DRAFT
ENVIRONMENTAL ASSESSMENT

UNITED STATES NAVAL ACADEMY
ALUMNI ASSOCIATION/NAVAL ACADEMY FOUNDATION
ALUMNI SERVICE CENTER AND HEADQUARTERS
AT
NAVAL SUPPORT ACTIVITY ANNAPOLIS

ANNAPOLIS, MARYLAND

DECEMBER 2016

DRAFT

ENVIRONMENTAL ASSESSMENT

For

UNITED STATES NAVAL ACADEMY ALUMNI ASSOCIATION/NAVAL ACADEMY FOUNDATION ALUMNI SERVICE CENTER AND HEADQUARTERS

At

NAVAL SUPPORT ACTIVITY ANNAPOLIS

ANNAPOLIS, MARYLAND

DECEMBER 2016

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Abstract

Designation: **Environmental Assessment**

Title of Proposed Action: United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters

Project Location: Naval Support Activity Annapolis, Annapolis Maryland

Lead Agency for the EA: Department of the Navy

Cooperating Agency: None

Affected Region: City of Annapolis in Anne Arundel County, Maryland

Action Proponent: Naval Support Activity Annapolis

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Date: December 2016

The Department of the Navy has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality Regulations and Navy regulations for implementing NEPA. The Proposed Action would lease property or a facility to the United States Naval Academy Alumni Association (USNA AA) and the Naval Academy Foundation (NAF) on Naval Support Activity (NSA) Annapolis property in Annapolis, Maryland. The USNA AA and NAF (USNA AA/F) would construct a new Alumni Service Center and Headquarters facility or renovate an existing facility for that purpose. The Proposed Action would be a multi-year, multi-phase action involving the potential relocation of existing Navy functions, a lease with USNA AA/F, and USNA AA/F conducting demolition and construction or renovation activities, as necessary. Project implementation would begin in 2017 with a 24 month construction or renovation period. This EA evaluates the potential environmental impacts associated with the two action alternatives, Alternative 1—Perry Center Site and Alternative 2—Renovate/Reuse Building 250 (Hospital Point), and the No Action Alternative to the following resource areas: air quality, water resources, geologic resources, cultural resources, biological resources, land use, noise, infrastructure, transportation, public health and safety, hazardous materials and waste, and socioeconomics.

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EXECUTIVE SUMMARY

Proposed Action

The United States (U.S.) Department of the Navy (Navy) proposes to lease property or a facility to the United States Naval Academy Alumni Association (USNA AA) and the Naval Academy Foundation (NAF) on Naval Support Activity (NSA) Annapolis property in Annapolis, Maryland. The USNA AA and NAF (USNA AA/F) would construct a new Alumni Service Center and Headquarters facility or renovate an existing facility for that purpose. The Proposed Action would be a multi-year, multi-phase action involving the potential relocation of existing Navy functions, a lease, and USNA AA/F conducting demolition and construction or renovation activities, as necessary. The USNA AA and the NAF are two 501(c)(3) organizations operating jointly to support the United States Naval Academy (USNA) and its alumni. The USNA AA and NAF currently operate in five separate facilities on or around NSA Annapolis—Ogle Hall, Cottage, and 49 House (USNA AA) and Beach Hall and 25 Maryland Avenue (NAF).

Potential locations for the new Alumni Service Center and Headquarters facility are the Perry Center site or Building 250 on the NSA Annapolis Upper Yard. The Perry Center site is located within the southwestern portion of the Upper Yard and is bounded by King George Street to the north and east, College Creek to the south and west, and the Central Heating Plant to the west. Building 250 is located on Wood Road at Hospital Point within the eastern portion of the Upper Yard.

Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to maximize the efficient use of space at NSA Annapolis. The Navy intends to advance this purpose through a sole-source lease with USNA AA/F and the relocation of existing functional support services (NSA Annapolis Mail Center and the consolidated hazardous material reutilization inventory management program [CHRIMP]).

The need for the Proposed Action is to fully implement the requirements of 10 United States Code (U.S.C.) section 2667 and the regulations of the General Services Administration, 41 Code of Federal Regulations (CFR) parts 102-75.40 through 75.55, which require federal agencies to assess the non-excess, underutilized property in their real estate portfolios. The existing functional support services operate in outdated, inefficient spaces that do not meet current requirements, and USNA AA and NAF leadership, staff, and functional spaces are currently spread across five facilities.

Alternatives Considered

Alternatives were developed for analysis based on the following reasonable alternative screening factors: must meet the needs of the NSA Annapolis Mail Center, the CHRIMP, and the USNA AA/F. The Navy is considering two action alternatives that meet the purpose and need for the Proposed Action and a No Action Alternative.

Under Alternative 1, the Navy would enter into a ground lease with USNA AA/F, and USNA AA/F would construct a new 29,000-square-foot Alumni Service Center and Headquarters facility with a parking lot on NSA Annapolis property located at the Perry Center site in the southwest portion of the Upper Yard. The USNA AA and NAF would relocate their staff and functions to the new facility. The USNA AA would continue to use property in the City of Annapolis for events, and NAF's current space lease with the Navy for use of Beach Hall would be terminated. To accommodate the new construction, the five existing buildings (Buildings 51, 194, 92, 974, and 340) on the proposed project site would be demolished, and the existing functions would be relocated to new facilities. The NSA Annapolis Mail Center would be relocated to one of two locations, either Building 15NS on the North Severn Complex or to a new 1,500-square-foot prefabricated facility constructed at the site of the to-be-demolished Building 619 on the northwestern portion of the Perry Center. Parking for at least 10 vehicles would be provided at either site on existing impervious surfaces. The CHRIMP would be relocated to either Building 104 or to a new prefabricated facility constructed adjacent to Building 104 within the northwestern portion of the Perry Center along Yew Street.

Under Alternative 2, the Navy would enter into a space lease with USNA AA/F for use of Building 250 located along Wood Road at Hospital Point in the eastern portion of the NSA Annapolis Upper Yard. The USNA AA/F would renovate the interior of Building 250 to meet their needs. Additionally, they would upgrade the mechanical, electrical, and plumbing systems to make them more functional, code-compliant, and energy efficient. The USNA AA would continue to use property in the City of Annapolis for events. NAF's current space lease with the Navy for use of Beach Hall would be terminated.

Under the No Action Alternative, the Navy would not enter into a lease with USNA AA/F, and USNA AA/F would not construct or renovate a new Alumni Service Center and Headquarters facility on NSA Annapolis property. The USNA AA and NAF would continue to operate in five separate facilities on or around NSA Annapolis, with alumni events held at Ogle Hall. At the Perry Center site, existing Buildings 51, 194, 92, 974, and 340 would not be demolished, and the current functions of Building 51 (NSA Annapolis Mail Center) and Building 194 (CHRIMP) would remain on site and would not be consistent with recommendations in the NSA Annapolis Installation Master Plan. Building 250 would also remain vacant once it is vacated by the Naval Health Clinic Annapolis. The No Action Alternative would not meet the purpose and need for the Proposed Action because the Navy would not be maximizing the efficient use of non-excess, underutilized space at NSA Annapolis.

Summary of Environmental Resources Evaluated in the Environmental Assessment

The National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations, and Navy instructions for implementing NEPA specify that an Environmental Assessment (EA) should address those resource areas potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact.

Important existing regulated and non-regulated resources (e.g., that require mitigation measures, consultations, and concurrence) that are analyzed in the EA include: historic properties, including the USNA National Historic Landmark District (NHLD) and contributing resources (Buildings 51, 92, and 194 at the Perry Center site and Building 250 at Hospital Point) and the Colonial Annapolis NHLD; coastal resources because Anne Arundel County including the NSA Annapolis Upper Yard and North Severn Complex are located entirely within Maryland's coastal zone; air quality because Anne Arundel County is a nonattainment area for 8-hour ozone, with a classification of moderate under the 2008 standards, and is in nonattainment for fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) under the 1997 standard.

The following resource areas are addressed in this EA: air quality, water resources, geological resources, cultural resources, biological resources, land use, noise, infrastructure, transportation, public health and safety, hazardous materials and waste, and socioeconomics. Because potential impacts were considered to be negligible or nonexistent, the following resources were not evaluated in this EA: marine species, visual resources, airspace, and environmental justice.

Summary of Potential Environmental Consequences of the Action Alternatives and Major Mitigating Actions

Table ES-1 provides a tabular summary of the potential impacts to the resources associated with each of the alternative actions analyzed.

Public Involvement

The Navy solicited public and agency comments during a scoping period from October 25, 2015, through November 23, 2015. A scoping meeting was held on November 9, 2015, in Annapolis, Maryland. Comments received during the scoping period were considered in preparing the Draft EA. The Navy circulated the Draft EA for public review from January 8, 2017, to February 6, 2017.

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Table ES-1. Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1—Perry Center Site***	***Alternative 2—Renovate/Reuse Building 250 (Hospital Point)***
Air Quality	There would be no change to baseline air quality; therefore, there would be no impacts.	There would be emissions of criteria pollutants during demolition, construction, and/or renovation activities, but they would be below the *de minimis* rates. There would be no appreciable change in operational emissions of criteria pollutants or greenhouse gases. Therefore, there would be no significant impacts.	There would be emissions of criteria pollutants during renovation activities, but they would be below the *de minimis* rates. There would be no appreciable change in operational emissions of criteria pollutants or greenhouse gases. Therefore, there would be no significant impacts.
Water Resources	There would be no change to baseline water resources; therefore, there would be no significant impacts to surface water, groundwater, wetlands, and floodplains.	There would be short-term adverse impacts on surface water from potential pollutant loading and stormwater during construction and demolition activities. There would be short-term adverse impacts on groundwater from potential pollutant infiltration and dewatering during construction and demolition activities. Impacts would be minimal because permit requirements, stormwater management, and sediment and erosion control BMPs and plans would be followed. Long-term adverse impacts on groundwater and surface water would be minimized by the use of pervious pavement. There would be no impacts from relocating the NSA Annapolis Mail Center or CHRIMP because both facilities would be relocated to either an existing building or a site that is already an impervious surface. Also, the existing functions of Building 15NS, if this mail center option is selected, or the existing functions of Building 104, if this CHRIMP option is selected, would be relocated to existing facilities. There would be no impacts on wetlands because none exist on the Perry Center site or on the potential relocation sites for the NSA Annapolis Mail Center and CHRIMP. Permit requirements, construction BMPs, and stormwater management and sediment and erosion control plans would be followed to prevent	There would be no significant impacts on surface water, groundwater, wetlands, or floodplains because only interior building renovations occur under this alternative.

Table ES-1. Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1—Perry Center Site***	***Alternative 2—Renovate/Reuse Building 250 (Hospital Point)***
		impacts to College Creek, an estuarine subtidal deepwater habitat. There would be minimal, short-term adverse impacts on floodplains from some disturbance and vegetation removal during construction activities at the Perry Center site. However, impacts would be minimized through the use of stormwater management and erosion and sediment control plans and BMPs. There would be no long-term impacts on floodplains, including floodplain functions and values, because the footprint of the building would be outside the floodplain. There would be no impacts from relocating the NSA Annapolis Mail Center or the CHRIMP because both relocation options for each facility are outside the floodplain. There would be no significant impacts on water resources.	
Geological Resources	There would be no change to baseline geological resource; therefore, there would be no significant impacts.	There would be minimal adverse impacts on geological resources at the Perry Center site from demolition and construction activities that could disturb and compact soils. Impacts would be minimized through the use of BMPs. There would be no impacts from relocating the NSA Annapolis Mail Center or CHRIMP because both facilities would be relocated to either an existing building or a site that is an existing impervious surface. The existing function of Building 15NS if this mail center option is selected, or Building 104, if this CHRIMP option is selected, would also be relocated to existing facilities, resulting in no impacts. Therefore, there would be no significant impacts.	There would be minimal adverse impacts on geological resources if any ground disturbance is required adjacent to Building 250 for utilities during renovations. There would be no significant impacts.
Cultural Resources	There would be a direct, adverse impact on the USNA NHLD because	There would be a direct adverse impact on the USNA NHLD from the demolition of Buildings 51, 194, and 92, which are discontiguous contributing resources.	There would be short-term visual impacts on the USNA NHLD during the renovation of Building 250. If the renovation of the building

Table ES-1. Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Alternative 1—Perry Center Site*	*Alternative 2—Renovate/Reuse Building 250 (Hospital Point)*
	Building 92, a discontiguous contributing resource, would remain unoccupied and continue to deteriorate. Despite this change, the USNA NHLD would remain eligible for NRHP and as a NHL. There would be no impacts on archeological resources because no ground-disturbing activities would occur. Therefore, there would be no significant impacts on cultural resources.	While construction of the Alumni Service Center and Headquarters facility would introduce a new visual element adjacent to the USNA NHLD, the adverse impacts would be minimal. Despite these changes, the USNA NHLD would remain eligible for the NRHP and as an NHL. Vegetation clearing and landscaping after construction, as well as the new facility would alter views from within the Colonial Annapolis NHLD and would result in indirect, adverse impacts on the setting and feeling of the district. Despite these changes, the Colonial Annapolis NHLD would remain eligible for the NRHP and as an NHL. The Navy intends to develop a programmatic agreement through the Section 106 consultation process of the National Historic Preservation Act to identify *adverse effects* and agreed upon mitigation measures to avoid, minimize, or mitigate potential *adverse effects* from the construction of the Alumni Service Center and Headquarters facility on the USNA NHLD and the Colonial Annapolis NHLD. The NSA Annapolis Mail Center would be relocated to Building 15NS on the North Severn Complex or to the site of the to-be-demolished Building 619 on the Perry Center. Both buildings are not eligible for the NRHP, nor are they located in or adjacent to a Historic District. Relocating the existing functions of Building 15NS to another facility on the North Severn Complex would potentially require minor interior renovations; therefore, there would be no impacts on historic resources from relocating the NSA Annapolis Mail Center. The area where the CHRIMP would be	follows the *Secretary of the Interior's Standards*, then the renovation would have no long-term impact on the interior, character-defining features of Building 250 or the USNA NHLD. There would be no impacts on archeological resources because no archeological sites are in the project boundary. There would be no significant impacts on cultural resources

Table ES-1. Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1—Perry Center Site***	***Alternative 2—Renovate/Reuse Building 250 (Hospital Point)***
		relocated to, either Building 104 or the area adjacent to Building 104, is outside of the USNA NHLD and the Colonial Annapolis NHLD, and Building 104 is not eligible for listing on the NRHP. Additionally, if the Building 104 option is selected, the existing functions would be moved to another, underutilized facility on the Perry Center. Therefore, there would be no impacts on historic resources from relocating the CHRIMP There would be no impacts on archeological resources because there are no sites in the project boundary. Because the USNA NHLD and Colonial Annapolis NHLD would remain eligible for the NRHP and as NHLs, there would be no significant impacts on cultural resources.	
Biological Resources	There would be no change to biological resources; therefore, there would be no significant impacts.	There would be minimal short-term adverse impacts from vegetation removal; however, undeveloped areas would be revegetated after construction. There would be minimal short-term adverse impacts on terrestrial wildlife from vegetation removal and construction noise. No effect on threatened and endangered species would be expected. Because each of the two options for relocating the NSA Annapolis Mail Center and the CHRIMP involve either renovating existing buildings or a site that is an existing impervious surface, there would be no impacts on vegetation, wildlife, or threatened and endangered species from relocating these facilities. The existing function of Building 15NS if this mail center option is selected, or Building 104, if this CHRIMP option is selected, would be relocated to existing facilities, resulting in no impacts. Therefore, there would be no significant impacts on biological resources.	There would be minimal, short-term adverse impacts on terrestrial wildlife from noise disturbance during renovation. There would be no impacts on vegetation or threatened and endangered species. Therefore, there would be no significant impacts on biological resources.

Table ES-1. Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1—Perry Center Site***	***Alternative 2—Renovate/Reuse Building 250 (Hospital Point)***
Land Use	There would be no change to the use of outdated buildings with inefficient use of space; uses would be inconsistent with the NSA Annapolis Installation Master Plan. There would be no impacts on coastal resources. Therefore, there would be no significant impacts on land use.	The Alumni Service Center and Headquarters facility, and each of the options for both relocating the NSA Annapolis Mail Center and the CHRIMP would all be compatible with surrounding land uses and the NSA Annapolis Installation Master Plan. Some short-term adverse impacts could result during construction activities from noise and access restrictions. Some short-term adverse impacts to coastal resources could result from sediment and stormwater runoff during construction activities, but would be minimized by the use of BMPs. Therefore, there would be no significant impacts on land use. The Navy will develop a Coastal Consistency Determination for submission to the MDE. The MDE will decide whether it concurs with the Navy's determination that the activities proposed by NSA Annapolis are consistent with the enforceable policies of the Maryland Coastal Zone Management Plan.	Short-term adverse impacts could result during renovation activities from noise and access restrictions. There would be no impacts on coastal resources. Therefore, there would be no significant impacts on land use.
Noise	There would be no change to existing noise levels; therefore, there would be no significant impacts.	There would be potential short-term adverse impacts from, demolition, construction, and/or renovation activities. There would be minimal long-term increases in noise from traffic during AM and PM peak hours. Noise levels would be consistent with the levels in the existing urban environment. Therefore, there would be no significant impacts on noise.	There would be short-term infrequent impacts during renovation activities. There would be minimal long-term increases in noise from traffic during AM and PM peak hours. Noise levels would be consistent with the levels in the existing urban environment. Therefore, there would be no significant impacts on noise.
Infrastructure	There would be no change to existing infrastructure; therefore, there would be no significant impacts.	There would be short-term adverse impacts on utilities during construction from removing, relocating, or properly abandoning service lines. Increases in utility demands at the Perry Center site could be met with no change in the level of service to surrounding users. Relocating the NSA Annapolis Mail Center and the CHRIMP, and existing functions of	Building 250 is currently served by all required utilities, and all utility systems are currently capable of supporting the functions of the building. Renovations would upgrade the utility systems to make them more functional, code-compliant, and energy efficient.

Table ES-1. Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Alternative 1—Perry Center Site*	*Alternative 2—Renovate/Reuse Building 250 (Hospital Point)*
		Building 15NS and Building 104, if those mail center and CHRIMP options are selected would not increase utility demands. Relocating the NSA Annapolis Mail Center and the CHRIMP would result in more efficient use of building space on NSA Annapolis resulting in beneficial impacts on facilities. There would be no significant impacts on infrastructure.	Therefore, there would be no significant impacts on infrastructure.
Transportation	There would be no significant impacts on pedestrian, bicycle, parking, and traffic (vehicular) modes of transportation.	During the construction period, there would be some short-term adverse parking, sidewalk, and truck impacts. However, once construction was over, there would be no significant impacts on pedestrian, bicycle, parking, and traffic (vehicular) modes of transportation.	During the construction period, there would be some short-term adverse parking, sidewalk, and truck impacts. After construction is complete, operations would adversely affect traffic only in the Navy's site driveway at Gate 8 during outbound mid-day and PM peak hours. Mid-day impacts would occur only during event activities. Consequently, it is recommended that the traffic signal timing at the Gate 8 exit be revised. There would be no significant impacts on pedestrian, bicycle, parking, or the remaining traffic network modes of transportation.
Public Health and Safety	There would be potential impacts adverse impacts from the continued deterioration of Buildings 92, 974, and 340, which contain ACM, LBP, and PCBs. However, any ACM, LBP, and PCBs would be removed, if necessary, in compliance with applicable federal and state regulations.	Adverse impacts during construction are possible; however, impacts would be minimized by a health and safety program, temporary fencing and limiting public access, and notification signs. The NSA Annapolis Mail Center would meet DoD and Navy requirements and standards for a mail center, including being able to provide containment for potential airborne contamination, resulting in no impacts on public health and safety. The CHRIMP facility would be in compliance with applicable hazardous materials requirements and National Fire Protection Association standards. The Alumni Service	During renovation activities, adverse impacts would be minimized by adhering to a health and safety program, and activities would comply with health and safety regulations and standards. Therefore, there would be no significant impacts.

Table ES-1. Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1—Perry Center Site***	***Alternative 2—Renovate/Reuse Building 250 (Hospital Point)***
	Therefore, there would be no significant impacts.	Center and Headquarters facility would be in compliance with antiterrorism/force protection regulations and DoD Minimum Antiterrorism Standards. Therefore, there would be no significant impacts.	
Hazardous Materials and Wastes	There would be potential impacts from the continued deterioration of Buildings 92, 974, and 340, which contain ACM, LBP, and PCBs. However, any ACM, LBP, and PCBs would be removed, as necessary, in compliance with applicable federal and state regulations. Therefore, there would be no significant impacts.	There would be adverse hazardous materials and hazardous wastes impacts from demolition, construction, and/or renovation activities; however, these impacts would be minimized through compliance with applicable federal and state regulations. There would be no impacts to special hazards or DERP components. The new CHRIMP facility would better meet the requirements for a hazardous materials warehouse that stores and handles materials than the existing CHRIMP in Building 194, resulting in beneficial impacts. Therefore, there would be no significant impacts.	There would be adverse hazardous materials and hazardous wastes impacts; however, these impacts would be minimized with removal of materials prior to renovation and through compliance with applicable federal and state regulations. There would be no impacts to special hazards or DERP components. Therefore, there would be no significant impacts.
Socioeconomics	There would be no change to the local or regional socioeconomics; therefore, there would be no significant impacts.	There would be short-term beneficial impacts on the economy from demolition, construction, and/or renovation activities. There would be no long-term impacts because there would be no increase in staffing numbers associated with the Proposed Action. Therefore, there would be no significant impacts.	There would be short-term beneficial impacts to the economy from renovation activities. There would be no long-term impacts because there would be no increase in staffing numbers associated with the Proposed Action. Therefore, there would be no significant impacts.

Key: ACM = asbestos containing material; BMP = best management practices; CEQ = Council on Environmental Quality; CHRIMP = consolidated hazardous material reutilization inventory management program; DERP = Defense Environmental Restoration Program; DoD = Department of Defense; LBP = lead-based paint; MDE = Maryland Department of the Environment; NHL = National Historic Landmark; NHLD = National Historic Landmark District; NRHP = National Register of Historic Places; NSA = Naval Support Activity; PCB = Polychlorinated Biphenyl; USNA = United States Naval Academy

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Environmental Assessment

United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters

Naval Support Activity Annapolis, Maryland

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Abbreviations and Acronyms

Acronym	Definition
ACM	asbestos containing materials
ADA	Americans with Disability Act
AOC	Area of Concern
BGE	Baltimore Gas and Electric
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BOS	Base Operating Support
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CHRIMP	consolidated hazardous material reutilization inventory management program
CO_2e	carbon dioxide equivalent
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
dB	decibel
dBA	A-weighted sound decibel
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
EA	Environmental Assessment
EO	Executive Order
ECF	Entry Control Facility
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
FHWA	Federal Highway Administration
FY	Fiscal Year
GHG	greenhouse gas
gpd	gallons per day
HCM	Highway Capacity Manual
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ITE	Institute of Transportation Engineers
LBP	lead-based paint
LOS	Level of Service
MBTA	Migratory Bird Treaty Act
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MHT	Maryland Historical Trust
MMRP	Military Munitions Response Program
MTA	Maryland Transit Administration
NAF	Naval Academy Foundation
Navy	United States Department of the Navy
NEPA	National Environmental Policy Act
NEX	Navy Exchange
NHL	National Historic Landmark
NHLD	National Historic Landmark District
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSA	Naval Support Activity
OPNAVINST	Office of the Chief of Naval Operations Instruction

Acronym	Definition
PCB	polychlorinated biphenyl
PM_{10}	fine particulate matter less than or equal to 10 microns in diameter
ppm	parts per million
RCRA	Resource, Conservation, and Recovery Act
SDZ	Surface Danger Zone
SHA	State Highway Administration
SO_2	sulfur dioxide
TMDL	Total Maximum Daily Load
TMP	Transportation Management Plan
TWSC	Two-way, STOP-controlled
UFC	Unified Facilities Criteria
U.S.	United States
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USNA	United States Naval Academy
USNA AA	United States Naval Academy Alumni Association
VOC	Volatile Organic Compound
WTP	Water Treatment Plant
WWTP	Waste Water Treatment Plant

1 Purpose of and Need for the Proposed Action

1.1 Introduction

The United States (U.S.) Department of the Navy (Navy) proposes to lease property or a facility to the United States Naval Academy Alumni Association (USNA AA) and the Naval Academy Foundation (NAF) on Naval Support Activity (NSA) Annapolis property in Annapolis, Maryland. The USNA AA and NAF (USNA AA/F) would construct a new Alumni Service Center and Headquarters facility or renovate an existing facility for that purpose. The Proposed Action would be a multi-year, multi-phase action involving the potential relocation of existing Navy functions, a lease, and USNA AA/F conducting demolition and construction or renovation activities, as necessary.

The USNA AA and the NAF are two 501(c)(3) organizations operating jointly to support the United States Naval Academy (USNA) and its alumni. The USNA AA is the primary source for the community of USNA alumni, family, and friends worldwide to maintain active lifetime links and be engaged with each other, USNA, and its traditions. The NAF supports, promotes, and advances the mission of USNA by working in conjunction with USNA leadership to identify strategic institutional priorities and by raising, managing, and disbursing private gift funds that provide a margin of excellence in support of the nation's premier leadership institution. Operating jointly, the USNA AA and NAF directly support USNA and its alumni.

The proposed lease would benefit the Navy by maximizing the efficient use of existing non-excess, underutilized space at NSA Annapolis. The proposed lease also would allow USNA AA/F to consolidate their operations within one facility. Currently, they operate in five separate facilities on or around NSA Annapolis—Ogle Hall, Cottage, and 49 House (USNA AA) and Beach Hall and 25 Maryland Avenue (NAF), and many of these facilities are rated as inadequate or substandard because of conditions and/or configurations that hinder the ability of the facility to support the existing occupant and/or mission.

The Navy has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) as implemented by the Council on Environmental Quality (CEQ) and Navy regulations for implementing NEPA.

1.2 Location

NSA Annapolis consists of USNA and the North Severn Complex (including Greenbury Point), which are located in the City of Annapolis in Anne Arundel County, Maryland. NSA Annapolis has a total acreage of approximately 1,162 acres (Figure 1-1). The USNA comprises approximately 338 acres between the south bank of the Severn River and historic downtown Annapolis. The North Severn Complex and Greenbury Point are located on the north bank of the Severn River across from USNA and comprise approximately 824 acres (including the golf course and former Naval Radio Transmitter Facility).

Under the Proposed Action, the Navy would lease property or a facility to USNA AA/F, and USNA AA/F would construct a new Alumni Service Center and Headquarters facility on Navy property or renovate an existing facility for that purpose. The potential locations for the new headquarters facility are the Perry Center and Building 250 on the NSA Annapolis Upper Yard (Figure 2-1 and Figure 2-2, below). The Perry Center site is located within the southwestern portion of the Upper Yard and is bounded by King George Street to the north and east, College Creek to the south and west, and the Central Heating Plant to the west. Building 250 is located on Wood Road at Hospital Point within the eastern portion of the Upper Yard. Figure 1-2 shows the location of the existing buildings associated with the Proposed Action.

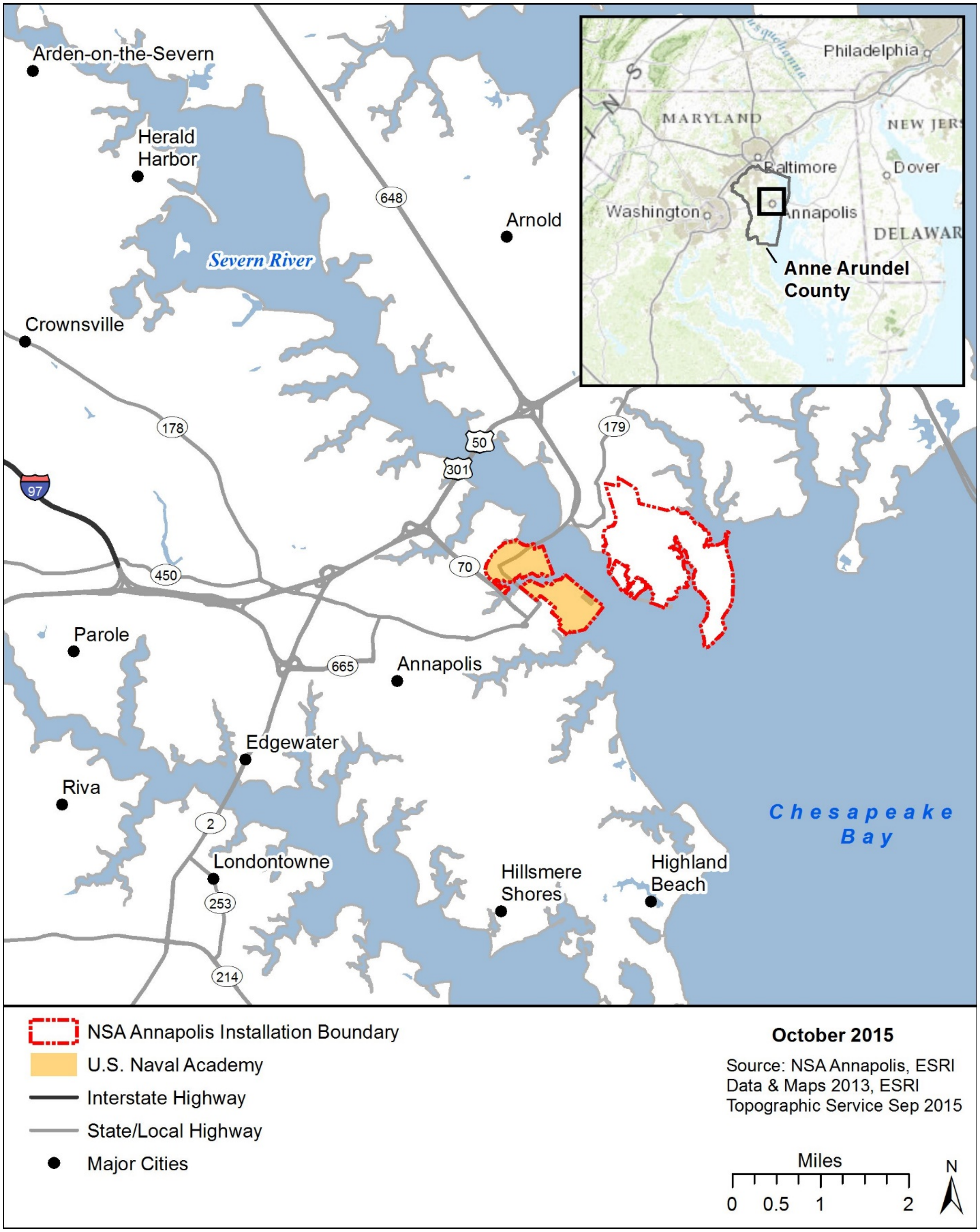

Figure 1-1 Location Map

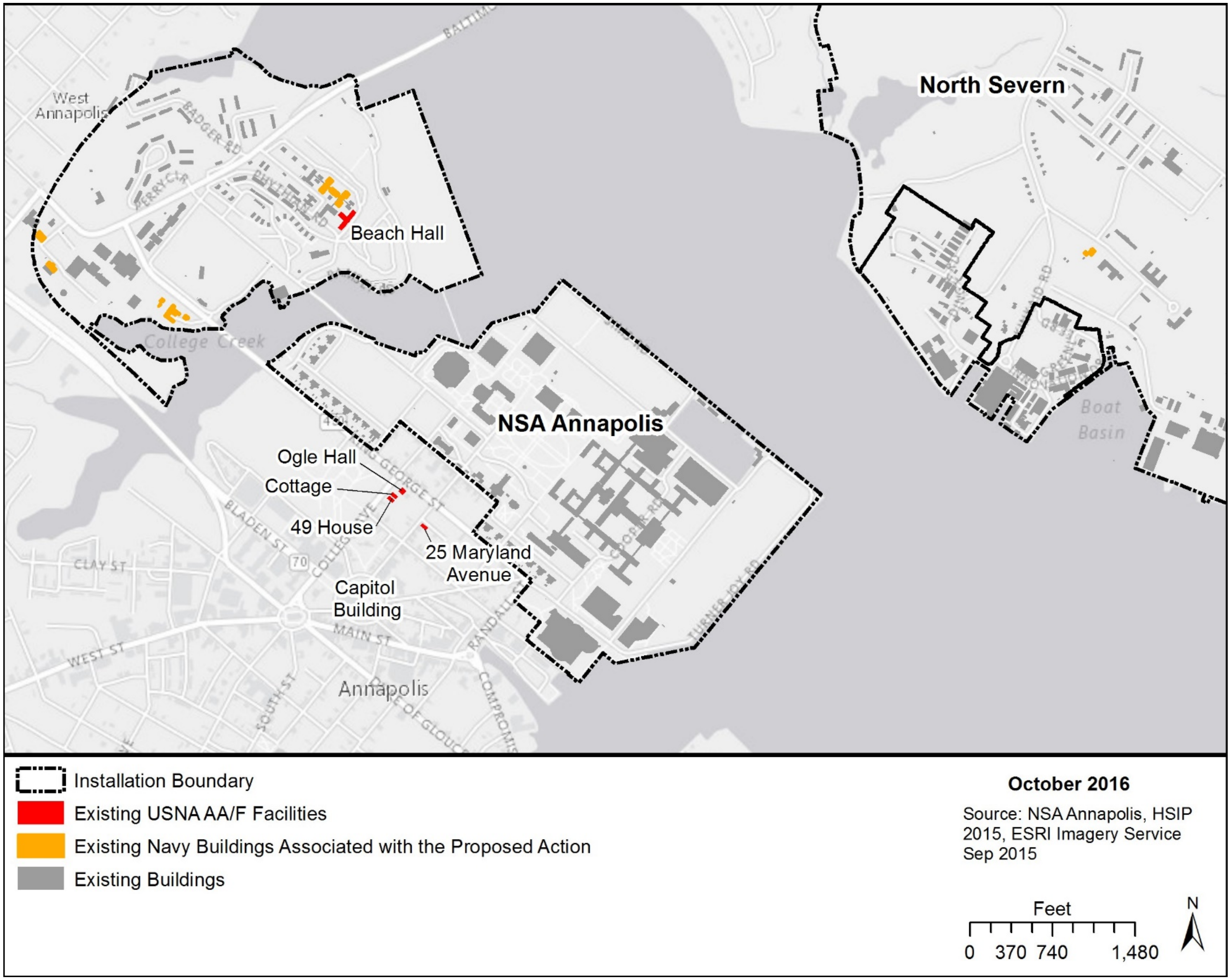

Figure 1-2 Existing Buildings Associated With the Proposed Action

1.3 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to maximize the efficient use of non-excess, underutilized space at NSA Annapolis. The Navy intends to advance this purpose through a sole-source lease with the USNA AA/F and the relocation of existing functional support services (NSA Annapolis Mail Center and the consolidated hazardous material reutilization inventory management program [CHRIMP]).

The Proposed Action is needed to fully implement the requirements of 10 United States Code (U.S.C.) section 2667 and the regulations of the General Services Administration, 41 Code of Federal Regulations (CFR) parts 102-75.40 through 75.55, which require federal agencies to assess their non-excess, underutilized property in their real estate portfolios. The existing functional support services operate in outdated, inefficient spaces that do not meet current requirements, and USNA AA/F leadership, staff, and functional spaces are currently spread across five facilities.

1.4 Scope of Environmental Analysis

This EA includes an analysis of potential environmental impacts associated with the action alternatives and the No Action Alternative. The environmental resource areas analyzed in this EA include: air quality, water resources, geological resources, cultural resources, biological resources, land use, noise, infrastructure, transportation, public health and safety, hazardous materials and waste, and socioeconomics. The study area for each resource analyzed may differ due to how the Proposed Action interacts with or affects the resource. For example, the study area for geological resources may only include the construction footprint of a building, whereas the noise study area would be expanded to include areas that may be affected by airborne noise.

1.5 Key Documents

Key documents are sources of information incorporated into this EA. Documents are considered to be key because of similar actions, analyses, or impacts that may apply to this Proposed Action. The CEQ's guidance encourages incorporating documents by reference. The following documents are incorporated by reference in part or in whole:

- *NSA Annapolis Installation Master Plan*, July 2012. This document describes, on a local level, the existing and emerging conditions (including regulatory), recommendations, historic preservation analysis, capital improvements plan, and urban design guidelines for land and facilities at NSA Annapolis installations. Both short-term and long-term needs are addressed.
- *U.S. Naval Academy Strategic Plan 2020,* March 2011. One of the imperatives noted in the strategic plan is to "develop strategic relationship with alumni, friends, and national institutions of influence" by providing a facility that "enables the Alumni Association and Foundation to co-locate on NSA Annapolis grounds and enhances the ongoing relationship between USNA and the Alumni Association and Foundation."
- *Integrated Cultural Resources Management Plan for Naval Support Activity Annapolis, Maryland*, May 2010. The Integrated Cultural Resources Management Plan (ICRMP) identifies and inventories historic, cultural, archeological, and architectural resources located at NSA Annapolis facilities; reviews associated issues; and provides procedures for the management of these resources. Guidance within this document applies to resources on NSA Annapolis.

- *Integrated Natural Resources Management Plan, Naval Support Activity Annapolis, Maryland*, May 2011. The Integrated Natural Resources Management Plan (INRMP) describes natural resource baseline conditions and issues, existing management and conservation programs, and future management recommendations at NSA Annapolis locations. Guidance within this document applies to land and habitats on NSA Annapolis.
- *USNAAA/NAF Master Plan*, December 2013. The Master Plan describes the operational needs of USNA AA and NAF and the ability of existing facilities to support their mission or function. Recommendations for collocation of USNA AA and NAF operations at a single facility are assessed.

1.6 Relevant Laws and Regulations

The Navy has prepared this EA based on federal and state laws, statutes, regulations, and policies that are pertinent to the implementation of the Proposed Action:

- NEPA (42 U.S.C. sections 4321–4370h), which requires an environmental analysis for major federal actions that have the potential to significantly affect the quality of the human environment
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR parts 1500–1508)
- Navy regulations for implementing NEPA (32 CFR part 775), which provides Navy policy for implementing CEQ regulations and NEPA
- Clean Air Act (CAA) (42 U.S.C. section 7401 et seq.)
- Clean Water Act (CWA) (33 U.S.C. section 1251 et seq.)
- Coastal Zone Management Act (CZMA) (16 U.S.C. section 1451 et seq.)
- National Historic Preservation Act (NHPA) (54 U.S.C. section 306108 et seq.)
- Archaeological Resources Protection Act of 1979 (16 U.S.C. section 470 et seq.); Final Uniform Regulations (32 CFR part 229)
- Endangered Species Act (ESA) (16 U.S.C. section 1531 et seq.)
- Migratory Bird Treaty Act (MBTA) (16 U.S.C. section 703–712)
- Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. section 668–668d)
- Safe Drinking Water Act (42 U.S.C. section 300f et seq.)
- Resource, Conservation, and Recovery Act (RCRA) (42 U.S.C. section 6901 et seq.)
- Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. section 9601 et seq.)
- Executive Order (EO) 11988, *Floodplain Management*
- EO 12088, *Federal Compliance with Pollution Control Standards*
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*

- EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*
- EO 13175, *Consultation and Coordination with Indian Tribal Governments*
- EO 13693, *Planning for Federal Sustainability in the Next Decad*e
- Department of Defense (DoD) 4525.6M, *Department of Defense Postal Manual*, Chapter 13
- DoD Antiterrorism Handbook; DoD O-2000.12-H

Chapter 5 (Table 5-1) describes the Proposed Action's consistency with these laws, policies, and regulations, as well as the names of regulatory agencies responsible for their implementation.

1.7 Public and Agency Participation and Intergovernmental Coordination

Regulations from CEQ (40 CFR part 1506.6) direct agencies to involve the public in preparing and implementing their NEPA procedures. The Navy solicited public and agency comments during a scoping period from October 25, 2015, through November 23, 2015. The Navy published an announcement of the scoping meeting for three consecutive days in the *Annapolis Capital Gazette* on October 25–27, 2015. The scoping meeting was held on November 9, 2015, in Annapolis, Maryland. Comments received during the scoping period were considered in preparing the Draft EA.

The Navy will coordinate or consult with the U.S. Fish and Wildlife Service (USFWS), Maryland Department of the Environment (MDE), Maryland Department of Natural Resources (MDNR), Maryland Historical Trust (MHT), Advisory Council on Historic Preservation, National Park Service, City of Annapolis Historic Preservation Division, and St. John's College regarding the Proposed Action. A Coastal Consistency Determination has been prepared and will be submitted to MDE and MDNR.

2 Proposed Action and Alternatives

2.1 Proposed Action

The Navy proposes to enter into a ground or space lease with the United States Naval Academy Alumni Association (USNA AA) and the Naval Academy Foundation (NAF). The USNA AA and NAF (USNA AA/F) would then construct or renovate an existing facility for a new Alumni Service Center and Headquarters facility in accordance with the lease. Execution of the lease and USNA AA/F's subsequent construction of a new Alumni Service Center and Headquarters facility or renovation of an existing facility for that purpose would allow the Navy to maximize efficient use of existing non-excess, underutilized space at Naval Support Activity (NSA) Annapolis.

2.2 Screening Factors

The National Environmental Policy Act's (NEPA) implementing regulations provide guidance on the consideration of alternatives to a federally proposed action and require rigorous exploration and objective evaluation of reasonable alternatives. Only those alternatives determined to be reasonable that meet the purpose and need require detailed analysis.

Potential alternatives that meet the purpose and need were evaluated against the following screening factors to provide updated, efficient, compliant spaces for all potentially affected functional uses in accordance with the requirements of 10 United States Code (U.S.C.) section 2667 and the regulations of the General Services Administration, 41 Code of Federal Regulations (CFR) parts 102-75.40 through 75.55.

Needs for the NSA Annapolis Mail Center

- space requirements of 1,280 square feet
- a secured location within the NSA Annapolis fence line with alarmed and barred windows
- an air exhaust shutoff system
- a loading dock
- meet the requirements of the Department of Defense (DoD) 4525.6*M—DoD Postal Manual*, Chapter 13; Unified Facilities Criteria (UFC) 4-010-01*, DoD Minimum Antiterrorism Standards for Buildings*; and the DoD O-2000.12-H*, DoD Antiterrorism Handbook*

Needs for the Consolidated Hazardous Material Reutilization Inventory Management Program

- space requirements of 5,000 square feet, including 60 square feet for personnel office space and 225 square feet for a clean-up room
- capability to store and handle flammable and combustible liquids, acids, oxidizers, poisons, water reactive materials, caustics, and organic peroxides
- adequate material separation space, including separate rooms, cabinets, lockers, shelves, and other storage infrastructure for incompatible materials
- contamination areas and berms, including the ability to provide containment of effluent run-off in the event of a sprinkler event
- exterior Hazardous Administration container storage

- fire protection and ventilation in accordance with National Fire Protection Association standards, including fire suppression system
- a 50-foot buffer zone between the Consolidated Hazardous Material Reutilization Inventory Management Program (CHRIMP) and inhabited facilities
- compatibility with adjacent properties

Needs for the USNA AA/F

- minimum space requirement of 29,000 square feet to integrate and collocate operations at one facility to include private offices (20 personnel), open office space (70 personnel), reception area, kitchen/mess/vending area, training room, two conference rooms, multi-purpose/banquet space for 300 people, consolidated and upgraded information services/utilities area, copy room, library-archive/print material storage, and administrative/supply storage
- maintain prominent visual character and maximize visibility within USNA
- provide adequate on-site parking and ease of access (preferred outside the secured NSA Annapolis fence line)
- accommodate large interior and exterior events

2.3 Alternatives Carried Forward for Analysis

Based on the reasonable alternative screening factors, two alternative sites were identified and are analyzed within this Environmental Assessment (EA) that meet the purpose and need for the Proposed Action.

2.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. The Navy would not enter into a lease with USNA AA/F to provide a new Alumni Service Center and Headquarters facility on NSA Annapolis property. The USNA AA and NAF would continue to operate in five separate facilities on or around NSA Annapolis with alumni events held at Ogle Hall. At the Perry Center site, existing Buildings 51, 194, 92, 974, and 340 would not be demolished, and the current functions of Building 51 (NSA Annapolis Mail Center) and Building 194 (CHRIMP) would remain on site. The NSA Annapolis Mail Center and CHRIMP do not comply with 10 U.S.C. section 2667 and 41 CFR parts 102-75.40 through 75.55 (see Section 1.1) because of outdated buildings and inefficient use of their respective spaces. The NSA Annapolis Installation Master Plan recommends that the current uses in Buildings 51 and 194 be relocated to more suitable spaces. The No Action Alternative would leave these uses in place and would be inconsistent with the recommendations included in the NSA Annapolis Installation Master Plan. Building 92 is a 1,795-square-foot building located in the northwestern portion of the project area and was the former gardener's quarters for the Superintendent. Building 974 is a 360-square-foot garage and Building 340 is a 130-square-foot equipment shed. Both buildings are associated with Building 92. Buildings 92, 974, and 340 are all unoccupied and deteriorating. Building 250 at Hospital Point in the Upper Yard would also remain vacant once the Naval Health Clinic Annapolis leaves the space. The No Action Alternative would not meet the purpose and need for the Proposed Action because the Navy would not be maximizing the efficient use of non-excess, underutilized space at NSA Annapolis. However, as required by NEPA, the No Action Alternative is carried forward for analysis in this EA to provide a baseline for measuring the environmental consequences of the action alternatives.

2.3.2 Alternative 1—Perry Center Site

Under Alternative 1, the Navy would enter into a ground lease with USNA AA/F, and USNA AA/F would construct a new Alumni Service Center and Headquarters facility on NSA Annapolis property located at the Perry Center in the southwest portion of the Upper Yard (Figure 2-1). The proposed project site is located along King George Street and contains five buildings, including the NSA Annapolis Mail Center, the CHRIMP, and the unoccupied former Superintendent's gardener's quarters and outbuildings.

The new 29,000-square-foot Alumni Service Center and Headquarters facility would include a parking lot that could accommodate approximately 90 to 120 vehicles. A new pedestrian crossing with proper signing to alert drivers to its existence would also be striped at the unsignalized intersection of King George Street and the Perry Center site (exit only)/Bishop Stadium. The USNA AA would relocate its staff and functions to the new facility and would continue to use property in the City of Annapolis for events. The NAF's current space lease with the Navy for use of Beach Hall would be terminated, and NAF would relocate its staff and functions to the new facility. In addition to office space, the new USNA AA/F facility would include a reception area; a kitchen, mess, and vending area; and a multi-purpose/banquet area that could accommodate up to 300 people.

To accommodate new construction, the five existing buildings (Buildings 51, 194, 92, 974, and 340) on the proposed project site would be demolished, and existing functions would be relocated to new facilities. Building 51 is a 2,790-square-foot building located in the southeastern portion of the project site that houses the NSA Annapolis Mail Center. Building 194, located in the central part of the project site, is an 11,312-square-foot building that functions as the CHRIMP. Building 92 is a 1,795-square-foot unoccupied, dilapidated building located in the northwestern portion of the project area. It was the former Superintendent's gardener's quarters. Building 974 is a 360-square-foot garage and Building 340 is a 130-square-foot equipment shed. Both are associated with Building 92 and are unoccupied and deteriorating.

Under Alternative 1, the NSA Annapolis Mail Center would be relocated to one of two locations (Figure 2-1). One option would be to relocate the facility to Building 15NS located on the North Severn Complex. Building 15NS is currently used as administrative support and would only require interior and some exterior renovations to accommodate the NSA Annapolis Mail Center. The administrative support functions in Building 15NS would be relocated to other existing administrative space on the North Severn Complex, yet to be identified, that would potentially require some minor interior renovations. No new construction would be required to accommodate the administrative functions. In addition to interior and exterior renovations, the use of Building 15NS would require the replacement of the heating, ventilating, and air conditioning system. Building 15NS is located within the fence line, providing security for the site. The building also includes an attached garage that can accommodate the loading and unloading of mail; thus, construction of a loading dock would not be needed. Parking for at least 10 vehicles would also be provided at the site on existing impervious surfaces. Any airborne contamination could also be isolated because the garage can be isolated from the rest of the building. All renovations would be made so that the facility would meet screening factors and the requirements for DoD mail centers as set forth in DoD 4525.6M—*DoD Postal Manual*, Chapter 13; UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*; and the DoD O-2000.12-H, *DoD Antiterrorism Handbook*.

The second option for relocating the NSA Annapolis Mail Center would be to demolish Building 619 in the northwestern portion of the Perry Center and use the existing slab/foundation to construct a new, 1,500-square-foot prefabricated building in its place. Parking for at least 10 vehicles would also be provided at

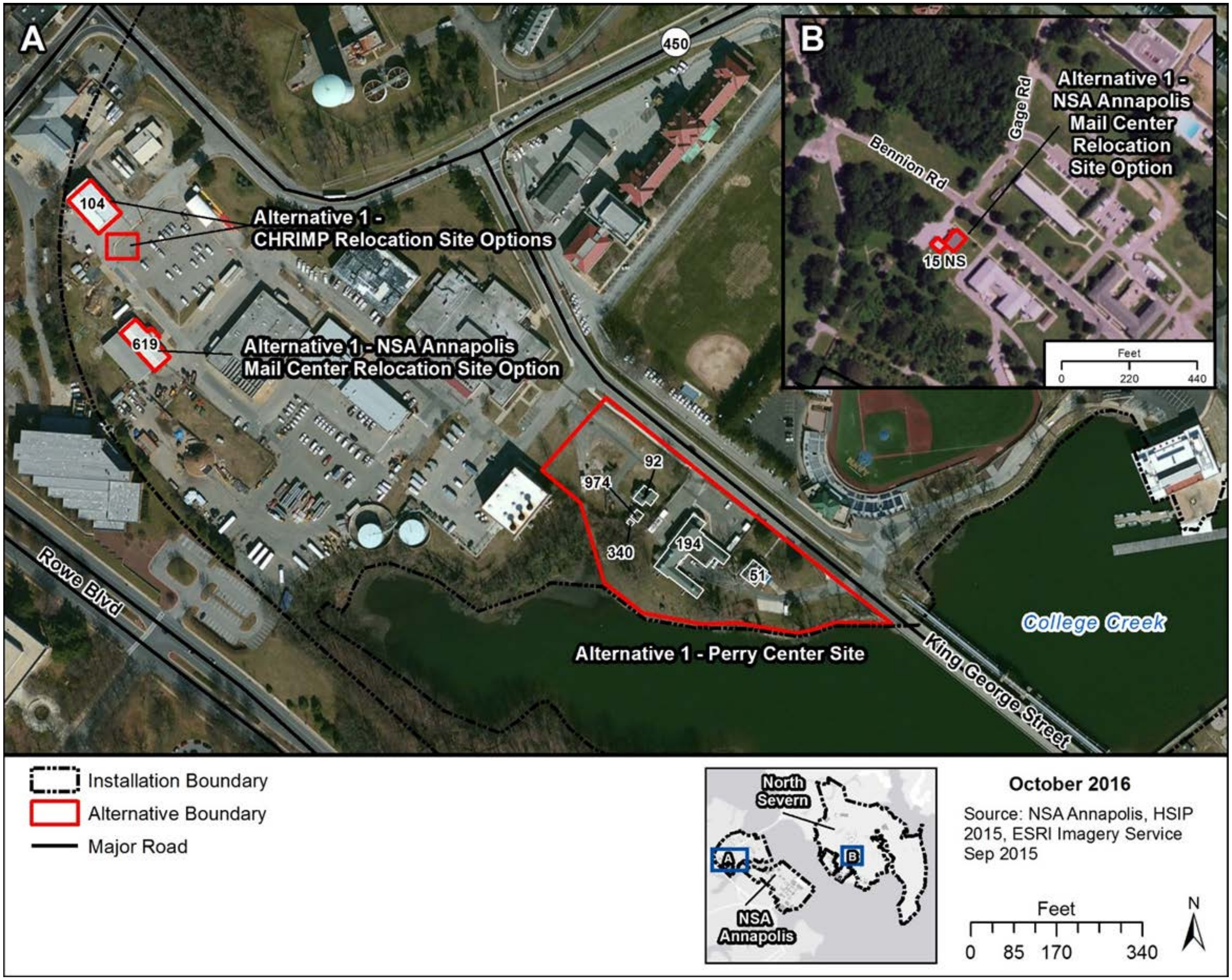

Figure 2-1 Alternative 1—Perry Center Site Location

the site on existing impervious surfaces. Building 619 is currently a public works shop storage area; however, the material currently stored there is not a requirement, and relocation to another space would not be needed. Building 619 is located behind the existing fence line, and the new mail center would meet the screening factors, as well as requirements for DoD mail centers as set forth in DoD 4525.6M—*DoD Postal Manual*, Chapter 13; UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*; and the DoD O-2000.12-H, *DoD Antiterrorism Handbook*.

Also under Alternative 1, the CHRIMP would be relocated to one of two locations. One option would be to relocate the CHRIMP to Building 104 within the northwestern portion of the Perry Center along Yew Street. The second option would be to construct a new facility adjacent to Building 104 (Figure 2-1). Building 104 is currently used as a ready room (warehouse/storage space) for the Base Operating Support (BOS) contractor and would only require interior renovations to accommodate the CHRIMP. The current functions of Building 104 would be moved to other underutilized BOS contractor spaces on the Perry Center and would not require any new construction or renovations.

If the CHRIMP were moved to a new facility adjacent to Building 104, the facility would be a prefabricated modular structure installed on the impervious surface associated with Building 104 and the roadway. The proposed location and new construction would meet the specific facility requirements.

2.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point)

Under Alternative 2, the Navy would enter into a space lease with USNA AA/F for use of Building 250 located along Wood Road at Hospital Point within the eastern portion of the NSA Annapolis Upper Yard (Figure 2-2). Building 250 is the Naval Health Clinic Annapolis, which will be vacated in spring 2017 as part of an unrelated action. Following execution of the space lease, USNA AA/F would renovate the interior of Building 250 to meet their needs. Additionally, they would upgrade the mechanical, electrical, and plumbing systems to make them more functional, code-compliant, and energy efficient. Under this alternative, construction of a new parking lot would not be required because ample parking associated with the Naval Health Clinic Annapolis exists immediately to the north of the building. Along with Building 250, USNA AA would continue to use property in the City of Annapolis for events. Implementation of this alternative for the USNA AA/F facility would not require the relocation of the existing functions in Buildings 51, 194, 92, 974, and 340 on the Perry Center site.

2.4 Alternatives Considered but not Carried Forward for Detailed Analysis

The following alternatives were considered but are not carried forward for detailed analysis in this EA because they did not meet the purpose and need for the project and do not satisfy the reasonable alternative screening factors presented in Section 2.2.

2.4.1 Renovate and Reuse Beach Hall, Building 291

Under this alternative, the Navy would enter into a space lease with USNA AA/F for use of Building 291, Beach Hall, at Hospital Point in the Upper Yard of NSA Annapolis. The NAF currently leases one floor of the building for its operations. This alternative would require extensive electrical, mechanical, and utility upgrades along with exterior and interior renovations. The United States (U.S.) Naval Institute also occupies space in the building and would be affected, requiring a portion of its lease to be renegotiated. This alternative was considered, but is not carried forward for detailed analysis in the EA because the available square footage of the building, approximately 23,300 square feet, including both floors of the building, would not meet the space requirements for the collocated functions of USNA AA and NAF.

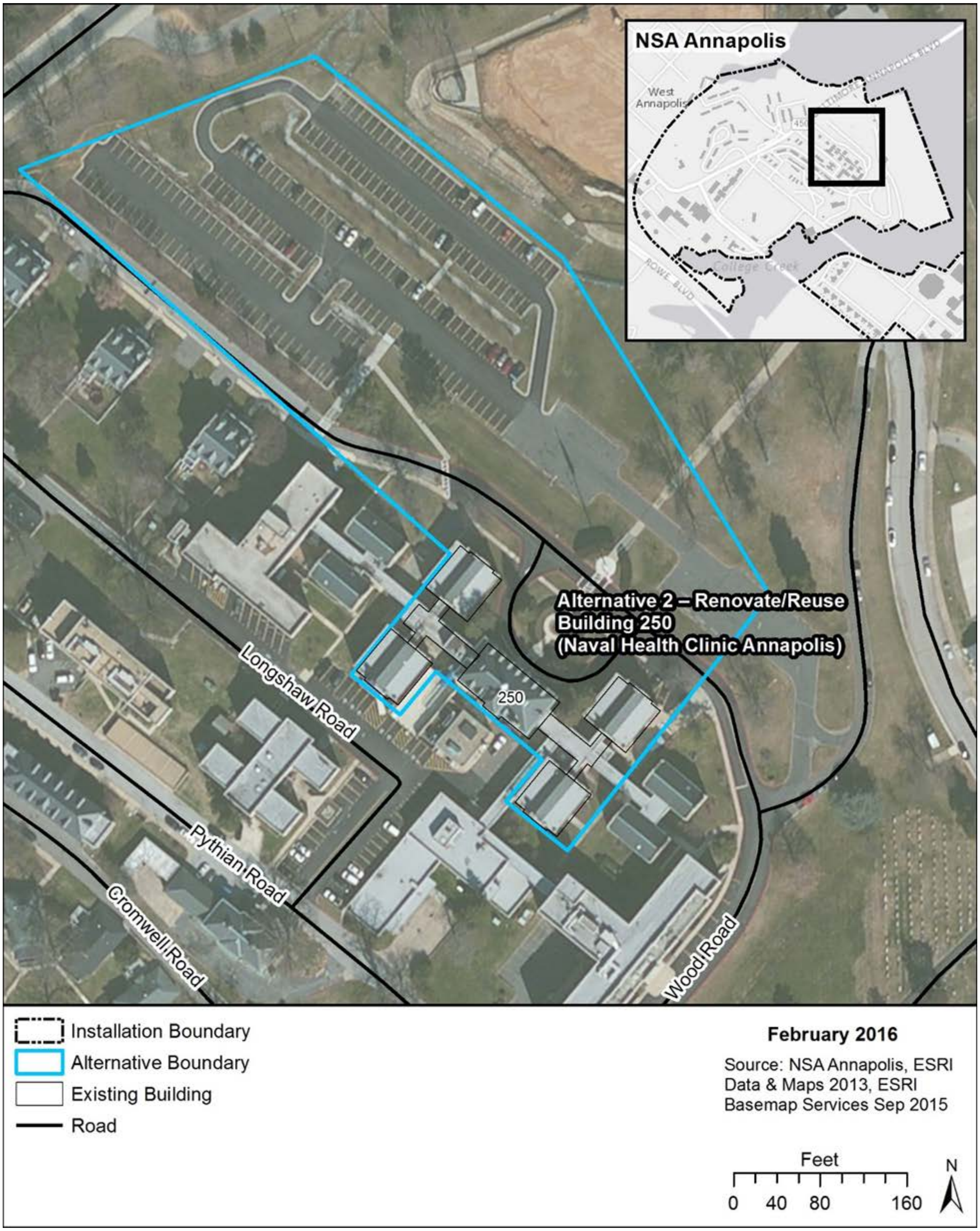

Figure 2-2 Alternative 2—Renovate/Reuse Building 250 Location

2.4.2 NSA Annapolis Mail Center and CHRIMP Relocation Alternatives under Alternative 1—Perry Center Site

If the Navy selects Alternative 1 as the Preferred Alternative, the NSA Annapolis Mail Center and the CHRIMP, currently located on the Perry Center site, would need to be relocated. Therefore, several potential alternatives for relocating these functions were considered and are described below, along with rationale for not carrying them forward for detailed analysis in the EA.

2.4.2.1 NSA Annapolis Mail Center Alternative

Two alternatives were considered for relocating the existing NSA Annapolis Mail Center. One alternative was to renovate/reuse Building 275, and the other was to renovate/reuse Building 274; both buildings are located on the Upper Yard at Hospital Point.

Building 275 currently houses the supply wing of the Naval Health Clinic Annapolis that will be vacated in spring 2017. This alternative was considered but is not carried forward for detailed analysis in the EA because the location would have no tangible environmental benefit over the proposed location for the NSA Annapolis Mail Center as described under Alternative 1—Perry Center Site and would incur greater costs.

Building 274 is currently the pharmacy wing of the Naval Health Clinic Annapolis, which will be vacated in spring 2017. Because the mail center is the first drop off for mail entering NSA Annapolis and the primary sorting facility, it must meet significant safety precautions dictated by UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*, and the DoD O-2000.12-H, *DoD Antiterrorism Handbook*. Although Building 274 has a secure area that was previously used for medication storage that could be reused for the required secure location as described in Section 2.2, the building does not comply with the applicable anti-terrorism, National Fire Protection Association 101, and International Building 2012 codes. The building has multiple doors leading to the mailroom, which is not permitted, and the windows lack the required steel bar reinforcement on the exterior. The building also does not have a loading dock or an existing provision for unloading and loading mail trucks, and space is not sufficient to construct one; thus, loading and unloading operations would have to be conducted in the street, which would block vehicular traffic and create problems for residents, security, and workers in the surrounding buildings. Additionally, the location would need to be secured along the exterior and also separated from adjacent interior occupants, requiring significant modifications to corridors, existing elevators, egress stairs, and exterior doors and windows. It would also require the heating, ventilating, and air conditioning (HVAC) system to be modified to avoid potential airborne contamination of adjacent spaces in the event of an attack. Given the nature of the facility and the adjoining facilities, modification of the HVAC system may be difficult to achieve. For these reasons, this alternative was considered but is not carried forward for detailed analysis in the EA.

2.4.2.2 CHRIMP Alternatives

One potential alternative considered for relocating the CHRIMP was the construction of a new permanent facility in the same impervious location described under Alternative 1. Under this alternative, the facility would be constructed on site, not prefabricated. This alternative was considered, but is not carried forward for detailed analysis in the EA because this action would have no tangible environmental benefit over the proposed alternative for the CHRIMP as described under Alternative 1 and the cost would be greater.

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3 Affected Environment and Environmental Consequences

This chapter presents a description of the environmental resources and baseline conditions that could be affected from implementing any of the alternatives and an analysis of the potential direct and indirect effects of each alternative.

All potentially relevant environmental resource areas were initially considered for analysis in this Environmental Assessment (EA). In compliance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ), and 32 Code of Federal Regulations (CFR) part 775 guidelines, the discussion of the affected environment (i.e., existing conditions) focuses only on those resource areas potentially subject to impacts. Additionally, the level of detail used in describing a resource is commensurate with the anticipated level of potential environmental impact.

"Significantly," as used in NEPA, requires considerations of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole (e.g., human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of a proposed action. For instance, in the case of a site-specific action, significance would usually depend on the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant (40 CFR part 1508.27). Intensity refers to the severity or extent of the potential environmental impact, which can be thought of in terms of the potential amount of likely change. In general, the more sensitive the context, the less intense a potential impact needs to be considered significant. Likewise, the less sensitive the context, the more intense a potential impact would be expected to be significant.

This section includes air quality, water resources, geological resources, cultural resources, biological resources, land use, noise, infrastructure, transportation, public health and safety, hazardous materials and wastes, and socioeconomics.

The potential impacts to the following resource areas are considered to be negligible or non-existent; therefore, they were not analyzed in detail in this EA:

Marine Species: The Proposed Action does not involve any in-water work; therefore, there would be no direct impacts on any marine vegetation, marine mammals, fish, or invertebrates. Implementing the Proposed Action under Alternative 1 at the Perry Center site, which is adjacent to College Creek, would disturb more than 1 acre of land. As a result, the project would require a General Permit for Stormwater Associated with Construction Activity. Compliance under this permit would require implementation of stormwater best management practices (BMPs) to prevent stormwater runoff and associated erosion, pollution, and sedimentation into College Creek that could otherwise affect marine species. Additionally, runoff from the increase in impervious surfaces from the new construction would be managed under a stormwater management plan. Using environmental site design practices to the maximum extent practicable as required under section 438 of the Energy Independence and Security Act, would further minimize any potential impacts to marine species. Relocating the NSA Annapolis Mail Center to Building 15NS on the North Severn Complex would only require interior and some exterior renovations to the building, and the site is not near the Severn River. Building 619 on the Perry Center, the other option for relocating the NSA Annapolis Mail Center, is also not near College Creek; therefore, relocating the NSA Annapolis Mail Center under either option would have no potential indirect impacts on marine species. The consolidated hazardous material reutilization inventory management program (CHRIMP) facility would be relocated to either Building 104 within the northwestern portion of the Perry Center, which would only require interior renovations, or to the existing impervious surface adjacent to Building 104, which is approximately 860 feet away from College Creek; therefore, there would be no indirect impacts on marine species. Alternative 2 would not affect marine species because it would only involve interior building renovations. The actions considered in this EA would not be expected to have an impact on marine resources; therefore, this issue is not analyzed in detail under Biological Resources.

Visual Resources: The construction of the new Alumni Service Center and Headquarters facility and the relocation of the NSA Annapolis Mail Center and the CHRIMP facility at the Perry Center site under Alternative 1 would be consistent with surrounding industrial land uses. The placement of the new structures would allow for the older, existing structures to be removed and would not adversely affect the views from inside or outside of the Perry Center area. If the CHRIMP were relocated to Building 104, it would only require interior renovations, which would not impact visual resources. Demolition of existing buildings and construction of the new USNA AA/F Alumni Service Center and Headquarters facility on the Perry Center site could affect the views from St. John's College across College Creek. However, because St. John's College is part of the Colonial Annapolis National Historic Landmark District (NHLD), these impacts are addressed as part of the Cultural Resources impact topic. Additionally, relocation of the NSA Annapolis Mail Center to Building 15NS would only entail interior and some exterior renovations to the building and would be consistent with the surrounding land uses. Under Alternative 2, the Proposed Action would consist only of interior renovations to an existing building and would have no impact on exterior visual resources. The actions considered in this EA would not be expected to have an impact on visual resources; therefore, this issue is not analyzed in detail.

Airspace: There are no airports in the vicinity of NSA Annapolis and the project site. Under Alternative 1, actions would consist of either interior building renovations or demolition and construction of new buildings that would not be higher than surrounding structures. Actions proposed under Alternative 2 would consist of interior renovations. The actions considered in this EA would not be expected to have an impact on airspace; therefore, this issue is not analyzed in detail.

Environmental Justice: The Perry Center site is located within an industrial area. The nearest residences are NSA Annapolis military housing located on the north side of Route 450, approximately 825 feet to the north of the site. The proposed site within the Upper Yard at Hospital Point (Building 250—Alternative 2) is located within an administrative area with adjacent NSA Annapolis military housing. This NSA Annapolis military housing area does not house low-income or minority populations. Building 15NS on the North Severn Complex, a potential site for relocating the NSA Annapolis Mail Center, is behind the installation's fence line, is not adjacent to any housing, and is consistent with surrounding land uses. The actions considered in this EA would not be expected to have a disproportionately high or adverse impact on any low-income or minority populations; therefore, environmental justice is not analyzed in detail.

3.1 Air Quality

This discussion of air quality includes criteria pollutants, standards, sources, permitting and greenhouse gases (GHGs). Air quality in a given location is defined by the concentration of various pollutants in the atmosphere. A region's air quality is influenced by many factors, including the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions.

Most air pollutants originate from human-made sources, including mobile sources (e.g., cars, trucks, buses) and stationary sources (e.g., factories, refineries, power plants), as well as indoor sources (e.g., some building materials and cleaning solvents). Air pollutants also are released from natural sources such as volcanic eruptions and forest fires.

3.1.1 Regulatory Setting

Criteria Pollutants and National Ambient Air Quality Standards

The principal pollutants defining air quality, called "criteria pollutants," include carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide, ozone, suspended particulate matter less than or equal to 10 microns in diameter (PM_{10}), fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead. CO, SO_2, lead, and some particulates are emitted directly into the atmosphere from emissions sources. Ozone, nitrogen dioxide, and some particulates are formed through atmospheric chemical reactions that are influenced by weather, ultraviolet light, and other atmospheric processes.

Under the Clean Air Act (CAA), the United States (U.S.) Environmental Protection Agency (USEPA) established National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for these pollutants. NAAQS are classified as primary or secondary. Primary standards protect against adverse health effects; secondary standards protect against welfare effects, such as damage to farm crops, vegetation, and buildings. Some pollutants have short-term and long-term standards. Short-term standards are designed to protect against acute, or short-term, health effects, while long-term standards protect against chronic health effects.

Areas that are and have historically been in compliance with the NAAQS are designated as attainment areas. Areas that violate a federal air quality standard are designated as nonattainment areas. Areas that have transitioned from nonattainment to attainment are designated as maintenance areas and are required to adhere to maintenance plans to ensure continued attainment.

The CAA requires states to develop a general plan to attain and maintain the NAAQS in all areas of the country and a specific plan to attain the standards for each area designated nonattainment for a NAAQS. These plans, known as State Implementation Plans, are developed by state and local air quality management agencies and submitted to the USEPA for approval.

General Conformity

The USEPA General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified rates. The emissions rates that trigger requirements for a conformity analysis are called *de minimis* levels. *De minimis* levels (in tons per year) vary by pollutant and also depend on the severity of the nonattainment status for the air quality management area in question.

A conformity applicability analysis is the first step of a conformity evaluation, and it assesses if a federal action must be supported by a conformity determination. This is typically done by quantifying applicable direct and indirect emissions that are projected to result from the implementation of the federal action. Indirect emissions are those emissions caused by the federal action and originating in the region of interest, but which can occur at a later time or in a different location from the action itself and are reasonably foreseeable. The federal agency can control and will maintain control over the indirect action due to a continuing program responsibility of the federal agency. Reasonably foreseeable emissions are projected future direct and indirect emissions that are identified at the time the conformity evaluation is performed. The location of such emissions is known and the emissions are quantifiable, as described and documented by the federal agency based on its own information and after reviewing any information presented to the federal agency. If the results of the applicability analysis indicate that the total emissions would not exceed the *de minimis* emissions rates, then the conformity evaluation process is completed. *De minimis* threshold emissions are presented in Table 3-1.

Table 3-1. General Conformity *De Minimis* Levels

Pollutant	*Area Type*	*Tons Per Year*
Ozone (volatile organic compound or nitrogen oxide)	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (nitrogen oxide)	Marginal and moderate nonattainment inside an ozone transport region	100
	Maintenance	100
Ozone (volatile organic compound)	Marginal and moderate nonattainment inside an ozone transport region	50
	Maintenance within an ozone transport region	50
	Maintenance outside an ozone transport region	100
Carbon monoxide, sulfur dioxide, and nitrogen dioxide	All nonattainment and maintenance	100
PM_{10}	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
$PM_{2.5}$ Direct emissions, sulfur dioxide, nitrogen oxide (unless determined not to be a significant precursor), volatile organic compound or ammonia (if determined to be significant precursors)	All nonattainment and maintenance	100
Lead	All nonattainment and maintenance	25

Key: PM_{10} = suspended particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 microns in diameter

Greenhouse Gases

GHGs are gas emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. Scientific evidence indicates a trend of increasing global temperature over the past century as a result of an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to produce negative economic and social consequences across the globe.

Final guidance from CEQ, dated August 1, 2016, recommends that agencies consider both the potential effects of a Proposed Action on climate change, as indicated by its estimated GHG emissions, and the implications of climate change for the environmental effects of a Proposed Action (CEQ, 2016). The guidance also emphasizes that agency analyses should be commensurate with projected GHG emissions and climate impacts and should employ appropriate quantitative or qualitative analytical methods to ensure useful information is available to inform the public and the decision-making process in distinguishing between alternatives and mitigations.

The USEPA issued the Final *Mandatory Reporting of Greenhouse Gases Rule* on September 22, 2009. GHGs covered under this rule are carbon dioxide (CO_2), methane, nitrogen oxide (NO_x), hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases, including nitrogen trifluoride and hydrofluorinated ethers. Each GHG is assigned a global warming potential. The global warming potential is the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to CO_2, which has a value of one. The equivalent CO_2 rate is calculated by multiplying the emissions of each GHG by its global warming potential and adding the results together to produce a single, combined emissions rate representing all GHGs. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of mobile sources and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions as carbon dioxide equivalents (CO_2e) are required to submit annual reports to the USEPA.

In an effort to reduce energy consumption, GHGs, and dependence on petroleum and increase the use of renewable energy resources, the Navy has implemented a number of renewable energy projects. The Navy has established Fiscal Year (FY) 2020 GHG emissions reduction targets of 34 percent from a FY 2008 baseline for direct GHG emissions and 13.5 percent for indirect emissions. Examples of Navy-wide GHG reduction projects include energy efficient construction, thermal and photovoltaic solar systems, geothermal power plants, and the generation of electricity with wind energy. The Navy continues to promote and install new renewable energy projects.

3.1.2 Affected Environment

NSA Annapolis is in Anne Arundel County, which is within the Metropolitan Baltimore Intrastate Air Quality Control Region. The Maryland Department of the Environment (MDE) is responsible for implementing and enforcing state and federal air quality regulations in Maryland. The USEPA has determined that Anne Arundel County is a nonattainment area for 8-hour ozone, with a classification of Moderate under the 2008 standards. The county also is a maintenance area (former nonattainment area) for $PM_{2.5}$ under the 1997 standard (USEPA, 2016). Effective September 12, 2016, portions of Anne Arundel County, including NSA Annapolis, were designated nonattainment for the 2010 SO_2 standard. The boundary of the partial county SO_2 nonattainment area is defined as the area within 26.8 kilometers (16.65 miles) of Herbert A. Wagner's Unit 3 stack, which is located at 39.17765 N. latitude, 76.52752 W. longitude (40 CFR part 81). The USEPA classifies Anne Arundel County as unclassified/attainment for all other criteria pollutants. NSA Annapolis also is within the Ozone Transport Region. The Ozone Transport Region was established by the 1990 amendments to the CAA and includes Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont, as well as the District of Columbia and portions of the Northern Virginia suburbs. Because the county is in nonattainment for ozone and SO_2 and a maintenance area for $PM_{2.5}$, a General Conformity applicability analysis is required.

The most recent emissions inventory for Anne Arundel County is shown in Table 3-2. Volatile organic compound (VOC) and NO_x emissions are used to represent ozone generation because they are precursors of ozone.

The Upper and Lower Yards of NSA Annapolis operate under Title V permit # 24-003-00310 that includes air quality requirements for fuel burning equipment such as external combustion sources (e.g., boilers and heaters); internal combustion engines (e.g., diesel emergency power generators); and gasoline dispensing tanks for motor vehicles. Recent annual criteria pollutants emissions for the Upper and Lower Yards of NSA Annapolis are shown in Table 3-3.

Table 3-2. Anne Arundel County Air Emissions Inventory (2011)

Location	*NO_x (tpy)*	*VOC (tpy)*	*CO (tpy)*	*SO_2 (tpy)*	*PM_{10} (tpy)*	*$PM_{2.5}$ (tpy)*
Anne Arundel County	20,731	18,781	71,736	14,078	5,079	2,586

Source: (USEPA, 2013)

Key: tpy = tons per year; NO_x = nitrogen oxide; VOC = volatile organic compounds; CO = carbon monoxide; SO_2 = sulfur dioxide, PM_{10} = suspended particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 microns in diameter

Table 3-3. NSA Annapolis Upper and Lower Yards Air Emissions Inventory

Year	*NO_x (tpy)*	*VOC (tpy)*	*CO (tpy)*	*SO_2 (tpy)*	*PM_{10} (tpy)*	*$PM_{2.5}$ (tpy)*
2011	12.2	0.75	11.5	1.16	1.11	1.08
2012	9.57	0.72	10.3	0.543	0.957	0.943
2013	11.43	0.83	12.5	0.25	0.307	0.302

Source: (NSA Annapolis, n.d.)

Key: tpy = tons per year; NO_x = nitrogen oxide; VOC = volatile organic compounds; CO = carbon monoxide; SO_2 = sulfur dioxide, PM_{10} = suspended particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 microns in diameter

3.1.3 Environmental Consequences

Effects on air quality are based on estimated direct and indirect emissions associated with the action alternatives. The study area for assessing air quality impacts is the air basin in which the project is located, the Metropolitan Baltimore Intrastate Air Quality Control Region.

Estimated emissions from a proposed federal action are typically compared with the relevant national and state standards to assess the potential for increases in pollutant concentrations.

3.1.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and baseline air quality would not change. Therefore, no significant impacts to air quality or air resources would occur with implementation of the No Action Alternative.

3.1.3.2 Alternative 1—Perry Center Site Potential Impacts

Under Alternative 1, the Navy would enter into a ground lease with the United States Naval Academy Alumni Association (USNA AA) and Naval Academy Foundation (NAF), and USNA AA and NAF (USNA/F) would construct a new Alumni Service Center and Headquarters facility on NSA Annapolis property located at the Perry Center in the southwest portion of the Upper Yard. A new 29,000-square-foot building and a parking lot would be constructed adjacent to College Creek. Five existing buildings on the site would be demolished. The NSA Annapolis Mail Center would be relocated to either Building 15NS on the North Severn Complex, requiring some renovations to the building, or to a prefabricated building constructed on the northwestern portion of the Perry Center that would require the demolition of Building 619. Additionally, either interior renovations to Building 104 on the Perry Center would occur to house the CHRIMP or a new prefabricated facility would be constructed directly southeast of Building 104 within the Perry Center on impervious surface. Emissions associated with the renovation of existing buildings or use of prefabricated structures would be negligible compared to the emissions resulting from the use of heavy equipment to demolish existing buildings and to construct a new USNA AA/F Alumni Service Center and Headquarters building. Therefore, renovation and prefabricated structure construction emissions were not included in the analysis.

The proposed project would not result in an appreciable change in operational emissions in the short term because it would involve the relocation of existing building functions and associated heating, ventilating, and air conditioning requirements to a single facility and would not increase population or employment levels. In the long term, although the specific reuse of the building spaces in which USNA AA and NAF currently operate is not known, it is reasonable to assume that these spaces would not remain vacant and that the long-term utility demands for these buildings would be similar to the current demand. Given the relatively small size of the proposed new building and the expected incorporation of energy-efficient design measures, the *de minimis* rates would not be exceeded by the additional long-term utility load.

Air quality impacts from construction would occur from (1) combustion emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10} and $PM_{2.5}$) during demolition activities, earth-moving activities, and the operation of equipment on bare soil. Fugitive dust emissions were calculated based on the total size disturbance (2.9 acres). Construction would occur over approximately two years (2017–2018), with the majority of earth disturbance and heavy equipment activity occurring in 2017. Equipment usage was based on similar construction projects to estimate project combustion and fugitive dust emissions. Refer to Appendix A for detailed information regarding the assumptions underlying the quantification of construction emissions.

The emissions associated with the construction of the Perry Center site are summarized in Table 3-4. The calculations indicate that annual emissions for proposed construction activities would be well below the *de minimis* rates and applicable major source thresholds. Therefore, air quality impacts would not be significant.

Table 3-4. Maximum Annual Emissions for Construction at the Perry Center Site in 2017 (in Tons/year)

	NO_x	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
2017 Total construction emissions	3.3	0.4	2.2	0.005	2.89	0.51
De minimis rates	100	50	—	100	—	100

Key: NO_x = nitrogen oxide; VOC = volatile organic compound; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = suspended particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 microns in diameter

General Conformity

A Record of Non-Applicability has been prepared and can be found in Appendix A.

Greenhouse Gases

Implementation of the Proposed Action under Alternative 1 would contribute directly to emissions of GHGs from the combustion of fossil fuels. Demolition, construction, and clearing activities would generate approximately 811 tons (736 metric tons) of CO_2e if the proposed activities occurred during

2017 (the peak year of construction activity). Once the facility is operational, there would be no net change in CO_2 emissions relative to existing space because the proposed project would involve the relocation of existing functions and staff to a new space (as opposed to adding new employees/space).

Therefore, implementation of this action alternative would not result in significant impacts on air quality.

3.1.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

Under Alternative 2, the Navy would enter into a space lease with USNA AA/F for use of Building 250 on the NSA Annapolis Upper Yard. Interior renovations to Building 250 and upgrades to utilities would occur. The renovation of Building 250 under Alternative 2 would result in substantially lower construction emissions than the new construction proposed under Alternative 1 because interior renovations would not require heavy-duty diesel equipment (e.g., dozers, excavators, cranes) or ground-disturbing activities that generate fugitive dust. In the long-term, the renovated building would be expected to use the same or less energy as under existing conditions and therefore emissions related to heating, ventilating, and air conditioning systems would not increase. A detailed quantified emissions estimate has not been prepared for Alternative 2. The *de minimis* criteria would not be exceeded based on the analysis performed for Alternative 1 showing that larger amount of construction would be well below the *de minimis* criteria.

Therefore, implementation of this action alternative would not result in significant impacts on air quality.

3.2 Water Resources

This discussion of water resources includes groundwater, surface water, wetlands, and floodplains. This section discusses the physical characteristics of wetlands, etc.; wildlife and vegetation are addressed in Section 3.5, Biological Resources.

Groundwater is water that flows or seeps downward and saturates soil or rock, supplying springs and wells.

Surface water resources generally consist of wetlands, lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. A Total Maximum Daily Load (TMDL) is the maximum amount of a substance that can be assimilated by a water body without causing impairment. A water body can be deemed impaired if water quality analyses conclude that exceedances of water quality standards occur.

Wetlands are jointly defined by USEPA and the United States Army Corps of Engineers (USACE) as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR part 328.3). Wetlands generally include “swamps, marshes, bogs and similar areas.”

