceleration and deceleration lanes for the Interstate on and off ramps. Traffic merging onto I-395 from

the southbound GWMP exit ramp has effectively no acceleration lane, therefore causing backups on I-395 due to ramp traffic merging from almost a complete stop. Traffic also backs up along the ramp and spills back onto the southbound GWMP because of the stop-and-go conditions at the I-395 merge area.

- Various weave areas along I-395 in the study area from GWMP to the ramps at Rte 110
  Several weave areas operate at or near unacceptable levels of service during the peak hours, including the weaving movement from the southbound GWMP ramp to southbound I-395.

4. Speed Studies

A detailed speed study for the GWMP that included the areas analyzed in this study was conducted in the *Traffic Safety Study*. The highest percentages of vehicles traveling 10 miles or more over the posted speed limit occurred in locations with reduced speed limits (35 to 40 mph). The posted speed in the Study Area is 40 mph. However, the average "actual" speed recorded in the vicinity of the Columbia Island Marina entrance was over 47 mph. The average speeds in both directions jumped from 45 mph during the morning and evening peak hours (7:00 AM – 10:00 AM and 4:00 PM -7:00 PM) to 49 mph throughout the rest of the day.

Overall, speeding is considered the greatest safety problem on the Parkway, although drivers generally seem to maintain a fairly consistent speed throughout the length of the Parkway, regardless of the posted speed limit. However, the mixture of slower moving tourists with the faster moving commuters on the GWMP creates varying driver styles and the potential for conflicts between vehicles. Due to the lack of NPS personnel and equipment, high volume traffic conditions, and the basic design of the Parkway, U.S. Park Police have trouble enforcing the speed limit.

5. Roadway and Ramp Geometric Design

An analysis of geometric design deficiencies, including the Study Area, was conducted for the *14th Street Bridge Corridor Improvement Feasibility Study*. Most of the major deficiencies are related to the interchange or ramp geometry, and are summarized below.

- Southbound I-395 ramp to northbound GWMP
  The length of the deceleration lane for this ramp is less than engineering design standards. There is no acceleration lane on the GWMP for traffic entering the parkway from this ramp. The lack of an acceleration lane on the GWMP for merging traffic results in frequent queues on the ramp and extending back to the mainline segment of southbound I-395/George Mason Bridge during peak periods.

- Mainline GWMP at the Humpback Bridge
  The existing vertical profile of the Humpback Bridge and its approaches is well below the recommended minimum design speed for this portion of the GWMP, particularly the northbound lanes. The bridge approaches are designed for 20 miles per hour (mph) while the bridge itself has a 30 mph design speed. The posted speed limit for the bridge and its approaches is 40 mph. The limited sight distance coupled with the intersection of the southbound I-395 ramp to the Parkway and its deficiencies just south of the Humpback Bridge raise multiple safety concerns for this portion of the GWMP.

- Northbound I-395 ramp to northbound GWMP
  This left-exit ramp has no deceleration lane and, due to the curved alignment on the approach to the exit, sight distance is limited. Low speeds and high delays on this segment of northbound I-395 result due to the tendency for exiting vehicles to decelerate more abruptly than anticipated by through-freeway vehicles. The acceleration lane length where this ramp merges with northbound GWMP is also substandard. In addition, the proximity of this ramp to the northbound GWMP exit ramp to southbound I-395 creates additional vehicle conflicts.

- Northbound GWMP ramp to southbound I-395
  As discussed above, this ramp is too close to the prior northbound I-395 to northbound GWMP on-ramp. The conflicts between vehicles entering and exiting the GWMP as well as the substandard deceleration lane length of this ramp create an accident hazard at this location.

- Southbound GWMP ramp to southbound I-395
  The deceleration and acceleration lengths of this ramp are shorter than current design standards and pose a safety concern. This ramp is also part of a 3,800-foot long segment of I-395 between the northbound GWMP and VA Route 27/Pentagon off-ramps that contains five consecutive weaving sections and nine different ramp junctions. The higher than normal lane changing activity at this location significantly slows operations through this portion of I-395 and frequently results in accidents.

- Southbound GWMP ramp to northbound I-395
  Accidents occur at the end of this ramp, at the merge with I-395, and on the southbound GWMP at the diverge or deceleration lane for this ramp. The lack of a merge area at the end of the ramp is a problem at this location, as well as the proximity of this GWMP exit to the adjacent on-ramp for southbound I-395 traffic entering the southbound GWMP.

- Southbound I-395 ramp to southbound GWMP
  Potential problems at this location include the lack of advance and visible signage for the vehicles merging onto southbound GWMP from the northbound I-395 exit ramp. Additionally, the ramp merges with high-speed traffic on the southbound Parkway lanes with no merge/acceleration lane provided.

6. Accident Information

All three of the prior studies that have been used as a resource for this analysis provide useful accident information for the GWMP. Accident records maintained by the U.S. Park Police for the years 1997 through July 2001 were also reviewed as well as VDOT accident data for the Study Area (1997-2002). Overall, the GWMP has a fair safety performance record. Over the period of time from 1994 to 1996, the GWMP system (which includes the GWMP, the Mt. Vernon Memorial Highway, the Clara Barton Parkway, and other adjacent parklands operated by National Park Service) had a total accident rate of 2.25 accidents per million vehicle miles traveled. This accident rate is average when compared to other similar roadways. However, in the segment of the parkway between Memorial Circle and the I-395 ramps, which includes the Study Area, a number of “high accident locations” have been identified, where the accident rates were significantly higher than other comparable segments of the GWMP.

A brief summary of the accident history and problems associated with the accident locations within the Study Area is provided below. Accidents on this segment of the GWMP are documented in Appendix C.

- Northbound GWMP at the ramp from southbound I-395 (George Mason Bridge)
  This site is the location of the most accidents on the entire GWMP system (286 accidents between 1994 and July 2001). All accidents that occurred at this location, except one, were between motor vehicles (i.e., no pedestrians involved) and most involved property damage only. The majority of accidents were during the AM and PM peak hours and were rear-end collisions (approximately 95%). Commonly listed contributing factors include "Driver failed to give full time and attention" and "Driver followed to closely".

  Location-specific problems included the lack of adequate merge ramps for the traffic merging into the northbound GWMP mainline flows. In addition, merging traffic immediately encounters an upgrade leading into the Humpback Bridge (specifically difficult during wet conditions).

- GWMP at Columbia Island Marina/Navy-Marine Memorial/Lady Bird Johnson Park
  Accidents at this location were primarily between vehicles (although there was an incidence of a pedestrian/vehicle accident during the study period). Of the accidents involving other motor vehicles, rear-end collisions were the most common type of collision reported. If contributing factors were indicated, the most frequent factors were "Driver - failed to give full time and attention", "Driver too fast for conditions" and "Driver followed to closely".

  Problems at the intersection are specifically related to the high volume of vehicles on the GWMP. Left-turns and U-turns are difficult and dangerous because they involve crossing opposing traffic flows. In addition, there are site-related problems at this location. There is a lack of guidance signs leading pedestrians to the crosswalk from parking areas on the side of the road. On a related note, very few pedestrians use the marked crosswalk. Sight distances are limited to the south of the site by the presence of the Humpback Bridge over Boundary Channel.

- GWMP Mainline at the Humpback Bridge
  The Humpback Bridge span is a frequent accident location, in both the northbound and southbound directions. Approximately 20% of the accidents involved some kind of personal injury. As with other locations, there was a predominance of rear-end collisions. Contributing factors include "Driver - failed to give full time and attention", "Driver too fast for conditions" and "Driver followed to closely".

- Northbound I-395 ramp to northbound GWMP
  The majority of the accidents occurring at this ramp (23 total between 1994 and July 2001) result in property damage only and are rear-end collisions. The lack of a deceleration lane on I-395 is the reason for the problems at this ramp. In addition, the acceleration lane for this ramp is inadequate for vehicles entering the GWMP, which must merge with high-speed traffic on the mainline lanes of the parkway. The proximity of this ramp to the northbound GWMP exit ramp to southbound I-395 creates additional conflicts for traffic using this ramp.

- Northbound GWMP at the ramp to southbound I-395
  This location was the scene of 20 accidents between 1994 and July 2001. The accidents were a mixture of vehicle-to-vehicle collisions (rear-end and sideswipe) and collisions between a vehicle and a fixed object such as a guardrail. The substandard deceleration lane and proximity of this ramp to the prior northbound I-395 to northbound GWMP on-ramp cause the problems at this location.

- Southbound GWMP ramp to southbound I-395
  The substandard deceleration lane length is a problem at this location. As a result, accidents are most common on the southbound GWMP at the diverge/deceleration lane for this ramp. Accidents also occur at the end of this ramp, where the merge area onto mainline I-395 is inadequate, and where the ramp is part of a series of closely-spaced on- and off-ramps results in multiple weaving movements for traffic entering and exiting southbound I-395.

B. Bicycle and Pedestrian Facilities

An extensive network of pedestrian and bicycle paths is currently provided adjacent to the GWMP in the Study Area. The shared-use pathway system is frequented by walkers, joggers, tourists, naturalists, in-line skaters and recreational and commuter bicyclists. Major pedestrian and bicyclist attractions in the Study Area include the LBJ Memorial Grove and Columbia Island Marina, and Gravelly Point and Roaches Run Waterfowl Sanctuary, located to the south of the Study Area.

The Mt. Vernon Trail, the main pedestrian-bicycle route on the GWMP, is nine feet wide for most of the Study Area. The trail narrows considerably, to about six feet, as it crosses the Humpback Bridge. There is no protective separation between the trail and the roadway. The AASHTO *Guide for the Development of Bicycle Facilities* (AASHTO, 1999) recommends a width of 10 feet for a two-directional shared use path. A 12 to 14 foot wide path is desirable when there is substantial use by bicycles, joggers, and pedestrians, use by large maintenance vehicles and/or steep grades. When the distance between a vehicular roadway and the shared use path is less than five feet, a physical barrier is recommended to separate vehicular traffic from bicycle and pedestrian traffic.

The GWMP approaches to the Humpback Bridge are steep and do not work well with the vertical curvature of the bridge. These factors contribute to poor sight distance for both the GWMP motorist and for the Mt. Vernon Trail user. The transition of the trail to the sidewalk of the bridge is substandard as well.

There is an at-grade pedestrian crossing of the mainline GWMP within the Study Area. It is located just north of Columbia Island Marina entrance. Pedestrians and bicyclists find it difficult to cross the Parkway. Heavy traffic volumes and high vehicle speeds create a barrier for pedestrians and bicyclists and make the crossing difficult.

C. Historic and Cultural Resources

The Study Area and its immediate environs have been subject to human occupation since prehistoric times. Historic maps provide a detailed history of the area since the mid-nineteenth century. Changes to the landscape since that time have largely been the result of activities such as grading, dredging, filling, mining and construction.

Prior to 1924, the southern end of Columbia Island and the GWMP lands to the north of I-395 and the George Mason Bridge were the open waters of the Potomac River. Other land within the Study Area was low-lying marsh. A stream known as Roaches Run flowed in a north-south direction west of the Boundary Channel lagoon in the area where VA 110 and the Pentagon north parking lot are now located. Another stream fed into Roaches Run from the west, just north of the Pentagon. Columbia Pike intersected a road following the alignment of today's U.S. Route 1 in the vicinity of the current Route 1/I-395 interchange. From there, the road extended eastward to the Potomac River. The Long Bridge carried the road across the Potomac about where the RF&P railroad bridge now sits. Columbia Island was created in 1924 when the U.S. Army Corps of Engineers dredged the Potomac River navigational channel and side-cast the spoils to the west. A small lagoon and Boundary Channel were formed by the creation of Columbia Island. Roaches Run and the second stream were filled in 1942 during the construction of the Pentagon. Boundary Channel was also enlarged as a result of dredging during the construction of the Pentagon.

A detailed discussion of the historical development of the lands within the Study Area is included in the *GWMP Safety Improvements Existing Conditions Report* (August 2001).

1. GWMP Historic Resource

The GWMP was established in 1930 by the U.S. Congress as a memorial to George Washington, connecting the areas where he spent much of his time: Mount Vernon, his residence; Washington, D.C, the nation's capital; and Great Falls, location of the Potomac Canal, which he helped design and build. The initial section of the parkway, known as the Mount Vernon Memorial Highway, opened in November 1932 and extended from the Arlington Memorial Bridge to Mount Vernon. Most of the northern section of the parkway, from the Memorial Bridge to the Capital Beltway, was opened in 1966.

The initial Mount Vernon Memorial Highway segment of the GWMP was listed on the National Register of Historic Places in 1981. It had previously been identified as a historic resource of the District of Columbia in 1964. The remaining portions of the GWMP were listed on the National Register in 1995. It is significant as the first parkway constructed and maintained by the U.S. Government, as a work of landscape architecture, and as a memorial to George Washington. Specifically, the significance of the parkway closely relates to the long and continuous city planning effort for the Washington, DC region. The GWMP has additional significance as a designed entryway into the nation's capital and the grand approach it provides to the monumental core of the capital. George Washington's association with the Potomac River corridor and the District of Columbia is another major factor that elevates the significance of the parkway. Finally, the GWMP has significance as an instrument of conservation and protection of the natural resources of the Potomac River. By its very existence, the parkway prevents development along the river corridor and the potentially detrimental impacts of that development to the corridor's natural resources.

GWMP National Register elements include the Humpback Bridge. The GWMP and the bridge are also within the viewsheds of other National Register resources in the area, including the Pentagon, Arlington National Cemetery and the LBJ Memorial Grove. Although not constructed in connection with the original segment of the GWMP, the Navy-Marine Memorial on the southern end of Columbia Island is also a contributing element of the GWMP National Register resource. Erected in 1934 on the lands of the GWMP, the sculpture is a unique and striking specimen among the abundance of memorial art in the Washington, DC region.

Detailed discussions of the GWMP and its historical significance are found in the *Historic Resource Study: Rock Creek and Potomac Parkway, George Washington Memorial Parkway, Suitland Parkway and Baltimore-Washington Parkway* (U.S. Department of Interior, 1990) and the *Cultural Landscape Report, Mount Vernon Memorial Highway* (EDAW, 1986).

2. Archaeological Resources

The construction of roads, bridges across the Potomac River, the Pentagon Reservation and the GWMP itself involved extensive cutting, filling and grading. Filling activities may have covered archaeological sites, protecting them from shallow surface disturbances. Cutting may have destroyed archaeological sites. Although these activities, and human activity in general, have altered the landscape throughout its history, archaeological sites may still exist in or near the Study Area, although the extensive ground-moving activities in the area may have destroyed them.

3. Historic Resources

In addition to the GWMP, a number of other historic resources are located immediately adjacent to the GWMP. Most resources are related to the growth of Washington, DC as the nation's capital and the federal government's role in that development or are federally designated memorials and monuments. Historic resources in proximity to the Study Area include the Pentagon, Arlington National Cemetery and Arlington House, the Arlington Memorial Bridge, the LBJ Memorial Grove, the National Airport Complex, the Lincoln Memorial, the Jefferson Memorial, East and West Potomac Parks and the Tidal Basin, the National Mall Historic District, and the L'Enfant Plan of Washington or the Squares, Circles, Streets, Vistas and Other Delineated Elements Created by the Plan of the Federal City.

These and other resources are listed on various federal and local historic registers including the National Register of Historic Places, the District of Columbia (DC) Inventory of Historic Sites, the Virginia Landmarks Register and the Arlington County Inventory of Historic Resources. A more comprehensive listing of historic and cultural resources in the vicinity of the Study Area is included in Appendix D.

D. Aesthetics and Viewsheds

The GWMP was constructed, in part, to provide a fittingly grand approach to Washington, DC. Its alignment and original landscape elements were designed to frame a series of planned vistas of the National Capital and its monumental core. Today much of the parkway, including the landscaping, is relatively unaltered from its original construction and siting. It should be noted, however, that much change has taken place on the lands adjacent to the parkway – including dense urban development in areas such as Crystal City and Rosslyn, the construction of I-395, and the construction of National Airport and the Pentagon – that has compromised some of the GWMP's original character.

The GWMP is also an element in the viewsheds of numerous surrounding historic resources. The Study Area forms the foreground for the views from the Pentagon river terrace across the Potomac River to the Washington, DC monumental core. It is also within the viewshed of the LBJ Memorial Grove and Arlington National Cemetery. Finally, the GWMP is part of the background of vistas formed by the L'Enfant Plan of Washington. Vistas include the primary intersecting vistas from the Capitol along the National Mall to the western horizon and from the White House along President's Park to the southern horizon.

E. Land Use

The area immediately surrounding the intersection of the GWMP and the 14th Street Bridge is devoted to the park and recreation uses of the GWMP. The areas adjacent to the GWMP, in Arlington, VA and Washington, DC, include a mixture highly developed urbanized areas and parklands and open space. Land use categories in the vicinity of the Study Area include:

- Park and open space,
- Federal government facilities,
- Residential (single family and multi-family),
- Commercial office, hotel and retail, and
- Industrial.

The GWMP itself is a major park and recreation resource, primarily devoted to passive recreation activities and memorial functions such as the Navy-Marine Memorial, Lady Bird Johnson Memorial Park and the LBJ Memorial Grove. Recreation facilities within the Study Area include the Columbia Island Marina and boat launching facility and the Mt. Vernon Trail.

Roaches Run Waterfowl Sanctuary, a 53-acre lake created by the Civilian Conservation Corps in the 1930's, is located immediately south of the Study Area. Other federal parklands and open space include East and West Potomac Parks, the Jefferson Memorial and the National Mall and Smithsonian museum complex located across the Potomac River in Washington, DC. The Army-Navy Country Club is located to the southwest. A county park, Virginia Highlands, is also located to the southwest.

Interstate 395 and the Pentagon and Arlington National Cemetery separate the Study Area from adjacent residential areas. Other federal facilities in the vicinity include National Airport, Fort Myer Military Reservation and the federal office complex adjacent to the National Mall in Washington, DC. The closest residential neighborhoods are Aurora Highlands/Pentagon City and Crystal City, located southwest of the study area. The residential neighborhoods are a high-density mixture of single-family dwellings and multi-family dwellings and apartments. Those areas also contain a concentration of commercial office, hotel and retail land uses.

A small pocket of industrial land use is located immediately south of the Study Area and I-395. This area, which includes the site of the former Twin Bridges Marriott Hotel, is largely undeveloped, although Arlington County is currently developing a master recreation plan for the area.

1. Arlington County Zoning

The Arlington County Zoning Map designates the portion of the GWMP within the Study Area and the surrounding Pentagon Reservation, Arlington National Cemetery and I-395 as a Special District (S-3A). The strip of land directly south of the Study Area, between I-395 and the Roaches Run Waterfowl Sanctuary is zoned a combination of Limited Industrial (CM), Commercial Office Building, Hotel and Apartment (C-0-1.5), Light Industrial (M-1) and Service Industrial (M-2).

F. Biological Resources

1. Vegetation

Vegetation within the Study Area is comprised primarily of lawn and ornamental plantings. Remnants of the original landscape plantings remain, including four large-caliper specimen trees – three American elms (*Ulmus americana*) and a flowering pear (*Pyrus calleryana*) – that flank the Humpback Bridge on the Potomac River side. Additional specimens include flowering dogwood (*Cornus florida*) and pin oak (*Quercus palustris*).

Natural vegetation fringes Boundary Channel and the lagoon and includes wetland vegetation (floodplain forest associations and aquatic herbs), as well as white oaks (*Quercus alba*), black locusts (*Robinia pseudoacacia*) and tulip poplars (*Liriodendron tulipifera*).

2. Wildlife and Threatened and Endangered Species

Wildlife found within the portion of the GWMP within the Study Area is limited to species associated with urban environments, such as birds, squirrels and other small animals. The Roaches Run Waterfowl Sanctuary is located just south of I-395, adjacent to the GWMP, and is also under the jurisdiction of the NPS. The area is not considered a unique habitat for any wildlife species.

There are no state or federally listed rare, threatened or endangered species known to inhabit the Study Area. A list of Natural Heritage Resources of Arlington County, including federal and state protected species, is provided in the *GWMP Safety Improvements Existing Conditions Report* (August 2001).

3. Wetlands

The U.S. Fish and Wildlife Service (FWS), National Wetlands Inventory (NWI) map data classifies the Boundary Channel and lagoon as a lacustrine, limnetic, unconsolidated bottom, permanent-tidal (L1UBV) wetland, approximately 39 acres in size. A small lacustrine, littoral, emergent, nonpersistent, semipermanent-tidal (L2EM2T) wetland of approximately 2 acres is found adjacent to the Boundary Channel shoreline, north of the LBJ Memorial Grove parking lot. The Potomac River is classified as a riverine, tidal, unconsolidated bottom, permanent-tidal (R1UBV) wetland.

G. Water Resources

The Study Area is within the Arlington and Alexandria City Drainages watershed. That watershed, in turn, is part of the Middle Potomac, Potomac River and Chesapeake Bay watersheds. The Potomac River is tidal along the segment adjacent to the Study Area and experiences a mean tidal range of approximately 3 feet (1.5 feet above and below MSL). There are no national or state designated wild and scenic rivers in the vicinity of the GWMP and 14th Street Bridge.

Groundwater is encountered approximately 20 to 25 feet below the surface, although groundwater is not used as a source of water supply in the region. Arlington County purchases its water from the City of Falls Church, VA, which is supplied by the Washington Aqueduct by drawing water from the Potomac River. Arlington County drinking water meets or surpasses all federal and state drinking water standards.

1. Floodplains

The Study Area encompasses two water bodies: the Potomac River and Boundary Channel. The Federal Emergency Management Agency (FEMA) designates the 100-year base flood elevation to be approximately 13 feet above mean sea level (MSL) in the vicinity of the Study Area. The 100-year floodplain encompasses portions of Columbia Island adjacent to Boundary Channel, including the marina parking lot and dock areas and the shoreline surrounding the Navy-Marine Memorial. Flood Zone B, defined as the areas between the limits of the 100-year flood and 500-year flood or certain other areas subject to 100-year flood, includes the open areas adjacent to the Columbia Island Marina and its parking lot as well as the area surrounding the Navy-Marine Memorial.

2. Coastal Zone Management

The Virginia Coastal Resources Management Program was established in 1986 to protect and manage an area known as Virginia's "Coastal Zone" which encompasses 29 counties, including Arlington County, 15 cities and 43 towns and all of the waters to the three-mile Territorial Sea boundary. The Study Area is contained in the Potomac River basin of the Chesapeake Bay watershed. The tidal portion of the river extends from the mouth of the Chesapeake Bay to Chain Bridge in Washington, DC. As such, the Virginia portions of the Study Area are within the Virginia Coastal Zone. The District of Columbia was excluded from the original Coastal Zone legislation[2] and is not required to have a coastal zone management program.

3. Chesapeake Bay Preservation Area

Arlington County is responsible for delineating Chesapeake Bay Preservation Areas (CBPA's) and adopting programs that implement the performance criteria specified in the language of the Chesapeake Bay Preservation Act. CBPA's are divided into two designations by Commonwealth of Virginia regulation: Resource Protection Areas (RPA's) and Resource Management Areas (RMA's). The District of Columbia does not designate Chesapeake Bay Preservation Areas.

A RPA includes extremely sensitive areas such as major streams, rivers, lakes and wetlands as well as a 100-foot buffer surrounding them. While the Arlington County CBPA does not include federal properties such as the GWMP, the Potomac River and Boundary Channel shorelines and a 100-foot buffer around them would qualify as a RPA if the CBPA designations were applied.

H. *Physiography, Geology and Soils*

The Study Area and GWMP are located in the Atlantic Coastal Plain physiographic province. In general, the Coastal Plain province is flat, defined by terraces at several different locations, including the Arlington Ridge to the west of the Pentagon Reservation. The low-lying area encompassing the Study Area has been altered extensively by human activity and no longer resembles the natural landform of the area.

The geologic formation underlying the Study Area is designated as part of the Potomac Formation on the *Simplified Geologic Map of Arlington County, VA and Vicinity* (Arlington County, 1999). The geology of the Study Area itself is designated as artificial fill. The artificial fill category is described as heterogeneous materials found in large areas regraded,

[2] 16 USC 1453

leveled, or filled for construction. It also includes fill of marshes or low-lying areas and those formerly mined for sand, gravel or clay.

Most soils in Arlington County include some percentage of urban land intermixed with the native soil profile. Urban land is designated as soils completely covered by concrete, asphalt, buildings or other impervious surfaces. The soils within the Study Area are part of the Urban Land-Sassafras-Neabsco complex. The mapping unit is designated as the Urban land-Udorthents complex, 2 to 15 percent slopes and consists of areas where more than 85 percent of the surface is Urban land. The Udorthents consist of material that has been graded, cut, filled, or otherwise disturbed during urbanization.

I. Air Quality

The GWMP is located approximately 125 miles from the Atlantic Ocean. Good air dispersion parameters occur in the region, with typical wind speeds of 5 to 15 miles per hour (mph) predominantly from a general northerly or southerly direction. Overall air quality can be considered fair, but problems with specific pollutants exist in the area. The metropolitan Washington, DC region exceeds the National Ambient Air Quality Standards (NAAQS) for ozone and has been designated a Serious Non-Attainment Area for ozone by the U.S. Environmental Protection Agency (EPA). The region is in compliance for the other pollutants considered in the NAAQS.

The Environmental Protection Agency (EPA) approved the National Capital Region State Implementation Plan (SIP) on December 15, 2000. The EPA also approved the region's request to extend the ozone attainment date to November 15, 2005. On June 20, 2001 the National Capital Region Transportation Planning Board (TPB) approved amendments to the 2000 Constrained Long-Range Plan (CLRP) and FY2001-2006 Transportation Improvement Program (TIP) to include the proposed short- and mid-term safety improvements associated with the 14th Street Bridge/I-395 and GWMP/I-395 interchange to the region's transportation plan and TIP. As the proposed improvements do not result in an expansion of the regional transportation system capacity, they are not anticipated to affect conformity with the SIP.

J. Noise

Vehicular traffic noise on the GWMP and I-395 and aircraft noise from planes approaching and departing from National Airport are the most common type of noise in the Study Area. Other noise sources include rail traffic from the adjacent Metro and RF&P tracks. Information on existing noise levels was drawn from existing published studies. No new field measurements were taken. The aircraft noise is an intermittent source that is superimposed upon the relatively constant ambient traffic noise and accounts for only periodic sharp increases in noise levels.

The Metropolitan Washington Airports Authority completed a *Noise Compatibility Study* for National Airport in 1990. Additional noise analysis was conducted as part of the *Environmental Assessment for Airport Traffic Control Tower and Related Terminal Improvements* (Ricondo and Associates, 1993). Noise modeling done in conjunction with the terminal improvements environmental assessment reflected compliance with the Airport Noise and Capacity Act of 1990, which directed the Federal Aviation Administration (FAA) to phase out the operation of Stage 2 aircraft by the end of 1999. While the projected year 2000 noise levels reflect an increase in the use of widebody (i.e., Boeing 767's) operations at National Airport, they also reflect the introduction of the quieter Stage 3 aircraft. The average day-night sound level (Ldn) measured in decibels on the A-scale or dBA, the metric

used by the FAA to measure noise levels, is predicted to be 65 Ldn or less in the Study Area.

Monitoring of noise levels in the vicinity of the Study Area was also conducted in conjunction with the preparation of the *Environmental Assessment of the Pentagon Reservation Master Plan* (DMJM-3D/I, 1991). The monitoring site closest to the Study Area was in the Pentagon north parking lot. The maximum noise levels at that site are associated with National Airport operations. The average equivalent sound level (L_{eq}) measured at that location was 62 L_{eq} for the AM peak (with aircraft making a south takeoff from National Airport), 75 L_{eq} for mid-day (with aircraft making a north takeoff from National Airport) and 77 L_{eq} for the PM peak (with aircraft making a north takeoff). An additional monitoring site was located southwest of the Study Area, adjacent to I-395 and in the vicinity of Federal Office Building 2 (FOB2) or the Navy Annex. That site reflects noise generated by traffic on I-395. Noise measurements at that location were 69 L_{eq} in the AM peak, 70 L_{eq} at mid-day and 71 L_{eq} in the PM peak.

K. Hazardous Materials and Wastes

A Phase I Environmental Site Assessment (ESA) was conducted of the portion of the GWMP encompassing the Study Area. The assessment included buildings associated with the Columbia Island Marina facility, which is located on Columbia Island. These buildings include a main concession building, restroom facilities and two small storage sheds.

Neither evidence of any historical land use that involved the manufacture, use, or disposal of hazardous materials or hazardous wastes on the property was found, nor any evidence that suggests the presence of recognized environmental conditions based on the past use of the property. The assessment did reveal evidence of recognized environmental conditions – the presence of underground storage tanks (USTs) and aboveground storage tanks (ASTs) – in connection with the current use of the Columbia Island Marina portion of the Study Area for motorboat docking/storage.

The USTs are used for the storage of gasoline, for refueling the motorboats that use the marina, while the ASTs are used for storage of used motor oil and fuel oil storage. According to NPS records, the USTs and ASTs and piping appear to be in compliance with current local and federal regulations. There was one historical recognized environmental condition associated with the property, also related to the Columbia Island Marina. This closed leaking UST was reported on the environmental regulatory record search report. Although there are no dates indicating when this case was opened or closed, it is known that this leaking UST case has been closed. As such, it is believed that this reported leaking UST case is not a current recognized environmental condition.

L. Energy

Energy requirements associated with the Study Area relate to the amount of energy required to operate and maintain buildings and other permanent facilities (i.e., the outbuildings at the marina), the operation of maintenance vehicles and equipment, including grounds maintenance equipment, and the operation of other NPS vehicles. Energy is also required for the operation of motor vehicles traversing the Study Area.

Energy sources utilized include electricity and petroleum products (heating oil and fuels). The operations related to the Study Area are dependent upon the continued availability of the existing energy sources.

M. Socioeconomic and Community Features

The GWMP and its associated uses primarily influence the surrounding areas of Arlington County and areas of Washington, DC at the other end of the 14th Street Bridge(s). The recreation and open space features of the GWMP have a broader influence and function as a regional park resource. The GWMP is also a major component of the regional transportation network.

1. Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, directs all federal agencies to determine whether a proposed action would have an adverse or disproportionate impact on minority and/or low-income populations. It also directs agencies to ensure that representatives of an affected community have every opportunity to provide input regarding the impact of the proposed project.

There are no minority or low-income populations within the Study Area. Within Arlington County, the majority of county residents (69%) consider themselves to be of the white race; minority races include black or African American (9%), Asian (9%) or multi-racial (8%). The median household income, as reported in the 1997 Economic Census, was $57,244. The 2000 population of Arlington County was 189,453 persons, based on 2000 Census of Population estimates.

3.0 ALTERNATIVES

This study has evolved from a series of investigations by the FHWA and NPS dating back to the mid-1980's that documented safety and engineering deficiencies in the segment of the GWMP from the southern end of Columbia Island to the GWMP/I-395 interchange. Each of the studies included recommendations for improvements to the GWMP to eliminate the safety and design deficiencies. Those recommendations formed the basis for an initial set of safety improvement alternatives.

Coordination meetings with public agencies having jurisdiction over the Study Area were held in the summer of 2001 to review the initial set of improvement alternatives and gauge agency reactions to the potential alternatives. At the same time, two public information meetings were also held to determine the level of public interest in the project and initiate public comment on the possible alternatives.

A. Goals and Objectives

Goals and objectives for the project were developed based upon the specific problems associated with the Study Area, a review of goals and objectives outlined by the FHWA and the NPS at the beginning of the current investigations, and a review of relevant goals and objectives associated with previous investigations in the Study Area. Specific goals include:

1. Improve safety for motorists, pedestrians, bicyclists and other GWMP users.
2. Improve transportation system efficiency.
3. Protect and preserve the scenic, historic and recreational aspects of the GWMP and surrounding historic resources.
4. Protect and preserve natural features of the GWMP.

Objectives related to the various goals are summarized in Table 1.

Table 1: Safety Improvement Goals and Objectives

GOALS	OBJECTIVES
1. Improve safety for motorists, pedestrians, bicyclists and other GWMP users.	• Reduce the number of accidents and incidents: motorists-motorists, motorists-pedestrians/bicyclists, and pedestrian/bicyclist-pedestrian/bicyclist. • Eliminate or reduce the hazard potential of roadway, trail or Parkway features.
2. Improve transportation system efficiency.	• Improve traffic operations at problem locations on the GWMP, especially peak period traffic, consistent with the alleviation of safety hazards and deficiencies. • Improve pedestrian/bicycle mobility.
3. Protect and preserve the scenic, historic and recreational aspects of the GWMP and surrounding historic resources.	• Minimize impacts to scenic, historic or recreational elements of the GWMP, including visual impacts to surrounding historic resources (i.e., GWMP, the Pentagon, Arlington National Cemetery, East-West Potomac Park, etc.) that include the Columbia Island portion of the GWMP in their viewshed(s). • Maintain navigation in Boundary Channel to/from the Columbia Island Marina.
4. Protect and preserve natural features of the GWMP.	• Minimize impacts on trees, wetlands, floodplains, riparian areas, Potomac River water quality and other natural features.

B. Preliminary Candidate Alternatives

Potential safety improvement options for each of the areas of concern within the Study Area (see Figure 2) have been developed using the recommendations identified in prior studies as a starting point. One of the prior studies, the 1998 *14th Street Bridge Corridor Improvement Feasibility Study,* was initiated in 1996 as a result of special Congressional legislation[3] that directed action be taken to reduce congestion and improve safety and traffic operations in the 14th Street/I-395 corridor, including the I-395/GWMP interchange. The study recommended a number of short- and long-term improvements for I-395, 14th Street and the GWMP. To implement those recommendations, a Memorandum of Agreement (MOA) was executed on December 20, 2000 between the Federal Highway Administration (FHWA), District of Columbia Department of Public Works (DCDPW), the Virginia Department of Transportation (VDOT) and the NPS for the environmental planning and design of the safety and operational improvements, including the I-395 interchange with the GWMP.

Ten potential projects have been developed from those identified in the 1998 feasibility study, prioritized as short-, mid- and long-term improvements, and recommended for implementation by the FHWA:

Short-term Improvements

1. Construct acceleration lane on northbound I-395 for ramp from southbound GWMP to northbound I-395.
2. Improve signage on I-395 in Virginia.
3. Improve signage on I-395 in the District of Columbia.
4. Improve signal timing on 14th Street, between Constitution and C Streets, in the District of Columbia.

Mid-term Improvements

5. Remove the ramp from northbound I-395 to northbound GWMP.
6. Remove the ramp from southbound GWMP to southbound I-395.
7. Replace the Humpback Bridge and construct an acceleration lane on northbound GWMP for the ramp from southbound I-395 to northbound GWMP. Also construct Mt. Vernon Trail underpasses connecting the east and west sides of the parkway.
8. Close the entrance into the Columbia Island Marina from the GWMP and construct a new entrance and bridge from Boundary Channel Drive over Boundary Channel to the marina. Also close the small parking lot serving the Navy-Marine Memorial on the western side of the parkway.

Long-term Improvements

9. Widen the northbound I-395 bridge over the GWMP as it approaches the Williams Bridge.
10. Widen the Williams Bridge through the addition of one through lane and one acceleration lane for the ramp from the northbound GWMP to northbound I-395.

The projects that correspond to the mid-term improvements listed above, numbers four through eight, comprise the initial set of safety improvement alternatives evaluated by this EA. Short-term improvements are currently being implemented by the FHWA and VDOT. Since the issues being evaluated and the purpose and need of this EA are strictly concerned with improving the safety of GWMP roadway and trail operations, rather than expanding its traffic-carrying capacity, additional traffic analysis and environmental documentation will be conducted before any long-term modifications or capacity

[3] Public Law 106-113.

improvements for I-395, the Williams Bridge or the other 14th Street bridges are implemented.

A potential connection between the GWMP (either northbound or southbound) and northbound I-395/Rochambeau Bridge has also been considered in prior studies to alleviate congestion and weaving activity on the inbound segment of I-395 between the GWMP and Williams Bridge. The *14th Street Bridge Corridor Improvement Feasibility Study* recommended the northbound GWMP to northbound I-395/Rochambeau Bridge ramp connection while a southbound GWMP to northbound I-395/Rochambeau Bridge ramp connection was identified in the 1986 *Feasibility Study of Measures to Improve the Safety, Capacity and Operation of the 14th Street Bridge on I-395 and the I-395 and George Washington Memorial Parkway Interchange*.

Additional alternatives have been identified based upon an analysis of traffic counts and forecasts, geometric design standards, accident information, and input from agency and public involvement. Proposed vehicular and pedestrian improvement alternatives are listed in Table E-1, Appendix E, grouped by the location they address within the Study Area. Additional information on the preliminary alternatives and the evaluation process is included in the *GWMP Safety Improvements Study Candidate Alternatives Report*, prepared in conjunction with this EA.

Each of the preliminary alternatives were considered relative to the goals and objectives of this study – the expected safety benefit, traffic impacts, practical operational ability, and potential impacts on scenic/historic and natural features of the GWMP and adjacent properties – and relative to its financial impact. Of the preliminary GWMP safety improvement options, those determined to be the most viable and reasonable options for improving safety on the GWMP for motorists and pedestrians have been retained for further evaluation. Alternatives inconsistent with the goals and objectives of the study, alternatives contrary to GWMP management objectives or review agency objectives, and alternatives not considered environmentally or economically feasible have been eliminated from further consideration.

Drawings depicting the proposed alternatives retained for evaluation in this EA are located in Appendix A.

C. Alternatives for the Columbia Island Marina Entrance

1. No Action Alternative

Under the No Action Alternative, no changes would be made to the Columbia Island Marina entrance and related circulation/turning patterns. The small parking lot serving the Navy-Marine Memorial and Lady Bird Johnson Park would be retained as well. The safety concerns associated with turning traffic at the marina entrance would not be addressed.

2. Preferred Alternative: New Entrance

The proposed action would include the permanent closing of the Columbia Island Marina entrance at the GWMP and construction of a new entrance on Boundary Channel Drive, to the west (see drawings in Appendix A). The existing entrance roadway to the marina parking lot and boat ramp would be removed. The reclaimed roadway would be re-vegetated with grass, consistent with the groundcover of the surrounding open space areas.

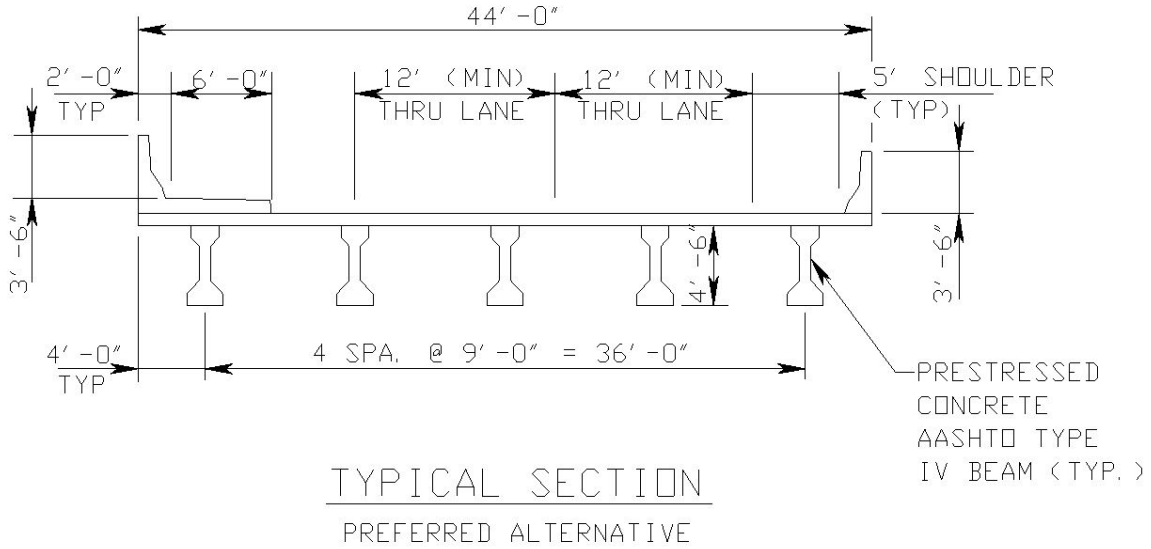
A two-lane vehicular bridge would be constructed over Boundary Channel to connect Boundary Channel Drive with the existing marina parking lot (see Figure 3). The bridge would accommodate two vehicle travel lanes (one in each direction) and a sidewalk on one side. It would be designed to blend with the character of the GWMP National Register historic resource as well as adjacent National Register resources (i.e., LBJ Memorial Grove and the Pentagon).

Boundary Channel Drive is part of the Pentagon Reservation and under the jurisdiction of Department of Defense (DOD). A permit has been requested from the DOD Directorate of Real Estate and Facilities for access from Boundary Channel Drive for the new Columbia Island Marina entrance and bridge. The NPS maintains a parking area for the LBJ Grove and pedestrian bridge across Boundary Channel that are accessed via Boundary Channel Drive under a similar permit agreement.

It should be noted that, due to the terrorist attack on the Pentagon of September 11, 2002, DOD has initiated plans to realign Virginia Route 110 (VA 110) to decrease its proximity to the Pentagon (see Figure 2). While a final alignment has not been established, the relocation may require modifications to Boundary Channel Drive and/or the I-395/Boundary Channel Drive interchange that could also affect the design for the new marina entrance. As an interim safety measure and until a final alignment has been determined, the FHWA and NPS propose to reconfigure the Columbia Island Marina entrance on the GWMP to right turns only (see Appendix A). The center median of the GWMP would be closed to turning traffic as discussed previously. Once the relocation of VA 110 is completed, the new marina entrance would be constructed.

A bus turnaround located adjacent to the existing marina entrance roadway and parking lot would be removed in conjunction with the interim modifications to the marina entrance. Public buses no longer serve the Columbia Island Marina and the turnaround serves no useful purpose.

Figure 3: Proposed Marina Bridge Section



3. Alternatives Eliminated from Further Consideration

a. Signalize Entrance

The installation of traffic signals at the GWMP/marina intersection is a relatively low-impact option that would provide for a safer intersection and more efficient traffic flow in this area. However, it is a priority of the NPS to keep the Parkway flowing freely without any traffic signals. The portion of the GWMP that travels through the City of Alexandria is the exception to this policy because the city has jurisdiction over this stretch of parkway. For general GWMP application, both the operational and aesthetic factors make traffic signalization and/or automated vehicle message signs an undesirable option.

D. Alternatives for the Southbound I-395 Ramp to Northbound GWMP, Humpback Bridge and Pedestrian Crossing of the GWMP

1. No Action Alternative

Under the No Action Alternative, no modifications would be made to the southbound I-395 ramp to northbound GWMP. The safety and design deficiencies associated with the ramp would not be addressed. The Humpback Bridge would remain in its existing configuration. The bridges vertical sight distance deficiencies would remain as well. No modifications would be made to the Mt. Vernon Trail crossing of the Humpback Bridge. The at-grade, pedestrian[4] crossing of the GWMP would remain in its present location to the north of the marina entrance. Pedestrian safety concerns associated with the existing trail and crosswalk would not be addressed.

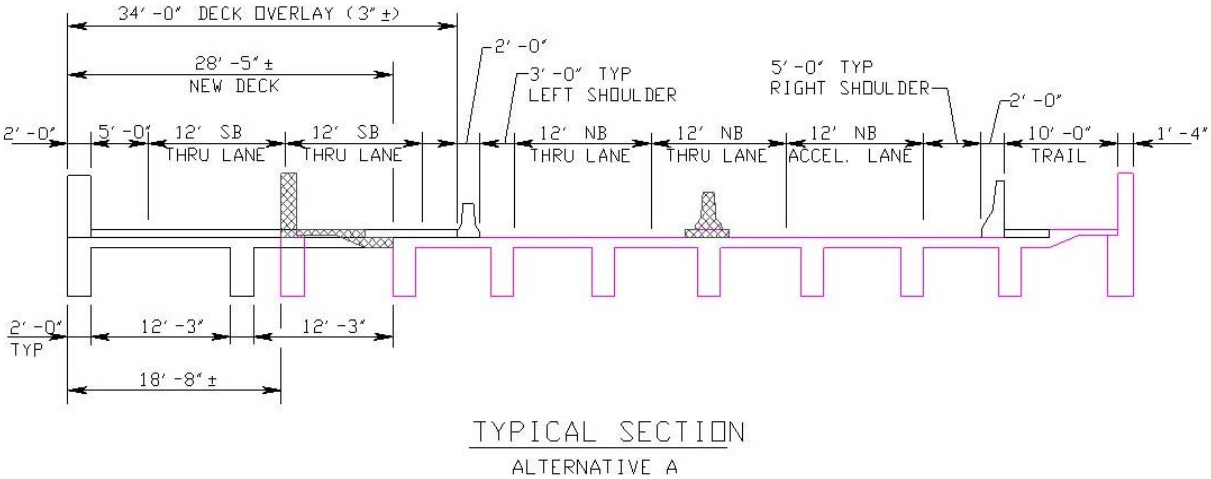
2. Alternative A: Widen Existing Bridge

Alternative A involves widening the Humpback Bridge on the west side of the existing bridge through the construction of an additional, self-supporting bridge section (see Appendix A). The widened structure would accommodate a northbound acceleration lane for the I-395 ramp, two northbound vehicle travel lanes and two southbound vehicle travel lanes (see Figure 4). A median barrier would separate the northbound and southbound GWMP lanes. Modification of the horizontal alignment of the GWMP to the north and south of the Humpback Bridge would be required to accommodate the wider bridge structure.

The expanded bridge would accommodate a 10-foot wide Mt. Vernon Trail crossing and a physical barrier or guardrail between the trail and vehicular traffic. Both the median barrier and the trail barrier would be constructed in a style and material(s) compatible with the GWMP historic resource and the character of the existing bridge.

[4] The use of the term pedestrian applies to all users of the GWMP and its trails: walkers and joggers, bicyclists and others.

Figure 4: Proposed Humpback Bridge Section, Alternative A



The existing at-grade crosswalk would be eliminated and pedestrian underpasses would be constructed to the north and south of the Humpback Bridge. The underpasses would be lighted and equipped for the potential use of security devices. Sidewalks/trails would be constructed to connect the Columbia Island Marina parking lot with the Mt. Vernon Trail and Navy-Marie Memorial, via the northern underpass. Modifications to the Mt. Vernon Trail would be made to link the existing trail with both underpasses. A new trail connection would be constructed along the southern edge of the Boundary Channel lagoon to link the Pentagon/Boundary Channel Drive with the GWMP and Mt. Vernon Trail via the southern underpass. All trail connections would be 9-feet wide, consistent with the Mt. Vernon Trail width standard. The small, six-stall parking lot serving the Navy-Marine Memorial would be eliminated in this alternative.

Alternative A also involves adjusting the vertical profile of the Humpback Bridge and approaches to increase the sight distance. Modification of the GWMP ramps with I-395 (i.e., northbound GWMP ramp to southbound I-395, southbound GWMP ramp to southbound I-395 and southbound I-395 ramp to southbound GWMP) would be required to transition from the new vertical alignment.