Floodplains are areas of low-level ground present along rivers, stream channels, large wetlands, or coastal waters. Floodplain ecosystem functions include natural moderation of floods, flood storage and conveyance, groundwater recharge, and nutrient cycling. Floodplains also help to maintain water quality and are often home to a diverse array of plants and animals. In their natural vegetated state, floodplains slow the rate at which the incoming overland flow reaches the main water body. Floodplain boundaries are most often defined in terms of frequency of inundation, that is, the 100-year and 500-year flood.

Floodplain delineation maps are produced by the Federal Emergency Management Agency and provide a basis for comparing the locale of the Proposed Action to the floodplains.

3.2.1 Regulatory Setting

Groundwater quality and quantity are regulated under several statutes and regulations, including the Safe Drinking Water Act. Under the federal Safe Drinking Water Act, states are allowed to seek approval from USEPA to administer their own Public Water System Supervision Program. The state of Maryland received approval to administer its own program in 1977 and regulates its public water supplies and groundwater through the Maryland Water Supply Program in combination with state groundwater quality standards, both of which apply to the federal government. Regulations to protect and improve groundwater drinking water supplies include primary and secondary drinking water standards, a Groundwater Rule for water system improvement, wellhead protection, and well siting. Appropriation permits are issued to sustainably manage groundwater withdrawal and use. Potential issues for groundwater quality and quantity include contamination from surface water supplies and overexploitation (MDE, 2015a).

The Clean Water Act (CWA) establishes federal limits, through the National Pollutant Discharge Elimination System (NPDES) program, on the amounts of specific pollutants that can be discharged into surface waters to restore and maintain the chemical, physical, and biological integrity of the water. The NPDES program regulates the discharge of point (i.e., end of pipe) and nonpoint sources (i.e., stormwater) of water pollution.

Waters of the United States are defined as (1) traditional navigable waters, (2) wetlands adjacent to navigable waters, (3) nonnavigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow perennially or have continuous flow at least seasonally (e.g., typically 3 months), and (4) wetlands that directly abut such tributaries under section 404 of the CWA, as amended, and are regulated by USEPA and USACE. The CWA requires that Maryland establish a section 303(d) list to identify impaired waters and establish TMDLs for the sources causing the impairment.

Section 438 of the Energy Independence and Security Act establishes stormwater design requirements for development and redevelopment projects. Under these requirements, federal facility projects larger than 5,000 square feet must “maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.” The performance standards can be attained through on-site stormwater management practices that mimic natural processes, including the use of design and building practices, low-impact development, and green infrastructure tools.

State stormwater management is guided by the Stormwater Management Act of 2007 and state regulations under Code of Maryland Regulations 26.17.02. The Maryland NPDES stormwater program requires construction site operators engaged in clearing, grading, and excavating activities that disturb 1 acre or more to obtain coverage under a General Permit for Stormwater Associated with Construction Activity for stormwater discharges. Construction or demolition that necessitates an individual permit also requires preparation of a Notice of Intent to discharge stormwater and a Stormwater Pollution Prevention Plan that is implemented during construction. As part of the 2010 Final Rule for the CWA, titled *Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category*, activities covered by this permit must implement non-numeric erosion and sediment controls and pollution prevention measures.

Wetlands are currently regulated by USACE under section 404 of the CWA as a subset of all "Waters of the United States." The term "Waters of the United States" has a broad meaning under the CWA and incorporates deepwater aquatic habitats and special aquatic habitats including wetlands. Jurisdictional Waters of the United States regulated under the CWA include coastal and inland waters, lakes, rivers, ponds, streams, intermittent streams, and "other" waters that, if degraded or destroyed, could affect interstate commerce. The full regulatory definition of Waters of the United States is provided in the CWA.

Executive Order (EO) 11990, *Protection of Wetlands,* requires that federal agencies adopt a policy to avoid, to the extent possible, long- and short-term adverse impacts associated with destruction and modification of wetlands and direct and indirect support of new construction in wetlands whenever there is a practicable alternative.

EO 11988, *Floodplain Management*, requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and direct and indirect support of floodplain development unless it is the only practicable alternative. Flood potential of a site is usually determined by the 100-year floodplain, which is defined as the area that has a 1 percent chance of inundation by a flood event in a given year. EO 11988 details an eight step process for floodplain management decisions. These steps include: (1) determine if a proposed action is in the base floodplain; (2) conduct a public review of the action; (3) identify and evaluate practicable alternatives to locating in the base floodplain; (4) identify the impacts of the proposed action; (5) develop measures to reduce unavoidable impacts and restore floodplain values; (6) reevaluate alternatives; (7) issue findings and a public explanation; and (8) implement the action.

EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*, and the associated Federal Flood Risk Management Standard reinforce the guidelines stated in EO 11988. The Federal Flood Risk Management Standard encourages the consideration of existing natural features during the development of alternatives. Additionally, the standard guides agencies to use a higher flood elevation to ensure that proposed projects account for uncertainties associated with climate change. Additionally the EO 13653, *Preparing the United States for the Impacts of Climate Change*, requires federal agencies to manage their operations and missions for climate preparedness and resilience through better anticipation of the risks and vulnerabilities associated with climate change.

A Department of Defense (DoD) memorandum, *Floodplain Management on Department of Defense Installations*, complements the EOs and other regulations by instructing installations to minimize construction in the 100-year floodplain, if feasible (Under Secretary of Defense, 2014). Construction in a floodplain would require implementation of flood mitigation measures.

Under Code of Maryland Regulations 26.17.04, changes within the 100-year floodplain require a permit. Activities include filling, grading, excavating or dredging, extraction, storage, subdivision of land, and the construction or improvement of structures (MDE, n.d.a). In order to receive authorization from USACE and Maryland, the "Joint Federal/State application for the Alteration of Any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland" would need to be completed and submitted. Specifically, a General Waterway Construction Permit would be required for clearing and grading activities disturbing less than 5,000 square feet of land and 100 cubic yards of earth in the floodplain. The permit ensures that construction activities protect fish habitat, prevent erosion and increased flooding, and do not alter flood risks on upstream and downstream land.

3.2.2 Affected Environment

The following discussions provide a description of the existing conditions for each of the categories under water quality resources at NSA Annapolis.

3.2.2.1 Groundwater

Drinking water for the Upper and Lower Yards of NSA Annapolis is provided from the Patapsco Aquifer, approximately 600 to 700 feet below the ground surface, via three groundwater wells located in the Upper Yard (NSA Annapolis, 2014a). The NSA Annapolis Environmental Department monitors groundwater and implements a wellhead protection program that manages the land surface around wells to ensure no surface activities impact water quality. The 2014 water quality report for drinking water noted that all detected contaminants were well below the maximum contaminant levels set by the USEPA and MDE (NSA Annapolis, 2014a). While groundwater levels fluctuate on a seasonal basis, groundwater monitoring wells located adjacent to College Creek on the NSA Annapolis Lower Yard show monthly median depths to water level of approximately 7 feet to 28 feet below land surface and wells on the North Severn Complex show depths of approximately 100 feet below land surface (U.S. Geological Survey, 2016).

3.2.2.2 Surface Water

NSA Annapolis has approximately 4 miles of shoreline along the Severn River, College Creek, and Spa Creek (NAVFAC Washington, 2015). NSA Annapolis, including the North Severn Complex, is located within the Severn River watershed, and has a drainage area of 70 square miles (USNA, 2001). College Creek, a tidal tributary to the Severn River, is the closest surface water to the project sites and forms the southern border of the Perry Center site (Alternative 1) (Figure 2-1). Hospital Point, where Building 250 (Alternative 2) is located, is approximately 800 feet away from the Severn River, which empties into the Chesapeake Bay. Building 15NS (Alternative 1) on the North Severn Complex is approximately 1,000 feet from the Severn River. Carr Creek intersects the North Severn Complex and empties into the Severn River to the east of Building 15NS.

The Severn River is classified as a “scenic river.” The MDE classifies the tidal areas of the Severn River as Use Class II waters, Nursery Use from February 1 to May 31, shallow water submerged aquatic vegetation use from April 1 to October 30 to a depth of 1.0 meter, and open water fish and shellfish use year-round (MDE, 2014). The Severn River is impaired due to nitrogen, phosphorus, total suspended solids, and fecal coliform but has an approved TMDL, the Chesapeake Bay TMDL, finalized in 2010, establishing pollutant loading limits designed to bring the river back into compliance (MDE, 2015b). College Creek is also classified as Use II Class II waters.

Stormwater runoff from the Perry Center site and Hospital Point is directed to existing stormwater lines that drain to either College Creek or the Severn River (NAVFAC Washington, 2012b). Runoff from the area around Building 15NS on the North Severn Complex is directed to the Severn River. Stormwater discharges on NSA Annapolis are also regulated by a NPDES Phase II General Permit for Discharges from State and Federal Small Municipal Separate Storm Sewer System. This permit requires a reduction in stormwater runoff related pollutants through “public education and outreach; public participation and involvement; illicit discharge detection and elimination; construction site runoff control; post-construction runoff control; and pollution prevention/good housekeeping” (MDE, n.d.b).

3.2.2.3 Wetlands

According to the National Wetlands Inventory, no wetlands are located on the proposed project sites (USFWS, 2013) (MDNR, 2016). College Creek, which is adjacent to the Perry Center site, is considered by the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory data to be an estuarine subtidal deepwater habitat. The Severn River, which is also classified as an estuarine subtidal deepwater habitat, is approximately 1,000 feet from Building 15NS (Alternative 1) on the North Severn Complex and 800 feet from Building 250 (Alternative 2) at Hospital Point.

3.2.2.4 Floodplains

Similar to wetlands, floodplain functions include temporary storage of floodwaters, attenuation of high flows, and prevention of erosion. Floodplains are important for natural ecosystem integrity and biodiversity because they provide habitat for wildlife, areas for groundwater recharge or discharge, and water quality improvement. Floodplains also have aesthetic value and can be used for recreational and educational activities.

A small strip along the southern edge of the Perry Center site adjacent to College Creek is part of flood zone AE, or the 1 percent annual chance floodplain (Figure 3-1) (FEMA, 2015a) (MDNR, 2016). This is also referred to as the 100-year floodplain. The base flood elevation at the Perry Center site is 5 feet (FEMA, 2015a). A wooden seawall reinforces a portion of the shoreline of College Creek at the Perry Center site. Hospital Point is not located within a floodplain. Although small portions of the North Severn Complex are within the 1 percent or 0.2 percent annual chance floodplains, the area around Building 15NS is not located within the floodplain (FEMA, 2015b).

Storm surge can lead to greater flooding risks for coastal areas. Sea level rise can exacerbate flooding along the coast, including associated storm surges. Storm surge data from MDNR shows that the Perry Center site would be impacted from flooding surges as a result of Category 1 through 4 storms (Figure 3-2) (MDNR, 2016). Flooding would range from minimal inundation associated with Category 1 storms to inundation of approximately 250 feet inland of the shoreline with Category 4 storms close to the King George Street bridge. At Hospital Point, Building 250 (Alternative 2) would not be affected by storm surge, although a small portion of the parking lot at Hospital Point would be affected, experiencing minimal inundation from Category 4 storm surges (Figure 3-2). Building 15NS on the North Severn Complex would not be affected by storm surges. Sea level rise would affect the Perry Center site (Alternative 1), but not Hospital Point (i.e., Building 250 (Alternative 2)) (MDNR, 2016). A sea level rise of 0 to 2 feet would not inundate the Perry Center site; however, a rise of 2 to 5 feet would inundate a small portion of the site boundary along the shoreline, while a rise of 5 to 10 feet would have a greater extent of inundation, particularly in the southwest and southeast (MDNR, 2016). Building 15NS on the North Severn Complex would not be affected by sea level rise.

3.2.3 Environmental Consequences

The water resources analysis evaluates potential impacts on water resources, including water quality issues related to the lease of Navy property to USNA AA/F, the subsequent construction or renovation of a new Alumni Service Center and Headquarters facility on the leased property, and the relocation of existing functional support services on NSA Annapolis property.

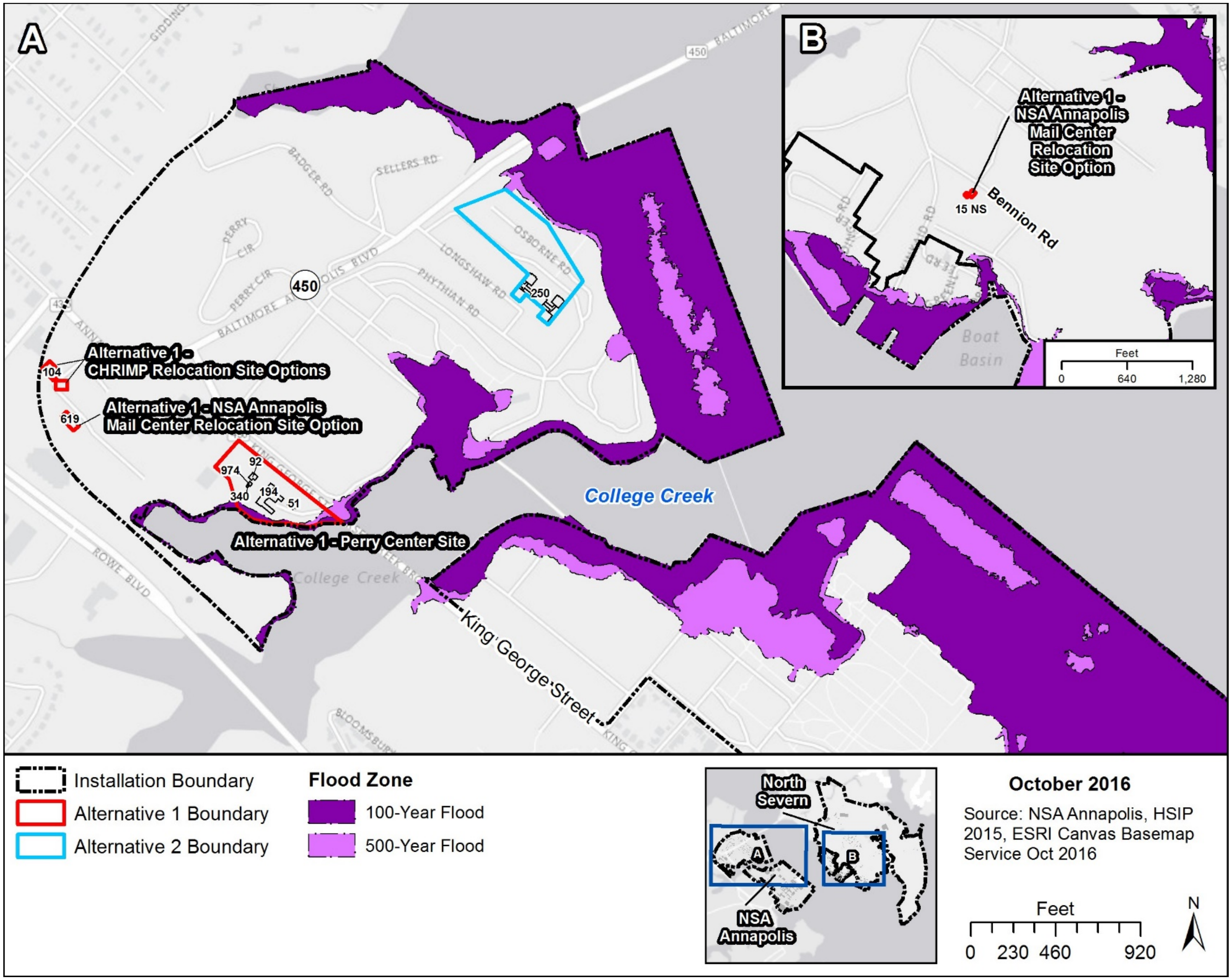


Figure 3-1 Floodplains in Project Areas

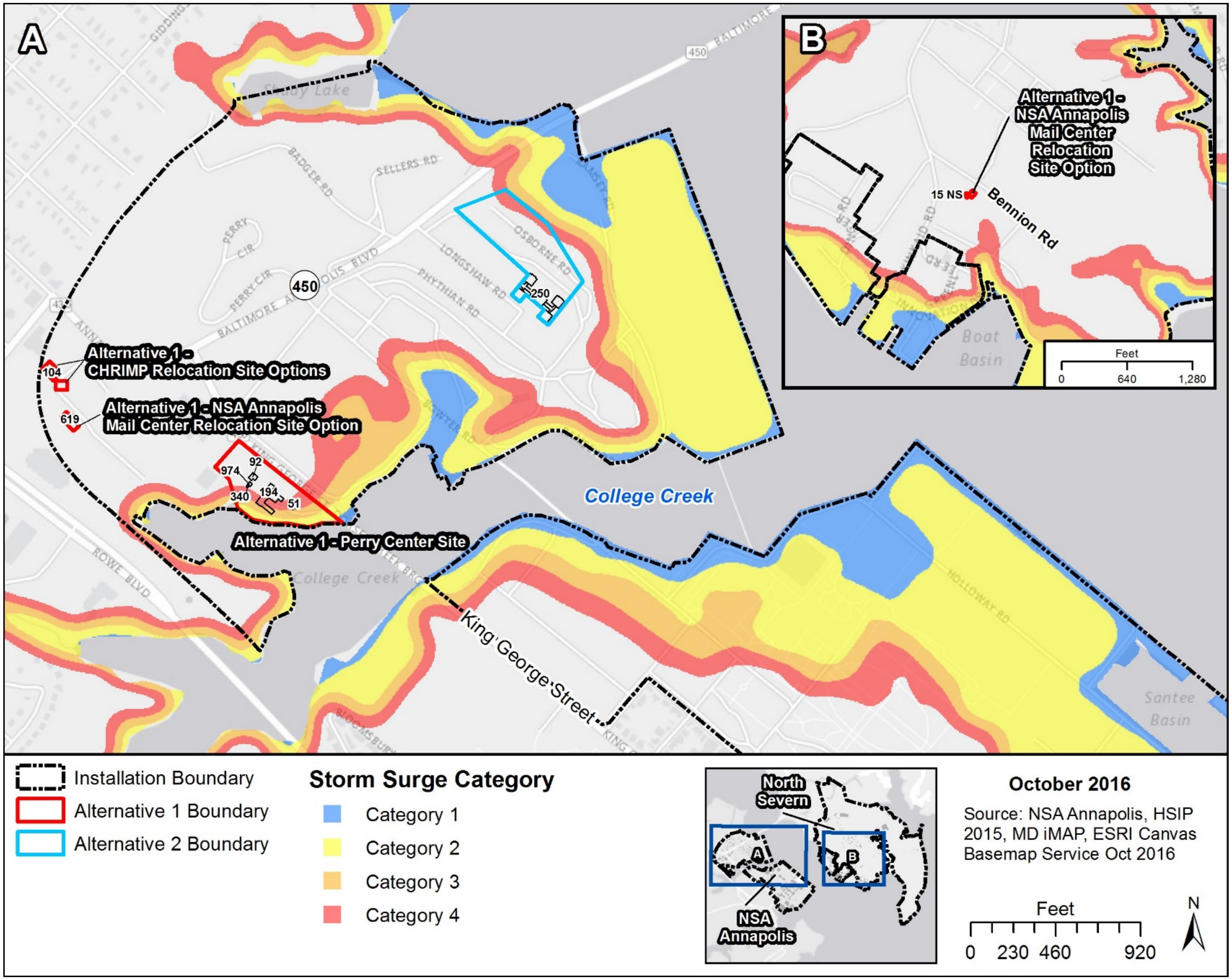


Figure 3-2 Storm Surge in Project Areas

3.2.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to baseline water resources. Therefore, no significant impacts to water resources would occur with implementation of the No Action Alternative.

3.2.3.2 Alternative 1—Perry Center Site Potential Impacts

Under Alternative 1, the Navy would enter into a ground lease with USNA AA/F, and USNA AA/F would construct a new Alumni Service Center and Headquarters facility on NSA Annapolis property located at the Perry Center in the southwest portion of the NSA Annapolis Upper Yard. A new 29,000-square-foot building and a parking lot would be constructed adjacent to College Creek. Five existing buildings on the site would be demolished. The NSA Annapolis Mail Center would be relocated to either Building 15NS on the North Severn Complex, requiring some renovations to the building, or to a prefabricated building constructed on the northwestern portion of the Perry Center that would require the demolition of Building 619. Additionally, relocating the functions of the CHRIMP facility would require either interior renovations to Building 104 on the Perry Center or construction of a new prefabricated facility directly southeast of Building 104 within the Perry Center on impervious surface. The study area for Alternative 1 includes the Alternative 1 boundary as shown in Figure 3-1. Water quality issues for water resources affected by construction and operation actions consider resources in the study area and along College Creek and the Severn River.

Groundwater

Constructing the Alumni Service Center and Headquarters facility would require demolishing five existing buildings and clearing and grading land. Impacts on groundwater could result from the leaching of pollutants from the surface into the shallow groundwater resources during construction. Soil disturbance and the use of construction equipment would increase the potential for impacts on groundwater resources. Depending on the depth to groundwater, dewatering during construction activities could temporarily alter groundwater resources. However, no Water Appropriation and Use permit for construction activities would be necessary, no new wells would be constructed, and existing wells would not be impacted. Stormwater runoff can contribute to groundwater pollution; therefore, compliance with a pollution prevention plan, stormwater construction permit, and stormwater BMPs would prevent or minimize possible pollutant loading to shallow groundwater and protect groundwater quality during construction. Additionally, installation of pervious pavement would minimize impacts to groundwater recharge on the Perry Center site. Therefore, implementation of Alternative 1 would have minimal short-term adverse impacts on groundwater.

NSA Annapolis Mail Center Options

Under Alternative 1, relocating the existing NSA Annapolis Mail Center would not impact groundwater. The option for relocating the NSA Annapolis Mail Center to Building 15NS on the North Severn Complex would require interior and some exterior renovations to the building, while relocating the existing administrative support functions in Building 15NS to another location on the North Severn Complex would only involve potential interior renovations. The second option for relocating the NSA Annapolis Mail Center would require the demolition of Building 619 followed by the placement of a prefabricated structure on top of an existing impervious surface. Demolition and construction would occur and include the use of heavy equipment; however, the actions would take place on top of existing impervious surface which would prevent infiltration of pollutants and contamination of groundwater. Therefore, there would be no impacts to groundwater.

CHRIMP Options

Under Alternative 1, relocating the existing CHRIMP would not impact groundwater. One option would only involve interior renovations to Building 104. Building 104 is a Base Operating Support (BOS) contractor's ready room including warehouse and storage functions. These functions would be relocated to underutilized contractor space within the Perry Center and would not impact groundwater, and a second option would place a prefabricated structure on top of an existing impervious surface adjacent to Building 104.

Overall under Alternative 1, relocation of the NSA Annapolis Mail Center and CHRIMP would not affect groundwater; however, the construction of the Alumni Service Center and Headquarters facility would result in minimal, short-term adverse impacts on groundwater.

Surface Water

There are no surface waters located within the footprint of the Alumni Service Center and Headquarters facility at the Perry Center; therefore, this alternative would have no direct impacts on surface water resources. However, there could be indirect impacts on surface water as a result of demolition activities, construction activities, or an increase in impervious surface. Constructing the Alumni Service Center and Headquarters facility would involve demolishing existing buildings, clearing and grading activities, and using heavy equipment. Temporary impacts on surface waters could result from soil disturbance associated with demolition and construction activities that could increase the potential for the transport of sediment into surrounding surface waters via overland stormwater runoff. Operation of construction equipment would increase the potential of accidental leaks or spills of fuel, lubricants, or other materials. Adherence to water quality regulations, including the implementation of applicable construction, stormwater management, and sediment and erosion control plans and BMPs in addition to a NPDES stormwater permit would minimize and prevent any indirect pollutant loading to surface waters, resulting in minimal, short-term adverse impacts on surface waters at the Perry Center site.

The construction of the new Alumni Service Center and Headquarters facility would increase impervious surfaces at the Perry Center site. Because the construction would disturb more than 1 acre of land, the project would require a General Permit for Stormwater Associated with Construction Activity. Compliance under this permit would require implementation of stormwater BMPs to prevent water quality impacts. Under Alternative 1, runoff from the increase in impervious surfaces would be managed under a stormwater management plan using environmental site design practices to the maximum extent practicable as required under section 438 of the Energy Independence and Security Act. At the proposed Alumni Service Center and Headquarters facility site, preliminary conceptual designs considered the use of pervious pavement for parking and patio areas. Additional potential practices that could be implemented include raingardens and other "green techniques." Therefore, adverse impacts to surface waters would be minimal because of the permitting requirements and implementation of management plans and mitigation measures that reduce stormwater runoff and associated erosion, pollution, and sedimentation.

NSA Annapolis Mail Center Options

The option of relocating the existing NSA Annapolis Mail Center to Building 15NS on the North Severn Complex would have no impact on surface water because it only involves interior and some exterior renovations to the building and is not located near surface waters. The existing function of Building 15NS would be relocated to another building location on the North Severn Complex, which would require only minor interior renovations, and would not affect surface waters. For the option that would demolish Building 619 and place a prefabricated building on the existing foundation/slab, there would be no disturbance to soils, and the demolition and construction activities would occur over existing impervious surface. Adherence to water quality regulations and permits and implementation of BMPs would prevent any indirect pollutant loading to surface waters. The existing functions of Building 619 are unnecessary and would not be relocated resulting in no surface water impacts. The amount of impervious surface area would remain the same under either option. Therefore, relocation of the NSA Annapolis Mail Center would not impact surface water.

CHRIMP Options

There are no surface waters located within the footprint of the CHRIMP options at the Perry Center; therefore, there would be no direct impacts on surface water resources. The first option for the relocation of the CHRIMP facility functions would involve the placement of a prefabricated modular structure on top of existing impervious surface adjacent to Building 104. Adherence to water quality regulations and permits and implementation of BMPs would prevent any indirect pollutant loading to surface waters. The second option would only include interior renovations to Building 104, and the existing functions of Building 104 would be relocated to other underutilized space resulting in no surface water impacts. Impervious surface area would not change under either option. Therefore, there would be no impacts to surface water from CHRIMP relocation.

Overall under Alternative 1, relocation of the NSA Annapolis Mail Center and CHRIMP would not affect surface water; however, the construction of the Alumni Service Center and Headquarters facility would result in minimal, short-term adverse impacts on surface water.

Wetlands

The Perry Center site is located immediately north of College Creek, an estuarine subtidal deepwater habitat, but does not contain any wetlands. Therefore, the construction of the new Alumni Service Center and Headquarters facility would have no impacts on wetlands.

NSA Annapolis Mail Center Options

Relocating the existing NSA Annapolis Mail Center to Building 15NS on the North Severn Complex would have no impact on wetlands because it only involves interior and some exterior renovations to the building and is not located within or near a wetland. The existing functions of Building 15NS would be relocated to another building location with only minor interior renovations needed. For the option that would demolish Building 619 and place a prefabricated building on the existing foundation/slab, there are no wetlands within or near the site, and both demolition and construction activities would occur over existing impervious surface resulting in no impacts to wetlands. The existing functions of Building 619 are unnecessary and would not be relocated. As a result, relocating the NSA Annapolis Mail Center would not impact wetlands.

CHRIMP Options

Relocating the existing CHRIMP functions to Building 104 or to a prefabricated structure constructed adjacent to Building 104 would not impact wetlands. Both options would take place within the Perry Center. Relocating the CHRIMP functions to Building 104 would only involve interior renovations, and the current functions of Building 104 would be relocated to an existing underutilized BOS contractor space within the Perry Center. The site adjacent to Building 104 is an existing parking lot with no wetlands, and the prefabricated CHRIMP would be placed on top of the existing impervious surface. Therefore, the options for relocating the CHRIMP would not impact wetlands.

Therefore, overall under Alternative 1, there would be no impacts on wetlands.

Floodplains

Demolishing the five existing buildings located on the Perry Center site would not affect any portion of the 100-year floodplain. The footprint of the Alumni Service Center and Headquarters facility would not be within the floodplain, resulting in no long-term impacts on the floodplain. However, during construction, a small portion of the 100-year floodplain would be temporarily disturbed through vegetation removal, soil compaction, and exposure of soils to potential erosive processes. The short-term impacts on floodplains from construction would be minimized through the use of stormwater management plans, erosion and sediment control plans, and associated BMPs. Compliance with the Department of Defense (DoD) memorandum, EO 13653, and EO 11988 to avoid and minimize impacts to the floodplain and floodplain functions resulted in the design and placement of the Alumni Service Center and Headquarters facility outside of the 100-year floodplain. There would be minimal, short-term impacts and no long-term impacts on the floodplain and no impacts on floodplain functions and values. Therefore, construction and operation of the new Alumni Service Center and Headquarters facility under Alternative 1 would not result in significant impacts on floodplains.

NSA Annapolis Mail Center Options

Under Alternative 1, relocating the existing NSA Annapolis Mail Center would not impact floodplains. The site options of Building 15NS on the North Severn Complex and Building 619 within the Perry Center are both located outside of the floodplain. The existing functions of Building 15NS would be relocated to another building on the North Severn Complex with only interior renovations required. The existing functions of Building 619 are unnecessary and would not be relocated.

CHRIMP Options

Both CHRIMP relocation options are located within the Perry Center. Renovating the interior spaces of Building 104 or constructing the new prefabricated CHRIMP facility adjacent to Building 104 would not affect floodplains because these locations are not located within the 100-year floodplain. Furthermore, the current BOS contractor functions in Building 104 would be relocated to an existing underutilized BOS contractor space within the Perry Center. Therefore, the options for relocating the CHRIMP under Alternative 1 would not impact floodplains.

Overall, Alternative 1 would have minimal, short-term impacts to floodplains resulting from temporary disturbances during construction of the Alumni Service Center and Headquarters facility.

3.2.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

Under Alternative 2, the Navy would enter into a space lease with USNA AA/F for use of Building 250 located along Wood Road at Hospital Point within the eastern portion of the NSA Annapolis Upper Yard. Interior renovations to Building 250 and upgrades to utilities would occur. The study area for Alternative 2 includes the footprint of Building 250 on Hospital Point.

Alternative 2 would not require any new construction and only interior renovation activities within Building 250 itself would take place. There would be no impacts on water resources during normal operation of the facility. Therefore, implementation of Alternative 2 would not result in significant impacts on water resources.

3.3 Geological Resources

This discussion of geological resources includes topography, geology, and soils of a given area. Topography is typically described with respect to the elevation, slope, and surface features found within a given area. The geology of an area may include bedrock materials, mineral deposits, and fossil remains. The principal geological factors influencing the stability of structures are soil stability and seismic properties. Soil refers to unconsolidated earthen materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility determine the ability for the ground to support structures and facilities. Soils are typically described in terms of their type, slope, physical characteristics, and relative compatibility or limitations with regard to particular construction activities and types of land use. Bathymetry is described in terms of the topography of the sea floor or river bottoms where the Proposed Action would occur.

3.3.1 Affected Environment

The following discussions provide a description of the existing conditions for each of the categories under geological resources at NSA Annapolis.

3.3.1.1 Topography

NSA Annapolis lies in the Atlantic Coastal Plain Physiographic Province, a gently undulating plain along the Atlantic and Gulf of Mexico coast from northwestern New Jersey to Mexico. The topography of the USNA portion of the installation varies from relatively flat in the southeastern portion to steep ridges and swales in the northwestern portion. Elevation varies from sea level to 80 feet above mean sea level. The North Severn Complex is relatively flat with elevations ranging from sea level along the shoreline to 20 feet above mean sea level on the golf course (NAVFAC Washington, 2014). The Perry Center site is adjacent to College Creek and has an estimated elevation of 25 to 35 feet. The CHRIMP relocation site and Hospital Point have estimated elevations of 40 to 55 feet (NAVFAC Washington, 2011a).

3.3.1.2 Geology

The Atlantic Coastal Plain is underlain by unconsolidated sediments containing gravels, sands, and clays of the late Mesozoic and Cenozoic Age, 100 million years old or younger. Geologic formations occurring in the area include the Aquia Greensand and Matawan Formation, which overlie the Magothy Formation. There are no major geographical structural features and no active fault lines in the Annapolis area (NAVFAC Washington, 2012a).

3.3.1.3 Soils

There are six major soil series on the USNA portion of NSA Annapolis, including the Annapolis, Collington-Wist, Cumberstone-Mattapex, Donlonton, Udorthents, and Urban series (see Figure 3-3). There are 14 major soil series on the North Severn Complex of which the Colemantown, Deale-Shadyoak complexes, Donlonton, Mispillion and Transquaking, and Widewater and Issue soils are hydric and prone to flooding. The Annapolis, Collington-Wist, Cumberstone-Mattapex, Downer-Phalanx, Patapsco-Evesboro, Russett, and Sassafras soils, outside of previously built areas, are classified as prime farmland or farmland of statewide importance by the Natural Resources Conservation Service (NAVFAC Washington, 2014). Prime farmland does not include land already in or committed to urban development. The project sites have been previously disturbed and are developed; therefore, the soils are not considered prime farmland. As shown in Figure 3-3, the soil at the Alternative 1 project sites (including Building 15NS on the North Severn Complex) consists of the Annapolis soil series, including Annapolis fine sandy loam, 15–20 percent slopes (AsE); Annapolis-Urban land complex, 0–5 percent slopes (AuB); and Annapolis-Urban land complex, 5–15 percent slopes (AuD) or Udorthents (UxB). Soils in the Annapolis series are in the upland coastal plain and are generally well-drained. These soils have a parent material consisting of loamy glauconitic fluviomarine deposits and typically support cropland, woodland, and urban development (USDA-NRCS, 2016). The Udorthents soils on site are loamy and sulfidic substratum with 0 to 5 percent slopes. Udorthents soils exist where upper soil materials have been previously removed or filled, indicating that a site is currently or has previously been developed or otherwise disturbed (USDA-NRCS, 2016).

As shown in Figure 3-3, the soil at the Alternative 2 project site consists of the Collington-Wist and Cumberstone-Mattapex soil series, including Collington-Wist-Urban land complex, 5–15 percent slopes (CpD), and Cumberstone-Mattapex-Urban land complex, 0–5 percent slopes (CyB). Soils in the Collington series are in the North Atlantic Coastal Plain and are well drained. They exhibit a low to very rapid surface runoff and moderate to moderately slow permeability. Soils in the Cumberstone series are in the coastal plain and somewhat poorly drained. They exhibit a high to very high surface runoff and moderately slow to slow permeability. These soils typically support cropland, woodland, and urban development (USDA-NRCS, 2016).

3.3.2 Environmental Consequences

Analysis of impacts on geological resources is focused on the impacts of the alternatives on geology, topography, and soils.

3.3.2.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to baseline geology, topography, or soils. Therefore, no significant impacts on geological resources would occur with implementation of the No Action Alternative.

3.3.2.2 Alternative 1—Perry Center Site Potential Impacts

Impacts from demolition and construction activities at the new Alumni Service Center and Headquarters facility on the Perry Center site would be limited to the areas where ground disturbance would occur, including sites identified for demolition and construction, and would result from disturbance and compaction of soils. Soils were previously disturbed during initial construction of the existing buildings, surrounding roads, parking, and sidewalk areas; therefore, minimal grading would occur. BMPs would be implemented during construction activities to prevent runoff and erosion of soils into the adjacent College Creek and Severn River. As a result, implementation of Alternative 1 would not result in significant impacts on geological resources.

NSA Annapolis Mail Center Options

Relocating the mail center to the North Severn Complex would necessitate minor interior and exterior renovations at Building 15NS. Required renovations would not include new construction, and all areas affected have been previously disturbed during prior construction activities. To the extent that any soil disturbances would occur, BMPs would be implemented to prevent erosion and related sedimentation impacts. Relocating the existing functions in Building 15NS to another facility on the North Severn

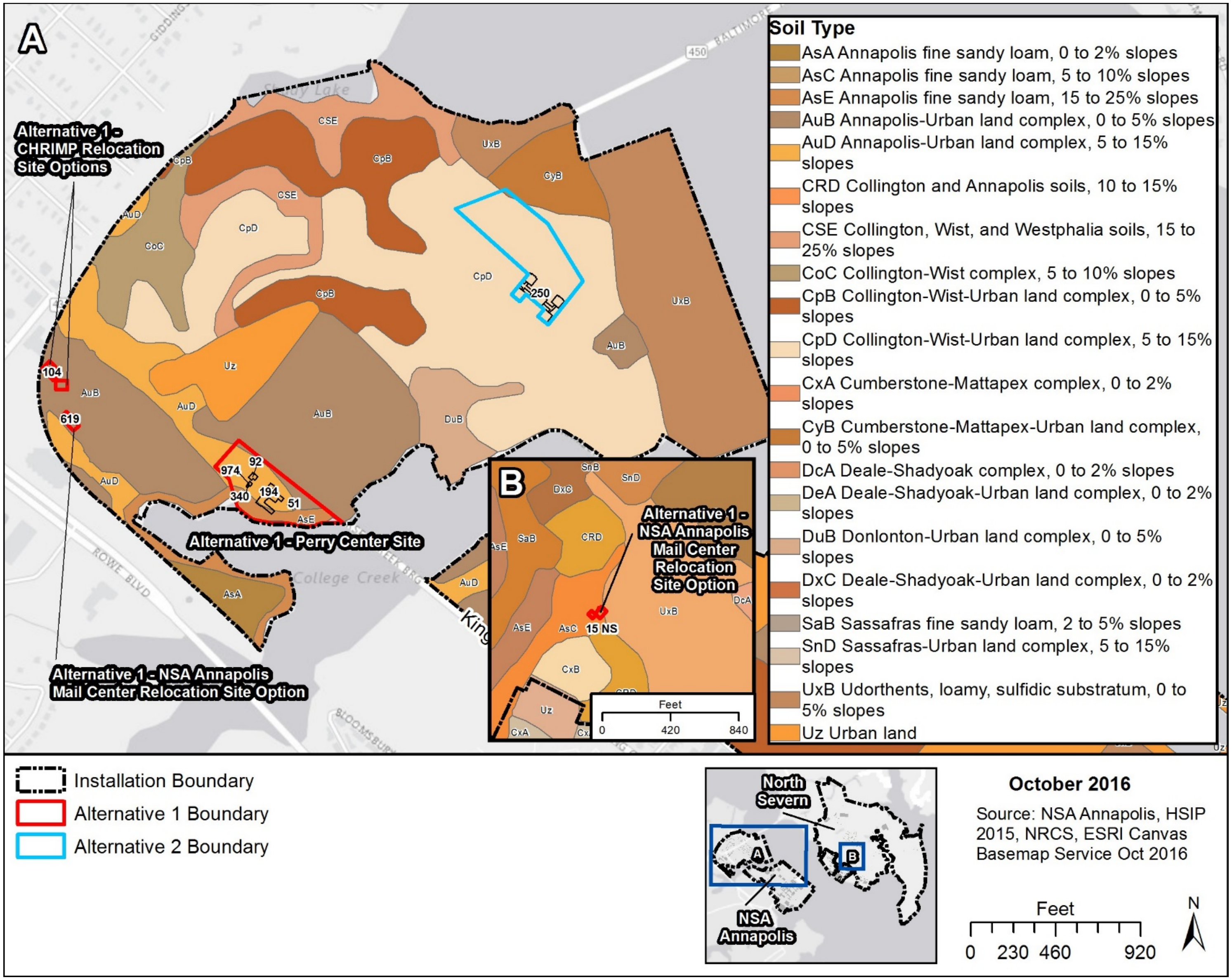


Figure 3-3 Soils in Project Areas

Complex would only require interior renovations and would not impact geological resources. Another option for relocating the NSA Annapolis Mail Center would entail demolishing Building 619 and placing a prefabricated building to serve as the mail center on the existing slab/foundation. The building and associated parking would be placed on existing impervious surfaces; therefore, no new impacts to soils would occur. No impacts to geological resources would result from the implementation of either mail center option under Alternative 1.

CHRIMP Options

Relocating the CHRIMP would entail either moving CHRIMP functions to an existing facility (Building 104) or the construction of a prefabricated facility on an existing parking lot area adjacent to Building 104 that has already been disturbed. If Building 104 is renovated, the existing BOS contractor functions would be moved to another existing facility on Perry Center and would not impact geological resources. These options would not require significant earthwork or other soil disturbance. Therefore, no impacts to geological resources would occur.

Overall under Alternative 1, relocation of the NSA Annapolis Mail Center and CHRIMP would not affect geological resources. Similarly, the construction of the Alumni Service Center and Headquarters facility would not result in significant impacts on those resources.

3.3.2.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

The study area encompasses the proposed renovation and ground-disturbance areas related to the reuse/renovation of Building 250. Impacts on geological resources would be minimal and limited to the areas where ground disturbance would occur, including any exterior areas that are disturbed during the internal infrastructure renovation, and would result from disturbance and compaction of soils. BMPs would be implemented during renovation activities to prevent runoff and erosion of soils. Therefore, implementation of Alternative 2 would not result in significant impacts on geological resources.

3.4 Cultural Resources

This discussion of cultural resources includes prehistoric and historic archaeological sites; historic buildings, structures, and districts; and physical entities and human-made or natural features important to a culture, a subculture, or a community for traditional, religious, or other reasons. Cultural resources can be divided into three major categories:

- Archaeological resources (prehistoric and historic) are locations where human activity measurably altered the earth or left deposits of physical remains.
- Architectural resources include standing buildings, structures, landscapes, and other built-environment resources of historic or aesthetic significance.
- Traditional cultural properties may include archaeological resources, structures, neighborhoods, prominent topographic features, habitat, plants, animals, and minerals that Native Americans or other groups consider essential for the preservation of traditional culture.

3.4.1 Regulatory Setting

Cultural resources are governed by other federal laws and regulations, including the National Historic Preservation Act (NHPA), Archeological and Historic Preservation Act, American Indian Religious Freedom Act, Archaeological Resources Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990. Federal agencies' responsibility for protecting historic properties is defined primarily by Sections 106 and 110 of the NHPA. Section 106 requires federal agencies to consider the effects of their undertakings on historic properties. Section 110 of the NHPA requires federal agencies to establish—in conjunction with the Secretary of the Interior—historic preservation programs for the identification, evaluation, and protection of historic properties. Cultural resources also may be covered by state, local, and territorial laws.

Though the Navy is coordinating the Section 106 compliance process with the NEPA compliance process, it is conducting Section 106 consultation separately from NEPA. Consultation with the Maryland Historical Trust (MHT), which serves as the Maryland State Historic Preservation Office, was initiated on October 20, 2015, and the Navy invited the following as consulting parties: Advisory Council on Historic Preservation, National Park Service, City of Annapolis Historic Preservation Division, City of Annapolis Historic Preservation Commission, Historic Annapolis Foundation, West Annapolis Heritage Partnership, and St. John's College. An initial consulting parties meeting was held on December 7, 2015. As part of the Section 106 compliance process, the Navy intends to develop a programmatic agreement with MHT and consulting parties to govern the implementation of the undertaking, identify any adverse effects under the NHPA, and specify appropriate avoidance, minimization, and mitigation measures.

3.4.2 Affected Environment

The NHPA defines “historic properties” as cultural resources that are listed in the National Register of Historic Places (NRHP) or eligible for listing in the NRHP. The list was established under the NHPA and is administered by the National Park Service on behalf of the Secretary of the Interior. The NRHP includes properties on public and private land. The Secretary of the Interior or a federal agency official (with concurrence from the applicable State Historic Preservation Office) can determine properties eligible for listing in the NRHP. An NRHP-eligible property has the same protections as a property listed in the NRHP. Historical properties include archaeological and architectural resources.

The Navy has conducted inventories of cultural resources at NSA Annapolis to identify historical properties that are listed or potentially eligible for listing in the NRHP (NSA Annapolis and NAVFAC Washington PWD Annapolis, 2010).

The study area for cultural resources is the geographic area or areas within which an undertaking (project, activity, program, or practice) may cause changes in the character or use of any historic properties present. The study area is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking.

For this Proposed Action, the Navy determined that the study area for Alternative 1 is approximately 98 acres and includes an area in the southwestern portion of the Upper Yard in the USNA National Historic Landmark District (NHLD), as well as an area on the North Severn Complex (Figure 3-4). In the Upper Yard, the study area includes Buildings 51, 92, and 194, which are contributing resources that are discontiguous to the USNA NHLD. It also includes Buildings 974, 340, 619, and 104, all of which are outside the boundary of the USNA NHLD and are also not contributing resources to the NHLD. The study area in the Upper Yard also includes neighboring areas to the east and across College Creek to the south, including a portion of the St. John’s College campus located within the Colonial Annapolis NHLD. On the North Severn Complex, the study area includes Building 15NS, an option for relocation of the NSA Annapolis Mail Center, and the area immediately surrounding it.

The study area for Alternative 2 includes Building 250 located at Hospital Point in the Upper Yard and the parking areas north and northwest of the building. The study area for Alternative 2 is located within the

USNA NHLD, and Building 250 is a contributing resource in the district. The study areas for both Alternative 1 and Alternative 2 equate to the area of potential effect identified for each alternative during the Section 106 process under NHPA.

3.4.2.1 Archaeological Resources

Nineteen archaeological surveys have been conducted at NSA Annapolis within the Upper and Lower Yards. A total of 15 archaeological sites, including prehistoric sites and historic domestic and military sites, are located within the Upper and Lower Yards, although none are located in the study area for either Alternative 1 or Alternative 2. Eighteen archaeological surveys have been conducted within the boundaries of the North Severn Complex. A total of 29 archeological sites and 7 areas of potential archeological deposits are located within the North Severn Complex, including prehistoric sites and historic domestic and agricultural sites, although none are located in the study area for Alternative 1 (i.e., Building 15NS and the surrounding area) (NSA Annapolis and NAVFAC Washington PWD Annapolis, 2010).

3.4.2.2 Architectural Resources

USNA NHLD[1]

The USNA NHLD was designated as an NHL on July 4, 1961, and was automatically placed on the NRHP in 1966 when the Register was created by the passage of the NHPA. The USNA NHLD is nationally significant for its pivotal role in American naval affairs and the education of naval officers in both military and academic studies, and for exemplifying the design principles of Beaux Arts architecture and the work of New York architect Ernest Flagg, who designed the plan of the main campus and its core buildings in the late 19th century. Flagg's design includes classically inspired monumental buildings arranged around a central yard (the Quadrangle) in rigid axial symmetry.

The USNA NHLD's boundaries encompass the Lower Yard and much of the Upper Yard (Figure 3-4). The NRHP nomination forms (two were completed in the 1970s) do not indicate a period of significance for the USNA NHLD. The USNA NHLD is noted for its national historic significance in architectural design and in the development of military education. The district includes more than 100 contributing elements containing buildings, structures, and monuments. As a whole, these features define the character and the significance of the USNA. The USNA NHLD encompasses virtually all of the Lower and Upper Yards.

In 2003, Buildings 51, 92, and 194 were determined to be contributing resources in the USNA NHLD, discontiguous to the historic district's boundaries. Building 51, constructed in 1904, was originally the stabler's cottage and currently houses the NSA Annapolis Mail Center. Building 194, also constructed in 1904, was originally a stable and is currently the location of the CHRIMP. Building 92, constructed in 1901, was originally the superintendent's gardener's cottage and is currently unoccupied and in disrepair. Building 974 is a garage that was constructed in 1932. Building 340 is an equipment shed that was constructed in 1916. Both of these buildings are associated with Building 92 and were determined not eligible for listing in the NRHP in 1997 (NSA Annapolis and NAVFAC Washington PWD Annapolis, 2010).Buildings 619 and 104 are located in the Perry Center but outside the USNA NHLD boundaries. They

[1] The boundaries of the historic district are the same for both the NRHP and NHL. While listed on both the NRHP and NHL, buildings within the historic district have been evaluated from both, and no distinction is made between the two. To avoid confusion the resource will be referred to as the USNA NHLD, referencing both the NRHP and NHL listings.

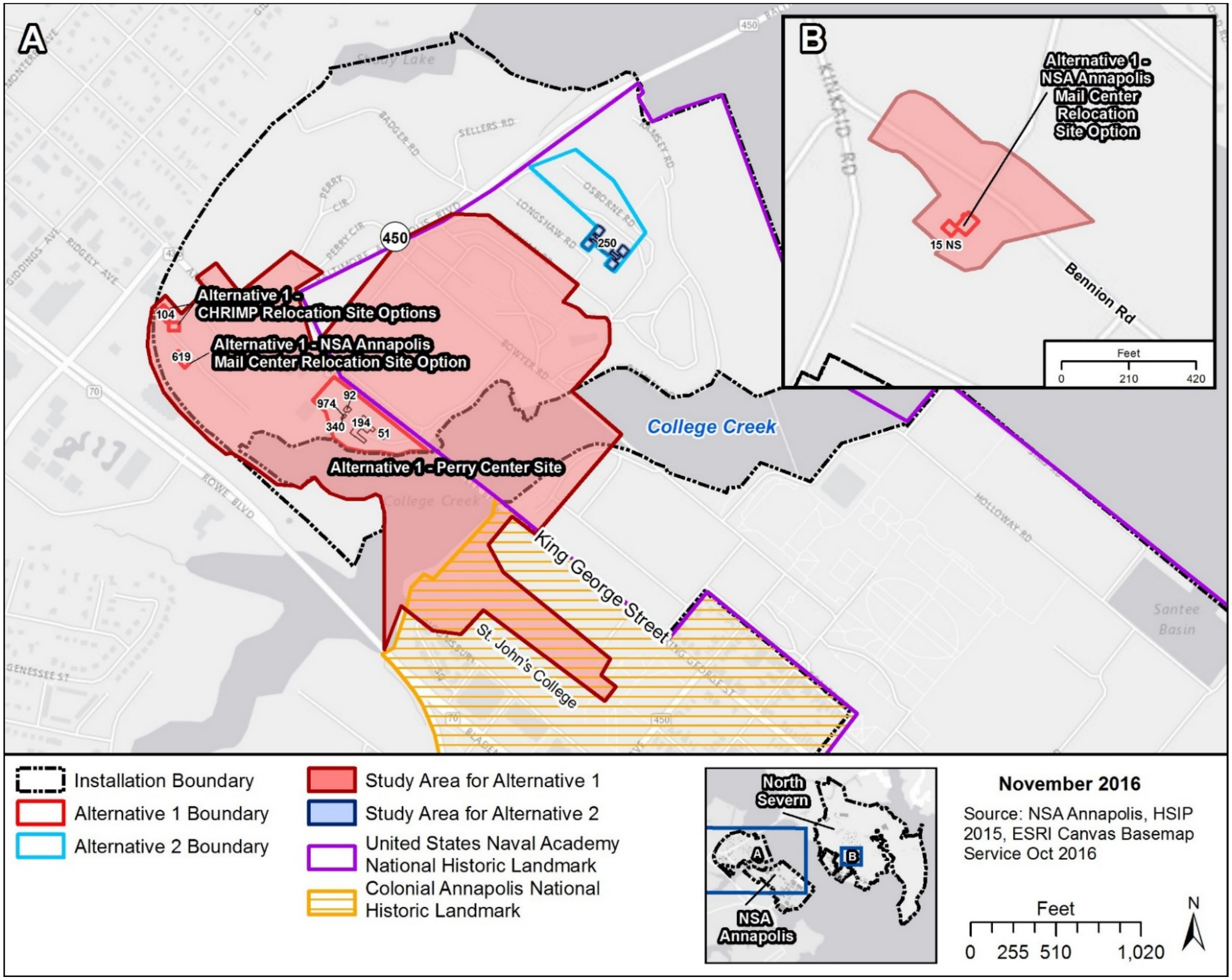


Figure 3-4 Cultural Resource Study Area

were constructed as Public Works shops in 1946 and 1947, respectively, and were determined not eligible for listing in the NRHP in 1997 (NSA Annapolis and NAVFAC Washington PWD Annapolis, 2010). On the North Severn Complex, the architectural resources were evaluated through six architectural studies conducted from 1980 to 1999. No historic districts in the North Severn Complex were identified as potentially eligible for listing in the NRHP in these surveys (NSA Annapolis and NAVFAC Washington PWD Annapolis, 2010). Building 15NS is located outside of the USNA NHLD boundaries. Building 15NS was constructed in 1943 as a garage and was recommended not eligible for listing in the NRHP in 2011 (Kuhn, 2011).

In 2013, a historic landscape study was completed to identify landscape features within the USNA NHLD (Louis Berger, 2013). The goal of the study was to determine which features, if any, are contributing resources to the USNA NHLD. A period of significance of 1845 to 1975 was defined to guide the survey and evaluation efforts of the landscape study. This period of significance extends from the year of the Naval School's establishment in 1845 to the completion of construction of Rickover Hall (Building 590) in 1975. This period encompasses the Ernest Flagg plan in the late 19th century as well as the John Carl Warnecke Master Plan in the late 1960s, which modernized the USNA campus. The following landscape features were included in the survey: topography, land use, spatial organization (e.g., axial arrangement, designed open spaces), circulation (e.g., roads and parking, pedestrian paths, boundary demarcations), vegetation, small scale features (e.g., flagpoles, light posts), and views and vistas.

Colonial Annapolis NHLD

The Colonial Annapolis Historic District was designated a NHL in 1965 and automatically listed in the NRHP in 1966 as the Annapolis Historic District (Figure 3-4). The NRHP historic district boundaries were expanded in 1984. The NRHP and NHL historic districts have different boundaries, but both contain St. John's College as a contributing resource (included in the Alternative 1 study area). (Because the historic district's NHL status affords it greater protection under the NHPA, it will be referred to in the text as the Colonial Annapolis NHLD.) The Colonial Annapolis NHLD is nationally significant as the site of the Continental Congress in 1783–1784 and the Annapolis Convention in 1786, which led to the Constitutional Convention in 1787. The Colonial Annapolis NHLD is also nationally significant in the areas of architecture and urban planning as one of the first planned cities in colonial America, a rare example of a modified baroque plan, and for its several outstanding examples of high Georgian design. As the capital of both the Colony and State of Maryland, the Colonial Annapolis NHLD also has state significance as the center of colonial and state government, politics, and commerce. Its large collection of intact residential, commercial, religious, educational, and civic buildings exemplifying popular architectural styles from the late 17th to the late 19th centuries also attain state significance. Finally, the Colonial Annapolis NHLD is also is locally significant for the role of Annapolis as the seat of Anne Arundel County (Heintzelman, 1974).

3.4.2.3 Traditional Cultural Properties

No known Traditional Cultural Properties have been identified in or near the installation (NSA Annapolis and NAVFAC Washington PWD Annapolis, 2010).

3.4.3 Environmental Consequences

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may be the result of physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the importance of the resource;

introducing visual, atmospheric, or audible elements that are out of character for the period the resource represents (thereby altering the setting); or neglecting the resource to the extent that it deteriorates or is destroyed.

3.4.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and no buildings would be demolished, constructed, or renovated. While Building 92 on the Perry Center site would not be demolished, it would remain unoccupied, and its condition would continue to deteriorate. Because Building 92 is a discontiguous contributing resource to the USNA NHLD, its continued deterioration under the No Action Alternative would result in a direct, adverse impact on the USNA NHLD. Despite this impact, the USNA NHLD would remain eligible for the NRHP and as an NHL. Therefore, no significant impacts on cultural resources would occur with implementation of the No Action Alternative.

3.4.3.2 Alternative 1—Perry Center Site Potential Impacts

Under Alternative 1, the Navy would enter into a ground lease with USNA AA/F, and USNA AA/F would construct a new Alumni Service Center and Headquarters facility on NSA Annapolis property. Currently, NAF leases the lower floor of Beach Hall at Hospital Point from the Navy. Under Alternative 1, this lease would be terminated, and NAF would relocate its staff and functions to the new Alumni Service Center and Headquarters facility. The NSA Annapolis Mail Center would be relocated to either Building 15NS on the North Severn Complex, requiring some renovations to the building, or to a prefabricated building constructed on the northwestern portion of the Perry Center on the existing slab/foundation of Building 619, which would be demolished. The CHRIMP would be relocated to either a new facility adjacent to Building 104, or to Building 104 itself, which would require interior renovations. Potential impacts include a direct, adverse impact on the USNA NHLD because of the demolition of Buildings 92, 51, and 194. Demolition is considered a direct, long-term adverse impact on a historic resource because it would alter the physical character of an individual historic property and the historic district to which it contributes. Construction of the Alumni Service Center and Headquarters facility would result in indirect adverse impacts on the USNA NHLD from the introduction of a visual element adjacent to the NHL; however, the impacts would be minimal. Despite these changes, the USNA NHLD would remain eligible for the NRHP and as an NHL.

The construction of the new Alumni Service Center and Headquarters building would potentially have an adverse impact on the Colonial Annapolis NHLD. The Perry Center site is located across the river from St. John’s College with views toward College Creek from the sweeping, terrace lawns fronting the creek. Alternative 1 would include some vegetation clearing and landscaping after construction is complete; these changes would alter views from within the district and would affect the setting and feeling of the district. Despite these changes, the Colonial Annapolis NHLD would remain eligible for the NRHP and as an NHL.

NSA Annapolis Mail Center Options

Relocating the NSA Annapolis Mail Center to either Building 15NS on the North Severn Complex or to a prefabricated building constructed on the northwestern portion of the Perry Center would have no impact to cultural resources. There would be no impacts because, if the NSA Annapolis Mail Center is relocated to the North Severn Complex, Building 15NS is not eligible for the NRHP and there are no historic districts or buildings nearby that are eligible for the NRHP that would be visually impacted by any exterior renovations to Building 15NS. Additionally, the current administrative functions of Building 15NS would be relocated to another facility on the North Severn Complex and would only require some minor interior renovations, resulting in no impacts on cultural resources. If the NSA Annapolis Mail Center is relocated to the footprint of Building 619, which would be demolished, Building 619 is not eligible for the NRHP, none of the buildings adjacent to the site are eligible for the NRHP, and it is outside the boundaries of the USNA NHLD and the Colonial Annapolis NHLD and is not a discontiguous contributing resource. Therefore, it would not impact any cultural resources.

No archaeological resources would be impacted by the proposed project for both sites because no archaeological resources have been identified at Building 15NS or the Perry Center site. Additionally, any exterior work at Building 15NS would only involve minor renovations and no ground-disturbing activities, and at the Perry Center site, the NSA Annapolis Mail Center would be relocated to a previously disturbed area.

CHRIMP Options

The new CHRIMP facility would either be relocated to Building 104 in the northwestern portion of the Perry Center or to a prefabricated building constructed adjacent to Building 104, which was acquired from the Naval Surface Warfare Center in 1996. Relocating the facility to Building 104 would only require interior renovations to the building, and the existing BOS contractor functions located in Building 104 would be moved to other, underutilized BOS contractor spaces on the Perry Center and would not require any interior renovations. Because Building 104 is not eligible for the NRHP and is not a part of a historic district, there would be no impacts on cultural resources. Additionally, the BOS contractor functions in Building 104 would be moved to an existing, underutilized facility on Perry Center and would not impact cultural resources. Construction of a new prefabricated CHRIMP facility adjacent to Building 104 would have no impact on cultural resources because none of the buildings adjacent to it are eligible for the NRHP, and it is outside the boundaries of the USNA NHLD and the Colonial Annapolis NHLD. Therefore, the property does not meet the threshold under which project impacts must be considered.

No archaeological resources would be impacted by the proposed project for both sites because no archaeological resources have been identified at the Perry Center site and the new CHRIMP would be relocated to a previously disturbed area.

Overall, although implementation of Alternative 1 would result in direct, adverse impacts on the USNA NHLD and potential indirect impacts on the Colonial Annapolis NHLD, both districts would remain eligible for the NRHP and as NHLs. Therefore, implementation of Alternative 1 would not result in significant impacts to cultural resources.

3.4.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

Under Alternative 2, the Navy would enter into a space lease with USNA AA/F for use of Building 250 located along Wood Road at Hospital Point within the eastern portion of the NSA Annapolis Upper Yard. Following execution of the space lease, USNA AA/F would renovate the interior of Building 250 to meet their needs and staff would be relocated to Building 250, but no external renovations would occur. The renovation could have short-term, indirect visual impacts on the USNA NHLD from construction staging areas that would last for the duration of the renovation. Additionally, USNA AA/F would upgrade the mechanical, electrical, and plumbing systems to make them more functional, code-compliant, and energy efficient. Implementation of this alternative for the USNA AA/F facility would not require relocating the existing CHRIMP or NSA Annapolis Mail Center from the Perry Center site. Building 250 is a contributing resource in the USNA NHLD, and interior, character-defining features have been identified for the building. If the renovation of the building follows the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, then the renovation would have no impact on the interior, character-defining features of Building 250 or on the USNA NHLD (Weeks & Grimmer, 1995).

While no buildings on the Perry Center site would be demolished under Alternative 2, Building 92 would remain unoccupied, and its condition would continue to deteriorate. Because Building 92 is a discontiguous contributing resource to the USNA NHLD, its continued deterioration under Alternative 2 would result in a direct, adverse impact on the USNA NHLD.

Because only interior renovations would be required for this alternative, no archaeological resources would be affected.

Alternative 2 would result in short-term, indirect impacts on the USNA NHLD, resulting from the use of construction staging areas during the renovation of Building 250 and direct, adverse impacts on the USNA NHLD from the continued deterioration of Building 92. Nonetheless, the USNA NHLD would remain eligible for the NRHP and as an NHL. Therefore, implementation of Alternative 2 would not result in significant impacts to cultural resources.

3.5 Biological Resources

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to generally as vegetation, and animal species are referred to as wildlife. Habitat can be defined as the resources and conditions present in an area that support a plant or animal.

Within this EA, biological resources are divided into four major categories: (1) terrestrial vegetation, (2) terrestrial wildlife, (3) marine vegetation, and (4) marine wildlife. Threatened, endangered, and other special status species are discussed in their respective categories. Table 3-5 lists all special status species that are potentially present.

3.5.1 Regulatory Setting

Special-status species, which for the purposes of this EA are those species listed as threatened or endangered under the Endangered Species Act (ESA), and species afforded federal protection under the Marine Mammal Protection Act, the Migratory Bird Treaty Act (MBTA), or the Bald and Golden Eagle Protection Act (BGEPA).

The purpose of the ESA is to conserve the ecosystems upon which threatened and endangered species depend and to conserve and recover listed species. Section 7 of the ESA requires action proponents to consult with the USFWS or National Oceanic and Atmospheric Administration (NOAA) Fisheries to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species or result in the destruction or adverse modification of designated critical habitat. Critical habitat cannot be designated on any areas owned, controlled, or designated for use by the DoD where an Integrated Natural Resources Management Plan has been developed that, as determined by the Secretary of the Department of the Interior or Department of Commerce, provides a benefit to the species subject to critical habitat designation.

Birds, including migratory and most native-resident bird species, are protected under the MBTA, and their conservation by federal agencies is mandated by EO 13186, *Migratory Bird Conservation*. Under the MBTA it is unlawful by any means or in any manner, to pursue, hunt, take, capture, kill, or to attempt to take, capture, or kill, [or] possess migratory birds or their nests or eggs at any time, unless permitted by regulation. The 2003 National Defense Authorization Act gave the Secretary of the Interior authority to prescribe regulations to exempt the Armed Forces from the incidental taking of migratory birds during authorized military readiness activities. The final rule authorizing the DoD to take migratory birds in such cases includes a requirement that the Armed Forces must confer with the USFWS to develop and implement appropriate conservation measures to minimize or mitigate adverse impacts of a proposed action if the action will have a significant negative impact on the sustainability of a population of a migratory bird species.

Bald and golden eagles are protected under the BGEPA. The BGEPA prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles, including their parts, nests, or eggs. The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.”

3.5.2 Affected Environment

The following discussions provide a description of the existing conditions for each of the categories under biological resources at NSA Annapolis.

3.5.2.1 Terrestrial Vegetation

Vegetation includes terrestrial plant communities and constituent plant species. NSA Annapolis contains diverse vegetation communities, including forested areas, grasslands, and improved (developed) land. The NSA Annapolis property is predominantly landscaped areas and improved lands with the exception of a small forested peninsula. Major forested areas are located on the North Severn Complex. A thorough inventory of forest resources has not been completed; however, a plant species inventory and forest stand assessment identified approximately 236 acres of natural forests at NSA Annapolis (NAVFAC Washington, 2011a). The majority of the forested land (approximately 226 acres) is located on the North Severn Complex with limited amounts at the USNA (10 acres). A 2009 urban tree inventory also catalogued all ornamental trees within the NSA Annapolis (Navy, 2008). There are no commercial forest management options at NSA Annapolis because its highly urbanized location and relative lack of continuous forest tracts makes commercial forestry impractical. The forested areas at NSA Annapolis (outside of the maintained areas at the USNA) are dominated by a primarily deciduous or mixed deciduous-conifer canopy and herbaceous understory of commonly occurring regional and invasive species. The primary natural wooded area on NSA Annapolis surrounds the Perry Center site adjacent to College Creek. The site is dominated by chestnut oak (*Quercus prinus*) with scattered white oak (*Quercus alba*), southern red oak (*Quercus falcata*), and black oak (*Quercus velutina)*. The most common species in the understory of the forested area include flowering dogwood (*Cornus florida)*, sassafras (*Sassafras albidum)*, spicebush (*Lindera bezoin)*, privet (*Ligustrum* spp.), and maple-leaf viburnum (*Viburnum acerifolium*). For a detailed description of the forest species occurring at NSA Annapolis, refer to Sections 4.D.6 and 5.C.6 of the 2011 INRMP (NAVFAC Washington, 2011a).

Most of the land area at the NSA Annapolis and the North Severn Complex is landscaped and maintained through a grounds maintenance program. The primary focus of the program is to promote biodiversity and minimize the use of energy, water, fertilizer, and herbicides for activities including grass mowing and tree and foliage maintenance. This program emphasizes the use of low-maintenance, native species for landscaping. Many of the tree stands at NSA Annapolis occur on improved grounds and consequently, consist of primarily introduced species used in landscape design with few indigenous species scattered throughout the site. The only natural wooded area is the small 4-acre peninsula south of the Perry Center and adjacent to Roscoe/Rowe Boulevard reaching into College Creek (NAVFAC Washington, 2011a). This is the last tract of mature natural forest in the City of Annapolis. The potential CHRIMP sites, the potential NSA Annapolis Mail Center sites, and Hospital Point are highly developed locations surrounded by parking lots and have no vegetation other than landscaped grass and trees. The vegetation at the Perry Center site (where the current mail center is located) was planted as part of a forest improvement stand and is maintained to prevent invasive species. Detailed invasive species mapping has not been completed for NSA Annapolis; however, invasive plant surveys were included in the 2000 forestry survey at the USNA and the North Severn Complex and the 2008 urban tree study. The most problematic invasive species at NSA Annapolis include privet (*Ligustrum* spp.), common reed (*Phragmites australis*), English ivy (*Hedera helix*), tree of heaven (*Ailanthus altissima*), and wintercreeper (*Euonymus fortunei*). Oriental bittersweet (*Celastrus orbiculatus)* and multiflora rose were determined to be the most problematic species on the North Severn Complex. For a detailed description of the invasive species at NSA Annapolis, refer to the 2011 INRMP (NAVFAC Washington, 2011a).

The only federal- or state-listed rare, threatened, or endangered plant species known to occur at NSA Annapolis include the state-listed maroon Carolina milkvine (*Matelea carolinensis*), which was recently found on the North Severn Complex (NAVFAC Washington, 2011a). One state-listed (threatened or rare) plant species is known to occur in the vicinity of NSA Annapolis: the clasping-leaf pondweed (*Potamogeton perfoliatus*) (very rare). Table 3-5 provides a list of threatened and endangered species that are known to occur or that could potentially occur in the project area.

3.5.2.2 Terrestrial Wildlife

Wildlife includes all animal species (i.e., insects and other invertebrates, fish, amphibians, reptiles, birds, and mammals), but this EA focuses on the species and habitat features of greatest importance or interest. The NSA Annapolis properties provide food, cover, and nesting opportunities for a variety of wildlife species, many of which use NSA Annapolis for all or part of their life-cycle requirements. Generally, the wildlife species known to occur at NSA Annapolis are consistent with native faunal communities throughout the mid-Atlantic coastal region. Although detailed faunal surveys have not been completed, the habitat diversity at NSA Annapolis provides valuable breeding, foraging, and stopover habitat for a multitude of species in the increasingly urbanized Annapolis area. NSA Annapolis also is home to a variety of nuisance wildlife and feral pets, in particular on the North Severn Complex. White-tailed deer (*Odocoileus virginianus*), resident Canada geese (*Branta canadensis*), raccoons (*Procyon lotor*), and feral cats are the most prominent species of concern because they can overharvest vegetation and outcompete and prey on native wildlife species. Recreational hunting is not allowed at NSA Annapolis; therefore, these species are afforded a low-risk area in which to live.

Mammals likely to occur at the Perry Center site where the new Alumni Service Center and Headquarters facility is proposed under Alternative 1 include the white-tailed deer, gray squirrel (*Sciurus carolinensis*), gray fox (*Urocyon cinereoargenteus*), eastern cottontail rabbit (*Sylvilagus floridiana*), and muskrat (*Ondatra zibethicus*). Small mammals that are likely found at the Perry Center site include the field mouse (*Mus musculus*) and the white-footed mouse (*Peromyscus leucopus*).

The forested areas at NSA Annapolis provide important stopover habitat for migratory birds during spring and fall migration. Extensive bird surveys have been conducted in the region throughout the last 20 years; as a result, more than 150 bird species have been documented at Greenbury Point and the adjacent water bodies, including songbirds, shorebirds, wading birds, waterfowl, and raptors (NAVFAC Washington, 2011a). A wide variety of migratory bird species occur on or in the vicinity of the Perry Center site. Osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), forest interior dwelling birds, and waterfowl are common in the region in addition to local birds, such as the American crow (*Corvus brachyrhynchos*). The potential CHRIMP sites and the potential NSA Annapolis Mail Center site on the Perry Center are highly developed with impervious surfaces; therefore, it is unlikely that terrestrial species would inhabit this area. Species found at the potential NSA Annapolis Mail Center site on the North Severn Complex are likely to be similar to those found at the Perry Center site where the new Alumni Service Center and Headquarters facility is proposed.

The only federal- or state-listed rare, threatened, or endangered animal species known to occur at NSA Annapolis is the monarch butterfly (*Danaus plexippus*), which is under review by USFWS for listing under the ESA (79 *Federal Register* 78,775–78,778). The federally listed threatened northern long-eared bat (*Myotis septentrionalis*) is likely to occur on or around NSA Annapolis because Maryland is within the habitat range for the species. The American peregrine falcon (*Falco peregrinus anatum*) (state-rare and in need of conservation) is the one state-listed (threatened or rare) animal species known to occur in the vicinity of NSA Annapolis. The bald eagle, which is protected under the MBTA and the BGEPA, also is present in the vicinity. Three species are listed as state endangered and include the mourning warbler (*Oporornis philadelphia*), royal tern (*Thalasseus maximus*), and short-eared owl (*Asio flammeus*). The Nashville warbler (*Vermivora ruficapilla*) has been designated by the state as In Need of Conservation. Table 3-5 provides a list of threatened and endangered species that are known to occur or that could potentially occur in the project area.

Table 3-5. Threatened and Endangered Species Known to Occur or Potentially Occurring in the Region of Influence

Common Name	*Scientific Name*	*Federal Listing Status*	*State Listing Status*
American peregrine falcon	*Falco peregrinus anatum*	Not listed	I
Bald Eagle	*Haliaeetus leucocephalus*	Not listed	S3
Least tern	*Sternula antillarum*	Not listed	ST
Maroon Carolina milkvine	*Matelea carolinensis*	Not listed	S1
Monarch butterfly	*Danaus plexippus*	Under review	–
Mourning warbler	*Oporornis philadelphia*	Not listed	SE
Nashville warbler	*Vermivora ruficapilla*	Not listed	I
Northern long-eared bat	*Myotis septentrionalis*	Threatened	–
Royal tern	*Thalasseus maximus*	Not listed	SE
Short-eared owl	*Asio flammeus*	Not listed	SE

Source: (NAVFAC Washington, 2011a); 79 *Federal Register* 78,775–78,778

Key: Selections for Listing Status Column include: SE = State endangered; ST = State threatened; S1, S2, S3 = State rare; I = In Need of Conservation (State designation)

3.5.3 Environmental Consequences

This analysis focuses on wildlife or vegetation types that are important to the function of the ecosystem or are protected under federal or state law or statute.

3.5.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to biological resources. Therefore, no significant impacts to biological resources would occur with implementation of the No Action Alternative.

3.5.3.2 Alternative 1—Perry Center Site Potential Impacts

The study area for the analysis of impact on biological resources associated with Alternative 1 includes the Perry Center site in the southwest portion of the Upper Yard along King George Street. In addition to the five buildings at the Perry Center, the study area also includes the proposed locations for the NSA Annapolis Mail Center and CHRIMP.

Vegetation

Under Alternative 1, some of the existing vegetation on NSA Annapolis property at the Perry Center site would be removed during demolition and construction activities, and short-term adverse impacts would occur as a result. Currently, the vegetation is limited to grass, trees, and shrubs; the southern portion of the site along College Creek has a natural tree line. The vegetation was planted as part of a forest improvement stand and is maintained to prevent invasive species. Under Alternative 1, once construction is complete, undeveloped areas would be replanted with vegetation native to Maryland and/or the East Coast and included in the plant list in the Installation Appearance Plan (NSA Annapolis, 2008) to remain consistent with surrounding areas and to prevent the growth of invasive species.

NSA Annapolis Mail Center Options

Renovations to Building 15NS would largely be contained within the structure's current footprint. Staging for renovation activities would be confined to on-site parking lots. Exterior renovations could result in temporary placement of construction supplies, vehicles, and equipment on existing lawn areas. Any affected areas would be reseeded as lawn or appropriate native vegetation as prescribed in the Installation Appearance Plan. Interior renovations to another facility on the North Severn Complex to accommodate the current administrative functions in Building 15NS would not impact any vegetation.

Under the Alternative 1 option for relocating the NSA Annapolis Mail Center to the current site of Building 619, demolition and construction activities would largely be confined to the existing footprint of Building 619 and surrounding impervious parking lots. Therefore, no impacts would be expected.

CHRIMP Options

The CHRIMP relocation sites are located in a highly developed area with parking lots and sparse landscaped grass and trees. If renovating Building 104 is the action selected, construction activities would be confined to the existing structure footprint and the current BOS contractor functions would be moved to another existing underutilized facility on Perry Center that would not require any renovations. If constructing a new prefabricated building adjacent to Building 104 is the selected action, the construction footprint would be limited to the surrounding impervious surfaces.

Therefore, overall, Alternative 1 would not result in significant impacts to vegetation.

Terrestrial Wildlife

The Perry Center site consists of buildings and a parking lot in a highly urbanized location with trees lining the southern portion of the site. Although the existing vegetation provides some minimal foraging potential for wildlife, it does not offer suitable habitat. Although native species inhabit the site, the site does not host significant residential populations because it is fenced and restricts species migratory abilities. Some bird species, such as the American crow, osprey, and some bats, are known to roost on buildings. Therefore, removal of buildings could have an impact on their habitat. However, because the site does not currently host significant populations, any adverse impacts would be minimal. Short-term adverse impacts would occur during demolition and construction activities from the use of heavy machinery and influx of noise that may affect the typical movement of wildlife in the area; however, impacts would cease when construction activities are completed.

NSA Annapolis Mail Center Options

Few wildlife species other than those well adapted to an urban environment (e.g., squirrels) exist in the vicinity of Building 15NS on the North Severn Complex. As a result, no long-term impacts on wildlife species are expected. Minimal short-term adverse impacts could occur from renovation activities both at Building 15NS and at the facility where the administrative functions of Building 15NS would be relocated. The increase in traffic, use of renovation equipment, and influx of noise at the project site would temporarily disturb the small population of wildlife that inhabit and frequently travel through the area. The relocation option for the NSA Annapolis Mail Center at the Building 619 site on the Perry Center would occur in a highly developed, previously disturbed area that is not suitable habitat for wildlife. Therefore, it is expected that implementation of Alternative 1 would result in no significant impact on wildlife.

CHRIMP Options

The proposed relocation sites for the CHRIMP are located on the northwestern portion of the Perry Center which is highly developed. Building 104 and the adjacent site where the prefabricated CHRIMP facility would be located is surrounded by other buildings and concrete parking areas, with little to no vegetation, making it largely unsuitable as habitat for wildlife. Additionally, if the Building 104 option is selected, the current BOS contractor functions in the building would be relocated to another underutilized facility on Perry Center, which would not impact wildlife species or habitat.

Therefore, overall, Alternative 1 would have no significant impacts on terrestrial wildlife, migratory birds, or wildlife habitat.

Threatened and Endangered Species

No threatened and endangered species are likely to occur within the Alternative 1 project area. The primary habitat for the monarch butterfly includes milkweed; however, because the habitat in the project area does not support milkweed, it is unlikely that the monarch butterfly occurs in the project area.

The northern long-eared bat generally hibernates from mid-fall to mid-spring each year, with the timing varying due to differences in regional climate. The summer season in the Virginia is estimated to be April 15–September 15; while the season in North Carolina is estimated to be May 15–August 15 (USFWS, 2014). Therefore, to be conservative, the summer season in of Maryland is assumed to be April 15–September 15. In the summer, the northern long-eared bat tends to roost in tree cavities, underneath bark, in crevices, or in the hollows of live or dead trees. Typical diameter for roost trees is at least 3 inches. This species tends to select tall trees located in multi-aged forest stands that include both mature and young trees. Roost trees are often located near wetlands (USFWS, 2014). Although this includes the use of some adjacent or interspersed non-forest habitat, generally the maternity roosting areas range in size from 71 to 425 acres (Owens, et al., 2003) (Broders et al., 2006) (Lacki et al., 2009). Though less common, northern long-eared bats have occasionally been documented roosting in structures such as barns, houses, and bridges (Benedict & Howell, 2008) (Krochmal & Sparks, 2007) (Timpone et al., 2010). Given that the treed areas around the new Alumni Service Center and Headquarters facility project site are significantly smaller than typical maternity roosting areas, it is unlikely that the northern long-eared bat would occur on the Perry Center site. As a result, it is unlikely that implementation of Alternative 1 would threaten the existence of the northern long-eared bat.

Possible suitable habitat exists adjacent to the project area for the American peregrine falcon and the bald eagle. Temporary impacts on these species could occur from noise and habitat disturbances associated with construction activities. However, the terrestrial species on NSA Annapolis are already habituated to high levels of noise associated with mission operation, training activities, and the surrounding urban environment. Increases in noise levels from demolition and construction activities would be negligible and temporary. Construction would occur on previously disturbed and highly maintained natural areas. Therefore, habitat disturbance would be negligible and would not permanently affect habitat use by any protected species. Demolition and construction activities would result in short-term adverse impacts from disturbance to terrestrial wildlife, but would not further threaten the existence of any protected species. In addition, installation personnel would continue to manage habitats according to the INRMP, which is designed to protect and benefit threatened and endangered species on NSA Annapolis.

NSA Annapolis Mail Center Options

There is no primary habitat for the monarch butterfly at either potential relocation site for the NSA Annapolis Mail Center; therefore, it is unlikely that the butterfly would occur at either site. There is also no suitable habitat for the northern long-eared bat; consequently, there would be no potential impacts to this species. Relocating the current administrative functions of Building 15NS to another existing facility on the North Severn Complex also would not impact the monarch butterfly or the northern long-eared bat.

CHRIMP Options

There is no suitable habitat for either the monarch butterfly or the northern long-eared bat in the vicinity of Building 104; therefore, there would be no potential impacts to these species from relocating the CHRIMP to either Building 104 or to a prefabricated building adjacent to Building 104. Relocating the existing BOS contractor functions of Building 104 to another underutilized facility on Perry Center also would not impact the species.

No effect on threatened and endangered species would be expected. Therefore, overall, Alternative 1 would not result in significant impacts on biological resources.

3.5.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

The study area for the analysis of impacts on biological resources associated with Alternative 2 includes Building 250, located at Hospital Point in the eastern portion of the Upper Yard. No demolition or construction is proposed for this alternative. However, internal building renovations could temporarily disturb the natural environment at the proposed site as a result of increased noise levels.

Vegetation

Alternative 2 would involve internal renovations to Building 250 and vegetation would remain largely undisturbed. Vegetation is limited to maintained strips of grass outlining the parking lot and Building 250, as well as a few trees and shrubs dispersed throughout the study area. Mechanical, electrical, and plumbing systems would be upgraded in the existing building that could cause minimal vegetation disturbance on the exterior of the building from the use of heavy equipment. However, the direct removal of vegetation around the project site would not be required. Therefore, implementation of Alternative 2 would not result in significant impacts on vegetation.

Terrestrial Wildlife

Because Building 250 is in an urban environment and on-site vegetation is scarce and holds little functional value, few wildlife species other than those well adapted to an urban environment (e.g., squirrels) exist in the vicinity of Building 250. As a result, no long-term impacts on wildlife species are expected. Minimal short-term adverse impacts could occur from renovation activities. The increase in traffic, use of renovation equipment, and influx of noise at the project site would temporarily disturb the small population of wildlife that inhabit and frequently travel through the area. Therefore, it is expected that implementation of Alternative 2 would result in no significant impact on wildlife.

Threatened and Endangered Species

No threatened or endangered species occur or are likely to occur in the study area of Alternative 2. There is also no habitat in the immediate vicinity for the northern long-eared bat. Possible suitable habitat exists adjacent to the project site for the American peregrine falcon and bald eagle. The monarch butterfly, which is under review for listing as a threatened species under the ESA, could occur in the project area. However, because no exterior construction activities would occur at this site, no effect on these species from noise and habitat disturbances is expected. Therefore, no significant impacts on critical habitat or threatened and endangered species are expected.

3.6 Land Use

This discussion of land use includes current and planned uses and the regulations, policies, or zoning that may control the proposed land use. The term land use refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel. Two main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent property parcels or areas. However, there is no nationally recognized convention or uniform terminology for describing land use categories. As a result, the meanings of various land use descriptions, labels, and definitions vary among jurisdictions. Natural conditions of property can be described or categorized as unimproved, undeveloped, conservation or preservation, and natural or scenic areas. There is a wide variety of land use categories resulting from human activity. Descriptive terms often used include residential, commercial, industrial, agricultural, institutional, and recreational.

3.6.1 Regulatory Setting

The NSA Annapolis Upper Yard is located entirely within Maryland’s coastal zone. This means that activities conducted within it are deemed reasonably likely to affect use of lands, waters, or natural resources of the coastal zone beyond the boundaries of federal property. Such activities must be consistent to the maximum extent practicable with the enforceable policies of Maryland’s Coastal Zone Management Program (CZMP) in accordance with the federal Coastal Zone Management Act (CZMA). Maryland’s CZMP addresses coastal hazards, growth management, habitat and living resources, nonpoint source pollution, nontidal wetlands, provision of public access, and tidal wetlands, and it encompasses several state laws and regulatory programs, of which the CWA is specifically applicable to the Proposed Action.

A memorandum of understanding between the State of Maryland and DoD, signed in May 2013, outlines Maryland’s CZMP as they relate to federal actions. This memorandum also states that, pursuant to 15 CFR 930.33(a)(4), listed *de minimis* and environmentally beneficial activities are excluded from state agency consistency review.

3.6.2 Affected Environment

The following discussions provide a description of the existing conditions for each of the categories under land use resources at NSA Annapolis.

The study area for the land use analysis under Alternative 1 includes the Perry Center site, the NSA Annapolis Mail Center relocation sites options, the CHRIMP relocation site options, and the land areas adjacent to them. Land use at NSA Annapolis Upper and Lower Yards, as described in the NSA Annapolis Installation Master Plan (NAVFAC Washington, 2012b), includes Base Support, Training Support, and Sailor and Family Support. Land use at and adjacent to the Perry Center site is categorized as Base Support, which includes facility management buildings (i.e., administration). Buildings at the Perry Center site consist mostly of office and industrial facilities. Buildings 51, 92, and 194, which would be demolished under Alternative 1, are on the eastern edge of the Perry Center site, adjacent to College Creek. Building 194 is currently being used to house the CHRIMP, and the NSA Annapolis Mail Center currently occupies Building 51. Buildings 92 is unoccupied and in a moderate state of disrepair. Buildings 974 and 340, which also would be demolished under Alternative 1, are outbuildings associated with Building 92 and are both in moderate states of disrepair. Land uses adjacent to the Perry Center site include residences and St. John’s College to the north and southeast; athletic fields and facilities to the north and northeast; industrial facilities to the northwest; and College Creek to the south and west. The NSA Annapolis Installation Master Plan states that the Navy has recommended that all program elements be relocated to more appropriate locations on the site and that each of these buildings be restored, renovated for more suitable uses, or demolished (NAVFAC Washington, 2012b).

Land use on the North Severn Complex in the vicinity of Building 15NS is currently classified as Sailor and Family Support. Adjacent areas are classified as Base Support. Land use at the CHRIMP relocation sites is classified as Base Support. Facilities around this site are used mainly for industrial purposes.

Land use at and adjacent to Hospital Point, where Building 250 (Alternative 2) is located, is classified as Sailor and Family Support, which consists of housing, services that support dependents, and community service facilities. Land uses adjacent to this site consist mainly of office buildings; some of which are in substandard condition.

3.6.3 Environmental Consequences

The location and extent of a Proposed Action needs to be evaluated for its potential impacts on a project site and adjacent land uses. The foremost factor affecting a Proposed Action in terms of land use is its compliance with any applicable land use or zoning regulations. Other relevant factors include land use at the project site, land uses on adjacent properties and their proximity to a Proposed Action, the duration of a proposed activity, and its permanence.

3.6.3.1 No Action Alternative

Under the No Action Alternative, the Navy would not enter into a lease with USNA AA/F. The USNA AA and NAF would continue to operate in five separate facilities on or around NSA Annapolis with alumni events held at Ogle Hall. The current land uses at the Perry Center site would remain. Given the outdated buildings and inefficient use of space, the functions of the NSA Annapolis Mail Center and CHRIMP do not comply with 10 United States Code (U.S.C.) section 2667 and 41 CFR parts 102-75.40 through 75.55. The NSA Annapolis Installation Master Plan recommends that the current uses in these buildings (Buildings 51 and 194) be relocated to more suitable spaces. In addition, Buildings 92, 974, and 340 are all unoccupied and deteriorating.

Under the No Action Alternative, Buildings 51 and 194 and their uses, which are not consistent with the NSA Annapolis Installation Master Plan recommendations, would remain; Buildings 92, 974, and 340 would remain unoccupied and continue to deteriorate. Therefore, implementation of the No Alternative would not result in significant impacts to land use.

3.6.3.2 Alternative 1—Perry Center Site Potential Impacts

Under Alternative 1, the Navy would enter into a ground lease with USNA AA/F, and USNA AA/F would construct a new Alumni Service Center and Headquarters facility on NSA Annapolis property. The NAF's current space lease with the Navy for use of Beach Hall would be terminated, and NAF would relocate its staff and functions to the new facility. It is anticipated that the proposed ground lease would be similar in function to the existing lease. In addition, modifications to the lease would not affect existing or adjacent land uses. Therefore, it is not anticipated that the proposed ground lease would have significant impacts on land use.

Currently, USNA AA and NAF operate in five separate facilities on or around NSA Annapolis. Under Alternative 1, these facilities and their functions would be consolidated. The USNA AA would relocate applicable staff to the new facility and would continue to use property in the City of Annapolis for events.

Under Alternative 1, the Alumni Service Center and Headquarters facility would be located at the Perry Center site. As previously mentioned, current land use at this site is classified as Base Support, which consists of facility management buildings such as administration. The proposed Alumni Service Center and Headquarters facility would be compatible with this land use classification. In addition, land uses adjacent to this site include offices, athletic fields and facilities, and industrial facilities, which would also be compatible with the proposed use. During construction phases, personnel engaging in outdoor activities adjacent to the Perry Center site would be exposed to noise from demolition and construction activities or traffic. However, the increased noise levels would be periodic and short term.

The proposed location and new construction would meet the specific facility requirements in accordance with 10 U.S.C. section 2667 and 41 CFR parts 102-75.40 through 75.55 and in compliance with the NSA Annapolis Master Plan. Existing conditions do not comply with these standards. Therefore, the implementation of Alternative 1 would result in minor, long-term beneficial effects on land use.

NSA Annapolis Mail Center Options

Under Alternative 1, one option for the new NSA Annapolis Mail Center would relocate it to Building 15NS on the North Severn Complex. This option would not significantly affect land use because the NSA Annapolis Mail Center's operation would be compatible with both existing and proposed land uses. Land use in the area is currently administrative and base support functions. The NSA Annapolis Installation Master Plan does not project a change in land uses for this area and describes a consolidation of "Mission Cluster" facilities, to include NSA Annapolis command headquarters and support facilities. The proposed relocation of the Mail Center would displace current administrative support functions at Building 15NS. These functions would be moved to another administrative facility within the North Severn Complex, resulting in no significant changes to land use.

A second option for the NSA Annapolis Mail Center would be to demolish Building 619 located on the northwestern portion of the Perry Center and construct a new prefabricated building for the mail center in its place. This option would result in minor, long-term beneficial impacts to land use. Current and recommended land use for this area is classified as Base Support, and the functional support services provided through the mail center would be compatible with this functional land use category. This option would displace the current public works storage function currently at Building 619; however, this function is not required and this option would allow the Navy to reutilize an excess space, resulting in minor, beneficial effects.

Both options for relocating the NSA Annapolis Mail Center would allow the mail center to move from its current outdated, inefficient space to a new space meeting the requirements of 10 U.S.C. section 2667 and 41 CFR parts 102-75.40 through 75.55 and in compliance with the NSA Annapolis Installation Master Plan. This would result in minor, long-term beneficial impacts to land use within the installation.

CHRIMP Options

Under Alternative 1, the CHRIMP facility would be relocated to comply with 10 U.S.C. section 2667; 41 CFR parts 102-75.40 through 75.55; and the NSA Annapolis Installation Master Plan. According to the NSA Annapolis Installation Master Plan, current and projected land use at the proposed CHRIMP relocation sites at the Perry Center is classified as Base Support. There are industrial facilities adjacent to the site. Because the CHRIMP building would support personnel working on the inventory management program, it would be compatible with Base Support functions and the adjacent land uses. Under the option of relocating the CHRIMP to Building 104, the building would be renovated to make efficient use of space and functions and the existing BOS functions of Building 104 would be relocated to other underutilized BOS contractor space on the Perry Center. Under the option of relocating the CHRIMP to a new, prefabricated facility adjacent to Building 104, uses at Building 104 would not change. Therefore, implementing either option under Alternative 1 would not affect the current or surrounding land use and would result in minor, long-term beneficial impacts to land use within the installation.

During the short term, construction or renovation operations at the CHRIMP sites may require additional land access near the study area for heavy equipment and bulk materials. Adverse impacts on land use adjacent to the construction area would be short-term and could restrict use of roadways, parking, sidewalks, and utilities in the immediate vicinity of the proposed site during demolition and construction.

Overall, Alternative 1 would result in minor, long-term beneficial effects on land use.

Coastal Zone Management

The actions contained in this alternative are not on the list of *de minimis* activities, nor would they be considered environmentally beneficial per the Maryland CZMP memorandum of understanding. Therefore, the Navy will develop a Coastal Consistency Determination in accordance with 15 CFR 930.39 under the CZMA for submission to the MDE, Wetlands and Waterways Program. The MDE, Wetlands and Waterways Program will review the Navy's Coastal Consistency Determination, and the state will decide whether it concurs with the Navy's determination that the activities proposed by NSA Annapolis are consistent with the enforceable policies of the Maryland CZMP. The state's decision will be based on the activities' compliance with the Maryland CZMP authorities. See Appendix B for the Coastal Consistency Determination.

Because all elements of the Proposed Action under Alternative 1 would be compatible with surrounding land uses and consistent with the enforceable policies of the Maryland CZMP, implementation of Alternative 1 would not result in significant impacts on land use.

3.6.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

The site proposed for Alternative 2 and adjacent lands define the study area for land use analyses. Under Alternative 2, the Navy would enter into a space lease with USNA AA/F for use of Building 250 at the NSA

Annapolis Upper Yard. Currently, NAF leases the lower floor of Beach Hall at Hospital Point from the Navy. It is anticipated that the proposed space lease would be similar in function to the existing lease. The proposed space lease is not anticipated to have significant impacts on land use.

Building 250 is the Naval Health Clinic Annapolis, which will be vacated in spring 2017 as part of a separate project. Under Alternative 2, USNA AA/F would renovate the interior and upgrade the mechanical, electrical, and plumbing systems. As a result, Building 250 would be more functional, code-compliant, and energy efficient than under its current use.

Land use in the study area includes Base Support. The proposed use for Building 250, which is an Alumni Service Center and Headquarters facility, is compatible with Base Support functions. Therefore, implementation of Alternative 2 would not affect the current or surrounding land use.

During renovation, there may be temporary restrictions on the use of roadways, parking, sidewalks, and utilities in the immediate vicinity of the proposed site. The project site is adjacent to an area that supports training functions and residences and is near the USNA Cemetery, which is directly across from Wood Road and Building 250. Personnel engaging in outdoor activities in these areas could be exposed to noise from renovation activities or traffic. However, the increased noise levels would be periodic and short term. Therefore, implementation of Alternative 2 would not result in significant impacts on land use.

Under Alternative 2, USNA AA/F would renovate the interior of Building 250 and upgrade the mechanical, electrical, and plumbing systems to make them more functional, code-compliant, and energy efficient. Because renovations would be to the interior only, no impacts on the coastal zone would occur. Additionally, under the 2013 Maryland CZMP memorandum of understanding, *de minimis* activities, which include utility line maintenance and repair and repair and in-kind replacement of underground utility lines, as well as environmentally beneficial activities are excluded from state agency consistency review. Therefore, implementation of Alternative 2 would not result in significant impacts on land use.

3.7 Noise

This discussion of noise includes the types or sources of noise and the associated sensitive receptors in the human environment. Noise in relation to biological resources and wildlife species is discussed in the Section 3.5, Biological Resources.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Sound is all around us. The perception and evaluation of sound involves three basic physical characteristics:

- intensity—the acoustic energy, which is expressed in terms of sound pressure, in decibels (dB)
- frequency—the number of cycles per second the air vibrates, in Hertz
- duration – the length of time the sound can be detected

Noise is defined as an unwanted or annoying sound that interferes with or disrupts normal human activities. Although continuous and extended exposure to high noise levels (e.g., through occupational exposure) can cause hearing loss, the principal human response to noise is annoyance. The response of different individuals to similar noise events is diverse and is influenced by the type of noise, perceived importance of the noise, its appropriateness in the setting, time of day, type of activity during which the noise occurs, and sensitivity of the individual.

3.7.1 Basics of Sound and A-weighted Sound Level

The loudest sounds that can be detected comfortably by the human ear have intensities that are a trillion times higher than those of sounds that can barely be detected. This vast range means that using a linear scale to represent sound intensity is not feasible. The dB is a logarithmic unit used to represent the intensity of a sound, also referred to as the sound level. All sounds have a spectral content, which means their magnitude or level changes with frequency, where frequency is measured in cycles per second or Hertz. To mimic the human ear's non-linear sensitivity and perception of different frequencies of sound, the spectral content is weighted. For example, environmental noise measurements are usually on an "A-weighted" scale that filters out very low and very high frequencies to replicate human sensitivity. It is common to add the "A" to the measurement unit to identify that the measurement has been made with this filtering process (dBA). In this document, the dB unit refers to A-weighted sound levels. Table 3-6 provides a comparison of how the human ear perceives changes in loudness on the logarithmic scale.

Table 3-6. Subjective Responses to Changes in A-Weighted Decibels

Change	*Change in Perceived Loudness*
3 decibels	Barely perceptible
5 decibels	Quite noticeable
10 decibels	Dramatic – twice or half as loud
20 decibels	Striking – fourfold change

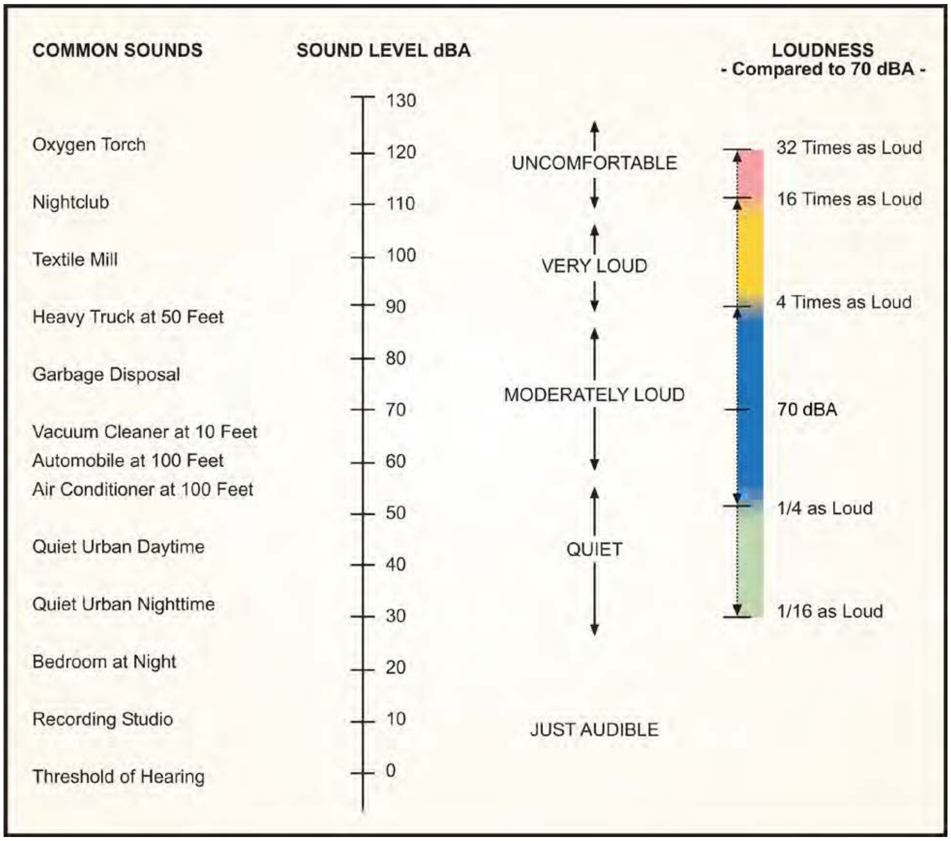
Figure 3-5 provides a chart of A-weighted sound levels from typical noise sources. Some noise sources (e.g., air conditioner, vacuum cleaner) are continuous sounds that maintain a constant sound level for some period of time. Other sources (e.g., automobile, heavy truck) are the maximum sound produced during an event like a vehicle pass-by. Other sounds (e.g., urban daytime, urban nighttime) are averages taken over extended periods of time. A variety of noise metrics have been developed to describe noise over different time periods, as discussed below.

Noise Metrics

A metric is a system for measuring or quantifying a particular characteristic of a subject. Since noise is a complex physical phenomenon, different noise metrics help to quantify the noise environment. The noise metrics used in this EA are described in summary format below.

Maximum Sound Level

The highest A-weighted sound level measured during a single event where the sound level changes value with time (e.g., an aircraft overflight) is called the maximum A-weighted sound level or Lmax. During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. Lmax defines the maximum sound level occurring for a fraction of a second. For aircraft noise, the "fraction of a second" over which the maximum level is defined is generally 1/8 second (American National Standards Institute, 1988).



Sources: Derived from (Harris, 1979) and (Federal Interagency Committee on Aviation Noise, 1997)

Figure 3-5 A-Weighted Sound Levels from Typical Sources

Noise Effects

An extensive amount of research has been conducted regarding noise effects, including annoyance, speech interference, sleep disturbance, noise-induced hearing impairment, nonauditory health effects, performance effects, noise effects on children, effects on domestic animals and wildlife, property values, structures, terrain, and archaeological sites.

Workplace Noise

In 1972, the National Institute for Occupational Safety and Health published a criteria document with a recommended exposure limit of 85 dBA as an 8-hour time-weighted average. This exposure limit was reevaluated in 1998 when the National Institute for Occupational Safety and Health made recommendations that went beyond conserving hearing by focusing on the prevention of occupational hearing loss. Following the reevaluation using a new risk assessment technique, the institute published another criteria document in 1998, which reaffirmed the 85 dB recommended exposure limit (National Institute for Occupational Health and Safety, 1998).

Noise Regulations

Under the Noise Control Act of 1972, the Occupational Safety and Health Administration established workplace standards for noise. The minimum requirement states that constant noise exposure must not exceed 90 dBA over an 8-hour period. The highest allowable sound level to which workers can be constantly exposed is 115 dBA, and exposure to this level must not exceed 15 minutes within an 8-hour period. The standards limit instantaneous exposure, such as impact noise, to 140 dBA. If noise levels exceed these standards, employers are required to provide hearing protection equipment that will reduce sound levels to acceptable limits.

Navy regulations for hearing protection are within OPNAVINST 5100.23G (Change 1), *Navy Safety and Occupational Health Program Manual*. A potentially hazardous noise area is defined as a work area where the continuous or intermittent noise is greater than 84 dBA or a work area where peak levels exceed 140 dBA. Hearing protective devices must be worn by personnel in a work environment where operations exceed these noise levels. In cases where hearing protection does not provide sufficient attenuation to reduce an employee's exposure to below these level, additional controls will be necessary.

3.7.2 Affected Environment

Many components may generate noise and warrant analysis as contributors to the total noise impact. Existing noise levels at and near NSA Annapolis and the project site are typical of those normally associated with nearby land uses and activities and with the overall level of development in the area, which can be characterized as moderately dense urban. The Perry Center site has the closest noise sensitive receptors that are off installation property. Land uses adjacent to the Perry Center site include residences and St. John's College to the north and southeast; athletic fields and facilities to the north and northeast; industrial facilities to the northwest; and College Creek to the south and west. The primary source of noise is vehicular traffic. Noise levels are low to moderate. On the North Severn Complex, there are base support facilities and some military residences in proximity to Building 15NS. The primary source of noise is likely from vehicular traffic. Noise levels are low to moderate.

The federal government supports conditions free from noise that threaten human health and welfare and the environment. Response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and whoever hears it (i.e., the receptor), receptor sensitivity, and time of day. A noise-sensitive receptor is defined as a land use where people involved in indoor or outdoor activities may be subject to stress or considerable interference from noise. Such locations or facilities often include residential dwellings, hospitals, nursing homes, educational facilities, and libraries. Sensitive receptors also may include noise-sensitive cultural practices, some domestic animals, or certain wildlife species.

3.7.3 Environmental Consequences

Analysis of potential noise impacts includes estimating likely noise levels from the Proposed Action and determining potential impacts on sensitive receptor sites.

3.7.3.1 No Action Alternative

Under the No Action Alternative, the Navy would not enter into a lease with USNA AA/F, and there would be no change to existing noise levels. Therefore, no impacts on the noise environment would occur with implementation of the No Action Alternative.

3.7.3.2 Alternative 1—Perry Center Site Potential Impacts

The study area for noise includes the Alternative 1 boundary as shown in Figure 2-1 and the southern side of College Creek, which has the closest noise sensitive receptors. Land use in this area includes residences and St. John's College.

Construction and Demolition Noise

Table 3-7 shows typical noise levels from construction and demolition equipment. Noise from demolition and construction activities varies depending on numerous conditions such as how many pieces of equipment are used simultaneously, type of equipment being used, and distance between the source and receptor. As discussed, the closest noise sensitive receptors are across College Creek southeast of the Perry Center site. The distance between these two locations is approximately 700 feet. Generally, there is a 6 dBA reduction in sound with the doubling of a distance (The Engineering Toolbox [TET], 2016). Given that the nearest noise sensitive receptor is about 700 feet away, noise from construction equipment likely would attenuate to or below ambient noise levels in residential neighborhoods. If small increases in noise levels occur from construction and demolition activities, those increases would be short term. In addition, development at NSA Annapolis and the surrounding community is moderately dense urban; therefore, noise from demolition and construction activities would not introduce noise elements that are inconsistent with the existing ambient noise environment. Implementation of Alternative 1 would not result in significant short-term impacts on the noise environment.

Table 3-7. Construction and Demolition Equipment Noise Emission Levels

Equipment	***Typical Noise Level (dBA) 50 Feet From Source***
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane derrick	88
Crane mobile	83
Dozer	85
Generator	81
Grader	85
Jack hammer	88
Loader	85
Paver	89
Pile driver (impact)	101
Pile driver (sonic)	96
Pneumatic tool	85
Pump	76
Rail saw	90
Roller	74
Saw	76
Scraper	89
Shovel	82
Spike driver	77
Truck	88

Source: (Federal Transit Administration, 2016). Information based on USEPA Report, measured data from railroad construction equipment taken during Northeast Corridor improvement project and other measured data.
Key: dBA = A-weighted sound decibel

NSA Annapolis Mail Center Options

Under Alternative 1, one option for relocating the NSA Annapolis Mail Center would involve minor interior and exterior renovations to Building 15NS on the North Severn Complex, as well as minor interior renovations to another existing facility on the North Severn Complex to accommodate the administrative functions currently located in Building 15NS. The project area is adjacent to installation facilities and a grove of trees. Given the minor increases in noise that would occur during construction activities and the nature of the adjacent land uses, no significant impacts to noise would occur.

A second option for relocating the NSA Annapolis Mail Center would be to demolish Building 619 and construct a new prefabricated building on the existing slab/foundation. Building 619 is located within the installation surrounded by buildings used for Base Support land uses. While demolition and construction activities would increase noise levels on a short-term basis, no sensitive noise receptors are adjacent to this site.

CHRIMP Options

The location options for the CHRIMP facility are within the installation boundary at the Perry Center and are surrounded by buildings used for Base Support land uses. Noise from interior renovations to Building 104 would be minimal and short-term. Relocating the existing BOS contractor functions to other underutilized BOS contractor space on Perry Center would also have minimal impacts on noise. Noise generated from installing a prefabricated facility adjacent to Building 104 would also be short-term and minimal. There are also no noise sensitive receptors adjacent to this site.

Once construction has been completed, noise from building operations and functions are expected to be similar to existing conditions. Therefore, overall, Alternative 1 would not result in significant long-term impacts on the noise environment.

Vehicle Noise

To estimate the impacts from the increase in vehicle noise under Alternative 1, three sites were analyzed. These sites were chosen based on the proposed increase in traffic, their location outside of the installation, and the adjacent land uses. Data for this analysis was obtained from the *Transportation Study for United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters Environmental Assessment at Naval Support Activity Annapolis, Annapolis, MD,* which is summarized in Section 3.9, Transportation.

The first site that was analyzed is a section on King George Street, south of College Creek (site #4 as shown in Figure 3-21, in Section 3.9.3, below). Land use in this area includes residences and St. John's College. Under existing conditions, during the AM peak hour, approximately 941 vehicles travel along this road (see Figure 4-3 in Appendix C). Under Alternative 1, there would be an increase of 10 cars during the AM peak hour, which is an increase of approximately 1 percent (see Figure 4-13 in Appendix C). During the PM peak hour, approximately 749 vehicles travel on King George Street, south of College Creek (see Figure 4-3 in Appendix C). Under Alternative 1, there would be an increase of 10 cars during the PM peak hour, which is an increase of approximately 1 percent (see Figure 3-13 in Appendix C).

The second site that was analyzed also is on King George Street, south of College Avenue (site #5 as shown in Figure 3-21, in Section 3.9.3, below). Land use in this area consists mostly of residences. During the AM peak hour, approximately 746 vehicles travel on this road (see Figure 4-3 in Appendix C). Under Alternative 1, there would an increase of six cars during the AM peak hour, which is an increase of less than 1 percent (see Figure 4-13 in Appendix C). During the PM peak hour, approximately 618 vehicles travel on King George Street, south of College Avenue (see Figure 4-3 in Appendix C). Under Alternative 1, there would be an increase of five cars during the PM peak hour, which is an increase of less than 1 percent (see Figure 4-13 in Appendix C).

The third site that was analyzed is a section of Baltimore Annapolis Boulevard. In particular, noise sensitive land uses are northeast of the Severn River and include a park and numerous residences. Data for this region is shown as site #3 in Figure 3-21 (in Section 3.9.3, below). However, as illustrated, there are several roads between site #3 and the area northeast of the Severn River. Therefore, data for this site are an approximation of the actual number of vehicles that travel on this section of Baltimore Annapolis Boulevard. During the AM peak hour, there are approximately 1,563 vehicles on this road (see Figure 4-3 in Appendix C). Under Alternative 1, there would be an increase of 20 cars during the AM peak hour, which is an increase of approximately 1 percent (see Figure 4-13 in Appendix C). During the PM peak hour, there are approximately 1,805 vehicles on this road (see Figure 4-3 in Appendix C). Under Alternative 1, there would be an increase of 18 cars during the PM peak hour, which is an increase of approximately 1 percent (see Figure 4-3 in Appendix C).

NSA Annapolis Mail Center Options

Under Alternative 1, the NSA Annapolis Mail Center would be relocated to either building 15NS on the North Severn Complex or to a new prefabricated building at the current location of Building 619 on the northwest portion of the Perry Center. For the Building 15NS location on the North Severn Complex, because the number of vehicles used for mail delivery would be minimal, the resultant noise from vehicle traffic would also be minimal. Relocating the existing administrative functions in Building 15NS to another facility on the North Severn Complex would also generate only minimal vehicle noise impacts at the new location. For the Perry Center option, the location is in proximity to the existing mail center location; therefore, there would be no change in vehicle noise to the surrounding area.

CHRIMP Options

Under Alternative 1, the CHRIMP facility would be relocated to either Building 104 in the northwest portion of the Perry Center or to a prefabricated building constructed adjacent to Building 104. Because there are only a couple of employees that work at the CHRIMP and the location is in proximity to the current CHRIMP facility, there would be no change in vehicle noise impacts to the surrounding area. Moving the current BOS contractor functions from Building 104 to another BOS contractor space on Perry Center would also result in no changes to the current vehicle noise impacts to the surrounding area.

As discussed, all of the sites that were analyzed for the new Alumni Service Center and Headquarters facility had an increase in traffic during the AM and PM peak hours of approximately 1 percent. The additional vehicles would consist of personnel commuting to and from work and would include vehicles such as cars, sport utility vehicles, or light-weight trucks, such as pick-up trucks. Additionally, any increase in vehicle noise from relocating the NSA Annapolis Mail Center or CHRIMP facility would either be minimal, in the case of relocating the mail center to Building 15NS on the North Severn Complex, or nonexistent for the mail center and CHRIMP facility options on the northwest portion of the Perry Center. Therefore, overall, Alternative 1 would not result in significant long-term impacts on the noise environment.

3.7.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

The study area for noise includes the Alternative 2 boundary as shown in Figure 2-2 and the area adjacent to it.

Construction Noise

Noise from renovation activities would occur mainly on the inside of Building 250, although some noise would occur outside the building from construction traffic and equipment maneuvering. The project site is surrounded by Navy property. Noise-sensitive receptors would include installation housing and personnel engaging in outdoor activities adjacent to the project site. However, noise from renovation activities would be infrequent and short term in duration and would not introduce noise elements that are inconsistent with the ambient noise conditions in this urban environment. Consequently, no significant short-term impacts on the noise environment would occur from renovation activities.

Once renovation has been completed, building operations and functions are expected to be similar to existing conditions. As a result, no long-term impacts on the noise environment are expected. Therefore, implementation of Alternative 2 would not result in significant long-term impacts on the noise environment.

Vehicle Noise

In the transportation analysis, the same number of trips and the same trip distribution that was used under Alternative 1 was used for Alternative 2 (see Section 3.9). Under Alternative 2, the location of the trips originate or terminate at NSA Annapolis Gate 8 instead of the Perry Center site. However, this does not significantly change the number of vehicles traveling on any of the roadways in or outside of the installation. As a result, the proposed increase in traffic during the AM and PM peak hours would be approximately 1 percent, and the additional vehicles would include passenger cars, sport utility vehicles, or light-weight trucks. Therefore, implementation of Alternative 2 would not result in significant long-term impacts on the noise environment.

3.8 Infrastructure

This section discusses infrastructure, including utilities (water distribution, wastewater collection, stormwater collection, solid waste management, energy, and communications) and facilities. Transportation systems and traffic are addressed separately in Section 3.9.

3.8.1 Regulatory Setting

EO 13693, *Planning for Federal Sustainability in the Next Decade*, requires federal departments and agencies to enact specific actions and operations outlined within the executive order to reduce agency direct GHG emissions by at least 40 percent over the next decade. Improved environmental performance and federal sustainability will be achieved by reducing energy use and cost. Pursuing clean sources of energy will improve energy and water security.

OPNAVINST 4100.5E outlines the Secretary of the Navy's vision for shore energy management. The focus of this instruction is establishing the energy goals and implementing strategy to achieve energy efficiency.

3.8.2 Affected Environment

The following discussions provide a description of the existing conditions for each of the categories under infrastructure at NSA Annapolis.

3.8.2.1 Utilities

The utilities discussed in this section include potable water, wastewater, stormwater, solid waste management, energy, and communications. At this time, no on-site utilities have been privatized with the exception of natural gas. When describing some of the existing conditions for utilities, the NSA Annapolis Installation Master Plan divides the installation into three main areas: the Lower Yard, the Upper Yard, and the North Severn Complex. The Perry Center site and Building 250 are located on Upper Yard of NSA Annapolis. Building 15NS is located on the North Severn Complex.

Potable Water

Potable water for the Perry Center site and Building 250 (Alternative 2) at Hospital Point is provided from three on-site wells. The wells are 600–700 feet deep and tap into the Upper Patapsco Aquifer. NSA Annapolis has its own water treatment plant (WTP) located on the Upper Yard. The water quality is good, and there is no concern about exceeding the withdrawal permit allocation. The system is deemed reliable with occasional breaks to the mains (NAVFAC Washington, 2012b). The North Severn Complex receives potable water from the Anne Arundel County water system, which is independent from the system used on the Perry Center and at Hospital Point. Although flow for domestic water use is reliable and has adequate pressure, during fire flow usage, a water tower is necessary to maintain adequate pressure and water quality and sanitation can become problematic (NAVFAC Washington, 2012b).

Wastewater

Waste water from the Perry Center site and Building 250 is treated by the municipal waste water treatment plant (WWTP). The Navy owns the lines, and NAVFAC maintains them on the installation. The wastewater is metered at the two locations where it joins the municipal system. The current system consists of both gravity and force sewer mains. There are a number of lift stations located throughout the Lower Yard. The mains were relined and replaced several years ago to address problems with infiltration. The system is deemed reliable, in good shape, and has capacity to support future development (NAVFAC Washington, 2012b). A separate wastewater treatment system on the North Severn Complex includes gravity flow and pressure mains and a treatment plant providing tertiary treatment. The plant outfall is directed into Carr Creek. Many unimproved water mains result in high levels of groundwater infiltration during rain events, and subsequently greater volumes of water treated at the plant. The plant capacity is 1 million gallons per day (gpd) with actual demand at 150,000 gpd (NAVFAC Washington, 2012b). Currently, nutrient removal guidelines would require plant improvements or a reduction in capacity to 500 gpd or the construction of new plant. Although there is excess treatment capacity, the plant should be evaluated prior to any new development. North Severn also contains one septic system associated with the camping area.

Stormwater

The approximately 348 acres of the NSA Annapolis Upper and Lower Yards' consist of 24 major drainage basins that collect and discharge 78 percent of runoff (approximately 270 acres). The remaining 22 percent of runoff discharges through single or double structure outlets, which collect runoff in the immediate area of the structures. These drainage areas typically collect runoff from athletic fields and perimeter roadways. The building outfalls within each drainage basin discharge into Spa Creek, Santee Basin, College Creek, Shady Lake, the Severn River, and eventually the Chesapeake Bay. The North Severn Complex has 13 drainage areas collecting runoff from base facilities including a golf course, recycling center, roads and parking lots, housing, and marinas. The outfalls discharge into Carr Creek, Mill Creek, Severn River, and other smaller tributaries. NAVFAC owns the storm drain lines, and the Public Works is responsible for repairing and maintaining the existing system when broken or damaged lines are found (NAVFAC Washington, 2012b).

NSA Annapolis, including the Upper and Lower Yards and North Severn, is currently discharging stormwater from industrial activities under the MDE State Discharge Permit Number 08-DP-2513 (NPDES Permit Number MD0002488). The permit also covers occasional discharges into the storm system from USNA pools in Lejeune Hall on the Lower Yard when repairs are necessary and from boat maintenance including pressure washing, repairs, and sanding and painting at a marina on North Severn. NSA Annapolis has an existing Stormwater Pollution Prevention Plan that combines both the requirements of the NPDES Phase II General Permit for Discharges from State and Federal Small Municipal Separate Storm Sewer Systems and the NPDES Permit Number MD0002488 (NSA Annapolis, 2014b).

Solid Waste Management

Domestic solid waste is collected by a private contractor for off-site disposal at a permitted landfill. In addition, the Navy has implemented a recycling program (NAVFAC Washington, 2015).

Energy

NAVFAC owns and maintains the electrical distribution grid on the installation and Baltimore Gas and Electric (BGE) provides the power. For the Upper Yard, BGE provides two feeders from Substation A, which is located on Navy property and is Navy-owned. Upgrades to the substation were recently completed. The power is deemed reliable. The distribution system is fairly new and has been upgraded to underground. The distribution system on the North Severn Complex is composed of mostly aerial transmission lines with a recently upgraded substation. The Navy-owned substation has two feeders for redundancy. There are a number of emergency generators on both the Upper Yard and the North Severn Complex for additional reliability and back-up power for critical functions (NAVFAC Washington, 2012b).

BGE also provides natural gas, and there are natural gas lines located throughout the Upper and Lower Yards and the North Severn Complex (NAVFAC Washington, 2012b). There are easements for BGE to maintain its infrastructure on the installation.

The installation of high pressure natural gas at the King Hall Galley was completed in 2010. In the future, high pressure natural gas will provide benefits for the installation that can be tapped into and expanded to meet additional needs.

Communications

The Navy provides telecommunication services, including telephone, fiber optic, and cable, are provided to all buildings in the Upper and Lower Yards and the operations and administrative buildings on the North Severn Complex, with the exception of Navy Marine Corps Intranet services at the facilities occupied by NSA Annapolis and Commander Navy Installations Command (NAVFAC Washington, 2012b).

3.8.2.2 Facilities

The Facility Readiness Evaluation System was used to evaluate facility readiness indicators for each facility resource. Existing facility assets were evaluated in terms of condition, configuration, and capacity. The condition rating measures an asset’s physical condition at a particular point in time. The configuration rating measures the asset’s capability to support the current occupant or mission with respect to functionality. The capacity rating indicates if there are sufficient facilities to meet the mission at a site or installation.

The buildings slated for demolition on the Perry Center site under Alternative 1 (51, 194, 92, 974, and 340) are all rated as inadequate or substandard. Building 619, slated for potential demolition under one of the NSA Annapolis Mail Center relocation options under Alternative 1, is also rated as inadequate.

Additionally, many of the buildings in which USNA AA and NAF currently operate (49 House, Beach Hall, and 25 Maryland Avenue) also are rated as inadequate or substandard.

3.8.3 Environmental Consequences

This section analyzes the magnitude of anticipated increases or decreases in public works infrastructure demands considering historic levels, existing management practices, and storage capacity. It also evaluates potential impacts to public works infrastructure associated with implementation of the alternatives. Impacts are evaluated by whether they would result in the use of a substantial proportion of the remaining system capacity, reach or exceed the current capacity of the system, or require development of facilities and sources beyond those existing or currently planned.

3.8.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to the existing infrastructure of NSA Annapolis. Therefore, no significant impacts to utilities or facilities would occur with implementation of the No Action Alternative.

3.8.3.2 Alternative 1—Perry Center Site Potential Impacts

The study area for infrastructure for Alternative 1 includes Buildings 51, 194, 92, 974, 340, and all associated utility infrastructure and impervious surfaces serving these buildings. The study area also includes the proposed relocation sites for the NSA Annapolis Mail Center on the North Severn Complex (Building 15NS) and the Perry Center (Building 619) and for the CHRIMP, Building 104 at the Perry Center and the impervious surface directly southeast of Building 104. In addition, some of the buildings in which USNA AA and NAF currently operate (49 House, Beach Hall, and 25 Maryland Avenue) also are included in the study area because these buildings are expected to experience a short-term reduction in day-to-day utility demands once USNA AA and NAF staff are relocated out of these buildings. Although the specific reuse of the building spaces in which USNA AA and NAF currently operate is not known, it is reasonable to assume that these spaces would not remain vacant and that the long-term utility demands for these buildings would be similar to the current demand.

Adverse impacts to utilities during demolition and construction would be short term and would include removing or properly abandoning the service lines from the buildings slated for demolition and relocating portions of service lines serving adjacent buildings. During construction, new connections to existing utility lines would be required to serve the proposed Alumni Service Center and Headquarters facility, the new prefabricated NSA Annapolis Mail Center at the Building 619 location, and the new prefabricated CHRIMP building adjacent to Building 104 (if these options are selected). Design of the new buildings has not been completed yet; therefore, specific information regarding the location of the utility connections is not yet available. Under the Proposed Action, there would be no increase in the number of staff on site. Increases in demand for utilities at the new buildings are expected to be met with no change in the level of service to surrounding users. Relocating the NSA Annapolis Mail Center and CHRIMP would have no noticeable impacts to overall utility demands because the demand for utilities to support these functions would simply be changing locations.

Potable Water

The WTP has a capacity of 3.46 million gpd, and current demand at NSA Annapolis is approximately 1.8 million gpd (NAVFAC Washington, 2015). The addition of the proposed Alumni Service Center and Headquarters facility would increase demands by approximately 2,900 gpd for the office use (this assumes the new 29,000-square-foot building has a demand of 0.09 gpd per square foot) plus an additional 7,500 gpd during events where the banquet portion of the facility is used (this assumes 300 seats at 25 gpd per seat) (MDE, n.d.). The total increase in potable water demand is less than 1 percent of the current demand and is well below current capacity. The increase in water demand for the new Headquarters facility could be met with no change in the level of service to surrounding users.

NSA Annapolis Mail Center Options

No change in overall potable water demand would result from relocating the NSA Annapolis Mail Center to existing Building 15NS and relocating the current Building 15NS functions to another existing facility on the North Severn Complex, or to a new prefabricated building at the location of Building 619. The new prefabricated building option would likely require a new connection to the water distribution system.

CHRIMP Options

No change in overall potable water demand would result from relocating the CHRIMP to Building 104 and the current BOS contractor functions of Building 104 to another underutilized BOS contractor space on Perry Center, or to a new prefabricated building adjacent to Building 104. The new prefabricated building option would likely require a new connection to the water distribution system.

Therefore, overall, Alternative 1 would not result in significant impacts to the water supply system.

Wastewater

The increase in wastewater discharge would be similar to the amount of water use for the new Headquarters facility under Alternative 1. The on-site wastewater collection system was recently upgraded and has capacity to support future development. The wastewater demands from the new Headquarters facility would be met with no change in the level of service to surrounding users.

NSA Annapolis Mail Center Options

No change in overall wastewater demand would result from relocating the NSA Annapolis Mail Center to either Building 15NS and relocating the current Building 15NS functions to another existing facility on the North Severn Complex, or to a new prefabricated building at the location of Building 619. The new prefabricated building option would likely require a new connection to the wastewater collection system.

CHRIMP Options

No change in overall wastewater demand would result from relocating the CHRIMP to Building 104 and the current BOS contractor functions of Building 104 to another underutilized BOS contractor space on Perry Center, or to a new prefabricated building adjacent to Building 104. The new prefabricated building option would likely require a new connection to the wastewater collection system.

Therefore, implementation of Alternative 1 would not result in a significant impact on the wastewater collection system or municipal WWTP.

Stormwater

Low-impact development design principles would be used to reduce stormwater impacts from the new Alumni Service Center and Headquarters facility, to the extent practicable. While complete plans for stormwater management have not yet been finalized, pervious pavement would be considered as one potential technique to reduce stormwater runoff from the Perry Center site.

NSA Annapolis Mail Center Options

The NSA Annapolis Mail Center would either be relocated to an existing building (15NS on the North Severn Complex) with its current administrative functions moved to another yet to be determined existing facility on the North Severn Complex, or to a new prefabricated building constructed on an existing impervious area (currently the location of Building 619 at the Perry Center); therefore, relocating this facility would not be expected to have an impact on stormwater.

CHRIMP Options

The CHRIMP would be relocated to an existing building (Building 104 on the northwest portion of the Perry Center) with its current BOS contractor functions moving to another existing facility on Perry Center, or to a new prefabricated building constructed on an existing impervious area adjacent to Building 104; therefore, relocating this facility would not be expected to have an impact on stormwater.

Alternative 1 would be implemented in accordance with NSA Annapolis' existing Stormwater Pollution Prevention Plan. Therefore, implementation of Alternative 1 would not result in significant impacts on stormwater. Impacts on stormwater are also discussed in Section 3.2, Water Resources.

Solid Waste Management

A private contractor would dispose of solid waste generated during demolition of the existing facilities and the construction, operation, and maintenance of the new building. Solid waste would be disposed of in accordance with applicable laws and regulations at an existing permitted landfill with sufficient capacity. Solid waste generated during operation of the new building by personnel working in the building would be less than 5 cubic yards per week. This assumes the 29,000-square-foot building would generate approximately 0.03 pound per square foot weekly (NAVFAC Washington, 2015). The increase in solid waste from the construction and operation of the new building would not result in significant impacts to existing arrangements for solid waste disposal.

NSA Annapolis Mail Center Options

No change to solid waste generation would result from relocating the NSA Annapolis Mail Center under either of the options, including moving the current administrative functions of Building 15NS to another facility on the North Severn Complex.

CHRIMP Options

No change to solid waste generation would result from relocating the CHRIMP under either of the options, including moving the current BOS contractor functions in Building 104 to other BOS contractor space on Perry Center.

Energy

Under Alternative 1, the proposed Alumni Service Center and Headquarters facility would require new connections to the electrical distribution system. Upgrades to the substation and distribution lines in the Upper Yard and substation on the North Severn Complex have been completed recently and are expected to adequately support these new buildings with no change in the level of service to surrounding users. Operation of the new buildings would not result in significant impacts to the existing electrical distribution system.

Under Alternative 1, the increase in natural gas usage is expected to be minor. The proposed connection point to provide natural gas service to the new Headquarters facility has not been determined at this time. The operation of the new building would not result in significant impacts to the existing natural gas distribution system. New demands could be met with no change in the level of service to surrounding users.

NSA Annapolis Mail Center Options

No change in overall energy demand would result from relocating the NSA Annapolis Mail Center under either option, including moving the current administrative functions of Building 15NS to another facility on the North Severn Complex.

CHRIMP Options

No change in overall energy demand would result from relocating the CHRIMP facility under either option, including moving the current BOS contractor functions in Building 104 to other BOS contractor space on Perry Center. However, the new prefabricated CHRIMP building option would require new connections to the electrical distribution system. The new CHRIMP building would not require natural gas service.

Overall, implementation of Alternative 1 would not result in significant impacts to energy.

Communications

The telecommunications systems to be provided to the proposed Alumni Service Center and Headquarters facility would include telephone, fiber optic, and cable. Proposed connection points for these systems have not been determined yet, but increased demands are expected to be minimal.

NSA Annapolis Mail Center Options

Telecommunications services would be required for both NSA Annapolis Mail Center options. However, there would be no increase in demand because both options would just be relocating existing functions, including moving the current administrative functions of Building 15NS to another facility on the North Severn Complex.

CHRIMP Options

Telecommunications services would be required for both of the CHRIMP options. However, there would be no increase in demand because both options would just be relocating existing functions, including moving the current BOS contractor functions in Building 104 to other BOS contractor space on Perry Center.

Therefore, implementation of Alternative 1 would not result in significant impacts to existing telecommunications systems.

Facilities

The buildings slated for demolition under Alternative 1 (51, 194, 92, 974, and 340) are all rated as inadequate or substandard because of conditions and/or configurations that hinder the ability of the facility to support the existing occupant and/or mission. Many of the buildings in which USNA AA and NAF currently operate—Ogle Hall, Cottage, 49 House, Beach Hall, and 25 Maryland Avenue—also are rated as inadequate or substandard. Alternative 1 would remove five buildings deemed inadequate or substandard and replace them with one new building that meets all current standards and fully supports the USNA AA/F mission and function.

NSA Annapolis Mail Center Options

The NSA Annapolis Mail Center would either be relocated to Building 15NS on the North Severn Complex, which would be renovated to fully support this function, or to a new building on the Perry Center, which would be designed to fully support this function. Construction of the new prefabricated building would require demolition of underutilized Building 619. Both options for relocating the NSA Annapolis Mail Center would allow the mail center to move from its current outdated, inefficient space to a new space meeting the requirements of 10 U.S.C. section 2667 and 41 CFR parts 102-75.40 through 75.55 and in compliance with the NSA Annapolis Installation Master Plan. This would result in minor, long-term beneficial impacts on facilities within the installation. Under the Building 15NS option, moving the current administrative functions to another facility on the North Severn Complex may have some minimal, long-term beneficial impacts on facilities, but it would be dependent on the facility selected and if it is currently underutilized or not.

CHRIMP Options

The CHRIMP facility would either be relocated to Building 104 on the Perry Center, which would be renovated to make efficient use of the space to fully support this function, or to a new prefabricated building constructed adjacent to Building 104, which would be designed to fully support this function. Both options for relocating the CHRIMP facility would increase the efficient use of space for the CHRIMP compared to its current operations in Building 194, providing beneficial impacts on facilities. Additionally, under the Building 104 option, the existing BOS functions in Building 104 would be relocated to other underutilized BOS contractor space on the Perry Center, providing additional beneficial impacts by maximizing the use of underutilized space on the installation.

Implementation of Alternative 1 would have a beneficial impact on facilities. Therefore, overall, Alternative 1 would not result in significant impacts to infrastructure, including utilities and facilities.

3.8.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

The study area for infrastructure for Alternative 2 includes Building 250 and all associated utility infrastructure and impervious surfaces serving this building. In addition, the buildings in which USNA AA and NAF currently operate (Ogle Hall, Cottage, 49 House, Beach Hall, and 25 Maryland Avenue) are included in the infrastructure study area because these buildings are expected to experience a short-term reduction in utility demands once USNA AA and NAF staff move out of them. Although the specific reuse of the building spaces in which USNA AA and NAF currently operate is not known, it is reasonable to assume that these spaces would not remain vacant and that the long-term utility demands for these buildings would be similar to the current demand.

Under Alternative 2, USNA AA/F would renovate the interior of Building 250 to meet their needs. Implementation of this alternative would not require the relocation of any existing Navy functions. During the interior renovations, mechanical, electrical, and plumbing systems would be upgraded to make them more functional, code-compliant, and energy efficient. Building 250 is currently served by all required utilities, and all utility systems are currently capable of supporting the functions of this building. Therefore implementation of Alternative 2 would have no significant impacts on water supply, wastewater, electricity, natural gas, telecommunications, or solid waste.

Under Alternative 2, no exterior renovations would occur and no new impervious area would be required for parking because ample parking exists immediately north of Building 250. Therefore, implementation of Alternative 2 would not result in significant impacts to stormwater.

Building 250, in its current condition, is rated inadequate as a facility. Renovation would have a beneficial impact on facilities because the finished building would comply with many of the modern codes and would support the mission and function of USNA AA/F.

Therefore, implementation of Alternative 2 would not result in significant impacts to infrastructure, including utilities and facilities.

3.9 Transportation

This discussion of transportation includes all of the land routes with the means of moving passengers and goods. A transportation system can consist of any or all of the following: roadways, bus routes, railways, subways, bikeways, trails, and taxis, and can be examined on a local or regional scale.

3.9.1 Regulatory Setting

Annapolis City Code Section 22.21.010 establishes when a traffic impact analysis is required based on criteria including volume of trips generated, location in a high crash area, or driveways close to an existing intersection. In addition, the regulation specifies that a study be prepared following the City of Annapolis' *Polices and Guidelines for Traffic Impact Analysis for Proposed Development in the City of Annapolis* (City of Annapolis, 2013) and under the direction of the Department of Planning and Zoning.

The policy and guidelines manual provides a step-by-step approach for conducting a traffic impact assessment and includes the elements that should be included in the study such as developing a study area, existing traffic volumes, physical characteristics, bicycle and pedestrian facilities, transit, site generated traffic, mode choice, trip distribution, operations analysis, and queue analysis.

Prior to initiating the transportation analysis, it was essential to determine what analysis tools, data parameters, and assumptions would provide the basis of the analysis. The Navy sent a letter to the City of Annapolis regarding an agreement on the assumptions to follow for a traffic analysis for the Proposed Action and its alternatives. The Navy and the City of Annapolis Transportation Division met on November 5, 2015, to verbally agree on the transportation assumptions to be used for the traffic analysis.

The City of Annapolis, requires that the study provide a certain level of detail, data parameters, and type of analysis (City of Annapolis, 2013). These parameters and assumptions include a study area, trip generation, trip distribution, modal split, analysis years, analysis methods, and No Action Alternative transportation assumptions (e.g., background growth, planned developments, and planned roadway improvements). Attachment 1 in Appendix C contains the letter that the Navy sent to the City of Annapolis and Maryland State Highway Administration (SHA).

3.9.2 Affected Environment

This section presents the transportation study area and summarizes conditions in the study area as of December 2015, covering the following modes of transportation: pedestrian, bicycle, public transit, and traffic (vehicular). The existing parking conditions also are discussed.

3.9.2.1 Study Area Definition

The study area was delineated based on the City of Annapolis guidance to include site access driveways, signalized and major unsignalized intersections within 0.25 mile of a single development phase project that would generate 200 to 399 daily trips. The study contains the following five intersections:

- Taylor Avenue and Baltimore Annapolis Boulevard (unsignalized)

- Baltimore Annapolis Boulevard and King George Street (signalized)
- Baltimore Annapolis Boulevard and Bowyer Road (signalized)
- King George Street and College Avenue (signalized)
- King George Street and Baseball Stadium Entrance/access to Perry Center (unsignalized)

The five intersections cover the traffic impact analysis study area; the bicycle study area covers a 0.5-mile radius from the development site. Figure 3-6 illustrates the study area.

Appendix C contains the descriptions of the roadways in the study area and includes the Maryland SHA roadway functional classification, the number of lanes in each direction, the most recent (2014) average annual daily traffic volumes available from the Maryland SHA, and any noteworthy characteristics such as a roadway's role within the transportation network and the presence of bicycle lanes.

3.9.2.2 Data Collection

Vehicular turning movement counts were collected on November 18, 2015, during weekday AM and PM peak hours (7:00 a.m.–10:00 a.m. and 4:00 p.m.–7:00 p.m.), a non-holiday week in mid-November. Vehicular turning movement counts also were collected during the mid-day (11:00 p.m.–1:00 p.m.) on the same day to represent the peak time for event-based traffic.

According to the counts, the AM peak hour occurred between 7:30 a.m.–8:30 a.m., the PM peak period occurred between 4:00 p.m.–5:00 p.m., and the mid-day peak period occurred between 11:30 a.m.–12:30 p.m. These hours reflect the period the combined highest vehicular volume entered all five study area intersections. This is also called the system peak hour for the study area. Appendix C contains the AM, mid-day, and PM peak hours turning movement volumes. Attachment 2 of Appendix C contains the traffic counts obtained covering the five study area intersections.

During the mid-day, pedestrian activity peaked in the vicinity of College Avenue and Church Circle, and some pedestrian activity also was observed on King George Street near the intersection of Baltimore Annapolis Boulevard.

During the PM peak period, vehicular traffic queued along King George Street westbound to the intersection at Baltimore Annapolis Boulevard. Specifically, the queue extended from the right-turn lane and continued onto Baltimore Annapolis Boulevard and queuing into the next intersection at Bowyer Road. Few bicyclists were observed in the study area.

3.9.2.3 Pedestrian Network

The pedestrian network surrounding the proposed project sites was evaluated for an approximate 0.5-mile walking distance from the proposed alternative sites based on the City of Annapolis' *Policies and Guidelines for Traffic Impact Analysis* recommendation that a 10-minute walk area should be studied (City of Annapolis, 2013). Information was obtained from the Annapolis Comprehensive Plan and the West Annapolis Sector Study. Field observations also were made using Google Earth and a visit of the study area. Figure 3-7 illustrates the pedestrian network surrounding NSA Annapolis.

Pedestrian Network Description

The Lower Yard of NSA Annapolis is a walkable environment with sidewalks and walkways connecting every building. The Upper Yard is also walkable and has sidewalks along many roads and walkways connecting most of the buildings and crosswalks at roads. Pedestrian connections between the Upper

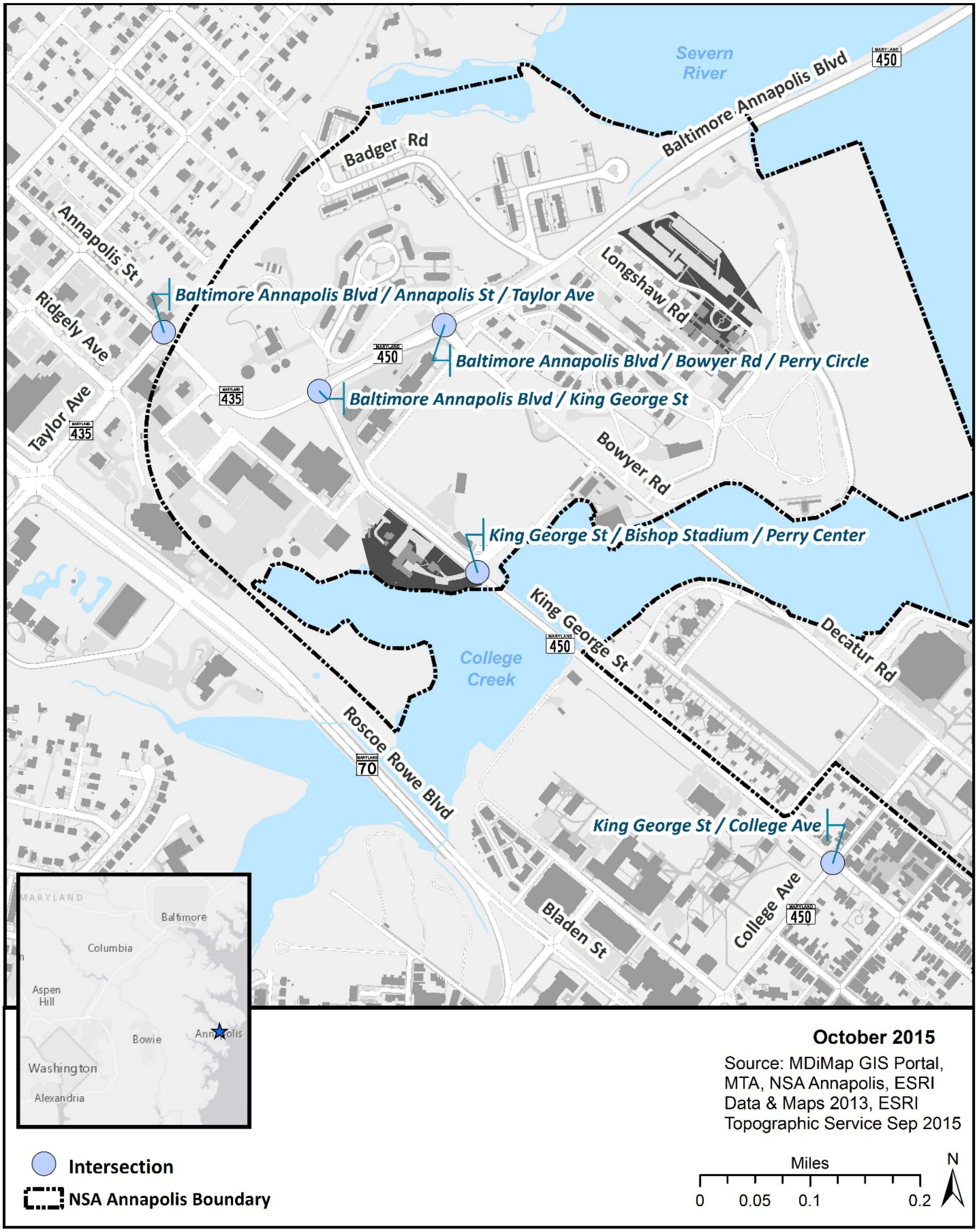


Figure 3-6 Traffic Study Intersections

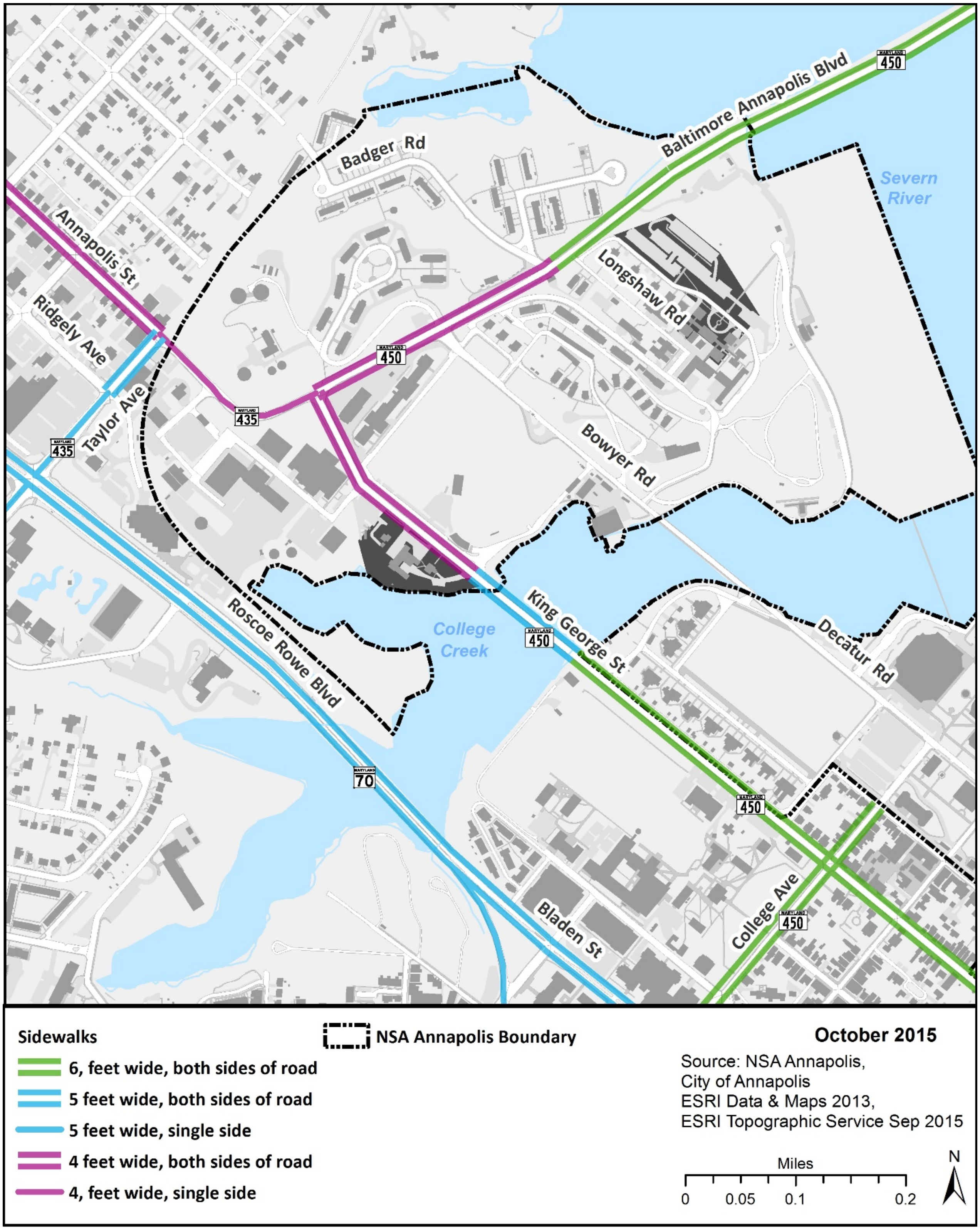


Figure 3-7 Pedestrian Facilities

and Lower Yards over College Creek are made via sidewalks on Bowyer Road Bridge or a dedicated pedestrian footbridge (NAVFAC Washington, 2012b).

The City of Annapolis pedestrian network provides the opportunity for walking around both the core Annapolis city and the suburban areas of West Annapolis. Although the quality of the pedestrian facilities varies throughout the 0.5-mile pedestrian analysis area, no major gaps in the network could be identified. All streets within this area have sidewalks on at least one side of the street, and all intersections are equipped with street curb ramps.

3.9.2.4 Observations

Observations were made while driving through the study area on Tuesday, November 17, 2015, during the AM, mid-day, and PM periods, mirroring the same times the traffic counts were obtained. Queues were minor during the AM peak period, except at the intersection of College Avenue and King George Street where some queues were observed. Vehicles did not follow the traffic laws at the intersection of Annapolis Street/Baltimore Annapolis Boulevard and Taylor Road. Vehicles from the southeast STOP-sign-controlled approach along Annapolis Street did not yield to vehicles making a left turn on the northwest approach along Baltimore Annapolis Boulevard. The Baltimore Annapolis Boulevard approach was not controlled and has the right-of-way over the Annapolis Avenue approach. Many joggers were witnessed along King George Street. Few bicyclists were observed in the study area.

West Annapolis, to the northwest of the Upper Yard, was constructed following a grid system of streets in the first half of the 20th century (Environmental Resources Management, 2015). It offers sidewalks, usually on both sides of the street, placing its commercial and residential buildings within an easy walk from the NSA Annapolis Upper Yard. Although pedestrian facilities are provided on all streets, they are inconsistent and their quality varies from block to block. In many cases, sidewalks are provided on both sides of a street but not for the entire length of the street. Curb ramps along the same street in some cases are wide with rumble strips, while others are narrow.

The sidewalks in West Annapolis almost universally do not meet Federal Highway Administration (FHWA) requirements for people with disabilities. FHWA guidelines state that sidewalks require a minimum width of 5.0 feet if setback from the curb or 6.0 feet if at the curb face. Any width less than this does not meet the minimum requirements for people with disabilities (FHWA, 2006). Almost all of the sidewalks in West Annapolis are 4 feet wide if set back from the curb or no more than 5 feet wide if at the curb. In many cases, sidewalks are 4 feet wide and at the curb. However, the minimal amount of through vehicular traffic alleviates this deficiency and the inconsistencies in the quality of the pedestrian facilities.

The weakest portion of the pedestrian network external to NSA Annapolis within the 0.5-mile pedestrian analysis area is found immediately surrounding the project locations and the Upper Yard. In this location, northwest of College Creek, the arterial roads of Baltimore Annapolis Boulevard, Taylor Avenue, and King George Street all converge along NSA Annapolis to create an area with high traffic and cramped streets and sidewalks. Although all of these roads have sidewalks, usually on both sides, they have no shoulders. Sidewalk widths are a narrow—4 to 5 feet wide—and are not separated from the travel lanes by a buffer, resulting in the sidewalks not meeting FHWA guidelines for people with disabilities (FHWA, 2006). Provision of crosswalks at intersections is not universal, and although all intersections have curb ramps, they do not have rumble strips. The most pedestrian friendly section of this area is along Baltimore Annapolis Boulevard toward the Naval Academy Bridge, which has 6-foot-wide sidewalks.

Appendix C contains the existing condition pedestrian network use.

3.9.2.5 Bicycle Network

Analysis of the bicycle network surrounding the proposed project sites was made for an approximate 1-mile ride distance, based on the City of Annapolis' *Policies and Guidelines for Traffic Impact Analysis* recommendation that a 10-minute ride area should be studied (City of Annapolis, 2013). Information was obtained from the City of Annapolis Bicycle Map, Bicycle Trail Website, Bicycle Plan and the West Annapolis Sector Study. Field observations also were made using Google Earth and a visit to the study area.

Bicycle Network Description

Bicycle facilities in the bicycle study area, whether on street lanes or trails, are isolated from each other and NSA Annapolis by roads with narrow shoulders or on-street parking. In the West Annapolis neighborhood, Melvin Avenue, northeast of Annapolis Avenue, has bicycle lanes on both sides of the road. Naval Academy Bridge on Baltimore Annapolis Boulevard features bicycle lanes on both sides of its road, but these do not continue off the bridge. About 0.75-mile west of NSA Annapolis, there are two multi-use trails—the Navy-Marine Corps Memorial Stadium Trail and the Poplar Trail. The Navy-Marine Corps Memorial Stadium Trail encircles the property of the Navy-Marine Corps Memorial Stadium, while Popular Trail is a linear park on the former Baltimore and Annapolis Railroad Route (City of Annapolis, n.d.). Although important for recreation, neither one is linked to NSA Annapolis by roads with good characteristics for bicycling. Baltimore Annapolis Boulevard is signed as a bicycle route south of the Severn River; however, it is not clear where or if the routes continue beyond the intersection with Taylor Avenue.

At NSA Annapolis, commuters and residents are permitted to ride bicycles in both the Upper and Lower Yards, and bicycle racks and storage areas can be found at most buildings. Midshipmen are not permitted to ride bicycles in those areas, except outside the gates. No marked bicycle lanes or trails are located in the Upper or Lower Yards because of the presence of parking spaces and limited right of way, but bicyclists can share the streets with cars.

The bicycle study area in the City of Annapolis outside NSA Annapolis consists mostly of streets where bicyclists must share the road with cars. Oftentimes these streets have narrow shoulders, no shoulders, or on-street parking, limiting the ability of cyclists to avoid riding in travel lanes. Connectivity is an issue, because bicycle lanes and bicycle trails are usually isolated, and connecting bicycle routes are not marked or easily identified.

The streets in downtown Annapolis to the southwest of the Lower Yard and to the southeast of College Creek universally lack bicycle lanes and shoulders. These roads are two lanes, paved or cobblestone, with well-used, on-street parking. Many of them are narrow and have limited lane space for cars or bicyclists. The major through routes in the area—King George Street and College Avenue—both have on-street parking on either side or one side on-street parking with no shoulders.

In the area surrounding the Upper Yard and northwest of College Creek, outside downtown Annapolis, conditions are largely the same for on-street bicycle facilities. The two links across College Creek between the Upper Yard area and the downtown, King George Street, and Rowe Boulevard do not have bicycle lanes, although Rowe Boulevard offers shoulders. All other major streets around the Upper Yard, including Taylor Ave and Baltimore Annapolis Boulevard, do not have bicycle lanes or shoulders; however, the lack of on-street parking on roads surrounding the Upper Yard helps improve the bicycle environment. Figure 3-8 shows the existing bicycle facilities.

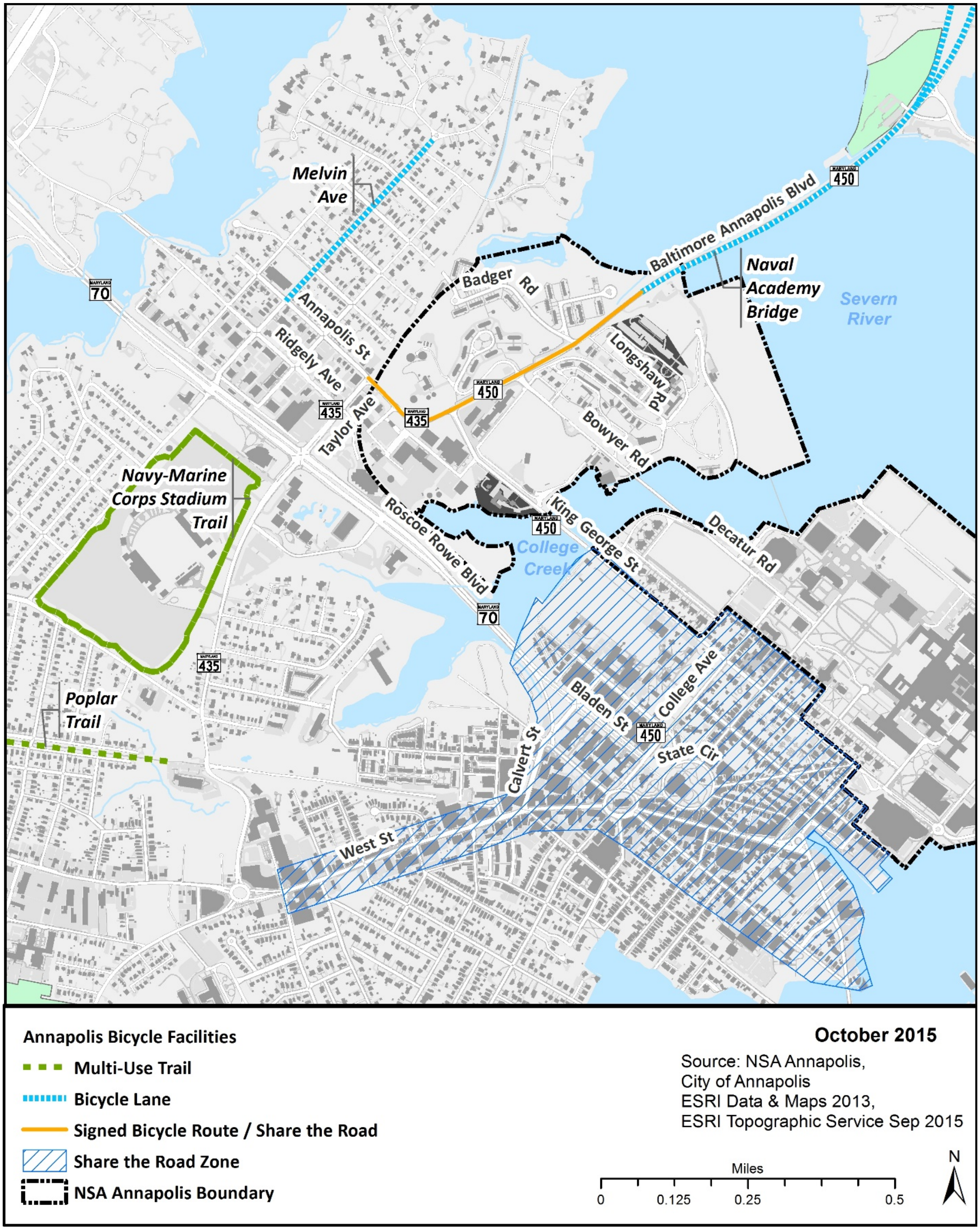


Figure 3-8 Bicycle Facilities

Appendix C contains the existing condition bicycle network use.

3.9.2.6 Public Transit

The assessment of public transit conditions was completed during November 2015 and reflects the data available at the time. Annapolis Transit schedules referenced were effective November 2015, Maryland Transit Administration (MTA) local bus schedules referenced were effective August 2015, and MTA commuter bus schedules were effective June 2015. Ridership data reflects the most recent data available for the study area but, in some cases, does not reflect the most recent route adjustments. Although the region in general has a wide variety of public transit options, the only mode directly serving Annapolis is bus.

Bus

A variety of bus options are available in the City of Annapolis. Local service within the city limits and its immediate suburbs is provided by the City of Annapolis, Annapolis Transit. The MTA operates the local service between the City of Annapolis and Baltimore. It also provides commuter bus service between the City of Annapolis and Washington, D.C., operated under a contract with Dillon's Bus Service.

Annapolis Transit Local Bus Service. The core of Annapolis Transit's routes serve the downtown and suburbs to the southwest and northwest. Service to the project area is provided by the Gold Route, which operates from Edgewater to Anne Arundel Community College via downtown. Near NSA Annapolis, Gold Route operates on Taylor Avenue and Baltimore Annapolis Boulevard, stopping near Gate 8 and the intersection of Baltimore Annapolis Boulevard and King George Street.

The Gold Route is one of Annapolis Transit's least busy corridors. Service is provided in the study area daily between 6:40 a.m. and 6:40 p.m. for northbound buses and between 7:15 a.m. and 7:15 p.m. for southbound buses. Headways are infrequent with buses running every 2 hours all day. No current ridership records were available for the Gold Route, but statistics for its predecessor route in the study area, the C-40, show a ridership of about 40 passengers per day (MTA, 2010).

Connections are available from the Gold Route to three other Annapolis Transit routes at Church Circle, including the Orange Route (downtown to Forest Drive), Green Route (Westfield Mall to Eastport), and Purple Route (Westfield Mall Loop). All of these routes provide service frequencies between 30 minutes and 1 hour and 15 minutes. However, the Orange Route does not operate on weekends; the Purple Route only operates during the evenings on weekdays and Saturdays and has all day service on Sundays (Annapolis Transit, 2014). Connections to commuter buses are available at the intersection of Rowe Boulevard and Taylor Avenue. Figure 3-9 shows the Annapolis Transit local bus service routes. Appendix C contains a summary of Annapolis Transit local bus service.

Maryland Transit Administration Local Bus Service. MTA operates a single local bus route to Annapolis. This is the Route 14 local bus that connects Annapolis to the Baltimore Light Rail Patapsco Station. Route 14 passes through the study area on Taylor Avenue and Baltimore Annapolis Boulevard. Stops near the project sites are shared with the Annapolis Transit Gold Route near Gate 8 and at the intersection of Baltimore Annapolis Boulevard and King George Street.

Route 14 buses duplicate the route of the Annapolis Transit's Gold Route local bus between West Annapolis and the Church Circle in the downtown, increasing the density of bus service along this corridor and to NSA Annapolis. Service is provided in the study area daily between 5:30 a.m. and 11:30 p.m. for northbound buses and between 6:20 a.m. and 12:50 a.m. for southbound buses. Saturday hours extend

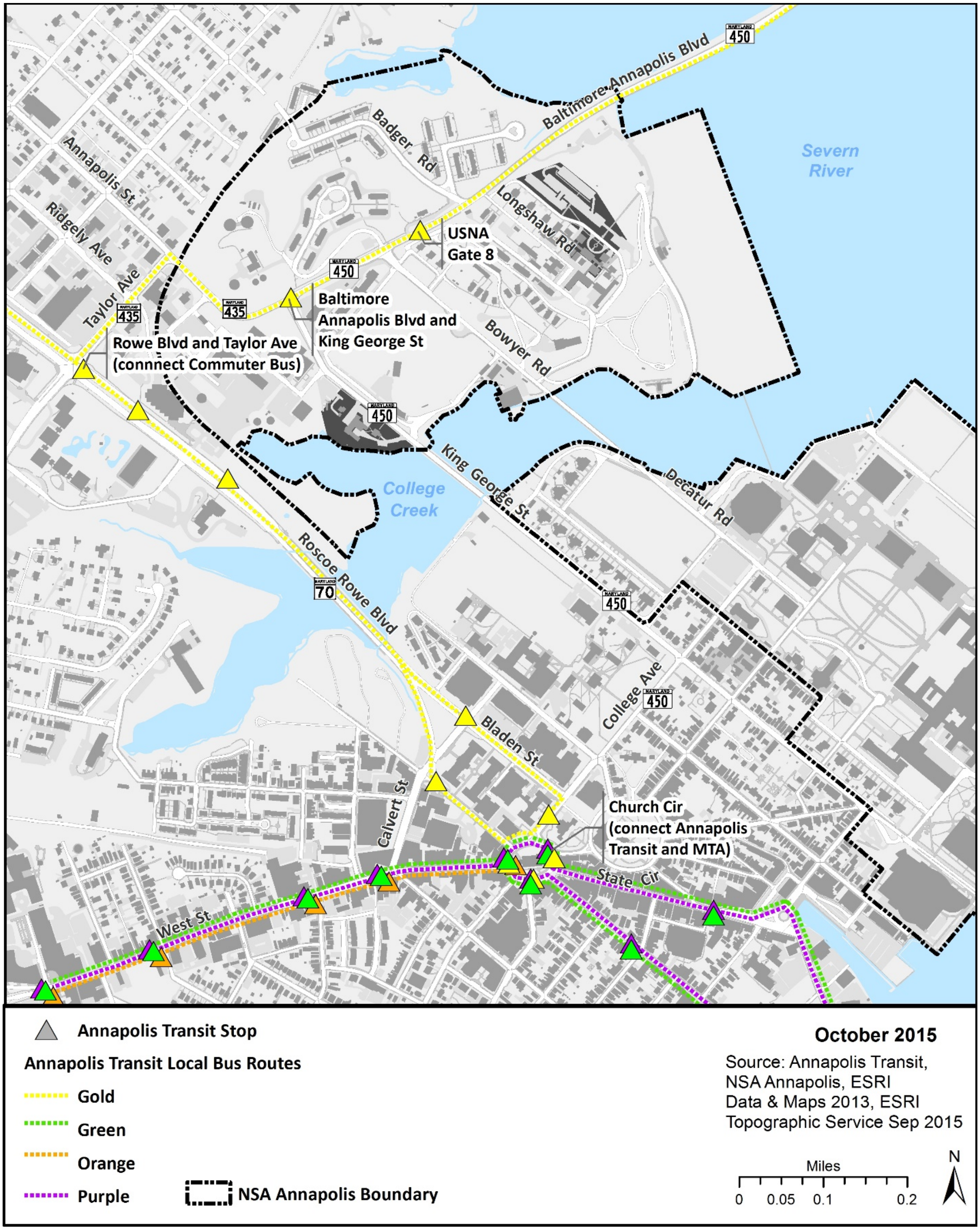


Figure 3-9 Annapolis Transit Local Bus Route Map

from 8:00 a.m. to 11:05 p.m. for northbound buses and from 8:00 a.m. to 11:46 p.m. for southbound buses. Service hours on Sunday are limited. Headways are 45 minutes or less during peak hours and hourly during off-peak hours (MTA, 2015a). Use of the two stops in the study area is light; boarding and alighting data indicate only 11 passenger per day (MTA, 2015a).

Connections can be made from the Route 14 local bus at Church Circle to Annapolis Transit Routes, including the Orange Route (downtown to Forest Drive), the Green Route (Westfield Mall to Eastport) and the Purple Route (Westfield Mall Loop). Connections to commuter buses can be made at the intersection of Rowe Boulevard and Taylor Avenue. Figure 3-10 contains the MTA local bus routes. Appendix C contains a summary of the MTA local bus service.

Maryland Transit Administration Commuter Bus Service. MTA provides two commuter bus routes between Annapolis and Washington, D.C., Routes 220 and 230. Buses are operated under a contract by Dillon's Bus Service. These routes contain stops within 0.25 mile of the study area and can be reached via connections with the MTA Route 14 local bus or the Annapolis Transit Gold Route at Rowe Boulevard and Taylor Avenue.

These commuter bus services operate during peak hours, inbound toward Washington in the morning and outbound toward Annapolis in the evenings. Buses leave from the transfer point on Rowe Boulevard and Taylor Avenue between 4:50 a.m. and 7:25 a.m. in the mornings and arrive from Washington in the evenings between 1:49 p.m. and 7:50 p.m. Each route operates with 30-minute headways during peak hours (MTA, 2015b). Figure 3-10 contains the MTA commuter bus routes. Appendix C contains a summary of MTA commuter bus service.