Unless additional structural analysis of the Humpback Bridge is conducted, it is recommended that no additional dead loads be added to the Humpback Bridge structure. Filling and grading required to adjust the vertical approaches to the bridge should incorporate the use of lightweight fill or decking material so as to not increase the dead load on the bridge.

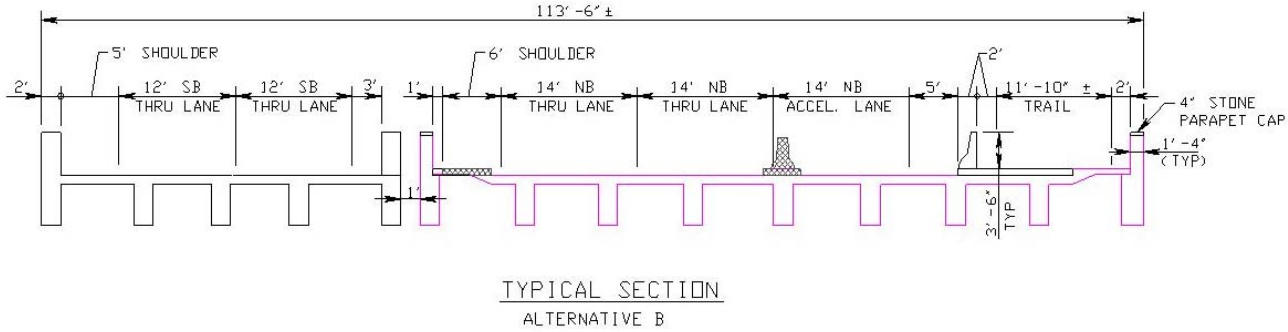
3. Alternative B: Construct a Second, Parallel Bridge

Alternative B involves constructing a second bridge across Boundary Channel, parallel to the Humpback Bridge (see Appendix A). The existing bridge structure would be modified to accommodate the northbound acceleration lane for the I-395 off-ramp, two northbound travel lanes and a widened Mt. Vernon Trail and a barrier between the trail and vehicle travel lanes (see Figure 5). The new span would accommodate the two southbound GWMP travel lanes. The design style and material(s) of the new bridge would be similar to that of the Humpback Bridge.

The northbound and southbound vehicle travel lanes of the GWMP would be realigned to meet the new bridge structure. Modification of the southbound GWMP ramp to southbound I-395 and the Columbia Island Marina entrance would also be required to transition from the new alignment. Additionally, the vertical profile of the Humpback Bridge and its approaches would be modified to conform to recommended design standards. Modification of the GWMP ramps with I-395 (i.e., northbound GWMP ramp to southbound I-395, southbound GWMP ramp to southbound I-395 and southbound I-395 ramp to southbound GWMP) would also be required to transition from the new vertical alignment. Unless additional structural analysis of the Humpback Bridge is conducted, it is recommended that no additional dead loads be added to the Humpback Bridge structure. Filling and grading required to adjust the vertical approaches to the bridge should incorporate the use of lightweight fill or decking material so as to not increase the dead load on the bridge.

This alternative also involves eliminating the existing at-grade crosswalk and constructing pedestrian underpasses to the north and south of the Humpback Bridge. As with Alternative A, the underpasses would be lighted and equipped for the potential use of security devices. Sidewalks/trails would be constructed to connect the Columbia Island Marina parking lot with the Mt. Vernon Trail and Navy-Marie Memorial, via the northern underpass. Modifications to the Mt. Vernon Trail would be made to link the existing trail with both underpasses. A new trail connection would be constructed along the southern edge of the Boundary Channel lagoon to link the Pentagon/Boundary Channel Drive with the GWMP and Mt. Vernon Trail via the southern underpass. All trail connections would be 9-feet wide, consistent with the Mt. Vernon Trail width standard. The small, six-stall parking lot serving the Navy-Marine Memorial would be eliminated in this alternative.

Figure 5: Proposed Humpback Bridge Section, Alternative B



4. Preferred Alternative: Replace Existing Bridge

The Preferred Alternative involves the demolition of the Humpback Bridge and construction of a replacement bridge structure to include: a widened Mt. Vernon Trail crossing (with a physical barrier between the trail and vehicular travel lanes), a northbound acceleration lane for the ramp from southbound I-395 to northbound GWMP, two northbound travel lanes and two southbound travel lanes (see Figure 6 and Appendix A). The vertical profile and sight distance deficiencies of the existing bridge would be corrected and addressed in the design of the new bridge and the GWMP approaches.

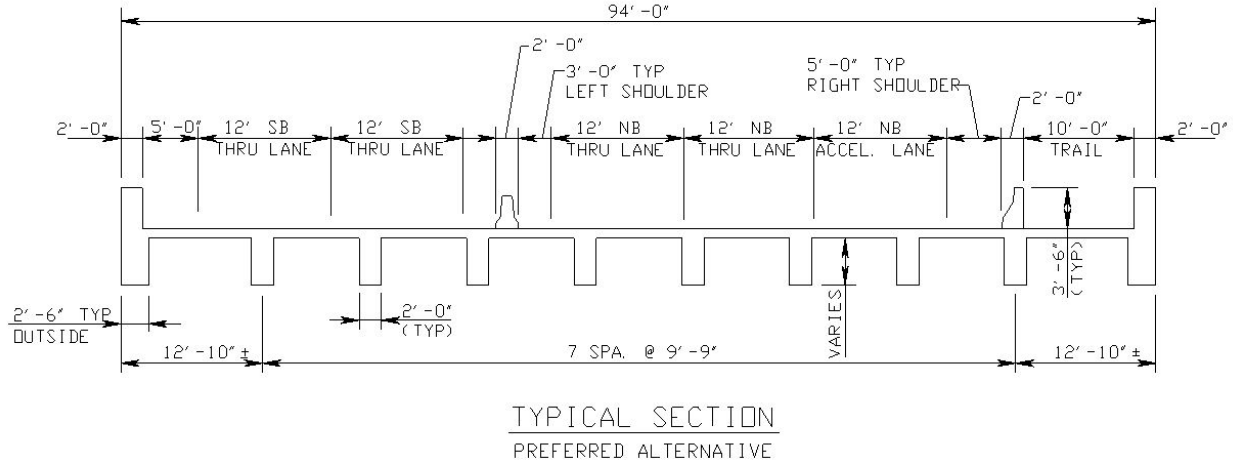
The design of the new bridge would also incorporate north and south pedestrian trail underpasses and the trail connections discussed in Alternative A and Alternative B. The small parking lot serving the Navy-Marine Memorial would also be eliminated in this alternative.

5. Alternatives Eliminated from Further Consideration

a. Realign Ramp

This alternative involves the realignment of the ramp approximately 250 feet south of its current location. Although the realigned ramp would incorporate compound horizontal curves that would serve to slow exiting southbound I-395 traffic to some degree, the new acceleration lane on the GWMP would still be substandard. Implementation of this option would also result in a new deficiency on the GWMP; the distance between the realigned ramp and the prior northbound GWMP to southbound I-395 ramp would become substandard.

Figure 6: Proposed Humpback Bridge Replacement Section, Preferred Alternative



b. Adjust Humpback Bridge Vertical Profile

The vertical curve of the GWMP as it approaches and descends the bridge crossing of the Boundary Channel and Columbia Island Marina inlet exceeds current roadway standards, hence the name "Humpback Bridge". Adjusting the vertical profile of the bridge and its approaches, without modifying or replacing the bridge structure itself, would eliminate the roadway grade and sight distance deficiencies in this segment of the GWMP and provide some improvement in motorist safety and traffic operations. It would also, however, require modification of the southbound I-395 to northbound GWMP ramp and southbound GWMP to southbound I-395 ramp to meet the new vertical alignment of the mainline Parkway. In addition, it does not address the more critical deficiency in this segment of the Parkway; the lack of a merge/acceleration lane for the southbound I-395 to northbound GWMP ramp. Eliminating the sight distance deficiency without addressing the ramp merge deficiency may pose more of a hazard, as the limited sight distance serves to slow approaching northbound traffic.

c. Construct Separate Pedestrian Bridge Over Boundary Channel

Although providing a separate Mt. Vernon Trail crossing of Boundary Channel would eliminate the pedestrian-vehicle conflicts on the Humpback Bridge, that improvement is the most costly of the pedestrian access options investigated and results in greater potential impacts to GWMP historic and natural resources, particularly the viewshed(s) of the GWMP and adjacent historic resources. It was therefore eliminated from further consideration.

d. No Build with Pedestrian Modifications

While a wider Mt. Vernon Trail crossing can be accommodated on the Humpback Bridge by reducing the width of the existing vehicle travel lanes, this option only addresses the pedestrian-vehicle safety conflicts associated with the bridge and the GWMP. Other safety concerns related to the bridge, such as the vertical sight distance deficiency and deficiencies associated with the southbound I-395 to northbound GWMP ramp, are not addressed with this alternative. Those safety problems would remain. Therefore, this alternative was eliminated from further consideration.

e. Signalize Existing Crosswalk

As discussed in the previous section, the installation of traffic signals on the GWMP, including pedestrian-activated signals, is not supported by the NPS for aesthetic and operational reasons. Furthermore, the crosswalk is located outside of the logical circulation path used by pedestrians and bicyclists traveling between the Columbia Island Marina, Navy-Marine Memorial and the Mt. Vernon Trail. Even with signalization, it may be bypassed for the more direct crossing at the Columbia Island Marina entrance.

f. Modify Existing Crosswalk: Construct Pedestrian Underpass

The construction of a pedestrian underpass, in the vicinity of the existing at-grade crosswalk, was also considered as an option to alleviate current pedestrian-vehicle safety conflicts. Due to the relative flatness of the Parkway at the existing crosswalk, an underpass would take the form of a tunnel beneath the existing roadway. The transition from the at-grade trails to a tunnel would be difficult to achieve and costly, and result in the addition of the tunnel structure to the view of the GWMP as seen from the Potomac River and District of Columbia. In addition, a pedestrian crossing at this location would still be outside of the logical circulation path between the eastern and western sides of the Parkway. It is likely at-grade crossings of the GWMP and conflicts with motor vehicles would continue further south, closer to the Columbia Island Marina entrance and the Humpback Bridge.

g. Relocate Crossing: Construct Pedestrian Underpass North of the Humpback Bridge

The construction of a single pedestrian underpass, located north of the Humpback Bridge, was considered as a solution to address the pedestrian-vehicle conflicts associated with the existing at-grade GWMP crosswalk. This solution does not, however, provide any additional opportunities for bicyclists and pedestrians to access the GWMP and the Mt. Vernon Trail from the Pentagon and other points to the south and west in Arlington County. Arlington County and DOD officials and local bicyclist groups have expressed a desire to link the Mt. Vernon Trail with adjacent, non-NPS trails and routes.

h. Modify/Relocate Crosswalk: Construct Pedestrian Overpass

The construction of a grade-separated pedestrian crossing, in the form of an overpass, was considered as an option to alleviate current pedestrian-vehicle safety conflicts. Two locations were identified: the general location of the existing at-grade crosswalk and adjacent to the northern end of the Humpback Bridge. Although an overpass would be less costly to construct than an underpass, the visual costs and impacts on the GWMP and adjacent National Register historic resources were determined to be too great to consider this option further.

E. Alternatives for Additional GWMP Ramp Connection to Northbound I-395/Rochambeau Bridge

1. Alternatives Eliminated from Further Consideration

a. New Ramp from Southbound GWMP to Northbound I-395/Rochambeau Bridge

A new ramp connection between the southbound GWMP and northbound I-395 Rochambeau Bridge approach was considered in the 1986 *Feasibility Study of Measures to Improve the Safety, Capacity and Operation of the 14th Street Bridge on I-395 and the I-395 and George Washington Memorial Parkway Interchange* to alleviate congestion on inbound I-395/Williams Bridge and the GWMP. Although the construction of a new ramp at this location would likely reduce queues on the GWMP during peak periods at the existing southbound GWMP to northbound I-395/Williams Bridge ramp by providing additional inbound access to the District of Columbia via the Rochambeau Bridge, it serves primarily to reduce weaving activity on the inbound Williams Bridge.

As discussed in the 1986 feasibility study, there is no practical way to enforce the use of one ramp over the other, if the additional ramp were constructed, except by physically prohibiting the weave movement between 14th Street and I-395 on each bridge. If the weave movement were prohibited through the construction of a physical barrier, with no additional modifications to the 14th Street Bridge corridor, no significant improvement in traffic conditions was expected to result. The construction of this new ramp connection is also projected to be difficult to construct, given the limited space available and proximity of other ramps and roadways in this segment of the GWMP, and would require the widening of the Rochambeau Bridge. The cost associated with the construction of the ramp was anticipated to be prohibitively expensive relative to the traffic and safety improvements that would be achieved. Finally, any improvement proposal that involves the widening of one of the 14th Street-Potomac River bridge crossing is expected to be highly controversial to local stakeholders. The National Capital Region Transportation Planning Board (TPB) has expressed the desire that an environmental impact statement (EIS) and public outreach effort be conducted as part of the evaluation of any bridge widening proposal. The TPB has

also requested that improvement proposals for the 14th Street Bridge corridor evaluate increased reliance on transit as an alternative to bridge widening. In addition, the NPS-GWMP unit indicated they do not support construction of new ramp access to/from the Parkway or other improvements that may result in additional traffic volumes on the GWMP. A new ramp would be considered a significant impact to the parkway facility.

Due to the limited improvement to motorist safety on the GWMP and the potential controversy a new ramp from the GWMP to the Rochambeau Bridge would generate, this option was not considered further as part of this EA.

b. New Ramp from Northbound GWMP to Northbound I-395/Rochambeau Bridge

A new ramp connection between the northbound GWMP and northbound I-395 Rochambeau Bridge approach was recommended in the *14th Street Bridge Corridor Improvement Feasibility Study* to alleviate congestion and weaving activity on inbound I-395 between the GWMP and Williams Bridge. The construction of a new ramp at this location was investigated because of the high volume of District-bound traffic using the northbound GWMP to northbound I-395/Williams Bridge ramp in the peak period and resulting queues that form on the Parkway, as well as the existing ramp's geometric deficiencies. The construction of the additional I-395 entrance ramp from the GWMP is also projected to increase motorist safety and decrease weaving movements between 14th Street and I-395 on the Williams Bridge by providing a direct ramp connection to the Rochambeau Bridge for motorists destined for 14th Street.

Due to the limited distance between the Williams and Rochambeau Bridges and the approximately 19 feet difference in elevation between the GWMP and the Rochambeau Bridge, a ramp connecting the two roadways would likely extend to the Potomac River shoreline or beyond before merging with the bridge deck and result in significant land-disturbing activity. Additional widening of the Rochambeau Bridge across the Potomac River would also be necessary to provide an acceleration lane for the merging traffic. As with the previously dismissed option to construct a ramp connection between the southbound GWMP and inbound Rochambeau Bridge, the cost of the proposed ramp is projected to be much greater than the safety and traffic benefits that would be realized on the GWMP and is likely to be controversial to local policymakers and motorists. Therefore, this option was eliminated from further consideration.

F. Alternatives Evaluated but Decision Deferred

The closure of two ramps at the GWMP and I-395 interchange – the southbound GWMP exit ramp to southbound I-395 and the northbound I-395 exit ramp to northbound GWMP – were identified in the *14th Street Bridge Corridor Improvement Feasibility Study* as an option to improve motorist safety. The NPS has deferred selection of a preferred alternative or action/no action for the proposed ramp closures until the completion of a more extensive evaluation by the FHWA of the transportation needs of the I-395/14th Street corridor in Virginia and the District of Columbia, including the GWMP/I-395 interchange. Therefore, no preferred alternative has been selected at this time.

1. Southbound GWMP Ramp to Southbound I-395

a. No Action Alternative

The safety and design deficiencies associated with the southbound GWMP ramp to southbound I-395 would not be addressed under the No Action Alternative and the ramp would continue in operation.

b. Deferred Alternative: Eliminate Ramp

This alternative involves closing the southbound GWMP exit ramp to southbound I-395. Traffic currently utilizing this ramp would be diverted to the following alternate routes:

1. Southbound GWMP to southbound Virginia Route 27 (VA 27) to southbound I-395.
2. Southbound GWMP to southbound VA 27 to southbound Boundary Channel Drive to southbound I-395. Traffic bound for U.S. Route 1 (Route 1) or the Crystal City area of Arlington County, south of the existing ramp and the Study Area, could use southbound GWMP to southbound VA 27 to southbound Boundary Channel Drive to southbound Old Jefferson Davis Highway to access Route 1/Crystal City.

As noted previously, DOD has initiated plans to realign VA 110 to decrease its proximity to the Pentagon. While a final alignment has not been established, the relocation may require modifications to Boundary Channel Drive and/or the I-395/Boundary Channel Drive interchange that could affect the use of Boundary Channel Drive as an alternate route between the GWMP and I-395. This ramp closure alternative would not be implemented until the plans for relocating VA 110 are complete and impacts to Boundary Channel Drive can be assessed.

c. Alternatives Eliminated from Further Consideration

<u>Lengthen the Deceleration Lane</u>

The extension of the existing, substandard deceleration lane for this ramp would improve the present geometric deficiency on the GWMP. Despite the geometric deficiencies, the ramp currently operates at an acceptable level of service. The weaving section where this ramp merges with southbound I-395, however, operates at an unacceptable level of service. Constructing the deceleration lane on the GWMP would do nothing to address that deficiency and would require the widening or replacement of the Humpback Bridge. Therefore, this option was eliminated from further consideration.

2. Northbound I-395 Ramp to Northbound GWMP

a. No Action Alternative

Under the No Action Alternative, the northbound I-395 ramp to northbound GWMP would continue in operation. The safety and design deficiencies associated with the ramp would not be addressed.

b. Deferred Alternative: Eliminate Ramp

This alternative involves closing the left-side exit ramp from northbound I-395 to northbound GWMP. Traffic currently utilizing this ramp would be diverted to the following alternate routes:

1. Northbound I-395 to VA 27 to northbound GWMP.
2. Northbound I-395 to northbound Boundary Channel Drive to northbound VA 27 to northbound GWMP.

As with the proposed southbound GWMP to southbound I-395 ramp closure, this alternative also relies on Boundary Channel Drive as an alternate means of accessing I-395 from the GWMP. The ramp closure would not be implemented until DOD plans for relocating VA 110 are complete and impacts to Boundary Channel Drive can be assessed.

4.0 ENVIRONMENTAL EFFECTS OF COLUMBIA ISLAND MARINA ALTERNATIVES

A. *Roadways and Ramps*

1. Future (2025) Traffic Conditions Analysis

Year 2001 traffic counts and historical traffic projections were used to develop the future (2025) traffic projections for the future conditions traffic model. In the *14th Street Bridge Corridor Improvement Feasibility Study* (Virginia Department of Transportation, 1998), traffic was projected from 1996 to 2000, and again to the year 2020. The study utilized the Metropolitan Washington Council of Governments (MWCOG) travel-forecasting model to develop these growth rates. The growth rates from this report were utilized to determine the growth in traffic from 2001 to 2025 during the peak hours. The 2025 projected peak hour traffic is shown in the figure found in Appendix B, Figure B-4. There are several locations at which 2001 traffic counts were taken and no future projection has been developed. These locations had not been included in the *14th Street Study*, and therefore, no future traffic projection has been made.

A CORSIM model was developed using the projected 2025 traffic volumes with no roadway improvements. This analysis will be the baseline from which the various improvement alternatives will be compared. A figure depicting the results of the LOS analysis is found in Appendix B, Figure B-5. The heavier traffic volumes overload the road network, especially I-395 northbound in the AM where the bottleneck at GWMP causes severe backups along the Interstate. At that location several design and capacity deficiencies cause the traffic congestion; the interstate decreases from four lanes to three lanes, an on-ramp from the GWMP with a short acceleration lane is located only 200 feet downstream of the lane drop, and an off-ramp to the GWMP with no deceleration lane is located 200 feet downstream of the on-ramp.

The intersection of the GWMP and the Columbia Island Marina entrance was analyzed using Highway Capacity Software (HCS) 2000, which is based on the standard Highway Capacity Manual (HCM) methodology for analyzing intersections, and utilizing AM and PM peak hour turning movement counts collected in August 2001. Although the peak period for traffic using the marina entrance may be on the weekend, the traffic on the GWMP peaks during the weekday rush hours. It is also standard engineering practice to analyze an intersection based on the weekday peak hours, and not on a weekend peak.

2. No Action: Retain Existing Marina Entrance

No change to existing traffic operations would result. Traffic entering and exiting the marina and memorial parking lots operate at or near unacceptable levels of service, as indicated in Figure B-5, Appendix B. The intersection would operate at LOS F for the northbound GWMP traffic and LOS D for southbound GWMP traffic. The conflicts between turning vehicles and the mainline GWMP traffic flows would also remain.

3. Preferred Alternative: New Entrance

The high traffic volumes on the GWMP at the unsignalized marina entrance intersection make left turns in and out of the Columbia Island Marina and Navy-Marine Memorial parking lot difficult and unsafe. The intersection was analyzed for the existing (2001) conditions, future (2025) no-build conditions, as well as the Preferred Alternative (2025), which involves the closure of the GWMP median (right in/out) as an interim safety measure and the permanent closure of the marina entrance on the GWMP and Navy-Marine Memorial parking lot as the preferred, long-term measure. The future marina entrance traffic was determined using the growth rate already developed on the GWMP in the vicinity of the marina, as described in the 'Future (2025) Traffic Conditions Analysis' section of this report. Table 2 details the results of the traffic operations analysis.

Table 2: Weekday Level of Service Results / Peak Hour Volumes* for Columbia Island Marina Entrance

	Existing (2001)		**No Build (2025)**		**Interim (2025) Right In & Right out**	
	AM	PM	AM	PM	AM	PM
NB Lefts – NB GWMP to marina	D / 12	F / 28	D / 12	F / 32	n/a	n/a
WB Rights – Navy-Marine Memorial parking lot to NB GWMP	F / 7	E / 12	F / 7	F / 14	n/a	n/a
EB Lefts – marina to NB GWMP	F / 3	F / 12	F / 3	F / 14	n/a	n/a
EB Rights – marina to SB GWMP	D / 12	F / 37	D / 12	F / 43	D / 15	F / 57

* peak hour volume in vph (vehicles per hour)
Note: Right turns from northbound GWMP to the Navy-Marine Memorial parking lot and from the southbound GWMP to the marina are not included because they are free-flow turning movements. Left turns into and out of the Navy-Marine Memorial parking lot are prohibited.

Eliminating the left turns at this intersection and providing right turns only, as an interim measure, removes most of the conflict points between vehicles, thus creating a safer intersection. The left turns into and out of the marina would be rerouted to become right turns at the marina entrance. This additional traffic on the southbound GWMP right-turn movement does not significantly affect its operation, since it is a free-flow movement. The mainline GWMP would remain at LOS D for southbound traffic and LOS F for northbound traffic.

Eliminating the entrance completely and relocating it to Boundary Channel Drive, as a long-term measure, would have the greatest safety benefit for the GWMP, although the northbound and southbound through traffic on the GWMP would remain at or near unacceptable levels of service due to the heavy mainline traffic volumes. Relocating the marina entrance would result in increased traffic on Boundary Channel Drive. The peak marina traffic, however, is on the weekend so there would be little conflict with weekday, peak period commuter traffic.

The long-term option to relocate the marina entrance assumes Boundary Channel Drive, which is under DOD jurisdiction, remains open to non-Pentagon traffic. The FHWA has submitted a request to the DOD, on behalf of the NPS, for a permit for access to Boundary

Channel Drive for a new Columbia Island Marina entrance and vehicular bridge across Boundary Channel.

Maintenance of Traffic

The proposed interim measure to reconfigure the marina entrance to limit turning movements to right turns only and close the existing GWMP median break would require temporary reductions in mainline GWMP lane widths and at the marina entrance. The construction is not anticipated to have a significant on GWMP or marina traffic operations.

The construction of the new marina entrance and bridge would temporarily affect traffic patterns on Boundary Channel Drive and within the marina parking lot. Travel lanes on Boundary Channel Drive would be temporarily reduced in width due to construction activities. No road closures are anticipated. The new entrance would also result in the loss of approximately six parking spaces at the Columbia Island Marina. Travel lanes on the mainline GWMP in the vicinity of the marina would also be temporarily reduced during the removal of the existing entrance and median. No road closures are anticipated.

B. *Bicycle and Pedestrian Facilities*

1. No Action: Retain Existing Marina Entrance

The Mt. Vernon Trail and other pedestrian/bicycle facilities within the Study Area, as well as related safety deficiencies, would remain in their current condition.

2. Preferred Alternative: New Entrance

This alternative does not involve any modifications to the Mt. Vernon Trail or other pedestrian/bicycle facilities. The existing facilities would remain in their current condition.

C. *Historic and Cultural Resources*

1. No Action: Retain Existing Marina Entrance

No impact to historic or cultural resources is anticipated.

2. Preferred Alternative: New Entrance

Construction of the new marina entrance and bridge across Boundary Channel would impact the historic setting of the GWMP. Consultation with the Advisory Council on Historic Presentation (Advisory Council) and Virginia and District of Columbia State Historic Preservation Officers (SHPO) has been initiated in compliance with Section 106 of the National Historic Preservation Act. The design of the new bridge, construction plans and details would be executed in conjunction with the terms and conditions of a memorandum of agreement (MOA) between the FHWA, NPS, Advisory Council and District of Columbia and Virginia SHPO's that would outline the measures to be taken to mitigate potential impacts to the historic resources.

Past grading and filling activity have extensively modified the land within the Study Area. It is not anticipated to have a high potential for the presence of undisturbed cultural or archaeological resources.

D. Aesthetics and Viewsheds

1. No Action: Retain Existing Marina Entrance

The aesthetic condition and viewshed of the GWMP and adjacent historic resources would remain in their current condition.

2. Preferred Alternative: New Entrance

The interim configuration of the marina entrance would benefit Parkway aesthetics slightly, due to the elimination of pavement in the GWMP and at the marina entrance. Construction of a new marina entrance and bridge across Boundary Channel would create a new element within the GWMP historic resource and in the viewsheds of adjacent historic resources: LBJ Memorial Grove, the Pentagon and Arlington National Cemetery (see also Environmental Effects, *Historic and Cultural Resources*).

While the design of the new bridge and entrance would be compatible with the existing character of the GWMP and other historic resources, the visual setting of the GWMP and Columbia Island would be affected by the construction of the new entrance, as well as views from the Pentagon and LBJ Memorial Grove. Areas cleared of vegetation during the construction process would be replanted once the new entrance is complete, to minimize visual impacts.

E. Land Use

1. No Action: Retain Existing Marina Entrance

No change to existing Land use patterns is anticipated.

2. Preferred Alternative: New Entrance

No change to existing land use patterns is anticipated, either for the interim marina alternations (e.g., right in/right out) or the construction of a new entrance from Boundary Channel Drive and vehicular bridge over Boundary Channel.

F. Biological Resources

1. No Action: Retain Existing Marina Entrance

Vegetation

No change to existing vegetation would result.

Wildlife and Threatened and Endangered Species

No change to existing wildlife is anticipated.

Wetlands

No impact to wetland resources is anticipated.

2. Preferred Alternative: New Entrance

Vegetation

The interim option to limit turning movements at the existing entrance to right in/out would result in the closure and re-vegetation of the center GWMP median at the marina entrance. The median would likely be planted with turf grass, consistent with the treatment of the adjacent median areas. This modification is anticipated to have a minimal benefit to existing vegetation resources, but would increase the amount of landscaped area by approximately 5,900 square feet (SF) or 0.1 acres (AC).

The construction of a new marina entrance from Boundary Channel Drive would result in the clearing of approximately 6,500 SF or 0.1 AC of mixed woodland vegetation adjacent to Boundary Channel within the path of the proposed entrance bridge. Once the new bridge is constructed, disturbed areas would be re-vegetated. Removal of the existing marina entrance roadway would increase the amount of landscaped area by approximately 0.8 AC.

Wildlife and Threatened and Endangered Species

While existing vegetation would be cleared on each side of Boundary Channel for the proposed new entrance bridge, loss of that resource is not anticipated to have an adverse impact on wildlife inhabiting the area surrounding the Columbia Island Marina. Disturbed areas would be replanted with vegetation consistent with that removed in order to provide the same type of wildlife habitat that would be destroyed. Construction of the bridge would also affect aquatic wildlife found in Boundary Channel; however those impacts are anticipated to be temporary. There are no state or federally listed rare, threatened or endangered species known to inhabit the Study Area.

Wetlands

Construction of the new entrance bridge over Boundary Channel to the marina would take place within the Boundary Channel wetland resource. No wetlands would be destroyed, however temporary impacts to the wetlands and associated aquatic vegetation and wildlife would result. The construction of the new bridge would comply with the conditions of Section 401 and 404 of the Clean Water Act, if necessary. A wetlands permit would be obtained from the U.S. Army Corps of Engineers for the construction activity. The proposed action would also comply with applicable state and local permit requirements.

G. *Water Resources*

1. No Action: Retain Existing Marina Entrance

Floodplains

No impact to floodplains is anticipated.

Coastal Zone Management

No Coastal Zone impacts are anticipated.

Chesapeake Bay Preservation Area

No Chesapeake Bay impacts are anticipated.

2. Preferred Alternative: New Entrance

Floodplains

Construction of the new entrance bridge over Boundary Channel to the marina would take place within Flood Zone A12, area of 100-year flood, as indicated on the FEMA Flood Insurance Rate Map for the Study Area. A permit would be required from the U.S. Army Corps of Engineers for the construction activity. A bridge permit from the U.S. Coast Guard would also be required.

Coastal Zone Management

The Arlington County portions of the Study Area are located within the Virginia Coastal Zone. The Federal Coastal Zone Management Act requires development projects of Federal agencies that take place within the Coastal Zone be consistent with the applicable state coastal zone management program to the maximum extent practicable. The Virginia Coastal Resources Management Program is a network of existing state laws and policies though which the Commonwealth of Virginia manages its coastal resources. Proposed actions that comply with the applicable state laws and policies[5] are considered to be consistent with the Virginia Coastal program. The District of Columbia is not subject to the Coastal Zone Management Act. The proposed safety improvements would be constructed in accordance with Commonwealth of Virginia and District of Columbia stormwater management, sedimentation and erosion control and other water quality protection laws and policies.

Chesapeake Bay Preservation Area

The proposed new marina entrance is located on government-owned property that is exempt from Arlington County Chesapeake Bay Preservation regulations. Construction and other activities related to the implementation of the proposed safety improvements would comply with local stormwater management, sedimentation and erosion control and other water quality protection regulations.

H. *Physiography, Geology and Soils*

1. No Action: Retain Existing Marina Entrance

No disturbance to soils is anticipated.

2. Preferred Alternative: New Entrance

Minor soil disturbance would occur during the reconfiguration of the marina entrance from the GWMP and removal of the pavement in the GWMP median for the interim entrance modifications (right in/out). An area of approximately 0.3 AC would be impacted by the interim modifications. Soils would be disturbed during the construction of the new entrance bridge and the removal of the existing marina entrance driveway. Approximately 3.9 AC would be disturbed. All demolition and construction activities would incorporate erosion control measures to minimize soils loss.

I. *Air Quality*

1. No Action: Retain Existing Marina Entrance

No change to air quality levels is anticipated.

2. Preferred Alternative: New Entrance

The proposed action does not increase the capacity of the GWMP transportation system; air quality levels would remain essentially the same as present conditions as a result of the construction of the new marina entrance. Minor, temporary increases in dust and other air emissions would result from construction activities. Construction activities would be conducted in accordance with the FHWA's Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (1996) and would comply with applicable local, state and federal regulations.

[5] State laws and policies applicable to the proposed action include: Virginia Marine Resources Commission, Subaqueous Lands Management and Wetlands Management regulations; Virginia Department of Conservation and Recreation, Non-point Source Pollution Control regulations; and Chesapeake Bay Preservation Act regulations.

J. Noise

1. No Action: Retain Existing Marina Entrance

No change in existing noise sources or noise levels is anticipated.

2. Preferred Alternative: New Entrance

Existing noise levels would increase temporarily during the construction of the new marina entrance and bridge across Boundary Channel. The rerouting of traffic to the new entrance would result in minor increases in noise levels on I-395, VA 27 and Boundary Channel Drive, due to the additional vehicle traffic. The increases in noise levels are not anticipated to be significant.

K. Hazardous Materials and Wastes

No evidence of historical land use involving hazardous materials or hazardous wastes was found within the Study Area. Implementation of the proposed action would not require the disturbance or relocation of any of the existing, recognized environmental conditions – USTs and ASTs – found at the Columbia Island Marina. Therefore, no disturbance or generation of hazardous materials or hazardous wastes are anticipated to occur with either the implementation of any of the safety improvements or under “no-action” conditions.

L. Energy

1. No Action: Retain Existing Marina Entrance

No change in energy consumption is anticipated.

2. Preferred Alternative: New Entrance

Energy consumption would temporarily increase during construction of the new marina entrance and bridge. No significant change in long-term energy consumption is anticipated.

M. Socioeconomic and Community Features

1. No Action: Retain Existing Marina Entrance

No change to socioeconomic or community features is anticipated. The public would continue to be exposed to the safety hazards associated with the current GWMP transportation and circulation systems.

2. Preferred Alternative: New Entrance

Construction jobs associated with the relocation of the marina entrance and construction of the entrance bridge across Boundary Channel would have a short-term benefit to local construction workers and the local economy.

If turning movements in and out of the Columbia Island Marina were limited to right turns only, as an interim safety improvement measure, marina access/egress options would be reduced. The change in traffic patterns is not anticipated to adversely impact traffic operations. The marina situation would be similar to other locations on the GWMP, such as Gravelly Point and the Teddy Roosevelt Island parking lot, where access is only possible from one direction of the Parkway. In the long term, marina-bound visitors would be rerouted to the new entrance via a less direct route. Since the majority of marina traffic travels in non-peak periods, the rerouting is not anticipated to result in greater congestion on the Study Area road network.

N. Cumulative Impacts

The proposed mid-term safety improvements identified for the Study Area are intended to complement the short-term and long-term safety improvements proposed by the FHWA for the I-395/GWMP interchange and 14th Street Bridge to enhance overall motorist and pedestrian safety within the corridor. No increase in the traffic-carrying capacity of the GWMP would result from the implementation of the preferred marina entrance alternative. It is not anticipated to contribute to any cumulative impacts.

Implementation of the proposed safety improvements would create a safer environment for the users of the other GWMP facilities proposed by the NPS in the vicinity of the Study Area as well as current GWMP users. Those facilities – a (non-motorized) boathouse and comfort station – would utilize the existing mainline roadway network, although the construction of vehicular and pedestrian connections may be necessary to link the new facilities with existing parking and trail resources.

The selection of the preferred alternative to relocate the Columbia Island Marina entrance to Boundary Channel Drive is contingent upon approval of the proposed entrance location by DOD, which controls access to Boundary Channel Drive. Any changes to Boundary Channel Drive would also require coordination with proposed plans to realign VA 110 to decrease its proximity to the Pentagon. Other planned improvements for the Pentagon Reservation are primarily concerned with the renovation of the existing Pentagon building. No major new structures are anticipated that, when combined with the impacts of the proposed marina relocation would result in significant cumulative impacts.

Undeveloped parcels in the vicinity of the Study Area include the former Twin Bridges Marriott site and the Arlington County “North Tract” site. Both are located to the southwest of the Study Area, at the north end of Crystal City. Arlington County plans to redevelop the North Tract as a public park and recreation facility. The county is also investigating the acquisition of the Twin Bridges Marriott site. Upgrade of the existing transportation network, including Old Jefferson Davis Highway, is under investigation as well. The upgrade of Old Jefferson Davis Highway would facilitate access to Boundary Channel Drive and the preferred new marina entrance. Development of the two parcels for park and recreation uses would be compatible with the use of the GWMP and would not be anticipated to result in significant cumulative impacts.

O. Comparison of Alternatives

A comparison of the No Action Alternative and the Preferred Build Alternative is provided in Table 3.

Table 3: Comparison of Alternatives – Columbia Island Marina Entrance

Evaluation Factor	No Action Alternative	Preferred Alternative: New Entrance	
		Interim Action – Right In/Out	*Long-term Action – New Entrance from Boundary Channel Drive*
Navigation Impacts	No impact is anticipated.	No impact is anticipated.	No impact is anticipated. Boundary Channel is not navigable by marina traffic at the proposed bridge location. USCG bridge permit would be required.
Maintenance of Traffic	No impact is anticipated.	GWMP and marina would remain open during construction activities to modify the marina entrance and GWMP median.	Boundary Channel Drive and marina would remain open during construction of new entrance/bridge.
Motorist Safety and Traffic Operations	Safety hazards and accident potential associated with marina entrance would remain.	Motorist safety improved with elimination of left turns in/out of marina. Access to marina would be eliminated from the northbound GWMP.	Motorist safety improved with the elimination marina entrance on GWMP. Conflicts between marina traffic and mainline GWMP traffic would be eliminated. Marina-bound traffic would be rerouted to the new entrance via a less direct route.
Alternate Routes	No impact is anticipated.	Northbound vehicles on GWMP destined for and exiting the marina would have to use alternate route. Traffic increases on alternate routes would be minimal.	Marina traffic would be rerouted to the new entrance via I-395/Route 27/Boundary Channel Drive. Permission of DOD required to access marina from Boundary Channel Drive.
Historic and Cultural Resources	No impact is anticipated.	No impact is anticipated.	Consultation with Advisory Council and VA and DC SHPO's required. No adverse impacts to historic/cultural resources are anticipated; new bridge design would be compatible with historic resource(s). Concurrence with SHPO would be sought for determination of "no adverse effect".
Aesthetics and Viewsheds	No impact is anticipated.	No impact is anticipated.	New entrance bridge would be new element in GWMP and Pentagon viewsheds; new bridge design would be compatible with historic resources.
Vegetation	No impact is anticipated.	GWMP median would be re-vegetated after removal of existing turn lanes. Landscaped area would increase by approximately 0.1 AC.	New entrance/bridge construction results in clearing of approximately 0.1 AC of mixed woodland vegetation adjacent to Boundary Channel. Cleared areas would be re-planted following construction completion.
Wildlife and Threatened & Endangered Species	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Wetlands	No impact is anticipated.	No impact is anticipated.	Boundary Channel wetlands impacted by bridge construction. USACOE permit would be required.

Table 3: Comparison of Alternatives – Columbia Island Marina Entrance

Evaluation Factor	No Action Alternative	Preferred Alternative: New Entrance	
		Interim Action – Right In/Out	*Long-term Action – New Entrance from Boundary Channel Drive*
Water Resources/Floodplains	No impact is anticipated.	Minor decrease in impervious surface on GWMP. Modifications would be constructed in accordance with DC stormwater management, sedimentation and erosion control and other water quality protection laws and policies.	New bridge located in 100-year floodplain; USACOE permit would be required. Improvements would be constructed in accordance with VA and DC stormwater management, sedimentation and erosion control and other water quality protection laws and policies. Net reduction in impervious surface of approximately 0.3 AC in marina area due to removal of existing entrance driveway pavement.
Geology/Soils	No impact is anticipated.	Minor soils disturbance (0.3 AC) for median removal and construction of entrance modifications. Erosion control measures would be incorporated during construction and disturbed areas re-vegetated.	Soils disturbance of approximately 3.9 AC during construction of new entrance/bridge. Erosion control measures would be incorporated during construction and disturbed areas re-vegetated.
Air Quality	No impact is anticipated.	Existing air quality levels would remain essentially the same.	Existing air quality levels would remain essentially the same.
Noise	No impact is anticipated.	Existing noise levels would remain essentially the same.	Rerouting of marina-bound traffic would result in negligible decrease in traffic noise on GWMP and negligible increase along alternate routes.
Hazardous Materials and Wastes	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Energy	No impact is anticipated.	No significant impact is anticipated.	No significant impact is anticipated.
Socioeconomic and Community Features	The public would continue to be subject to safety hazards associated with the current GWMP circulation systems.	Traffic hazards on the GWMP would be reduced, making it safer for Parkway users.	Minor benefit from construction-related jobs and purchases. No long-term economic impact is anticipated. The public would no longer be subject to safety hazards associated with the current GWMP circulation systems.
Temporary Impacts	No impact is anticipated.	Temporary lane reductions and/or closures may be required during construction of entrance modifications. Minor, temporary noise increases would result during demolition/construction activities.	Temporary lane reductions and/or closures may be required during construction of new bridge. Minor, temporary impacts to air quality during construction of entrance modifications. Minor, temporary noise increases would result during construction activities. Energy consumption would temporarily increase during construction of the new marina entrance and bridge.
Cumulative Impacts	No impact is anticipated.	Safer environment for vehicular and pedestrian users of the GWMP would result. No adverse impacts are anticipated.	Safer environment for vehicular and pedestrian users of the GWMP would result. Marina access enhanced by potential Old Jefferson Highway improvements under investigation by Arlington County. No adverse impacts are anticipated.
Cost	Not applicable	$170,000	$3,350,000

5.0 ENVIRONMENTAL EFFECTS OF THE ALTERNATIVES FOR THE SOUTHBOUND I-395 RAMP TO NORTHBOUND GWMP, HUMPBACK BRIDGE AND PEDESTRIAN CROSSING OF THE GWMP

A. *Roadways and Ramps*

1. No Action: Keep Existing Bridge with No Modifications

No change to existing traffic operations would result. The ramp and GWMP would operate at LOS F as indicated in Figure B-6, Appendix B for the no build condition. Existing geometric and safety deficiencies would also remain.

2. All Alternatives

The three alternatives evaluated for this ramp,

- Alternative A, widen existing bridge;
- Alternative B, construct a second, parallel bridge; and
- Preferred Alternative, replace existing bridge

are the same in terms of a traffic operations analysis. All involve a wider bridge crossing of the Boundary Channel inlet, which eliminates the geometric deficiencies for this ramp and allows for a longer acceleration lane without realigning the ramp.

Figure B-6, Appendix B shows the level of service improvement as a result of the proposed ramp alternatives. The LOS on the ramp is significantly improved from a LOS F to a LOS D in the AM peak. In the PM peak, the LOS improved from an F to borderline C/D. The longer acceleration lanes in the improvement scenarios allow vehicles to merge more easily, thus reducing the queues that develop along the ramp. However, northbound GWMP continues to operate at LOS F even with the ramp improvements due to the heavy mainline volumes.

In addition to the level of service analysis, an analysis of average speed and density was performed on the southbound I-395 to northbound GWMP movement in order to further compare the alternatives to the no-build scenario. As shown in Table 4, the results are reported for the affected portion of the model; the link of I-395 before the ramp, the ramp itself, and the GWMP link after the ramp merges.

In the AM peak, speed improved by about 16 mph over a 0.65-mile length of roadway. In this same section, density improved by about 40 percent. In the PM peak, speed improved by about 3 mph over a 0.73-mile section. In this same section, density improved by about 8 percent.

In the AM peak CORSIM models, the section of roadway analyzed was 0.65 miles in length. The time it takes to travel this 0.65-mile section of roadway improved by 1.3 minutes for the AM peak. In the PM peak models, the section of roadway analyzed was 0.73 miles in length. The time it takes to travel this 0.73-mile section of roadway improved only by 0.2 minutes for the PM peak.

Table 4: 2025 Speed and Density Results – Comparison of No Build to Alternatives for SB I-395 to NB GWMP

	Average speed difference	Average density difference	Length of affected area
SB I-395 to NB GWMP			
AM	15.6 mph	39.5 %	0.65 mi
PM	3.4 mph	8.2 %	0.73 mi

Note: AM & PM peak hours were simulated in different models. As a result, the endpoints of the models may be in slightly different positions, causing the "Length of Affected Area" to be slightly different between the AM & PM peak hour models.

Maintenance of Traffic

Maintenance of traffic (MOT) plans would be developed to manage traffic on the GWMP during the construction of any of the ramp/bridge alternatives. For Alternative A, additional structural analysis of the Humpback Bridge is necessary to determine the feasibility of maintaining traffic loads on the existing structure while the widening and the construction of pedestrian underpasses are underway. Without further analysis, it is recommended that a temporary bridge be installed to maintain GWMP traffic flow during construction. A temporary bridge would be located to the west of the existing bridge and proposed expansion area. A reduction in the GWMP speed limit would be required for the duration of construction activities to correspond to the 35 mph design speed of the temporary bridge.

For Alternative B, traffic flows on the GWMP roadway and the Mt. Vernon Trail would be maintained in their current configuration during construction of the parallel bridge span and its horizontal and vertical approaches. Construction of the pedestrian underpasses would also commence on the western side of the span(s). Once the new span is complete, southbound GWMP traffic would be shifted to the new structure and modifications to the existing Humpback Bridge/Mt. Vernon Trail and its approaches undertaken, by reducing lane widths and shifting travel lanes between the eastern and western sides of the existing bridge. By constructing a new span that is physically separated from the Humpback Bridge, the impacts to existing traffic patterns and flows are minimized. A reduction in the GWMP speed limit would be required, however, for the duration of construction activities.

If the Humpback Bridge were replaced with a new structure, as in the Preferred Alternative, a temporary bridge across the Boundary Channel inlet would be required to maintain GWMP/Mt. Vernon Trail traffic. The temporary bridge would be located to the west of the proposed replacement bridge. Northbound and southbound GWMP travel lanes and the Mt. Vernon Trail would be diverted to the temporary bridge for the duration of the construction period. This alternative would result in the greatest disruption of existing traffic patterns and flows.

B. Bicycle and Pedestrian Facilities

1. No Action: Keep Existing Bridge with No Modifications

The Mt. Vernon Trail and other pedestrian/bicycle facilities within the Study Area, as well as related safety deficiencies, would remain in their current condition.

2. All Alternatives

The three alternatives evaluated for this location

- Alternative A, widen existing bridge;
- Alternative B, construct a second, parallel bridge; and
- Preferred Alternative, replace existing bridge

include similar pedestrian/bicycle trail improvements. All involve a wider bridge crossing of the Boundary Channel inlet, which eliminates the geometric deficiencies for this ramp and allows for a longer acceleration lane without realigning the ramp. For each alternative, the Mt. Vernon Trail would be widened as it crosses the Humpback Bridge and a barrier constructed between the trail and vehicle travel lanes to eliminate the existing safety deficiencies. In Alternative A and the Preferred Alternative, the trail would be widened to 10 feet. In Alternative B the trail would be widened to (±) 12 feet. Pedestrian/bicyclist conflicts with vehicular traffic associated with the existing at-grade crosswalk between the east and west sides of the GWMP would also be eliminated in this alternative, through the construction of pedestrian trail underpasses to the north and south of the bridge structure(s). The small parking lot serving the Navy-Marine Memorial would also be eliminated in this alternative. Accessible sidewalk/trail connections would be constructed to connect the Columbia Island Marina parking lot with the Mt. Vernon Trail and Navy-Marie Memorial, via the northern underpass. The pedestrian/bicyclist connection between the Mt. Vernon Trail, the Pentagon and Arlington County would be enhanced through the construction of a new trail connection along the southern edge of the Boundary Channel lagoon linking the Pentagon/Boundary Channel Drive with the GWMP via the southern underpass. All trail connections would be 9-feet wide, consistent with the Mt. Vernon Trail width standard.