3.9.2.7 Parking

The assessment of existing parking conditions was conducted based on data contained in the NSA Annapolis Installation Master Plan, as well as a field count of city parking spaces conducted on September 2, 2015. Many of the streets in downtown Annapolis, including those around some of the existing USNA AA and NAF buildings on College Avenue are limited to resident parking and have 2-hour limits.

Public long-term parking is located along King George Street west of College Avenue. Southeast of College Creek and northwest of Wagner Street, there are 48 parking spaces with 9-hour limits on the north side of King George Street and 41 spaces with 9-hour limits on its south side.

The Upper Yard has parking for employees and events. The Perry Center currently has 309 spaces; Bishop Stadium has 86 spaces; and Halligan Hall has 175 spaces. Hospital Point has 97 spaces in its rear parking lot and 274 spaces in its front (NAVFAC Washington, 2012b). No on-street public parking is available on the streets surrounding the Upper Yard. King George Street, Baltimore Annapolis Boulevard, and Taylor Avenue have no shoulders or narrow shoulders and no on-street parking. Figure 3-11 shows the existing parking in the study area.

3.9.2.8 Traffic Section

This section explains the concepts and definitions for analyzing the traffic operations, the process used to analyze the five study area intersections, and the results.

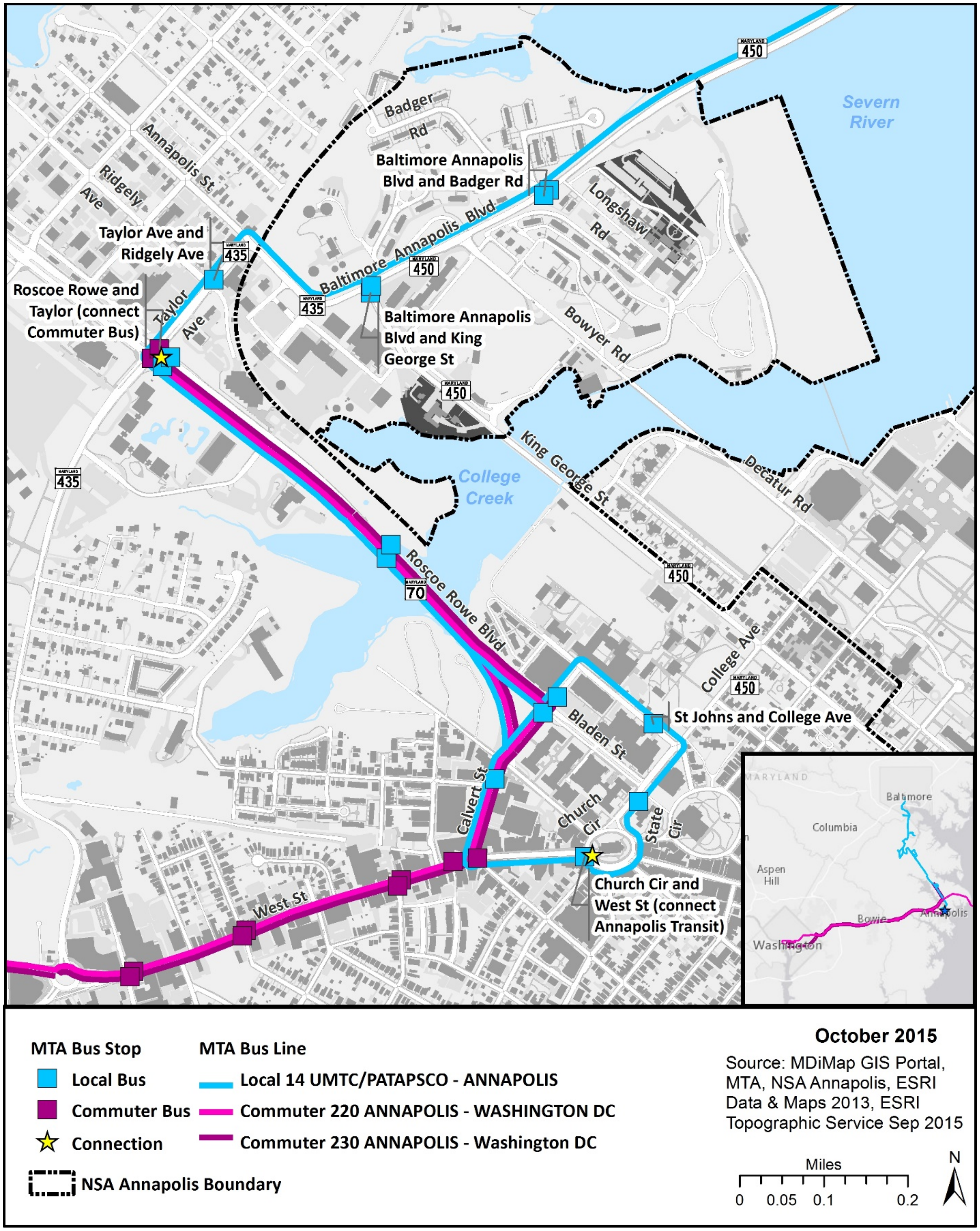


Figure 3-10 MTA Local and Commuter Bus Route Map

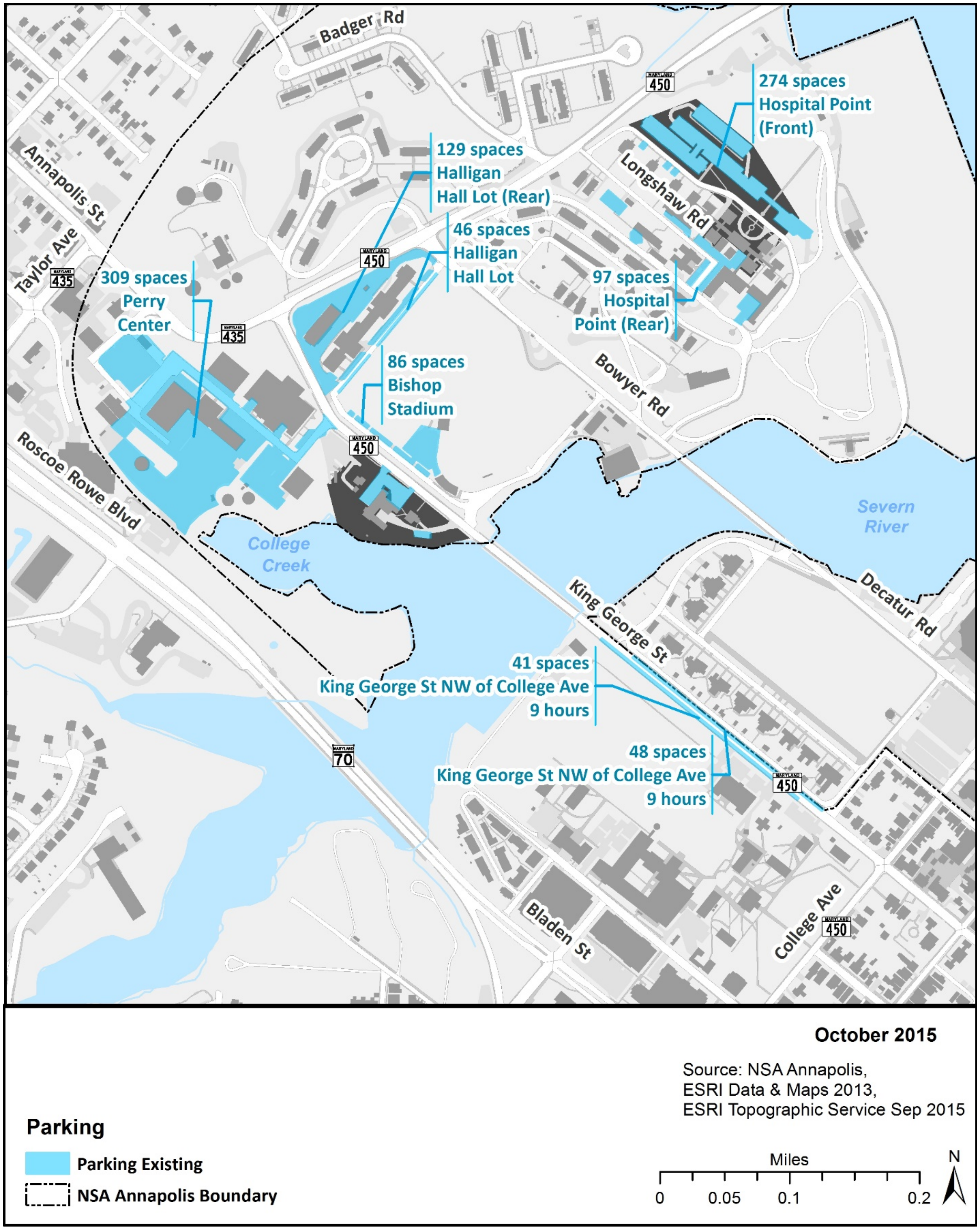


Figure 3-11 Parking Near Project Sites

Analysis Tools

The study analyzed the study area intersections using Synchro™ Traffic Signal Coordination Software Version 8.0 (Build 806, Revision 77) and SimTraffic™ Version 8.0 (Build 806, Revision 77). Three analyses were performed for traffic, including an intersection capacity analysis, an intersection queueing analysis, and a travel time analysis. The intersection capacity analysis used the Synchro™ software tool and various input values as described in the following sections to determine the Level of Service (LOS), or driver perception of an intersection's operation. The intersection queuing analysis used the Synchro™ tool to determine different levels of queuing, or the length that vehicles may back up at an intersection. The travel time analysis used the Synchro ™ software tool to determine the travel time along specifically designated routes.

Intersection Operations Analysis Method. LOS is the primary measure of traffic operations for both signalized and unsignalized intersections. It is a standard performance measure developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles. LOS provides a scale that is intended to match motorists' perception of how a transportation facility operates and provide a scale to compare different facilities. Detailed LOS descriptions are presented in Figure 3-12.

Signalized Intersection Level of Service. The LOS for signalized intersections is based on the Highway Capacity Manual (HCM) 2000 method and requires the same inputs to determine an accurate LOS (TRB, 2000). HCM 2010 methods were not followed because the signal timings were not HCM 2010 compliant; for example, signal timings were assigned for pedestrians only. Primary inputs include the following data:

- vehicular volumes
- pedestrian volumes
- traffic signal timings
- roadway geometry
- speed limits
- truck percentages
- peak hour factor (measure of vehicle 15-minute flow rate)

The average vehicle control delay, measured in seconds per vehicle, is calculated using these parameters with the Synchro™ procedures. This represents the average extra delay in seconds per vehicle caused by the presence of a traffic control device or traffic signal and includes the time required to decelerate, stop, and accelerate. The LOS can be characterized for the entire intersection, each intersection approach, and each lane group. Control delay is used to characterize the LOS for the entire intersection or an approach. The control delay and the volume to capacity ratio are used to characterize the LOS for a lane group. Delay quantifies the increase in travel time due to a traffic signal control. It is also a surrogate measure for driver discomfort and fuel consumption (TRB, 2010). Signalized intersections or approaches that exceed a delay of 50 seconds have LOS E and 80 seconds have LOS F. Table 3-8 shows the average control delay and corresponding LOS for signalized intersections. Using the Synchro™ method, LOS E and LOS F constitute failing operations.

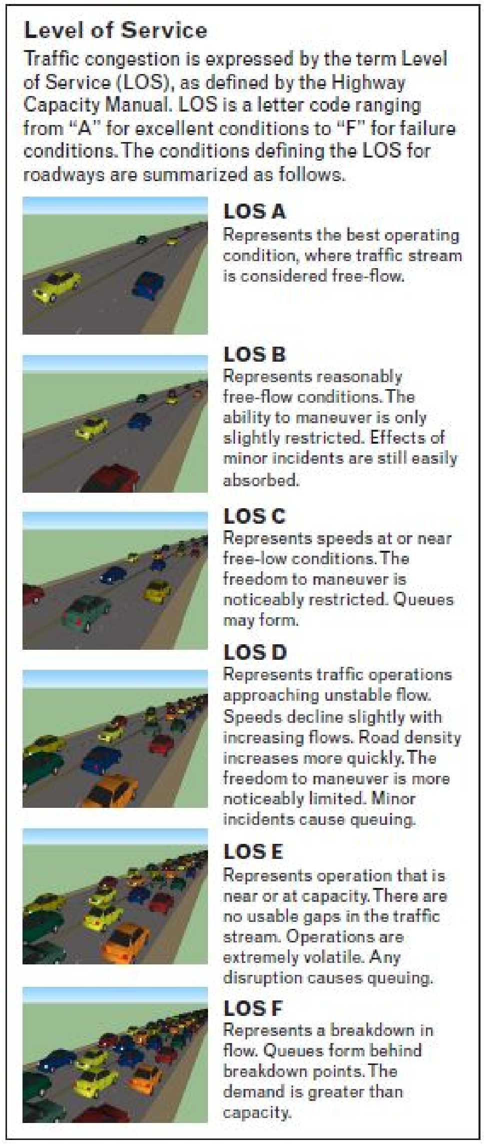


Figure 3-12 Level of Service Diagram

Table 3-8. Signalized Intersection Control Delay and Level of Service Thresholds—Highway Capacity Manual 2010 Method

LOS	*Average Control Delay (seconds/vehicle)*	*Description*
A	Less than or equal to 10	Stable conditions
B	>10–20	
C	>20–35	
D	>35–55	
E	>55–80	Unstable conditions
F	More than 80	Above capacity and unstable conditions

Source: (TRB, 2010)

To determine the LOS of an intersection, the critical input values were entered into the analysis software (Synchro™), and the average vehicle delay (seconds per vehicle) was calculated. Based on the average vehicle delay, the LOS was determined for all movements (left, though, and right), approaches, and the intersection as a whole. The five existing conditions intersections analyzed consisted of three signalized intersections and two unsignalized intersections.

Unsignalized Intersection Levels of Service. The LOS for unsignalized intersections (STOP-controlled intersections) is based on HCM 2010 method and requires the following several inputs:

- vehicular volumes
- pedestrian volumes
- roadway geometry
- speed limits
- truck percentages
- peak hour factor

The average vehicle control delay, in seconds per vehicle, is calculated using these parameters with the HCM 2010 procedures (TRB, 2010). This represents the average delay caused by the presence of a stop sign or roundabout and includes the time required to decelerate, stop, and accelerate.

The LOS for a two-way, STOP-controlled (TWSC) intersection (i.e., unsignalized intersection) is determined for each minor-street movement or shared movement as well as the major-street left turns. LOS F is assigned to the movement if the volume to capacity ratio for the movement exceeds 1.0 or if the movement's control delay exceeds 50 seconds. The LOS for TWSC intersections are different from the criteria used for signalized intersections primarily because user perceptions differ among transportation facility types. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will present greater delays than an unsignalized intersection. Unsignalized intersections also are associated with more uncertainty for users because delays are less predictable than at signals, which can reduce users' delay tolerance. LOS is not defined for the TWSC intersection as a whole or for major-street approaches for three primary reasons: (1) major-street through vehicles are assumed to experience zero delay; (2) the disproportionate number of major-street through vehicles at a typical TWSC intersection skews the weighted average of all movements, resulting in a very low overall average delay for all vehicles; and (3) the resulting low delay can mask important LOS deficiencies for minor movements (TRB, 2010).

The capacity of the controlled intersection legs is based primarily on three factors: conflicting volume, critical gap time defined as the number of seconds between vehicles passing the same point along the major street approach, and follow-up time defined as the number of seconds between the departure of the first and second vehicle in queue along the minor street approach. The HCM-based capacity analysis procedure assumes that drivers are both consistent and homogeneous and assumes consistency for their critical gap time. Critical gap times are based on many factors, including delay experienced by drivers on the approaches controlled by STOP signs. As delay increases, drivers become less patient and will accept shorter gaps, resulting in higher capacities for unsignalized intersections that are operating at LOS D or worse. The unsignalized intersection procedure uses fixed critical gap times. Unless the critical gap times are adjusted, the procedure will have a tendency to overestimate the delay at unsignalized intersections that are operating at LOS D or worse. Also, poor operations at an unsignalized intersection will encourage some drivers to turn right and make a U-turn on the mainline or accept shorter critical gaps (safety issue) rather than attempt a turn left (TRB, 2010).

Table 3-9 shows the average control delay and corresponding LOS for unsignalized intersections. It should be noted that the worst LOS at one-way, STOP-controlled and TWSC intersections represents the delay for the minor approach only. Using the HCM 2010 Method, LOS E and LOS F constitute failing operations.

Table 3-9. Unsignalized Intersection Control Delay and Level of Service Thresholds—Highway Capacity Manual 2010 Method

Level of Service	*Average Control Delay (seconds/vehicle)*	*Description*
A	Less than or equal to 10	Stable conditions
B	>10–15	
C	>15–25	
D	>25–35	
E	>35–50	Unstable conditions
F	More than 50	Above capacity and unstable conditions

Source: (TRB, 2010)

Existing Condition Intersection Operations Analysis

Based on the Synchro™ signalized intersection analysis results, all of the study area intersections operate at overall acceptable conditions during the morning and afternoon peak hours. LOS D or better are considered acceptable operating levels.

The following individual intersection approaches that primarily serve the Navy operate under unacceptable conditions during peak hours:

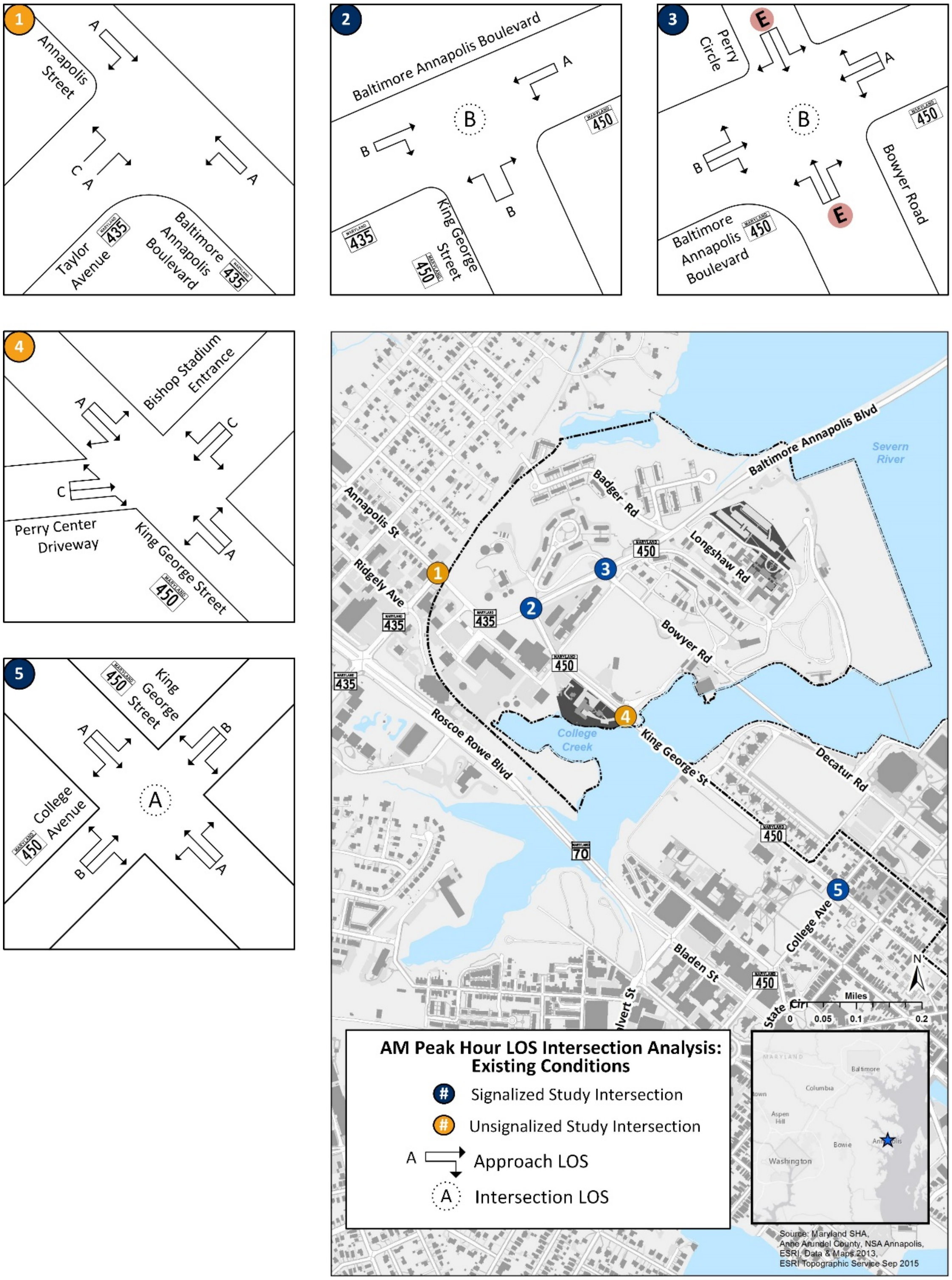
- northbound at the intersection of Baltimore Annapolis Boulevard and Bowyer Road and Perry Circle (Intersection #3) during the AM and PM peak hours
- southbound at the intersection of Baltimore Annapolis Boulevard and Bowyer Road and Perry Circle (Intersection #3) during the AM and PM peak hours

Based on the unsignalized intersection analysis, all approaches operate at acceptable conditions during the peak hours.

The average LOS for the various approaches to the intersection and the overall intersection LOS grade are depicted in Figure 3-13 and Figure 3-14 for AM and PM, respectively. Appendix C contains the Existing Condition AM, mid-day, and PM peak hour LOS results and capacity analysis.

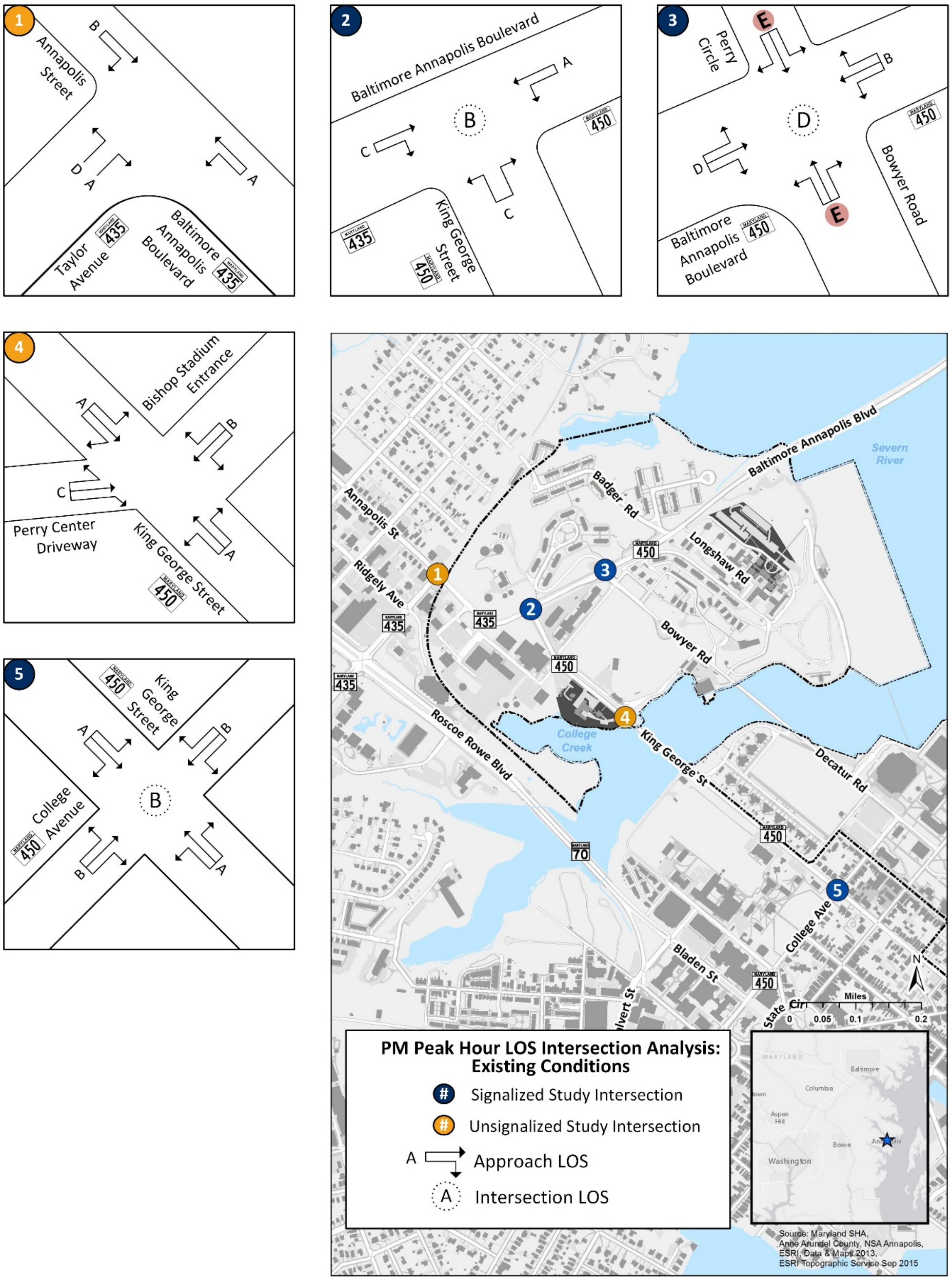
Intersection Queuing Analysis Method

In addition to analyzing the vehicle delay, the vehicle queue lengths were calculated for each approach. A failing queue length is determined by a queue length exceeding the intersection approach storage capacity. As the available storage for each intersection approach differs, these values reflect whether the existing storage provides enough space for vehicles waiting to pass through the intersection without blocking another lane or another intersection.



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-13 Existing Condition Intersection Level of Service (AM Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-14 Existing Condition Intersection Level of Service (PM Peak Hour)

Existing Condition Intersection Queueing Analysis

Based on the Synchro™ results, the only intersection to receive failing queue lengths is the intersection of Bowyer Road and Perry Circle with Baltimore Annapolis Boulevard (Intersection #3), and only during the PM peak hour. Appendix C contains the detailed Existing Condition queue analysis.

Travel Time Method

Travel time runs were acquired on Tuesday, November 17, 2015, in the morning (7:00 a.m.–9:00 a.m.), mid-day (11:00 a.m.–1:00 p.m.), and evening (4:00 p.m.–6:00 p.m.). The runs followed two routes both sharing King George Street. The first run followed King George Street starting east of College Avenue, turned left at Baltimore Annapolis Boulevard, turned left at Taylor Road, and ended at Ridgely Avenue (southern route). The second run followed King George Street starting east of College Avenue, turned right onto Baltimore Annapolis Boulevard, and ended at Badger Road (northern route). Figure 3-15 shows the two travel time routes. Appendix C contains the detailed Existing Condition travel time analysis.

Traffic Patterns along King George Street

Appendix C contains the description of how the data was acquired along King George Street. The results of the data are include the following:

- The AM rush hour is short and intense, occurring between 7:00 a.m. and 9:00 a.m. with the peak hour between 8:00 a.m. and 9:00 a.m. The dominant flow of traffic during the AM peak period is eastbound, toward downtown Annapolis. During each of these hours, King George Street experiences higher volumes than any given hour in the PM rush hour.
- The PM rush hour is much more spread out and less intense than the AM rush hour. Occurring between 2:00 p.m. and 7:00 p.m., the peak hour can vary from day to day, but each hour during the period, including the peak hour, sees less volume than the AM peak hour. The dominant direction of traffic during this time is westbound, away from downtown Annapolis.
- The mid-day traffic volume in both directions is around half the AM peak hour volume and around two-thirds of the PM peak hour volume.
- During late night and early morning (11:00 p.m. to 5:00 a.m.), traffic is light with fewer than 100 vehicles per hour using the road.

Existing NSA Annapolis Transportation Management Plan

The NSA Annapolis Installation Master Plan contains a Transportation Management Plan (TMP) that includes recommended strategies for NSA Annapolis to implement to encourage the reduction of single occupant vehicles and increase the use of alternative transportation options. Strategies include hiring an employee transportation coordinator, instituting parking policies, providing pedestrian and bicycle amenities, providing rideshare education, exploring shuttle bus opportunities, providing transit subsidy education, promoting telecommuting, and establishing a guaranteed-ride-home program (NAVFAC Washington, 2012b)

An effective TMP requires continual monitoring and evaluation to ensure NSA Annapolis delivers a reduction in single occupant vehicle use and thus a reduction of vehicles traveling through City of Annapolis and along internal NSA Annapolis roadways. According to the NSA Annapolis Installation Master Plan, the installation will evaluate lessons learned, evaluate impacts to the TMP programs by future construction and command realignments, and prepare periodic reports covering the effectiveness of the TMP strategies by comparing appropriate performance metrics (NAVFAC Washington, 2012b).

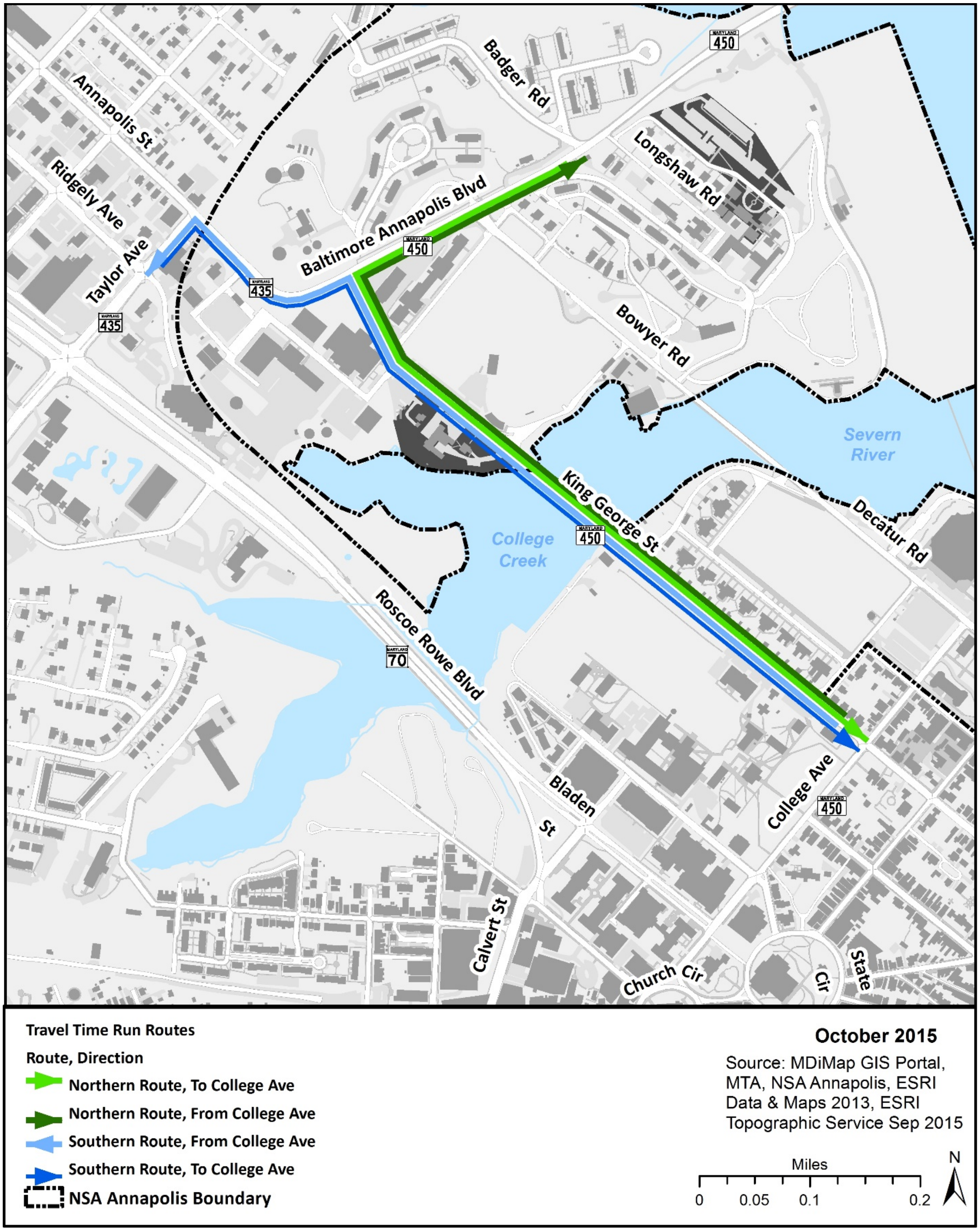


Figure 3-15 Travel Time Run Routes

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3.9.3 Environmental Consequences

3.9.3.1 No Action Alternative

This section contains an evaluation of the pedestrian network, bicycle network, transit, parking, and traffic under the No Action Alternative.

Pedestrian Network

The Annapolis Transit Development Plan of 2010 encourages limiting the growth of automobile use through improving other modes, including improving the infrastructure to support pedestrians (MTA, 2010). Specific improvements for the study area are proposed in the West Annapolis Sector Study. In the area of the Upper Yard, countdown pedestrian indicators are proposed along Baltimore Annapolis Boulevard where it intersects King George Street and where it intersects Bowyer Road at Gate 8. Closing gaps in the existing sidewalk network is recommended in the adjacent West Annapolis neighborhood, as well as finishing the addition of Americans with Disabilities Act (ADA)-compliant ramps at all intersections (Environmental Resources Management, 2015). In the 2015-2020 Capital Improvement Program, some of the projects (not specified) from the West Annapolis Sector Study for pedestrian improvements were funded (City of Annapolis, 2015).

The Maryland SHA currently has planned improvements to sidewalks in the study area on Baltimore Annapolis Boulevard and King George Street (Maryland SHA, 2014). The improvements would run from the existing sidewalks at the Severn River Bridge, along Baltimore Annapolis Boulevard south to King George Street and then east to the Perry Center driveway. Sidewalks in this area are currently only 4 feet wide, next to the road, and bordered by fences, creating an unsafe environment for pedestrians. The Maryland SHA project would bring the sidewalks into compliance with the ADA by widening them to 5 feet, including relocating fencing where necessary and installing ADA-compliant curb ramps at intersections. Bus stops in the project area would be improved to have 8-foot by 5-foot ADA-compliant landing areas. The completed project would enhance pedestrian access to the Upper Yard and Perry Center for those commuting on foot and provide bus commuters improved access to bus stops on Baltimore Annapolis Boulevard. Attachment 3 under Appendix C contains the Maryland SHA designs.

Bicycle Network

The Annapolis Bicycle Master Plan of 2011 serves as the City's guide for expanding and improving its bicycle facilities. Within the 1-mile bicycle study area, numerous facilities are proposed, some of which also are included in the West Annapolis Sector Study. In addition, according to the Annapolis Comprehensive Plan 2009–2014 Update, the area around the Upper Yard is recognized as needing improved bicycle facilities because of crowded roads (City of Annapolis, 2014). The City's 2015–2020 Capital Improvement Program includes funding to implement proposed bicycle facility improvements in West Annapolis recommended in the Bicycle Master Plan and West Annapolis Sector Study (City of Annapolis, 2015).

Figure 3-16 illustrates the future bicycle network for Annapolis as proposed in the City's 2011 Bicycle Master Plan. Note that the facilities shown were proposed in 2011, and many were programmed for completion in zero to five years before the No-build Condition date of 2020 (Toole Design Group, LLC, 2011). However, as of December 2015, the only facilities to be implemented were some of the signed bicycle routes. Some of the facilities are programmed for long-term completion, meaning that they may not be completed by 2020. The most significant proposed improvements with near-term implementation dates in the study area are a multi-use trail paralleling Baltimore Annapolis Boulevard between the

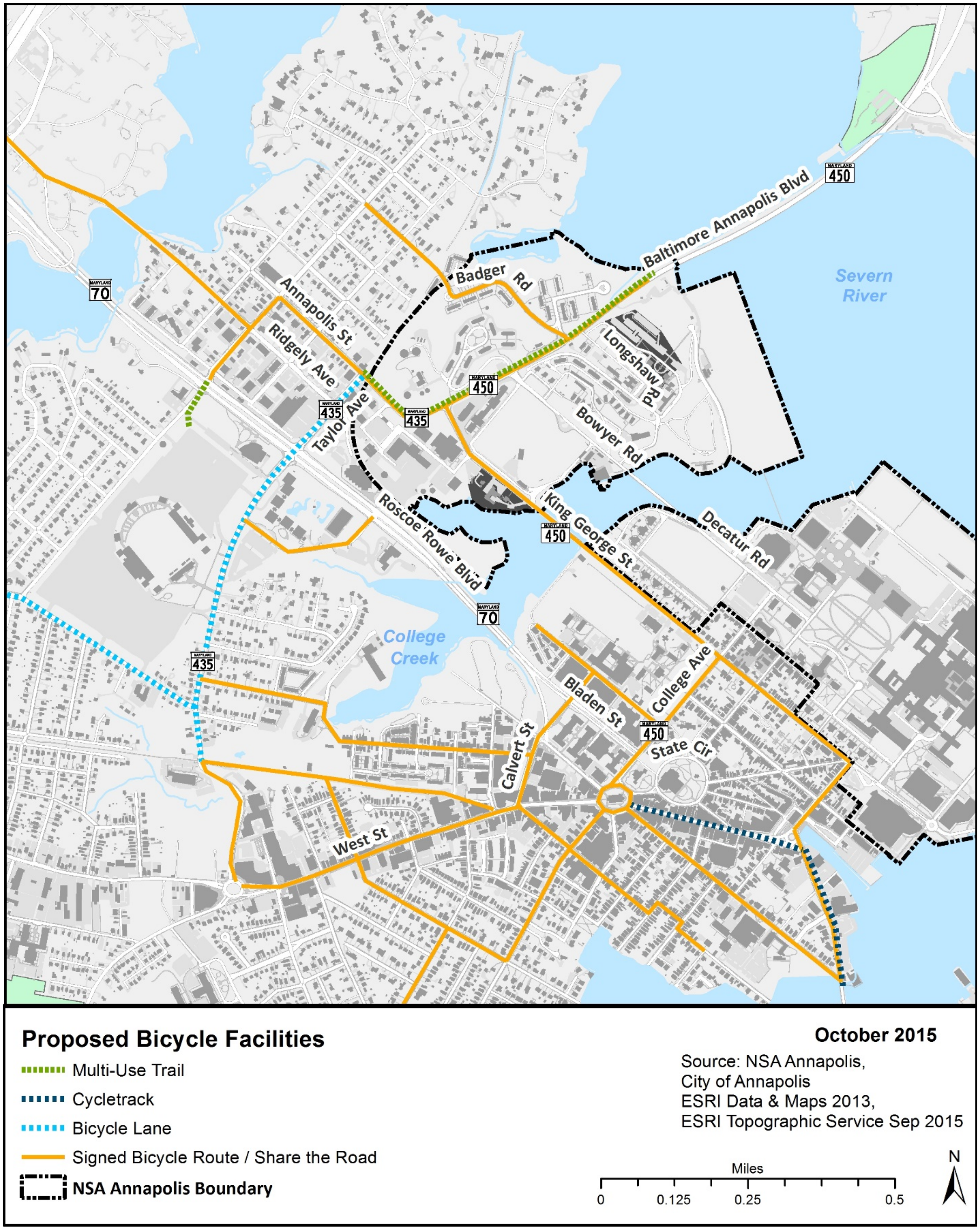


Figure 3-16 Proposed Bicycle Facilities

Severn River Bridge and Taylor Avenue, bicycle lanes along Taylor Avenue between Baltimore Annapolis Boulevard, the multi-use Poplar Trail, and a share the road bicycle route along the length of King George Street. These proposed facilities would allow bicyclists to reach existing bicycle facilities, like the Poplar Trail, as well as bicycle friendly streets of the West Annapolis neighborhood, without riding in travel lanes on the congested Baltimore Annapolis Boulevard and Taylor Avenue.

Public Transit

The MTA is currently in the process of implementing system-wide service changes and improvements under its Baltimorelink Plan (MTA, 2015c). For the City of Annapolis, the most significant service change would be the addition of a commuter bus route between Baltimore and Annapolis/Kent Island in early 2017. In addition to inbound morning trips and outbound afternoon trips, this service would feature reverse commute trips, allowing Baltimore City residents to commute to Annapolis. In mid-2017, the Route 14 local bus from Annapolis to Patapasco would be replaced with a similar service, the LocalLink 70. Service would be similar to the existing Route 14 but with a reduction in frequency from 45 minutes to 60 minutes. Evening hours also would be reduced from the current near midnight end of service to 10:00 p.m. on weekdays, 11:00 p.m. on Saturday, and 9:00 p.m. on Sunday.

The Annapolis Transit Development Plan provides alternatives for improving Annapolis Transit service to the study area. Increasing frequency to 90 minutes headways is recommended, but no weekend service is recommended (MTA, 2010). Note that when the Transit Development Plan was completed in 2010, no weekend Annapolis Transit service was available to the study area. Since then, the C-40 route serving the study area, as described in the Transit Development Plan, has been superseded by the Gold Route (discussed in Section 3.9.2.6.), which provides weekday and weekend service on 2-hour headways in each direction. Stops around the NSA Annapolis Upper Yard on the Gold Route have relatively low volumes compared to other Annapolis Transit stops and are not targeted for significant service improvements by the Transit Development Plan.

Parking

The City of Annapolis Comprehensive Plan restricts the development of long-term parking lots to areas outside the city center by connecting shuttle buses and restricts the addition of short-term parking capacity to the city center (City of Annapolis, 2014). Given that the immediate area surrounding the Upper Yard is already developed, it is unlikely that the City of Annapolis will provide additional long-term or short-term public parking.

Traffic

The No Action Alternative includes various programmed transportation improvements in the study area, growth in existing traffic volumes through the same horizon year as the action alternatives or 2020, and trips generated by approved and unbuilt development projects that are reasonably foreseeable. Volumes are then used as an input, along with delay, signal timing, and geometrics, to evaluate traffic operations and queuing at signalized and unsignalized intersections to determine the impacts of traffic growth.

Note that the procedures to forecast future traffic volumes throughout this transportation study include rounding; therefore, totals may not add up to the precise value indicated.

Background Growth. Background growth was added to the roadway network to account for vehicle trips traveling through the study area during the AM and PM peak hours. These trips are important to include because they account for vehicle volume growth from land use changes outside of the study area. Based on the process presented in the transportation scoping letter from the Navy to the City of Annapolis, an analysis of average annual daily traffic values helped to develop background growth rates because they provide a historical reference. Six years of historical data were used to determine a historical average growth. The latest available Maryland SHA historic average daily vehicle counts were compared from 2009–2014 to provide an average annual growth rate to apply to the study area roadways (Maryland SHA, n.d.).

The comparison separated roadways into principal arterials and minor arterials based on Anne Arundel County's assigned functional classification map. The principal arterials examined in the study area had negative average growth trends (-1.0 percent) and the minor arterials examined had 0.3 percent growth. Based on the transportation scoping letter from the Navy to the City of Annapolis, a 0.3 percent per year growth was applied to all study area roadways, providing a conservative estimate of future growth. This equated to a 1.5 percent growth over five years. Appendix C contains a detailed map of the background vehicle trips assigned to each study area intersection.

Planned Developments and Roadway Improvements. Based on a search of planned developments in Anne Arundel County (more than 20 projects west of City of Annapolis) and City of Annapolis (Crystal Springs Mixed-Use Development approximately 2.0 miles southwest of the study area), it was determined that none are located near the study area or would create vehicle through trips through the study area.

There were no planned roadway improvement projects other than the Maryland SHA proposed sidewalk improvement project along King George Street (discussed under Pedestrian Network above).

It is assumed that the traffic signal timings would be optimized by the City of Annapolis to improve the operations and reduce queueing.

Complete No Action Condition. The background growth was added to each study area intersection to account for growth between 2015 and 2020. Because there were no planning developments and no planned roadway improvements, the added background growth represented the No Action Alternative turning movement volumes. Appendix C contains the No Action Alternative turning movement volumes.

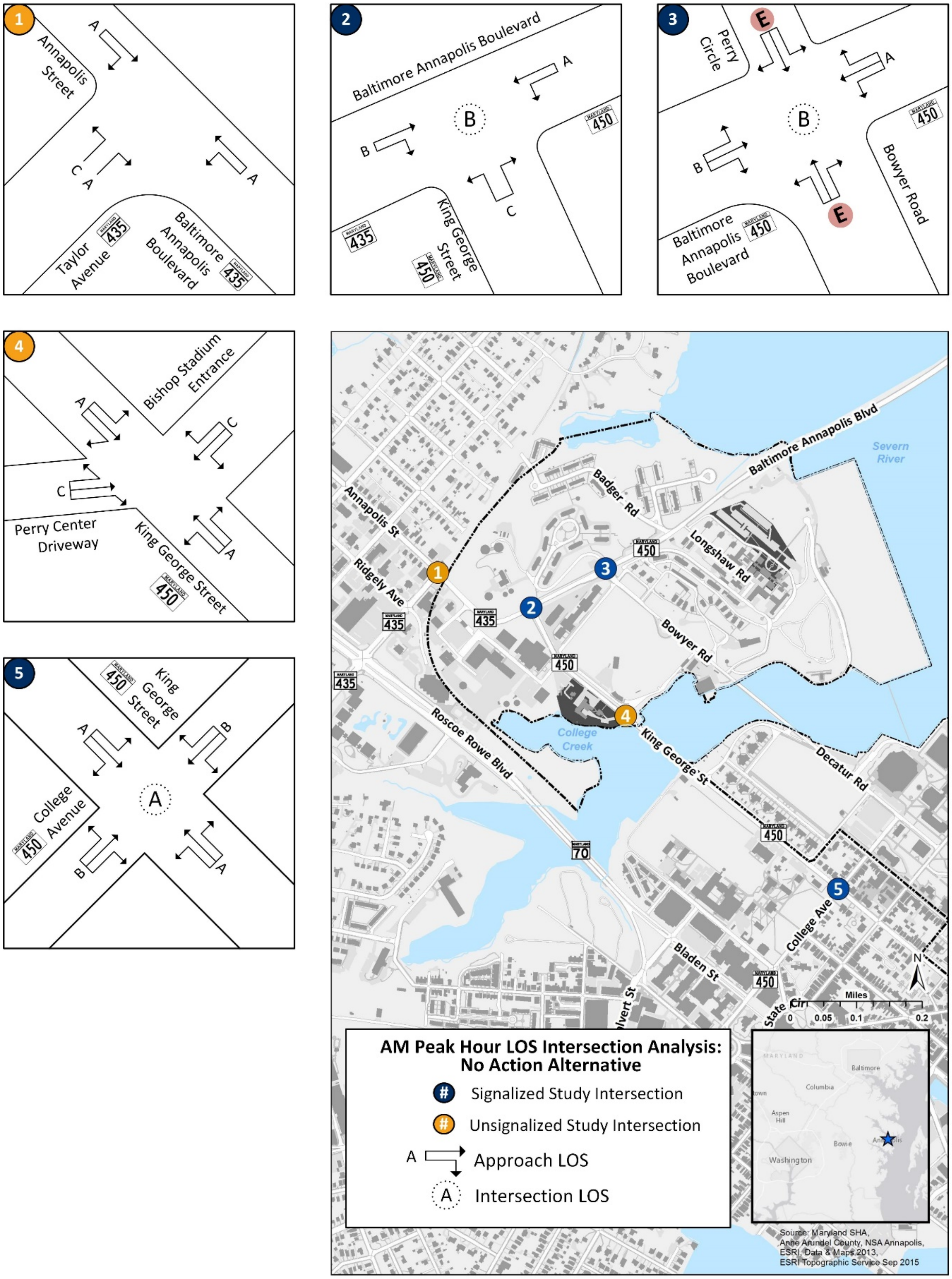
No Action Alternative Intersection Operations Analysis. Based on the Synchro™ signalized intersection analysis results, all of the study area intersections would operate at overall acceptable conditions during the morning and afternoon peak hours. Overall operating conditions during mid-day also would operate at an acceptable level.

The following individual intersection approaches that primarily serve the Navy would operate under unacceptable conditions during peak hours:

- northbound at the intersection of Baltimore Annapolis Boulevard and Bowyer Road and Perry Circle (Intersection #3) during the AM, mid-day, and PM peak hours
- southbound at the intersection of Baltimore Annapolis Boulevard and Bowyer Road and Perry Circle (Intersection #3) during the AM and PM peak hours

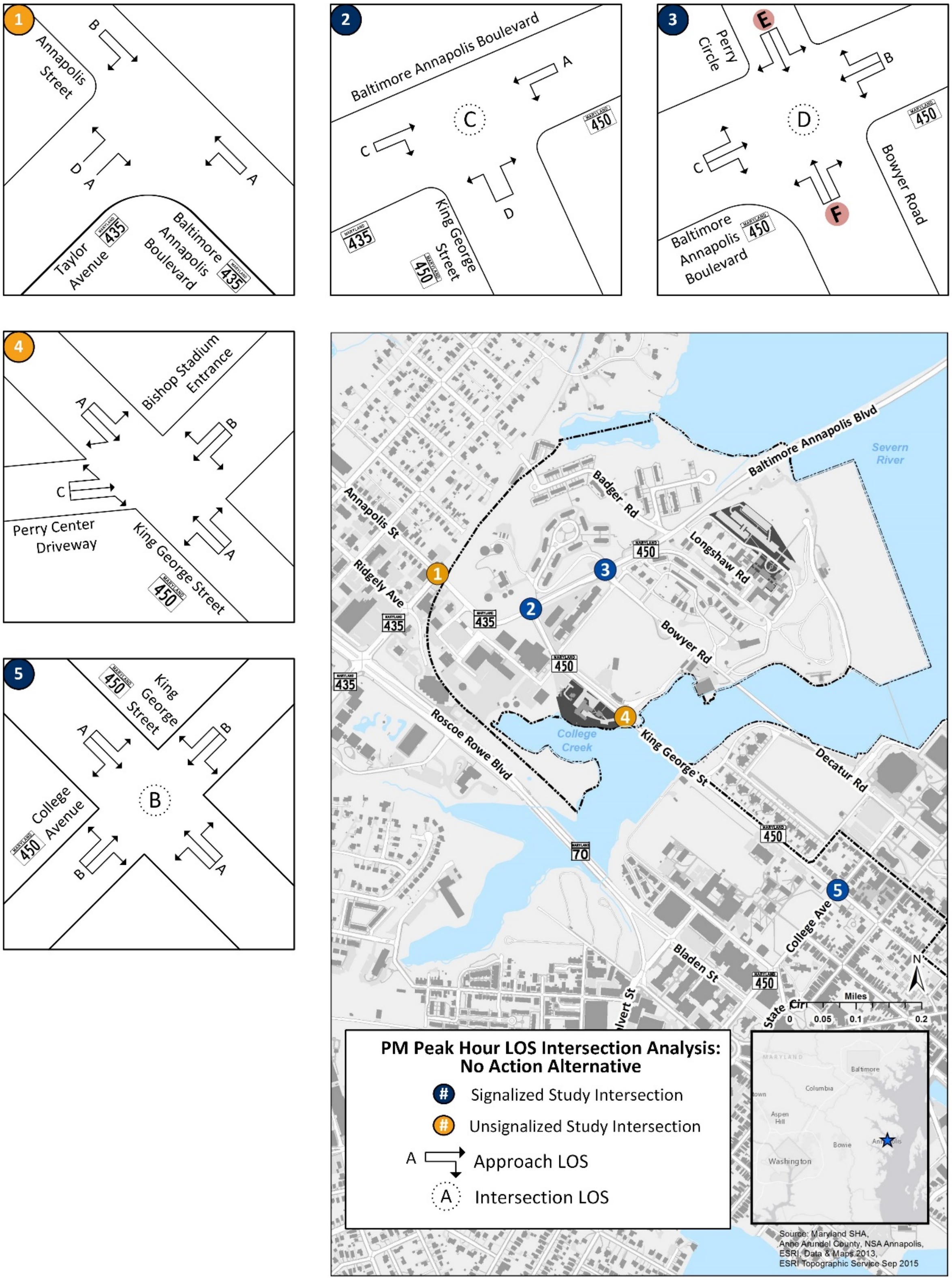
Based on the unsignalized intersection analysis, all approaches would operate at acceptable conditions during the peak hours.

The average LOS for the various approaches to the intersection and the overall intersection LOS grade are depicted in Figure 3-17 and Figure 3-18 for AM and PM peak hours, respectively. Appendix C contains the No Action Alternative AM, PM, and mid-day peak hour LOS results and capacity analysis.



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-17 No Action Alternative Intersection Level of Service (AM Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-18 No Action Alternative Intersection Level of Service (PM Peak Hour)

No Action Alternative Intersection Queueing Analysis. Based on the Synchro™ results, the only intersection to receive failing queue lengths would be the intersection of Bowyer Road and Perry Circle with Baltimore Annapolis Boulevard (Intersection #3), and this intersection would only fail during the PM peak hour. Appendix C contains the detailed queue analysis results.

No Action Alternative Travel Time Analysis. Synchro™ provides the estimated travel time between two points based on the signal timing, vehicle volumes, intersection operation, and queuing. Because the traffic signals were assumed to be optimized for this analysis, the travel times are faster than the Existing Condition. The same two routes were analyzed using Synchro™ between King George Street and College Avenue (Intersection #5) and Baltimore Annapolis Boulevard and Bowyer Street /Perry Circle (Intersection #3) also called the northern route and between King George Street and College Avenue (Intersection #5) and Baltimore Annapolis Boulevard and Taylor Avenue/Annapolis Street (Intersection #1) also called the southern route.

Based in the Synchro™ analysis, the morning peak covering both routes would range between 2 and 2.5 minutes with a minimum travel time of 1 minute and 51 seconds and a maximum travel time of 2 minutes and 22 seconds. The mid-day times would be similar to the morning travel times with a maximum of 4 seconds separating the two periods. The evening peak period would have the largest difference in travel times ranging from a low of 1 minute and 52 seconds to a high of 3 minutes and 7 seconds. Appendix C contains the detailed No Action Alternative travel time results.

No Action Alternative Impact Summary

Under the No Action Alternative, the Proposed Action would not occur and the only changes to transportation would be the planned sidewalk and bicycle network improvements. There also would be an increase in traffic from background growth occurring between 2015 (year the traffic counts were collected) and 2020. Therefore, no significant impacts to transportation would occur with the implementation of the No Action Alternative.

3.9.3.2 Alternative 1—Perry Center Site Potential Impacts

This section contains an evaluation of the pedestrian network, bicycle network, transit, parking, and traffic under Alternative 1.

Pedestrian Network

The Perry Center site would directly tie into the planned sidewalk improvements along King George Street. There would also be a new pedestrian crossing striped at the unsignalized intersection of King George Street and the Perry Center site (exit only)/Bishop Stadium. The pedestrian crossing would provide a safe location to cross between Bishop Stadium and the Perry Center site and would include the proper signing to alert drivers of its existence.

Assuming proper signing is posted at the Perry Center site driveways alerting pedestrians to an active driveway, they should not be affected. Currently the sidewalks near the Alternative 1 site are lightly used. The West Annapolis Sector Study recorded between 10 and 20 peak hour pedestrians at the intersection between King George Street and Baltimore Annapolis Boulevard; therefore, the pedestrian network should be able to handle increases in pedestrian traffic from the proposed Alumni Service Center and Headquarters facility.

The proposed new pedestrian crossing requires an evaluation to determine if a pedestrian signal would be necessary based on the forecasted traffic and pedestrian volumes. The data collected in November, 2015 indicated that 15, 9, and 27 pedestrians crossed King George Street during the AM, midday, and PM peak hours, respectively. The total forecasted vehicular volume along King George Street under Alternative 1 would be 982, 669, and 754 vehicles per hour during the AM, midday, and PM peak hours, respectively. The distance to the closest intersection (signalized or unsignalized) is 1,100 feet from the Perry Center site.

The *Manual of Uniform Traffic Control Devices* provides guidance for evaluating the need for a pedestrian signal at a pedestrian crossing. According to the manual, the following conditions must be met for the pedestrian peak hour warrant test:

- The closest intersection (signalized or unsignalized) must be at least 300 feet
- The plotted point on the graph (Figure 3-19) must fall above the curve (FHWA, 2012)

All three plotted points representing the three peak hour time periods fall below the curve; therefore, the intersection does not meet the warrant to add a pedestrian signal for this crossing.

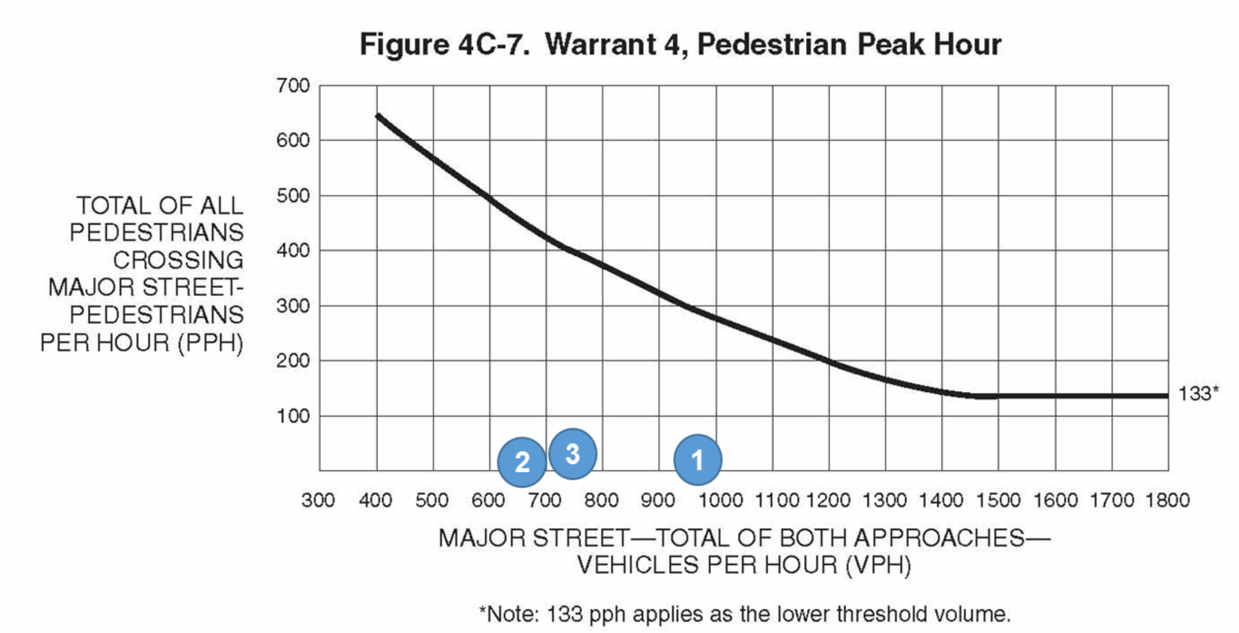
In terms of striping a new crosswalk at King George Street and the Perry Center site (exit)/Bishop Stadium (Intersection #4), HCM provides guidance to calculate the difference in time between using the existing nearest crosswalk or new proposed crosswalk. The nearest location for a pedestrian to safely cross King George Street is located at King George Street and Baltimore Annapolis Boulevard (Intersection #2), a roundtrip distance of 2,250 feet, including the distance to cross King George Street. According to the HCM, the time per person to walk to Intersection #2 and walk back along the other side of the King George Street would be approximately 9–11 minutes, depending on the pedestrian's walking speed (TRB, 2010). If a crosswalk were available to cross at Intersection #4, it would take less than 10 seconds to cross King George Street. Based on this comparison, a new crosswalk is warranted at Intersection #4 to avoid a safety issue that could be caused by pedestrians choosing to cross at a location without a crosswalk and proper signing rather than walking to Intersection #2 to cross.

Bicycle Network

The Perry Center site would directly tie into the planned signed bicycle route along King George Street. Assuming proper signing is posted to alert bicyclists of the active driveway serving the Perry Center site, bicyclists should not be affected as a result of implementing Alternative 1. Observations of bicycle use along King George Street near the Upper Yard indicate the bicycle use is light in the area. Thus, the planned bicycle network should be able to handle an increase in use from the proposed Alumni Service Center and Headquarters.

Public Transit

The public transit network located near the Perry Center site would not undergo changes in levels of service or operation hours. The closest bus stop, served by both Annapolis Transit and the MTA local buses, would be at the corner of King George Street and Baltimore Annapolis Boulevard, a distance of 800 feet from the Alternative 1 site. Commuters would be able to reach the bus stop from the Perry Center site via the planned sidewalk improvements.



1: AM peak hour

2: Midday peak hour

3: PM peak hour

Figure 3-19 Manual of Uniform Traffic Control Devices Pedestrian Peak Hour Warrant Graph

Parking

The Perry Center site would include between 90 and 120 parking spaces. Assuming the low range, 79 parking spaces for employees and 11 parking spaces for visitors would be sufficient to accommodate commuters and visitors to the Perry Center site. If a mid-day event were to occur, it is assumed that the 79 employees would be asked to park elsewhere, thus freeing up the spaces at the Perry Center site. It is also assumed that the 86 spaces at Bishop Stadium would be freed up for event parking as well, leaving approximately 25 spaces short of the potential demand of 200 vehicles. Those additional vehicles could be accommodated on the northwest corner of the existing Perry Center; however, the traffic model placed all vehicles destined to the Perry Center site at Perry Center and Bishop Stadium. These assumptions provide a conservative approach (i.e., worst case scenario) to the traffic analysis by assigning all of the visitors attending a mid-day event to access off-street parking at the Perry Center site and Bishop Stadium, thus placing all forecasted traffic at the Perry Center/Bishop Stadium intersection in the immediate vicinity of the Alumni Service Center and Headquarters facility. However, because of daily use of the parking lots, a number of visitors likely would park at other locations or use available on-street parking, which would lessen the traffic impact along King George Street. A shuttle bus could be required to provide the employees, as well as event visitors, access between their parked vehicles and the Perry Center site.

Traffic

Future projected traffic analysis is based on containing two driveways connecting the Perry Center site to King George Street. The driveway to the west would operate as an entrance only and the driveway to the east would serve as an exit only. Appendix C contains the change in lane geometry for Alternative 1.

The following two sections describe the process used to project future traffic volumes. First, the trip generation is covered, followed by the modal split and trip distribution to develop the future forecasted traffic volumes.

Trip Generation and Modal Split. Trip generation refers to the total number of person trips created by the Perry Center site during the AM and PM peak hours each workday. Following the transportation scoping letter from the Navy to the City of Annapolis, the Institute of Transportation Engineers (ITE) *Trip Generation Manual 9th Edition* was used to forecast the number of peak hour trips that would be produced based on 120 people (employees and visitors). Based on primary use as an office within NSA Annapolis, the single tenant office building land use category was used, relying on the number of employees to determine the total peak hour trips. According to ITE, the total trips generated would be 64 during the AM peak hour and 61 during the PM peak hour. Table 3-10 contains the Alternative 1 trip generation.

Table 3-10. Alternative 1: Trip Generation

Source	*Independent Variable*	*Time Period*	*IN*	*OUT*	*TOTAL*
Institute of Transportation Engineers Land Use Code 715	120 employees	AM Peak Hour	57	7	64
	120 employees	PM Peak Hour	9	52	61

For the AM and PM vehicle trips, the ITE rates were used to develop the trip generation. Because the ITE rates were developed based on a similar suburban environment with a limited amount of transit and some carpooling occurring, the full ITE rate was used to forecast the vehicle trips.

Mid-day vehicle trips represent occasions where the Perry Center site would host events during the mid-day. These events are assumed to occur on a limited frequency and would more likely occur during weekday evenings or weekends. Appendix C contains the peak hour mid-day trip generation and modal split assumptions.

Trip Distribution. Trip distribution represents the origin-destination pattern by percentage for trips generated by the Perry Center site to/from points beyond the study area boundary. For example, 53 percent of the vehicle trips are destined to Taylor Road and points west, 30 percent of vehicle trips are destined to the Naval Academy Bridge, and 17 percent of vehicle trips are destined to downtown Annapolis. This process sums to 100 percent. Trip assignment reflects the estimated number of trips between the Perry Center site and the study area boundary by selecting which route within the study to assign the trip.

For the AM and PM peak hour, the trip distribution was developed by grouping together the zip codes surrounding Annapolis into distribution zones based on the geographic relationship to the primary roadway network access from the Perry Center site. A full list of employee zip codes was loaded into a database. The database was connected to distribution zones to create a list of the total number of employees by distribution.

Even though the USNA AA and NAF employees work at several locations southeast of the study area along King George Street and may already be traveling through the study area, removing these trips would be difficult to pinpoint; therefore, new trips were added to the study area to represent all employees and visitors. It also is possible that based on the location of the existing USNA AA and NAF facilities, most of the existing trips do not travel through the study area. Adding all the USNA AA/F employee and visitor trips to the study area network ensures the worst case scenario is covered in the traffic impact analysis.

Table 3-11 summarizes of the total number and percentage of employees by distribution zone. Figure 3-20 shows the Alternative 1 AM and PM trip distribution, and Appendix C contains the Alternative 1 AM and PM vehicle trip generation in the study area.

Table 3-11. Alternative 1: AM and PM Peak Hour Trip Distribution

Destination	*Roadway*	*Total Employees*	*Percent*
Annapolis	MD 450 southbound	13	17%
North and east	MD 450 northbound	23	30%
West and south	Taylor Road	41	53%
TOTAL		77	100%

Complete Action Alternative 1. Alternative 1 vehicle trips were added to each study area intersection using the No Action Alternative as a base. Existing vehicle volumes entering and exiting the Perry Center site were removed because the existing site activity would be relocated. No other volumes from other study area intersections were removed because the trip distribution from the existing Perry Center site is unknown. This provides for a conservative analysis approach because some of existing trips most likely already enter or exit through the study area intersections. Also the existing trips created by either of the two options for relocating the CHRIMP would shift to the northern portion of the Perry Center site. The total vehicle trips represents the complete Alternative 1. Appendix C contains the Alternative 1 AM and PM peak hour turning movement volumes and the Alternative 1 mid-day inbound and outbound turning movement volumes.

Alternative 1 Intersection Operations Analysis. Based on the Synchro™ signalized intersection analysis results, all of the study area intersections would operate at overall acceptable conditions during the AM and PM peak hours. Overall operating conditions during mid-day also would operate at acceptable levels.

Appendix C contains the mid-day vehicle trip distribution.

Individual signalized intersection approaches would operate at acceptable conditions for Intersections #2 and #5. The Bowyer Road and Perry Circle approaches at Intersection #3 (primarily used by the Navy) would operate under unacceptable conditions. When compared to the No Action Alternative, these approaches would operate as follows:

- During the AM peak hour, the northbound Bowyer Road and southbound Perry Circle approaches would continue to operate at LOS E and experience no increase in vehicle delay.
- During the mid-day inbound and outbound peak hours, the northbound Bowyer Road approach would continue to operate at LOS E and experience less than a second increase in vehicle delay; the southbound Perry Circle approach would continue to operate at LOS D.
- During the PM peak hour, the northbound Bowyer Road approach would continue to operate at LOS F and experience no increase in vehicle delay; the southbound Perry Circle approach would continue to operate at LOS E and experience no increase in vehicle delay.

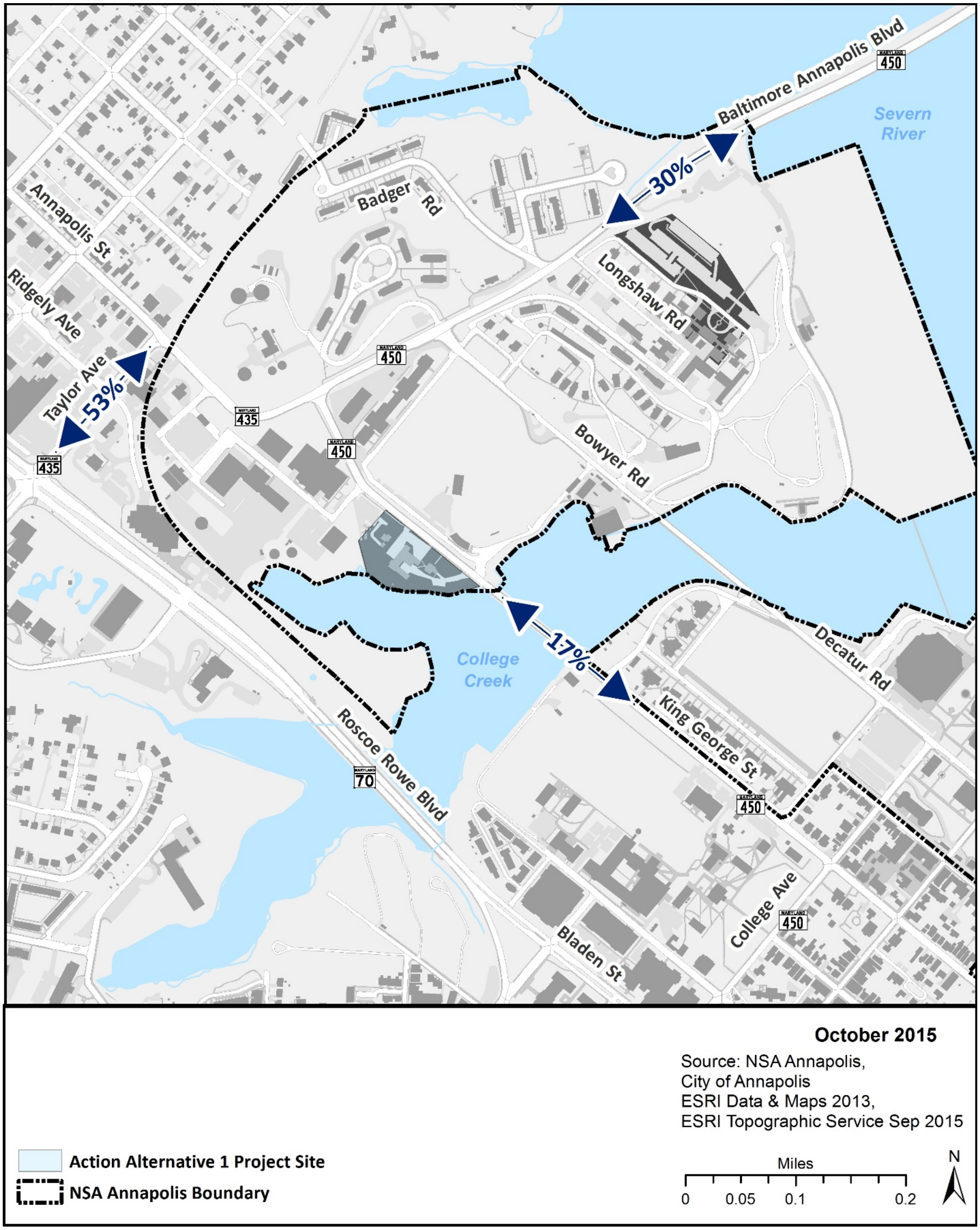


Figure 3-20 Alternative 1 AM and PM Trip Distribution

Based on the unsignalized intersection analysis, all approaches would operate at acceptable conditions during the peak hours.

The average LOS for the various approaches to the intersection and the overall intersection LOS grade are depicted in Figure 3-21 and Figure 3-22 for AM and PM peak hours, respectively. Appendix C contains the Alternative 1 AM, PM, and mid-day peak hour LOS results and capacity analysis.

Alternative 1 Intersection Queueing Analysis. Based on the Synchro™ results, the only intersection to receive failing queue lengths would be the intersection of Bowyer Road and Perry Circle with Baltimore Annapolis Boulevard (Intersection #3), and failure only would occur during the PM peak hour and would add a few additional queued vehicles to this approach. Appendix C contains the detailed Alternative 1 queueing analysis.

Alternative 1 Travel Time Analysis. Based in the Synchro™ analysis, Alternative 1 would result in a maximum of 3 additional seconds (1 percent increase) when compared to the No Action Alternative. The 3 additional seconds are on top of the travel time that would occur under the No Action Alternative or if the relocation of staff, demolition of buildings, relocation of Navy functions, and construction of a new building at the Perry Center site did not occur. Appendix C contains the detailed Alternative 1 travel time analysis.

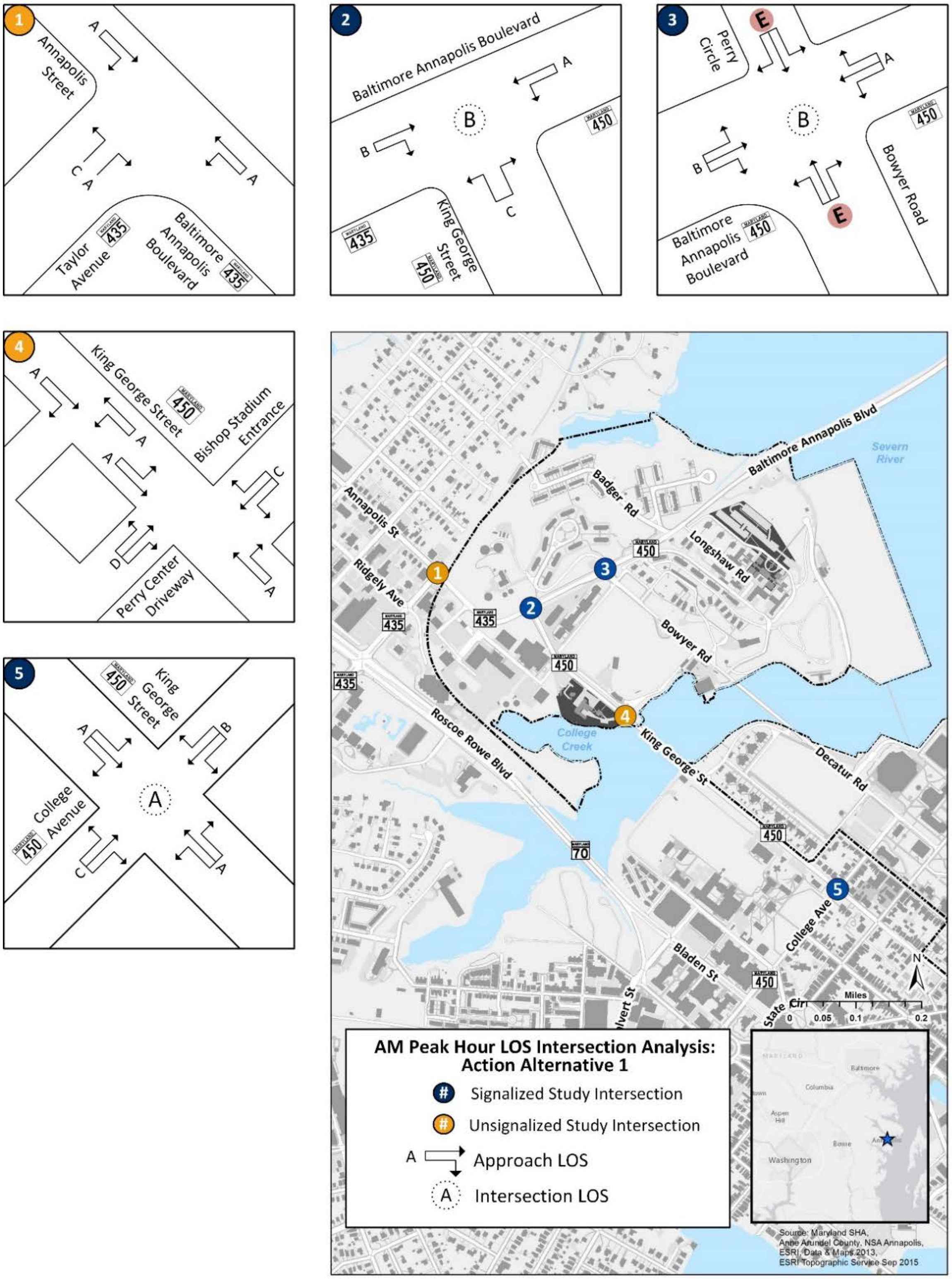
Alternative 1 Impact Summary

Pedestrian, bicycle, parking, and traffic conditions were evaluated. Based on the assumption that the Perry Center site would be connected to the bicycle system along King George Street and all employees would be accommodated with ample parking spaces at the Perry Center site, there would be no significant impact from implementing Alternative 1 with regard to the bicycle network and parking.

Because the closest intersection (unsignalized or signalized) is more than 1,000 feet away, a crosswalk and appropriate signing to alert drivers is warranted to address a potential safety issue caused by pedestrians choosing to cross if the crosswalk was not present. Based on the assumption that the Perry Center site would be connected to the sidewalk system planned by Maryland SHA along King George Street and the proposed crosswalk at Intersection #4 is warranted, Alternative 1 would have no significant impact with regard to the pedestrian network.

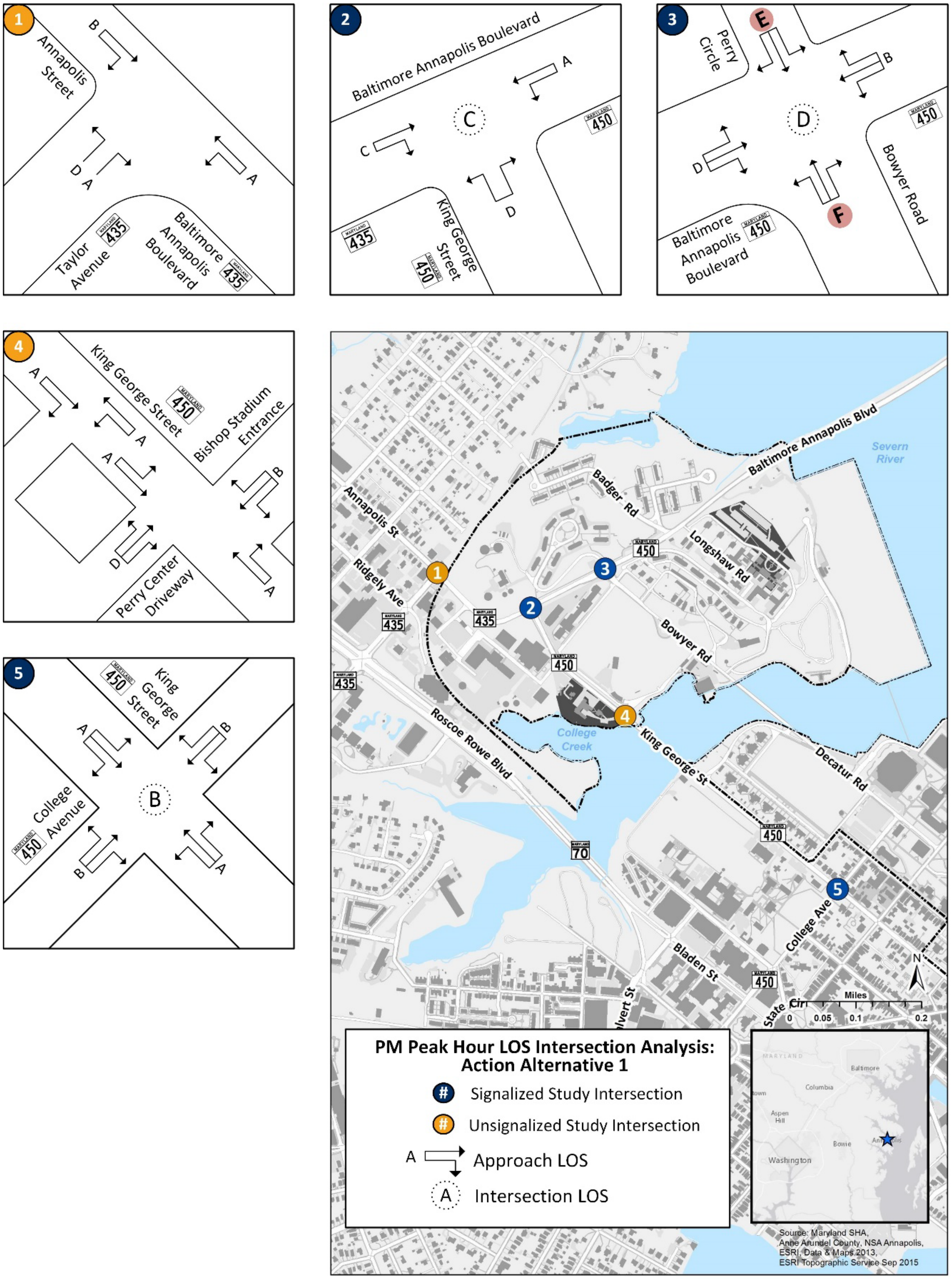
For the traffic conditions, five intersections were analyzed for Alternative 1 (same as the Existing Condition and No Action Alternative), including the site driveway (exit only) because the entrance would operate at LOS A for all conditions and four other nearby intersections serving the majority of site generated vehicle trips. Based on the Synchro™ analysis, all intersections would operate with an overall acceptable LOS (LOS D or better). Two intersection approaches primarily serving Navy traffic—Bowyer Road and Perry Circle at Baltimore Annapolis Boulevard (Intersection #3)—would operate at a failing LOS during the inbound mid-day, outbound mid-day, and PM peak hours; however, the difference between the No Action Alternative and Alternative 1 vehicle delay and queue lengths would be within the thresholds established in the transportation assumptions. These differential thresholds include a less than 5 second-added vehicle delay and less than a 150-foot added queue length for facilities operating at unacceptable levels in the No Action Alternative. All other approaches for both the signalized and unsignalized intersections would operate at acceptable levels. Therefore, implementing Alternative 1 would not significantly affect traffic.