C. Historic and Cultural Resources

1. No Action: Keep Existing Bridge with No Modifications

No impact to historic or cultural resources is anticipated.

2. Alternative A: Widen Existing Bridge

The widening of the Humpback Bridge across Boundary Channel, would directly impact the Humpback Bridge, a contributing element of the GWMP historic resource. Consultation with the Advisory Council and Virginia and District of Columbia SHPO's has been initiated in compliance with Section 106 of the National Historic Preservation Act. The design of the modifications to the Humpback Bridge, construction plans and details would be executed in conjunction with the terms and conditions of a MOA between the FHWA, NPS, Advisory Council and District of Columbia and Virginia SHPO's outlining the measures to be taken to address effects to the historic resources.

The eastern façade of the Humpback Bridge would remain in place, although it would be modified by the addition of the pedestrian/bicycle underpasses. The parapet wall along the eastern side of the Humpback Bridge would be extended to the north and south of its current location in conjunction with the re-grading of the GWMP approaches to the bridge to

eliminate the vertical sight deficiencies. The height of the wall would also be extended to provide increased safety for Mt. Vernon Trail users. Modifications to the structure would be similar in character and materials to the existing bridge.

The western or Pentagon side of the Humpback Bridge would be demolished and the bridge widened by (±) 19 feet. The new structure would be similar to the existing Humpback Bridge in shape and massing, in order to minimize the appearance of the bridge alternations as seen from the Columbia Island Marina and Pentagon river terrace. The stone facing from the western side of the bridge would be removed prior to demolition for potential reuse on the new façade.

Pedestrian and bicycle circulation patterns surrounding the Navy-Marine Memorial, a contributing element of the GWMP historic resource, would also be modified to provide a transition and trail connection between the Mt. Vernon Trail, new pedestrian underpasses and Columbia Island Marina. The new trail connections would be designed and constructed to minimize disturbances to the Navy-Marine Memorial and views of the GWMP as seen from the District of Columbia.

With respect to cultural or archaeological resources, past grading and filling activity have extensively modified the land within the Study Area. It is not anticipated to have a high potential for the presence of undisturbed cultural or archaeological resources.

3. Alternative B: Construct a Second, Parallel Bridge

The construction of a second bridge across Boundary Channel, parallel to the existing Humpback Bridge would indirectly impact the Humpback Bridge. The proposed action would also impact the historic setting of the GWMP and adjacent historic resources (i.e., the Pentagon and LBJ Memorial Grove). Consultation with the Advisory Council and Virginia and District of Columbia SHPO's has been initiated. The design of the modifications to the Humpback Bridge and the new bridge, construction plans and details would be executed in conjunction with the terms and conditions of a MOA between the FHWA, NPS, Advisory Council and District of Columbia and Virginia SHPO's outlining the measures to be taken to address effects to the historic resources.

The eastern façade of the Humpback Bridge would remain in place, although it would be modified by the addition of the pedestrian/bicycle underpasses. The parapet wall along the eastern side of the Humpback Bridge would be extended to the north and south of its current location in conjunction with the re-grading of the GWMP approaches to the bridge. The height of the wall would also be extended. All modifications to the structure would be similar in character and materials to the existing bridge.

The western or Pentagon side of the Humpback Bridge would be obscured by the parallel bridge structure. The new structure would be separated from the existing bridge by approximately one foot. It would be reflective of the Humpback Bridge in shape and massing and faced with similar materials (e.g., stone-faced), in order to minimize the appearance of the bridge alternations as seen from the Columbia Island Marina and Pentagon river terrace. It should be noted the proximity of the two bridges to one another and limited access between the spans is projected to compromise the ability to complete maintenance work on the historic resource as well as the new bridge.

Pedestrian and bicycle circulation patterns surrounding the Navy-Marine Memorial would also be modified to provide a transition and trail connection between the Mt. Vernon Trail,

new pedestrian underpasses and Columbia Island Marina. The new trail connections would be designed and constructed to minimize disturbances to the Navy-Marine Memorial and views of the GWMP as seen from the District of Columbia.

With respect to cultural or archaeological resources, past grading and filling activity have extensively modified the land within the Study Area. It is not anticipated to have a high potential for the presence of undisturbed cultural or archaeological resources.

4. Preferred Alternative: Replace Existing Bridge

This alternative would result in the replacement of the Humpback Bridge with a new bridge across Boundary Channel. The existing bridge would be demolished, a direct impact to the GWMP historic resource and the bridge. The proposed action would also alter the GWMP setting within the views and vistas of adjacent historic resources, including the Pentagon, LBJ Memorial Grove, Arlington National Cemetery, East and West Potomac Park, and other historic resources of the District of Columbia. Consultation with the Advisory Council and Virginia and District of Columbia SHPO's has been initiated. The design of the new bridge and related elements, construction plans and details would be executed in conjunction with the terms and conditions of a MOA between the FHWA, NPS, Advisory Council and District of Columbia and Virginia SHPO's outlining the measures to be taken to mitigate the impacts to the historic resources.

The new bridge would be similar in design and materials to the Humpback Bridge. The eastern or Potomac River edge of the new structure would not be located any farther east than the eastern façade of the existing bridge, to minimize impacts to the adjacent Navy-Marine Memorial. Multi-use trails would be constructed to pass beneath the new bridge and provide grade-separated crossing of the GWMP. Pedestrian and bicycle circulation patterns surrounding the Navy-Marine Memorial would also be modified to provide a transition and trail connection between the Mt. Vernon Trail, new trail underpasses and Columbia Island Marina. The new trail connections would be designed and constructed to minimize disturbances to the Navy-Marine Memorial.

With respect to cultural or archaeological resources, past grading and filling activity have extensively modified the land within the Study Area. It is not anticipated to have a high potential for the presence of undisturbed cultural or archaeological resources.

D. *Aesthetics and Viewsheds*

1. No Action: Keep Existing Bridge with No Modifications

The aesthetic condition and viewshed of the GWMP and adjacent historic resources would remain in their current condition.

2. Alternative A: Widen Existing Bridge

The appearance of the eastern or Potomac River façade of the Humpback Bridge, a contributing element of the GWMP and prominent component of the viewsheds of the Washington, DC monumental core as seen from East and West Potomac Park and other points within the District of Columbia, would be altered by the addition of the pedestrian/bicycle trail underpasses and modifications to the existing bridge's eastern parapet wall. All modifications to the structure would be similar in character and materials to the existing bridge, to minimize visual impacts.

The western view of the Humpback Bridge, as seen from the Pentagon river terrace and LBJ Memorial Grove is a prominent element in the viewsheds of those two historic resources. Although the western side of the Humpback Bridge would be demolished, the expanded bridge structure would be designed to mimic the existing façade. Reuse of the stone facing from the existing façade may also serve to minimize the visual impact of the bridge modifications.

The original landscape elements of the GWMP were designed to frame and enhance the parkway elements, including the Humpback Bridge. The mature specimen trees flanking the Potomac River side of the bridge and Boundary Channel inlet are remnants of the original GWMP plantings. Construction of the pedestrian underpasses beneath the Humpback Bridge and the new bridge would require the removal of some of those plantings. While the alignment of the underpasses and associated trails have been sited to minimize impacts on existing vegetation as much as possible, some impacts are unavoidable. Mixed woodland vegetation on the western or Pentagon side of the bridge would also be cleared to accommodate the new bridge span, which would affect the views of the bridge from the Pentagon. Cleared areas adjacent to the bridge and underpasses would be landscaped once construction activities are complete to mitigate visual impacts.

3. Alternative B: Construct a Second, Parallel Bridge

As with Alternative A, the appearance of the Potomac River façade of the Humpback Bridge would be altered by the addition of the pedestrian/bicycle trail underpasses and modifications to the existing bridge's eastern parapet wall. All modifications to the structure would be similar in character and materials to the existing bridge, to minimize visual impacts. The western or Pentagon side of the Humpback Bridge would be obscured by the new bridge structure. The new structure would be reflective of the existing Humpback Bridge in shape, massing and materials, in order to minimize the changes to the Pentagon and LBJ Memorial Grove viewsheds.

The construction of the pedestrian underpasses and related Mt. Vernon Trail modifications associated with Alternative B would also unavoidably impact original plantings of the GWMP that remain adjacent to the Humpback Bridge on the Potomac River side as well as mixed woodland vegetation on the Pentagon side of the bridge. Landscape elements removed during construction would be replanted once construction is complete to mitigate visual impacts.

4. Preferred Alternative: Replace Existing Bridge

Alternative C would have the greatest potential visual impact on the GWMP historic resource and adjacent historic resources. The Humpback Bridge would be replaced with a new structure. The design of the new bridge would be reminiscent of the Humpback Bridge in scale, massing and materials. The pedestrian underpasses and other new elements would be designed as integral components of the new bridge, to ensure their fit and compatibility. As with the other Humpback Bridge alternatives, mature specimen trees dating to the 1930's that flank the existing bridge on the Potomac River side would need to be removed. Vegetation on the Pentagon side of the bridge would also be cleared as part of construction activities. Landscaped areas adjacent to the bridge that would be cleared during construction would be replanted once construction is complete to mitigate the visual impacts.

E. Land Use

1. No Action: Keep Existing Bridge with No Modifications

No change to existing land use patterns is anticipated.

2. All Alternatives

No change to existing land use patterns is anticipated to result from the implementation of any of the proposed Humpback Bridge improvements other modifications in its location.

F. Biological Resources

1. No Action: Keep Existing Bridge with No Modifications

Vegetation

No change to existing vegetation would result.

Wildlife and Threatened and Endangered Species

No change to existing wildlife is anticipated.

Wetlands

No impact to wetland resources is anticipated.

2. Alternative A: Widen Existing Bridge

Vegetation

Widening the Humpback Bridge and adding the pedestrian underpasses would result in the removal of approximately 1.78 AC of mixed woodland vegetation on the Pentagon side of the existing bridge.

The proposed pedestrian underpasses would also impact the specimen trees on the Potomac River side of the bridge. While the alignment of the underpasses and associated trails have been sited to minimize impacts on existing vegetation as much as possible, the location of the existing bridge abutments, topographic conditions and tunnel cover requirements make the impacts unavoidable. The removal of four trees, a pin oak (*Quercus palustris*) of approximately 80 inches diameter at breast height (dbh), two American elms (*Ulmus americana*) of approximately 120 inches dbh and 150 inches dbh, and a 25-inch dbh flowering dogwood (*Cornus florida*) would be necessary. Other trees located adjacent to the bridge and the proposed tunnels would be protected during construction to minimize impacts to them. Once the bridge widening and underpasses are completed, the cleared areas would be re-planted.

The construction of the temporary bridge and roadway to re-route GWMP traffic around the construction site would require the clearing of an additional 0.3 AC of mixed woodland vegetation. The cleared area would be re-planted once construction is completed.

Wildlife and Threatened and Endangered Species

Disturbed areas would be re-vegetated after the bridge widening is complete. It is anticipated that loss of the existing vegetation resources would not have an adverse impact on wildlife inhabiting the GWMP. The bridge widening would also temporarily affect aquatic wildlife found in Boundary Channel. There are no state or federally listed rare, threatened or endangered species known to inhabit the Study Area.

Wetlands

Filling of approximately 1,400 SF or 0.03 AC within the Boundary Channel wetland would be required for the foundations of the expanded bridge structure. Additional construction activity would take place on and over the waters of Boundary Channel. Construction activities would comply with the conditions of Section 401 and 404 of the Clean Water Act, if necessary. A wetlands permit would be required from the U.S. Army Corps of Engineers for the construction activity. The proposed action would also comply with applicable state and local permit requirements.

Temporary filling of approximately 900 SF of wetland would also be required for the temporary construction bridge and roadway. The necessary permits would be obtained for the temporary filling and the wetland would be restored once construction was completed.

3. Alternative B: Construct a Second, Parallel Bridge

Vegetation

The construction of a new bridge structure parallel to the Humpback Bridge and pedestrian underpasses would result in the removal approximately 1.84 AC of mixed woodland vegetation on the Pentagon side of the existing bridge.

As discussed in the previous section, the proposed pedestrian underpasses would impact mature trees on the Potomac River side of the bridge. The underpasses and related trails follow the same approximate alignment as in Alternative A and result in the same impacts to the mature trees located on each side the Boundary Channel inlet. The removal of an 80-inch dbh pin oak (*Quercus palustris*), two American elms (*Ulmus americana*) of approximately 120 inches dbh and 150 inches dbh, and a 25-inch dbh flowering dogwood (*Cornus florida*) would be necessary. Other trees located adjacent to the bridge and the proposed tunnels would be protected during construction to minimize impacts to them. Once the bridge widening and underpasses are completed, the cleared areas would be re-planted.

Wildlife and Threatened and Endangered Species

Once the new bridge span and underpasses are constructed, disturbed areas would be re-vegetated. It is anticipated that loss of the existing vegetation resources would not have an adverse impact on wildlife inhabiting the GWMP. Construction of the additional span would also temporarily affect aquatic wildlife found in Boundary Channel. There are no state or federally listed rare, threatened or endangered species known to inhabit the Study Area.

Wetlands

Construction of the parallel bridge span across Boundary Channel would require filling of approximately 1,900 SF within the Boundary Channel wetland for the bridge foundations. Additional work would take place on and over the waters of Boundary Channel. Construction activities would comply with the conditions of Section 401 and 404 of the Clean Water Act, if necessary. A wetlands permit would be required from the U.S. Army Corps of Engineers for the construction activity. The proposed action would also comply with applicable state and local permit requirements.

4. Preferred Alternative: Replace Existing Bridge

Vegetation

Replacement of the Humpback Bridge would result in the clearing of trees and other vegetation on both sides of the new structure. The eastern or river face of the new structure would be located in approximately the same position as the existing bridge face in order to minimize the impact to existing planting, although constructing a new bridge allows greater flexibility in the location of the underpasses and related trails. Those features have been located to minimize the loss of existing plantings, particularly the specimens on the Potomac River side of the bridge. However, three trees, the 80-inch dbh pin oak (*Quercus palustris*), the 25-inch dbh flowering dogwood (*Cornus florida*) and a multi-trunk flowering pear (*Pyrus calleryana*) would be impacted. Protective measures such as the use of pile shoring and other measures would be taken during the construction of the bridge to minimize additional impacts to vegetation. Approximately 1.77 AC of mixed woodland vegetation would be also need to be removed on the Pentagon side of the new bridge. Once the new bridge and underpasses are constructed, cleared areas would be re-planted.

Wildlife and Threatened and Endangered Species

Existing vegetation would be cleared on each side of Boundary Channel for the proposed new GWMP bridge. Loss of that resource, however, is not anticipated to have an adverse impact on wildlife inhabiting the Study Area. Disturbed areas would be replanted with vegetation consistent with that removed in order to provide the same type of wildlife habitat. Construction of the bridge would also temporarily affect aquatic wildlife found in Boundary Channel. There are no state or federally listed rare, threatened or endangered species known to inhabit the Study Area; therefore there would be no impact.

Wetlands

Construction of the new bridge would require filling of approximately 1,400 SF within the Boundary Channel wetland for the bridge foundations. Additional work would take place on and over the waters of Boundary Channel. Construction activities would comply with the conditions of Section 401 and 404 of the Clean Water Act, if necessary. A wetlands permit would be required from the U.S. Army Corps of Engineers for the construction activity. The proposed action would also comply with applicable state and local permit requirements.

Temporary filling of approximately 900 SF of wetland would also be required for the temporary construction bridge and roadway. The necessary permits would be obtained for the temporary filling activity and the wetland would be restored once construction was completed.

G. *Water Resources*

1. No Action: Keep Existing Bridge with No Modifications

Floodplains

No impact to floodplains is anticipated.

Coastal Zone Management

No Coastal Zone impacts are anticipated.

Chesapeake Bay Preservation Area

No Chesapeake Bay impacts are anticipated.

2. Alternative A: Widen Existing Bridge

Floodplains

Construction of the foundations and piers of the expanded bridge structure would take place within the 100-year floodplain, at the Boundary Channel shoreline. A permit would be required from the U.S. Army Corps of Engineers for the construction activity. A bridge permit from the U.S. Coast Guard would also be required.

Coastal Zone Management

The Arlington County portions of the Study Area are located within the Virginia Coastal Zone. The Federal Coastal Zone Management Act requires development projects of Federal agencies that take place within the Coastal Zone be consistent with the applicable state coastal zone management program to the maximum extent practicable. The Virginia Coastal Resources Management Program is a network of existing state laws and policies though which the Commonwealth of Virginia manages its coastal resources. Proposed actions that comply with the applicable state laws and policies are considered to be consistent with the Virginia Coastal program. The District of Columbia is not subject to the Coastal Zone Management Act. The proposed safety improvements would be constructed in accordance with applicable Commonwealth of Virginia and District of Columbia stormwater management, sedimentation and erosion control and water quality protection laws and policies.

Chesapeake Bay Preservation Area

The proposed Humpback Bridge alternatives are located on government-owned property that is exempt from Arlington County Chesapeake Bay Preservation regulations. Remaining Humpback Bridge and other safety improvements proposed for Columbia Island are located in the District of Columbia, which does not designate Chesapeake Bay Preservation Areas. However, construction and other activities related to the implementation of the proposed safety improvements would comply with local stormwater management, sedimentation and erosion control and other water quality protection regulations.

3. Alternative B: Construct a Second, Parallel Bridge

Floodplains

Construction of the parallel bridge span across Boundary Channel would involve construction within the 100-year floodplain, at the Boundary Channel shoreline, for bridge foundations and piers. A permit would be required from the U.S. Army Corps of Engineers for the construction activity. A bridge permit from the U.S. Coast Guard would also be required.

Coastal Zone Management

The proposed action would comply with the Virginia Coastal Zone Management Program to the maximum extent practicable. The proposed safety improvements would be constructed in accordance with applicable Virginia and District of Columbia stormwater management, sedimentation and erosion control and water quality protection laws and policies.

Chesapeake Bay Preservation Area

The proposed Humpback Bridge alternatives are partially located on government-owned property in Virginia that is exempt from Arlington County Chesapeake Bay Preservation regulations and partially located in the District of Columbia, which does not designate Chesapeake Bay Preservation Areas. However, construction and other activities related to the implementation of the proposed safety improvements would comply with local

stormwater management, sedimentation and erosion control and other water quality protection regulations.

4. Preferred Alternative: Replace Existing Bridge

Floodplains

Construction of the new bridge would involve construction within the 100-year floodplain for bridge foundations and piers. A permit would be required from the U.S. Army Corps of Engineers for the construction activity. A bridge permit from the U.S. Coast Guard would also be required.

Coastal Zone Management

The proposed action would comply with the Virginia Coastal Zone Management Program to the maximum extent practicable. The proposed safety improvements would be constructed in accordance with applicable Virginia and District of Columbia stormwater management, sedimentation and erosion control and water quality protection laws and policies.

Chesapeake Bay Preservation Area

The proposed Humpback Bridge alternatives are partially located on government-owned property in Virginia that is exempt from Arlington County Chesapeake Bay Preservation regulations and partially located in the District of Columbia, which does not designate Chesapeake Bay Preservation Areas. However, construction and other activities related to the implementation of the proposed safety improvements would comply with local stormwater management, sedimentation and erosion control and other water quality protection regulations.

H. Physiography, Geology and Soils

1. No Action: Keep Existing Bridge with No Modifications

No disturbance to soils is anticipated.

2. Alternative A: Widen Existing Bridge

Soil disturbance would result from site clearing and grading activities related to the widening of the Humpback Bridge and the construction of a pedestrian underpass to the north and south of the bridge crossing and other related Mt. Vernon Trail modifications. Approximately 10.1 AC would be disturbed. The modification of the GWMP vertical profile at its approaches to the Humpback Bridge(s) would require the placement of fill and related grading activities along the mainline GWMP roadway alignment as well. Demolition and construction activities would incorporate erosion control measures to minimize soils loss. Disturbed areas would be re-vegetated once construction activities are complete.

3. Alternative B: Construct a Second, Parallel Bridge

Soil disturbance, filling and grading activities would result from site clearing and construction activities related to the construction of a second bridge over the Boundary Channel inlet, parallel to the Humpback Bridge and other modifications at this location. Approximately 10.5 AC would be disturbed. Construction activities would incorporate erosion control measures to minimize soils loss. Disturbed areas would be re-vegetated once construction activities are complete.

4. Preferred Alternative: Replace Existing Bridge

Soil disturbance would result in the disturbance of approximately 9.9 AC due to demolition, clearing, filling/grading and other activities related to the construction of a new GWMP bridge over the Boundary Channel inlet and other modifications at this location. Demolition and construction activities would incorporate erosion control measures to minimize soils loss. Disturbed areas would be re-vegetated once construction activities are complete.

I. Air Quality

1. No Action: Keep Existing Bridge with No Modifications

No change to air quality levels is anticipated.

2. All Alternatives

The three alternatives evaluated for this location

- Preferred Alternative A, widen existing bridge;
- Alternative B, construct a second, parallel bridge; and
- Preferred Alternative, replace existing bridge

Are generally the same in terms of air quality impacts. None of the alternatives expand the capacity of the GWMP transportation system. No changes to air quality levels are anticipated as a result of the implementation of any of the three alternatives, except for minor, temporary increases in dust and other air emissions associated with construction activities.

From the construction emissions standpoint, the Preferred Alternative would involve more extensive demolition and construction activities and, as a result, have a greater impact on local air quality than Alternatives A or B. Construction activities related to each of the alternatives would be conducted in accordance with the FHWA's Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (1996) and would comply with applicable local, state and federal regulations.

J. Noise

1. No Action: Keep Existing Bridge with No Modifications

No change in existing noise sources or noise levels is anticipated.

2. All Alternatives

The three alternatives evaluated for this location

- Preferred Alternative A, widen existing bridge;
- Alternative B, construct a second, parallel bridge; and
- Preferred Alternative, replace existing bridge

are similar in terms of noise impacts. Existing noise levels would increase temporarily during the construction of the acceleration lane and bridge improvements. The speed with which a vehicle would travel the segment of roadway encompassing the ramp – the segment of southbound I-395 before the ramp, the ramp to the GWMP and the GWMP segment after the ramp merge – improved slightly with the addition of the acceleration lane, by approximately 16 mph (1.3 minutes) in the AM peak and 3 mph (0.2 minutes) in the PM peak. That increase in vehicle speeds would result in a corresponding slight increase in traffic-related noise

levels within the Study Area, although below the approximately 20 mph increase necessary to produce a readily noticeable (i.e., 5 dBA) increase in noise levels[6].

K. Hazardous Materials and Wastes

No evidence of historical land use involving hazardous materials or hazardous wastes was found within the Study Area. The proposed actions would not require the disturbance or relocation of any of the existing, recognized environmental conditions – USTs and ASTs – found at the Columbia Island Marina. Therefore, no disturbance or generation of hazardous materials or hazardous wastes are anticipated to occur with either the implementation of any of the proposed safety improvements or under "no-action" conditions.

L. Energy

1. No Action: Keep Existing Bridge with No Modifications

No change in energy consumption is anticipated.

2. All Build Alternatives

Energy consumption would temporarily increase during the construction of any of the proposed Humpback Bridge improvements and construction of related roadway and Mt. Vernon Trail improvements. No significant change in long-term energy consumption is anticipated.

M. Socioeconomic and Community Features

1. No Action: Keep Existing Bridge with No Modifications

No change to socioeconomic or community features is anticipated. The public would continue to be exposed to the safety hazards associated with the current GWMP transportation and circulation systems.

2. Alternative A: Widen Existing Bridge

Construction jobs associated with the widened bridge would have a short-term benefit to local construction workers and the local economy. No long-term economic benefit to local community is anticipated. NPS bridge maintenance costs would not be anticipated decrease significantly, since the 70-year-old Humpback Bridge would comprise the majority of the structure. Its useful life expectancy is approximately 25 to 30 years.