The traffic analysis for Alternative 1 evaluated the impacts of the proposed Perry Center site containing two curb cuts (i.e., driveway entrances), one to serve vehicles entering the site and the other to serve



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-21 Alternative 1 Intersection Level of Service (AM Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-22 Alternative 1 Intersection Level of Service (PM Peak Hour)

vehicles exiting the site. This analysis assessed the worst case scenario for all vehicles exiting the Perry Center site through one driveway. If the design results in more curb cuts, thus providing multiple exit points, the mid-day and PM peak hour traffic would result in a more distributed traffic pattern and reduce the forecasted vehicle delay along the Perry Center driveway approaches to King George Street.

During the construction period, there would be short-term parking, sidewalk, and truck impacts. The Perry Center site would require a temporary parking area for construction workers and trucks. Limited overflow parking could be considered across King George Street at Bishop Stadium and at the Navy-Marine Corps Memorial Stadium. The number of peak trips may temporarily increase as a result of construction worker trips during the construction period. Pedestrians along King George Street would experience temporary sidewalk closings; temporary new sidewalk connections provided to compensate for the sidewalk closings, when necessary; and sidewalk impacts such as narrowed or torn-up sidewalks.

Short-term impacts on traffic would result from dump trucks hauling debris while the existing buildings on the Perry Center site are being demolished. These impacts would occur until the parcel is clear of existing building materials. Delivery trucks would haul new building materials, including foundation materials and building materials for framing the interior and exterior and installing flooring.

NSA Annapolis Mail Center Options

One option under Alternative 1 for relocating the NSA Annapolis Mail Center would be to move the facility to Building 15NS across the Severn River near Bennion Road within the North Severn Complex. Because the number of vehicles in use to perform the mail delivery would be minimal and would occur as a linear travel path from the facility to all pick up and drop off points covering the NSA Annapolis installation, the number of additional vehicle trips to the peak hour roadway network would be negligible. Also, relocating the current administrative functions of Building 15NS to another existing facility on the North Severn Complex would not add any additional vehicle trips to the area. Therefore, there would be no long-term traffic impacts as a result of the relocating the NSA Annapolis Mail Center to Building 15NS. Additionally, there is a parking area associated with Building 15NS that construction workers could use; thus, it is unlikely that there would be any short-term impacts on parking in the area.

A second option for relocating the mail center under Alternative 1 would be to demolish Building 619 in the northwest portion of the Perry Center and construct a prefabricated facility on the remaining slab/foundation. This location is west of King George Street, south of Baltimore Annapolis Boulevard, and just north of the existing mail center. Because of its proximity to the mail center's current location, there would be no traffic impacts. During the construction period, there would be short-term parking impacts at the Perry Center because demolition and construction activities would require a temporary parking area for construction workers and trucks.

CHRIMP Options

One option under Alternative 1 for relocating the CHRIMP facility would be to move the facility to Building 104 in the northwest portion of the Perry Center just north of its current location. This site is west of King George Street and south of Baltimore Annapolis Boulevard. The existing BOS functions in Building 104 would be relocated to another, underutilized BOS contractor facility on Perry Center. The second option would move the facility to a new prefabricated building constructed adjacent to Building 104. Because there are a total of two employees who work at the CHRIMP and it would be relocated in proximity to the existing CHRIMP facility, there would be no change in the number of vehicle trips during the peak hour time period. Therefore, there would be no long-term traffic impacts as a result of either CHRIMP option. During the construction period, there would be short-term parking impacts at the Perry

Center because renovation or demolition/construction activities would require a temporary parking area for construction workers and trucks.

3.9.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

This section contains an evaluation of the pedestrian network, bicycle network, transit, parking, and traffic under Alternative 2.

Pedestrian Network

Under Alternative 2, Building 250 ready connects to the NSA Annapolis internal sidewalk network. Pedestrians can access the Upper Yard at Gate 8 and use the existing sidewalk network to reach the project site. Appropriate sidewalk connections are provided to the existing sidewalks on Baltimore Annapolis Boulevard and would be improved with the planned Baltimore Annapolis Boulevard sidewalk improvements; therefore, pedestrians should not be affected under Alternative 2.

Bicycle Network

According to the NSA Annapolis Installation Master Plan, bicycles are permitted on the Lower or Upper Yards by NSA Annapolis employees only (NAVFAC Washington, 2012b). Bicyclist can enter the Upper Yard at Gate 8 and use the existing internal roadway network to reach Building 250. Appropriate bicycle connections within NSA Annapolis exist to the bicycle route on Baltimore Annapolis Boulevard; therefore, bicyclists should not be affected under Alternative 2.

Public Transit

Under Alternative 2, the levels of service and operation hours of the public transit network near Building 250 and outside Gate 8 would not change. The closest Annapolis Transit bus stop is located near Gate 8, a walkable distance of 1,200 feet. The nearest MTA local bus stop is another 300 feet north on Baltimore Annapolis Boulevard. Both bus stops can be reached using the NSA Annapolis internal sidewalk network and the existing sidewalk on Baltimore Annapolis Boulevard. Planned sidewalk improvements along Baltimore Annapolis Boulevard would improve access to both bus stops.

The public transit network near Building 250 and outside Gate 9 would not undergo changes in levels of service or operation hours. The closest MTA local bus stop is located at the intersection of Baltimore Annapolis Boulevard and Badger Road, a walkable distance of 800 feet. The closest Annapolis Transit bus stop would be located near Gate 8, a walkable distance of 1,200 feet. Planned sidewalk improvements along Baltimore Annapolis Boulevard and the NSA Annapolis internal sidewalk network would allow commuters to walk to the bus stops, assuming appropriate sidewalk connections are provided at the Gate 9 driveway.

Parking

Under Alternative 2, the 274 parking spaces at Hospital Point would provide ample parking for the 79 employees and visitors, as well as a sufficient number of spaces to accommodate expected workers and visitors to the site for other NSA Annapolis tenant commands in the area. If a mid-day event were to occur, the remaining spaces at Hospital Point would be used but may fall short of meeting the potential demand of 200 vehicles. In that event, overflow spaces could be used along Ramsey Road, where numerous parallel parking spaces exist.

Traffic

Access to Building 250 would occur through NSA Annapolis Gate 8 along Bowyer Road to enter the Upper Yard, followed by turning left turn on to Phythian Road and right on to Wood Road. Wood Road would continue to provide access to the Hospital Point parking area, the primary parking lot that would service Building 250.

The following sections describe the process used to project future traffic volumes. First, the trip generation is covered, followed by the modal split and trip distribution to develop the future forecasted traffic volumes.

Trip Generation and Modal Split. Trip generation refers to the total number of person trips created by the Building 250 location during the AM and PM peak hours for each workday. Using the same process described under Alternative 1 and outlined in the transportation scoping letter from the Navy to the City of Annapolis, the ITE *Trip Generation Manual 9th Edition* was used to forecast the number of peak hour trips that would be produced based on 120 people (employees and visitors). The same number of trips are forecasted as Alternative 1, a total of 64 during the AM peak hour and 61 during the PM peak hour (Table 3-10).

The same process used under Alternative 1 was used for Alternative 2 to develop the AM and PM peak hours. This process relied on the ITE rate to forecast the vehicle trips for the AM and PM peak hour. As stated under Alternative 1, mid-day vehicle trips represent occasions where the Building 250 would host events during the mid-day. It is assumed that these events would occur on a limited frequency and would more likely occur during the weekday evenings or weekends. Appendix C contains the Alternative 2 mid-day trip generation and modal split.

Trip Distribution. For the AM and PM peak hour, the same trip distribution used for Alternative 1 was used for Alternative 2 (Figure 3-20). The only difference is that the location of the trips originate or terminate at NSA Annapolis Gate 8 rather than Perry Center site. Figure 3-23 shows the Alternative 2 AM and PM trip distribution, and Appendix C contains the Alternative 2 AM and PM vehicle trip generation in the study area and mid-day vehicle distribution.

Complete Action Alternative 2. Vehicle trips were added to each study area intersection using the No Action Alternative as a base. The total vehicle trips represents the complete Alternative 2 volumes. Appendix C contains the Alternative 2 AM and PM peak hour turning movement volumes and the Alternative 2 mid-day inbound and outbound turning movement volumes.

Alternative 2 Intersection Operations Analysis. Based on the Synchro™ signalized intersection analysis results, all of the study area intersections would operate at overall acceptable conditions during the morning and afternoon peak hours. Overall operating conditions during mid-day also would operate at acceptable levels.

Individual signalized intersection approaches would operate at acceptable conditions for Intersections #2 and #3. The Bowyer Road and Perry Circle approaches at Intersection #3 (primarily used by the Navy) would operate under unacceptable conditions. When compared to the No Action Alternative, these approaches would operate as follows:

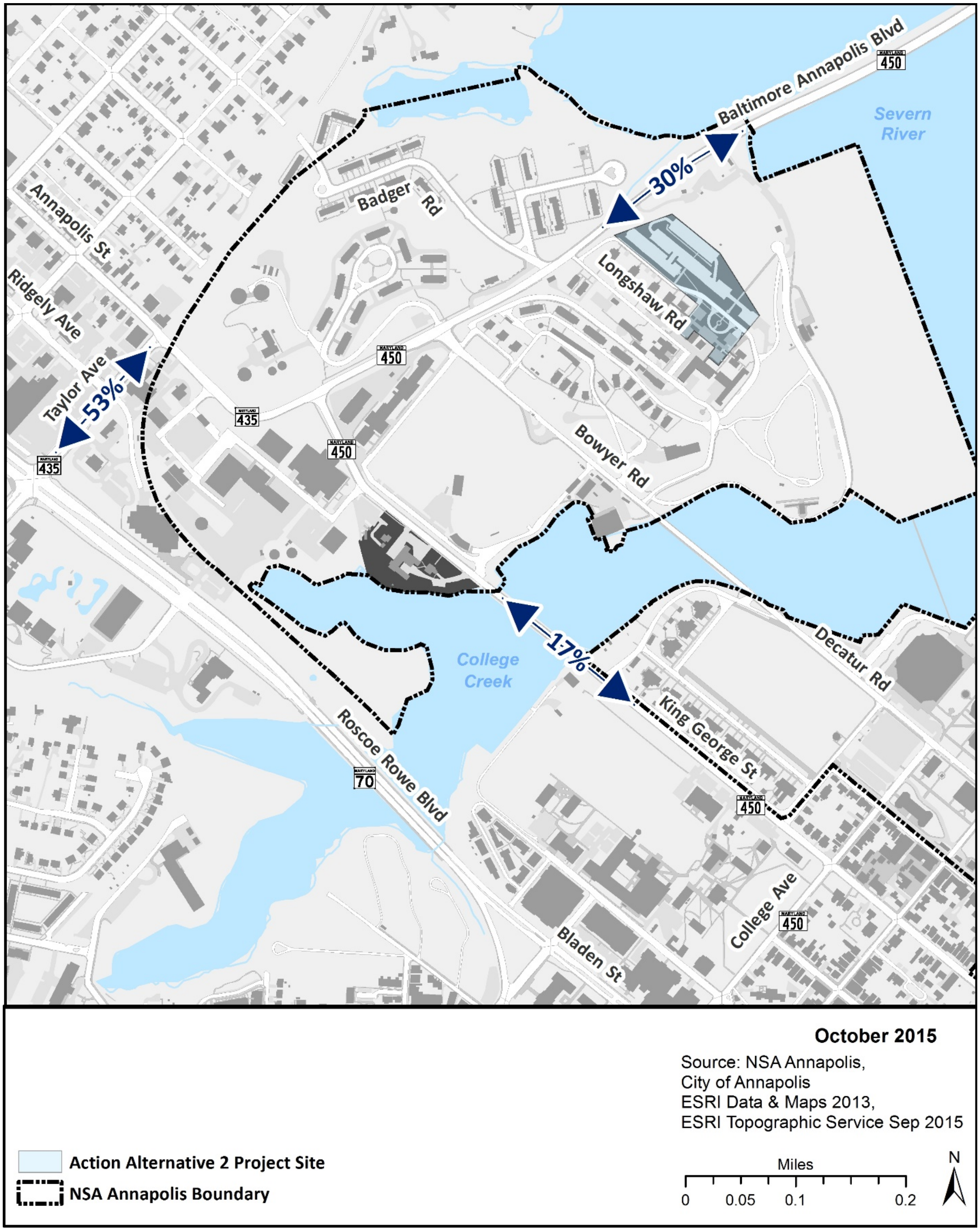


Figure 3-23 Alternative 2 AM and PM Trip Distribution

- During the AM peak hour, the northbound Bowyer Road and southbound Perry Circle approaches would continue to operate at LOS E and experience no increase in vehicle delay.
- During the mid-day inbound and outbound peak hours, the northbound Bowyer Road approach would continue to operate at LOS E and experience no increase in vehicle delay; the southbound Perry Circle approach would continue to operate at LOS D.
- During the PM peak hour, the northbound Bowyer Road approach would continue to operate at LOS F and experience a 30 second increase in vehicle delay; the southbound Perry Circle approach would continue to operate at LOS E and experience no increase in vehicle delay.

Based on the unsignalized intersection analysis, all approaches would operate at acceptable conditions during the peak hours.

The average LOS for the various approaches to the intersection and the overall intersection LOS grade are depicted in Figure 3-24 and Figure 3-25 for AM and PM peak hours, respectively. Appendix C contains the Alternative 2 AM, PM, and mid-day peak hour LOS results and capacity analysis.

Alternative 2 Intersection Queueing Analysis. Based on the Synchro™ results, the only intersection to receive failing queue lengths would be the intersection of Bowyer Road and Perry Circle with Baltimore Annapolis Boulevard (Intersection #3), and failure would only occur during the outbound mid-day and PM peak hours. Appendix C contains the detailed Alternative 2 queuing analysis.

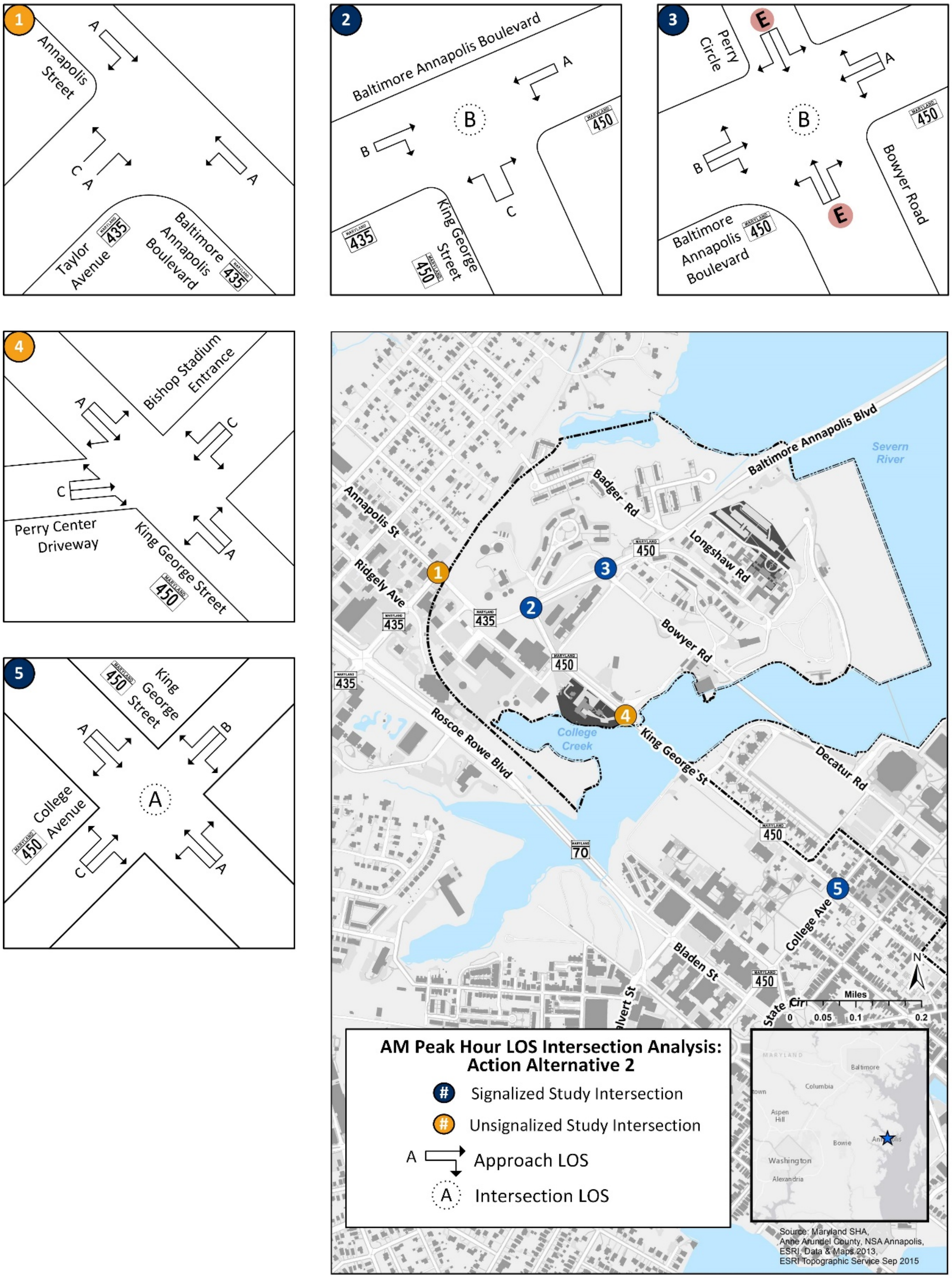
Alternative 2 Travel Time Analysis. Based on the Synchro™ analysis, Alternative 2 would result in a maximum of 5 additional seconds (4 percent increase) when compared to the No Action Alternative. The 5 additional seconds are on top of the travel time that would occur under the No Action Alternative or if the relocation of staff and renovation of Building 250 did not occur. Appendix C contains the detailed Alternative 2 travel time analysis.

Alternative 2 Entry Control Facility Analysis. Because access to Building 250 would exclusively be through NSA Annapolis Gate 8 along Bowyer Road, the operation of the Entry Control Facility (ECF) was studied to determine if the queue would affect Baltimore Annapolis Boulevard. Relying on published national standards for ECF vehicle throughput per hour per lane and based on the number of personnel checking credentials, a study showed that the AM peak hour would not be affected by the additional vehicle trips destined to Building 250. However, the mid-day inbound peak hour would be affected and would potentially affect Baltimore Annapolis Boulevard with a minimum eight vehicle queue. Approximately 16 vehicles can queue before blocking access to Halligan Hall and 20 vehicles can queue before blocking Baltimore Annapolis Boulevard. Appendix C contains the detailed Alternative 2 ECF analysis.

Alternative 2 Impact Summary

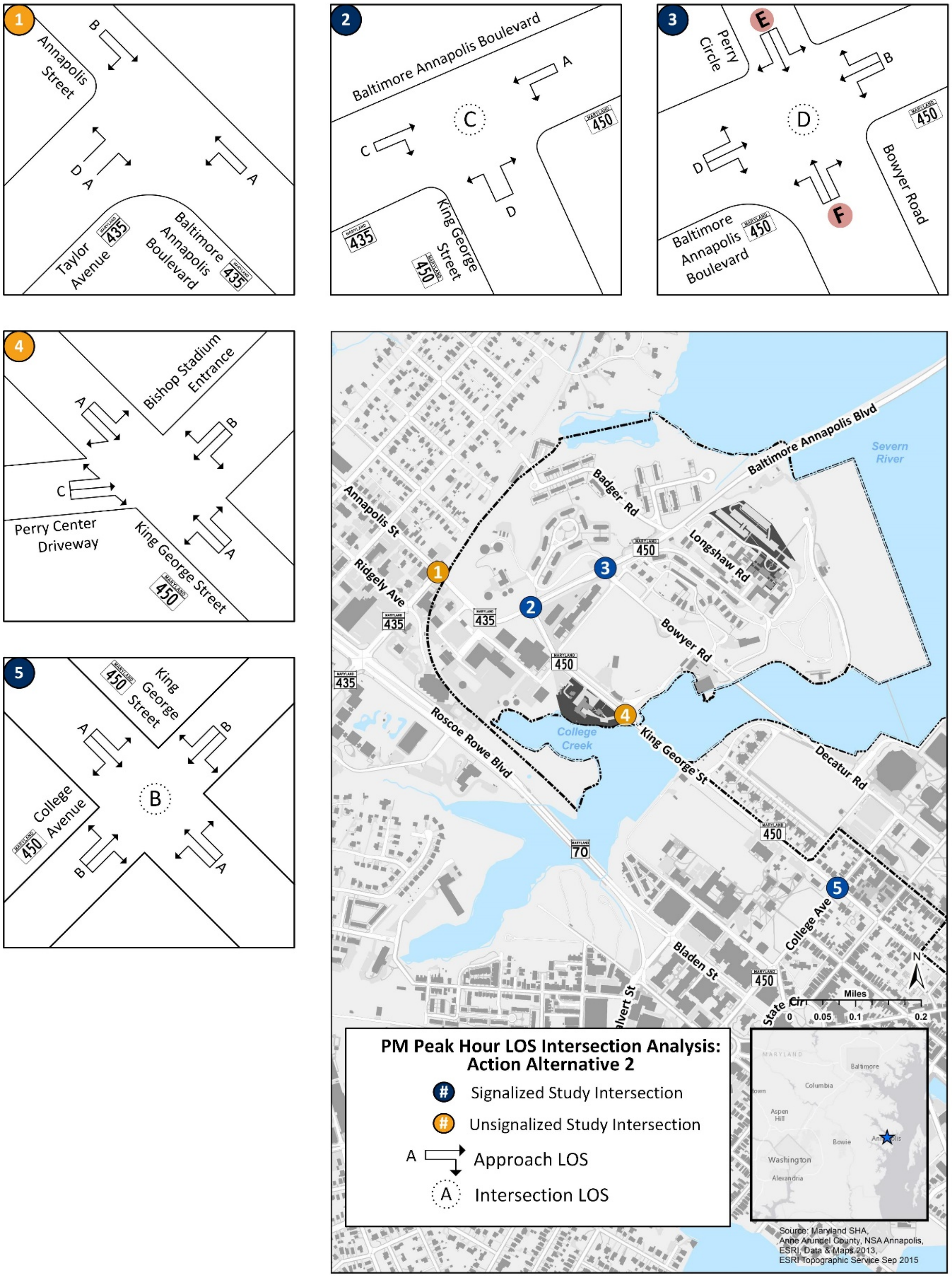
Pedestrian, bicycle, parking, and traffic conditions were evaluated. Building 250 is connected to the sidewalk and bicycle system along Baltimore Annapolis Boulevard by the internal road and sidewalk network in the Upper Yard, and all employees would be accommodated with ample parking spaces at the Hospital Point parking lot; therefore, implementing Alternative 2 would have no significant impact with regard to the pedestrian network, bicycle network, and parking.

For the traffic conditions, five intersections were analyzed for Alternative 1 (same as the Existing Condition and No Action Alternative).



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-24 Alternative 2 Intersection Level of Service (AM Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-25 Alternative 2 Intersection Level of Service (PM Peak Hour)

Based on the Synchro™ analysis, all intersections would operate with an overall acceptable LOS (LOS D or better). Under Alternative 2 the same two intersection approaches (primarily serving Navy traffic) as Alternative 1—Bowyer Road and Perry Circle at Baltimore Annapolis Boulevard (Intersection #3)—would operate at a failing LOS during all time periods; however, only the PM peak hour would experience more than a 5 second increase in vehicle delay difference between the No Action Alternative and Alternative 2. This would not be within the thresholds established in the transportation assumptions. During the mid-day outbound peak hour, the queue lengths would increase by more than 150 feet, greater than the thresholds established in the transportation assumptions; however, these impacts would only occur when the facility hosts an event. All other approaches for both the signalized and unsignalized intersections would operate at acceptable levels.

In addition to the study area intersection, the Bowyer Road ECF was analyzed under Alternative 2 because this alternative would add all 100 percent of the forecasted trips generated through the Bowyer Road ECF. Under Alternative 2, there would be a 15 percent and 125 percent increase in vehicle trips entering the ECF during the AM and mid-day peak hours, respectively. Based on an upper threshold of 500 vehicles per hour for an ECF with one lane and two personnel processing two vehicles concurrently, Alternative 2 would not create a queue from the ECF and would not affect Baltimore Annapolis Boulevard during the AM peak hour. Based on 375 vehicles per hour for an ECF with one lane and one person processing one vehicle at a time, Alternative 2 would create an eight-vehicle queue from the ECF and potentially affect Baltimore Annapolis Boulevard during the mid-day peak hour. It should be noted that this analysis does not consider the effect that the traffic signals might have on the vehicle arrival rates entering the ECF and would require a more substantial microsimulation analysis to fully evaluate.

Therefore, Alternative 2 would adversely affect Navy traffic along northbound Bowyer Road accessing Baltimore Annapolis Boulevard and along southbound Bowyer Road accessing the ECF; it would not significantly affect traffic in any of the other study area intersections.

During the construction period, there would be short-term parking, sidewalk, and truck impacts. The Building 250 site would include access to the existing 200 plus-space parking lot that is currently used for the Naval Health Clinic Annapolis. This access should provide adequate parking for construction workers as well as staging areas for trucks. The number of peak trips may temporarily increase from construction worker trips during the construction period. Pedestrians walking near Building 250 would experience temporary sidewalk closings; temporary new sidewalk connections provided to compensate for the sidewalk closings, when necessary; and sidewalk impacts such as narrowed or torn-up sidewalks.

Short-term impacts on traffic would result from dump trucks hauling existing building materials from building 250 as part of the facility renovation, and delivery trucks would haul new building materials.

3.9.3.4 Recommendations

Under Alternative 2, it is recommended that the traffic signal timings to both the Baltimore Annapolis Boulevard at Bowyer Road/Perry Circle intersection (Intersection #3) and Baltimore Annapolis Boulevard at King George Street intersection (Intersection #2) be updated. Both traffic signals must be updated because they need to operate in conjunction with each other to ensure a smooth operation through the corridor. The update would involve changing the pedestrian-only phase to occur at the same time as the vehicles traveling parallel to the pedestrian crosswalk. Pedestrians would continue to have the right-of-way over right-turning vehicles. This intersection operation is very common. Signing following Maryland standards should be displayed at both intersections to alert drivers planning to turn right to yield to pedestrians. To avoid confusion of pedestrians and drivers, the traffic signal timings should be updated for all time periods to provide a consistent operation and expectation for daily users of the intersections.

Based on the Synchro™ analysis, the AM peak hour and mid-day inbound and outbound peak hours would result in LOS D or better operation for all approaches at Intersections #2 and #3. The PM peak hour would result in the northbound Bowyer Road approach improving from LOS F to LOS E, and the southbound Perry Circle approach would improve from LOS E to LOS C. Also based on the Synchro™ analysis, the AM peak hour and mid-day inbound and outbound peak hours would result in passing queue lengths. The PM peak hour would result in failing queue lengths for the eastbound Baltimore Annapolis Boulevard approach and northbound Bowyer Road approach; however, the queue lengths would be less than under the No Action Alternative.

The ECF was analyzed using a direct comparison of the forecasted volume to a published average maximum throughput given the existing one-lane operation. It is recommended that if Alternative 2 is chosen as the preferred alternative that the Navy consider either adding a second person to check credentials on days when mid-day events are scheduled, enabling the ECF to process two vehicles concurrently. This would increase the mid-day inbound peak hour throughput and address the potential ECF impact on Baltimore Annapolis Boulevard. Based on the AM peak hour ECF analysis, the ECF would process more than the forecasted number of vehicles; however, it is suggested to monitor the AM operations and implement a third person to check credentials, if the queue affects Baltimore Annapolis Boulevard. This would allow three vehicles to be processed concurrently.

Based on the proposed intersection and ECF mitigation strategies, all traffic impacts would be addressed.

It is also recommended that the Installation TMP continue to be implemented to reduce the number of vehicle trips on the roadway system by using the Annapolis Transit, Navy Transportation Department shuttles, vanpools, carpools, and bicycle trails. The sustained implementation of the TMP would continue to ensure that the transportation system in the area functions efficiently and adheres to EO 13693, *Planning for Federal Sustainability in the Next Decade*. The goal of EO 13693 specific to this study relates to participating in a demand management program.

3.10 Public Health and Safety

This discussion of public health and safety includes consideration of any activities, occurrences, or operations that have the potential to affect the safety, well-being, or health of members of the public. The primary goal is to identify and prevent potential accidents or impacts on the general public.

A safe environment is one in which there is no, or optimally reduced, potential for death, serious bodily injury or illness, or property damage. Human health and safety addresses public safety during construction, demolition, and renovation activities and during subsequent operations of those facilities. Various stressors in the environment can adversely affect human health and safety. Identification and control or elimination of these stressors can reduce risks to health and safety to acceptable levels or eliminate risk entirely.

Emergency services are organizations that ensure public safety and health by addressing different emergencies. The three main emergency service functions include police, fire and rescue service, and emergency medical service.

Environmental health and safety risks to children are defined as those that are attributable to products or substances a child is likely to come into contact with or ingest, such as air, food, water, soil, and products that children use or to which they are exposed.

3.10.1 Regulatory Setting

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires federal agencies to "make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."

3.10.2 Affected Environment

NSA Annapolis has its own fire department, which has a mutual aid agreement with the City of Annapolis and Anne Arundel County. Both Annapolis and Anne Arundel Fire Departments provide backup fire suppression support to the Upper and Lower Yards and the North Severn Complex (NAVFAC Washington, 2012b). Additionally, NSA Annapolis has its own police department.

The Naval Health Clinic provides primary care by appointment. Military beneficiaries also may receive care from civilian facilities in the area. Anne Arundel County contains the 303-bed Baltimore Washington Medical Center located in Glen Burnie and the 415-bed Anne Arundel Medical Center (University of Maryland Baltimore Washington Medical Center, n.d.) (Anne Arundel Medical Center, 2015).

At NSA Annapolis, the pistol ranges and rifle range used for Midshipmen training are located on the North Severn Complex, as is the associated ammunition storage area. There are surface danger zones (SDZs) associated with the ranges and Explosive Safety Quantity Distances (ESQDs) pertaining to the ammunition storage. There are two Installation Restoration Program (IRP) sites located on the North Severn Complex: one is undergoing remediation, and the other is currently undergoing a site investigation (PWD NSA Annapolis, 2016). There are also several former small arms ranges located on the North Severn Complex that are being investigated under the Military Munitions Response Program (MMRP) (PWD NSA Annapolis, 2016) (see Section 3.11.2 for more information). Under Alternative 1, an option for the NSA Annapolis Mail Center relocation would be the renovation of Building 15NS on the North Severn Complex. The building is not within either the SDZs or the ESQDs nor is it within any of the IRP or MMRP sites, although the former Rifle Range B is in proximity to the north of the building. The Proposed Action, under either of the two action alternatives, would not be located within the temporary SDZs associated with the USNA Cemetery and Columbarium that are in place during ceremonial functions.

3.10.3 Environmental Consequences

The safety and environmental health analysis contained in the respective sections addresses issues related to the health and well-being of military personnel and civilians living on or in the vicinity of NSA Annapolis. Specifically, this section provides information on the following hazards associated with the Proposed Action:

- worker and public safety hazards from construction activities and related traffic
- hazardous materials and waste that might be used, generated, or exist at the sites proposed for development and hazardous waste stored at the CHRIMP
- antiterrorism/force protection (AT/FP)

Additionally, this section addresses the environmental health and safety risks to children.

3.10.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. Therefore, Buildings 92, 340, and 974, which are all unoccupied and deteriorating, would continue to deteriorate. As discussed in detail in Section 3.11.2, all three buildings potentially contain asbestos containing materials (ACM), lead-based paint (LBP), and polychlorinated biphenyls (PCBs), and the continued deterioration could pose a significant impact to public health and safety. However, the Navy would remove any ACM, LBP, and PCBs in those buildings to comply with applicable federal and state regulations. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

3.10.3.2 Alternative 1—Perry Center Site Potential Impacts

The study area for public health and safety for Alternative 1 includes Buildings 51, 194, 92, 974, and 340. The study area also includes the proposed relocation sites for the NSA Annapolis Mail Center on the North Severn Complex (Building 15NS) and the Perry Center (Building 619) and the proposed relocation sites for the CHRIMP on Perry Center—Building 104 and adjacent to Building 104.

Worker and Public Safety Hazards

The demolition and construction activities related to the proposed Alumni Service Center and Headquarters facility would be conducted in compliance with the applicable regulations and guidance, including 29 CFR part 1926, Safety and Health Regulations for Construction, and applicable subparts of 29 CFR part 1910, Occupational Safety and Health Standards, and would ensure the safety and health of the workers during construction. To minimize potential safety hazards to construction workers and the public, the USNA AA/F would implement a health and safety program to ensure construction workers are aware of the hazards associated with the project site and the safety measures that must be taken to prevent injury and hazardous conditions within and outside of the working environment. The program would identify and address safety issues such as site access, construction hazards, safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, unknown hazards, and fire control. It also would identify requirements for temporary fencing around staging areas, storage yards, and excavation areas during construction, as well as measures to be taken during operation of the project to limit public access to potential hazards (e.g., permanent fencing, locked access).

To prevent unauthorized members of the public from entering the project site during construction, temporary fences would be installed around the perimeter of the construction site, and notification signs would be placed at all entrances to the site prior to the start of construction activity. In addition, construction workers would be clearly identifiable so as to prevent unauthorized persons from entering the site during construction.

NSA Annapolis Mail Center Options

Under Alternative 1, the NSA Annapolis Mail Center would be relocated to one of two locations: Building 15NS, which would be renovated to better suit the needs of the mail center, or to a new facility built in the place of Building 619, which would be demolished.

Under the first option, Building 15NS would require interior renovations and some exterior renovations, as well as replacing the heating, ventilating, and air conditioning system. Building 15NS is located within the fence line providing security for the site. The building also includes an attached garage that can accommodate the loading and unloading of mail; therefore, a loading dock would not need to be constructed. Any airborne contamination could also be isolated because the garage can be isolated from the rest of the building. Although the former Rifle Range B is located near the north of Building 15NS, the building is not located within the boundary of the former range, and no ground-disturbing activities would occur associated with renovation activities. Therefore, no impacts would occur from potential unexploded munitions or soil contamination. Relocating the current administrative functions of Building 15NS to another existing facility on the North Severn Complex would possibly only require some minor interior renovations to the facility.

Under the second option, Building 619 in the northwestern portion of the Perry Center would be demolished, and the existing slab/foundation would be used to construct a new, 1,500-square-foot prefabricated building in its place. The Building 619 location is located within the existing fence line of the installation.

Under both options, the new mail center would meet the screening factors as well as requirements for DoD mail centers as set forth in DoD 4525.6M—DoD Postal Manual, Chapter 13; UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*; and the DoD O-2000.12-H, *DoD Antiterrorism Handbook*. Additionally, to prevent unauthorized members of the public from entering the project site during construction, temporary fences would be installed around the perimeter of the construction site, and notification signs would be placed at all entrances to the site prior to the start of construction activity. In addition, construction workers would be clearly identifiable so as to prevent unauthorized persons from entering the site during construction.

CHRIMP Options

Under Alternative 1, the CHRIMP would be relocated to one of two locations. One option would be to relocate the CHRIMP to Building 104 within the northwestern portion of the Perry Center along Yew Street, and the other option would be to construct a new prefabricated facility adjacent to Building 104.

Under the first option, Building 104 would undergo internal renovations to accommodate the CHRIMP and the existing BOS contractor functions in Building 104 would be moved to another underutilized BOS contractor space on Perry Center.

Under the second option, the new CHRIMP would be accommodated with a prefabricated modular facility that would be fenced and alarmed (Jenkins, 2016).

Under both options, the CHRIMP facility would be in compliance with the appropriate requirements, including Unified Facilities Criteria (UFC) 4-442-01N and UFC 2-000-05N, for a hazardous materials warehouse that stores and handles materials such as flammable and combustible liquids, acids, oxidizers, poisons, water-reactive materials, caustics, and organic peroxides (Paoloni, 2016). It would also meet requirements for fire protection and ventilation in accordance with National Fire Protection Association standards, including fire suppression system and a buffer of 50 feet between the CHRIMP and inhabited facilities.

Anti-Terrorism/Force Protection

The proposed Alumni Service Center and Headquarters facility would provide AT/FP features in compliance with AT/FP regulations and physical security mitigation in accordance with UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*. The UFC 4-010-01, *Section 1-8.6-Non-DoD Tenant Buildings on DoD Installations*, states “Because buildings built by non-DoD tenants on DoD property may be taken over by DoD during their life cycles, non-DoD tenant-built buildings other than those that meet one of the exemptions below shall comply with these standards, regardless of funding source. For the purposes of these standards, non-DoD tenant-built building occupancies will be calculated assuming that building occupants are DoD personnel."

NSA Annapolis Mail Center Options

Under both options, the new mail center would meet the screening factors as well as requirements for DoD mail centers as set forth in DoD 4525.6M—*DoD Postal Manual*, Chapter 13; UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*; and the DoD O-2000.12-H, *DoD Antiterrorism Handbook*. In relocating the existing administrative functions of Building 15NS to another, as yet to be determined, facility on the North Severn Complex, any AT/FP standards that might be applicable would also be met, resulting in no impacts.

CHRIMP Options

The CHRIMP, under either option, would house two employees; therefore, it would be classified as a low occupancy building and exempt from AT/FP standards of UFC 4-101-01. The facilities would also be fenced and alarmed. If Building 104 is the option selected, the existing BOS contractor functions would be moved to other underutilized BOS contractor space on Perry Center resulting in no impacts on AT/FP.

Traffic

Section 3.9.3.2 and 3.9.3.4 present transportation-related impacts from Alternative 1 and measures to address the impacts. As discussed in detail in Section 3.9.3.2, the Perry Center site would directly tie into the planned sidewalk improvements along King George Street, and the unsignalized intersection of King George Street and Perry Center site (exit only)/Bishop Stadium would have a new striped pedestrian crossing. The pedestrian crossing would provide a safe location to cross between Bishop Stadium and the Perry Center site and would include the proper signing to alert drivers of its existence.

NSA Annapolis Mail Center Options

As discussed in detail in Section 3.9.3.2, for the Building 15NS option on the North Severn a Complex, because the number of vehicles used for mail delivery would be minimal and would occur as a linear travel path from the facility to all pick up and drop off points covering the NSA Annapolis installation, the number of additional vehicle trips to the peak hour roadway network would be negligible. Additionally, relocating the current administrative functions of Building 15NS to another existing facility on the North Severn Complex would not add any additional vehicle trips to the area. For the Building 619 option at the Perry Center, because this site is in proximity to the current mail center, there would be no change in the number vehicle trips during the peak hour time periods. Therefore, there would be no long-term traffic impacts as a result of either of the mail center options. Renovation and construction activities would result in short-term adverse parking and truck impacts, which would occur until those activities are concluded.

CHRIMP Options

As discussed in detail in Section 3.9.3.2, because there are only two employees who work at the CHRIMP, and the new facility under either option would be in proximity to the current CHRIMP facility, there would be no change in the number of vehicle trips during the peak hour time periods. Additionally, if the Building 104 option is selected, the existing BOS functions in Building 104 would be relocated to another, underutilized BOS contractor facility on Perry Center. Therefore, there would be no long-term traffic impacts as a result of either of the CHRIMP options. Renovation, demolition, and construction activities would result in short-term adverse parking and truck impacts at the Perry Center, which would occur until those activities are concluded.

Environmental Health and Safety Risks to Children

Under Alternative 1, neither the proposed Alumni Service Center and Headquarters facility nor the new location of the CHRIMP would be sited in the vicinity of the family housing on NSA Annapolis.

NSA Annapolis Mail Center Options

Under Alternative 1, neither of two site options for the relocation of the mail center would be sited in the vicinity of the family housing on NSA Annapolis.

CHRIMP Options

Under Alternative 1, neither of the site options for the relocation of the CHRIMP would be sited in the vicinity of the family housing on NSA Annapolis.

For all of the reasons stated above, overall, Alternative 1 would not result in significant impacts to public health and safety.

3.10.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

The study area for public health and safety for Alternative 2 includes Building 250, the Naval Health Clinic Annapolis, which will be vacated in spring 2017 under a separate action.

Worker and Public Safety Hazards

Under Alternative 2, USNA AA/F would lease Building 250 and renovate its interior. While there would be no demolition or new construction, renovation activities would be conducted in compliance with the applicable regulations and guidance, including 29 CFR part 1926, Safety and Health Regulations for Construction, and applicable subparts of 29 CFR part 1910, Occupational Safety and Health Standards, and would ensure the safety and health of the workers during construction. Similar to Alternative 1, to minimize potential significant safety hazards to construction workers and the public, USNA AA/F would implement a health and safety program for the renovation activities under Alternative 2.

Under Alternative 2, neither the NSA Annapolis Mail Center nor CHRIMP would be relocated. As discussed, Buildings 92, 340, and 974 would continue to deteriorate and because of the potential of ACM, LBP, and PCBs in the buildings, the continued deterioration could pose a significant adverse impact to public health and safety. However, the Navy would remove any ACM, LBP, and PCBs in those buildings to comply with applicable federal and state regulations.

Anti-Terrorism/Force Protection

Building 250 is within the secure perimeter of the NSA Annapolis Upper Yard and is only accessible through the security-controlled Gate 8. Under Alternative 2, access to the USNA AA/F Alumni Service Center and Headquarters facility would be limited to authorized personnel, and event attendees and other guests to the facility would have to obtain advance clearance to gain access to the installation through Gate 8.

Traffic

Section 3.9.3.3 and 3.9.3.4 present transportation-related impacts from Alternative 2 and measures to address the impacts. As discussed in Section 3.9.3.3, under Alternative 2, the Building 250 site already connects to the NSA Annapolis internal sidewalk network. Pedestrians can access the Upper Yard at Gate 8 and use the existing sidewalk network to reach the project site. Appropriate sidewalk connections are provided to the existing sidewalks on Baltimore Annapolis Boulevard and would be improved with the planned Baltimore Annapolis Boulevard sidewalk improvements; therefore, pedestrians should not be affected under Alternative 2.

Environmental Health and Safety Risks to Children

Building 250 is located near the Perry Circle and Phythian Road neighborhoods, which include multi-family buildings available for junior officer and senior enlisted personnel (NAVFAC Washington, 2012b). However, renovation activities would be internal to the building and as discussed, USNA AA/F would implement a health and safety program for the renovation activities. Therefore, implementation of the Alternative 2 would not result in impacts to environmental health and safety risks to children.

For the reasons stated above, implementation of Alternative 2 would not result in significant impacts to public health and safety.

3.11 Hazardous Materials and Wastes

This section discusses hazardous materials, hazardous waste, toxic substances, and contaminated sites.

3.11.1 Regulatory Setting

Hazardous materials are defined by 49 CFR section 171.8 as "hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table, and materials that meet the defining criteria for hazard classes and divisions" in 49 CFR part 173. Transportation of hazardous materials is regulated by the U.S. Department of Transportation regulations.

Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments, as: "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." Certain types of hazardous wastes are subject to special management provisions intended to ease the management burden and facilitate the recycling of such materials. These are called universal wastes and their associated regulatory requirements are specified in 40 CFR part 273. Four types of waste are currently covered under the universal wastes regulations: universal waste batteries, universal waste pesticides that are either recalled or collected in waste pesticide collection programs, universal waste mercury-containing equipment, and hazardous waste lamps.

Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances. Special hazards include ACM, PCBs, and LBP. The Toxic Substances Control Act gives USEPA authority to regulate special hazard substances. Asbestos is also regulated by USEPA under the CAA and Comprehensive Environmental Response, Compensation, and Liability Act.

The DoD established the Defense Environmental Restoration Program (DERP) to facilitate thorough investigation and clean-up of contaminated sites on military installations (active installations, installations subject to Base Realignment and Closure, and formerly used defense sites). The IRP and the MMRP are components of the DERP. The IRP requires each DoD installation to identify, investigate, and clean up hazardous waste disposal or release sites. The MMRP addresses non-operational rangelands that are suspected or known to contain unexploded ordnance, discarded military munitions, or munitions constituent contamination. The Environmental Restoration Program is the Navy's initiative to address DERP.

3.11.2 Affected Environment

The Navy has implemented a strict Hazardous Material Control and Management Program and a Hazardous Waste Minimization Program for all activities. These programs are governed Navy-wide by applicable OPNAV instructions and at the installation by specific instructions issued by the Base Commander. The Navy continuously monitors its operations to find ways to minimize the use of hazardous materials and reduce the generation of hazardous wastes.

3.11.2.1 Hazardous Materials

Hazardous materials at NSA Annapolis are managed in accordance with the installation's Integrated Contingency Plan. The plan contains the facility Tank Management Plan, hazardous substance inventory, and Spill Prevention Control and Countermeasures Plan. It also identifies hazardous materials storage areas and response facilities and provides the procedures for all aspects of hazardous materials management and reporting including spill response and training (NAVFAC Washington, 2015).

The various departments, divisions, and tenants of the installation make use of different types of hazardous materials (Navy, 2009). Hazardous materials used on the installation include paints, aerosols, oils, cleaning solutions, and florescent bulbs (NAVFAC Washington, 2012b). The CHRIMP building serves as the central hazardous material storage and distribution facility for NSA Annapolis (NSA Annapolis, 2014b). This facility is a one-story concrete structure with secondary containment. All of the storage areas are contained, and the floors are epoxy coated to prevent spilled material infiltration into the concrete. All materials stored outside are kept in large contained lockers. Empty and clean 55-gallon plastic containers are kept upside down outside on pallets. This facility (including exterior storage) is inspected during NSA Annapolis' annual site inspections (NSA Annapolis, 2014b).

3.11.2.2 Hazardous Waste

NSA Annapolis is classified as a large quantity generator of hazardous waste. The installation has a pollution prevention program aimed at reducing the use of and controlling, managing, and reutilizing hazardous materials. Hazardous waste typically produced at the installation include solvents, used oils, organic substances, used paint, dirt contaminated with oil and other organic liquids, batteries, and battery fluids (Navy, 2009). Building 194 is where the Hazardous Materials Program Administration is located and it is used to store hazardous waste.

Specific hazardous waste streams that have recycling initiatives are detailed below (NAVFAC Washington, 2012b).

- Fluorescent Tube Recycling: Within the first year of recycling fluorescent tubes, savings of more than $6,000 were recognized, and more than 15,000 pounds of hazardous waste was averted from hazardous waste disposal. When damaged, fluorescent tubes are disposed of as a universal waste and are not recycled. The cost to recycle fluorescent tubes continues to decrease, increasing the potential savings and has become the standard operating procedure at NSA Annapolis.

- Aerosol Can Recycling: In 2012, aerosol paint cans cost $15.00 per pound to dispose of as hazardous waste. NSA Annapolis Environmental Division acquired the proper equipment to treat the cans for recycling.
- Oil Recycling: Oil and antifreeze recycling initiatives have been implemented throughout NSA Annapolis, recycling approximately 8,000 gallons of waste oil and 1,000 gallons of antifreeze annually.
- Paint Recycling: NSA Annapolis established a paint recycling contract to eliminate all waste paints from their waste stream. Now waste paint is fully recycled into new paint rather than being disposed of in a hazardous waste landfill.
- Battery Recycling: Battery recycling containers are located at 29 locations throughout NSA Annapolis. Containers are green, 10 gallon, swing lid trash cans with battery recycling labels. Batteries that are deposited in these containers are recycled. In addition, all lead acid automobile batteries are recycled on a buy/exchange program.
- Oily Rag Recycling: On a weekly basis, a contractor supplies clean rags and picks up oily ones, eliminating the need for treating them as hazardous waste. The used rags are cleaned using the latest pollution prevention technology. This technology removes suspended solids, oil and grease, heavy metals, VOCs, and total toxic organics. The rags can then be reused.

A Hazardous Waste Management Plan was developed for NSA Annapolis in accordance with the requirements outlined in the Environmental and Natural Resources Program Manual (NSA Annapolis, 2010). The plan is a part of the Integrated Pollution Prevention Plan for the installation and provides the basis for operating NSA Annapolis' hazardous waste management program in accordance with all the appropriate regulations. In conjunction with the Hazardous Waste Management Plan, NSA Annapolis has a Spill Prevention, Control, and Countermeasure Plan that details emergency preparedness, planning, and response procedures specific to NSA Annapolis. Hazardous wastes at NSA Annapolis are also managed in accordance with the facility Integrated Contingency Plan (NSA Annapolis, 2014b). As discussed, NSA Annapolis is a large quantity generator of hazardous waste, therefore, MDE inspectors can make routine, unannounced inspections at the installation.

3.11.2.3 Special Hazards (Asbestos Containing Materials, Lead-based Paint, Polychlorinated Biphenyls)

There is a strong likelihood that ACMs, LBP, and PCBs are present on and within older structures and equipment (NAVFAC Washington, 2012b).

ACMs include, but are not limited to, pipe insulation, floor tiles, cement siding, and wall/ceiling coverings. Asbestos was added to a variety of building materials and other products and was routinely used in buildings constructed prior to 1980 because of its fire resistance, chemical resistance, and insulating properties. Because of the age of the buildings being analyzed as part of this Draft EA, ACMs may be present in the existing buildings associated with the Proposed Action (Table 3-13).

Similarly, LBP was used as coatings and finishes before the hazards associated with lead accumulation in children were identified. LBP regulation began in 1978; any building or portion thereof constructed prior to 1978 may contain LBP (Table 3-13).

Table 3-13. Date Constructed, Approximate Age, and Potential for Special Hazards in NSA Annapolis Buildings

Building	*Date Constructed*	*Approximate Age*	*Potential for ACM*	*Potential for LBP*
Beach Hall	1907	109	Yes	Yes
Building 15NS	1943	73	Yes	Yes
Building 51	1904	112	Yes	Yes
Building 92	1901	115	Yes	Yes
Building 104	1947	69	Yes	Yes
Building 194	1904	112	Yes	Yes
Building 340	1916	100	Yes	Yes
Building 974	1932	84	Yes	Yes
Building 250	1907	109	Yes	Yes
Building 619	1946	70	Yes	Yes

Source: (NAVFAC Washington, 2012b); (NSA Annapolis and NAVFAC Washington PWD Annapolis, 2010); ((Dascalu, 2016)
Key: ACM = asbestos containing materials; LBP = lead-based paint

Electrical equipment and lighting, unless documented to be free of PCBs, are assumed to contain PCBs. PCBs are a group of chemical mixtures used as insulators in electrical equipment such as transformers and fluorescent light ballasts. Transformers and electrical equipment containing greater than 500 parts per million (ppm) PCBs, between 50 and 500 ppm PCBs, and less than 50 ppm PCB are considered PCB, PCB-contaminated, and non-PCB, respectively. PCB products with 0 to 49 ppm PCB are not subject to federal regulations and can be transferred, donated, sold, or otherwise processed under CFR part 101–42.1102–2. A transformer (TS-79) is located on the exterior of Building 15NS (NSA Annapolis, 2014c).

3.11.2.4 Defense Environmental Restoration Program

The DoD has developed an IRP to identify, characterize, and clean up past hazardous waste sites in response to the Comprehensive Environmental Response, Compensation, and Liability Act and RCRA. Two IRP sites occur on NSA Annapolis, located on the North Severn Complex to the west and southwest of the Navy Commissary and Exchange. Site 1 is undergoing remediation, and an ongoing site investigation is occurring at Site 2 (PWD NSA Annapolis, 2016). Neither IRP site is within any of the proposed alternative sites.

A former Area of Concern (AOC) is located near the proposed CHRIMP location adjacent to Building 104 on the Perry Center. AOC 3 was the Perry Center Steam Cleaning Unit (Wash Rack) and was located south of what is now Building 104. A 165-gallon tank filled with cleaning solution and a 250-gallon aboveground storage fuel tank for the cleaning facility were located in AOC 3. Drainage from the wash rack was filtered to the sanitary sewer system. The final report of a RCRA verification investigation in the early 1990s recommended no further action at AOC 3, although the report did recommend that the USNA follow the Spill Prevention, Control, and Countermeasures Plan and other applicable regulations to prevent future releases to the environment (NAVFAC Atlantic, 1994).

The second part of the DERP, the MMRP, addresses non-operational rangelands that are suspected or known to contain unexploded ordnance, discarded military munitions, or munitions constituent contamination. The alternative sites within NSA Annapolis do not contain any known non-operational rangelands; however, on the North Severn Complex, the western end of the former Rifle Range B is located in proximity to the north of Building 15NS. Rifle Range B was an 800-yard range running west to east in the center of the southeastern portion of the North Severn Complex with the impact berm located at the eastern edge of the facility at Carr Point. The range was used for rifle and machine gun training and is currently undergoing a site investigation along with several other former small arms ranges on the North Severn Complex (PWD NSA Annapolis, 2016).

3.11.3 Environmental Consequences

The hazardous materials and wastes analysis contained in the respective sections addresses issues related to the use and management of hazardous materials and wastes as well as the presence and management of specific clean-up sites at NSA Annapolis.

3.11.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. Therefore, Buildings 92, 340, and 974, which are all unoccupied and deteriorating, would continue to deteriorate. As discussed, all three buildings potentially contain ACM, LBP, and PCBs, and continued deterioration could pose a significant adverse impact to public health and safety. However, the Navy would remove any ACM, LBP, and PCBs in those buildings, as necessary, to comply with applicable federal and state regulations. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

3.11.3.2 Alternative 1—Perry Center Site Potential Impacts

The sites proposed for Alternative 1 define the study area for hazardous materials and waste analyses.

Hazardous Materials

Hazardous materials found or generated during demolition and construction activities associated with the construction of the Alumni Service Center Headquarters facility would be handled in compliance with all applicable federal and state regulations, guidelines, and management plans resulting in no significant impacts.

NSA Annapolis Options

Any hazardous materials currently used in the NSA Annapolis Mail Center would be relocated to one of two locations: Building 15NS, which would be renovated to better suit the needs of the mail center, or to a new prefabricated facility that would be built on the site of Building 619, which would be demolished, on the northwest portion of the Perry Center. Hazardous materials found or generated during renovation, demolition, or construction activities, including any interior renovations needed at the as yet to be determined facility on the North Severn Complex to accommodate the current administrative functions of Building 15NS, would be handled in compliance with all applicable federal and state regulations, guidelines, and management plans resulting in no significant impacts.

CHRIMP Options

Hazardous materials, as well as the CHRIMP staff and functions, would be relocated from Building 194 to either Building 104 or to a new prefabricated facility constructed adjacent to Building 104 within the northwest portion of the Perry Center. For whichever option is selected, the new CHRIMP facility would comply with requirements, including UFC 4-442- 01N and UFC 2-000-05N, for a hazardous materials warehouse that stores and handles materials such as flammable and combustible liquids, acids, oxidizers, poisons, water-reactive materials, caustics, and organic peroxides (Paoloni, 2016). It would meet other requirements for fire protection and ventilation in accordance with the National Fire Protection

Association standards, including fire suppression system and a buffer of 50 feet between the CHRIMP and inhabited facilities.

Hazardous materials found or generated during renovation of Building 104 or construction of the new prefabricated facility adjacent to Building 104 would be handled in compliance with all applicable federal and state regulations, guidelines, and management plans. If the Building 104 option is selected, the existing BOS contractor functions would be moved to other underutilized BOS contractor space on Perry Center and would not have any impacts on hazardous materials.

Hazardous Wastes

Under Alternative 1, impacts on hazardous wastes for the demolition of buildings on the Perry Center site, for construction of the new Alumni Service Center Headquarters facility, as well as for renovation or demolition and construction activities for the mail center and CHRIMP options, would be similar to impacts described for hazardous materials. All applicable federal and state regulations would be followed during demolition activities, construction activities, and when hazardous wastes are removed from the buildings, which would result in minimal impacts.

Special Hazards

Under Alternative 1, Buildings 51, 194, 92, 340, and 974 would be demolished. All of the aforementioned buildings were constructed prior to 1980 and may contain ACMs, LBP, or PCBs. Any ACMs, LBP, or PCBs would be removed in compliance with applicable federal and state regulations, guidelines, and management plans prior to demolition activities.

NSA Annapolis Mail Center Options

For the two options for relocating the NSA Annapolis Mail Center, both Building 15NS on the North Severn Complex and Building 619 on the Perry Center were constructed prior to 1980 and may contain ACMs, LBP, or PCBs. Any ACMs, LBP, or PCBs would be removed during renovation activities (Building 15NS) or prior to demolition activities (Building 619) in compliance with applicable federal and state regulations, guidelines, and management plans prior to demolition activities. Similarly, if renovations to Building 15NS involve the transformer located on the exterior of the building, its handling would be in compliance with applicable federal and state regulations, guidelines, and management plans.

Additionally, the new mail center facility, whether it be at the renovated Building 15NS or at the new prefabricated building on the Perry Center, would be designed so that any potential airborne contamination could also be isolated. For Building 15NS, mail would be offloaded in what is now the garage of the building, and the facility would be renovated so that airflow in the garage could be isolated from the rest of the facility. Similarly, the new prefabricated facility constructed on the Perry Center site would be designed so that the loading dock area could be isolated from the rest of the facility.

CHRIMP Options

Relocating the CHRIMP facility to Building 104 under Alternative 1 would require interior renovations to make efficient use of the space and make it compliant with regulations. Building 104 was constructed prior to 1980 and may contain ACMs, LBP, or PCBs. Any ACMs, LBP, or PCBs would be removed in compliance with applicable federal and state regulations, guidelines, and management plans prior to demolition activities. Moving the existing BOS contractor functions in Building 104 to other underutilized BOS contractor space on Perry Center and would not have any impacts on hazardous wastes.

Defense Environmental Restoration Program

Under Alternative 1, no impacts would occur to DERP components, including IRP and MMRP sites, because no DERP components are within the vicinity of the Perry Center site where the new Alumni Service Center and Headquarters facility would be constructed.

NSA Annapolis Mail Center Options

Under Alternative 1, no impacts would occur to DERP components, including IRP and MMRP sites. No DERP components are within the vicinity of Building 619. On the North Severn Complex, Building 15NS is not located within the vicinity of the IRP sites or within the boundary of any MMRP sites. Although the former Rifle Range B is located in proximity to the north of Building 15NS, the building is not within the boundary of the former rifle range, and any exterior work at Building 15NS would only involve minor renovations and no ground-disturbing activities. The range is also currently undergoing a site investigation. Additionally, relocating the existing administrative functions of Building 15NS to a yet to be determined existing facility on the North Severn Complex would only require interior renovations.

CHRIMP Options

Under Alternative 1, no impacts would occur to DERP components, including IRP and MMRP sites, because, as discussed prior, no further action was recommended for the AOC 3 site, which was located in the vicinity of the proposed CHRIMP facility adjacent to Building 104, and no MMRP sites are located in the vicinity of the relocation sites. Additionally, existing BOS contractor functions in Building 104 would be moved to other existing but underutilized BOS contractor space on Perry Center.

Overall, Alternative 1 would not result in significant impacts related to hazardous materials and wastes. Additionally, because it would be designed for its stated purpose, the new CHRIMP facility would better meet the requirements for a hazardous materials warehouse that stores and handles materials than the existing CHRIMP in Building 194, resulting in beneficial impacts.

3.11.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

The site proposed for Alternative 2 defines the study area for hazardous materials and wastes analyses.

Hazardous Materials

Under Alternative 2, minimal impacts related to hazardous materials would occur. Any hazardous materials encountered or used during the renovation of Building 250 would be handled in compliance with applicable federal and state regulations, guidelines, and management plans. Relocation of staff would not affect hazardous materials.

Hazardous Wastes

Under Alternative 2, impacts would be similar to impacts described for hazardous materials. Hazardous wastes would be removed from Building 250 in compliance with applicable federal and state regulations, guidelines, and management plans.

Special Hazards

Under Alternative 2, no measurable impacts related to special hazards would occur provided that ACM abatement and removal of LBP and PCBs was completed in Building 250 prior to renovation activities. If the ACMs, LBP, and PCBs are not damaged or manipulated during building renovation or are not in a state of needing repair, human health would not be affected.

Defense Environmental Restoration Program

No impacts would occur to DERP components under Alternative 2 because no IRP or MMRP sites are located within or in proximity to the alternative sites.

Conclusion

Implementation of Alternative 2 would not result in significant impacts related to hazardous materials and wastes.

3.12 Socioeconomics

This section discusses population demographics, employment characteristics, and housing occupancy status—data that provide key insights into socioeconomic conditions that might be affected by a Proposed Action. The project areas are located within the installation boundary and do not include schools. In addition, any employment that would be generated would be temporary and would not impact school enrollment.

3.12.1 Regulatory Setting

Socioeconomic data shown in this section are presented at U.S. Census Bureau tract, metropolitan statistical area, state, and national levels to characterize baseline socioeconomic conditions in the context of regional, state, and national trends. A metropolitan statistical area is a geographic entity defined for use by federal statistical agencies based on the concept of a core urban area with a high degree of economic and social integration with surrounding communities. Data have been collected from previously published documents issued by federal, state, and local agencies and from state and national databases (e.g., U.S. Bureau of Economic Analysis' Regional Economic Information System).

3.12.2 Affected Environment

NSA Annapolis is located in the Maryland state capital of Annapolis, approximately 30 miles from Baltimore and 33 miles from Washington, D.C. Anne Arundel County, Maryland, serves as the study area for this EA.

3.12.2.1 Population

Anne Arundel County has undergone substantial population growth since 2000, ranking in the top third of all counties in the United States at 13.7 percent. This growth is the result of several factors, including its location between the Baltimore, Maryland, Metropolitan Area and the Washington-Baltimore-Northern Virginia Combined Statistical Area, which includes the District of Columbia, Maryland, Virginia, and West Virginia (U.S. Census Bureau, 2010). Approximately 37 percent of all adults over the age of 25 have a bachelor's degree or higher, ranking in the top 10 percent of all counties in the country. The population is predominantly white, with the largest minority group, African American, comprising more than 16 percent of the population. The 2014 poverty rate in Anne Arundel County was 6.7 percent, compared to the national average of 14.8 percent (U.S. Census Bureau, 2014a). Racial and other population statistics are summarized below in Tables 3-14 and 3-15.

Table 3-14. 2014 Population Racial Characteristics Estimates

Location	*United States**	*Maryland**	*Anne Arundel County**
Total Population	318,857,056	5,976,407	560,133
Percent of Population			
Caucasian	76.10%	60.10%	77.40%
African American	13.20%	30.30%	16.60%
American Indian & Alaska Native	.09%	0.40%	0.30%
Asian	4.60%	6.40%	3.20%
Native Hawaiian & Other Pacific Islander	0.20%	0.10%	0.10%
Two or more races	2.50%	2.60%	2.90%
Hispanic or Latino (of any race)	17.40%	9.30%	7.2%

Source: (U.S. Census Bureau, 2014a)
*Totals may not add to 100 percent due to rounding.

Table 3-15. Percent Age Distribution in Region of Influence Estimates

	2000		*2014 Estimates*	
	0 to 18	*65 and Over*	*0 to 18*	*65 and over*
Percent of Total Population	25.20%	10.00%	22.60%	13.40%

Source: (U.S. Census Bureau, 2014a)

3.12.2.2 Employment Characteristics

Economic statistics of the county are summarized below in Table 3-16. The average five-year per capita income in Anne Arundel County, in 2014 inflation-adjusted dollars, was $41,315 (U.S. Census Bureau, 2014a). Between 2005 and 2009, approximately 6.7 percent of individuals in Anne Arundel County were below the poverty level, compared with the national average of 14.8 percent. Economic characteristics of Anne Arundel County compare favorably to national averages, with a higher per capita income and lower unemployment averages.

Table 3-16. Economic Characteristics (2014)

	United States	*Maryland*	*Anne Arundel County*
Median Household Income	$53,482	$74,149	$89,031
Per Capita Income	$28,555	$36,670	$41,315
Individuals Below Poverty	14.80%	10.10%	6.70%

Source: (U.S. Census Bureau, 2014a)

3.12.2.3 Housing

The housing market in Anne Arundel County, Maryland, is dominated by single-unit structures, which constitute 81 percent of all housing units in the county (U.S. Census Bureau, 2014b). Approximately 74 percent of all occupied housing units are owner-occupied, with a median home value of $333,100, compared to the national average home value of $175,700 (U.S. Census Bureau, 2014a). Housing data for the county is shown in Table 3-17.

Table 3-17. Housing Data, Anne Arundel County, Maryland 2014

County	Total Units	Percent Change 2000–2010	Occupied Units	
			Number	Owner Occupied
Anne Arundel	212,562	13.70%	199,378	148,006

Source: (U.S. Census Bureau, 2014a).

3.12.3 Environmental Consequences

Analysis of impacts to socioeconomics is focused on the issues of the effects of the alternatives on population, employment, and housing.

3.12.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to the socioeconomics of the local area or region. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

3.12.3.2 Alternative 1—Perry Center Site Potential Impacts

Anne Arundel County has been defined as the study area for the socioeconomic analyses. Project construction is expected to occur from 2017 to 2019. The demolition, construction, and/or renovation activities required to complete the Alumni Service Center Headquarters facility, and relocate both the NSA Annapolis Mail Center and CHRIMP facility would increase construction spending and likely generate additional construction jobs in the study area. This could attract additional construction workers to the area as a response to increased jobs. Construction spending also could generate indirect jobs in the food, retail, and accommodation industries, which would be beneficial to the economy. It is expected that the jobs created indirectly by construction would be filled by the unemployed in the study area. There could be some migration to the study area because of the job opportunities generated under Alternative 1; however, it is not expected to significantly affect short- or long-term population or housing trends.

NSA Annapolis Mail Center Options

For the two mail center relocation options, the option of demolishing Building 619 at the Perry Center and constructing a new prefabricated facility would entail more extensive work than the option of renovating Building 15NS on the North Severn Complex and the yet to be determined facility where the current administrative functions of Building 15NS would be relocated. For this reason, the option at the Perry Center would contribute slightly more to the overall beneficial impacts to the local economy from the demolition and construction expenditures than would the Building 15NS option.

CHRIMP Options

For the two CHRIMP relocation options, the option of renovating Building 104 would likely entail a slightly larger effort than constructing a new prefabricated facility adjacent to Building 104 (NAVFAC Washington, 2015); therefore, it would contribute slightly more to the overall beneficial impacts to the local economy than the prefabricated facility option.

Overall, Alternative 1 would increase construction spending and likely generate additional construction jobs in the study area providing beneficial impact. However, the alternative would not increase staffing numbers of USNA AA, NAF, or NSA Annapolis. As a result, no long-term employment, population, or housing impacts are expected. Therefore, implementation of Alternative 1 would not result in significant impacts on socioeconomics in the study area.

3.12.3.3 Alternative 2—Renovate/Reuse Building 250 (Hospital Point) Potential Impacts

The study area for socioeconomic analyses for Alternative 2 is the same as the study area for Alternative 1—Anne Arundel County. Alternative 2 would require renovation of an existing building. Construction spending to renovate the building would generate some construction jobs directly related to the project. Alternative 2 also could indirectly generate jobs in the food, retail, and accommodation industries during construction. Any jobs created indirectly under Alternative 2 are expected to be filled by the unemployed in the study area. However, Alternative 2 is not expected to significantly affect short- or long-term population or housing trends.

Under Alternative 2, USNA AA, NAF, and NSA Annapolis would maintain the same number of staff, which would have no long-term impact on population, employment, or housing. Therefore, implementation of Alternative 2 would not result in significant impacts on the socioeconomics of the local area or region.

3.13 Summary of Potential Impacts to Resources and Impact Avoidance and Minimization Measures

A summary of the potential impacts associated with each of the action alternatives and the No Action Alternative and impact avoidance and minimization measures are presented in Tables 3-18 and 3-19, respectively. Table 3-19 provides a comprehensive list of all mitigation requirements associated with the Proposed Action.

Table 3-18. Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1—Perry Center Site***	***Alternative 2—Renovate/Reuse Building 250 (Hospital Point)***
Air Quality	There would be no change to baseline air quality; therefore, there would be no impacts.	There would be emissions of criteria pollutants during demolition, construction, and/or renovation activities, but they would be below the *de minimis* rates. There would be no appreciable change in operational emissions of criteria pollutants or greenhouse gases. Therefore, there would be no significant impacts.	There would be emissions of criteria pollutants during renovation activities, but they would be below the *de minimis* rates. There would be no appreciable change in operational emissions of criteria pollutants or greenhouse gases. Therefore, there would be no significant impacts.
Water Resources	There would be no change to baseline water resources; therefore, there would be no significant impacts to surface water, groundwater, wetlands, and floodplains.	There would be short-term adverse impacts on surface water from potential pollutant loading and stormwater during construction and demolition activities. There would be short-term adverse impacts on groundwater from potential pollutant infiltration and dewatering during construction and demolition activities. Impacts would be minimal because permit requirements, stormwater management, and sediment and erosion control BMPs and plans would be followed. Long-term adverse impacts on groundwater and surface water would be minimized by the use of pervious pavement. There would be no impacts from relocating the NSA Annapolis Mail Center or CHRIMP because both facilities would be relocated to either an existing building or a site that is already an impervious surface. Also, the existing functions of Building 15NS, if this mail center option is selected, or the existing functions of Building 104, if this CHRIMP option is selected, would be relocated to existing facilities. There would be no impacts on wetlands because none exist on the Perry Center site or on the potential relocation sites for the NSA Annapolis Mail Center and CHRIMP. Permit requirements, construction BMPs, and stormwater management and sediment and erosion control plans would be followed to prevent	There would be no significant impacts on surface water, groundwater, wetlands, or floodplains because only interior building renovations occur under this alternative.

Table 3-18. Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Alternative 1—Perry Center Site*	*Alternative 2—Renovate/Reuse Building 250 (Hospital Point)*
		impacts to College Creek, an estuarine subtidal deepwater habitat. There would be minimal, short-term adverse impacts on floodplains from some disturbance and vegetation removal during construction activities at the Perry Center site. However, impacts would be minimized through the use of stormwater management and erosion and sediment control plans and BMPs. There would be no long-term impacts on floodplains, including floodplain functions and values, because the footprint of the building would be outside the floodplain. There would be no impacts from relocating the NSA Annapolis Mail Center or the CHRIMP because both relocation options for each facility are outside the floodplain. There would be no significant impacts on water resources.	
Geological Resources	There would be no change to baseline geological resource; therefore, there would be no significant impacts.	There would be minimal adverse impacts on geological resources at the Perry Center site from demolition and construction activities that could disturb and compact soils. Impacts would be minimized through the use of BMPs. There would be no impacts from relocating the NSA Annapolis Mail Center or CHRIMP because both facilities would be relocated to either an existing building or a site that is an existing impervious surface. The existing function of Building 15NS if this mail center option is selected, or Building 104, if this CHRIMP option is selected, would also be relocated to existing facilities, resulting in no impacts. Therefore, there would be no significant impacts.	There would be minimal adverse impacts on geological resources if any ground disturbance is required adjacent to Building 250 for utilities during renovations. There would be no significant impacts.
Cultural Resources	There would be a direct, adverse impact on the USNA NHLD because	There would be a direct adverse impact on the USNA NHLD from the demolition of Buildings 51, 194, and 92, which are discontiguous contributing resources.	There would be short-term visual impacts on the USNA NHLD during the renovation of Building 250. If the renovation of the building

Table 3-18. Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1—Perry Center Site***	***Alternative 2—Renovate/Reuse Building 250 (Hospital Point)***
	Building 92, a discontiguous contributing resource, would remain unoccupied and continue to deteriorate. Despite this change, the USNA NHLD would remain eligible for NRHP and as a NHL. There would be no impacts on archeological resources because no ground-disturbing activities would occur. Therefore, there would be no significant impacts on cultural resources.	While construction of the Alumni Service Center and Headquarters facility would introduce a new visual element adjacent to the USNA NHLD, the adverse impacts would be minimal. Despite these changes, the USNA NHLD would remain eligible for the NRHP and as an NHL. Vegetation clearing and landscaping after construction, as well as the new facility would alter views from within the Colonial Annapolis NHLD and would result in indirect, adverse impacts on the setting and feeling of the district. Despite these changes, the Colonial Annapolis NHLD would remain eligible for the NRHP and as an NHL. The Navy intends to develop a programmatic agreement through the Section 106 consultation process of the National Historic Preservation Act to identify *adverse effects* and agreed upon mitigation measures to avoid, minimize, or mitigate potential *adverse effects* from the construction of the Alumni Service Center and Headquarters facility on the USNA NHLD and the Colonial Annapolis NHLD. The NSA Annapolis Mail Center would be relocated to Building 15NS on the North Severn Complex or to the site of the to-be-demolished Building 619 on the Perry Center. Both buildings are not eligible for the NRHP, nor are they located in or adjacent to a Historic District. Relocating the existing functions of Building 15NS to another facility on the North Severn Complex would potentially require minor interior renovations; therefore, there would be no impacts on historic resources from relocating the NSA Annapolis Mail Center. The area where the CHRIMP would be	follows the *Secretary of the Interior's Standards*, then the renovation would have no long-term impact on the interior, character-defining features of Building 250 or the USNA NHLD. There would be no impacts on archeological resources because no archeological sites are in the project boundary. There would be no significant impacts on cultural resources

Table 3-18. Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1—Perry Center Site***	***Alternative 2—Renovate/Reuse Building 250 (Hospital Point)***
		relocated to, either Building 104 or the area adjacent to Building 104, is outside of the USNA NHLD and the Colonial Annapolis NHLD, and Building 104 is not eligible for listing on the NRHP. Additionally, if the Building 104 option is selected, the existing functions would be moved to another, underutilized facility on the Perry Center. Therefore, there would be no impacts on historic resources from relocating the CHRIMP There would be no impacts on archeological resources because there are no sites in the project boundary. Because the USNA NHLD and Colonial Annapolis NHLD would remain eligible for the NRHP and as NHLs, there would be no significant impacts on cultural resources.	
Biological Resources	There would be no change to biological resources; therefore, there would be no significant impacts.	There would be minimal short-term adverse impacts from vegetation removal; however, undeveloped areas would be revegetated after construction. There would be minimal short-term adverse impacts on terrestrial wildlife from vegetation removal and construction noise. No effect on threatened and endangered species would be expected. Because each of the two options for relocating the NSA Annapolis Mail Center and the CHRIMP involve either renovating existing buildings or a site that is an existing impervious surface, there would be no impacts on vegetation, wildlife, or threatened and endangered species from relocating these facilities. The existing function of Building 15NS if this mail center option is selected, or Building 104, if this CHRIMP option is selected, would be relocated to existing facilities, resulting in no impacts. Therefore, there would be no significant impacts on biological resources.	There would be minimal short-term adverse impacts on terrestrial wildlife from noise disturbance during renovation. There would be no impacts on vegetation or threatened and endangered species. Therefore, there would be no significant impacts on biological resources.

Table 3-18. Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1—Perry Center Site***	***Alternative 2—Renovate/Reuse Building 250 (Hospital Point)***
Land Use	There would be no change to the use of outdated buildings with inefficient use of space; uses would be inconsistent with the NSA Annapolis Installation Master Plan. There would be no impacts on coastal resources. Therefore, there would be no significant impacts on land use.	The Alumni Service Center and Headquarters facility, and each of the options for both relocating the NSA Annapolis Mail Center and the CHRIMP would all be compatible with surrounding land uses and the NSA Annapolis Installation Master Plan. Some short-term adverse impacts could result during construction activities from noise and access restrictions. Some short-term adverse impacts to coastal resources could result from sediment and stormwater runoff during construction activities, but would be minimized by the use of BMPs. Therefore, there would be no significant impacts on land use. The Navy will develop a Coastal Consistency Determination for submission to MDE. The MDE will decide whether it concurs with the Navy's determination that the activities proposed by NSA Annapolis are consistent with the enforceable policies of the Maryland Coastal Zone Management Plan.	Short-term adverse impacts could result during renovation activities from noise and access restrictions. There would be no impacts on coastal resources. Therefore, there would be no significant impacts on land use.
Noise	There would be no change to existing noise levels; therefore, there would be no significant impacts.	There would be potential short-term adverse impacts from, demolition, construction, and/or renovation activities. There would be minimal long-term increases in noise from traffic during AM and PM peak hours. Noise levels would be consistent with the levels in the existing urban environment. Therefore, there would be no significant impacts on noise.	There would be short-term infrequent impacts during renovation activities. There would be minimal long-term increases in noise from traffic during AM and PM peak hours. Noise levels would be consistent with the levels in the existing urban environment. Therefore, there would be no significant impacts on noise.
Infrastructure	There would be no change to existing infrastructure; therefore, there would be no significant impacts.	There would be short-term adverse impacts on utilities during construction from removing, relocating, or properly abandoning service lines. Increases in utility demands at the Perry Center site could be met with no change in the level of service to surrounding users. Relocating the NSA Annapolis Mail Center and the CHRIMP, and existing functions of	Building 250 is currently served by all required utilities, and all utility systems are currently capable of supporting the functions of the building. Renovations would upgrade the utility systems to make them more functional, code-compliant, and energy efficient.

Table 3-18. Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Alternative 1—Perry Center Site*	*Alternative 2—Renovate/Reuse Building 250 (Hospital Point)*
		Building 15NS and Building 104, if those mail center and CHRIMP options are selected, would not increase utility demands. Relocating the NSA Annapolis Mail Center and the CHRIMP would result in more efficient use of building space on NSA Annapolis resulting in beneficial impacts on facilities. There would be no significant impacts on infrastructure.	Therefore, there would be no significant impacts on infrastructure.
Transportation	There would be no significant impacts on pedestrian, bicycle, parking, and traffic (vehicular) modes of transportation.	During the construction period, there would be some short-term adverse parking, sidewalk, and truck impacts. However, once construction was over, there would be no significant impacts on pedestrian, bicycle, parking, and traffic (vehicular) modes of transportation.	During the construction period, there would be some short-term adverse parking, sidewalk, and truck impacts. After construction is complete, operations would adversely affect traffic only in the Navy's site driveway at Gate 8 during outbound mid-day and PM peak hours. Mid-day impacts would occur only during event activities. Consequently, it is recommended that the traffic signal timing at the Gate 8 exit be revised. There would be no significant impacts on pedestrian, bicycle, parking, or the remaining traffic network modes of transportation.
Public Health and Safety	There would be potential impacts adverse impacts from the continued deterioration of Buildings 92, 974, and 340, which contain ACM, LBP, and PCBs. However, any ACM, LBP, and PCBs would be removed, if necessary, in compliance with applicable federal and state regulations.	Adverse impacts during construction are possible; however, impacts would be minimized by a health and safety program, temporary fencing and limiting public access, and notification signs. The NSA Annapolis Mail Center would meet DoD and Navy requirements and standards for a mail center, including being able to provide containment for potential airborne contamination, resulting in no impacts on public health and safety. The CHRIMP facility would be in compliance with applicable hazardous materials requirements and National Fire Protection Association standards. The Alumni Service	During renovation activities, adverse impacts would be minimized by adhering to a health and safety program, and activities would comply with health and safety regulations and standards. Therefore, there would be no significant impacts.

Table 3-18. Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1—Perry Center Site***	***Alternative 2—Renovate/Reuse Building 250 (Hospital Point)***
	Therefore, there would be no significant impacts.	Center and Headquarters facility would be in compliance with antiterrorism/force protection regulations and DoD Minimum Antiterrorism Standards. Therefore, there would be no significant impacts.	
Hazardous Materials and Wastes	There would be potential impacts from the continued deterioration of Buildings 92, 974, and 340, which contain ACM, LBP, and PCBs. However, any ACM, LBP, and PCBs would be removed, as necessary, in compliance with applicable federal and state regulations. Therefore, there would be no significant impacts.	There would be adverse hazardous materials and hazardous wastes impacts from demolition, construction, and/or renovation activities; however, these impacts would be minimized through compliance with applicable federal and state regulations. There would be no impacts to special hazards or DERP components. The new CHRIMP facility would better meet the requirements for a hazardous materials warehouse that stores and handles materials than the existing CHRIMP in Building 194, resulting in beneficial impacts. Therefore, there would be no significant impacts.	There would be adverse hazardous materials and hazardous wastes impacts; however, these impacts would be minimized with removal of materials prior to renovation and through compliance with applicable federal and state regulations. There would be no impacts to special hazards or DERP components. Therefore, there would be no significant impacts.
Socioeconomics	There would be no change to the local or regional socioeconomics; therefore, there would be no significant impacts.	There would be short-term beneficial impacts on the economy from demolition, construction, and/or renovation activities. There would be no long-term impacts because there would be no increase in staffing numbers associated with the Proposed Action. Therefore, there would be no significant impacts.	There would be short-term beneficial impacts to the economy from renovation activities. There would be no long-term impacts because there would be no increase in staffing numbers associated with the Proposed Action. Therefore, there would be no significant impacts.

Key: ACM = asbestos containing material; BMP = best management practices; CEQ = Council on Environmental Quality; CHRIMP = consolidated hazardous material reutilization inventory management program; DERP = Defense Environmental Restoration Program; DoD = Department of Defense; LBP = lead-based paint; MDE = Maryland Department of the Environment; NHL = National Historic Landmark; NHLD = National Historic Landmark District; NRHP = National Register of Historic Places; NSA = Naval Support Activity; PCB = Polychlorinated Biphenyl; USNA = United States Naval Academy

Table 3-19. Impact Avoidance and Minimization Measures

Measure	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Alternative 1—Perry Center Site					
Compliance with NPDES permit [General Permit for Stormwater Associated with Construction Activity]	Avoidance and minimization of water quality degradation. This is required by the CWA through the Maryland NPDES program.	Specific NPDES discharge limits and criteria; NSA Annapolis Stormwater Pollution Prevention Plan	Construction site discharge will be monitored.	USNA AA/F; NSA Annapolis	During construction
Development and implementation of stormwater pollution prevention and erosion and sediment control plans, and implementation of stormwater and erosion and sediment control BMPs (e.g., silt fences, inlet/outlet protection, check dams)	Prevent or minimize possible pollutant loading to water resources and protect water quality, marine species, and coastal resources during construction. Mitigation measures such these are required under the CWA through the Maryland NPDES program and the Stormwater Management Act of 2007 and state regulations under Code of Maryland Regulations 26.17.02 to meet water quality standards.	Specific NPDES discharge limits and criteria; Code of Maryland Regulations 26.17.01, Erosion and Sediment Control standards; NSA Annapolis Stormwater Pollution Prevention Plan	Construction site discharge will be monitored.	USNA AA/F; NSA Annapolis	During construction

Table 3-19. Impact Avoidance and Minimization Measures

Measure	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Development and implementation of stormwater management plan and associated BMPs (e.g., pervious pavement, raingardens, other "green techniques")	Management and reduction of stormwater runoff as required under section 438 of the Energy Independence and Security Act. Also reduces flooding and water quality impacts.	Site-specific performance standards for the site that "maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow."	Conduct post-construction analysis and annual evaluation of BMPs.	USNA AA/F	During and after construction
Design and placement of the construction footprint outside of the 100-year floodplain	Avoid and minimize impacts to the floodplain and floodplain functions as required under EO 13653 and EO 11988.	Avoidance of the floodplain	Design of construction footprint outside of the floodplain. No monitoring necessary.	The Navy and the USNA AA/F Design team	Before construction
Development and execution of the Programmatic Agreement including stakeholder participation in design review and other agreed-upon mitigation measures	Avoid, minimize, or mitigate any potential adverse effects on the USNA NHLD and Colonial Annapolis NHLD as required under Section 106 of the NHPA.	NHPA; NSA Annapolis Integrated Cultural Resources Management Plan	To be determined during the development of the Programmatic Agreement	The Navy and USNA AA/F Design team	Before, during, and after construction
Compliance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*	Prevention of adverse impacts on the USNA NHLD.	NHPA; NSA Annapolis Integrated Cultural Resources Management Plan	To be determined during the development of the Programmatic Agreement	The Navy and the USNA AA/F Design team	During renovation
Revegetation of disturbed areas	Prevent long-term impacts to vegetation community.	NSA Annapolis Integrated Natural Resources Management Plan	The Navy would oversee monitoring of the action	The Navy and the USNA AA/F	After construction

Table 3-19. Impact Avoidance and Minimization Measures

Measure	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Post signage alerting the public to the construction and the new active driveway	Prevent impacts to the pedestrian and bicycle networks during construction and to the new driveway after construction.	Compliance with construction safety plan	To be implemented and monitored according to the construction safety plan	USNA AA/F	During and after construction
Provision of temporary new sidewalk connections	Prevent impacts to the pedestrian and bicycle networks during construction. Compensation for sidewalk closings and narrowed or torn-up sidewalks.	Compliance with construction safety plan	To be implemented and monitored according to the construction safety plan	USNA AA/F	During construction
Remove any ACM, LBP, and polychlorinated biphenyls in buildings	Protection of public health and safety.	Compliance with applicable federal and state regulations, guidelines, and management	To be implemented and monitored according to guiding regulations	The Navy	Before construction and renovation
Implement a health and safety program including education of site hazards, issues, and safety measures including fencing and signage	Ensure the safety and health of the workers and the public during construction using applicable regulations and guidance.	29 CFR part 1926, Safety and Health Regulations for Construction, and applicable subparts of 29 CFR part 1910, Occupational Safety and Health Standards	To be implemented and monitored according to guiding regulations	USNA AA/F	During construction and renovation
Compliance with requirements for storage and handling of hazardous materials and wastes	Protection of public health and safety	UFC 4-442- 01N and UFC 2-000-05N and National Fire Protection Association standards	To be implemented and monitored according to guiding regulations	The Navy	Before, during, and after construction and renovation

Table 3-19. Impact Avoidance and Minimization Measures

Measure	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Compliance with antiterrorism/force protection regulations and physical security mitigation	Protection of public health and safety	UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*. The UFC 4-010-01, *Section 1-8.6-Non-DoD Tenant Buildings on DoD Installations*	To be implemented and monitored according to guiding regulations	The Navy	Before, during, and after construction and renovation
Compliance with construction and building regulations	Protection of public health and safety	DoD 4525.6M—*DoD Postal Manual*, Chapter 13; UFC 4-010-01, DoD *Minimum Antiterrorism Standards for Buildings*; and the DoD O-2000.12-H, *DoD Antiterrorism Handbook*	To be implemented and monitored according to guiding regulations	USNA AA/F	During construction and renovation
Alternative 2—Renovate/Reuse Building 250 (Hospital Point)					
Implementation of stormwater management and erosion and sediment control BMPs (e.g., silt fences, inlet/outlet protection, check dams)	Prevent or minimize possible pollutant loading to water resources and protect water quality during construction. Mitigation measures such these are required under the CWA through the Maryland NPDES program and the Stormwater Management Act of 2007 and state regulations under Code of Maryland Regulations 26.17.02 to meet water quality standards.	Specific NPDES discharge limits and criteria; Code of Maryland Regulations 26.17.01, Erosion and Sediment Control standards; NSA Annapolis Stormwater Pollution Prevention Plan	Construction site discharge will be monitored.	USNA AA/F; NSA Annapolis	During renovation

Table 3-19. Impact Avoidance and Minimization Measures

Measure	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Compliance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*	Prevention of adverse impacts on the USNA NHLD	NHPA; NSA Annapolis Integrated Cultural Resources Management Plan	To be determined during the development of the design for the renovation	The Navy and the USNA AA/F Design team	During renovation
Continue to implement the Installation TMP including the use of the Annapolis Transit, Navy Transportation Department shuttles, vanpools, carpools, and bicycle trails	Reduce the number of vehicle trips on the roadway system and ensure that the transportation system in the area functions efficiently and adheres to EO 13693, Planning for Federal Sustainability in the Next Decade.	Annual transportation surveys	To be implemented and monitored according to the TMP	The Navy; the City of Annapolis	Before, during, and after renovation
Implement a health and safety program including education of site hazards, issues, and safety measures including fencing and signage	Ensure the safety and health of the workers and the public during construction using applicable regulations and guidance.	29 CFR part 1926, Safety and Health Regulations for Construction, and applicable subparts of 29 CFR part 1910, Occupational Safety and Health Standards	To be implemented and monitored according to guiding regulations	USNA AA/F	During renovation
Compliance with requirements for storage and handling of hazardous materials and wastes	Protection of public health and safety.	UFC 4-442- 01N and UFC 2-000-05N and National Fire Protection Association standards	To be implemented and monitored according to guiding regulations	The Navy	Before, during, and after renovation

Key: ACM = asbestos containing materials; BMP = best management practices; CFR = Code of Federal Regulations; CWA = Clean Water Act; DoD = Department of Defense; EO = Executive Order; NHLD = National Historic Landmark District; NHPA = National Historic Preservation Act; NPDES = National Pollutant Discharge Elimination System; NRHP = National Register of Historic Places; NSA = Naval Support Activity; TMP = Transportation Management Plan; UFC = Unified Facilities Criteria; USNA = United States Naval Academy

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4 Cumulative Impacts

This section (1) defines cumulative impacts, (2) describes past, present, and reasonably foreseeable future actions relevant to cumulative impacts, (3) analyzes the incremental interaction the proposed action may have with other actions, and (4) evaluates cumulative impacts potentially resulting from these interactions.

4.1 Definition of Cumulative Impacts

The approach taken in the analysis of cumulative impacts follows the objectives of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations, and CEQ guidance. Cumulative impacts are defined in 40 Code of Federal Regulations (CFR) section 1508.7 as the impact on the environment that results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

In addition, CEQ and the U.S. Environmental Protection Agency (USEPA) have published guidance addressing implementation of cumulative impact analyses—Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ, 2005) and Consideration of Cumulative Impacts in EPA Review of NEPA Documents (USEPA, 1999). CEQ guidance entitled *Considering Cumulative Impacts Under NEPA* (CEQ, 1997) states that cumulative impact analyses should

"…determine the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative impacts of other past, present, and future actions...identify significant cumulative impacts…[and]…focus on truly meaningful impacts."

Cumulative impacts are most likely to arise when a relationship or synergism exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in proximity to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Similarly, relatively concurrent actions would tend to offer a higher potential for cumulative impacts. To identify cumulative impacts, the analysis needs to address the following three fundamental questions:

- Does a relationship exist such that affected resource areas of the proposed action might interact with the affected resource areas of past, present, or reasonably foreseeable actions?
- If one or more of the affected resource areas of the proposed action and another action could be expected to interact, would the proposed action affect or be affected by impacts of the other action?
- If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

4.2 Scope of Cumulative Impacts Analysis

The scope of the cumulative impacts analysis involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. For this Environmental Assessment (EA), the study area delimits the geographic extent of the cumulative impacts analysis. In general, the study area will include those areas previously identified in Chapter 3 for the respective resource areas. The time frame for cumulative impacts centers on the timing of the Proposed Action.

Another factor influencing the scope of cumulative impacts analysis involves identifying other actions to consider. Beyond determining that the geographic scope and time frame for the actions interrelated to the Proposed Action, the analysis employs the measure of “reasonably foreseeable” to include or exclude other actions. For the purposes of this analysis, public documents prepared by federal, state, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Documents used to identify other actions include notices of intent for EISs and EAs, management plans, land use plans, and other planning related studies.

4.3 Past, Present, and Reasonably Foreseeable Actions

This section will focus on past, present, and reasonably foreseeable future projects at and near NSA Annapolis. In determining which projects to include in the cumulative impacts analysis, a preliminary determination was made regarding the past, present, or reasonably foreseeable action. Specifically, using the first fundamental question included in Section 4.1, it was determined if a relationship exists such that the affected resource areas of the proposed action included in this EA might interact with the affected resource area of a past, present, or reasonably foreseeable action, the project was carried forward into the cumulative impacts analysis. If no such potential relationship exists, the project was not carried forward into the cumulative impacts analysis. In accordance with CEQ guidance (CEQ, 2005), these actions considered but excluded from further cumulative effects analysis are not catalogued here as the intent is to focus the analysis on the meaningful actions relevant to inform decision-making. Projects included in this cumulative impacts analysis are listed in Table 4-1 and briefly described in the following subsections.

Table 4-1. Cumulative Action Evaluation

Action	*Level of National Environmental Policy Act Analysis Completed*
Past Actions	
Water Treatment Plant Upgrades	Categorical Exclusion
Navy Exchange, Commissary, Health Clinic	Environmental Assessment
Present and Reasonably Foreseeable Future Actions	
Waste Water Treatment Plant Upgrades	Environmental Assessment
Halligan Hall (Building 181) Energy Repairs	Categorical Exclusion
Minor Repair/Upgrade Projects at United States Naval Academy Facilities	To be determined (Categorical Exclusion)
Bancroft Hall Watershed Improvements	Categorical Exclusion
New Football Facility-Addition to Ricketts Hall	To be determined
Center for Cyber Security Studies	Environmental Assessment

4.3.1 Past Actions

Water Treatment Plant Upgrades

The purpose of this project is to implement water savings initiatives associated with the installation’s water treatment plant (WTP). The main purpose of the upgrade is to recycle potable water back to the head of the WTP instead of discharging this water to the City of Annapolis. The scope of work includes the conversion of the existing waste holding tank to a gravity thickener and construction of one gravity thickener, a centrifuge building, pumping stations for the gravity thickeners and recycled water, polymer system, and associated mechanical equipment (NAVFAC Washington, 2015).

Navy Exchange, Commissary, and Health Clinic

The Navy prepared an EA to assess the potential environmental impacts of constructing and operating a new Navy Exchange (NEX), Commissary, and Health Clinic on the North Severn Complex of NSA Annapolis. The NEX and Commissary complex, located between Kinkaid and Greenbury Point Roads, includes a one-story building with an 88,000 square foot NEX and a 51,500-square-foot Commissary. A three-story 105,500-square foot-Health Clinic (two stories and a basement story wholly belowground) is located adjacent to the northwestern boundary of the golf course. A supporting 550-space parking area was constructed between the NEX and Commissary complex and the Health Clinic. The NEX and Commissary replace the existing facilities on the North Severn Complex; the existing NEX and Commissary buildings and their associated parking would be reused. The new Health Clinic on the North Severn Complex will replace the existing Naval Health Clinic Annapolis located at the NSA Annapolis Upper Yard (NAVFAC Washington, 2011b). The NEX/Commissary opened in September 2014, and construction of the Health Clinic is expected to be completed in 2016.

4.3.2 Present and Reasonably Foreseeable Actions

Waste Water Treatment Plant Upgrades

The Navy prepared an EA to evaluate the potential environmental impacts of upgrading the NSA Annapolis North Severn waste water treatment plant (WWTP) to comply with current and future regulatory requirements and meet future treatment demand. The Preferred Alternative for the Proposed Action consisted of new construction, demolition, and conversion projects at the North Severn WWTP, and installation of a water reuse conservation system (NAVFAC Washington, 2012a).

Halligan Hall (Building 181) Energy Repairs

This project consists of replacing the existing steam service and heating and air conditioning system in Halligan Hall (Building 181) with a more energy efficient ground-source heat pump, also known as a geothermal well system. Approximately 190 6-inch-diameter wells have been installed at a depth of up to 400 feet below Lawrence Field for the proposed ground-source heat pump system. The project also includes restoring and selectively replacing the existing windows to improve the building’s thermal performance. The entire project would be completed in phases (NSA Annapolis, 2013) (Klimoski, 2013)(as cited by NAVFAC Washington, 2015).

Minor Repair/Upgrade Projects at United States Naval Academy Facilities

The Navy anticipates several minor repair/upgrade projects at the United States Naval Academy (USNA) facilities between Fiscal Years (FY) 2015 and FY 2017. The following facilities are slated for repairs: MacDonough Hall (Building 102), Stribling Walk, the Perry Center (Building 571) roof, Rickover Hall (Building 590) building systems, and the water main at the Lower Yard. In addition, there are several energy projects, including upgrades of variable frequency drives and lighting systems in various buildings, installation of building automation systems for Buildings 628 and 675, and high efficiency water retrofits on various buildings, to be completed in two phases. One other project involves replacing the Chapel (Building 108) roof.

Bancroft Hall Watershed Improvements

This project consists of the construction of below-grade cisterns at Bancroft Hall that would collect stormwater. The stormwater would then be reused for irrigation, cooling, or other recycled water uses.

New Football Facility-Addition to Ricketts Hall

The Navy is planning to construct an addition to Ricketts Hall (Building 566) for additional administrative space for the football program. No increase in personnel or staff at Ricketts Hall would be associated with this project.

Center for Cyber Security Studies

This project consists of the construction of an approximately 206,000-square-foot new multistory facility at the Lower Yard to house the Center for Cyber Security Studies and a supporting two-story parking garage structure. The facilities were designed and will be constructed for energy efficiency and sustainability including, at a minimum, a Leadership in Energy and Environmental Design Silver certification.

4.4 Cumulative Impact Analysis

Where feasible, the cumulative impacts were assessed using quantifiable data; however, for many of the resources included for analysis, quantifiable data is not available and a qualitative analysis was undertaken. In addition, where an analysis of potential environmental effects for future actions has not been completed, assumptions were made regarding cumulative impacts related to this EA where possible. The analytical methodology presented in Chapter 3, which was used to determine potential impacts to the various resources analyzed in this document, also was used to determine cumulative impacts.

4.4.1 Air Quality

4.4.1.1 Description of Geographic Study Area

The study area for air quality cumulative impacts is Anne Arundel County, within the Metropolitan Baltimore Intrastate Air Quality Control Region, which is classified nonattainment for the 8-hour ozone standard and maintenance for the annual fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) standard. A portion of the county (including NSA Annapolis) is also within a recently designated SO_2 nonattainment area associated with the Herbert A. Wegner coal power plant. Regulatory actions, including increased emission standards for mobile and stationary sources, have contributed to substantial improvements in air quality in the study area in recent years. For example, ozone concentrations at the Anne Arundel Count monitor have decreased almost 18 percent since 2005–2007 (0.090 parts per million [ppm] in 2005-2007 to 0.074 ppm in 2012–2014).[2] Annual average $PM_{2.5}$ concentrations have steadily decreased 34 percent over this same time period (from 15.6 micrograms per cubic meter in 2005–2007 to 10.3 micrograms per cubic meter 2012–2014).[3]

4.4.1.2 Relevant Past, Present, and Future Actions

All of the present and reasonably foreseeable future projects identified in Table 4-1 would likely contribute cumulative impacts on air quality.

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[2] Concentrations are three-year design values from Davidsonville Recreation Center, 3801 Queen Anne Bridge Road obtained from USEPA's 2014 Ozone Design Value Report. http://www3.epa.gov/airtrends/values.html

[3] Concentrations are three-year design values for the former Baltimore nonattainment area obtained from USEPA's 2014 $PM_{2.5}$ Design Value Report. http://www3.epa.gov/airtrends/values.html

4.4.1.3 Cumulative Impact Analysis

All of the project identified in Table 4-1 would likely contribute short-term and temporary air quality impacts during construction. Based on the nature of the projects, minor, short-term emissions associated with construction equipment and fugitive dust would occur. No new major sources of long-term emissions would be created, and short-term emissions would not exceed *de minimis* levels. Several of the cumulative projects involve building energy efficiency improvements or alternative energy sources (such as the geothermal system proposed for Halligan Hall) that would contribute to reduced energy demands and associated emissions from heating and air conditioning. Cumulative air quality impacts from past, present, and future actions in the study area would be less than significant because they would be well below the General Conformity *de minimis* criteria. Continued progress in building energy efficiency is expected with the implementation of various building upgrade projects. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on air quality in the study area.

Cumulative air quality impacts that would occur with implementation of either of the action alternatives would include emissions from construction or renovation activities, but they would be below *de minimis* criteria.

4.4.2 Water Resources

4.4.2.1 Description of Geographic Study Area

The study area for assessment of cumulative impacts resulting from past, present, and future actions is the NSA Annapolis property.

4.4.2.2 Relevant Past, Present, and Future Actions

The following projects from Table 4-1 would likely contribute to cumulative impacts on water resources: the NEX, Commissary, and Health Clinic; the WWTP Upgrades, the Bancroft Hall Watershed Improvements; New Football Facility-Addition to Ricketts Hall; and the Center for Cyber Security Studies.

4.4.2.3 Cumulative Impact Analysis

WWTP Upgrades will improve the wastewater treatment facility and reduce impervious surface by adding storage tanks. The upgrades will result in long-term beneficial impacts on local surface water quality. The Bancroft Hall Watershed Improvements would collect stormwater in cisterns and reduce stormwater runoff and associated erosion, pollution, and sedimentation to local surface waters. These projects would benefit stormwater quantity and quality and local water quality.

Construction activities for the NEX, Commissary, Health Clinic; the New Football Facility-Addition to Ricketts Hall; and the Center for Cyber Security Studies would have short-term impacts on surface water and groundwater quality and stormwater runoff in small areas surrounding the construction footprints. Implementation of stormwater management and erosion and sediment control plans would prevent long-term impacts on water resources from increases in impervious surfaces as a result of the construction of the NEX, Commissary, and Health Clinic and the Center for Cyber Security Studies.

Cumulative water resources impacts from past, present, and future actions in the study area would be less than significant because the impacts would be localized compared to the study area and would have negligible impacts to water resources. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on water resources in the study area.

Cumulative water resource impacts that would occur from implementation of Alternative 1 would include minimal short-term impacts on groundwater, surface water, and floodplains, and minimal long-term impacts on groundwater and surface water.

There would be no impacts on water resources under Alternative 2; therefore, there would be no cumulative impacts.

4.4.3 Geological Resources

4.4.3.1 Description of Geographic Study Area

The study area for geological resources includes the areas that would be disturbed under the cumulative actions at NSA Annapolis and the project areas discussed in this EA.

4.4.3.2 Relevant Past, Present, and Future Actions

Past actions listed in Table 4-1 that could have affected geology and soils include the WTP Upgrades; the NEX, Commissary, and Health Clinic; and the geothermal well system associated with the Halligan Hall Energy Repairs. Present and future actions listed in Table 4-1 that could affect geology and soils include the WWTP Upgrades, Bancroft Hall Watershed Improvements, the New Football Facility-Addition to Ricketts Hall, and the Center for Cyber Security Studies.

4.4.3.3 Cumulative Impact Analysis

Typically, impacts on geological resources are limited to the areas where ground disturbance would occur. To address short-term impacts on geology from these projects, BMPs such as erosion and sediment controls would be implemented throughout construction. Cumulative impacts on geological resources from past, present, and future actions in the study area would be less than significant because BMPs would be implemented to address short-term impacts. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on geological resources in the study area under either Alternative 1 or Alternative 2.

Cumulative geological resource impacts that would occur with implementation of the action alternatives would include minimal impacts at the Perry Center site under Alternative 1 from demolition and construction activities that could disturb and compact soils, and minimal impacts under Alternative 2 if any ground disturbance is required adjacent to Building 250 for utility upgrades during renovation activities.

4.4.4 Cultural Resources

4.4.4.1 Description of Geographic Study Area

The study area for cultural resources cumulative impacts includes the study area and the entire USNA National Historic Landmark District (NHLD). Of the projects identified in Table 4-1, the Halligan Hall Energy Repairs, Minor Repair/Upgrade Projects at USNA Facilities, the New Football Facility-Addition to Ricketts Hall, and the Center for Cyber Security Studies likely would contribute to cultural resources impacts.

4.4.4.2 Relevant Past, Present, and Future Actions

Projects identified in Table 4-1 that could contribute to cumulative impacts on cultural resources include the Halligan Hall Energy Repairs, Minor Repair/Upgrade Projects at USNA Facilities, the New Football Facility-Addition to Ricketts Hall, and the Center for Cyber Security Studies.

4.4.4.3 Cumulative Impact Analysis

The Navy anticipates several minor repair/upgrade projects at USNA facilities between FY 2015 and FY 2017. The following facilities are slated for repairs: MacDonough Hall (Building 102), Stribling Walk, the Perry Center (Building 571) roof, Rickover Hall (Building 590) building systems, and the water main at the Lower Yard. In addition, there are several energy projects, including upgrades of variable frequency drives and lighting systems in various buildings, installation of building automation systems for Buildings 628 and 675, and high efficiency water retrofits on various buildings, to be completed in two phases. One other project involves replacing the Chapel (Building 108) roof.

The proposed Halligan Hall Energy Repairs (Building 181), a contributing resource to the USNA NHLD, have been designed to conform to the Secretary of the Interior's *Standards for the Treatment of Historic Properties* (Weeks & Grimmer, 1995). In addition, the installation of a geothermal well field at Lawrence Field as part of the proposed energy repairs has not affected archaeological resources because of substantial previous disturbances at the site. Therefore, the Navy determined, in consultation with the Maryland Historical Trust (MHT), that the project would have no adverse effect to historic properties (NAVFAC Washington, 2015).

The New Football Facility-Addition to Ricketts Hall has the potential to affect the USNA NHLD. While Ricketts Hall is a noncontributing resource to the NHLD, an addition to the building may result in adverse visual impacts on the district from the introduction of a new visual element in its setting. However, the project is in the early planning stage at this time; therefore, sufficient details on potential impacts are not available, and it is premature to conduct further analysis of potential cumulative impacts of this project on cultural resources.

There would be no significant impact on cultural resources related to the Center for Cyber Security Studies project, which consists of the construction of an approximately 206,000-square-foot new multistory facility at the Lower Yard to house the Center for Cyber Security Studies and a supporting two-story parking garage structure. The Center for Cyber Security Studies will be designed and constructed for energy efficiency and sustainability including, at a minimum, a Leadership in Energy and Environmental Design Silver certification. The Navy developed a programmatic agreement in consultation with MHT, Advisory Council on Historic Preservation, National Park Service, and Annapolis Historic Preservation Division to implement procedures for assessing effects and to set forth mitigation measures in case there would be an adverse effect. With implementation of the programmatic agreement, the impacts to historic properties would not be significant. Therefore, pursuant to NEPA, it is anticipated that there would be no significant impacts on cultural resources.

When past, present, and reasonably foreseeable future projects are analyzed together with the Proposed Action, implementation of Alternative 1 has the potential for cumulative impacts on the USNA NHLD. A programmatic agreement, executed through Section 106 consultation, would outline the process for identifying adverse effects and avoidance, minimization, or mitigation measures for any adverse effects. For these reasons, it is expected that any cumulative impacts on the USNA NHLD would be less than significant pursuant to NEPA.

Of the projects identified above, only the Chapel roof repair project is anticipated to have an adverse effect to the Colonial Annapolis NHLD. The visual impacts, however, would be temporary and short term, lasting only for the duration of the repairs. Under the Proposed Action, Alternative 1 is anticipated to have an adverse effect to the Colonial Annapolis NHLD. Therefore, when past, present, and reasonably foreseeable future projects are analyzed together with the Proposed Action, implementation of Alternative 1 has the potential for cumulative impacts to the Colonial Annapolis NHLD. Any potential significant impacts to this historic district would be mitigated through the development of a programmatic agreement. For these reasons, it is expected that any cumulative impacts to the Colonial Annapolis NHLD would be less than significant pursuant to NEPA. Cumulative impacts on cultural resources from past, present, and future actions in the study area would be less than significant because programmatic agreements that identify avoidance, minimization, or mitigation measures, would be developed and executed for individual projects. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts in the study area.

Cumulative cultural resource impacts that would occur with implementation of Alternative 1 would include an adverse impact on the USNA NHLD and the Colonial Annapolis NHLD. Therefore, when past, present, and reasonably foreseeable future projects are analyzed together with the Proposed Action, implementation of Alternative 1 has the potential for cumulative impacts on the USNA NHLD and the Colonial Annapolis NHLD. However, because impacts on the NHLDs from reasonably foreseeable future projects would not result in a loss of NRHP eligibility or NHL listing, implementation of the Proposed Action would not result in significant cumulative impacts.

When past, present, and reasonably foreseeable future projects are analyzed together with the Proposed Action, implementation of Alternative 2 has the potential for cumulative impacts on the USNA NHLD. However, because the impacts to the NHLD from reasonably foreseeable future projects would not result in a loss of NRHP eligibility or NHL listing, implementation of the Proposed Action would not result in significant cumulative impacts.

4.4.5 Biological Resources

4.4.5.1 Description of Geographic Study Area

The study area for biological resources cumulative impacts includes NSA Annapolis and contiguous land and tidal waters.

4.4.5.2 Relevant Past, Present, and Future Actions

Projects identified in Table 4-1 that could contribute to cumulative impacts on biological resources include the WTP Upgrades; NEX, Commissary, and Health Clinic; WWTP Upgrades; the New Football Facility-Addition to Ricketts Hall; and the Center for Cyber Security Studies.

4.4.5.3 Cumulative Impact Analysis

Cumulative biological resource impacts from past, present, and future actions in the study area would be less than significant because species at NSA Annapolis are already habituated to high levels of noise; no federally listed threatened, endangered, or candidate species would be impacted; and habitats would continue to be managed according to the NSA Annapolis Integrated Natural Resources Management Plan, which is designed to protect and benefit habitat and species, including threatened and endangered species. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on biological resources in the study area.

Cumulative biological resource impacts that would occur with implementation of the alternatives would include temporary disturbance of wildlife from noise generated during construction and operation activities and a small loss of vegetation.

4.4.6 Land Use

4.4.6.1 Description of Geographic Study Area

The study area for land use cumulative impacts includes NSA Annapolis.

4.4.6.2 Relevant Past, Present, and Future Actions

The majority of projects listed in Table 4-1 includes infrastructure and utility changes that would not impact land use. Projects that could impact land use include the NEX, Commissary, and Health Clinic and the Center for Cyber Security Studies.

4.4.6.3 Cumulative Impact Analysis

The NEX and Commissary facility would replace existing facilities on the North Severn Complex; the existing NEX and Commissary buildings and their associated parking would be reused. The proposed Health Clinic would be constructed on the North Severn Complex and would replace the existing Naval Health Clinic Annapolis located at the NSA Annapolis Upper Yard.

The Center for Cyber Security Studies would include the construction of an approximately 206,000-square-foot facility at the Lower Yard and a supporting two-story parking garage structure.

Cumulative land use impacts from past, present, and future actions in the study area would be less than significant because projects would be compatible with existing and surrounding land uses. Implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on land uses in the study area.

Cumulative land use impacts that would occur with implementation of the alternatives would include minor impacts on parking during construction of some of the alternatives.

4.4.7 Noise

4.4.7.1 Description of Geographic Study Area

The study area for noise cumulative impacts includes the land and population in the vicinity of NSA Annapolis.

4.4.7.2 Relevant Past, Present, and Future Actions

Of the projects listed in Table 4-1, all except the WTP Upgrades have the potential contribute to cumulative impacts on noise.

4.4.7.3 Cumulative Impact Analysis

All of the projects identified have the potential to generate short-term noise from construction activities. Projects that could impact transportation, and therefore, the long-term noise environment include the

NEX, Commissary, and Health Clinic; the New Football Facility-Addition to Ricketts Hall; and the Center for Cyber Security Studies.

Construction of the Center for Cyber Security Studies would occur between 2015 and 2018, which would overlap with the construction period of 2017 to 2018 for the Alumni Service Center and Headquarters facility under Alternatives 1 and 2. If small increases in noise levels did occur from construction and demolition activities, those increases would be short term. Construction of the New Football Facility-Addition to Ricketts Hall is expected to occur between 2018 and 2019. However, Ricketts Hall is located on the NSA Annapolis Lower Yard and is not in the same vicinity as Alternatives 1 or 2. Operations of the proposed NEX, Commissary, and Health Clinic would result in minor increases in traffic on Baltimore Annapolis Boulevard and negligible increases on King George Street, which would not result in significant noise impacts. Therefore, it is not expected that the cumulative impact of the minor increases in traffic would cause significant long-term noise impacts in the study area. Operations of the new football facility and the Center for Cyber Security Studies would result in minor increases in traffic along study area roads. However, these impacts would occur within the installation boundary and would not impact noise sensitive receptors. Cumulative noise impacts from past, present, and future actions in the study area would be less than significant because the distance between project sites and sensitive noise receptors likely would attenuate to levels at or below ambient noise levels in residential neighborhoods, and increases in traffic noise would be minimal. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on noise in the study area.

Cumulative noise impacts that would occur with implementation of the action alternatives would include temporary noise increases from construction and renovation activities, as well as slight increases in long-term noise increases from traffic during AM and PM peak hours.

4.4.8 Infrastructure

4.4.8.1 Description of Geographic Study Area

The study area for infrastructure cumulative impacts includes the NSA Annapolis property.

4.4.8.2 Relevant Past, Present, and Future Actions

All of the projects identified in Table 4-1 would contribute to cumulative impacts on infrastructure.

4.4.8.3 Cumulative Impact Analysis

The WTP upgrades would result in a beneficial impact on water supply because it would reduce the amount of water withdrawn from the aquifer.

Operations of the new NEX, Commissary, and Health Clinic would result in a minor increase in demand on the water supply, electricity, natural gas, telecommunications systems, wastewater conveyance, and solid waste disposal in the study area. It is anticipated the increased demand would be provided without major upgrades to existing utility systems. The designs for these projects incorporate stormwater management features to maintain current outflows for most of the site.

Under the WWTP upgrades, the plant would continue to operate during construction, consequently there would be no reduction in capacity for the duration of the project. Operation of the WWTP after completion of the upgrades would not increase the demand on the water supply, electricity, natural gas, or telecommunications systems in the study area.

The Halligan Hall Energy Repairs would have a beneficial impact energy as a result of the replacement of the existing mechanical/heating system with an energy efficient ground-source heat pump system. Minor repair/upgrade projects at USNA facilities, such as high energy water retrofits and upgrades of variable frequency drives and lighting systems in various buildings, would be a beneficial impact on water supply and energy.

The Bancroft Hall Watershed Improvements would result in a beneficial impact on water supply. Cisterns would be constructed to collect stormwater for reuse; therefore, the project would reduce water use.

Operations of the New Football Facility-Addition to Ricketts Hall and the new Center for Cyber Security Studies would result in a minor increase in demand on the water supply, electricity, natural gas, telecommunications systems, and solid waste disposal. It is anticipated the increase in demand would be met without difficulty and with no change in the level of service to surrounding users.

Cumulative infrastructure impacts from past, present, and future actions in the study area would be less than significant because each of the current systems is expected to meet the demands without major upgrades and with no change in the level of service to other systems users. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on infrastructure in the study area.

Cumulative infrastructure impacts that would occur with implementation of the action alternatives would include short-term impacts on utilities during construction from removing, relocating, or properly abandoning service lines under Alternative 1, and beneficial impacts under Alternative 2 from the upgrade of utility systems in Building 250 to make them code-compliant and more energy efficient.

4.4.9 Transportation

4.4.9.1 Description of Geographic Study Area

The study area for transportation cumulative impacts includes five intersections, three along Baltimore Annapolis Boulevard and two along King George Street. These include Taylor Avenue and Baltimore Annapolis Boulevard, Baltimore Annapolis Boulevard and King George Street, Baltimore Annapolis Boulevard and Bowyer Road, King George Street and College Avenue, and King George Street and Baseball Stadium Entrance/access to Perry Center.

4.4.9.2 Relevant Past, Present, and Future Actions

Of the projects identified in Table 4-1, the NEX, Commissary, and Health Clinic and the Center for Cyber Security Studies would affect transportation over the long term.

4.4.9.3 Cumulative Impact Analysis

Operations of the NEX, Commissary, and Health Clinic would result in a minor increase in traffic along Baltimore Annapolis Boulevard and to a lesser degree along King George Street as a result of its location across the Severn River from the study area on the North Severn Complex.

The new Center for Cyber Security Studies would result in a minor increase in traffic along study area roads. According to the EA for the Center for Cyber Security Studies, there would be a total of 80 daily vehicle trips forecasted spread throughout the day.

Cumulative transportation impacts from past, present, and future actions in the study area would be less than significant because the future transportation system is expected to meet the demands without requiring roadway improvements. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on transportation in the study area.

Cumulative transportation impacts that would occur with implementation of the action alternatives would include minor increases in traffic volumes as a result of the proximity of the cumulative projects to the study area and minimal number of the trips generated, but under Alternative 1 would not require roadway improvements. Under Alternative 2, implementing recommended updates and mitigation strategies for northbound Bowyer Road traffic accessing Baltimore Annapolis Boulevard and for southbound Bowyer Road traffic accessing the NSA Annapolis Gate 8 Entry Control Facility (ECF) would adequately address traffic impacts.

4.4.10 Public Health and Safety

4.4.10.1 Description of Geographic Study Area

The study area for public health and safety cumulative impacts is NSA Annapolis and adjacent areas.

4.4.10.2 Relevant Past, Present, and Future Actions

Of the projects identified in Table 4-1, the WWTP Upgrades, Minor Repair/Upgrade Projects at USNA Facilities, Halligan Hall Energy Repairs, the New Football Facility-Addition to Ricketts Hall, and the Center for Cyber Security Studies would contribute to cumulative impacts on public health and safety.

4.4.10.3 Cumulative Impact Analysis

Cumulative public health and safety impacts from past, present, and future actions in the study area would be less than significant because contractors would implement a health and safety program for the projects and minimize potential significant safety hazards to construction workers and the public. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on public health and safety in the study area.

Cumulative public health and safety impacts that would occur with implementation of the action alternatives would include impacts from construction-related activities, including construction-related traffic, if there are overlaps in construction schedules.

4.4.11 Hazardous Materials and Wastes

4.4.11.1 Description of Geographic Study Area

The study area for hazardous materials and wastes cumulative impacts includes NSA Annapolis and adjacent areas.

4.4.11.2 Relevant Past, Present, and Future Actions

Of the projects identified in Table 4-1, the WTP Upgrades; NEX, Commissary, and Health Clinic; WWTP Upgrades; Minor Repair/Upgrade Projects at USNA Facilities; Halligan Hall Energy Repairs; the New Football Facility-Addition to Ricketts Hall; and the Center for Cyber Security Studies likely would contribute to cumulative impacts on hazardous materials and wastes.

4.4.11.3 Cumulative Impact Analysis

The purpose of the WTP upgrades is to implement water savings initiatives associated with the installation's WTP. The scope of work includes the conversion of the existing waste holding tank to a gravity thickener and construction of one gravity thickener, a centrifuge building, pumping stations for the gravity thickeners and recycled water, polymer system, and associated mechanical equipment (NAVFAC Washington, 2015). Construction activities have been completed for this project.

The NEX and Commissary replace existing facilities on the North Severn Complex; the existing NEX and Commissary buildings and their associated parking would be reused. The new Health Clinic on the North Severn Complex will replace the existing Naval Health Clinic Annapolis located at the NSA Annapolis Upper Yard (NAVFAC Washington, 2011b). The NEX/Commissary opened in September 2014, and construction of the Health Clinic is expected to be completed in 2016. Construction activities may produce hazardous waste or disturb special hazards, which would contribute to the overall hazardous waste production for NSA Annapolis.

The Navy prepared an EA to evaluate the potential environmental impacts of upgrading the NSA Annapolis North Severn WWTP to comply with current and future regulatory requirements and meet future treatment demand. Alternative 1 for the Proposed Action consists of new construction, demolition, and conversion projects at the North Severn WWTP, and installation of a water reuse conservation system (NAVFAC Washington, 2012a).

The minor repair/upgrade projects at USNA facilities includes repairs to the Perry Center water distribution system. Under Alternative 1, the Perry Center is the site of the proposed ground lease and construction of a new Alumni Service Center and Headquarters facility and the proposed site for the relocation of the consolidated hazardous material reutilization inventory management program (CHRIMP).

The Halligan Hall Energy Repairs (Building 181) would decrease the chance of special hazards as a result of upgraded electrical systems.

The construction of the New Football Facility-Addition to Ricketts Hall may produce hazardous waste, which would contribute to the overall hazardous waste production for NSA Annapolis.

The Center for Cyber Security Studies project consists of the construction of an approximately 206,000-square-foot new multistory facility at the Lower Yard to house the Center for Cyber Security Studies and a supporting two-story parking garage structure. Construction activities may produce hazardous waste or disturb special hazards, which would contribute to the overall hazardous waste production for NSA Annapolis.

Cumulative impacts associated with hazardous materials and wastes from past, present, and future actions in the study area would be less than significant because NSA Annapolis would comply with the applicable regulations and adhere to standard safety practices regarding the Environmental Restoration Program, hazardous materials/hazardous waste, asbestos containing material (ACM), lead-based paint (LBP), and polychlorinated biphenyls (PCBs). Therefore, implementation of the Proposed Action, under either Alternative 1 or Alternative 2, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on hazardous materials and wastes in the study area.

Cumulative hazardous materials and wastes impacts on that would occur as a result of the implementation of the action alternatives would include minimal impacts from the removal of ACM, LBP, and PCBs during the demolition or renovation of buildings under Alternative 1 and interior building renovations under Alternative 2.

4.4.12 Socioeconomics

4.4.12.1 Description of Geographic Study Area

The study area for socioeconomics cumulative impacts includes Anne Arundel County.

4.4.12.2 Relevant Past, Present, and Future Actions

All of the projects listed in Table 4-1 would contribute cumulative impacts on socioeconomics.

4.4.12.3 Cumulative Impact Analysis

All of the projects identified would result in temporary beneficial impacts on the economy from the generation of construction jobs and increased economic activity. The NEX, Commissary, and Health Clinic would generate long-term socioeconomic effects, which would be beneficial as a result of their ongoing operations. The Center for Cyber Security Studies would employ 40 faculty and staff. Military and civilian personnel payrolls would increase, and some of these earnings would be spent on consumer goods and services, which would "ripple" through the economy. Cumulative socioeconomic impacts from past, present, and future actions in the study area would be less than significant because long-term impacts on employment, population, or housing would not be substantial. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on socioeconomics in the study area.

Cumulative socioeconomics impacts that would occur with implementation of the action alternatives would include increased employment opportunities and income in the study area from construction and additional jobs during construction and subsequent operations associated with the NEX, Commissary, and Health Clinic. Under Alternative 1, there could be some migration into the study area because of the job opportunities; however, it is not expected to significantly affect short- or long-term population or housing trends. Construction under Alternative 2 would generate some construction jobs, but would not be significant enough to expect migration to the study area. However, no long-term employment, population, or housing impact is expected under Alternatives 1 or 2.

5 Other Considerations Required by the National Environmental Policy Act

5.1 Consistency with Other Federal, State, and Local Laws, Plans, Policies, and Regulations

In accordance with 40 Code of Federal Regulations (CFR) section 1502.16(c), analysis of environmental consequences must include discussion of possible conflicts between the Proposed Action and the objectives of federal, regional, state and local land use plans, policies, and controls. Table 5-1 identifies the principal federal and state laws and regulations that are applicable to the Proposed Action, and describes briefly how compliance with these laws and regulations would be accomplished.

Table 5-1. Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	***Status of Compliance***
NEPA (42 U.S.C. section 4321 *et seq*.); CEQ NEPA implementing regulations (40 CFR parts 1500–1508); Navy Procedures for Implementing NEPA (32 CFR part 775 and Office of the Chief of Naval Operations Instruction 5090.1D)	This environmental assessment has been prepared in accordance with the NEPA as implemented by the Council on Environmental Quality and Navy regulations for implementing NEPA.
Clean Air Act (42 U.S.C. section 7401 *et seq*.)	The Proposed Action would not result in significant impacts to air quality from either construction, renovation, or operational emissions. Implementation of the Proposed Action would comply with the applicable federal and state air quality regulations. A record of non-applicability has been prepared.
Clean Water Act (33 U.S.C. section 1251 *et seq*.)	Permits under section 401 and 404 are not required. The discharge of pollutants would be regulated through compliance with a National Pollutant Discharge Elimination System stormwater permit and implementation of a stormwater pollution prevention plan, BMPs, and sediment and erosion control measures.
Coastal Zone Management Act (16 U.S.C. section 1451 *et seq*.)	A Coastal Consistency Determination will be prepared in accordance with the Coastal Zone Management Act and the 2013 memorandum of understanding with the State of Maryland.
National Historic Preservation Act (Section 106, 16 U.S.C. section 470 *et seq*.)	No archaeological resources or traditional cultural properties would be impacted by the Proposed Action. Adverse impacts to architectural resources are anticipated. Through the Section 106 consultation process the Navy intends to develop a programmatic agreement with the Maryland Historical Trust and other consulting parties. The agreement would include procedures to avoid, mitigate, or minimize adverse effects (if any are identified). As a result, there would be no significant impacts on cultural resources.
Endangered Species Act (16 U.S.C. section 1531 *et seq*.)	No effect on threatened and endangered species would be expected under the Proposed Action. Concurrence by the U.S. Fish and Wildlife Service under section 7 will be obtained.
Migratory Bird Treaty Act (16 U.S.C. sections 703–712)	The Proposed Action would have no significant impacts on migratory birds.

Table 5-1. Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
Bald and Golden Eagle Protection Act (16 U.S.C. section 668-668d)	There are no known bald or golden eagle nesting sites or suitable habitat in the vicinity of the Proposed Action; therefore, there would be no impact.
Executive Order 11988, Floodplain Management	A small portion of the 100-year floodplain would be temporarily disturbed during construction activities. Impacts would be minimized through the use of stormwater management plans, erosion and sediment control plans, BMPs, and the eight-step process detailed in Executive Order 11988. There would be no long-term impacts including to floodplain functions and values.
Executive Order 12088, Federal Compliance with Pollution Control Standards	All actions, including the use of BMPs and mitigation measures, would prevent significant contamination and pollution of resources and ensure the Navy meets pollution control responsibilities. The Navy will consult with applicable agencies, including the U.S. Fish and Wildlife Service, Maryland Department of the Environment, and the Maryland Department of Natural Resources.
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations	Because there are no minority or low-income populations in the vicinity of the Proposed Action, these populations would not be impacted. Therefore, the Proposed Action would not result in environmental justice issues.
Executive Order 13693, Planning for Federal Sustainability in the Next Decade	The more efficient and effective use of space for the NSA Annapolis Mail Center and the consolidated hazardous material reutilization inventory management program would support the goals of improving sustainability planning under Executive Order 13693. The sustained implementation of the Transportation Management Plan would continue to ensure that the transportation system in the area functions efficiently and adheres to Executive Order 13693.

Key: CEQ = Council on Environmental Quality; CFR = Code of Federal Regulations; BMP = best management practices; NEPA = National Environmental Policy Act; U.S.C. = United States Code

Coastal Zone Management

The federal Coastal Zone Management Act (CZMA) of 1972 establishes a federal-state partnership to provide for the comprehensive management of coastal resources. Coastal states and territories develop site-specific coastal management programs based on enforceable policies and mechanisms to balance resource protection and coastal development needs. The Maryland Coastal Zone Management Program (CZMP) lays out the policy to guide the use, protection, and development of land and ocean resources within the state's coastal zone. Maryland's CZMP addresses coastal hazards, growth management, habitat and living resources, nonpoint source pollution, nontidal wetlands, provision of public access, and tidal wetlands, and it encompasses several federal and state laws and regulatory programs. A memorandum of understanding between the State of Maryland and the Department of Defense (DoD), signed in May 2013, outlines Maryland's CZMP as it relates to federal actions. This memorandum also states that, pursuant to 15 CFR 930.33(a)(4), listed *de minimis* and environmentally beneficial activities are excluded from state agency consistency review. Because the Proposed Action is located in the NSA Annapolis Upper Yard, which is located entirely within Maryland's coastal zone, it is subject to the 2013 memorandum of understanding.

Potential impacts on applicable resources that are subject to the 2013 memorandum of understanding have been addressed in the respective Environmental Consequences sections of this document (see Section 3.6.3). Implementation of Alternative 1 would involve demolition and construction activities. However, best management practices (BMPs) would be applied to reduce sediment and stormwater runoff into the nearby waterways; consequently, impacts on coastal resources would not be considered significant. Actions under Alternative 2 include interior renovations that would not impact coastal resources and upgrades to the mechanical, electrical, and plumbing systems that would make them more energy efficient than under current conditions. Consequently, impacts on coastal resources would not be considered significant. The Navy will develop a Coastal Consistency Determination in accordance with the 2013 memorandum of understanding (see Appendix B).

5.2 Irreversible or Irretrievable Commitments of Resources

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and natural or cultural resources. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment. The loss of a cultural resource (i.e., through demolition) is also considered irretrievably committed to a project.

Implementation of the Proposed Action would involve human labor; the consumption of fuel, oil, and lubricants for construction vehicles; the use of non-renewable construction materials; the loss of natural resources (vegetation); and the loss of cultural resources (architectural resources). Some vegetation on the Perry Center site would be removed during construction activities. The demolition of Buildings 92, 51, 914, 340, and 194, as well as potentially Building 619 if the NSA Annapolis Mail Center is relocated to this site, would constitute an irretrievable loss of architectural resources. The operation of the new Alumni Service Center and Headquarters facility would increase the potable water demand and natural gas usage.

5.3 Relationship between Short-Term Use of the Environment and Long-Term Productivity

The National Environmental Policy Act (NEPA) requires an analysis of the relationship between a project's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development site reduces future flexibility in pursuing other options, or that using a parcel of land or other resources often eliminates the possibility of other uses at that site.

In the short-term, effects on the human environment with implementation of the Proposed Action would primarily relate to the construction or renovation activity itself. Under Alternative 1, air quality, water resources, geological resources (i.e., soils), cultural resources, biological resources, land use, public health and safety, and hazardous materials and wastes would be affected in the short term. Under Alternative 2, air quality, cultural resources, biological resources, noise, land use, public health and safety, and hazardous materials and wastes would be affected in the short term. In the long term, cultural resources would be affected, but the defining characteristics of the United States Naval Academy National Historic Landmark District (NHLD) and Colonial Annapolis NHLD would not be affected such that their integrity would be diminished. Both districts would remain eligible for listing on the National Register of Historic

Places and as National Historic Landmarks. The Proposed Action would not significantly affect the long-term natural resource productivity of the area nor would it result in any impacts that would significantly reduce environmental productivity or permanently narrow the range of beneficial uses of the environment. In addition, the Proposed Action would not pose long-term risks to the health, safety, or the general welfare of the public.

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Maryland State Highway Administration
707 North Calvert Street
Baltimore, Maryland 21202

National Park Service, Northeast Region
Preservation Assistance and Heritage Areas
Mr. Dennis Montagna
U.S. Custom House
200 Chestnut Street
Philadelphia, PA 19106

St. John’s College
Mr. Joseph Smolskis
60 College Avenue
Annapolis, MD 21401

State Historic Preservation Officer
Ms. Elizabeth Hughes, Acting Director
Maryland Historical Trust
100 Community Place
Crownsville, Maryland 21032

West Annapolis Heritage Partnership
103 Annapolis Street
Annapolis, MD 21401

Appendix A
Air Quality Conformity Applicability Analysis

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Abbreviations and Acronyms

Acronym	Definition
CAA	Clean Air Act
CFR	Code of Federal Regulations
CHRIMP	consolidated hazardous material reutilization inventory management program
CO	carbon monoxide
CO2	carbon dioxide
DoD	Department of Defense
EA	Environmental Assessment
g	grams
g/hp-hr	gram per horse power hour
GCR	General Conformity Rule
hp	horse power
lb	pounds
NAAQS	National Ambient Air Quality Standards
NAF	Naval Academy Foundation
Navy	United States Department of the Navy
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NSA	Naval Support Activity
$PM_{2.5}$	particulate matter with a diameter of 2.5 microns or less
PM_{10}	particulate matter with a diameter less than 10 microns
SIP	State Implementation Plan
SO_2	sulfur dioxide
USEPA	United States Environmental Protection Agency
USNA	United States Naval Academy
USNA AA	United States Naval Academy Alumni Association
VOC	volatile organic compound

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INTRODUCTION

The Clean Air Act (CAA) requires federal actions in air pollutant nonattainment or maintenance areas to conform to the applicable State Implementation Plan (SIP). The SIP is designed to achieve or maintain an attainment designation of air pollutants, as defined by the National Ambient Air Quality Standards (NAAQS). The regulations governing this requirement are found in 40 Code of Federal Regulations (CFR) part 93, also known as the General Conformity Rule (GCR). The threshold (*de minimis*) emission rates have been established for actions with the potential to have significant air quality impacts. A project/action that would be located in an area designated as nonattainment or a maintenance area and exceeding the *de minimis* rates must have a general conformity determination prepared to address significant impacts.

Pursuant to the requirements of the GCR, this document was prepared to determine the applicability of the GCR to the Proposed Action for the United States Department of the Navy (Navy) to lease property to the United States Naval Academy Alumni Association (USNA AA) and Naval Academy Foundation (NAF) for them to construct a new Alumni Service Center and Headquarters facility on Naval Support Activity (NSA) Annapolis property in Annapolis, Maryland. The proposed building would be approximately 29,000 square feet. The Proposed Action evaluated in this applicability analysis is referred to as Alternative 1 in the Draft Environmental Assessment because Alternative 1 has the greatest emissions potential of the alternatives considered in the Draft EA.

The USNA AA and NAF are two 501(c)(3) organizations operating jointly to support the United States Naval Academy (USNA) and its alumni. The USNA AA and the NAF currently operate in five separate facilities on or around NSA Annapolis—Ogle Hall, Cottage, and 49 House (USNA AA) and Beach Hall and 25 Maryland Avenue (NAF). The proposed lease would benefit the Navy by maximizing the efficient use of existing non-excess, underutilized space at NSA Annapolis. The proposed lease would also allow USNA AA and NAF (USNA AA/F) to consolidate their operations within one facility.

NSA Annapolis is in the Metropolitan Baltimore Intrastate Air Quality Control Region (40 CFR part 81.28). This Air Quality Control Region is designated as nonattainment for the 8-hour ozone standard and the 2010 SO_2 standard, and maintenance for the annual particulate matter less than 2.5 microns ($PM_{2.5}$) standard. Thus, the General Conformity *de minimis* rates for the ozone precursor pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOCs) apply, as well as $PM_{2.5}$ and its precursor, sulfur dioxide (SO_2). A General Conformity applicability analysis is not required for those pollutants/precursors for which the area is designated attainment/unclassified (including carbon monoxide and particulate matter less than 10 microns).

Potential emissions that could result from the Proposed Action were calculated for all applicable criteria pollutants emitted for every year during which the construction activities would occur; however, the conformity analysis focused on VOCs, NO_x, $PM_{2.5}$, and SO_2.

PROJECT DESCRIPTION

Under Alternative 1, the Navy would enter into a ground lease with USNA AA/F, and USNA AA/F would construct a new Alumni Service Center and Headquarters facility on NSA Annapolis property located at the Perry Center in the southwest portion of the Upper Yard (Figure 2-1 in the EA). The proposed project site is located along King George Street and contains five buildings, including the NSA Annapolis Mail Center, the consolidated hazardous material reutilization inventory management program (CHRIMP), and the unoccupied former Superintendent's gardener's quarters including two outbuildings.

The new 29,000-square-foot USNA AA/F Alumni Service Center and Headquarters building would include a parking lot that could accommodate approximately 90 to 120 vehicles. A new pedestrian crossing with proper signing to alert drivers to its existence would also be striped at the unsignalized intersection of King George Street and the Perry Center site (exit only)/Bishop Stadium. The USNA AA would relocate its staff and functions to the new facility and would continue to use property in the City of Annapolis for events. The NAF's current space lease with the Navy for use of Beach Hall would be terminated, and NAF would relocate its staff and functions to the new facility. In addition to office space, the new USNA AA/F facility would include a reception area; a kitchen, mess, vending area; and a multi-purpose/banquet area that could accommodate up to 300 people.

To accommodate new construction, the five existing buildings (Buildings 51, 194, 92, 974, and 340) on the proposed project site would be demolished, and existing functions would be relocated to new facilities. Building 51 is a 2,790-square-foot building located in the southeastern portion of the project site that houses the NSA Annapolis Mail Center. Building 194, located in the central part of the project site, is an 11,312-square-foot building that functions as the facility for the CHRIMP. Building 92 is a 1,795-square-foot unoccupied, dilapidated building located in the northwestern portion of the project area. It was the former Superintendent's gardener's quarters. Building 974 is a 360-square-foot garage and Building 340 is a 130-square-foot equipment shed. Both are associated with Building 92 and are unoccupied and deteriorating.

Under Alternative 1, the NSA Annapolis Mail Center would be relocated to one of two sites; either Building 15NS on the North Severn Complex or to a prefabricated facility at the site of the to-be-demolished Building 619 on the northwest portion of the Perry Center (Figure 2-1 in the EA). Building 15NS would require some renovations to meet the screening factors, as well as requirements for Department of Defense (DoD) mail centers as set forth in DoD 4525.6M—*DoD Postal Manual*, Chapter 13; Unified Facilities Criteria 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*; and the DoD O-2000.12-H, *DoD Antiterrorism Handbook*.

Also under Alternative 1, the CHRIMP would be relocated to either Building 104 or a new prefabricated facility constructed adjacent to Building 104 within the northwestern portion of the Perry Center along Yew Street (Figure 2-1 in the EA). If the facility is moved to Building 104, interior renovations to the building would be required, and the existing Base Operating Support functions would be moved to other underutilized Base Operating Support contractor space on the Perry Center. If the CHRIMP is relocated to a new facility adjacent to Building 104, the facility would be a prefabricated modular structure installed on the impervious surface associated with Building 104 and the roadway. The proposed location and new construction would meet the specific facility requirements.

Construction would occur over two years—2017 and 2018, with the majority of heavy equipment use and ground disturbance occurring in 2017.

Emissions associated with relocating the NSA Annapolis Mail Center and the CHRIMP, including the renovation of existing buildings or demolition of existing buildings (i.e., Building 619) and use of prefabricated structures, would be negligible compared to the emissions resulting from the use of heavy equipment to construct a new building. Therefore, renovation, demolition, and prefabricated structure construction emissions associated with relocating the NSA Annapolis Mail Center and the CHRIMP are not included in the analysis.

Additionally, a detailed quantified emissions estimate has not been prepared for Alternative 2. The renovation of Building 250 under Alternative 2 would result in substantially lower construction emissions than the new construction proposed under Alternative 1 because interior renovations would not require heavy-duty diesel equipment (e.g., dozers, excavators, cranes) or ground-disturbing activities that generate fugitive dust. In the long term, the renovated building would be expected to use the same or less energy as under existing conditions; therefore, emissions related to heating, ventilating, and air conditioning systems would not increase.

AIR QUALITY

Air quality is defined as the ambient air concentrations of specific criteria pollutants determined by the United States Environmental Protection Agency (USEPA) to be of concern to the health and welfare of the general public. These criteria pollutants include ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), SO_2, particulate matter less than 10 microns (PM_{10}), $PM_{2.5}$, and lead. The USEPA has established two types of NAAQS for these criteria air pollutants. Primary ambient air quality standards are designed to protect public health with an adequate margin of safety. Secondary ambient air quality standards are designed to protect public welfare-related values including property, materials, and plant and animal life. The maximum primary and secondary standards (concentrations) of criteria pollutants are listed in 40 CFR part 50, and apply throughout the United States.

FEDERAL REQUIREMENTS

Section 176(c) of the CAA, as amended, requires federal agencies to ensure that actions undertaken in nonattainment or maintenance areas are consistent with the CAA and with federally enforceable air quality management plans. The CAA places responsibility on individual states to achieve and maintain the NAAQS through USEPA-approved SIPs.

Under the GCR (40 CFR part 93, subpart B), emissions of criteria pollutants and their precursors (the ozone precursors VOCs and NO_x, $PM_{2.5}$, the $PM_{2.5}$ precursor SO_2, and PM_{10}) that are associated with a Proposed Action that is in a nonattainment area for a given pollutant must be below *de minimis* emission rates for that pollutant to be exempt from a formal conformity determination. *De minimis* rates for the NAAQS pollutants of concern are listed in Table A-1. Proposed Actions that contribute less than these amounts and have no other conformity requirements are exempt from the GCR. Proposed actions that exceed the pollutant *de minimis* rates in any given year must undergo a detailed analysis and a formal conformity determination is required. Finally, mitigation would be required if the detailed analysis indicates an exceedance of the *de minimis* levels for any of the pollutants of concern.

Table A-1. Criteria Pollutant *De Minimis* Emission Rates

De Minimis Rates in Tons/Year		
	Criteria Pollutant	***Precursor***
VOCs		50[1]
NOx		100
$PM_{2.5}$	100	
SO_2		100
PM_{10}	100	

Source: 40 CFR part 93.153
[1]The Metropolitan Baltimore Intrastate Air Quality Control Region is located in an ozone transport region and the VOC threshold is reduced to 50 tons/year.
Key: CFR = Code of Federal Regulations; VOCs = volatile organic compounds; NOx = nitrogen oxide; $PM_{2.5}$= particulate matter with a diameter of 2.5 microns or less; SO_2 = sulfur dioxide; PM_{10} = particulate matter with a diameter of 10 microns or less

METHODOLOGY

In accordance with 40 CFR part 93, subpart B, the incremental increase in emissions above the existing conditions has been considered and includes reasonably foreseeable direct and indirect emissions. The total of direct and indirect emissions from the Proposed Action has been evaluated to assess whether or not it would exceed any of the applicable *de minimis* rates.

Emissions resulting from the Proposed Action were estimated based on the expected number, type, and duration of construction operations on an annual basis to complete the proposed action. Preliminary order-of-magnitude estimates of potential construction equipment requirements are provided in Attachment 1.

The years 2017–2018, during which construction activities would occur, were evaluated to assess estimated emissions.

Procedure and Calculations

The following procedures were used to determine the applicability of the GCR. Direct and indirect emissions and reasonably foreseeable emissions are defined in the following paragraphs. Emissions are caused by the federal action if they would otherwise not occur in the absence of the federal action.

Reasonably foreseeable direct and indirect emissions can be estimated based on acceptable techniques using assumptions about the type and quantity of equipment to be used.

- **Direct emissions:** Direct emissions are caused by the action itself, such as the reasonably foreseeable emissions from the construction of a facility on government property.
- **Indirect emissions:** Those emissions that are caused by the federal action, but that may occur later in time and/or may be farther removed in distance from the federal action itself but are still reasonably foreseeable. Typically, indirect emissions will include two types: (1) emissions from mobile sources that are associated with the federal action but that are not owned or operated by the federal agency (e.g., employee vehicles, delivery trucks); and (2) emissions from the actions of private entities under a federal lease, permit, or approval.

Emissions Calculations

Operation emissions calculations performed for the Proposed Action include heavy duty diesel construction equipment and heavy duty highway vehicles such as concrete trucks, dump trucks, and delivery trucks. Employee commute emissions were also included.

Non-road diesel engine emissions were calculated as follows:

$$EP = EF\ x\ HP\ x\ LF\ x\ h\ x\ CF$$

Where:

EP = emissions per pollutant in pounds (lbs); EF = Emission Factor (grams per horse power hour [g/hp-hr]); HP = engine horse power (hp); LF = engine load factor h = total hours operated; CF = conversion factor for grams (g) to lb

On-road engine emissions for road travel were calculated as follows:

$$E = VMT\ x\ EF$$

Where:

E = emissions per pollutant in grams; EF = pollutant emission factor in grams/mile for a given speed and vehicle type

Attachment 1 contains the complete calculations for all of the equipment included in the proposed action.

CONSTRUCTION EQUIPMENT

Conservative construction equipment assumptions were developed based on review of other projects, including the Center for Cyber Security Studies at USNA. Emission factors for non-road equipment were estimated using the USEPA MOVES2014a emissions model's NONROAD functionality. On-road equipment emission factors (heavy trucks and passenger trucks) were estimated using MOVES2014a on-road functionality. For the on-road analysis, an average speed of 30 miles per hour on urban unrestricted access roadways (e.g., stop-and-go traffic with intersections) was assumed. An analysis year of 2017 was used for both non-road and on-road and MOVES default January meteorological inputs for Anne Arundel County were used.

OPERATIONAL EMISSIONS

No new employees would be added to USNA AA/F; however, some existing employee functions currently performed off of NSA Annapolis property would be relocated onto NSA Annapolis. The relocation of current functions to a single facility would not appreciably affect heating, ventilation, and air conditioning demands. In the long term, the building space being vacated by USNA AA/F could be occupied by new uses that would have utility demands similar to existing conditions. Given the relatively small size of the proposed new building and the expected incorporation of energy-efficient design measures, the *de minimis* rates would not be exceeded by the additional long-term heating, ventilation, and air conditioning load. Therefore, an analysis of operational-phase emission changes was not warranted.

ASSUMPTIONS

The following assumptions were used in this conformity applicability analysis:

- Approximate durations of construction activities would be as follows: demolition and site preparation (3 months), building construction (6 months), building interior/paving/landscaping (6+ months)
- Average of 170 working hours per month, all equipment identified for a phase is conservatively assumed to be in use for all hours of that phase
- 50 percent of the 2.9 acre site would have exposed soils at any one time on average during 2017 and dust control best management practices would be implemented to control fugitive dust during demolition and construction
- Interior paints meeting Leadership in Energy and Environmental Design requirements would be used (< 200 g/liter for primer, <150 g/liter for non-flat, < 50 g/liter for flat)
- During 2017, an average of four heavy trucks would be in operation each day, travelling 40 miles per day for 240 days, and 20 workers would travel 40 miles each day
- During 2018, an average of one heavy truck in operation per day, travelling 40 miles per day for 240 days, and 20 workers would travel 40 miles each day

The construction assumptions and details can be found in Attachment 1.

RESULTS AND CONCLUSION

Total emissions were calculated for construction of the proposed project. The emissions calculations are provided in Attachment 1. The conformity determination considers the scenario that would generate the maximum annual emissions. Comparing the maximum scenario to the general conformity *de minimis* rates evaluates the worst case air quality emissions for the proposed action. For construction, 2017 would be the year of maximum emissions for all pollutants.

The maximum estimated emissions are provided in Table A-2.

Table A-2. Maximum Estimated Annual Emissions Compared to *De Minimis*

Construction Activity	*Tons/Year*			
	VOCs	*NO_x*	*PM2.5*	*SO_2*
Alternative 1—Proposed Action	0.4	3.3	0.5	0.005
De minimis rates	50	100	100	100

Key: VOCs = volatile organic compounds; NOx = nitrogen oxide; PM2.5= particulate matter with a diameter of 2.5 microns or less

As indicated in Table A-2, the emissions generated as a result of implementation of the Proposed Action would not exceed the GCR *de minimis* threshold levels for VOCs, NO_x, $PM_{2.5}$, or SO_2. Based on the maximum annual emission estimates identified in Table A-2, a general conformity determination is not required because the total maximum annual direct and indirect emissions for the proposed action are below the *de minimis* rates.

REFERENCES

USEPA. AP-42-Section 13.2.3 Heavy Construction Operations. Retrieved from http://www3.epa.gov/ttnchie1/ap42/ch13/final/c13s02-3.pdf

USEPA MOVES2014a software, default database, and guidance. Retrieved from http://www3.epa.gov/otaq/models/moves/

Attachment 1:

Air Emissions Calculation Tables

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TAB A. Construction Emissions Summary

Table 1. Alternative 1 Emissions Summary (tons)

	VOC	*CO*	*NO_x*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*
2017	0.4	2.2	3.3	0.005	2.89	0.51	811.4
2018	0.1	0.8	0.6	0.001	0.05	0.04	213.1

Key: VOC = volatile organic compound; CO = carbon monoxide; NOx = nitrogen oxide; SO2 = sulfur dioxide; PM10 = PM2.4 = CO2= carbon dioxide

TAB B. Non-Road Construction Equipment

Demolition and Site Prep. (2017)											
3	months				***Emission Factors (g/hp-hr)***						
510	Working Hours										
Equipment Type	***Number***	***Total Operating Hours***	***Engine HP***	***Load Factor***	***VOC***	***CO***	***No_x***	***SO_2***	***PM_{10}***	***$PM_{2.5}$***	***CO_2***
Dozer	2	1020	145	0.59	0.188	0.612	1.411	0.003	0.142	0.138	536.313
Excavator	2	1020	243	0.59	0.169	0.324	1.070	0.003	0.055	0.053	536.368
Crane	1	510	330	0.43	0.201	0.668	2.583	0.003	0.100	0.097	530.480
Backhoe	1	510	87	0.21	0.842	4.895	3.940	0.004	0.698	0.677	693.579
Trencher	1	510	61	0.59	0.289	2.196	3.611	0.004	0.254	0.246	595.329
Grader	1	510	285	0.59	0.177	0.407	1.246	0.003	0.073	0.071	536.346
				Total Emissions (tons)	0.093	0.298	0.746	0.001	0.050	0.048	250.237
Building construction (2017											
6	months										
1020	working hours										
Equipment	Number	Total	Engine	Load	VOC	CO	No_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2

Demolition and Site Prep. (2017)											
3	months				***Emission Factors (g/hp-hr)***						
510	Working Hours										
Equipment Type	***Number***	***Total Operating Hours***	***Engine HP***	***Load Factor***	***VOC***	***CO***	***NO_x***	***SO_2***	***PM_{10}***	***$PM_{2.5}$***	***CO_2***
		Operating Hours	HP	Factor							
Concrete mixer	1	1020	3.5	0.43	0.892	4.652	5.765	0.004	0.598	0.580	587.780
Skid Steer Loader	2	2040	160	0.21	0.852	3.056	4.494	0.004	0.540	0.524	624.079
Backhoe	1	1020	87	0.21	0.842	4.895	3.940	0.004	0.698	0.677	693.579
Forklift	1	1020	84	0.59	0.264	2.200	2.351	0.003	0.283	0.275	595.419
Crane	1	1020	330	0.43	0.201	0.668	2.583	0.003	0.100	0.097	530.480
Diesel Generator	1	1020	40	0.43	0.417	1.548	4.407	0.004	0.291	0.282	589.158
				Total Emissions (tons)	0.138	0.598	1.059	0.001	0.094	0.091	191.604
Building interior work, paving, landscaping (2018)											
		Total Operating Hours	Engine HP	Load Factor	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Misc. Lawn and Garden Equipment		1000	11	0.44	0.565	2.473	4.664	0.004	0.362	0.351	588.744
Roller		500	400	0.59	0.197	0.976	2.399	0.003	0.135	0.131	536.280
Paving Equipment		500	164	0.59	0.233	0.866	2.127	0.003	0.192	0.186	536.180
				Total Emissions (tons)	0.041	0.186	0.450	0.001	0.030	0.029	101.491

TAB C. On-Road Trucks

2017-Average of four heavy trucks in operation each day, travelling 40 miles per day for 240 days. 20 workers travelling 40 miles each day												
2018-Average of one truck in operation per day, travelling 40 miles per day for 240 days. 20 workers travelling 40 miles each day												
Ave. speed of 30 mph												
		Emission Factor (grams/mile)										
Year	*Heavy Truck Vehicle Miles Traveled*	*VOC*	*CO*	*No_x*	*SO_2*	*PM_{10} Exhaust*	*PM_{10} Brake-wear*	*PM_{10} Tirewear*	*$PM_{2.5}$*	*$PM_{2.5}$ Brake-wear*	*$PM_{2.5}$ Tire-wear*	*CO_2e*
2017	38400	0.3840	2.0371	8.3813	0.0179	0.4625	0.2552	0.0402	0.4255	0.0319	0.0060	2091.5400
2018	9600	0.3840	2.0371	8.3813	0.0179	0.4625	0.2552	0.0402	0.4255	0.0319	0.0060	2091.5400
	Passenger Truck Vehicle Miles Traveled											
2017	192000	0.0953	2.9020	0.3725	0.0028	0.0109	0.0443	0.0111	0.0097	0.0055	0.0017	422.7030
2018	192000	0.0953	2.9020	0.3725	0.0028	0.0109	0.0443	0.0111	0.0097	0.0055	0.0017	422.7030

	Total On-Road Emissions (tons)						
Heavy Trucks	*VOC*	*CO*	*NO_x*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*
2017	0.016	0.086	0.355	0.001	0.032	0.020	88.532
2018	0.004	0.022	0.089	0.000	0.008	0.005	22.133
Passenger Trucks							
2017	0.020	0.614	0.079	0.001	0.014	0.004	89.462
2018	0.020	0.614	0.079	0.001	0.014	0.004	89.462
Total On-Road Emissions (tons)							
2017	0.036	0.700	0.434	0.001	0.046	0.023	177.995
2018	0.024	0.636	0.168	0.001	0.022	0.008	111.595

Key: VOC = volatile organic compound; CO = carbon monoxide; NOx = nitrogen oxide; SO2 = sulfur dioxide; PM10 = particulate matter with a diameter of 10 microns or less; PM2.5 = particulate matter with a diameter of 10 microns or less; CO2e = carbon dioxide equivalent

TAB D. Fugitive Dust

Fugitive Dust from Construction (2017)		
From AP-42, Section 13.2.3 Heavy Construction Operations:		
For construction activity operations:		
Total Suspended Particulate emission factor	1.2	tons/acre/month of activity
PM_{10} fraction	0.5	
PM_{10} Emission Factor	0.6	tons/acre/month of activity
Number of Months	6	
Total Acres	2.9	
50% Uncovered at one time	1.45	
Uncontrolled PM_{10} tons	5.2	
Controlled PM_{10} tons/year	2.6	
Controlled $PM_{2.5}$	0.3	

Key: PM2.5= particulate matter with a diameter of 2.5 microns or less; PM10 = particulate matter with a diameter of 10 microns or less

2018 Painting Emissions Based on Center for Cyber Security Studies EA Emission Factors

Year	*Interior SF*	*Coverage per gallon*	*Primer VOC lbs/gallon*	*Finish Coat VOC lbs/gallon*	*Total VOC (lbs)*	*Total VOC (tons)*
2018	29000	300	0.7	0.4	106.3	0.1

Key: lbs = pounds; SF = square feet; VOC = volatile organic compounds

RECORD OF NON-APPLICABILITY (RONA) FOR CLEAN AIR ACT CONFORMITY FOR

United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters at Naval Support Activity Annapolis, Annapolis, Maryland

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GENERAL CONFORMITY RULE - RECORD OF NON-APPLICABILITY (RONA) FOR CLEAN AIR ACT CONFORMITY

United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters

PROPOSED ACTION

Action Proponent: Naval Support Activity Annapolis

Proposed Action Name: United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters

Location: Annapolis, Maryland

Project Construction Begin Date: 2017

Project Construction End Date: 2018

Proposed Action Point of Contact: Naval Facilities Engineering Command Washington

Proposed Action Summary: Relocate existing United States Naval Academy Alumni Association and Naval Academy Foundation functions to a new 29,000-square-foot building, demolish existing buildings on site

The Clean Air Act requires federal actions in air pollutant nonattainment or maintenance areas to conform to the applicable State Implementation Plan. The State Implementation Plan is designed to achieve or maintain an attainment designation of air pollutants as defined by the National Ambient Air Quality Standards. The regulations governing this requirement are found in 40 Code of Federal Regulations (CFR) Part 93, also known as the "General Conformity Rule," which applies to federal actions occurring in regions designated as nonattainment or areas subject to maintenance plans. The threshold (*de minimis*) emission rates have been established for actions with the potential to have significant air quality impacts. A project/action that would be located in an area designated as nonattainment and exceeding the *de minimis* rates must have a general conformity determination prepared to address significant impacts.

Naval Support Activity Annapolis is in the Metropolitan Baltimore Intrastate Air Quality Control Region (40 CFR § 81.28). This Air Quality Control Region is designated as nonattainment for the 8-hour ozone and the 2010 SO_2 standard, and maintenance for the annual $PM_{2.5}$ standards. Thus, the *de minimis* rates for the ozone precursor pollutants NO_x and VOCs apply, as well as $PM_{2.5}$ and its precursor SO_2, apply to the conformity applicability analysis.

Air Emissions Summary

Diesel engine mobile emission sources associated with demolition and construction activities and interior painting of both were assessed. The estimated maximum emissions from construction equipment, vehicles, and paint are estimated and summarized in Table 1. Based on the maximum annual emission estimates identified in Table 1, a general conformity determination is not required because the total maximum annual direct and indirect emissions for the proposed action are below the *de minimis* rates.

Table 1. Maximum Estimated Annual Emissions Compared to *De Minimis* Rates (tons per year)

Construction Activity	***Tons/Year***			
	VOCs	***NO_x***	***$PM_{2.5}$***	***SO_2***
Alternative 1- Proposed Action	0.4	3.3	0.5	0.005
de minimis Rates	50	100	100	100
Exceed *de minimis* Rates?	No	No	No	No

Key: VOC = volatile organic compound; NO_x = nitrogen oxide; $PM_{2.5}$ = particulate matter with a diameter of 2.5 microns or less; SO_2 = sulfur dioxide;

Supporting documentation and emissions estimates can be found in Section 3.1, Air Quality, and Appendix A, Air Quality Conformity Applicability Analysis, of the Environmental Assessment.

<u>Date RONA Prepared:</u> December 2016

<u>RONA Prepared by:</u> Naval Facilities Engineering Command Washington

RONA Approval

____

Signature Date

Matthew Klimoski, P.E.
Director, Environmental Division
NSA Annapolis/U.S. Naval Academy

Appendix B
Coastal Consistency Determination

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5090

Ser N45

DATE

Elder A. Ghigiarelli, Jr.
Federal Consistency Coordinator
Wetlands and Waterways Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 430
Baltimore, Maryland 21230

Subject: Environmental Assessment for the United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters at Naval Support Activity Annapolis, Annapolis, Maryland

Dear Mr. Ghigiarelli:

In accordance with the Federal Coastal Zone Management Act of 1972 (CZMA), as amended, and the 2013 CZMA Memorandum of Understanding (MOU) between the state of Maryland and the United States Department of Defense, Naval Facilities Engineering Command (NAVFAC) Washington requests concurrence with the Negative Determination for the construction of a new Alumni Service Center and Headquarters facility under Alternative 1 at Naval Support Activity (NSA) Annapolis in Annapolis, Maryland. The Navy will presume concurrence if a response is not received within 60 days.

As required by the MOU, enclosures (1) through (3) provide the proposed project description and location, Alternative 1 description, Alternative 2 description, public and agency participation, and the basis for this Federal Consistency Determination as relevant to the enforceable coastal policies.

Please direct all written correspondence to:

Heather Huddle, Regional Natural Resources Manager
Washington Navy Yard
1314 Harwood Street, SE
Washington, DC 20374-5018

For more information about the proposed Alumni Service Center and Headquarters facility, please contact Heather Huddle at 202-685-0262 or heather.huddle@navy.mil.

Sincerely,

Matthew Klimoski, P.E.
Director, Environmental Division
NSA Annapolis/U.S. Naval Academy

Enclosures: 1. Proposed Project Description
2. Site Location
3. Basis of Determination

Copies to:

Adrian Dascalu, NAVFAC Washington NEPA Program
Heather Huddle, NAVFAC Washington Natural Resources Program Manager
Katharine Seguin, NSA Annapolis, Natural Resources Program Manager
Joe Abe, Maryland Department of Natural Resources, Coastal Policy Coordination Section Chief
Lisa Hoerger, Department of Natural Resources, Regulations Coordinator
Elizabeth J. Cole, Maryland Historical Trust, Administrator, Review & Compliance
Rick Ayella, Maryland Department of the Environment, Tidal Wetlands Division
Catherine McCall, Maryland Department of Natural Resources, Coastal & Marine Assessment
Marian Honeczy, Department of Natural Resources, Supervisor of Urban Programs & FCA Coordinator

Enclosure 1: Proposed Project Description

Project Description and Location

The United States (U.S.) Department of the Navy (Navy) proposes to lease property or a facility to the United States Naval Academy Alumni Association (USNA AA) and the Naval Academy Foundation (NAF) on Naval Support Activity (NSA) Annapolis property in Annapolis, Maryland (Figure 1 of Enclosure 2). The USNA AA and NAF (USNA AA/F) would construct a new USNA AA/F Alumni Service Center and Headquarters facility or renovate and existing facility for that purpose. The Proposed Action would be a multi-year, multi-phase action involving the potential relocation of existing Navy functions, a lease, and USNA AA/F conducting demolition and construction or renovation activities, as necessary.

The proposed lease would benefit the Navy by maximizing the efficient use of existing non-excess, underutilized space at NSA Annapolis. The proposed lease also would allow USNA AA and NAF to collocate approximately 90 personnel under one facility. Currently, the USNA AA and NAF operate in five separate facilities on or around NSA Annapolis—Ogle Hall, Cottage, and 49 House (USNA AA) and Beach Hall and 25 Maryland Avenue (NAF).

NSA Annapolis consists of the United States Naval Academy (USNA) and the North Severn Complex (including Greenbury Point), which are located in the City of Annapolis in Anne Arundel County, Maryland. The NSA Annapolis has a total acreage of approximately 1,162 acres. The USNA consists of approximately 338 acres between the south bank of the Severn River and historic downtown Annapolis. The North Severn Complex and Greenbury Point are located on the north bank of the Severn River across from USNA and consist of approximately 824 acres (including the golf course and former Naval Radio Transmitter Facility).

Under the Proposed Action, the Navy would lease property or a facility to USNA AA/F and USNA AA/F would construct a new Alumni Service Center and Headquarters facility on Navy property or renovate and existing facility for that purpose. The potential locations are the Perry Center site (Alternative 1) or Building 250 on the NSA Annapolis Upper Yard (Alternative 2). The Perry Center site is located within the southwestern portion of the Upper Yard and is bounded by King George Street to the north and east, College Creek to the south and west, and the Central Heating Plant to the west (Figure 2 of Enclosure 2). Building 250 is located on Wood Road at Hospital Point within the eastern portion of the Upper Yard (Figure 3 of Enclosure 2).

Alternative 1 Description

Under the Alternative 1, the Navy would enter into a ground lease with USNA AA/F, and USNA AA/F would construct the Alumni Service Center and Headquarters facility on NSA Annapolis property located at the Perry Center in the southwest portion of the Upper Yard. The facility would be a 29,000-square-foot building with a parking lot that could accommodate approximately 90 to 120 vehicles. The USNA AA would relocate its staff and functions to the new facility and would continue to use property in the City of Annapolis for events. NAF's current space lease with the Navy for use of Beach Hall would be terminated, and NAF would relocate its staff and functions to the new facility. In addition to office space, the new facility would include a reception area; a kitchen, mess, and vending area; and a multi-purpose/banquet area that could accommodate up to 300 people.

To accommodate new construction, the five existing buildings (Buildings 51, 194, 92, 974, and 340) on the proposed project site would be demolished and existing functions would be relocated to new facilities. Building 51 is a 2,790-square-foot building located in the southeastern portion of the project site that houses the NSA Annapolis Mail Center. Building 194, located in the central part of the project site, is an 11,312-square-foot building that functions as the consolidated hazardous material reutilization inventory management program (CHRIMP). Building 92 is a 1,795-square-foot unoccupied, dilapidated building located in the northwestern portion of the project area. It was the former Superintendent's gardener's quarters. Building 974 is a 360-square-foot garage and Building 340 is a 130-square-foot equipment shed. Both are associated with Building 92 and are unoccupied and deteriorating.

Under Alternative 1, the NSA Annapolis Mail Center would be relocated to either Building 15NS located on the North Severn Complex or to the current site of Building 619 on the northwest portion of the Perry Center. Building 15NS is currently used as administrative support and would only require interior and some exterior renovations to meet the screening factors, as well as requirements for DoD mail centers. The administrative support functions in Building 15NS would be relocated to other existing administrative space on the North Severn Complex, yet to be identified, that would potentially require some minor interior renovations. For the Building 619 option, Building 619 would be demolished and a prefabricated building would be constructed on the remaining slab/foundation. Building 619 is currently a public works shop storage area; however, the storage of materials found there is not a requirement, and relocation to another space would not be needed.