3. Alternative B: Construct a Second, Parallel Bridge

Construction jobs associated with the parallel bridge would have a short-term benefit to local construction workers and the local economy. While lower, long-term NPS maintenance costs would be anticipated for the new bridge span, which would have a 75 to 100 year life expectancy, maintenance of the 70 year old Humpback Bridge span that would remain would also be required. The anticipated life expectancy of the historic bridge is approximately 25 to 30 years. At that time a major renovation or replacement of the Humpback Bridge would be required.

[6] U.S. Department of Transportation, Federal Highway Administration. *Traffic Noise in the United States: Problem and Response*. April 2000.

4. Preferred Alternative: Replace Existing Bridge

Construction jobs associated with the new bridge would have a short-term benefit to local construction workers and the local economy. The longer and more extensive construction period required for a new bridge would produce slightly greater benefits than the shorter-term parallel bridge or bridge widening efforts.

In the long-term, a new bridge would incur lower maintenance costs for the NPS than the 70-year-old Humpback Bridge. The expected useful life of a new bridge would be 75 to 100 years, greater than the 25 to 30 year life expectancy of the Humpback Bridge.

N. Cumulative Impacts

The proposed mid-term safety improvements identified for the Study Area are intended to complement the short-term and long-term safety improvements proposed by the FHWA for the I-395/GWMP interchange and 14th Street Bridge to enhance overall motorist and pedestrian safety within the corridor. No increase in the traffic-carrying capacity of the GWMP would result from the implementation of the preferred replacement bridge alternative. It is not anticipated to contribute to any cumulative impacts.

Implementation of the proposed safety improvements would create a safer environment for the users of the other GWMP facilities proposed by the NPS in the vicinity of the Study Area as well as current GWMP users. Those facilities – a (non-motorized) boathouse and comfort station – would utilize the existing mainline roadway network, although the construction of vehicular and pedestrian connections may be necessary to link the new facilities with existing parking and trail resources.

Planned improvements for the adjacent Pentagon Reservation are primarily concerned with the renovation of the existing Pentagon building. No major new structures are anticipated that, when combined with the impacts of the proposed ramp, bridge and trail improvements would result in significant cumulative impacts.

Undeveloped parcels in the vicinity of the Study Area include the former Twin Bridges Marriott site and the Arlington County “North Tract” site. Both are located to the southwest of the Study Area, at the north end of Crystal City. Arlington County plans to redevelop the North Tract as a public park and recreation facility. The county is also investigating the acquisition of the Twin Bridges Marriott site. Upgrade of the existing transportation network, including Old Jefferson Davis Highway, is under investigation as well. The upgrade of Old Jefferson Davis Highway would facilitate access to the GWMP. Development of the two parcels for park and recreation uses would be compatible with the use of the GWMP and would not be anticipated to result in significant cumulative impacts.

O. Comparison of Alternatives

A comparison of the No Action Alternative and the Preferred Build Alternative is provided in Table 5.

Table 5: Comparison of Alternatives – SB I-395 Ramp to NB GWMP and Humpback Bridge

Evaluation Factor	No Action Alternative	Alternative A	Alternative B	Preferred Alternative
		Widen Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches	*Construct a Second, Parallel Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*	*Replace Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*
Roadway Horizontal Alignment	No change to horizontal alignment; existing design speed is adequate for posted speed limit.	Design speed = 50 mph New alignment would require minor modifications to SB GWMP ramp to SBI-395 and Columbia Island Marina entrance.	Design speed = 50 mph New alignment would require minor modifications to SB GWMP ramp to SBI-395 and Columbia Island Marina entrance.	Design speed = 50 mph New alignment would require minor modifications to SB GWMP ramp to SBI-395 and Columbia Island Marina entrance.
Roadway Vertical Alignment	No change to vertical alignment; sight distance deficiencies would remain.	Design speed = 50 mph Sight distance deficiencies would be eliminated. New alignment would require modifications to SB GWMP ramp to SB I-395, NB GWMP ramp to SB I-395 and SB I-395 ramp to SB GWMP.	Design speed = 50 mph Sight distance deficiencies would be eliminated. New alignment would require modifications to SB GWMP ramp to SB I-395, NB GWMP ramp to SB I-395 and SB I-395 ramp to SB GWMP.	Design speed = 50 mph Sight distance deficiencies would be eliminated. New alignment would require modifications to SB GWMP ramp to SB I-395, NB GWMP ramp to SB I-395 and SB I-395 ramp to SB GWMP.
Structural Impact to Humpback Bridge	No impact is anticipated	Lightweight fill would be used on Humpback Bridge so as to not increase the dead load on the bridge.	Lightweight fill would be used on Humpback Bridge so as to not increase the dead load on the bridge.	Not Applicable
Navigation Impacts	No impact is anticipated	Existing vertical bridge clearance would be maintained. USCG bridge permit would be required.	Existing vertical bridge clearance would be maintained. USCG bridge permit would be required.	Existing vertical bridge clearance would be maintained. USCG bridge permit would be required.
Maintenance of Traffic	No impact is anticipated	GWMP/Humpback Bridge and Mt. Vernon Trail would remain open during construction activities. Temporary lane reduction/closure and reduction in GWMP speed limit would be required during construction. Additional structural analysis of the Humpback Bridge is necessary to determine the feasibility of maintaining traffic loads on the existing structure during construction. Without further analysis, a temporary bridge is recommended.	GWMP/Humpback Bridge and Mt. Vernon Trail would remain open during construction activities. Temporary lane reduction/closure and reduction in GWMP speed limit would be required during construction. This alternative would have the least impact of the three build alternatives on GWMP traffic flow.	GWMP/Humpback Bridge and Mt. Vernon Trail would remain open during construction activities. A temporary bridge over Boundary Channel would be required during construction of new bridge for GWMP and Mt. Vernon Trail traffic. Temporary lane reduction/closure and reduction in GWMP speed limit would also be required during construction.

Table 5: Comparison of Alternatives – SB I-395 Ramp to NB GWMP and Humpback Bridge

Evaluation Factor	No Action Alternative	Alternative A	Alternative B	Preferred Alternative
		Widen Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches	*Construct a Second, Parallel Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*	*Replace Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*
Motorist Safety and Traffic Operations	Safety hazards and accident potential associated with ramp and bridge would remain. Traffic congestion on the I-395 off ramp and outbound George Mason Bridge would continue.	Motorist safety improved with the elimination of ramp and sight distance deficiencies. LOS on I-395 off ramp would improve from F to D in the AM peak and F to borderline C/D in the PM peak. Queues along the ramp and George Mason Bridge would be reduced. Northbound GWMP continues to operate at LOS F due to the heavy mainline volumes. Moderate improvement in traffic speed and density in AM peak and small increase in PM peak.	Motorist safety improved with the elimination of ramp and sight distance deficiencies. LOS on I-395 off ramp would improve from F to D in the AM peak and F to borderline C/D in the PM peak. Queues that develop along the ramp and George Mason Bridge would be reduced. Northbound GWMP continues to operate at LOS F due to the heavy mainline volumes. Moderate improvement in traffic speed and density in AM peak and small increase in PM peak.	Motorist safety improved with the elimination of ramp and sight distance deficiencies. LOS on I-395 off ramp would improve from F to D in the AM peak and F to borderline C/D in the PM peak. Queues that develop along the ramp and George Mason Bridge would be reduced. Northbound GWMP continues to operate at LOS F due to the heavy mainline volumes. Moderate improvement in traffic speed and density in AM peak and small increase in PM peak.
Pedestrian & Bicyclist Safety	Safety hazards associated with Mt. Vernon Trail crossing of Humpback Bridge and at-grade pedestrian/bicyclist crossing of the GWMP would remain.	Pedestrian and bicyclist safety improved with widened trail/barrier across Humpback Bridge and construction of underpasses and trail connections.	Pedestrian and bicyclist safety improved with widened trail/barrier across Humpback Bridge and construction of underpasses and trail connections.	Pedestrian and bicyclist safety improved with widened trail/barrier across Humpback Bridge and construction of underpasses and trail connections.
Historic and Cultural Resources	No impact to the GWMP historic resource and/or Humpback Bridge contributing element is anticipated.	Consultation with Advisory Council and VA and DC SHPO's required. The western face of the Humpback Bridge would be demolished; no other adverse effect is anticipated. Design of expanded bridge would be compatible with the design and materials of the historic resource. MOA would be executed between FHWA, NPS, Advisory Council and VA and DC SHPO's outlining measures to be taken to address effects to historic resources.	Consultation with Advisory Council and VA and DC SHPO's required. Indirect adverse effect on the Humpback Bridge would result from construction of parallel bridge. Preventative maintenance of historic resource would be compromised due to limited access between spans leading to deterioration. MOA would be executed outlining measures to be taken to address effects to historic resources.	Consultation with Advisory Council and VA and DC SHPO's required. Adverse effect with physical destruction of the Humpback Bridge would result; MOA would be executed to address replacement-in-kind and other measures to be taken to address effects to historic resources.

Table 5: Comparison of Alternatives – SB I-395 Ramp to NB GWMP and Humpback Bridge

Evaluation Factor	No Action Alternative	Alternative A	Alternative B	Preferred Alternative
		Widen Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches	*Construct a Second, Parallel Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*	*Replace Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*
Aesthetics and Viewsheds	No impact is anticipated.	Expanded bridge and pedestrian underpasses would result in minor-to-moderate change to GWMP, DC and Pentagon viewsheds. Design of new elements would be subject to terms and conditions of MOA (see Historic and Cultural Resources).	New bridge span and pedestrian underpasses would result in minor to-moderate change to the GWMP, DC and Pentagon viewsheds. Design of new elements would be subject to terms and conditions of MOA.	Replacement bridge and pedestrian underpasses would be new element in the GWMP, DC and Pentagon viewsheds. Design of new elements would be subject to terms and conditions of MOA.
Vegetation	No impact is anticipated.	Four mature specimen trees on Potomac River side of existing bridge would be removed: 2 American elms (*Ulmus americana*) - (±) 120" dbh and 150" dbh 1 flowering dogwood (*Cornus florida)* - (±) 25" dbh 1 pin oak (*Quercus palustris*) - (±) 80" dbh Approximately 1.78 AC of mixed woodland vegetation on Pentagon side of Boundary Channel Bridge would be cleared. Potential adverse effect on cultural landscape is anticipated. MOA may be needed to address impact to historic planting plans.	Four mature specimen trees on Potomac River side of existing bridge would be removed: 2 American elms (*Ulmus americana*) - (±) 120" dbh and 150" dbh 1 flowering dogwood (*Cornus florida)* - (±) 25" dbh 1 pin oak (*Quercus palustris*) - (±) 80" dbh Approximately 1.84 AC of mixed woodland vegetation on Pentagon side of Boundary Channel Bridge would be cleared. Potential adverse effect on cultural landscape is anticipated. MOA may be needed to address impact to historic planting plans.	Three mature specimen trees on Potomac River side of existing bridge would be removed: 1 multi-trunk flowering pear (*Pyrus calleryana*) 1 flowering dogwood (*Cornus florida)* - (±) 25" dbh 1 pin oak (*Quercus palustris*) - (±) 80" dbh Approximately 1.77 AC of mixed woodland vegetation on Pentagon side of Boundary Channel Bridge would be cleared. Potential adverse effect on cultural landscape is anticipated. MOA may be needed to address impact to historic planting plans.
Wildlife and Threatened & Endangered Species	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Wetlands	No impact is anticipated.	1,400 SF of Boundary Channel wetlands impacted by bridge expansion. USACOE permit would be required.	1,900 SF of Boundary Channel wetlands impacted by bridge construction. USACOE permit would be required.	1,400 SF Boundary Channel wetlands impacted by bridge construction. USACOE permit would be required.

Table 5: Comparison of Alternatives – SB I-395 Ramp to NB GWMP and Humpback Bridge

Evaluation Factor	No Action Alternative	Alternative A	Alternative B	Preferred Alternative
		Widen Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches	*Construct a Second, Parallel Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*	*Replace Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*
Water Resources/Floodplains	No impact is anticipated.	Widened bridge/foundations located in 100-year floodplain; USACOE permit would be required. Underpasses would be located in a flood-prone area. Improvements would be constructed in accordance with VA and DC stormwater management, sedimentation and erosion control and other water quality protection laws and policies. Net reduction in impervious surface of approximately 0.4 AC in vicinity of Humpback Bridge due to removal of existing pavement areas.	Additional bridge span located in 100-year floodplain; USACOE permit would be required. Underpasses would be located in a flood-prone area. Improvements would be constructed in accordance with VA and DC stormwater management, sedimentation and erosion control and other water quality protection laws and policies. Net reduction in impervious surface of approximately 1,500 SF in vicinity of Humpback Bridge due to removal of existing pavement areas.	New bridge located in 100-year floodplain; USACOE permit would be required. Underpasses would be located in a flood-prone area. Improvements would be constructed in accordance with VA and DC stormwater management, sedimentation and erosion control and other water quality protection laws and policies. Net reduction in impervious surface of approximately 0.3 AC in vicinity of Humpback Bridge due to removal of existing pavement areas.
Geology/Soils	No impact is anticipated.	Soils disturbance of approximately 10.1 AC during bridge expansion. Erosion control measures would be incorporated during construction and disturbed areas re-vegetated.	Soils disturbance of approximately 10.5 AC during bridge construction. Erosion control measures would be incorporated during construction and disturbed areas re-vegetated.	Soils disturbance of approximately 9.9 AC during bridge construction. Erosion control measures would be incorporated during construction and disturbed areas re-vegetated.
Air Quality	No impact is anticipated.	Existing air quality levels would remain essentially the same.	Existing air quality levels would remain essentially the same.	Existing air quality levels would remain essentially the same.
Noise	No impact is anticipated.	Existing noise levels would remain essentially the same.	Existing noise levels would remain essentially the same.	Existing noise levels would remain essentially the same.
Hazardous Materials and Wastes	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Energy	No impact is anticipated.	No significant change in long-term energy consumption is anticipated.	No significant change in long-term energy consumption is anticipated.	No significant change in long-term energy consumption is anticipated.
Socioeconomic and Community Features	The public would continue to be subject to safety hazards associated with the current GWMP circulation systems.	Minor benefit from construction-related jobs and purchases. No long-term economic benefit to local community is anticipated. The public would no longer be subject to safety hazards associated with the current GWMP circulation systems.	Minor benefit from construction-related jobs and purchases. No long-term economic benefit to local community is anticipated. The public would no longer be subject to safety hazards associated with the current GWMP circulation systems.	Minor benefit from construction-related jobs and purchases No long-term economic benefit to local community is anticipated. The public would no longer be subject to safety hazards associated with the current GWMP circulation systems.

Table 5: Comparison of Alternatives – SB I-395 Ramp to NB GWMP and Humpback Bridge

Evaluation Factor	No Action Alternative	Alternative A	Alternative B	Preferred Alternative
		Widen Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches	*Construct a Second, Parallel Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*	*Replace Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*
Temporary Impacts	No impact is anticipated.	Temporary height restriction of the Boundary Channel for formwork and scaffolding during construction activities. Clearing of approximately 0.3 AC of mixed woodland would be required for temporary bridge and roadway. The cleared area would be re-graded and landscaped when construction is complete. Temporary filling of 900 SF of wetland for temporary bridge and roadway would be required. The wetland would be restored when construction is complete. Minor, temporary impacts to air quality during bridge expansion. Minor, temporary noise increases would result during demolition and construction activities. Energy consumption would temporarily increase during construction of the proposed improvements.	Temporary height restriction of the Boundary Channel for formwork and scaffolding during construction activities. Minor, temporary impacts to air quality during bridge construction. Minor, temporary noise increases would result during construction activities. Energy consumption would temporarily increase during construction of the proposed improvements.	Temporary height restriction of the Boundary Channel for formwork and scaffolding during construction activities. Clearing of approximately 0.3 AC of mixed woodland would be required for temporary bridge and roadway. The cleared area would be re-graded and landscaped when construction is complete. Temporary filling of 900 SF of wetland for temporary bridge and roadway would be required. The wetland would be restored when construction is complete. Minor, temporary impacts to air quality during demolition of old bridge and construction of new bridge. Minor, temporary noise increases would result during demolition and construction activities. This alternative would have the greatest temporary noise impact. Energy consumption would temporarily increase during construction of the proposed improvements.
Cumulative Impacts	No impact is anticipated.	Safer environment for vehicular and pedestrian users of the GWMP would result. GWMP access would be enhanced by potential Old Jefferson Davis Highway improvements by Arlington County. No adverse impacts are anticipated.	Safer environment for vehicular and pedestrian users of the GWMP would result. GWMP access would be enhanced by potential Old Jefferson Davis Highway improvements by Arlington County. No adverse impacts are anticipated.	Safer environment for vehicular and pedestrian users of the GWMP would result. GWMP access would be enhanced by potential Old Jefferson Davis Highway improvements by Arlington County. No adverse impacts are anticipated.

Table 5: Comparison of Alternatives – SB I-395 Ramp to NB GWMP and Humpback Bridge

Evaluation Factor	No Action Alternative	Alternative A	Alternative B	Preferred Alternative
		Widen Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches	*Construct a Second, Parallel Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*	*Replace Existing Bridge, Construct Underpass North & South of Humpback Bridge and Modify Vertical Profile of Bridge and Approaches*
Maintenance Cost		The existing Humpback Bridge would comprise the majority of the modified bridge structure. Long-term maintenance costs would not be expected to decrease significantly. Est. 25-30 year remaining life expectancy for Humpback Bridge. Additional long-term maintenance costs would be incurred for underpasses and new trails.	Long-term maintenance costs anticipated to remain the same or increase, due to need to maintain both existing Humpback Bridge and new bridge. Est. 25-30 year remaining life expectancy for Humpback Bridge and 75 to 100 year life expectancy for new bridge. Additional long-term maintenance costs would be incurred for underpasses and new trails.	Maintenance costs would be reduced for a new bridge, with an est. 75-100 year life expectancy. Additional long-term maintenance costs would be incurred for underpasses and new trails.
Construction Cost		$5,990,000	$6,780,000	$10,390,000

6.0 ENVIRONMENTAL EFFECTS OF THE SOUTHBOUND GWMP RAMP TO SOUTHBOUND I-395 ALTERNATIVES

Due to weaving/safety issues, the removal of this ramp has been recommended. The NPS has deferred the selection of a preferred alternative or action/no action for the proposed ramp closure until the completion of a more extensive evaluation by the FHWA of the I-395 corridor in Virginia and the District of Columbia. The following analysis is provided for information purposes.

A. Roadways and Ramps

1. No Action: Keep Ramp Open

No change to existing traffic operations would result. The ramp and GWMP would operate at LOS A during the AM and PM peak periods for the no build condition. The weave section where the ramp merges with southbound I-395 would operate at LOS F/E (AM/PM) as indicated in Figure B-6, Appendix B.

2. Deferred Alternative: Close Ramp

While the ramp itself operates effectively, the 280-foot weave at the end of the ramp where it meets I-395 is anticipated to operate at unacceptable levels of service by 2025, as shown in Figure B-5. The projected traffic volumes on the ramp are the lowest of all the ramps in the GWMP/I-395 interchange: 190 and 180 vehicles per hour (vph) for AM and PM peak hours, respectively. If this ramp were removed, the alternate route a driver would take would involve diverting traffic from southbound GWMP to I-395 by way of VA 27. For drivers destined for Route 1 and other points east of VA 27, a driver would be diverted from the southbound GWMP to VA 27 to Boundary Channel Drive to I-395/Route 1/Old Jefferson Davis Highway.

Traffic Operations Impacts

Figure B-7, Appendix B shows the level of service results for this alternative. The removal of the ramp slightly improves the LOS on southbound I-395 for the AM peak in the vicinity of the prior ramp junction. The removal of the ramp actually causes the level of service on southbound GWMP to decrease from a D (No-Build) to an E (Ramp Closure) for the PM peak. This degradation occurs because the methodology of analyzing the existing ramp junction is different than the proposed basic freeway section. The threshold at which a section of roadway becomes an E is based on the type of freeway section; a basic freeway section (with no ramps), a freeway-ramp junction, or a weave section. The threshold of LOS D/E for a basic freeway section is 32 pc/mi/ln whereas the threshold of LOS D/E is 35 pc/mi/ln for a freeway-ramp junction. A driver anticipates more friction at ramp junctions, which causes the level of service criteria to shift to allow more vehicles/lane/mile based on driver expectancy. As a result, the LOS of a roadway section without a ramp junction reaches an E at a lower threshold than a section of roadway with a ramp junction.

The level of service is based on the density of the vehicles and is expressed as vehicles/lane/mile. In the No-Build scenario, the deceleration lane carries little traffic (low density) while the main lanes of southbound GWMP carry heavy traffic (higher density). If the deceleration lane is removed, only the heavy-volume, higher density main lanes are left, causing a slight increase in the total density of the road section.

In addition to the level of service analysis, an analysis of average speed and density was performed in order to compare the alternative (ramp removal) to the no-build scenario. The results are shown in Table 6. The results are reported for the portion of the model affected by the alternative.

Along southbound GWMP, removing the ramp causes very little, if any, improvement in speed and density for the AM and PM peak hours over the approximately 0.4-mile section of the Parkway affected by the ramp removal, which removes 190 and 180 vph from the SB I-395 flow in 2025 during the AM and PM peaks, respectively. The improvement to traffic is slightly greater for the portion of I-395 at the southbound end of the ramp. In the AM, speed improved by about 6 mph and density improved by about 12 percent for the section of I-395 affected by the ramp removal. In the PM, speed improved by 2 mph and density by 11 percent for the affected section of I-395.

In addition to speed and density impacts, the ramp closure would eliminate geometric deficiencies associated with the current ramp design on both the GWMP and I-395.

Impact on Alternate Routes

If the southbound GWMP ramp to southbound I-395 were eliminated, most drivers would take VA 27 to access southbound I-395 from the southbound GWMP. Traffic volumes on VA 27 and Boundary Channel Drive were investigated to determine the impact of the rerouted southbound GWMP traffic on alternate routes. While the two roadways were not included in the CORSIM modeling, average daily traffic (ADT) data was available for each and was used to evaluate the change in traffic volumes if the ramp were closed. Growth rates for VA 27 and Boundary Channel Drive were not determined in the *14th Street Bridge Corridor Improvement Feasibility Study* and CORSIM model. As a result, the existing year (2001) traffic volumes have been utilized to evaluate the change in traffic volumes.

Table 6: 2025 Speed and Density Results – Comparison of No Build to SB GWMP to SB I-395 Ramp Removal Alternative

	Average speed difference	Average density difference	Length of affected area
GWMP SB			
AM	-0.07 mph	1.5 %	0.43 mi
PM	2.1 mph	-3.3 %	0.43 mi
I-395 SB			
AM	6.2 mph	12.4 %	0.28 mi
PM	0.4 mph	3.9 %	0.22 mi

Note: AM & PM peak hours were simulated in different models. As a result, the endpoints of the models may be in slightly different positions, causing the "Length of Affected Area" to be slightly different between the AM & PM peak hour models.

Year 2001 peak hour volumes for the southbound GWMP ramp to southbound I-395 are 120 vph for both the AM and PM periods. According to the VDOT *Year 2000 Annual Average Daily Traffic Volume Estimates*, VA 27 carried 20,000 to 31,000 vph eastbound and 25,000 to 31,000 vph westbound between I-395 and Boundary Channel Drive in the year 2000. The design hourly volume for this section is 2,000-2,700 vph eastbound and 2,800-3,700 vph westbound. In the AM peak, approximately 420 vehicles travel southbound on Boundary Channel Drive. In the PM peak, approximately 660 vph travel southbound on Boundary Channel Drive. If the southbound GWMP ramp to southbound I-395 were eliminated, approximately 56 vehicles would be displaced to westbound VA 27 and 64 vehicles would be displaced to southbound Boundary Channel Drive during the AM peak hour to reach their ultimate destinations on I-395 and/or Route 1. The estimates of diverted traffic is based upon the traffic split identified in the *14th Street Bridge Corridor Improvement Feasibility Study* origin-destination analysis applied to 2001 balanced traffic volumes. The diversion of ramp traffic would increase westbound AM peak traffic on VA 27 by approximately 2% and on southbound Boundary Channel Drive by 15%. Approximately 17 vehicles would be displaced to VA 27 and 103 vehicles would be displaced to Boundary Channel Drive during the PM peak period. The displacement of traffic would increase PM peak traffic by 1% on VA 27 and by 16% on Boundary Channel Drive.

It should be noted that, in order to maintain consistency in traffic movement, both the southbound GWMP ramp to southbound I-395 and the northbound I-395 ramp to northbound GWMP should either remain or be removed. This is based on driver expectancy of the same return trip to an interstate once their vehicle has exited from the interstate.

B. Bicycle and Pedestrian Facilities

1. No Action: Keep Ramp Open

There are no pedestrian/bicyclist facilities associated with this ramp. The Mt. Vernon Trail and other pedestrian/bicycle facilities within the Study Area, as well as related safety deficiencies, would remain in their current condition.

2. Deferred Alternative: Close Ramp

This alternative does not involve any modifications to the Mt. Vernon Trail or other pedestrian/bicycle facilities. The existing facilities would remain in their current condition.

C. Historic and Cultural Resources

1. No Action: Keep Ramp Open

No impact to historic or cultural resources is anticipated.

2. Deferred Alternative: Close Ramp

No impact to historic or cultural resources is anticipated by the closure of this ramp.

D. Aesthetics and Viewsheds

1. No Action: Keep Ramp Open

The aesthetic condition and viewshed of the GWMP and adjacent historic resources would remain in their current condition.

2. Deferred Alternative: Close Ramp

Although not a prominent visual element of the parkway, the closure of the ramp, removal of ramp pavement and revegetation of the area would have a minor, positive impact on the aesthetic condition of the GWMP.

E. Land Use

1. No Action: Keep Ramp Open

No change to existing land use patterns is anticipated.

2. Deferred Alternative: Close Ramp

No change to existing land use patterns is anticipated to result.

F. Biological Resources

1. No Action: Keep Ramp Open

Vegetation

No change to existing vegetation would result.

Wildlife and Threatened and Endangered Species

No change to existing wildlife is anticipated.

Wetlands

No impact to wetland resources is anticipated.

2. Deferred Alternative: Close Ramp

Vegetation

Once the ramp is closed, the existing pavement would be removed and the area re-vegetated. The ramp area would likely be planted with turf grass, consistent with the treatment of the adjacent interchange areas. This modification is anticipated to have a minimal benefit to existing vegetation resources, but would increase the amount of landscaped area by approximately 0.6 acres AC.

Wildlife and Threatened and Endangered Species

While the former ramp area would be re-vegetated, the replacement turf grass cover provides minimal wildlife value and is not anticipated to have any effect on existing wildlife communities.

Wetlands

No impact to wetland resources is anticipated.

G. Water Resources

1. No Action: Keep Ramp Open

Floodplains

No impact to floodplains is anticipated.

Coastal Zone Management

No Coastal Zone impacts are anticipated.

Chesapeake Bay Preservation Area

No Chesapeake Bay impacts are anticipated.

2. Deferred Alternative: Close Ramp

Floodplains

No impact to floodplains is anticipated.

Coastal Zone Management

No Coastal Zone impacts are anticipated.

Chesapeake Bay Preservation Area

No Chesapeake Bay impacts are anticipated.

H. Physiography, Geology and Soils

1. No Action: Keep Ramp Open

No disturbance to soils is anticipated.

2. Deferred Alternative: Close Ramp

Minor soil disturbance would result from the demolition of the ramp pavement. Erosion control measures would be incorporated to minimize soils loss. Disturbed areas would be re-vegetated once demolition activities are complete.

I. Air Quality

1. No Action: Keep Ramp Open

No change to air quality levels is anticipated.

2. Deferred Alternative: Close Ramp

Minor increases in dust and other air emissions would result from demolition activities associated with the removal of the ramp. Emissions increases would be temporary in duration and would comply with the FHWA's Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (1996) and with applicable local, state and federal regulations.

J. Noise

1. No Action: Keep Ramp Open

No change in existing noise sources or noise levels is anticipated.

2. Deferred Alternative: Close Ramp

Existing noise levels would increase temporarily during the demolition of the existing ramp. The rerouting of traffic to VA 27 and Boundary Channel Drive associated with the closure of

this ramp would result in minor increases in noise levels on those roadways, due to the additional vehicle traffic. The increases in noise levels are not anticipated to be significant.

K. Hazardous Materials and Wastes

No evidence of historical land use involving hazardous materials or hazardous wastes was found within the Study Area. The proposed actions would not require the disturbance or relocation of any of the existing, recognized environmental conditions – USTs and ASTs – found at the Columbia Island Marina in the Study Area. Therefore, no disturbance or generation of hazardous materials or hazardous wastes are anticipated to occur with either the implementation of any of the safety improvements or under "no-action" conditions.

L. Energy

1. No Action: Keep Ramp Open

No change in energy consumption is anticipated.

2. Deferred Alternative: Close Ramp

Energy consumption would temporarily increase during demolition of the ramp. No significant change in long-term energy consumption is anticipated.

M. Socioeconomic and Community Features

1. No Action: Keep Ramp Open

No change to socioeconomic or community features is anticipated. The public would continue to be exposed to the safety hazards associated with the current GWMP transportation and circulation systems.

2. Deferred Alternative: Close Ramp

Construction jobs associated with the demolition of the ramp would have a short-term benefit to local construction workers and the local economy. In the long term, motorists would be rerouted to more heavily traveled alternate routes, VA 27 and Boundary Channel Drive/Jefferson Davis Highway, where they would experience increased traffic volumes and less direct routing to their final destinations, particularly for those destined for the Route 1 corridor and Crystal City.

N. Cumulative Impacts

The proposed ramp closure is not anticipated to contribute to significant cumulative impacts in the vicinity of the Study Area.

O. Comparison of Alternatives

A comparison of the No Action Alternative and the Preferred Build Alternative is provided in Table 7.

Table 7: Comparison of Alternatives – SB GWMP Ramp to SB I-395 and NB I-395 Ramp to NB GWMP*

Evaluation Factor	Southbound GWMP Ramp to Southbound I-395		Northbound I-395 Ramp to Northbound GWMP	
	No Action Alternative	**Preferred Alternative:**	**No Action Alternative**	**Preferred Alternative:**
		Eliminate Ramp		*Eliminate Ramp*
Motorist Safety and Traffic Operations	Safety hazards and accident potential associated with ramp would remain.	Motorist safety improved with the elimination of ramp. Peak hour traffic on westbound VA 27 projected to increase by approximately 2% in AM peak and 1% in PM peak due to ramp closure. Peak hour traffic on southbound Boundary Channel Drive projected to increase by 15% in the AM peak and by 16% in the PM peak.	Safety hazards and accident potential associated with ramp would remain.	Motorist safety improved with the elimination of ramp. Peak hour traffic on eastbound VA 27 projected to increase by approximately 15% in AM peak and 12% in PM peak due to ramp closure. Peak hour traffic on northbound Boundary Channel Drive projected to increase by 11% in the AM peak and by 41% in the PM peak.
Alternate Routes	No impact is anticipated.	Alternate route required between GWMP and I-395. In order to maintain consistency in traffic movement and driver expectations, both the SB GWMP ramp to SB I-395 and the NB I-395 ramp to NB GWMP should either be closed or remain open.	No impact is anticipated.	Alternate route required between I-395 and GWMP. In order to maintain consistency in traffic movement and driver expectations, both the SB GWMP ramp to SB I-395 and the NB I-395 ramp to NB GWMP should either be closed or remain open.
Historic and Cultural Resources	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Aesthetics and Viewsheds	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Vegetation	No impact is anticipated.	Interchange area would be re-vegetated after removal of ramp.	No impact is anticipated.	Interchange area would be re-vegetated after removal of ramp.
Wildlife and Threatened & Endangered Species	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Wetlands	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Water Resources/Floodplains	No impact is anticipated.	Sedimentation measures would be incorporated during ramp removal. Minor decrease in impervious surface cover on the GWMP (0.6 AC).	No impact is anticipated.	Sedimentation measures would be incorporated during ramp removal. Minor decrease in impervious surface cover on the GWMP (0.4 AC).
Geology/Soils	No impact is anticipated.	Minor soils disturbance during demolition of the ramp. Erosion control measures would be incorporated and disturbed areas re-vegetated.	No impact is anticipated.	Minor soils disturbance during demolition of the ramp. Erosion control measures would be incorporated and disturbed areas re-vegetated.
Air Quality	No impact is anticipated.	Existing air quality levels would remain essentially the same.	No impact is anticipated.	Existing air quality levels would remain essentially the same.

* The NPS has deferred the selection of a preferred alternative or action/no action for the proposed ramp closures until the completion of a more extensive evaluation by the FHWA of the I-395 corridor in Virginia and the District of Columbia. The comparisons in this table are provided for information purposes.

Table 7: Comparison of Alternatives – SB GWMP Ramp to SB I-395 and NB I-395 Ramp to NB GWMP*

Evaluation Factor	Southbound GWMP Ramp to Southbound I-395		Northbound I-395 Ramp to Northbound GWMP	
	No Action Alternative	**Preferred Alternative:**	**No Action Alternative**	**Preferred Alternative:**
		Eliminate Ramp		*Eliminate Ramp*
Noise	No impact is anticipated.	Rerouting of ramp traffic would result in negligible decrease in traffic noise on GWMP and negligible increase along alternate routes.	No impact is anticipated.	Rerouting of ramp traffic would result in negligible decrease in traffic noise on GWMP and negligible increase along alternate routes.
Hazardous Materials and Wastes	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Energy	No impact is anticipated.	Energy consumption would temporarily increase during demolition of the ramp. No significant change in long-term energy consumption is anticipated.	No impact is anticipated.	Energy consumption would temporarily increase during demolition of the ramp. No significant change in long-term energy consumption is anticipated.
Socioeconomic and Community Features	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Temporary Impacts	No impact is anticipated.	Minor, temporary impacts to air quality during ramp removal. Minor, temporary noise increases would result during demolition/construction activities.	No impact is anticipated.	Minor, temporary impacts to air quality during ramp removal. Minor, temporary noise increases would result during demolition/construction activities.
Cumulative Impacts	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.	No impact is anticipated.
Construction Cost		$350,000		$210,000

* The NPS has deferred the selection of a preferred alternative or action/no action for the proposed ramp closures until the completion of a more extensive evaluation by the FHWA of the I-395 corridor in Virginia and the District of Columbia. The comparisons in this table are provided for information purposes.

7.0 ENVIRONMENTAL EFFECTS OF THE NORTHBOUND I-395 RAMP TO NORTHBOUND GWMP ALTERNATIVES

As with the previously discussed ramp closure alternative, the NPS has deferred its decision on ramp closures at the GWMP/I-395 interchange until the completion of a more extensive I-395 corridor study by the FHWA. The following analysis is provided for information purposes.

A. *Roadways and Ramps*

1. No Action: Keep Ramp Open

No change to existing traffic operations would result. The ramp and GWMP would operate at LOS B during the AM and PM peak periods for the no build condition. The weave section where the ramp merges with northbound GWMP would operate at LOS E/F (AM/PM) as indicated in Figure B-6, Appendix B.

2. Deferred Alternative: Close Ramp

Due to safety/design issues, the removal of this ramp is also under consideration. While the ramp itself operates effectively, it has several design characteristics that cause safety/operational concerns on either end of the ramp; no deceleration lane at I-395 and a 420-foot weave at GWMP. As shown in Figure B-5, the section of I-395 prior to the exit ramp is anticipated to operate at LOS F for the AM and PM peaks in 2025 and the weave movement on the GWMP is expected to operate at LOS E and D in the AM and PM peak hours, respectively.

The projected traffic volumes on the ramp are the third lowest of all the ramps in the GWMP/I-395 interchange: 360 and 370 vph for AM and PM peak hours, respectively. If this ramp were removed, the alternate route a driver would take would involve diverting traffic from northbound I-395 to northbound GWMP via VA 27. Drivers on I-395 originating from Route 1 and other points east of VA 27 would be diverted to GWMP via northbound Boundary Channel Drive and VA 27.

Traffic Operations Impacts

Figure B-8, Appendix B shows the level of service results for this alternative. Note that the model limits for northbound I-395 in the AM peak were originally set in the CORSIM models east of Route 27 and the limits for the PM peak were set east of Boundary Channel Drive. As a result, operational improvements are reported up to these limits.

The removal of the ramp improves the density of the section of I-395 just prior to the ramp, but not enough to raise the LOS above F. However, the ramp closure removes approximately 6 percent of the total traffic from I-395 northbound east of Route 27 in the AM and PM peak. This decrease in traffic reduces the length of queuing along I-395 northbound in the AM peak hour, thus improving the LOS for I-395 from Route 27 to Route 110.

The ramp closure eliminates the weave on northbound GWMP, and improves the LOS along the GWMP in that weave area from an E (weave area) to D (weave removed) for the AM peak hour, and from a D to C for the PM peak hour.

In addition to the level of service analysis, an analysis of average speed and density was performed in order to compare the alternative (ramp closure) to the no-build scenario. Table 8 shows the results of the speed and density analysis for this alternative. The results are reported for the portion of the model affected by the alternative.

Along northbound GWMP, removing the ramp causes an improvement in speed of approximately 3 and 2 mph for the AM and PM peak hours, respectively, over the approximately 0.3-mile section of the Parkway affected by the ramp removal. The density of traffic in this section improved by 13 and 11 percent, for the AM and PM peak hours, respectively.

The improvement to traffic is greater for northbound I-395. In the AM, speed improved by about 12 mph and density improved by about 38 percent for the 1.7-mile section of I-395 affected by the ramp removal, which removes 360 vph in the AM peak in 2025. In the PM, speed improved by about 5 mph and density by 20 percent for the 0.3-mile section of I-395 affected by the ramp closure, which removes 370 vph in the PM peak in 2025. As stated above, the model limits for northbound I-395 in the AM peak were originally set in the CORSIM models east of Route 27 and the limits for the PM peak were set east of Boundary Channel Drive, and the results are therefore reported up to these limits.

In addition to speed and density impacts, the ramp closure would eliminate geometric deficiencies associated with the current ramp design on both the GWMP and I-395.

Impact on Alternate Routes

If the northbound I-395 ramp to northbound GWMP were eliminated, most drivers would take VA 27 to access northbound GWMP. As with the southbound GWMP ramp to southbound I-395, the existing year (2001) traffic volumes have been utilized to evaluate the change in traffic volumes. An additional alternate route utilizes northbound Boundary Channel Drive to access VA 27 from I-395.

Table 8: 2025 Speed and Density Results – Comparison of No Build to NB I-395 to NB GWMP Ramp Removal Alternative

	Average speed difference	Average density difference	Length of affected area
GWMP NB			
AM	3.3 mph	13.1 %	0.31 mi
PM	2.0 mph	10.9 %	0.31 mi
I-395 NB			
AM	11.6 mph	37.9 %	1.70 mi
PM	5.2 mph	20.0 %	0.30 mi

Note: AM & PM peak hours were simulated in different models. As a result, the endpoints of the models may be in slightly different positions, causing the "Length of Affected Area" to be slightly different between the AM & PM peak hour models.

Year 2001 peak hour volumes for the ramp are 290 vph in the AM hour and 240 vph in the PM hour. The design hourly volume for VA 27 between I-395 and Boundary Channel Drive is 2,000-2,700 vph eastbound and 2,800-3,700 vph westbound. In the AM peak, approximately 530 vehicles travel northbound on Boundary Channel Drive. In the PM peak, approximately 330 vehicles travel northbound on Boundary Channel Drive. If the northbound I-395 ramp to northbound GWMP were eliminated, approximately 290 vehicles would be displaced to eastbound VA 27 during the AM peak period. Of that total, approximately 232 would access VA 27 directly from I-395 while about 58 vehicles would be displaced from I-395 to northbound Boundary Channel Drive to VA 27. This would increase eastbound AM peak traffic on VA 27 by approximately 15% and on northbound Boundary Channel Drive by 11%. In the PM peak hour, 240 vehicles would be displaced to eastbound VA 27. Of that total, approximately 106 vehicles access VA 27 from I-395 and 134 vehicles would access VA 27 via I-395 and northbound Boundary Channel Drive during the PM peak period. The displacement of traffic would increase PM peak traffic by about 12% on VA 27 and by about 41% on Boundary Channel Drive.

As with the proposed southbound GWMP to southbound I-395 ramp closure, in order to maintain consistency in traffic movement, both that ramp and the northbound I-395 ramp to northbound GWMP should either remain or be removed. This is based on driver expectancy of the same return trip to an interstate once their vehicle has exited from the Interstate.

B. Bicycle and Pedestrian Facilities

1. No Action: Keep Ramp Open

There are no pedestrian/bicyclist facilities associated with this ramp. The Mt. Vernon Trail and other pedestrian/bicycle facilities within the Study Area, as well as related safety deficiencies, would remain in their current condition.

2. Deferred Alternative: Close Ramp

This alternative does not involve any modifications to the Mt. Vernon Trail or other pedestrian/bicycle facilities. The existing facilities would remain in their current condition.

C. Historic and Cultural Resources

1. No Action: Keep Ramp Open

No impact to historic or cultural resources is anticipated.

2. Deferred Alternative: Close Ramp

No impact to historic or cultural resources is anticipated by the closure of this ramp.

D. Aesthetics and Viewsheds

1. No Action: Keep Ramp Open

The aesthetic condition and viewshed of the GWMP and adjacent historic resources would remain in their current condition.

2. Deferred Alternative: Close Ramp

Although not a prominent visual element of the parkway, the closure of the ramp, removal of ramp pavement and revegetation of the area would have a minor, positive impact on the aesthetic condition of the GWMP.

E. Land Use

1. No Action: Keep Ramp Open

No change to existing land use patterns is anticipated.

2. Deferred Alternative: Close Ramp

No change to existing land use patterns is anticipated to result.

F. Biological Resources

1. No Action: Keep Ramp Open

Vegetation

No change to existing vegetation would result.

Wildlife and Threatened and Endangered Species

No change to existing wildlife is anticipated.

Wetlands

No impact to wetland resources is anticipated.

2. Deferred Alternative: Close Ramp

Vegetation

Once the ramp is closed, the existing pavement would be removed and the area re-vegetated. The ramp area would likely be planted with turf grass, consistent with the treatment of the adjacent interchange areas. This modification is anticipated to have a minimal benefit to existing vegetation resources, but would increase the amount of landscaped area by approximately 0.4 acres AC.

Wildlife and Threatened and Endangered Species

While the former ramp area would be re-vegetated, the replacement turf grass cover provides minimal wildlife value and is not anticipated to have any effect on existing wildlife communities.

Wetlands

No impact to wetland resources is anticipated.

G. Water Resources

1. No Action: Keep Ramp Open

Floodplains

No impact to floodplains is anticipated.

Coastal Zone Management

No Coastal Zone impacts are anticipated.

Chesapeake Bay Preservation Area

No Chesapeake Bay impacts are anticipated.

2. Deferred Alternative: Close Ramp

Floodplains

No impact to floodplains is anticipated.

Coastal Zone Management

No Coastal Zone impacts are anticipated.

Chesapeake Bay Preservation Area

No Chesapeake Bay impacts are anticipated.

H. Physiography, Geology and Soils

1. No Action: Keep Ramp Open

No disturbance to soils is anticipated.

2. Deferred Alternative: Close Ramp

Minor soil disturbance would result from the demolition of the ramp pavement. Erosion control measures would be incorporated to minimize soils loss. Disturbed areas would be re-vegetated once demolition activities are complete.

I. Air Quality

1. No Action: Keep Ramp Open

No change to air quality levels is anticipated.

2. Deferred Alternative: Close Ramp

Minor increases in dust and other air emissions would result from demolition activities associated with the removal of the ramp. Emissions increases would be temporary in duration and would comply with the FHWA's Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (1996) and with applicable local, state and federal regulations.

J. Noise

1. No Action: Keep Ramp Open

No change in existing noise sources or noise levels is anticipated.

2. Deferred Alternative: Close Ramp

Existing noise levels would increase temporarily during the demolition of the existing ramp. The rerouting of traffic to VA 27 and Boundary Channel Drive associated with the closure of this ramp would result in minor increases in noise levels on those roadways, due to the additional vehicle traffic. The increases in noise levels are not anticipated to be significant.

K. Hazardous Materials and Wastes

No evidence of historical land use involving hazardous materials or hazardous wastes was found within the Study Area. The proposed actions would not require the disturbance or relocation of any of the existing, recognized environmental conditions – USTs and ASTs – found at the Columbia Island Marina in the Study Area. Therefore, no disturbance or generation of hazardous materials or hazardous wastes are anticipated to occur with either the implementation of any of the safety improvements or under "no-action" conditions.

L. Energy

1. No Action: Keep Ramp Open

No change in energy consumption is anticipated.

2. Preferred Alternative: Close Ramp

Energy consumption would temporarily increase during demolition of the ramp. No significant change in long-term energy consumption is anticipated.

M. Socioeconomic and Community Features

1. No Action: Keep Ramp Open

No change to socioeconomic or community features is anticipated. The public would continue to be exposed to the safety hazards associated with the current GWMP transportation and circulation systems.

2. Deferred Alternative: Close Ramp

Construction jobs associated with the demolition of the ramp would have a short-term benefit to local construction workers and the local economy. In the long term, motorists would be rerouted to more heavily traveled alternate routes, VA 27 and Boundary Channel Drive/Jefferson Davis Highway, where they would experience increased traffic volumes and slightly less direct routing to their final destinations.

N. Cumulative Impacts

The proposed ramp closure is not anticipated to contribute to significant cumulative impacts in the vicinity of the Study Area.

O. Comparison of Alternatives

A comparison of the No Action Alternative and the Preferred Build Alternative is provided in Table 7.

8.0 MITIGATION

A. Historic and Cultural Resources

In order to prevent potential adverse impacts to historic resources, the FHWA EFLHD and the NPS initiated coordination with the Advisory Council on Historic Preservation (Advisory Council) and the Virginia and District of Columbia State Historic Preservation Offices (SHPO). Consultation has also taken place with the District of Columbia Commission of Fine Arts and the National Capital Planning Commission.

A memorandum of agreement (MOA) would be developed between the FHWA, NPS, Advisory Council and District of Columbia and Virginia SHPO's to address impacts to the GWMP historic resource as a result of the implementation of the preferred safety improvement alternative(s). Potential impacts include the construction of the new marina entrance and bridge over Boundary Channel Drive, demolition of the Humpback Bridge over Boundary Channel and replacement-in-kind with a new bridge, alteration of circulation patterns adjacent to the Humpback Bridge and Navy-Marine Memorial, and removal of historic plantings. The design of the proposed safety improvements, construction plans and details would be executed in conjunction with the terms and conditions of the MOA.

B. Vegetation

In order to minimize any adverse impacts to vegetation, the preferred alternative safety improvements have been located to minimize the removal of trees and other vegetation necessary to accomplish the proposed action. Trees and other plants located adjacent to construction areas would be protected to minimize impacts to them. Landscape plans would be developed to restore and stabilize the cleared or disturbed areas. Adverse impacts to the remaining original GWMP plantings and the historic planting plans would be coordinated with the Advisory Council and the Virginia and District of Columbia SHPO's. Impacts to the cultural landscape would be addressed in a MOA between the FHWA, NPS, Advisory Council and the two SHPO's.