Also under Alternative 1, the CHRIMP would either be relocated to Building 104 on the northwest portion of the Perry Center along Yew Street or to a new facility constructed adjacent to Building 104. Building 104 is currently used as a ready room (warehouse/storage space) for the Base Operating Support (BOS) contractor and would only require interior renovations to accommodate the CHRIMP. The current functions of Building 104 would be moved to other underutilized BOS contractor spaces on the Perry Center and would not require any new construction or renovations. If the CHRIMP were moved to a new facility adjacent to Building 104, the facility would be a prefabricated modular structure installed on the impervious surface associated with Building 104 and the roadway. The proposed location and new construction would meet the specific facility requirements.

Alternative 2 Description

Under Alternative 2, the Navy would enter into a space lease with USNA AA/F for use of Building 250 located along Wood Road at Hospital Point in the eastern portion of the NSA Annapolis Upper Yard. Building 250 is the Naval Health Clinic Annapolis, which will be vacated in spring 2017 as part of an unrelated action. Following execution of the space lease, USNA AA/F would renovate the interior of Building 250 to meet their needs. Additionally, they would upgrade the mechanical, electrical, and plumbing systems to make them more functional, code-compliant, and energy efficient. Under this alternative, construction of a new parking lot would not be required because ample parking, previously used for the Naval Health Clinic Annapolis, exists immediately to the north of the building. Along with Building 250, USNA AA would continue to use property in the City of Annapolis for events. Implementation of this alternative would not require the relocation of the existing functions in Buildings 51, 194, 92, 974, and 340 on the Perry Center site.

Public and Agency Participation

The Navy solicited public and agency comments during a scoping period from October 25, 2015, through November 23, 2015. The Navy published an announcement of the scoping meeting for three consecutive days in the *Annapolis Capital Gazette* on October 25–27, 2015. The scoping meeting was held on November 9, 2015, in Annapolis, Maryland. Comments received during the scoping period were considered in preparing the Draft Environmental Assessment (EA).

The Navy will coordinate or consult with the U.S. Fish and Wildlife Service (USFWS), Maryland Department of the Environment (MDE), Maryland Department of Natural Resources (MDNR), Maryland Historical Trust (MHT), Advisory Council on Historic Preservation, National Park Service, City of Annapolis Historic Preservation Division, and St. John's College regarding the Proposed Action.

Enclosure 2: Site Location

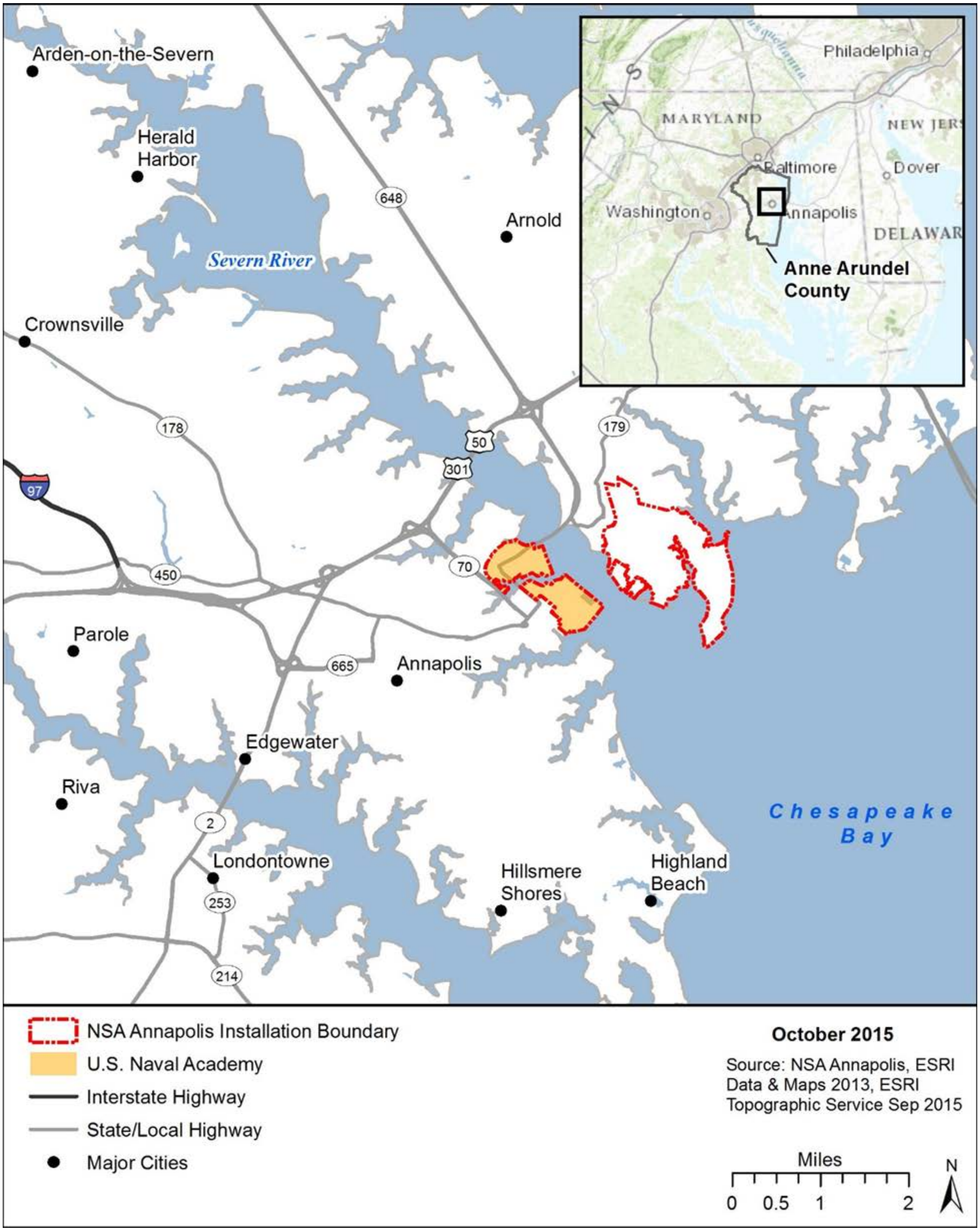

Figure 1 General Location Map

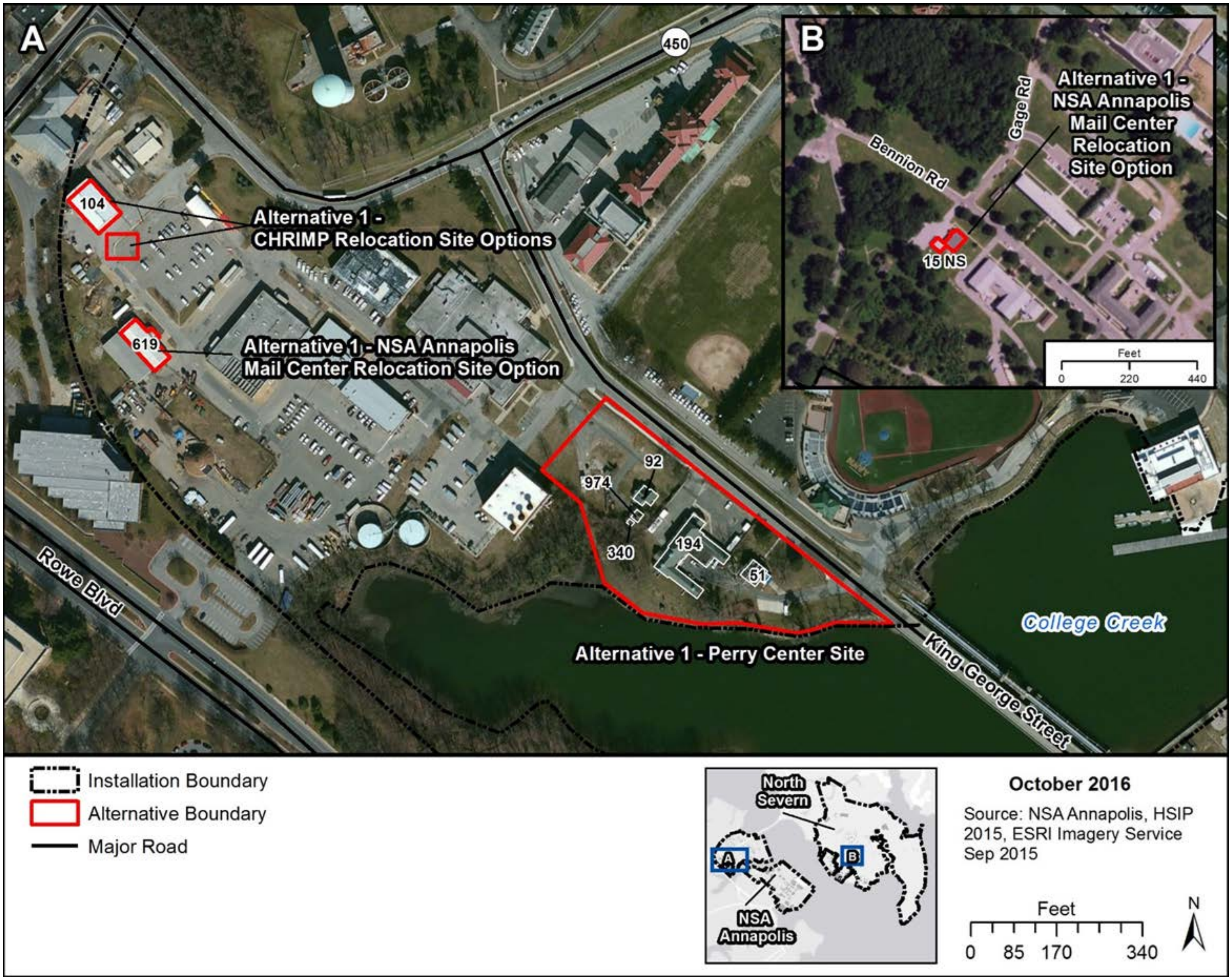

Figure 2 Alternative 1 Project Site

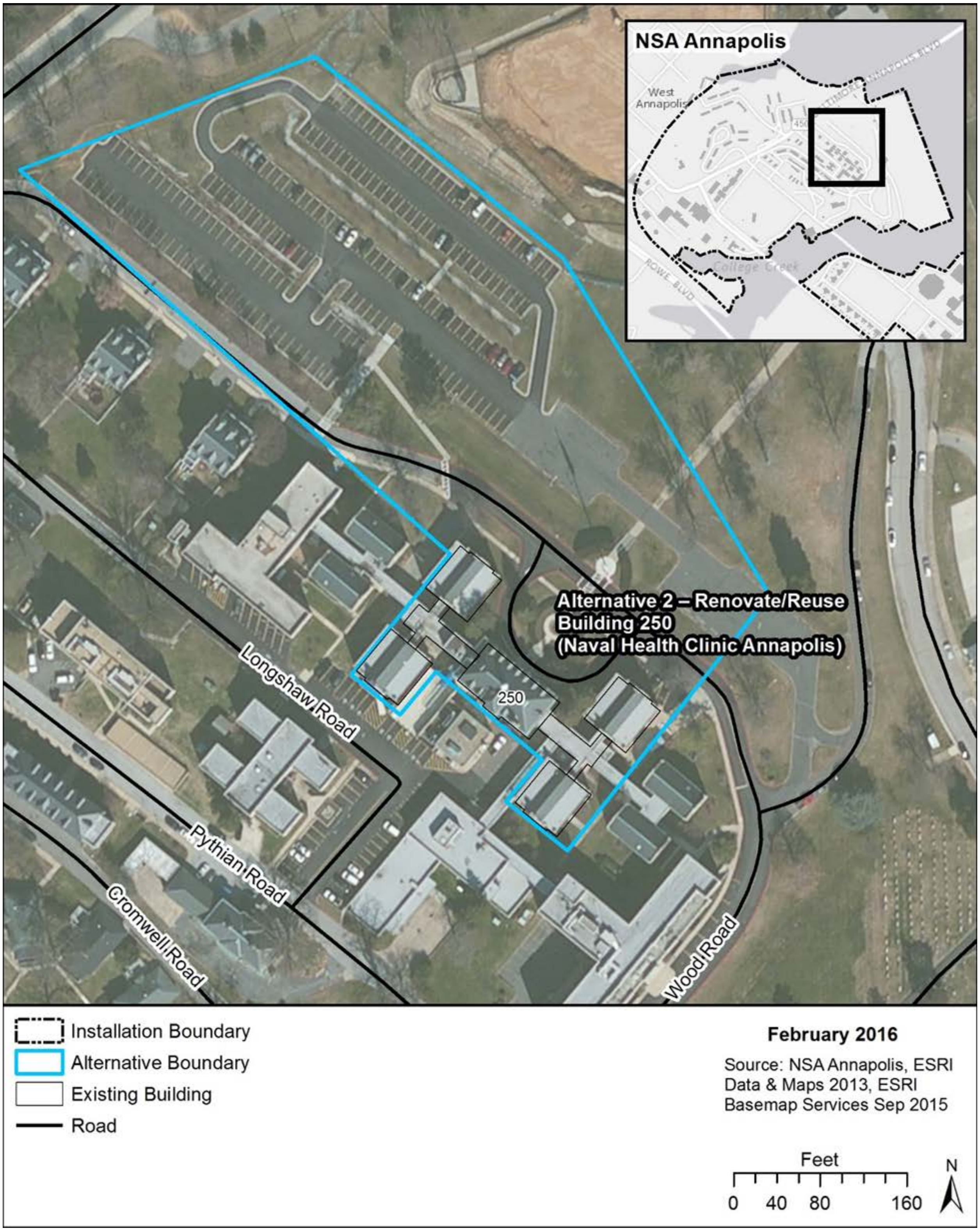

Figure 3 Alternative 2 Project Site

Enclosure 3: Basis of Determination

Table 1. Alternative 1 Basis for Determination

Enforceable Policy	*Relevant to Project*	*Not Relevant to Project*	*Impacts on Resource*
General Policy			
Core Policies	X		The proposed construction and demolition would not create or alter any point source emissions; this action would not affect the existing Title V air permit. Although there would be temporary, minor noise impacts during construction activities, these impacts would not affect noise sensitive receptors. No long-term impacts would occur. During demolition and construction activities, sediment- and erosion-control plans would be adhered to.
Water Quality	X		No new discharges would be associated with the project. A sediment- and erosion-control plan and associated measures would reduce potential impacts from demolition and construction activities.
Flood Hazards	X		No structures would be constructed within the floodplain. However, during demolition and construction activities, a small portion of the 100-year floodplain would be temporarily disturbed through vegetation removal, soil compaction, and exposure of soils to potential erosive processes. Short-term impacts would be minimized through the use of stormwater management plans, erosion and sediment control plans, and associated BMPs. A permit from the Maryland Department of the Environment Wetlands and Waterways Program would be required for development. On-site utilities would be placed appropriately to minimize damage from flooding. These mitigation actions would adhere to federal, state, and local permits and would prevent any increase in flooding or the creation of additional flood risks. Therefore, the long-term impacts on the floodplain would be negligible resulting from the maintenance of flood storage functions and the use of construction BMPs.
Coastal Resources			
Tidal Wetlands		X	There are no tidal wetlands within the project site.
Non-tidal Wetlands	X		There are no wetlands within the proposed sites; therefore, Alternative 1 would have no direct impacts on wetlands. The Perry Center site is north of College Creek and Building15NS is approximately 1,000 feet away from the Severn River. College Creek and the Severn River are estuarine subtidal deepwater habitat. Construction on the Perry Center site would disturb soils and increase the potential for erosion and transport of sediment via overland stormwater runoff. However, the use of construction BMPs and plans for stormwater management and sediment and erosion control would prevent these impacts.

Enforceable Policy	*Relevant to Project*	*Not Relevant to Project*	*Impacts on Resource*
Forests	X		There are no forested areas within or adjacent to the project site. The CHRIMP facility would be relocated to either an existing building (Building 104) or to an existing impervious surface adjacent to Building 104, and the Naval Support Activity (NSA) Mail Center would be relocated to either an existing building (Building 15NS on the North Severn Complex) or to the existing slab/foundation of Building 619 on the northwest portion of the Perry Center once Building 619 is demolished, resulting in no impacts. Vegetation on the Perry Center site is limited to grass, trees, and shrubs; the southern portion of the site along College Creek has a natural tree line that was planted as part of a forest improvement stand and is maintained to prevent invasive species. Some trees would be removed during demolition and construction activities. Once construction is complete, undeveloped areas would be replanted with vegetation native to Maryland and/or the East Coast and included in the plant list in the Installation Appearance Plan to remain consistent with surrounding areas.
Historical and Archaeological Sites	X		There are no known archaeological resources in the project boundary. Demolition of Buildings 51, 194, and 92 (discontiguous contributing resources) would cause a direct, adverse impact on the USNA NHLD. Construction of the Alumni Service Center and Headquarters facility would introduce a new visual element adjacent to the USNA NHLD, but impacts would be minimal. Vegetation clearing and landscaping after construction, as well as the new facility would alter views from within the Colonial Annapolis NHLD and would result in indirect, adverse impacts on the setting and feeling of the district. The NSA Annapolis Mail Center would either be relocated to Building 15NS on the North Severn Complex or to the current site of Building 619 on the northwest portion of the Perry Center. Building 15NS is not eligible for the NRHP nor is it located in a historic district. Building 619, which could be demolished, is not eligible for the NRHP and is also outside both the USNA NHLD and the Colonial Annapolis. Relocating the existing functions of Building 15NS, to another facility on the North Severn Complex, if that option is selected, would only require minor interior renovations. Therefore, there would be no impacts to these resources. Relocating the CHRIMP to either Building 104, which is not eligible for inclusion on the NRHP, or to a site adjacent to Building 104 would not impact the USNA NHLD or the

Enforceable Policy	*Relevant to Project*	*Not Relevant to Project*	*Impacts on Resource*
			Colonial Annapolis NHLD. If the Building 104 option is selected, the existing functions would be moved to another, underutilized facility on the Perry Center and would also not impact the USNA NHLD or the Colonial Annapolis NHLD. Despite the changes, the USNA NHLD and the Colonial Annapolis NHLD would remain eligible for the NRHP and as an NHL. As part of the Section 106 consultation process under the NHPA, the Navy intends to develop a programmatic agreement with the Maryland Historical Trust and other appropriate stakeholders to govern the implementation of the undertaking, identify any adverse effects under the NHPA, and specify appropriate avoidance, minimization, and mitigation measures. Implementation of Alternative 1 would be consistent with existing and recommended development within NSA Annapolis, per the NSA Annapolis Installation Master Plan.
Living Aquatic Resources	X		Construction, demolition, and renovation activities would occur in an urban, terrestrial environment with no direct activity on water resources. Demolition and construction activities could result in runoff from increased traffic and use of heavy machinery; however, BMPs such as erosion and sediment controls would be implemented to diminish impacts. Therefore, Alternative 1 would have no significant impacts on living aquatic resources.
Coastal Uses			
Mineral Extraction		X	(not applicable)
Electrical Generation and Transmission		X	(not applicable)
Tidal Shore Erosion Control		X	(not applicable)
Oil and Natural Gas Facilities		X	(not applicable)
Dredging and Disposal of Dredged Material		X	(not applicable)
Navigation		X	(not applicable)
Transportation	X		Under Alternative 1 there would be an increase in traffic during the AM and PM peak hours of approximately 1 percent. The additional vehicles would consist of personnel commuting to and from work and would include vehicles such as cars, sport utility vehicles, or light-weight trucks, such as pick-up trucks. Therefore, no impacts on coastal resources from transportation would occur.
Agriculture		X	(not applicable)

Enforceable Policy	*Relevant to Project*	*Not Relevant to Project*	*Impacts on Resource*
Development	X		Alternative 1 includes the construction of a new building that would allow approximately 90 personnel to be located under one facility. Five buildings would be demolished at the Perry Center site where the new facility would be constructed. The land where demolition and construction would occur has been previously disturbed. A sediment and erosion control plan and associated measures would reduce potential impacts from these activities. The alternative would also involve relocating the NSA Annapolis Mail Center and CHRIMP facility to either renovated buildings (Building 15NS on the North Severn Complex and Building 104 on Perry Center, respectively) or new prefabricated facilities constructed on existing impervious surfaces on the northwest portion of the Perry Center (within the existing footprint of the to-be-demolished Building 619 and adjacent to Building 104, respectively). The existing functions of Building 15NS, if that mail center option is selected, or the existing functions of Building 104, if that CHRIMP option is selected, would be relocated to existing facilities only potentially requiring interior renovations. Therefore, no impacts on coastal resources from development would occur.
Sewage Treatment		X	(not applicable)

Key: BMP = best management practices; CHRIMP = consolidated hazardous material reutilization inventory management program; NHL = National Historic Landmark; NHLD = National Historic Landmark District; NHPA = National Historic Preservation Act; NRHP = National Register of Historic Places; NSA = Naval Support Activity; USNA = United States Naval Academy

Table 2. Alternative 2 Basis for Determination

Enforceable Policy	*Relevant to Project*	*Not Relevant to Project*	*Impacts on Resource*
General Policy			
Core Policies	X		The proposed renovation would not create or alter any point source emissions; this action would not affect the existing Title V air permit. Although there would be temporary, minor noise impacts during renovation activities, these impacts would not affect noise sensitive receptors. No long-term impacts would occur. During renovation activities, sediment- and erosion-control plans would be adhered to.
Water Quality	X		Alternative 2 would require only interior renovation activities; there would be no impacts on water resources.
Flood Hazards	X		Alternative 2 would require only interior renovation activities; there would be no impacts on flood hazards.
Coastal Resources			
Tidal Wetlands		X	There are no tidal wetlands within the project site.

Enforceable Policy	*Relevant to Project*	*Not Relevant to Project*	*Impacts on Resource*
Non-tidal Wetlands	X		Alternative 2 would require only interior renovation activities; there would be no impacts on wetlands.
Forests		X	There are no forested areas within or adjacent to the project site.
Historical and Archaeological Sites	X		There are no archaeological resources in the project boundary. Building 250 is a contributing resource in the USNA NHLD and interior, character-defining features have been identified for the building. The renovation of the building would follow the Secretary of the Interior's Standards for the Treatment of Historic Properties; therefore, the renovation would have no impact on the interior, character-defining features of Building 250 or on the USNA NHLD (no adverse effect under the NHPA).
Living Aquatic Resources	X		Alternative 2 would require only interior renovation activities; there would be no impacts on aquatic resources.
Coastal Uses			
Mineral Extraction		X	(not applicable)
Electrical Generation and Transmission		X	(not applicable)
Tidal Shore Erosion Control		X	(not applicable)
Oil and Natural Gas Facilities		X	(not applicable)
Dredging and Disposal of Dredged Material		X	(not applicable)
Navigation		X	(not applicable)
Transportation	X		Under Alternative 2, there would be an increase in traffic during the AM and PM peak hours of approximately 1 percent. The additional vehicles would consist of personnel commuting to and from work and would include vehicles such as cars, sport utility vehicles, or light-weight trucks, such as pick-up trucks. Therefore, no impacts on coastal resources from transportation would occur.
Agriculture		X	(not applicable)
Development	X		Alternative 2 would require only interior renovation activities; there would be no impacts on development.
Sewage Treatment		X	(not applicable)

Key: NHLD = National Historic Landmark District; NHPA = National Historic Preservation Act; USNA = United States Naval Academy

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Appendix C
Traffic Study

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DRAFT

TRANSPORTATION STUDY

For

United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters Environmental Assessment

At

Naval Support Activity Annapolis,

Annapolis, MD

December 2016

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Abstract

Designation:	**Transportation Study**
Title of Proposed Action:	United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters
Project Location:	Annapolis, Maryland
Lead Agency for the EA:	Department of the Navy
Affected Region:	City of Annapolis in Anne Arundel County, Maryland
Action Proponent:	Naval Support Activity Annapolis
Point of Contact:	Naval Facilities Engineering Command Washington Attn: Adrian Dascalu (EV) 1314 Harwood St SE, Building 212 Washington Navy Yard, DC 20374
Date:	December 2016

Abstract:

This United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters Transportation Study analyzes the traffic capacity and level of service for both existing and 2020 future conditions. The analysis of future conditions consists of determining the impacts of a 2020 No Action Alternative plus the proposed two actions for the construction or renovation of a new facility for the United States Naval Academy Alumni Association/Naval Academy Foundation. This report provides individual analysis of each action alternative compared to the No Action Alternative and a summary of all action alternatives in the discussion section. This report also presents a set of recommendations based upon the analyses.

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Transportation Study

United States Naval Academy Alumni Association/Naval Academy Foundation Alumni Service Center and Headquarters

Naval Support Activity Annapolis,

Annapolis, MD

TABLE OF CONTENTS

Attachments

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Abbreviations and Acronyms

Acronym	Definition
AADT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act
ATR	Automatic Traffic Recorder
CHRIMP	consolidated hazardous material reutilization inventory management program
EA	Environmental Assessment
EB	Eastbound
ECF	Entry Control Facility
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
LOS	Level of Service
LTR	Left, Through, Right
Maryland SHA	Maryland State Highway Administration
MD	Maryland
MPH	Miles Per Hour
MTA	Maryland Transit Administration
MUTCD	*Manual of Uniform Traffic Control Devices*
NAF	Naval Academy Foundation
NAVFAC	Naval Facilities Engineering Command
NB	Northbound
NCPC	National Capital Planning Commission
NSA	Naval Support Activity
PHF	Peak Hour Factor
SB	Southbound
SOV	Single Occupant Vehicle
TMP	Transportation Management Plan
TRB	Transportation Research Board
TWSC	Two-Way STOP-Controlled
USNA	United States Naval Academy
USNA AA	United States Naval Academy Alumni Association
USNA AA/F	United States Naval Academy Alumni Association and Naval Academy Foundation
V/C	Volume to Capacity
WB	Westbound

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1 Introduction

This report presents the findings of a transportation study prepared as part of the Environmental Assessment (EA) developed to assess the impacts that would result from the Navy leasing property or a facility on Naval Support Activity (NSA) Annapolis in Annapolis, Maryland, to the United States Naval Academy Alumni Association (USNA AA) and the Naval Academy Foundation (NAF). The USNA AA and NAF (USNA AA/F) would establish a new Alumni Service Center and Headquarters Facility through new construction or renovation of an existing facility. This transportation study was performed to determine whether the alternatives presented as a part of the proposed action would affect the transportation network in the local area, what the impacts would be, and what mitigation measures, if warranted, would be necessary to preclude adverse impacts.

The EA purpose and need presents two alternatives, one for the relocation of staff, demolition of buildings, relocation of Navy facilities, and construction of a new facility and the second for the relocation of staff and renovation of an existing building, both within the City of Annapolis. The potential alternative locations are the Perry Center site or Building 250 on the Naval Support Activity (NSA) Annapolis Upper Yard of the United States Navy Academy (USNA). The Perry Center site (Alternative 1) is located within the southwestern portion of the Upper Yard and is bounded by King George Street to the north and east and College Creek to the south and west, and the Central Heating Plant to the west. Building 250 (Alternative 2) is located on Wood Road at Hospital Point within the eastern portion of the Upper Yard. Figure 1-1 shows Alternatives 1 and 2. The relocation of the existing functions from the Perry Center site are also included in the EA purpose and need.

The EA, and subsequently this transportation study, evaluates the effects of two action alternatives and a No Action Alternative. Each of the action alternatives represents differing amounts of development and associated parking to accommodate USNA AA/F personnel and visitors. The study will use the two action alternatives to project a conservative estimate of the transportation impacts from development and document the results in the EA. If needed, mitigation measures are suggested to address identified impacts.

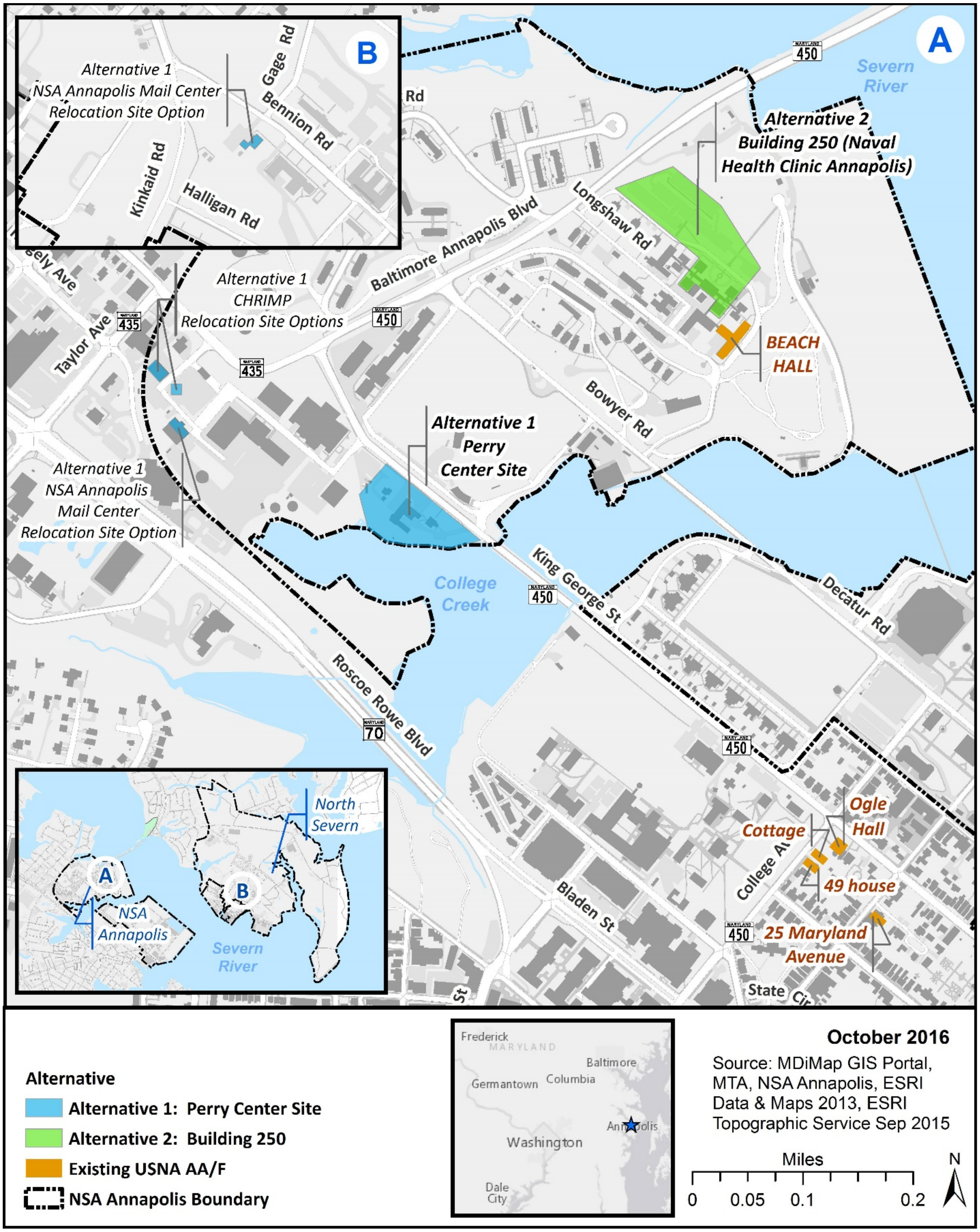


Figure 1-1 Alternatives 1 and 2

2 Background

This section presents the description tasking, the existing land use, planning context, and the transportation assumption agreement. The project tasking outlines the scope of the study and elements contained in the study by section title. The existing land use describes the current land use surrounding the affected environment, including land owned by NSA Annapolis and private use. The planning context reviews the most relevant plans covering the affected environment, including broad bicycle and master plans and specific sector plans. The transportation assumption agreement covers the proposed assumptions presented to the City of Annapolis and the Maryland State Highway Administration (Maryland SHA) that the study uses to develop future traffic volumes and the methods proposed to evaluate the traffic operations.

2.1 Description of the Project Tasking

The scope of work for this transportation study includes the following tasks:

- Provide engineering services necessary for the preparation of a condition assessment report of the traffic capacity and level of service (LOS) analysis as well as parking adequacy for both the existing condition and for future requirements based on the construction of a new facility for the USNA AA/F at the two potential sites
- Provide recommendations for improvements to the study area road system based on the results of the capacity and LOS analysis of future requirements
- Provide a list of findings, recommendations, and alternatives for the two alternatives

This transportation study has seven sections to document the analysis, findings, and recommendations for USNA AA/F.

- Section 1.0 presents the introduction and the proposed actions.
- Section 2.0 describes the background including the project tasking, existing land use, planned context, and transportation assumption agreement.
- Section 3.0 presents an operational analysis of the existing condition and includes the operational analysis of the study area roadway networks as well as non-automotive transportation modes.
- Section 4.0 presents the operational analysis of the future conditions and includes future background growth and proposed actions and presents the operational analysis under these conditions.
- Section 5.0 presents a discussion of the future findings.
- Section 6.0 describes transportation impacts from construction activities associated with the proposed actions.
- Section 7.0 presents the recommendations for minimizing transportation impacts once the proposed actions are implemented.
- Section 8.0 presents recommendations for minimizing transportation impacts during construction activities.

2.2 Existing Land Use

Land use at NSA Annapolis Upper and Lower Yards, as described in the NSA Annapolis Master Plan (NSA Annapolis, 2012), includes Base Support, Training Support, and Sailor and Family Support. Land use at and adjacent to the Perry Center site is categorized as Base Support, which includes facility management buildings (i.e., administration). Buildings at the Perry Center site consist mostly of office and industrial facilities. Buildings 51, 92, and 194, which would be demolished under Alternative 1, are on the eastern edge of the Perry Center site, adjacent to College Creek. Building 194 is currently being used to house the consolidated hazardous material reutilization inventory management program, and Building 51 is currently occupied by the NSA Annapolis Mail Center. Buildings 92 is unoccupied and in a moderate state of disrepair. Buildings 974 and 340, which also would be demolished under Alternative 1, are outbuildings associated with Building 92 and are both in moderate states of disrepair. Land use adjacent to the Perry Center site includes athletic fields and facilities to the north and northeast, industrial facilities to the northwest, and College Creek to the south and west. The NSA Annapolis Installation Master Plan states that the Navy has recommended that all program elements be relocated to more appropriate locations on the site and that each of these buildings be restored, renovated for more suitable uses, or demolished (NSA Annapolis, 2012).

Land use in the northwest portion of the Perry Center where one site option for relocating the NSA Annapolis Mail Center and both site options for relocating the CHRIMP facility are located is classified as Base Support. Facilities around this site are used mainly for industrial purposes. Land use on North Severn in the vicinity of Building 15NS, the other site option for relocating the NSA Annapolis Mail Center, is classified as Sailor and Family Support. Adjacent areas are classified as Base Support. Land use at and adjacent to Hospital Point, where Building 250 is located, is classified as Sailor and Family Support, which consists of housing, services that support dependents, and community service facilities. Land uses adjacent to this site consist mainly of office buildings; some of which are in substandard condition.

2.3 Planning Context

This section contains a summary of planning documents that cover the affected environment, including bicycle, master, and sector plans.

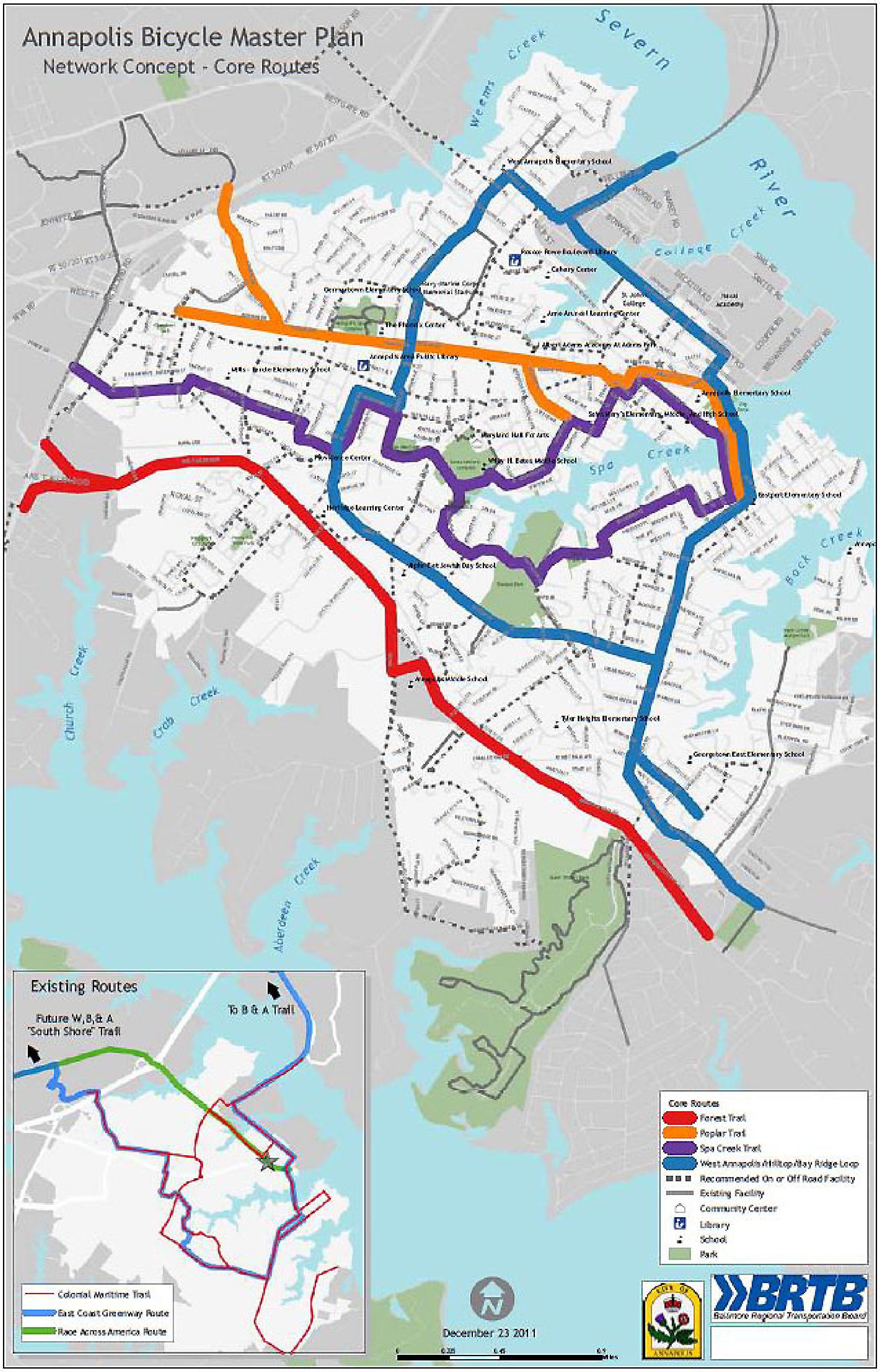
2.3.1 Annapolis Bicycle Master Plan

The Annapolis Bicycle Master Plan was completed in 2011. It was the result of a planning effort to create a blueprint for improving on the city's existing developed bicycle network with the goal of winning a Silver Level Community award from the League of American Bicyclist by 2016 (Toole Design Group, LLC, 2011). Public and stakeholder involvement was a critical component of this plan. Stakeholders were interviewed, including organizations related to bicycling: the Maryland SHA, Anne Arundel County, and the City of Annapolis Department of Public Works. Public involvement included open house meetings, two public workshops, and an online interactive map for reporting weaknesses in the bicycle network. Physical infrastructure was also evaluated as part of the process; field surveys identified both on road and off road gaps in the existing bicycle network.

Based on this input, the plan's goals include creating a lasting bicycle transportation program integrated with the county and the state, developing ongoing programs for bicycle safety and education, improving a convenient and attractive bicycle network, making connections to other modes of transportation, and developing a financial plan for construction and maintenance. The implementation strategy includes dedicating funding; improving staff, including training and the hiring of a full-time bike coordinator; expanding the existing Coexist Give/Get Bicycle Safety Program; and integrating plan recommendations into the land development review and capital scoping process. This will include the requirement that trails and facilities identified in the bicycle facilities map meet certain conditions of approval in the development review process. The plan also recommends that the Annapolis Comprehensive Plan function as the city's complete street policy with the goal of converting main roads into streets to serve the bike network.

The plan lists the affected environment as having core routes and primary connections that are part of the recommended bicycle network. These bicycle routes comprise the West Annapolis/Hilltop/Bay Ridge Loop that originates at the city docks and West Annapolis and travels to the Naval Academy Bridge, passing through the defined study area (Section 3.1.1). Figure 2-1 shows the Annapolis Bicycle Master Plan network concepts.

Recommended enhancements to these core routes will allow bicyclists to travel between neighborhoods of the city while avoiding major roads by using roads enhanced with signs and connector trails. For the study area, the recommended implementation schedule for most of the improvements to these core routes was 0 to 5 years from the publication of the plan. However, as of December 2015, only some of the improvements have been completed.



Source: City of Annapolis, 2011

Figure 2-1 Annapolis Bicycle Master Plan Network Concepts

2.3.2 Annapolis Comprehensive Plan 2009

The Annapolis 2009 Comprehensive Plan lays out guidance to city leaders for achieving a vision based on the input of citizens to preserve and enhance community character, maintain a vibrant economy, and promote a “green” Annapolis (City of Annapolis, Maryland, 2009). This plan varies substantially from previous comprehensive plans by de-emphasizing planning based on land use and density in favor of planning based on preserving community character: the understanding of a community’s physical, functional, design attributes and how they work together. The plan also recognizes the relationship between land use and transportation by providing mechanisms to anticipate transportation needs associated with new developments and account for the impact of traffic on community character and quality of life. As part of the vision to promote a “green” Annapolis, the plan includes actions to expand transportation alternatives to driving like walking, bicycling, and transit.

Specifics for transportation are spelled out in the Transportation chapter of the Comprehensive Plan. This chapter establishes the city’s transportation plan, providing guiding principles and objectives based on community input and the policy recommendations and major projects to fulfill them. The overarching goal is to enhance mobility in Annapolis, which increasingly is experiencing an inflow of commuters and visitors and discouraging automobile use to grow as a percent of total trips. Principles included state that:

- *Transportation plays a critical role in the achievement of personal and community goals:* All neighborhoods should have access to transit service and all activity centers should be linked by all modes of transportation.
- *Transportation offers a significant opportunity to move toward a “Green” Annapolis*: Transportation-related pollution and energy consumption can be reduced, mass transit can be convenient, and infrastructure for walking and bicycling can be improved.
- *Transportation systems both lead and follow important changes in our city’s land uses*: Target transportation to support land use patterns that are sustainable, provide a high level of mobility within downtown, and emphasize high-capacity modes of transportation to accommodate development densities, which have been increasing.
- *Transportation investments in Annapolis must shift to transit, pedestrians and bicycles first, automobile second*: Annapolis is already a walkable city, and investments in transportation should take advantage of and strengthen this asset.
- *Parking is key to transport system operation and funding*: Parking should be managed to encourage people to use non-automobile alternatives and parking revenues should fund improvements in transit services.

The Land Use chapter of the Comprehensive Plan designates the area bordering the northwestern corner of the defined study area (Section 3.1.1) as the West Annapolis Opportunity Area, specifically, the intersection of Rowe Boulevard and Taylor Avenue and the commercial sections of West Annapolis. Policy 1 of the Transportation section states that such areas will contribute to system wide-transit demand to leverage the operation of the entire transit system through the use of site design, parking limits and pricing. In effect, the plan designates the West Annapolis Opportunity Area to become a vital transit hub with transit-oriented development and transportation demand management. To support the Opportunity Area, the plan includes road improvements to relieve congestion on Taylor Avenue and create a pedestrian friendly environment. The Transportation chapter also recommends that an engineering study be conducted to alleviate congestion during special events by improving Taylor

Avenue, King George Street, Naval Academy Gate, and Baltimore Annapolis Boulevard. Figure 2-2 shows the West Annapolis Study Area with the urban center highlighted in dark red.

Source: City of Annapolis, 2009

Figure 2-2 West Annapolis Study Area

2.3.3 City of Annapolis 2009-2014 Five Year Comprehensive Plan Update

The City of Annapolis 2009–2014 Five Year Comprehensive Plan Update is required by state law as a narrative of the implementation status of the comprehensive plan (City of Annapolis, 2014). The plan update reported that although progress has been made on implementing transportation policies, along with their dependent land use policies, the weak economy has slowed progress by draining resources from planning funding and private developers. This is most significant in opportunity areas, where land use changes and transportation improvements are tied together in Sector Studies, which must be completed before full implementation can begin. However, it is also significant for smart growth and creating walkable communities because these rely on development in the private sector to occur.

Despite these obstacles, a number of transportation and related policies have been implemented and include the introduction of new bus routes to alleviate parking crowding downtown and market pricing in parking garages. Specific policies that have progressed in the study area include the completion of the West Annapolis Sector Study and a traffic study at the intersection of Taylor and Rowe Boulevard as part of that project.

2.3.4 West Annapolis Sector Study

The West Annapolis Sector Study is a detailed planning effort focused on the West Annapolis Opportunity Area as identified in the City of Annapolis 2009 Comprehensive Plan (Environmental Resources Management, 2015). Opportunity areas are locations where the city intends to direct new growth. Through the use of transit-oriented development techniques, such as parking limits, site design, and pedestrian access, these areas will favor public transit use and provide ridership to support public transit across the city. Topics studied in the West Annapolis Sector Study include traffic flows and routes; the market for retail opportunities; and how well current zoning, urban design, public transit, and pedestrian and bicycle facilities meet recommendations in the Comprehensive Plan.

The transportation study portion of the Sector Study used public involvement, stakeholder involvement with local businesses, travel time measurements, levels of service at intersections, and an origin and destination analysis. Issues relevant to transportation identified include gaps in the bike and pedestrian network, limited public transit service, cut-through traffic and traffic congestion both during peak hours, and events at the Navy-Marine Corps Memorial Stadium. Recommendations of the Sector Study to remedy these issues include implementing regional intelligent traffic management to solve traffic congestion in West Annapolis, using traffic calming devices to improve safety and improving bicycle and pedestrian facilities.

2.4 Transportation Assumption Agreement

Prior to initiating the transportation analysis, it was essential to determine what analysis tools, data parameters, and assumptions would provide the basis of the analysis. The Navy sent to the City of Annapolis and Maryland SHA a letter regarding an agreement on the assumptions to follow for a traffic analysis for the proposed action and its alternatives. The Navy and the City of Annapolis Transportation Division met on November 5, 2015, to obtain verbal concurrence on the transportation assumptions to be used for the traffic analysis.

In coordination with Naval Facilities Engineering Command (NAVFAC), a letter was drafted and sent to the City of Annapolis to present an agreement on the assumptions to follow. A meeting between NAVFAC and the City of Annapolis Transportation Division also took place on November 5, 2015, to obtain their verbal concurrence on the transportation assumptions within the traffic analysis.

The City of Annapolis, through its “Policies and Guidelines for Traffic Impact Analysis for Proposed Development in the City of Annapolis” (City of Annapolis, 2013), requires that the study provide a certain level of detail, data parameters, and type of analysis. These parameters and assumptions include a study area, trip generation, trip distribution, modal split, analysis years, analysis methods, and No Action Alternative transportation assumptions (e.g., background growth, planned developments, and planned roadway improvements). Attachment 1 contains the letter sent to the City of Annapolis by NAVFAC.

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3 Existing Condition

This chapter presents the transportation study area and summarizes the existing transportation conditions within the study area as of December 2015. This chapter covers the following modes of transportation: pedestrian, bicycle, public transit, and traffic (vehicular). The existing parking conditions are also discussed. The study area definition and roadway descriptions are covered first.

3.1 Study Area Definition

The study area was delineated based on the City of Annapolis' guidance to include site access driveways, signalized and major unsignalized intersections within 0.25 mile of a single development phase project that would generate 200 to 399 daily trips. The study contains the following five intersections:

- Taylor Avenue and Baltimore Annapolis Boulevard (unsignalized)
- Baltimore Annapolis Boulevard and King George Street (signalized)
- Baltimore Annapolis Boulevard and Bowyer Road (signalized)
- King George Street and College Avenue (signalized)
- King George Street and Baseball Stadium Entrance/access to Perry Center (unsignalized)

The five intersections cover the traffic impact analysis study area; the bicycle study area covers a one-half-mile radius from the development site. Figure 3-1 illustrates the study area.

3.2 Roadway Descriptions

The following sections describe the roadways within the study area, including the Maryland SHA roadway functional classification, the number of lanes in each direction, the most recent average annual daily traffic (AADT) volumes available from the Maryland SHA from 2014, and any noteworthy characteristics such as a roadway's role within the transportation network and the presence of bicycle lanes. The information was collected from a Maryland SHA Roadway Functional Classification Map (Maryland SHA, 2014), field observations, aerial imagery, and Maryland SHA's 2014 Traffic Volume Map (Maryland SHA, 2015).

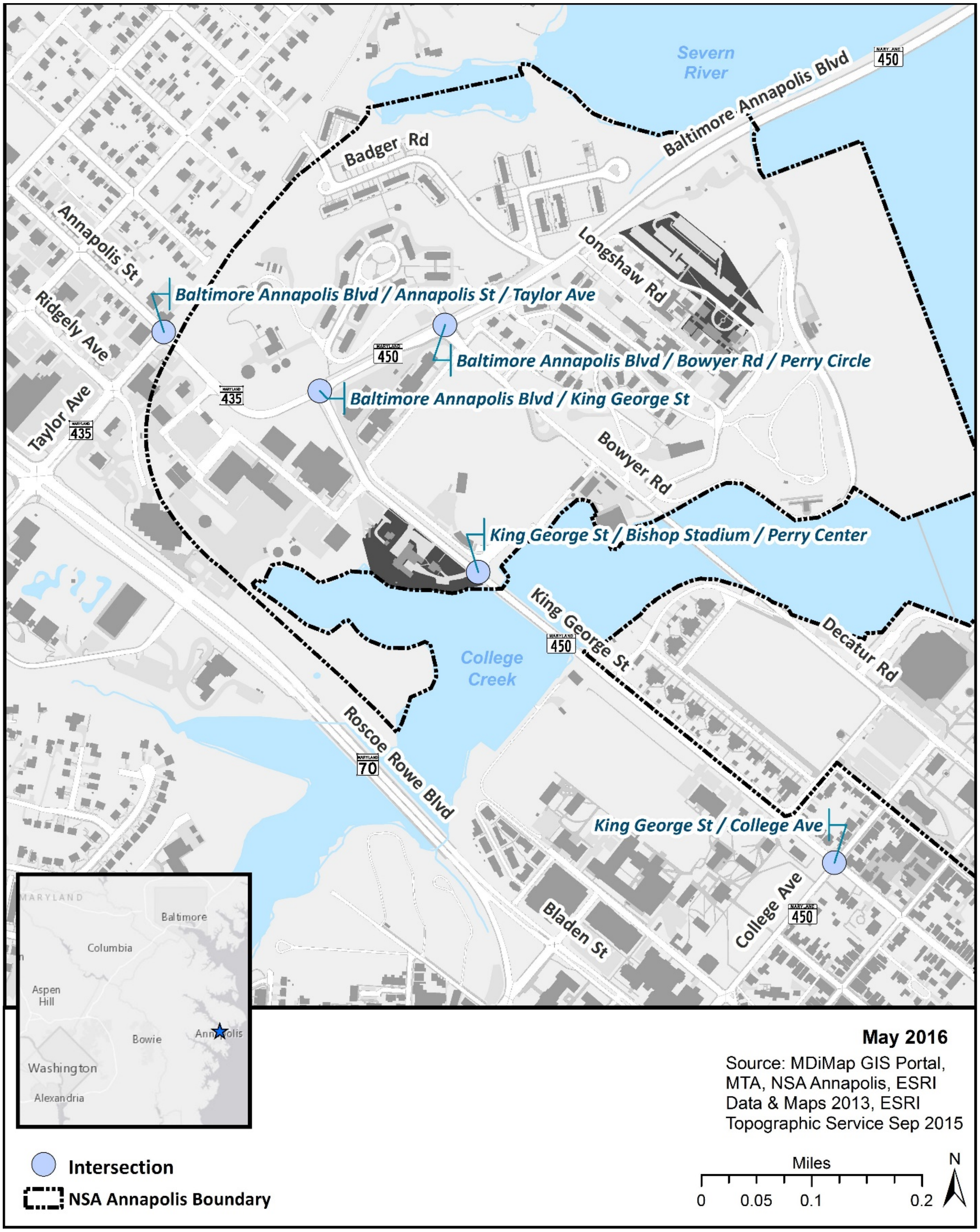


Figure 3-1 Study Intersections

3.2.1.1 King George Street

The State of Maryland maintains King George Street, and Maryland SHA has classified it as a Principal Arterial. By definition, this class of roadway serves through traffic, major activity centers, and trips entering or leaving urban areas (Anne Arundel County, 2015). King George Street serves as an artery for commuters and special event attendees traveling from the north to downtown Annapolis and the USNA via connections between Baltimore Annapolis Boulevard and downtown Annapolis. In the opposite direction, it serves evening rush hour traffic leaving downtown Annapolis and traffic to events at the Navy-Marine Corps Memorial Stadium. Between Baltimore Annapolis Boulevard and College Avenue, King George Street is part of Maryland (MD) Route 450, a state highway that runs between Bladensburg and Arnold.

The cross section of King George Street changes between Baltimore Annapolis Boulevard and College Avenue. Parallel to the NSA Annapolis Upper Yard, the road has two travel lanes and no shoulders; it has long, exclusive right- and left-turn lanes serving the intersection of Baltimore Annapolis Boulevard. East of College Creek, the road is similar to other streets in downtown Annapolis, having on-street parking lining most of its length, limiting lane width, and no exclusive turn lanes at the intersection with College Avenue. West of the College Creek, the posted speed limit is 30 miles per hour (mph) and east of the creek the posted speed limit is reduced to 25 mph.

As a primary artery into Annapolis, King George Street carries a substantial amount of the traffic. In 2014, it had an AADT of 10,382 (Maryland SHA, 2015). Traffic is heavy toward downtown Annapolis during the morning commute and heavy toward Baltimore Annapolis Boulevard during the evening commute and events at the Navy-Marine Corps Memorial Stadium. Special events can add to traffic congestion on King George Street. According to the West Annapolis Sector Study, it is known that during events at Navy-Marine Corps Memorial Stadium, the city dock, and state government offices and during traffic spillovers on U.S. Route 50, traffic can back up onto King George Street, causing significantly higher traffic volumes than normal (Environmental Resources Management, 2015).

3.2.1.2 Baltimore Annapolis Boulevard

The State of Maryland maintains Baltimore Annapolis Boulevard, and the Maryland SHA has classified it as a Principal Arterial east of King George Street and a minor arterial west of King George Street. As such, Baltimore Annapolis Boulevard provides a major entrance and exit to downtown Annapolis, as well as the USNA. Major routes connected include U.S. Route 50, MD Route 2, King George Street, and Taylor Avenue. East of its intersection with King George Street, Baltimore Annapolis Boulevard is part of MD Route 450. West of King George Street, it is part of MD Route 435.

Baltimore Annapolis Boulevard is a two-lane, two-way road through the study area. Where it enters the study area to the northeast on the Naval Academy Bridge, the cross section includes ample shoulder space, and it has a posted speed limit of 40 mph. The bridge also includes the only set of bicycle lanes located in the study area. Within West Annapolis, the roadway has no shoulders and a posted speed limit of 30 mph.

As a primary route serving the USNA and Annapolis, Baltimore Annapolis Boulevard carries a heavy volume of traffic. In 2014, it had an AADT of 17,272 between the Severn River and King George Street, and 12,182 between King George Street and Taylor Avenue (Maryland SHA, 2015).

3.2.1.3 College Avenue

The State of Maryland maintains College Avenue, and Maryland SHA has classified it as a Principal Arterial. As such, it provides a major route for traffic through downtown Annapolis and connects to King George Street, Roscoe Rowe (Rowe) Boulevard, and West Street. South of its intersection with King George Street, College Avenue is part of MD Route 450.

The College Avenue cross section is a two-lane, two-way road with no shoulders and on-street parking along its west side. The posted speed limit is 25 mph. The 2014 AADT reported is the same as King George Street—10,382.

3.2.1.4 Bowyer Road

Bowyer Road is a public artery that provides access to the secure areas of the USNA via Gate 8. This artery includes the Upper Yard and the Lower Yard via Hill Bridge over the College Creek. Maryland SHA has not assigned it a functional class; however, the USNA considers it a primary vehicle route because it handles through traffic in and out of the Academy (NSA Annapolis, 2012). Traffic enters and exits the Upper Yard from Baltimore Annapolis Boulevard and can enter side streets to facilities in the Upper Yard or continue across the College Creek to Decatur Road in the Lower Yard.

Bowyer Road is a two-lane, two-way road with no shoulders along its length of four-tenths of a mile. An exception is made 600 feet southeast of Baltimore Annapolis Boulevard where Gate 8 has two lanes for southeast bound traffic.

About one-half the traffic entering the USNA, including most of the trucks and deliveries, pass through Gate 8 on Bowyer Road. According to the USNA, a total of 1,652 vehicles per day enters through the gate (NSA Annapolis, 2012). Additional vehicles use Bowyer Road northwest of Gate 8 to access roads to non-secure areas of the Upper Yard. Maryland SHA does not provide an overall AADT for the road.

3.2.1.5 Taylor Avenue

The State of Maryland maintains Taylor Avenue, and Maryland SHA has classified it as a minor arterial. By definition, these types of roads connect higher functional class facilities (Anne Arundel County, 2015). Taylor Avenue connects three gateways into the city—West Street, Rowe Boulevard, and the west end of Baltimore Annapolis Boulevard. In the study area, it is part of MD Route 435.

Taylor Avenue is a two-lane, two-way road with no shoulders with a posted speed limit of 30 mph. As a major connector between routes into Annapolis, Taylor Avenue carries a substantial amount of traffic. In 2014, it has an AADT of 12,182 along its length. However, its connections to major roads serving Annapolis also leads to heavy cross-traffic volumes during special events or queues on other roads, resulting in creating congestion at Rowe Boulevard and King George Street (City of Annapolis, Maryland, 2009).

Figure 3-2 shows the Maryland SHA roadway functional classification. Figure 3-3 shows the most recent AADT volumes available from the Maryland SHA from 2014. Figure 3-4 shows the existing lane geometry and traffic control type for the study intersections.

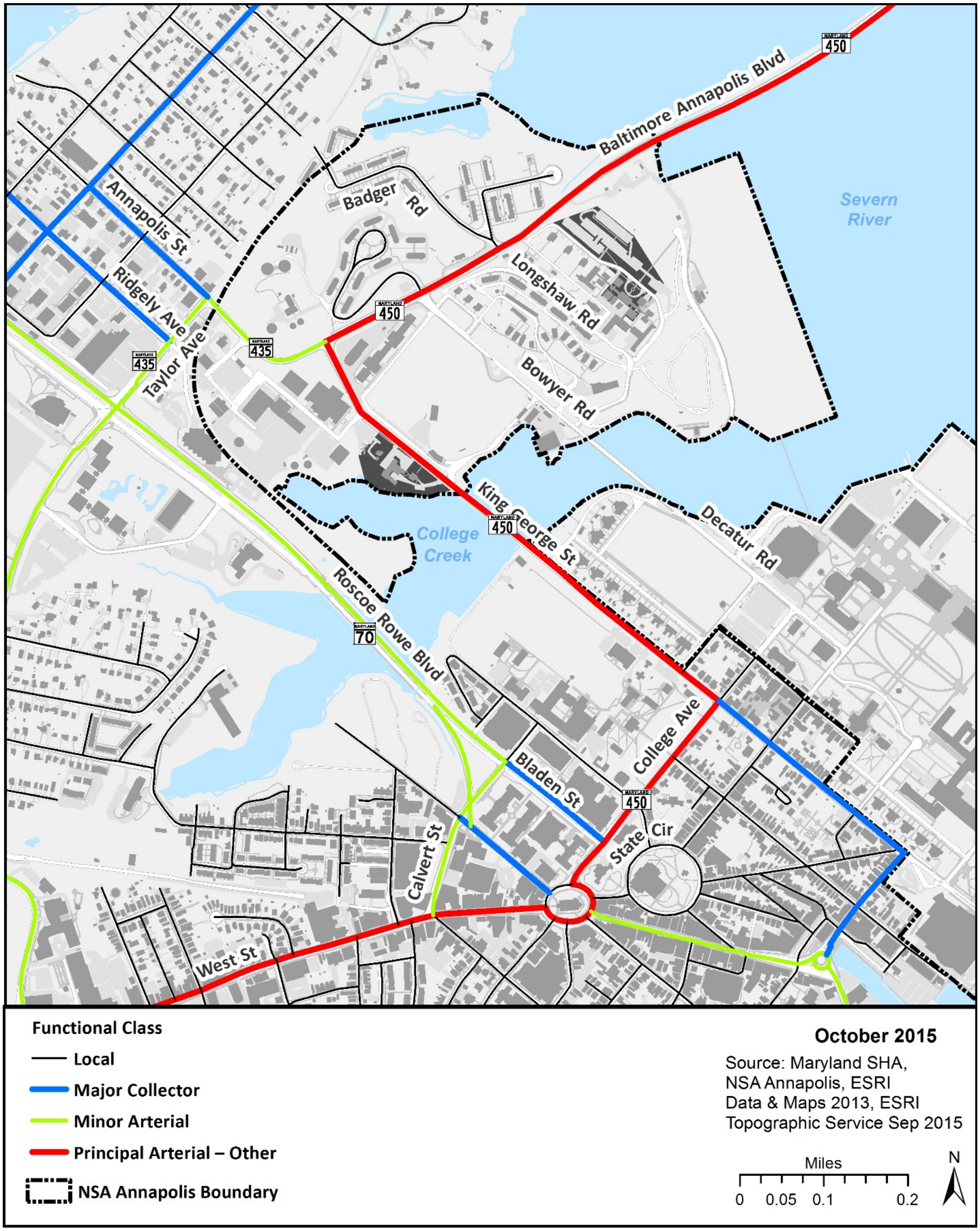


Figure 3-2 Functional Classification Road Map

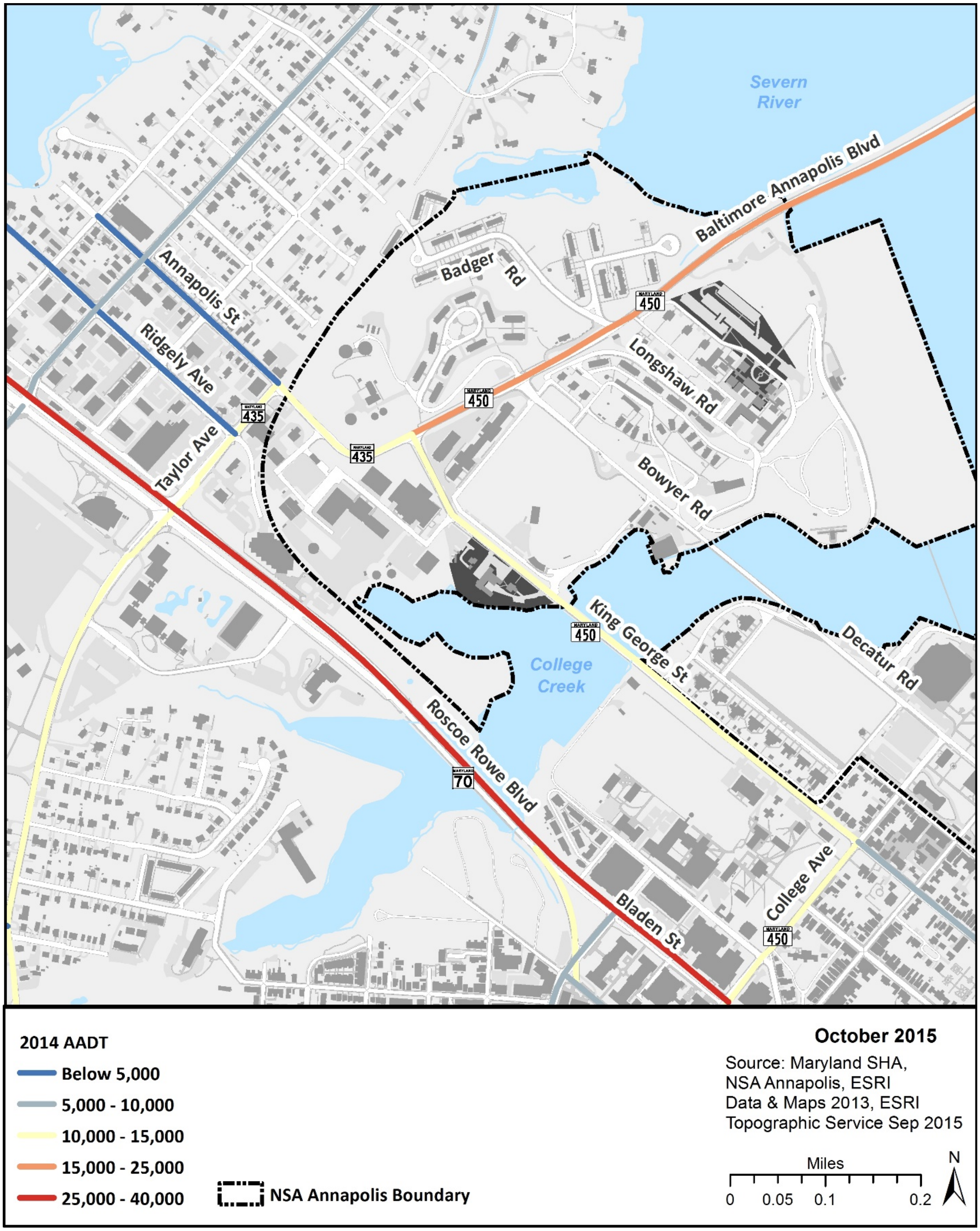


Figure 3-3 Annual Average Daily Traffic Map

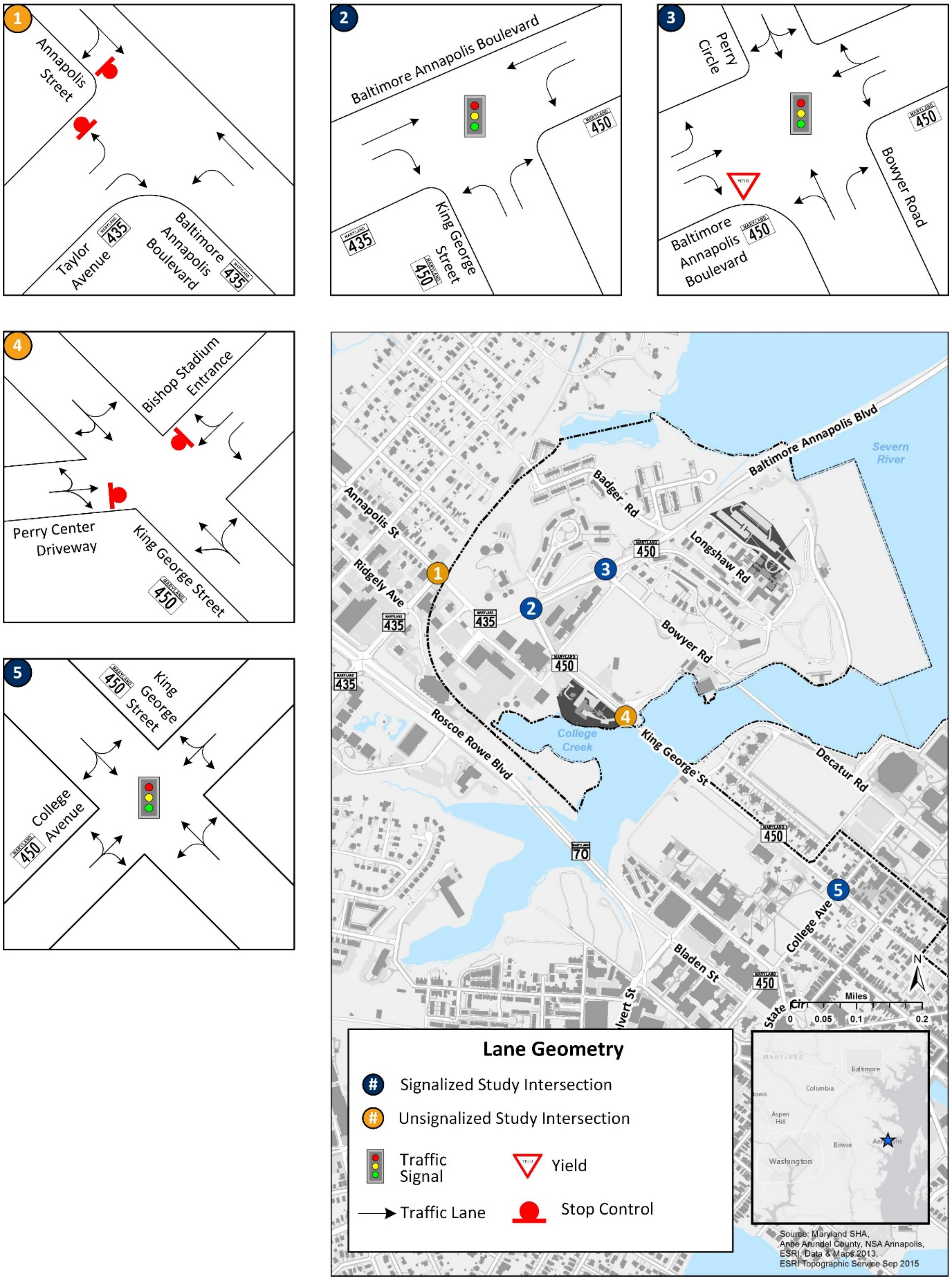


Figure 3-4 Existing Lane Geometry and Traffic Control Type

3.2.2 Data Collection

Vehicular turning movement counts were collected on November 18, 2015, during weekday AM and PM peak hours (7:00 a.m.–10:00 a.m. and 4:00 p.m.–7:00 p.m.), a non-holiday week in mid-November. Vehicular turning movement counts were also collected during the mid-day (11:00 p.m.–1:00 p.m.) on the same day to represent the peak time for event-based traffic.

According to the counts, the AM peak hour occurred between 7:30 a.m.–8:30 a.m., the PM peak period occurred between 4:00 p.m.–5:00 p.m., and the mid-day peak period occurred between 11:30 a.m.–12:30 p.m. These hours reflect the period the combined highest vehicular volume entered all five study area intersections. This is also called the system peak hour for the study area. Figure 3-5 shows the AM, mid-day, and PM peak hours turning movement volumes.

In addition to the vehicular turning movements, an Automatic Traffic Recorder (ATR) was placed along King George Street east of Juniper Street. The ATR captured volumes for 3 consecutive days (72 hours) on November 17, 18, and 19, 2015, recording the volumes each hour. ATR data provide a daily log of traffic highlighting the multiple peak periods and change in vehicle demand at all times during a typical weekday.

Attachment 2 contains the traffic counts obtained covering the five study area intersections and ATR data covering 3 days.

3.2.3 Observations

Observations were acquired while driving through the study area on Tuesday, November 17, during the AM, mid-day, and PM periods, mirroring the same times the traffic counts were obtained. It was observed during the AM peak period that queues were minor, except at the intersection of College Avenue and King George Street where some queues were observed. It was noted that vehicles did not follow the traffic laws at the intersection of Annapolis Street/Baltimore Annapolis Boulevard and Taylor Avenue. Vehicles from the southeast STOP-sign-controlled approach along Annapolis Street did not yield to vehicles making a left turn on the northwest approach along Baltimore Annapolis Boulevard. The Baltimore Annapolis Boulevard approach was not controlled and has the right-of-way over the Annapolis Avenue approach. Many joggers were witnessed along King George Street. Few bicyclists were observed in the study area.

During the mid-day, it was observed that pedestrian activity peaked in the vicinity of College Avenue and Church Circle, and some pedestrian activity was also observed on King George Street near the intersection of Baltimore Annapolis Boulevard.

During the PM peak period, it was observed that vehicular traffic queued along King George Street westbound to the intersection at Baltimore Annapolis Boulevard. Specifically, the queue extended from the right-turn lane and continued onto Baltimore Annapolis Boulevard and queuing into the next intersection at Bowyer Road. Few bicyclists were observed in the study area.

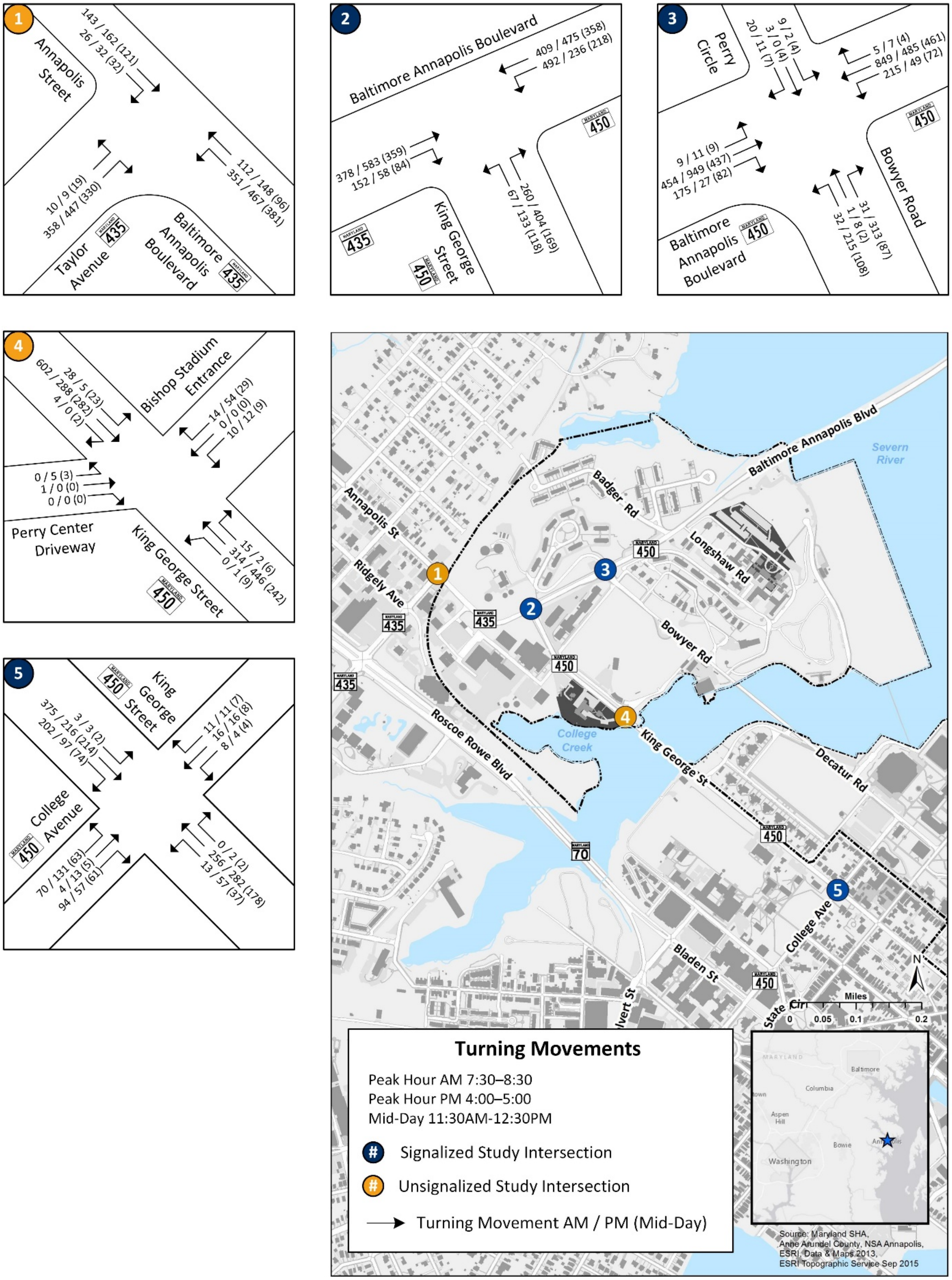


Figure 3-5 Existing AM / PM (Mid-Day) Turning Movements

3.3 Pedestrian Network

The pedestrian network surrounding the proposed USNA AA/F project sites was evaluated for an approximate one-half-mile walking distance from the proposed alternative sites based on the City of Annapolis' Policies and Guidelines for Traffic Impact Analysis recommendation that a 10-minute walk area should be studied (City of Annapolis, 2013). Information was obtained from the Annapolis Comprehensive Plan and the West Annapolis Sector Study. Field observations were also made using Google Earth and a visit of the study area. Figure 3-6 illustrates the pedestrian network surrounding the USNA.

3.3.1 Pedestrian Network Description

The Lower Yard of USNA is a walkable environment with sidewalks and walkways connecting every building. The Upper Yard is also walkable and has sidewalks along many roads and walkways connecting most of the buildings and crosswalks at roads. Pedestrian connections between the Upper and Lower Yards over the College Creek are made via sidewalks on Bowyer Road Bridge or a dedicated pedestrian footbridge (NSA Annapolis, 2012).

The City of Annapolis pedestrian network provides the opportunity for walking around both the core Annapolis city and the suburban areas of West Annapolis. Although the quality of the pedestrian facilities varies throughout the one-half-mile pedestrian analysis area, no major gaps in the network could be identified. All streets within this area have sidewalks on at least one side of the street, and all intersections are equipped with street curb ramps.

Annapolis City to the southwest of the Lower Yard and southeast of College Creek features streets with 6-foot-wide or greater sidewalks, typically on both sides of the street, along with crosswalks and street curb ramps. On-street parking, frequent alleys, driveways, building steps, utility poles and trees at times intrude into the sidewalks, reducing their usefulness. However, no major gaps were identified in the pedestrian network in this area.

West Annapolis, to the northwest of the Upper Yard, was constructed following a grid system of streets in the first half of the twentieth century (Environmental Resources Management, 2015). It offers sidewalks, usually on both sides of the street, which place its commercial and residential buildings within an easy walk from the NSA Annapolis Upper Yard. Although pedestrian facilities are provided on all streets, they are inconsistent, and their quality varies from block to block. In many cases, sidewalks are provided on both sides of a street but not for the entire length of the street. Curb ramps along the same street in some cases are wide with rumble strips, while others are narrow.

The sidewalks in West Annapolis almost universally do not meet Federal Highway Administration (FHWA) requirements for people with disabilities. FHWA guidelines state that sidewalks require a minimum width of 5.0 feet if setback from the curb or 6.0 feet if at the curb face. Any width less than this does not meet the minimum requirements for people with disabilities (FHWA, 2006). Almost all of the sidewalks in West Annapolis are 4 feet wide if set back from the curb or no more than 5 feet wide if at the curb. In many cases, sidewalks are 4 feet wide and at the curb. However, the minimal amount of through vehicular traffic alleviates this deficiency and the inconsistencies in the quality of the pedestrian facilities.

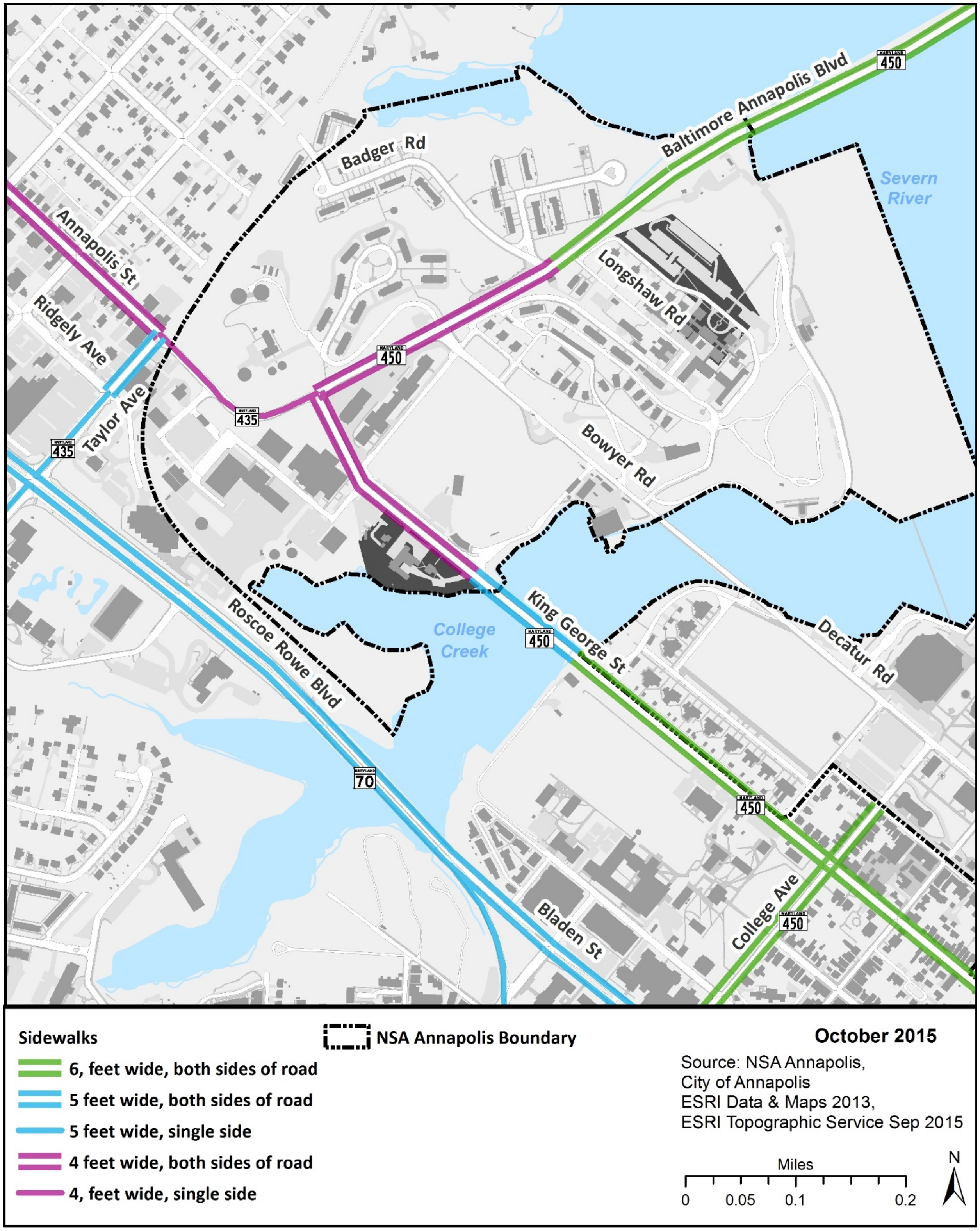


Figure 3-6 Pedestrian Facilities

The weakest portion of the pedestrian network external to USNA within the one-half-mile pedestrian analysis area is found immediately surrounding the project locations and the Upper Yard. In this location, northwest of College Creek, the arterial roads of Baltimore Annapolis Boulevard, Taylor Avenue, and King George Street all converge along the USNA to create an area with high traffic and cramped streets and sidewalks. Although all of these roads have sidewalks, usually on both sides, they have no shoulders. Sidewalk widths are a narrow—4 to 5 feet wide—and are not separated from the travel lanes by a buffer, resulting in the sidewalks not meeting FHWA guidelines for people with disabilities (FHWA, 2006) Provision of crosswalks at intersections is not universal, and although all intersections have curb ramps, they do not have rumble strips. The most pedestrian friendly section of this area is along Baltimore Annapolis Boulevard toward the Naval Academy Bridge, which has 6-foot-wide sidewalks.