C. Wetlands and Water Resources

The proposed safety improvements would be constructed in accordance with applicable Commonwealth of Virginia and District of Columbia stormwater management, sedimentation and erosion control and other water quality protection laws and policies. Safety improvements implemented in areas under the jurisdiction of the Commonwealth of Virginia would comply with state Coastal Zone policies to the maximum extent practicable.

Construction activities would comply with the conditions of Section 401 and 404 of the Clean Water Act, if necessary. Permits would be obtained from the U.S. Army Corps of Engineers for filling within the Boundary Channel wetland and construction within the 100-year floodplain. Bridge permits would also be obtained from the U.S. Coast Guard for the construction of the new bridges across Boundary Channel (i.e., Humpback Bridge replacement and new marina entrance bridge). The proposed action would also comply with applicable state and local permit requirements.

Implementation of the preferred safety improvements would result in a net decrease in impervious surface cover within the Study Area. Areas of excess roadway pavement and other paved areas along the GWMP and at the Columbia Island Marina would be removed in conjunction with the proposed modifications.

D. Socio-economic and Public Use and Enjoyment

In order to minimize disruption to commuters and other users of the GWMP, measures would be taken to maintain access to the GWMP, the Mt. Vernon Trail, Columbia Island Marina, the Navy-Marine Memorial and other areas affected by the implementation of the proposed safety improvements and construction activities. Measures include the provision of a temporary road, trail and bridge across Boundary Channel during the replacement of the Humpback Bridge to maintain traffic flows on the GWMP and pedestrian/bicycle traffic on the Mt. Vernon Trail. Temporary reductions in roadway or trail widths or closures of segments of the Mt. Vernon Trail may, however, be necessary in order to complete the proposed modifications. Any closures or other potential impacts would be scheduled to occur during off-peak times, to minimize impacts on GWMP traffic.

The proposed replacement bridge would maintain the same vertical clearance between the water surface and the bridge as the existing Humpback Bridge. While water access to the Columbia Island Marina via Boundary Channel would be maintained during the proposed replacement of the Humpback Bridge, clearance beneath the bridge would be temporarily reduced due to the placement of concrete formwork and scaffolding necessary for construction. Periodic, temporary closures of the inlet may also be required due to demolition or other construction activities.

9.0 ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ) regulations. CEQ regulations provide direction that the "environmentally preferred alternative is the alternative that would promote the national environmental policy as expressed in NEPA's Section 101. Generally, this means the alternative that causes the least damage to the biological and physical environment. It also means the alternative that best protects, preserves and enhances historic, cultural and natural resources."[7]

A. Columbia Island Marina

The No Action Alternative, which maintains the status quo regarding the Columbia Island Marina entrance location and configuration, is the environmentally preferred alternative since it provides for the preservation of the GWMP's historic, cultural, and natural resources and maximizes protection of the biological and physical environment. The No Action Alternative does not, however, address the purpose and need for the proposed action. The safety of Parkway and Mt. Vernon Trail users would still be at risk and the accident potential at the marina entrance would not be addressed. Although the Preferred Alternative, Construction of a New Columbia Island Marina Entrance, would impact historic and cultural resources, vegetation and wetland/water resources in the Study Area, it would eliminate the safety concerns associated with the existing marina entrance location and configuration. Excess pavement within the marina area would also be removed as part of the Preferred Alternative, which would reduce the amount of impervious surface cover in this part of the GWMP. It is believed that through the use of mitigation and best management practices, any environmental effects related to the implementation of the Preferred Alternative would be minimized and no significant impacts would result.

B. Southbound I-395 Ramp to Northbound GWMP, Humpback Bridge and Pedestrian Crossing of the GWMP

The No Action Alternative, which maintains the status quo regarding the southbound I-395 ramp to northbound GWMP, the Humpback Bridge and pedestrian crossings of the GWMP, is the environmentally preferred alternative since it provides for the preservation of the Parkway's historic, cultural, and natural resources and maximizes protection of the biological and physical environment. The No Action Alternative does not, however, address the purpose and need for the proposed action. The safety deficiencies and accident potential of the GWMP access ramp would not be addressed. Likewise, the safety concerns associated with the existing at-grade pedestrian crosswalk would remain. The Preferred Alternative, which would replace the Humpback Bridge with a wider bridge that would include a northbound acceleration lane for the GWMP access ramp, a wider Mt. Vernon Trail and new trail connections to grade-separated pedestrian underpasses beneath the bridge, would impact historic and cultural resources, vegetation and wetland/water resources in the Study Area. It would also, however, correct safety deficiencies related to the design of the existing access ramp and Humpback Bridge and provide a safer, more convenient pedestrian connection between the east and west sides of the GWMP.

[7] "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" (40 CFR 1500-1508), Federal Register Vol. 46, No. 55, 18026-18038, March 23, 1981.

The inclusion of the pedestrian underpasses in the bridge design and new trail segments would provide a direct connection between the Mt. Vernon Trail and other bicycle/pedestrian trail resources adjacent to the Study Area in Arlington County that minimizes the trail users interaction with motor vehicles. Removal of the small parking lot serving the Navy-Marine Memorial and excess pavement along the mainline GWMP, recommended in the Preferred Alternative, would reduce the amount of impervious surface cover in this segment of the GWMP. It is believed that through the use of mitigation and best management practices, any environmental effects related to the implementation of the Preferred Alternative would be minimized and no significant impacts would result.

C. Southbound GWMP Ramp to Southbound I-395

The NPS has deferred the selection of a preferred alternative or action/no action for the proposed ramp closure until the completion of a more extensive evaluation by the FHWA of the I-395 corridor in Virginia and the District of Columbia.

D. Northbound I-395 Ramp to Northbound GWMP

The NPS has deferred the selection of a preferred alternative or action/no action for the proposed ramp closure until the completion of a more extensive evaluation by the FHWA of the I-395 corridor in Virginia and the District of Columbia.

10.0 COMMITMENTS AND RESOURCES

A. *Irreversible and Irretrievable Commitment of Resources*

The implementation of the preferred alternatives would result in the irreversible and irretrievable commitment of federal funds, for the planning, design and construction of the proposed actions. Congress has authorized approximately $23.6 million for the planning, design and construction of the proposed actions. If it is determined the preferred alternative(s) would not result in significant environmental impacts, construction would begin in October 2003.

Resources in the form of construction materials and labor, fuels and other energy sources for vehicles and equipment would also be committed with the implementation of the preferred alternatives.

B. *Unavoidable Adverse Environmental Effects*

The implementation of the preferred alternatives would result in unavoidable construction-related impacts to: GWMP circulation and traffic; vegetation; floodplains; soils; local air quality; and noise levels. Most of these impacts are anticipated to of temporary duration and of minor intensity.

Long-term permanent impacts to historic resources, viewsheds, wetlands, and traffic patterns would also result. The Humpback Bridge, a contributing element of the GWMP historic resource, would be demolished. The character of the GWMP historic resource would be altered by the construction of the new GWMP bridge across Boundary Channel as well as the construction of a new entrance bridge to the Columbia Island Marina. The viewsheds of the Pentagon and LBJ Memorial Grove would also be altered by the introduction of the new bridges. Views westward across the Potomac River from the Washington, DC monumental core would also be similarly affected. Construction of the replacement GWMP bridge across Boundary Channel would also result in the permanent loss of approximately 1,400 SF of wetlands and the temporary loss of an additional 900 SF of wetland area. Finally, local traffic patterns on the GWMP, I-395, VA 27 and Boundary Channel Drive would be altered if the proposed ramp closures were implemented. Direct access between northbound I-395 and northbound GWMP and between southbound GWMP and southbound I-395 would be eliminated. Traffic volumes on the alternative routes – VA 27 and Boundary Channel Drive – would increase. Eastbound VA 27 volumes would increase moderately, by approximately 15% in the AM peak and 12% in the PM peak. Westbound VA 27 volumes would have minor increases of 2% in the AM peak and 1% in the PM peak. Northbound Boundary Channel Drive volumes would increase by approximately 11% in the AM peak and 41% in the PM peak. Southbound volumes would increase moderately by 15% and 16% in the respective peak periods.

C. Local Short-Term Uses and the Maintenance and Enhancement of Long-Term Productivity

While the implementation of the preferred alternatives would require a significant, short-term investment of construction dollars and materials, in the long-term, the safety of motorists, pedestrians, bicyclists and others using the GWMP would be enhanced. Long-term accident rates for this segment of the GWMP, identified as a high accident location, would be anticipated to decline. Maintenance costs associated with the 70-year-old Humpback Bridge would also be reduced with the construction of the new GWMP bridge over the Boundary Channel inlet. The anticipated life of the new structure is 75 to 100 years, compared to the estimated 25-year remaining life of the Humpback Bridge.

11.0 COMPLIANCE WITH ENVIRONMENTAL REGULATIONS AND PLANS

There is no General Management Plan in force for the GWMP. The Capper-Cramton Act, the GWMP enabling legislation, defines three major roles for the park:

3. To preserve the Potomac River shoreline from pollution and commercial development;
4. To provide for a variety of recreational needs of the Washington, DC metropolitan area; and
5. To provide a scenic memorial roadway to the nation's capital and the Mt. Vernon estate.

It is the current mission of the GWMP to protect those values and the unique character of the Parkway.

Ensuring the GWMP is maintained and operated in a safe manner supports its continued use and enjoyment as a scenic, recreational and transportation resource. Maintenance activities must, however, also be sensitive to the natural features and resources that are the setting for the parkway and its recreational functions. The proposed actions would be undertaken consistent with the following regulations and plans.

A. National Park Service Organic Act of August 25, 1916

This act states that the fundamental purpose of national parks is "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations".

B. National Environmental Policy Act (NEPA)

This environmental assessment (EA) and resultant decision documents provide disclosure of the decision-making process and potential environmental consequences of the alternatives. This EA will be available for a 30-day public review and comment period, after which the NPS would decide if the proposed action is significant enough to prepare an environmental impact statement (EIS). If an EIS is not required, the NPS National Capital Region Director and the FHWA Eastern Federal Lands Highway Division Engineer would jointly sign a Finding of No Significant Impact (FONSI). Together this EA and the FONSI would conclude the NEPA compliance process for this project.

All comments and/or questions can be directed to either:

Jack Van Dop
Environmental Specialist
Federal Highway Administration
Eastern Federal Lands Highway Division
21400 Ridgetop Circle
Sterling, VA 20166-6511
FAX (703) 404-6217

Audrey Calhoun
Superintendent
George Washington Memorial Parkway Unit
National Park Service
Turkey Run Park
McLean, VA 22101
FAX (703) 289-2598

C. National Historic Preservation Act of 1966

This act requires federal agencies to establish programs for evaluating and nominating properties to the National Historic Register of Historic Places. Section 106 of the act mandates that federal agencies take into account the effects of their actions on properties listed on the National Register or eligible to be listed and to give the Advisory Council on Historic Preservation a reasonable opportunity to comment on said actions, if appropriate.

The FHWA and NPS have consulted with the Advisory Council on Historic Preservation and District of Columbia and Commonwealth of Virginia State Historic Preservation Officers (SHPO) regarding the proposed actions and would complete any proposed safety improvements in accordance with National Register of Historic Places standards and criteria. A memorandum of agreement (MOA) would be executed between the FHWA, NPS, Advisory Council on Historic Preservation and DC and Virginia SHPO specifying the conditions under which the proposed actions would be implemented and mitigation measures necessary for the project.

D. Clean Water Act of 1972, as Amended

The act seeks to restore and maintain the chemical, physical, and biological integrity of the nation's water by a variety of means. Section 404 of the act directs wetlands protection by authorizing the U.S. Army Corps of Engineers to prohibit or regulate, through a permit process, discharge of dredged or fill material into the waters of the United States, including wetlands. Actions described in this document would comply with the requirements of Section 404 of the Clean Water Act and other applicable federal, state and local agencies.

Water quality in the project area would be protected by the implementation of erosion and sediment controls, such as silt fencing, straw bales and sediment traps, as needed. Disturbed areas would be stabilized by reseeding and mulching. A sedimentation and erosion control plan would be prepared as part of the construction documents for the project(s).

Construction of the preferred new GWMP bridge over Boundary Channel would require the permanent filling of approximately 1,400 SF of wetlands for the bridge abutments and the temporary filling of approximately 900 SF of wetlands for a temporary road and bridge across Boundary Channel to maintain GWMP traffic during construction. A permit would be obtained from the U.S. Army Corps of Engineers for the filling activity. Temporary fill areas would be restored once construction activities are complete.

E. Executive Order 11990, Protection of Wetlands

This EO requires federal agencies minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's mission, including agency construction and improvement actions. If there is no practicable alternative to the proposed action, the agency is required to take all practicable measures to minimize harm to wetlands that may result from the action.

The proposed GWMP bridge over Boundary Channel (Humpback Bridge replacement) would require the permanent filling of approximately 1,400 SF of wetlands and the temporary filling of approximately 900 SF of wetland area. No alternative exists to carry the mainline GWMP across the Boundary Channel inlet. The bridge would be constructed in the same general location as the existing bridge and would incorporate design features to minimize

the amount of filling required. Due to its use as a major commuter route, the GWMP would remain open during construction of the proposed replacement bridge. A temporary bridge over Boundary Channel would also be required to maintain traffic the flow.

F. General Bridge Act of 1946

This act requires the Secretary of Transportation approve the location and plans of any bridge over navigable waters of the United States in order to preserve the public right of navigation and to prevent interference with interstate and foreign commerce. The Secretary of Transportation delegated the approval and permitting authority to the U.S. Coast Guard in 1967.

The new GWMP bridge over Boundary Channel would be constructed in the same general location as the existing Humpback Bridge. No abutments or other bridge elements would be constructed within Boundary Channel to impede navigation. The boat clearance height of the existing bridge would be maintained. A permit would be obtained from the U.S. Coast Guard for the construction of the new GWMP bridge over Boundary Channel to replace the Humpback Bridge. A bridge permit would also be required for the construction of the Columbia Island Marina entrance bridge over Boundary Channel.

G. Executive Order 11988, Floodplain Management

This executive order (EO) requires federal agencies determine whether proposed actions, including construction and improvements, would occur in a floodplain. If the proposed action is located in a floodplain, the agency is required to consider alternatives to avoid adverse effects and incompatible development in the floodplains. If there is no practicable alternative to siting in a floodplain, the agency is required to design or modify its action in order to minimize potential harm to or within the floodplain.

The proposed new GWMP bridge over Boundary Channel (Humpback Bridge replacement) and the proposed Columbia Island Marina entrance bridge over Boundary Channel are both sited within the 100-year floodplain. No alternative exists to carry the mainline GWMP across the Boundary Channel inlet. The bridge would be constructed in the same general location as the existing bridge and would incorporate design features to withstand flooding impacts. The bridge roadway would be elevated above the 100-year flood level. While the proposed Columbia Island Marina entrance bridge is located within the 100-year floodplain, the existing parking lot, docks and marina support facilities are also located within the floodplain. In the event of a flood, the use of marina facilities would be limited and access potentially prohibited as a safety measure. Emergency access and egress would be possible via the GWMP.

H. Endangered Species Act of 1973

Section 7 of the Endangered Species Act directs all federal agencies to use their authority in furtherance of the purposes of the act by carrying out programs for the conservation of rare, threatened and endangered species. Federal agencies are required to consult with the U.S. Fish and Wildlife Service to ensure that any actions authorized, funded and/or carried out by the agency do not jeopardize the continued existence of any listed species or critical habitat.

There are no state or federally listed rare, threatened or endangered species known to inhabit the project area. Informal consultation pursuant to the Endangered Species Act was initiated via a letter request to the U.S. Fish and Wildlife Service, Chesapeake Bay Field Office.

I. Interrelationship with Other Plans and Projects

A review was conducted of plans and reports developed by other agencies to help identify any proposed projects or activities with the potential to impact this study's findings and recommendations. The following reports and studies that were assessed as part of this review.

- The October 2001 *Designing for Security in the Nation's Capital* report, developed by an Interagency Task Force of the National Capital Planning Commission (NCPC), made recommendations for safety and security.
- The *Arlington County Master Transportation Plan* was adopted by the County in 1986 and is an element of the Arlington County Comprehensive Plan.
- The *Arlington County Bicycle Transportation Plan*, completed in 1994, is a revision of the bicycle transportation elements contained in the 1986 Master Transportation Plan.
- The *Comprehensive Plan for the National Capital Parks, Open Space, and Natural Features Element Update*, was developed by the NCPC and was adopted in 2001. It established federal planning policies and recommendations related to parks, open spaces and natural features.
- The report, *Paved Recreation Trails of the National Capital Region,* provided recommendations for improvements and coordination for a multi-use trail system. The National Park Service prepared the 1990 document.
- The *Memorials and Museum Master* establishes policies for the siting and design of new memorials throughout the District of Columbia. The 1997 *Plan* is a collaborative effort of the National Capital Planning Commission, the Commission of Fine Arts and the National Capital Memorial Commission.

The section below identifies projects and policies included within the reports with the potential to impact the project areas.

1. Paved Recreation Trails of the National Capital Region

- G10: Widen the Mount Vernon Trail wherever possible to 10 feet, or at least 8 feet. In areas of heaviest use (near the city center and major bridges) widen to 12 feet.
- G20: This is identified as a top priority project. If the Boundary Channel or Humpback Bridge is rebuilt, accommodate trail access from all four quadrants as well as 12 foot wide sidewalks for trail use protected from vehicle traffic by appropriate barriers. Grade separated crossings under the Humpback Bridge with connections to the marina and to the Pentagon/Arlington County. Night lighting for safety.
- G34: Work with the General Services Administration, the Defense Department, Arlington County, and others as necessary to complete both a north-south and an east-west trail route near the Pentagon.

2. Arlington County Master Transportation Plan

The Plan identifies needs for new or improved pedestrian and biking trails, including the following in the study area.

- Columbia Island/Lady Bird Johnson Park: A connection would be provided to the Potomac shoreline and the Mount Vernon Trail by using the existing pedestrian bridge across Boundary Channel to Columbia Island and the LBJ Grove in the District of Columbia.

2. Arlington County Bicycle Transportation Plan

The Plan includes projects for the GWMP as identified in the NPS *Paved Recreation Trails of the National Capital Region* report to eliminate barriers to bicycles and link regional activity centers.

- No. 2: Bicycle underpass on the southern side of the Humpback Bridge.
- No. 3: A Columbia Pike-Pentagon-Boundary Channel connector bicycle route via the south side of the Boundary Channel lagoon and the Humpback Bridge underpass.
- No. 4: A GWMP crossing via a bicycle-pedestrian overpass in the vicinity of the RF&P railroad bridge linking the Mt. Vernon Trail with Old Jefferson Davis Highway and Boundary Channel Drive.

3. *Comprehensive Plan for the National Capital Parks, Open Space, and Natural Features Element Update*

The NCPC plan includes the following policies:

- Natural shoreline areas in the National Capital Open Space System should be retained in their natural condition or be appropriately landscaped for a distance of 150 to 200 feet from the water's edge, if possible.
- Existing large parking areas, such as the Pentagon's north parking lot along Boundary Channel, should be removed as soon as possible and the areas restored to a landscaped condition with active or passive recreational uses.
- The GWMP should be maintained as a scenic historic landscape corridor, serving not only as a spectacular gateway artery to the Nation's Capital but also preserving its important historic associations.

4. *Memorials and Museum Master Plan*

- A candidate memorial site was identified at a location described as the "Virginia side of the 14th Street Bridge near the location of the old Twin Bridges Marriott.

12.0 LIST OF PREPARERS

Federal Highway Administration
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Hala Elgaaly, P.E., Bridge Engineer

George Washington Memorial Parkway
Audrey Calhoun, Superintendent
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Kristin Belfield, Transportation Engineer
Jessica Juriga, Civil Engineer
John Michels, P.E., Structural Engineer

Applied Environmental, Inc.
David S. Rosa, P.E., Environmental Engineer

13.0 PUBLIC INVOLVEMENT AND COORDINATION

A. Public Involvement

In accordance with NPS Director's Order No. 12, Conservation Planning, Environmental Impact Analysis, and Decision-making and NPS-12, Handbook to Director's Order 12, efforts have been made to involve the interested and affected public in the planning and preliminary design of the proposed action(s) and the environmental assessment process.

Initial public meetings were held in June 2001 for scoping purposes and to generate public interest and public comments. Fourteen people attended the first meeting, held in Arlington County, VA, and five people attended the second meeting, held in the District of Columbia.

In addition, a newsletter announcing the initial public meetings and identifying the areas of the GWMP under investigation was mailed to members of the public and other organizations with interest in the study. The mailing list from the newsletter was compiled from names provided by the NPS, GWMP unit, the FHWA Eastern Federal Lands Highway Division, and Arlington County Department of Public Works. Material was also published on the World Wide Web sites of the NPS and FHWA. Requests for comments were included in both the newsletter and the web site. Written comments obtained through the public involvement process are summarized in Appendix F.

The EA will be made available for review to the interested and affected public, including affected agencies and tribes, for a minimum of 30 days, beginning March 28, 2002. A public meeting is scheduled for March 28, 2002 in Arlington County, VA. The purpose of the meeting is to inform the public of the actions that have taken place since the prior public meetings and to review the safety improvement alternatives being evaluated by the NPS and FHWA.

B. Agency Coordination

Consultation and coordination has occurred with a number of agencies and organizations having jurisdictional approval authority relative to proposed actions or anticipated to have a vested interest in the project plans and decision process.

The following agencies and organizations were contacted, by letter inquiry, for information to assist in identifying important issues, developing alternatives, analyzing impacts and assessing interest in the outcome of the investigations. Copies of responses received are included in Appendix G.

- U.S. Department of Transportation, Federal Highway Administration, DC Division Office
- U.S. Department of Interior, National Park Service, National Capital Region
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- U.S. Department of Defense, Pentagon Reservation
- U.S. Coast Guard
- Arlington County, Virginia, Department of Public Works
- District of Columbia, Department of Public Works
- District of Columbia, Office of Planning
- District of Columbia, Department of Parks and Recreation
- District of Columbia, Department of Health, Environmental Health Administration

- DC State Historic Preservation Officer
- Advisory Council on Historic Preservation
- Virginia State Historic Preservation Officer
- Virginia Department of Transportation, Northern Virginia District
- Virginia Department of Conservation and Recreation
- City of Alexandria, Parks and Recreation Commission
- Arlington National Cemetery
- National Capital Planning Commission
- U.S. Commission of Fine Arts
- Metropolitan Washington Council of Governments
- Washington Metropolitan Area Transit Administration
- Metropolitan Washington Airports Authority
- National Trust for Historic Preservation

Meetings were held throughout the alternatives development and evaluation process with representatives of the organizations listed below, to keep them informed of the planning and preliminary engineering progress and solicit informal comments on the various safety improvement alternatives.

- U.S. Department of Interior, National Park Service, George Washington Memorial Parkway Staff
- U.S. Department of Interior, National Park Service, National Capital Region Staff
- U.S. Department of Defense, Directorate of Real Estate and Facilities, Pentagon Reservation
- Arlington County, Virginia, Department of Public Works
- Arlington County, Virginia, Bicycle Advisory Committee
- Advisory Council on Historic Preservation
- District of Columbia State Historic Preservation Officer
- Virginia State Historic Preservation Officer
- National Capital Planning Commission
- U.S. Commission of Fine Arts
- Charles E. Smith Realty Companies

14.0 SELECTED REFERENCES

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Bellomo-McGee, Inc., "14th Street Bridge Corridor Improvement Feasibility Study," Virginia Department of Transportation, August 1998.

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