3.3.2 Pedestrian Network Use

Counts of pedestrians entering gates indicate that walking is relied on by many people to commute to the USNA daily. Gate 3, located in pedestrian friendly downtown Annapolis, records around 500 people daily entering the Lower Yard. About 180 people enter the USNA at Gate 8 in the Upper Yard. The West Annapolis Sector Study also documented pedestrians at intersections during the PM peak period. It determined that 41 to 90 pedestrians crossed at the intersection of Bowyer Street and Baltimore Annapolis Boulevard, near Gate 8 (NSA Annapolis, 2012).

Despite these strong numbers, it is unknown how many commuters walk to the USNA. Counts in the area of Gate 8 likely consist of people entering the Academy from USNA housing to the northwest of Baltimore Annapolis Boulevard. Counts taken at the intersection of King George Street and Baltimore Annapolis Boulevard and the intersection of Taylor Avenue and Baltimore Annapolis Boulevard are a more reliable measure because they are not routes to USNA housing and thus would only include external commuters. Respectively, these counts were 11 to 20 and 0 to 10, suggesting that the number of walking commuters to the USNA is relatively low (Environmental Resources Management, 2015).

3.4 Bicycle Network

Analysis of the bicycle network surrounding the proposed USNA AA/F project sites was made for an approximate 1-mile ride distance, based on the City of Annapolis Policies and Guidelines for Traffic Impact Analysis recommendation that a 10-minute ride area should be studied (City of Annapolis, 2013). Information was obtained from the City of Annapolis Bicycle Map, Bicycle Trail Website, Bicycle Plan and the West Annapolis Sector Study. Field observations were also made using Google Earth and a visit to the study area.

3.4.1 Bicycle Network Description

Bicycle facilities in the bicycle study area, whether on street lanes or trails, are isolated from each other and the USNA by roads with narrow shoulders or on-street parking. In the West Annapolis neighborhood, Melvin Avenue, northeast of Annapolis Avenue, has bicycle lanes on both sides of the road. Naval Academy Bridge on Baltimore Annapolis Boulevard features bicycle lanes on both sides of its road, but these do not continue off the bridge. About three-quarters of a mile west of the USNA, there are two multi-use trails—the Navy-Marine Corps Memorial Stadium Trail and the Poplar Trail. The Navy-Marine Corps Memorial Stadium rail encircles the property of the Navy-Marine Corps Memorial Stadium, while Popular Trail is a linear park on the former Baltimore and Annapolis Railroad Route (City of Annapolis, n.d.). Although important for recreation, neither one is linked to the USNA by roads with good characteristics for bicycling. Baltimore Annapolis Boulevard is signed as a bicycle route south of the Severn River; however, it is not clear where or if the routes continue beyond the intersection with Taylor Avenue.

At the USNA, commuters and residents are permitted to ride bicycles in both the Upper and Lower Yards, and bicycle racks and storage areas can be found at most buildings. Midshipmen are not permitted to ride bicycles in those areas, except outside the gates. No marked bicycle lanes or trails are located in the Upper or Lower Yards because of the presence of parking spaces and limited right-of-way, but bicyclists can share the streets with cars.

The bicycle study area in the City of Annapolis outside the USNA consists mostly of streets where bicyclists must share the road with cars. Oftentimes these streets have narrow shoulders, no shoulders, or on-street parking, limiting the ability of cyclists to avoid riding in travel lanes. Connectivity is an issue, because bicycle lanes are usually isolated, as are bicycle trails, and connecting bicycle routes are not marked or easily identified.

The streets in downtown Annapolis to the southwest of the Lower Yard and to the southeast of College Creek universally lack bicycle lanes and shoulders. These roads are two lanes, paved or cobblestone, with well-used, on-street parking. Many of them are narrow and have limited lane space for cars or bicyclists. Both major through routes in the area—King George Street and College Avenue—have either side on-street parking or one side on-street parking with no shoulders.

In the area surrounding the Upper Yard and northwest of College Creek, outside downtown Annapolis, conditions are largely the same for on-street bicycle facilities. The two links across College Creek between the Upper Yard area and downtown, King George Street, and Rowe Boulevard do not have bicycle lanes, although Rowe Boulevard offers shoulders. All other major streets around the Upper Yard, including Taylor Ave and Baltimore Annapolis Boulevard, do not have bicycle lanes or shoulders; however, the lack of on-street parking on roads surrounding the Upper Yard helps improve the bicycle environment. Figure 3-7 shows the existing bicycle facilities.

3.4.2 Bicycle Use

The NSA Annapolis Installation Master Plan noted that bicycle racks and storage at buildings on the USNA are well used, indicating that despite surrounding roads that are not optimal for bicycling, commuting by bicycle is already taking place (NSA Annapolis, 2012)). During a site visit in November 2015, during peak hours, College Avenue, Baltimore Annapolis Road and King George Street in the area of USNA bicyclists were observed. Bicyclists were found using College Avenue in downtown Annapolis near the Lower Yard, but only one was found in the area of the Upper Yard, using King George Street.

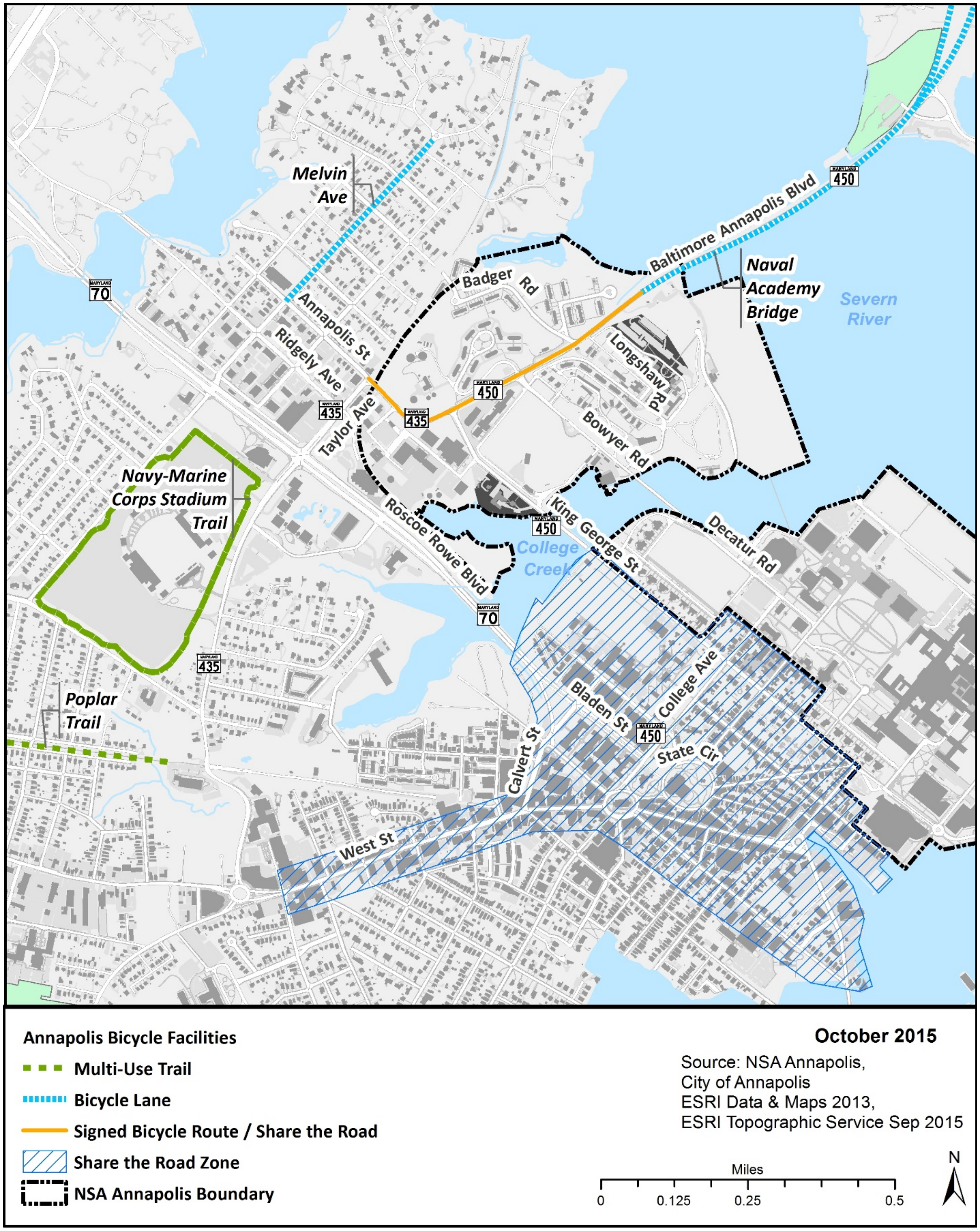


Figure 3-7 Bicycle Facilities

3.5 Public Transit

The assessment of public transit conditions was completed during November of 2015 and reflects the data available at the time. Annapolis transit schedules referenced were effective November 2015, Maryland Transit Administration (MTA) local bus schedules referenced were effective August 2015, and MTA commuter bus schedules were effective June of 2015. Ridership data reflected the most recent data available for the study area but, in some cases, do not reflect the most recent route adjustments. Although the region in general has a wide variety of public transit options, the only mode directly serving Annapolis is bus.

3.5.1 Bus

A variety of bus options are available in the City of Annapolis. Local service within the city limits and its immediate suburbs is provided by the City of Annapolis, Annapolis Transit. The MTA operates the local service between the City of Annapolis and Baltimore. Commuter bus service between the City of Annapolis and Washington, D.C., is provided by the MTA, operated under a contract with Dillon's Bus Service.

3.5.1.1 Annapolis Transit Local Bus Service

The core of Annapolis Transit's routes serve the downtown, and suburbs to the southwest and northwest. Service to the project area is provided by the Gold Route, which operates from Edgewater to Anne Arundel Community College via the downtown. Near the USNA, Gold Route operates on Taylor Avenue and Baltimore Annapolis Boulevard, stopping near Gate 8 and the intersection of Baltimore Annapolis Boulevard and King George Street.

The Gold Route is one of Annapolis Transit's least busy corridors. Service is provided in the study area daily between 6:40 a.m. and 6:40 p.m. for northbound buses and between 7:15 a.m. and 7:15 p.m. for southbound buses. Headways are infrequent with buses running every 2 hours all day. No current ridership records were available for the Gold Route, but statistics for its predecessor route in the study area, the C-40, show a ridership of about 40 passengers per day (MTA, 2010).

Connections are available from the Gold Route to three other Annapolis Transit routes at Church Circle, including the Orange Route (downtown to Forest Drive), Green Route (Westfield Mall to Eastport), and Purple Route (Westfield Mall Loop). All of these routes provide service frequencies between 30 minutes and 1 hour and 15 minutes. However, the Orange Route does not operate on weekends; the Purple Route only operates during the evenings on weekdays and Saturdays and has all day service on Sundays (Annapolis Transit, 2014). Connections to commuter busses are available at the intersection of Rowe Boulevard and Taylor Avenue. Table 3-1 contains a summary of Annapolis transit local bus service. Figure 3-8 shows the Annapolis Transit local bus service routes.

Table 3-1 Annapolis Transit Local Bus Service Summary

Route Name	*Route Endpoints*	*Headway (during hours of operation)*	*Service Hours for Study Area*
Gold	Edgewater to Anne Arundel Community College	2 hours	Weekdays and weekends: northbound 6:40 a.m.–6:40 p.m. Weekdays and weekends: southbound 7:15 a.m.–7:15 p.m.
Connections at Church Circle			***Service Hours for at Church Circle Connection***
Orange	Downtown to Forest Drive	45 minutes	Monday to Friday: looping route 6:05 a.m.–6:50 p.m.
Greene	Westfield Mall to Eastport	30 minutes	Monday to Saturday: eastbound 5:45 a.m.–6:45 p.m. Monday to Saturday: westbound 5:40 a.m.–6:40 p.m.
Purple	Westfield Mall Loop	1 hour, 15 minutes	Monday to Saturday: northbound 7:25 p.m.–9:55 p.m. Sunday: northbound 8:10 a.m.–7:25 p.m. Monday to Saturday: southbound 7:05 p.m.–9:35 p.m. Sunday: southbound 7:50 a.m.–7:05 p.m.

Source: (Annapolis Transit, 2014)

3.5.1.2 Maryland Transit Administration Local Bus Service

MTA operates a single local bus route to Annapolis. This is the Route 14 local bus that connects Annapolis to the Baltimore Light Rail Patapsco Station. Route 14 passes through the study area on Taylor Avenue and Baltimore Annapolis Boulevard. Stops near the project sites are shared with the Annapolis Transit Gold Route: near Gate 8 and the intersection of Baltimore Annapolis Boulevard and King George Street.

Route 14 buses duplicate the route of the Annapolis Transit's Gold Route local bus between West Annapolis and the Church Circle in the downtown, increasing the density of bus service along this corridor and, thus, to the USNA. Service is provided in the study area daily between 5:30 a.m. and 11:30 p.m. for northbound buses and between 6:20 a.m. and 12:50 a.m. for southbound buses. Saturday hours extend from 8:00 a.m. to 11:05 p.m. for northbound busses and from 8:00 a.m. to 11:46 p.m. for southbound busses. Service hours on Sunday are limited. Headways are 45 minutes or less during peak hours and hourly during off-peak hours (MTA, 2015). Use of the two stops in the study area is light; boarding and alighting data indicate only 11 passenger per day (MTA, 2015).

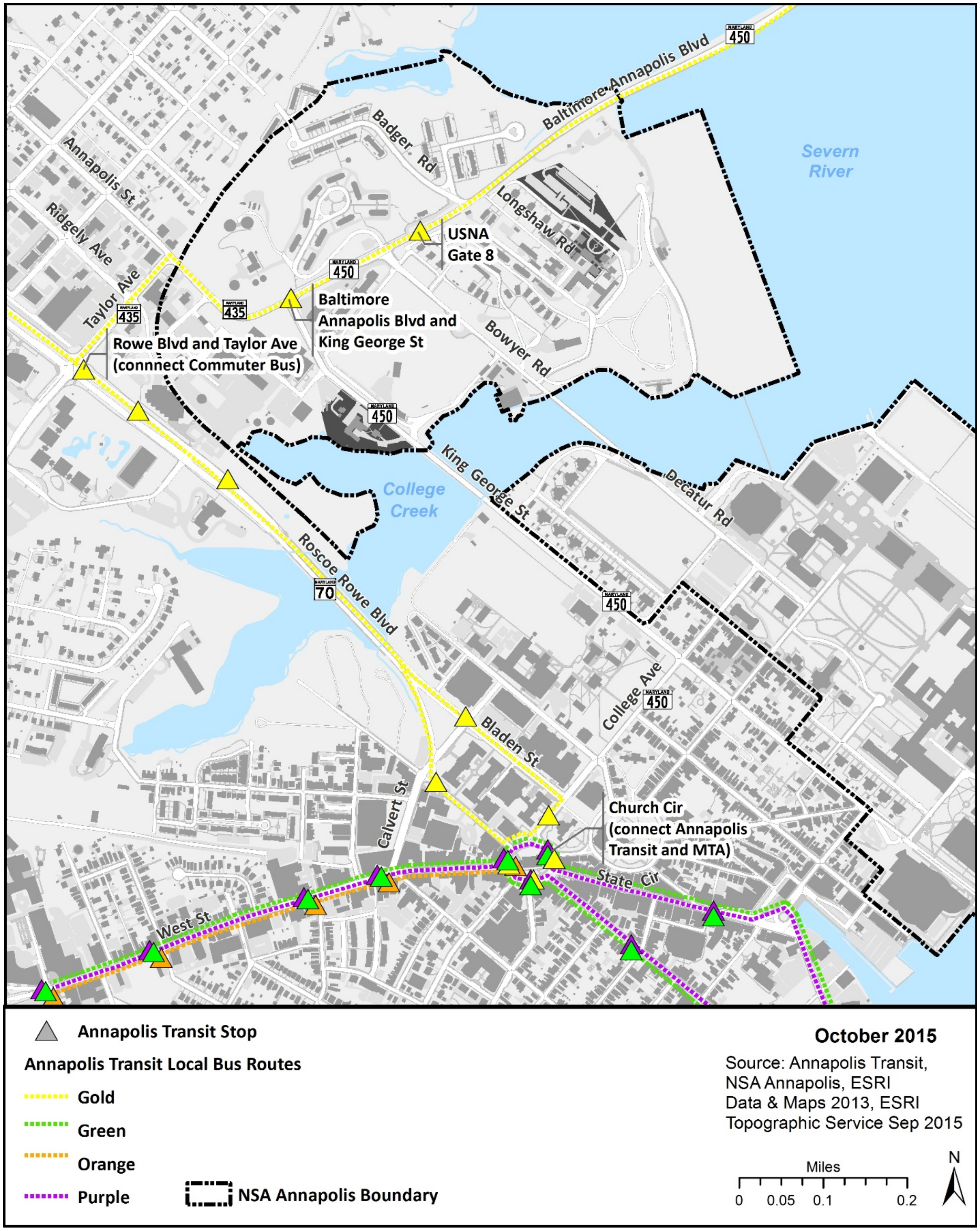


Figure 3-8 Annapolis Transit Local Bus Route Map

Connections can be made from the Route 14 local bus at Church Circle to Annapolis Transit Routes, including the Orange Route (downtown to Forest Drive), the Greene Route (Westfield Mall to Eastport) and the Purple Route (Westfield Mall Loop). Connections to commuter buses can be made at the intersection of Rowe Boulevard and Taylor Avenue. Table 3-2 contains a summary of the MTA local bus service. Figure 3-9 contains the MTA local bus routes.

Table 3-2 MTA Local Bus Service Summary

Route Name	*Route Endpoints*	*Headway (during peak hours of operation)*	*Service Hours for Study Area*
14	Annapolis to Patapsco Light Rail	45 minutes	Weekdays: northbound 5:30 a.m.–11:30 p.m. Weekdays: southbound 6:20 a.m.–12:50 a.m. Weekends: northbound 8:00 a.m.– 11:05 p.m. Weekends: southbound 8:00 a.m.–11:46 p.m.

Source: (MTA, 2015)

3.5.1.3 Maryland Transit Administration Commuter Bus Service

MTA provides two commuter bus routes between Annapolis and Washington, D.C., Routes 220 and 230. Buses are operated under a contract by Dillon's Bus Service. These routes contain stops within 0.25 miles of the study area and can be reached via connections with the MTA Route 14 local bus or the Annapolis Transit Gold Route at Rowe Boulevard and Taylor Avenue.

These commuter bus services operate during peak hours, inbound toward Washington in the morning and outbound toward Annapolis in the evenings. Buses leave from the transfer point on Rowe Boulevard and Taylor Avenue between 4:50 a.m. and 7:25 a.m. in the mornings and arrive from Washington in the evenings between 1:49 p.m. and 7:50 p.m. Each route operates with 30-minute headways during peak hours (MTA, 2015). Table 3-3 contains a summary of MTA commuter bus service. Figure 3-9 contains the MTA commuter bus routes.

Table 3-3 MTA Commuter Bus Service Summary

Route Name	*Route Endpoints*	*Headway (during peak hours of operation)*	*Service Hours for Transfer Point to Study Area*
220	Annapolis to Washington, D.C.	30 minutes	Weekdays: westbound 4:55 a.m.–7:25 a.m. Weekdays: eastbound 4:28 p.m.–7:28 p.m.
230	Annapolis to Washington, D.C.	30 minutes	Weekdays: westbound 5:10 a.m.–7:10 a.m. Weekdays: eastbound 1:49 p.m.–7:49 p.m.

Source: (MTA, 2015)

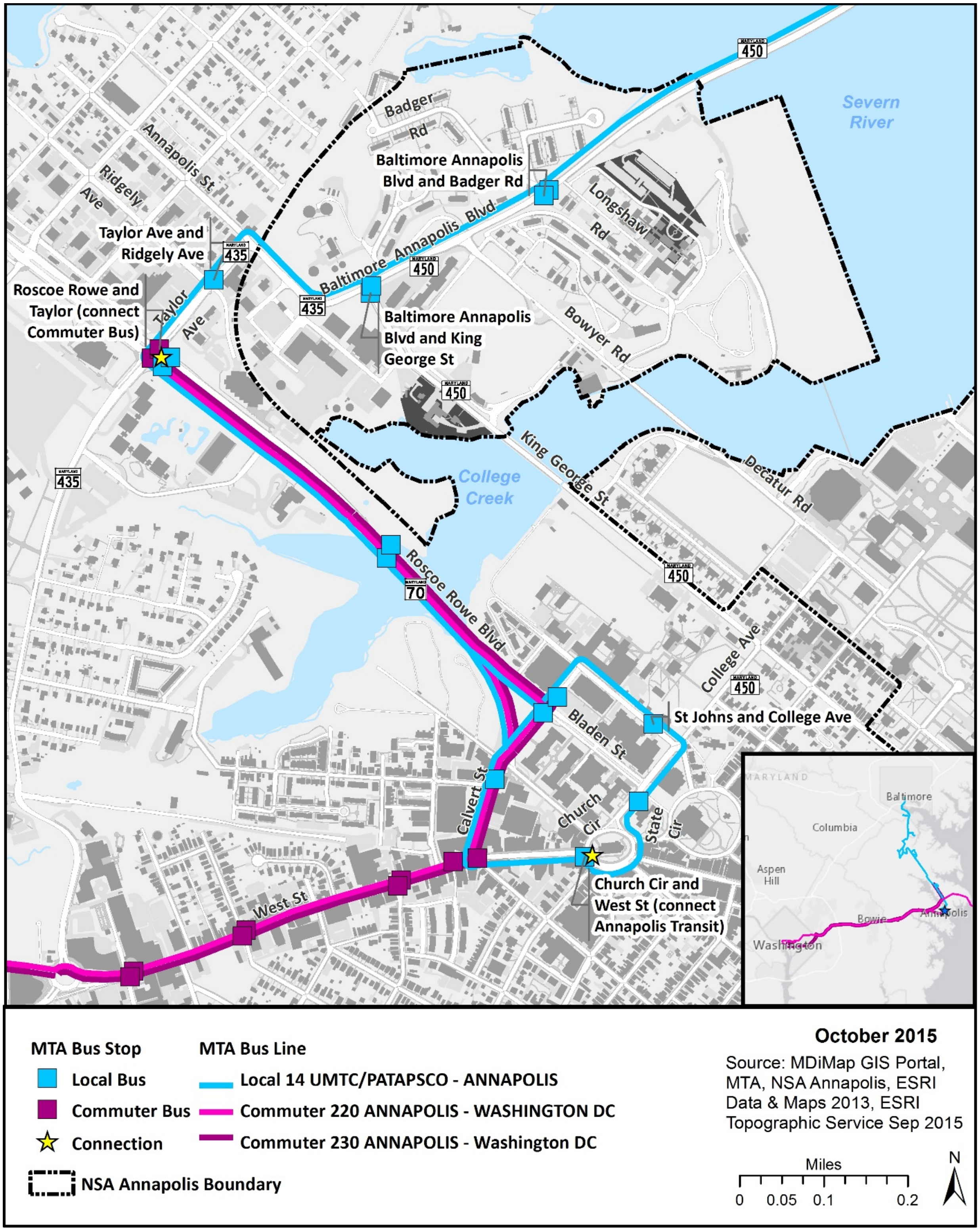


Figure 3-9 MTA Local and Commuter Bus Route Map

3.6 Parking

The assessment of existing parking conditions was conducted based on data contained in the NSA Annapolis Installation Master Plan, as well as a field count of city parking spaces conducted on September 2, 2015. Many of the streets in downtown Annapolis, including those around some of the existing USNA AA and NAF buildings on College Avenue are limited to resident parking and have 2-hour limits.

Long-term public parking is located along King George Street west of College Avenue. Southeast of College Creek and northwest of Wagner Street, there are 48 parking spaces with 9-hour limits on the north side of King George Street and 41 spaces with 9-hour limits on its south side.

The NSA Annapolis Upper Yard has parking for employees and events. The Perry Center currently has 309 spaces, Bishop Stadium has 86 spaces, Halligan Hall has 175 spaces, and Hospital Point has 97 spaces in its rear parking lot and 274 spaces in its front (NSA Annapolis, 2012). No on-street public parking is available on the streets surrounding the Upper Yard. King George Street, Baltimore Annapolis Boulevard, and Taylor Avenue all have no shoulders or narrow shoulders and no on-street parking. Figure 3-10 shows the existing parking within the study area.

3.7 Traffic Section

This section explains the concepts and definitions for analyzing the traffic operations, the process used to analyze the five study area intersections, and the results.

3.7.1 Analysis Tools

The study analyzed the study area intersections using Synchro™ Traffic Signal Coordination Software Version 8.0 (Build 806, Revision 77) and SimTraffic™ Version 8.0 (Build 806, Revision 77). Three analyses are performed for traffic including an intersection capacity analysis, an intersection queueing analysis, and a travel time analysis. The intersection capacity analysis uses the Synchro™ software tool and various input values as described in the following sections to determine the LOS, or driver perception of an intersection's operation. The intersection capacity analysis results are presented in Section 3.6.3. The intersection queuing analysis uses the Synchro™ tool to determine different levels of queuing, or the length that vehicles may back up at an intersection. The travel time analysis uses the Synchro ™ software tool to determine the travel time along specifically designated routes. The intersection queuing analysis process is described more in Section 3.6.4, the study area results of the queuing analysis are presented in Section 3.6.5, the travel time process is presented in Section 3.6.6, and the travel time results are presented in Section 3.6.7.

3.7.2 Intersection Operations Analysis Method

LOS is the primary measure of traffic operations for both signalized and unsignalized intersections. It is a standard performance measure developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles. LOS provides a scale that is intended to match motorists' perception of how a transportation facility operates and to provide a scale to compare different facilities. Detailed LOS descriptions are presented in Figure 3-11.

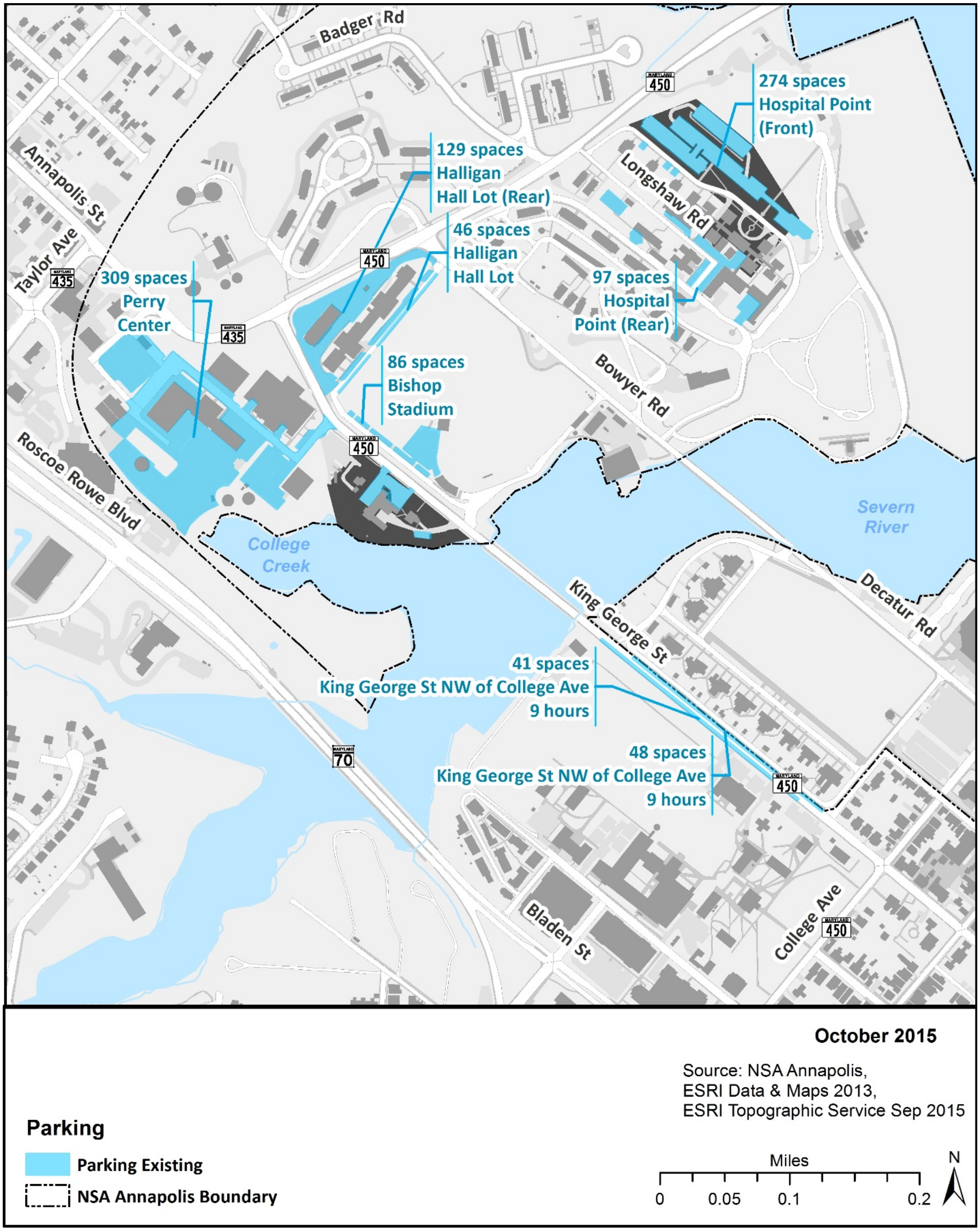


Figure 3-10 Parking Near Project Sites

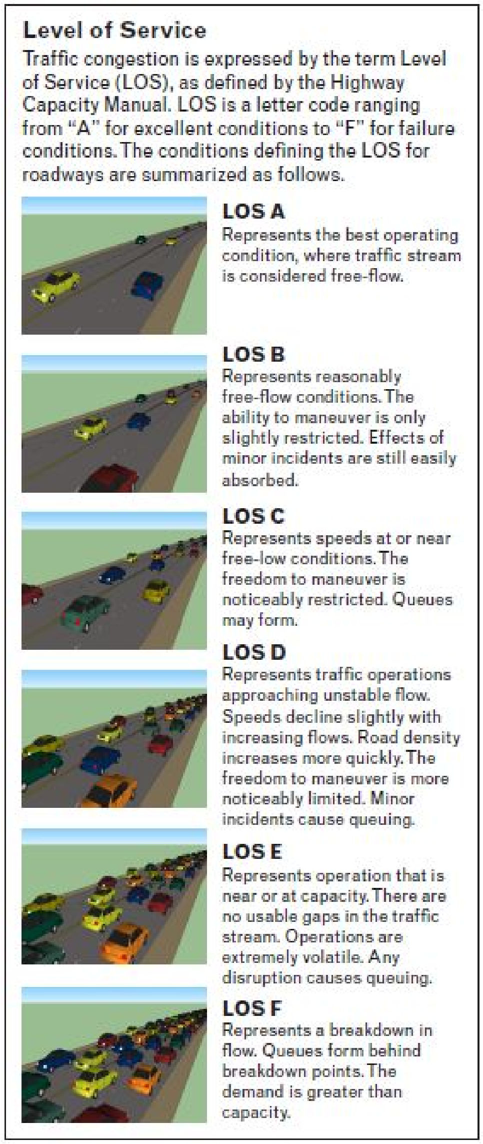


Figure 3-11 Level of Service Diagram

3.7.2.1 Signalized Intersection Level of Service

The LOS for signalized intersections is based on the Highway Capacity Manual (HCM) 2000 method and requires the same inputs to determine an accurate LOS (TRB, 2000). HCM 2010 methods were not followed because the signal timings were not HCM 2010 compliant, for example, signal timings were assigned for pedestrians only. Primary inputs include:

- vehicular volumes
- pedestrian volumes
- traffic signal timings
- roadway geometry
- speed limits
- truck percentages

- peak hour factor (measure of vehicle 15-minute flow rate)

The average vehicle control delay, measured in seconds per vehicle, is calculated using these parameters with the Synchro™ procedures. This represents the average extra delay in seconds per vehicle caused by the presence of a traffic control device or traffic signal and includes the time required to decelerate, stop, and accelerate. The LOS can be characterized for the entire intersection, each intersection approach, and each lane group. Control delay is used to characterize the LOS for the entire intersection or an approach. The control delay and the volume to capacity (v/c) ratio are used to characterize the LOS for a lane group. Delay quantifies the increase in travel time due to a traffic signal control. It is also a surrogate measure for driver discomfort and fuel consumption (TRB 2010). Signalized intersections or approaches that exceed a delay of 50 seconds have LOS E and 80 seconds have LOS F. Table 3-4 shows the average control delay and corresponding LOS for signalized intersections. Using the Synchro™ method, LOS E and LOS F constitute failing operations.

Table 3-4 Signalized Intersection Control Delay and LOS Thresholds – HCM 2010 Method

LOS	*Average Control Delay (seconds/vehicle)*	*Description*
A	Less than or equal to 10	Stable conditions
B	>10–20	
C	>20–35	
D	>35–55	
E	>55–80	Unstable conditions
F	More than 80	Above capacity and unstable conditions

Source: TRB (2010)

To determine the LOS of an intersection, the critical input values were entered into the analysis software (Synchro™), and the average vehicle delay (seconds per vehicle) was calculated. Based on the average vehicle delay, the LOS was determined for all movements (left, though, and right), approaches, and the intersection as a whole. The five existing condition intersections analyzed consisted of three signalized intersections and two unsignalized intersections.

3.7.2.2 Unsignalized Intersection Levels of Service

The LOS for unsignalized intersections (STOP-controlled intersections) is based on HCM 2010 method and requires several inputs, including:

- vehicular volumes
- pedestrian volumes
- roadway geometry
- speed limits
- truck percentages
- peak hour factor

The average vehicle control delay, in seconds per vehicle, is calculated using these parameters with the HCM 2010 procedures (TRB, 2010). This represents the average delay caused by the presence of a stop sign or roundabout and includes the time required to decelerate, stop, and accelerate.

The LOS for a two-way, STOP-controlled (TWSC) intersection (i.e., unsignalized intersection) is determined for each minor-street movement or shared movement as well as the major-street left turns. LOS F is assigned to the movement if the v/c ratio for the movement exceeds 1.0 or if the movement's control delay exceeds 50 seconds. The LOS for TWSC intersections are different from the criteria used for signalized intersections primarily because user perceptions differ among transportation facility types. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will present greater delay than an unsignalized intersection. Unsignalized intersections are also associated with more uncertainty for users because delays are less predictable than at signals, which can reduce users' delay tolerance. LOS is not defined for the TWSC intersection as a whole or for major-street approaches for three primary reasons: (1) major-street through vehicles are assumed to experience zero delay; (2) the disproportionate number of major-street through vehicles at a typical TWSC intersection skews the weighted average of all movements, resulting in a very low overall average delay for all vehicles; and (3) the resulting low delay can mask important LOS deficiencies for minor movements (TRB, 2010).

The capacity of the controlled intersection legs is based primarily on three factors: the conflicting volume, the critical gap time defined as the number of seconds between vehicles passing the same point along the major street approach, and the follow-up time defined as the number of seconds between the departure of the first and second vehicle in queue along the minor street approach. The HCM-based capacity analysis procedure assumes that drivers are both consistent and homogeneous and assumes consistency for their critical gap time. Critical gap times are based on many factors including delay experienced by drivers on the approaches controlled by STOP signs. As delay increases, drivers become less patient and will accept shorter gaps, resulting in higher capacities for unsignalized intersections that are operating at LOS D or worse. The unsignalized intersection procedure uses fixed critical gap times. Unless the critical gap times are adjusted, the procedure will have a tendency to overestimate the delay at unsignalized intersections that are operating at LOS D or worse. Also, poor operations at an unsignalized intersection will encourage some drivers to turn right and make a U-turn on the mainline or accept shorter critical gaps (safety issue) rather than attempt a turn left (TRB 2010).

Table 3-5 shows the average control delay and corresponding LOS for unsignalized intersections. It should be noted that the worst LOS at one-way, STOP-controlled and TWSC intersections represents the delay for the minor approach only. Using the HCM 2010 Method, LOS E and LOS F constitute failing operations.

Table 3-5 Unsignalized Intersection Control Delay and LOS Thresholds—HCM 2010 Method

LOS	***Average Control Delay (seconds/vehicle)***	***Description***
A	Less than or equal to 10	Stable conditions
B	>10–15	
C	>15–25	
D	>25–35	
E	>35–50	Unstable conditions
F	More than 50	Above capacity and unstable conditions

Source: TRB (2010)

3.7.3 Existing Condition Intersection Operations Analysis

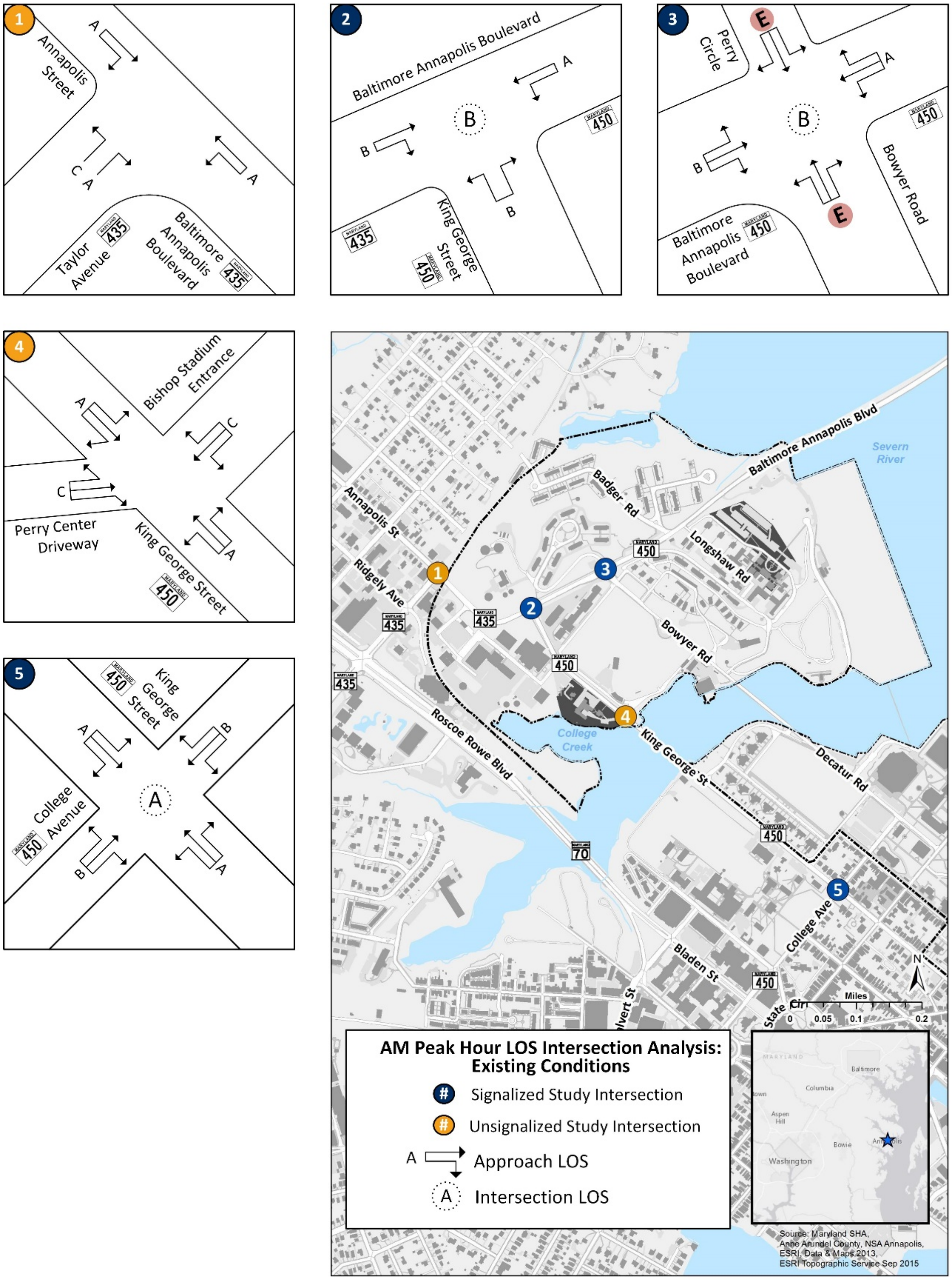
Based on the Synchro™ signalized intersection analysis results, all of the study area intersections operate at overall acceptable conditions during the morning and afternoon peak hours. Operating conditions during mid-day were also acceptable. LOS D or better is considered to be an acceptable operating level.

The following individual intersection approaches that primarily serve the Navy operate under unacceptable conditions during peak hours:

- Northbound at the intersection of Baltimore Annapolis Boulevard and Bowyer Road and Perry Circle (Intersection #3) during the AM and PM peak hours
- Southbound at the intersection of Baltimore Annapolis Boulevard and Bowyer Road and Perry Circle (Intersection #3) during the AM and PM peak hours

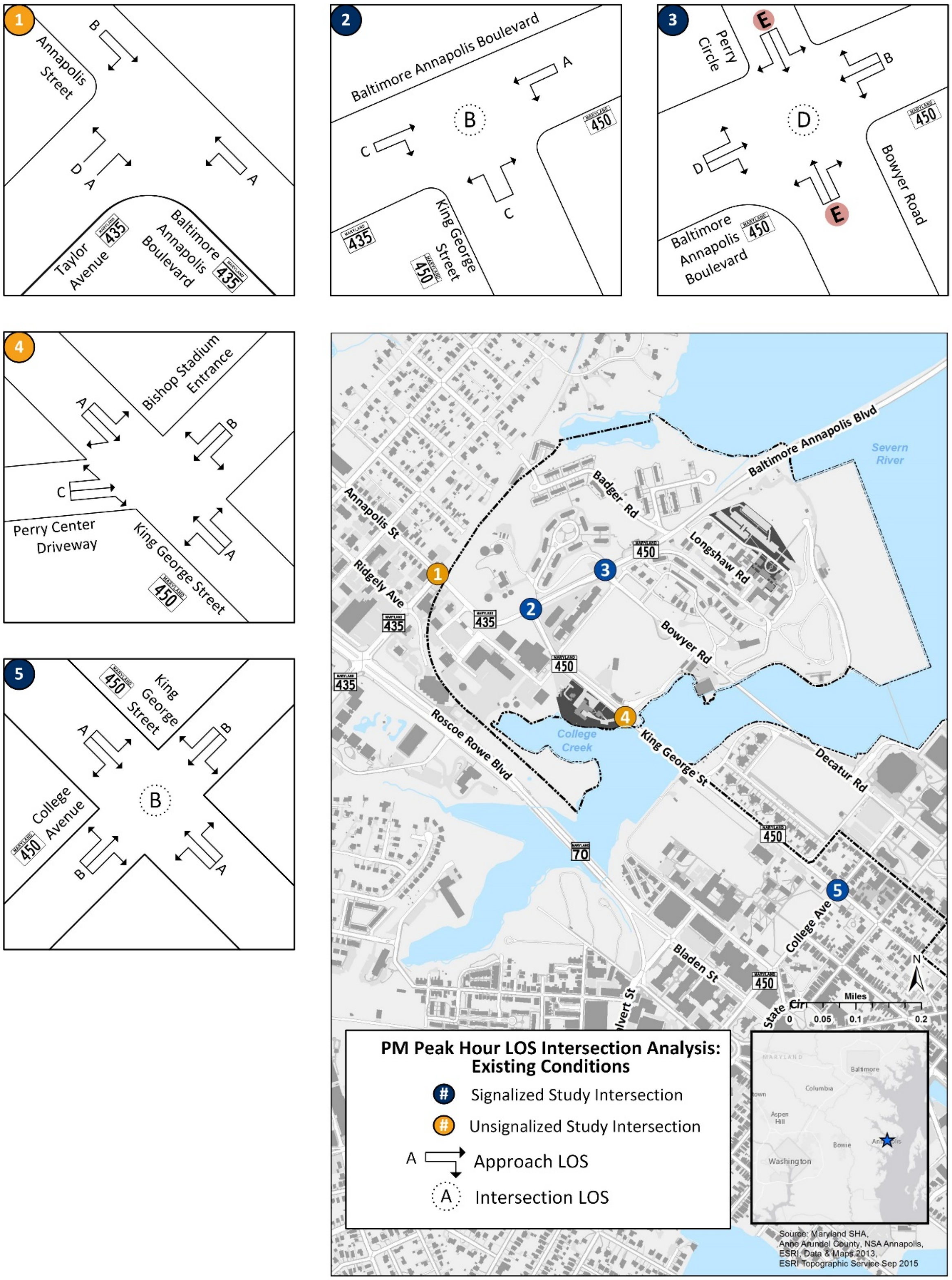
Based on the unsignalized intersection analysis, all approaches operate at acceptable conditions during the peak hours.

The average LOS for the various approaches to the intersection and the overall intersection LOS grade are depicted in Figure 3-12, Figure 3-13, and Figure 3-14 for AM, PM and mid-day peak hours, respectively. Table 3-6 shows the results of the LOS capacity analysis and the intersection vehicle delay for the existing condition during the AM and PM peak hours. Table 3-7 shows the results of the LOS capacity analysis and the intersection vehicle delay for the existing condition during the mid-day peak hour.



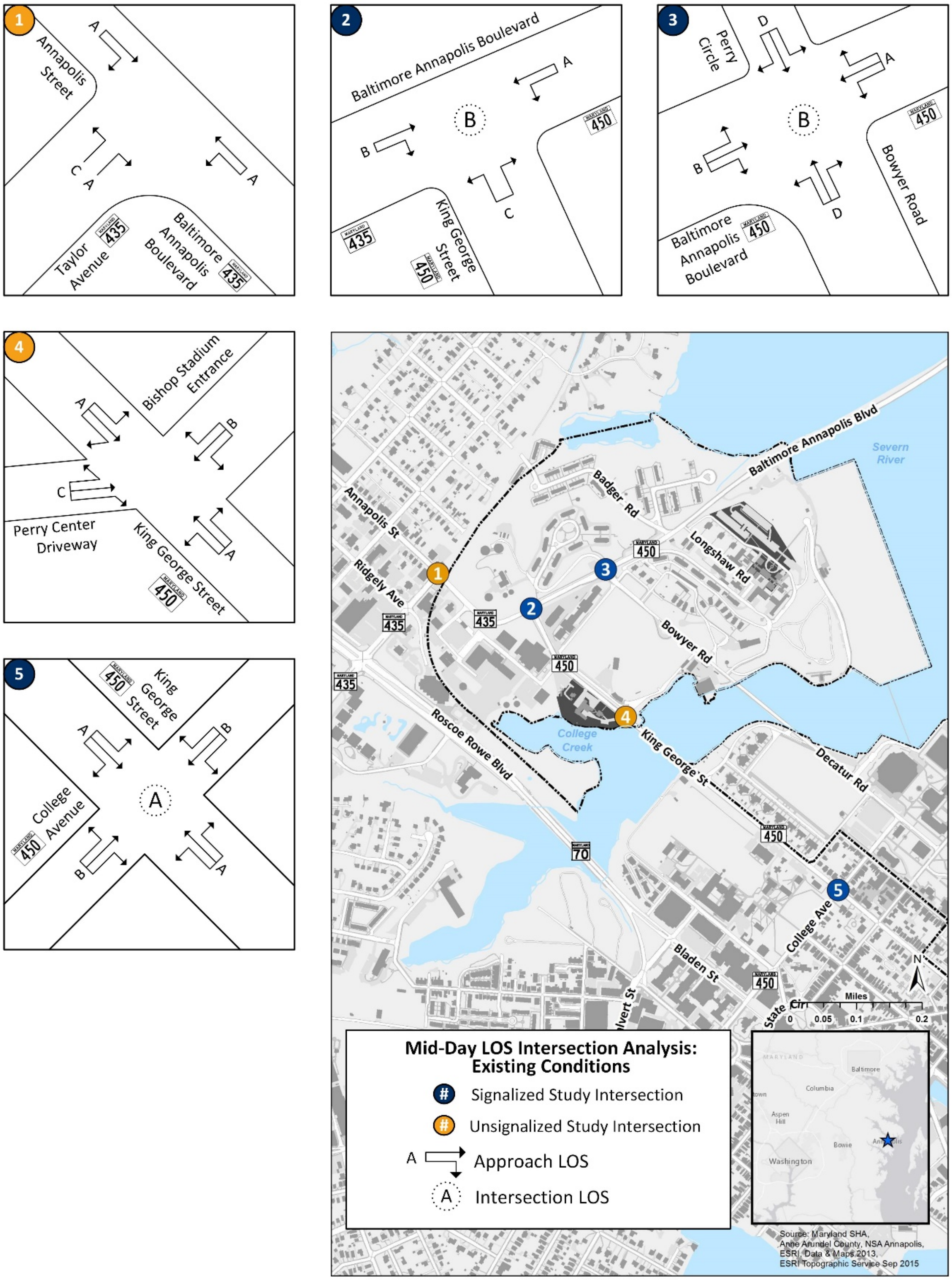
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-12 Existing Condition Intersection LOS (AM Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-13 Existing Condition Intersection LOS (PM Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-14 Existing Condition LOS (Mid-Day)

Table 3-6 Existing Condition AM and PM Peak Hour Operations Analysis

#	*Intersection and Approach*	*Lane Group*	*AM Peak Hour*			*PM Peak Hour*		
			V/C Ratio	*Delay (sec/ veh)*	*LOS*	*V/C Ratio*	*Delay (sec/ veh)*	*LOS*
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)** [a]							
	EB (Annapolis St)	TR	0.19	9.9	A	0.25	10.7	B
	EB Overall (Annapolis St)			**9.9**	**A**		**10.7**	**B**
	WB (Baltimore Annapolis Blvd)	L	-	-	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	-	-	-	-	-	-
	WB Overall (Baltimore Annapolis Blvd)			**-**	**-**		**-**	**-**
	NB (Taylor Avenue)	L	0.04	18.3	C	0.06	26.9	D
	NB (Taylor Avenue)	R	-	0.0	A	-	0.0	A
	NB Overall (Taylor Avenue)			**18.3**	**C**		**26.9**	**D**
	Overall			**2.9**	**-**		**2.8**	**-**
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)** [b]							
	EB (Baltimore Annapolis Blvd)	T	0.55	21.4	C	0.68	20.9	C
	EB (Baltimore Annapolis Blvd)	R	0.11	15.2	B	0.04	11.4	B
	EB Overall (Baltimore Annapolis Blvd)			**19.6**	**B**		**20.0**	**C**
	WB (Baltimore Annapolis Blvd)	L	0.75	12.6	B	0.53	10.5	B
	WB (Baltimore Annapolis Blvd)	T	0.34	6.4	A	0.40	7.3	A
	WB Overall (Baltimore Annapolis Blvd)			**9.8**	**A**		**8.4**	**A**
	WB (King George St)	L	0.22	28.1	C	0.42	33.6	C
	WB (King George St)	R	0.37	14.3	B	0.73	29.7	C
	WB Overall (King George St)			**17.1**	**B**		**30.6**	**C**
	Overall			**14.1**	**B**		**18.6**	**B**
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)** [b]							
	EB (Baltimore Annapolis Blvd)	L	0.02	7.7	A	0.02	13.8	B
	EB (Baltimore Annapolis Blvd)	T	0.38	10.9	B	0.90	41.3	D
	EB (Baltimore Annapolis Blvd)	R	0.13	8.5	A	0.02	13.7	B
	EB Overall (Baltimore Annapolis Blvd)			**10.2**	**B**		**40.3**	**D**
	WB (Baltimore Annapolis Blvd)	L	0.32	5.1	A	0.37	37.1	D
	WB (Baltimore Annapolis Blvd)	TR	0.60	8.1	A	0.42	13.6	B
	WB Overall (Baltimore Annapolis Blvd)			**7.5**	**A**		**15.7**	**B**
	NB (Bowyer Rd)	LT	0.39	67.2	E	0.91	103.4	F
	NB (Bowyer Rd)	R	0.02	53.0	D	0.58	61.8	E
	NB Overall (Bowyer Rd)			**60.3**	**E**		**79.2**	**E**
	SB (Perry Cir)	LTR	0.15	63.3	E	0.01	57.4	E
	SB Overall (Perry Cir)			**63.3**	**E**		**57.4**	**E**
	Overall			**11.3**	**B**		**44.0**	**D**

Table 3-6 Existing Condition AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour V/C Ratio	AM Peak Hour Delay (sec/veh)	AM Peak Hour LOS	PM Peak Hour V/C Ratio	PM Peak Hour Delay (sec/veh)	PM Peak Hour LOS
4	**King George Street & Perry Center & Bishop Stadium (TWSC) [a]**							
	EB (Perry Center)	LTR	0.01	23.3	C	0.03	23.2	C
	EB Overall (Perry Center)			**23.3**	**C**		**23.2**	**C**
	WB (Bishop Stadium)	L	0.07	27.0	D	**0.06**	**20.5**	**C**
	WB (Bishop Stadium)	TR	0.02	10.6	B	0.13	13.0	B
	WB Overall (Bishop Stadium)			**17.4**	**C**		**14.4**	**B**
	WB (King George St)	LTR	-	0.0	A	0.00	8.0	A
	WB Overall (King George St)			**0.0**	**-**		**0.0**	**-**
	EB (King George St)	LTR	0.03	8.1	A	0.01	8.6	A
	EB Overall (King George St)			**0.4**	**-**		**0.1**	**-**
	Overall			**0.7**	**-**		**1.3**	**-**
5	**College Avenue & King George Street (Signalized) [b]**							
	EB (King George St)	LTR	0.58	8.2	A	0.39	8.2	A
	EB Overall (EB King George St)			**8.2**	**A**		**8.2**	**A**
	WB (King George St)	LTR	0.28	5.8	A	0.50	9.2	A
	WB Overall (King George St)			**5.8**	**A**		**9.2**	**A**
	NB (College Ave)	LTR	0.37	18.1	B	0.57	18.6	B
	NB Overall (College Ave)			**18.1**	**B**		**18.6**	**B**
	SB (College Ave)	LTR	0.09	15.7	B	0.06	13.3	B
	SB Overall (College Ave)			**15.7**	**B**		**13.3**	**B**
	Overall			**9.4**	**A**		**11.1**	**B**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2010 results

[b] Highway Capacity Software 2000 results

Table 3-7 Existing Condition Mid-Day Operations Analysis

#	Intersection and Approach	Lane Group	Mid-Day V/C Ratio	Mid-Day Delay (sec/veh)	Mid-Day LOS
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC) [a]**				
	EB (Annapolis St)	TR	0.18	9.6	A
	EB Overall (Annapolis St)			**9.6**	**A**
	WB (Baltimore Annapolis Blvd)	L	-	-	-
	WB (Baltimore Annapolis Blvd)	T	-	-	-
	WB Overall (Baltimore Annapolis Blvd)			-	-
	NB (Taylor Avenue)	L	0.08	20.1	C
	NB (Taylor Avenue)	R	-	0.0	A
	NB Overall (Taylor Avenue)			**20.1**	**C**
	Overall			**2.9**	-
2	**King George Street & Baltimore Annapolis Boulevard (Signalized) [b]**				
	EB (Baltimore Annapolis Blvd)	T	0.45	12.9	B
	EB (Baltimore Annapolis Blvd)	R	0.06	9.1	A
	EB Overall (Baltimore Annapolis Blvd)			**12.2**	**B**
	WB (Baltimore Annapolis Blvd)	L	0.43	6.4	A
	WB (Baltimore Annapolis Blvd)	T	0.34	6.4	A
	WB Overall (Baltimore Annapolis Blvd)			**6.4**	**A**
	WB (King George St)	L	0.41	26.5	C
	WB (King George St)	R	0.36	17.8	B
	WB Overall (King George St)			**21.4**	**C**
	Overall			**11.7**	**B**
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized) [b]**				
	EB (Baltimore Annapolis Blvd)	L	0.02	11.0	B
	EB (Baltimore Annapolis Blvd)	T	0.44	15.7	B
	EB (Baltimore Annapolis Blvd)	R	0.06	11.3	B
	EB Overall (Baltimore Annapolis Blvd)			**15.0**	**B**
	WB (Baltimore Annapolis Blvd)	L	0.14	8.0	A
	WB (Baltimore Annapolis Blvd)	TR	0.40	9.6	A
	WB Overall (Baltimore Annapolis Blvd)			**9.4**	**A**
	NB (Bowyer Rd)	LT	0.63	56.6	E
	NB (Bowyer Rd)	R	0.06	39.1	D
	NB Overall (Bowyer Rd)			**48.9**	**D**
	SB (Perry Cir)	LTR	0.04	45.0	D
	SB Overall (Perry Cir)			**45.0**	**D**
	Overall			**18.2**	**B**

Table 3-7 Existing Condition Mid-Day Operations Analysis (continued)

#	Intersection and Approach	Lane Group	Mid-Day V/C Ratio	Mid-Day Delay (sec/veh)	Mid-Day LOS
4	**King George Street & Perry Center & Bishop Stadium (TWSC)** [a]				
	EB (Perry Center)	LTR	0.01	17.1	C
	EB Overall (Perry Center)			**17.1**	**C**
	WB (Bishop Stadium)	L	0.03	15.2	C
	WB (Bishop Stadium)	TR	0.04	10.0	B
	WB Overall (Bishop Stadium)			**11.2**	**B**
	WB (King George St)	LTR	0.01	7.9	A
	WB Overall (King George St)			**0.3**	**-**
	EB (King George St)	LTR	0.02	7.9	A
	EB Overall (King George St)			**0.6**	**-**
	Overall			**1.2**	**-**
5	**College Avenue & King George Street (Signalized)** [b]				
	EB (King George St)	LTR	0.32	6.1	A
	EB Overall (EB King George St)			**6.1**	**A**
	WB (King George St)	LTR	0.27	5.9	A
	WB Overall (King George St)			**5.9**	**A**
	NB (College Ave)	LTR	0.33	16.7	B
	NB Overall (College Ave)			**16.7**	**B**
	SB (College Ave)	LTR	0.05	14.5	B
	SB Overall (College Ave)			**14.5**	**B**
	Overall			**8.4**	**A**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2010 results

[b] Highway Capacity Software 2000 results

3.7.4 Intersection Queuing Analysis Method

In addition to analyzing the vehicle delay, the vehicle queue lengths were calculated for each approach. The 50th percentile queue length is average queue length, calculated as the queue expected during 50 percent of the analysis period. The 95th percentile queue length is the worst-case scenario, calculated as the queue that has a 5 percent probability of being exceeded. A failing queue length is determined by a queue length exceeding the intersection approach storage capacity. As the available storage for each intersection approach differs, these values reflect whether the existing storage provides enough space for vehicles waiting to pass through the intersection without blocking another lane or another intersection. Because failing queues might occur along the same approach as a failing LOS, these values are calculated independently and might result in one approach receiving a failing LOS score, while another approach has a failing queue length. The study used Synchro™ to calculate both the 50th and 95th percentile queue lengths for the three signalized intersections, and only the 95th percentile queue lengths for the two unsignalized intersection (50th percentile not reported in Synchro™ for unsignalized intersections).

3.7.5 Existing Condition Intersection Queueing Analysis

Based on the Synchro™ results, the only intersection to receive failing queue lengths is the intersection of Bowyer Road and Perry Circle with Baltimore Annapolis Boulevard (Intersection #3), and only during the PM peak hour at the 95th percentile. The Baltimore Annapolis Boulevard eastbound through approach had a 95th percentile length of 1,443 feet, exceeding its 597-foot storage capacity. The Bowyer Road northbound left and through approach had a 95th percentile queue length of 441 feet, also exceeding its 433-foot storage capacity. All of the results are depicted below in Tables 3-8 and 3-9.

3.7.6 Travel Time Method

Travel time runs were acquired on Tuesday, November 17, during the morning (7:00 a.m.–9:00 a.m.), mid-day (11:00 a.m.–1:00 p.m.), and evening (4:00 p.m.–6:00 p.m.). The runs followed two routes both sharing King George Street. The first run followed King George Street starting east of College Avenue, turned left at Baltimore Annapolis Boulevard, turned left at Taylor Avenue, and ended at Ridgely Avenue. This route was assigned the name of southern route. The second run followed King George Street starting east of College Avenue, turned right onto Baltimore Annapolis Boulevard, and ended at Badger Road. This route was assigned the name of northern route.

A total of 27 roundtrip travel time runs was performed covering the three periods and the northern and southern routes. Six round-trip travel time runs were performed on the southern route during each period, totaling 18 round-trip runs along the route. Three round-trip travel time runs were performed on the northern route during each period, totaling nine round-trip runs along the route. Figure 3-15 shows the two travel time routes.

Table 3-8 Existing Condition AM and PM Peak Hours Queuing Analysis

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	AM Peak Hour		PM Peak Hour	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)**						
	EB (Annapolis St)	TR	521	-	18	-	25
	WB (Baltimore Annapolis Blvd)	L	376	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	376	-	-	-	-
	NB (Taylor Avenue)	L	359	-	3	-	5
	NB (Taylor Avenue)	R	359	-	-	-	-
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)**						
	EB (Baltimore Annapolis Blvd)	T	471	147	270	261	399
	EB (Baltimore Annapolis Blvd)	R	471	0	40	0	20
	WB (Baltimore Annapolis Blvd)	L	450	97	156	44	71
	WB (Baltimore Annapolis Blvd)	T	597	80	125	110	165
	WB (King George St)	L	400	29	64	71	128
	WB (King George St)	R	375	84	116	205	314
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)**						
	EB (Baltimore Annapolis Blvd)	L	125	3	11	6	16
	EB (Baltimore Annapolis Blvd)	T	597	180	285	1045	#1443
	EB (Baltimore Annapolis Blvd)	R	150	12	45	0	3
	WB (Baltimore Annapolis Blvd)	L	350	45	77	20	37
	WB (Baltimore Annapolis Blvd)	TR	510	297	454	276	354
	NB (Bowyer Rd)	LT	433	30	68	281	#441
	NB (Bowyer Rd)	R	310	0	27	183	293
	SB (Perry Cir)	LTR	184	11	46	0	0
4	**King George Street & Perry Center & Bishop Stadium (TWSC)**						
	EB (Perry Center)	LTR	292	-	0	-	3
	WB (Bishop Stadium)	L	234	-	5	-	5
	WB (Bishop Stadium)	TR	234	-	3	-	10
	WB (King George St)	LTR	2203	-	0	-	0
	EB (King George St)	LTR	693	-	3	-	0
5	**College Avenue & King George Street (Signalized)**						
	EB (King George St)	LTR	2123	84	203	49	94
	WB (King George St)	LTR	327	36	87	69	125
	NB (College Ave)	LTR	354	16	56	41	97
	SB (College Ave)	LTR	275	5	22	4	20

Notes:

\# 95th percentile volume exceeds capacity, queue may be longer

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

Table 3-9 Existing Condition Mid-Day Queuing Analysis

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	Mid-Day	
				Queue Length 50th (ft)	Queue Length 95th (ft)
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)**				
	EB (Annapolis St)	TR	521	-	15
	WB (Baltimore Annapolis Blvd)	L	376	-	-
	WB (Baltimore Annapolis Blvd)	T	376	-	-
	NB (Taylor Avenue)	L	359	-	8
	NB (Taylor Avenue)	R	359	-	-
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)**				
	EB (Baltimore Annapolis Blvd)	T	471	107	180
	EB (Baltimore Annapolis Blvd)	R	471	0	21
	WB (Baltimore Annapolis Blvd)	L	450	36	66
	WB (Baltimore Annapolis Blvd)	T	597	70	120
	WB (King George St)	L	400	50	94
	WB (King George St)	R	375	60	106
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)**				
	EB (Baltimore Annapolis Blvd)	L	125	3	13
	EB (Baltimore Annapolis Blvd)	T	597	194	324
	EB (Baltimore Annapolis Blvd)	R	150	5	32
	WB (Baltimore Annapolis Blvd)	L	350	18	41
	WB (Baltimore Annapolis Blvd)	TR	510	155	261
	NB (Bowyer Rd)	LT	433	87	151
	NB (Bowyer Rd)	R	310	0	40
	SB (Perry Cir)	LTR	184	5	26
4	**King George Street & Perry Center & Bishop Stadium (TWSC)**				
	EB (Perry Center)	LTR	292	-	0
	WB (Bishop Stadium)	L	234	-	3
	WB (Bishop Stadium)	TR	234	-	3
	WB (King George St)	LTR	2203	-	0
	EB (King George St)	LTR	693	-	3
5	**College Avenue & King George Street (Signalized)**				
	EB (King George St)	LTR	2123	35	90
	WB (King George St)	LTR	1097	31	76
	NB (College Ave)	LTR	354	15	47
	SB (College Ave)	LTR	275	2	13

Notes:

95th percentile volume exceeds capacity, queue may be longer

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

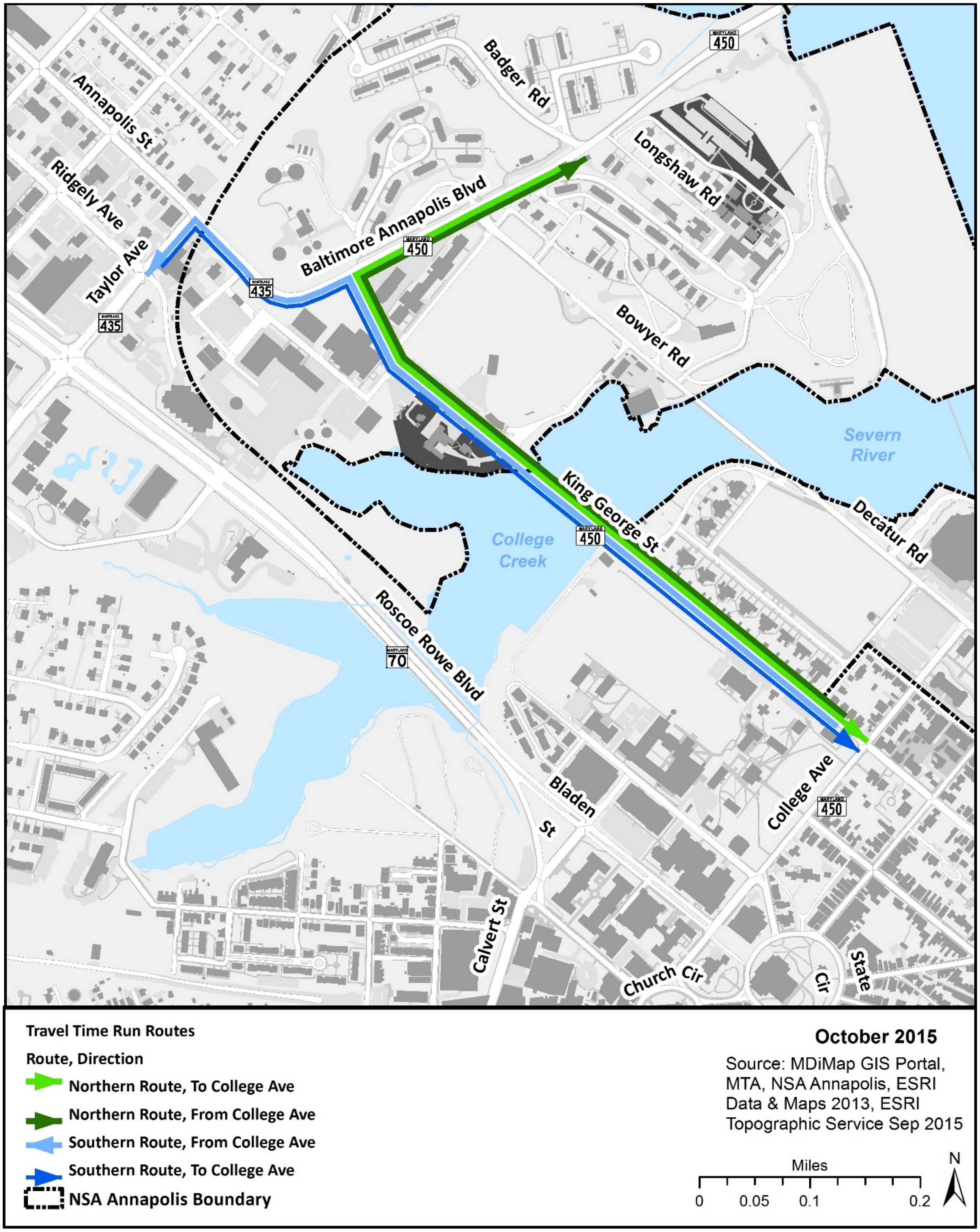


Figure 3-15 Travel Time Run Routes

3.7.7 Existing Travel Time Analysis

According to the travel time runs, the AM peak covering both routes ranged between two and a half minutes and three minutes with a minimum travel time of two minutes and twenty-three seconds and a maximum travel time of three minutes and thirteen seconds. The mid-day times were much closer, ranging from a low of two minutes and twenty-seven seconds to a high of two minutes and fifty-nine seconds. The PM peak period had the largest difference in travel times ranging from a low of two minutes and forty-eight seconds to a high of four minutes and one second. Table 3-10 contains a summary of travel times by route by time of day.

Table 3-10 Summary of Travel Time

Route	*Direction*	*Morning (7:00–9:00 a.m.)*	*Mid-day (11:00 a.m.–1:00 p.m.)*	*Evening (4:00–6:00 p.m.)*
Southern	To College Avenue	3:09	2:36	4:01
	From College Avenue	3:13	2:59	3:39
Northern	To College Avenue	2:55	2:27	3:28
	From College Avenue	2:23	2:30	2:48

3.7.8 Traffic Patterns Along King George Street

The ATR was placed just east of Juniper Street on King George Street, approximately 600 feet east of the King George Street and Baltimore Annapolis Boulevard intersection as shown in Figure 3-16. This location allowed the ATR to capture an hourly record of vehicles on King George Street moving between Baltimore Annapolis Boulevard in the area of the Upper Yard and College Avenue near the Lower Yard of the USNA.

ATR data were collected for 3 consecutive days during the middle of a typical workweek. Vehicle counts were made by direction, allowing the eastbound and westbound traffic volumes to be analyzed separately. All hourly volumes collected proved to be consistent from day to day with only slight variations in the volumes seen during the same hour between the 3 days. The results from the 3 days were then averaged to find the average hourly volume for a typical weekday, as shown in Figure 3-17.

The consistency of the AM peak hour and variations in the PM peak hour from day to day can be explained by the fact that traffic in the AM builds and dissipates rapidly, creating a sharp spike, while the PM traffic builds and dissipates gradually, creating several hours of high volumes. In effect, the PM rush hour with several hours of similar volumes is more spread out and less intense than the short and intense AM rush hour, allowing the PM peak hour to shift from day to day between 2:00 p.m. and 7:00 p.m. without much variation in volumes.

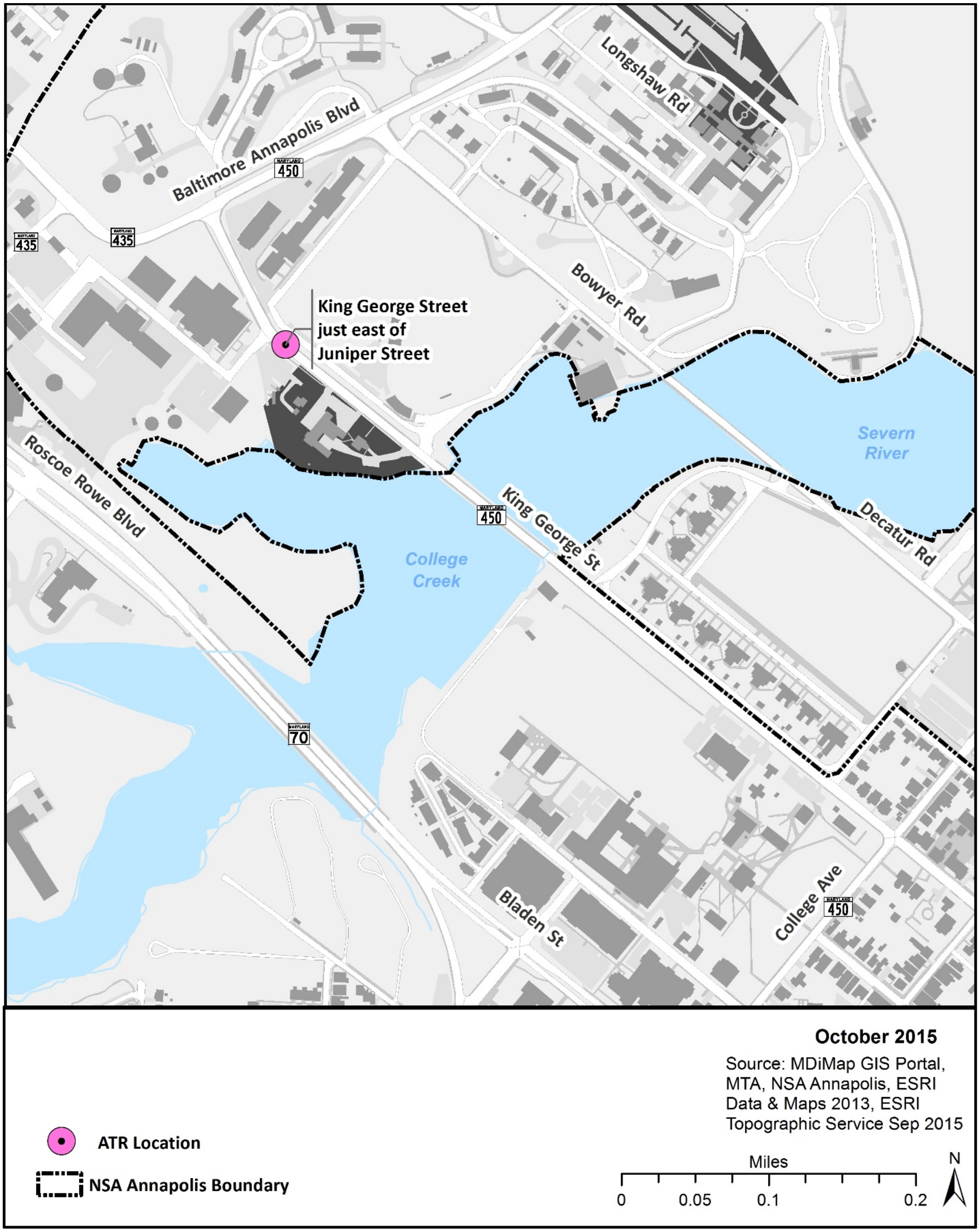


Figure 3-16 ATR Location

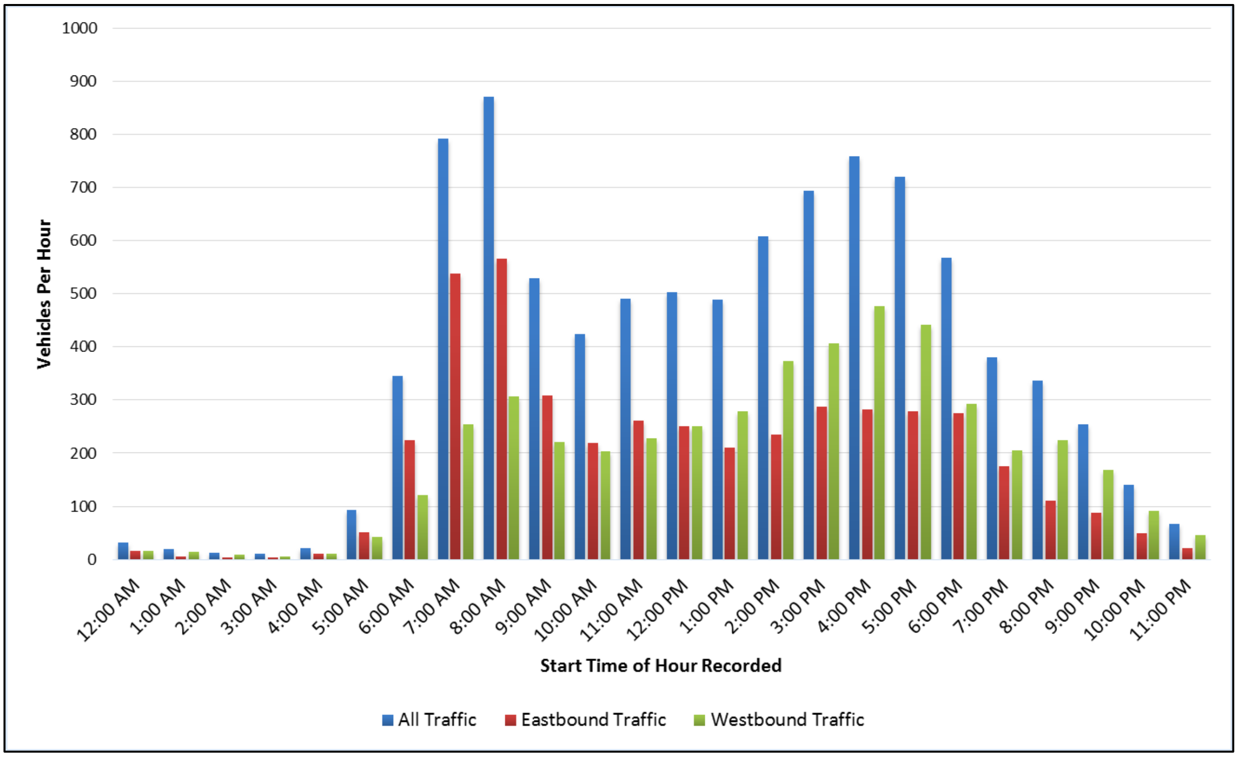


Figure 3-17 King George Street Weekday Vehicles per Hour

Analysis of the ATR data for the average day reveals several trends for the traffic volumes on King George Street.

- The AM rush hour is short and intense, occurring between 7:00 a.m. and 9:00 a.m. with the peak hour between 8:00 a.m. and 9:00 a.m. The dominant flow of traffic during the AM peak period is eastbound, toward downtown Annapolis. During each of these hours, King George Street experiences higher volumes than any given hour in the PM rush hour.

- The PM rush hour is much more spread out and less intense than the AM rush hour. Occurring between 2:00 p.m. and 7:00 p.m., the peak hour can vary from day to day, but each hour during the period, including the peak hour, sees less volume than the AM peak hour. The dominant direction of traffic during this time is westbound, away from downtown Annapolis.

- The mid-day traffic volume in both directions is around half the AM peak hour volume and around two-thirds of the PM peak hour volume.

- During late night and early morning (11:00 p.m. to 5:00 a.m.) traffic is light with less than 100 vehicles per hour using the road.

3.7.9 Existing NSA Annapolis Transportation Management Plan

The NSA Annapolis Master Plan contains a Transportation Management Plan (TMP) that includes recommended strategies for NSA Annapolis to implement to encourage the reduction of single occupant vehicles (SOV) and increase the use of alternative transportation options. Strategies include hiring an employee transportation coordinator, instituting parking policies, providing pedestrian and bicycle amenities, providing rideshare education, exploring shuttle bus opportunities, providing transit subsidy education, promoting telecommuting, and establishing a guaranteed-ride-home program (NSA Annapolis, 2012).

An effective TMP requires continual monitoring and evaluation to ensure NSA Annapolis delivers a reduction in SOV use and thus a reduction of vehicles traveling through City of Annapolis and along internal NSA Annapolis roadways. According to the NSA Annapolis Master Plan, the installation will evaluate lessons learned, evaluate impacts to the TMP programs by future construction and command realignments, and prepare periodic reports covering the effectiveness of the TMP strategies by comparing appropriate performance metrics (NSA Annapolis, 2012).

4 Future Conditions

4.1 No Action Alternative

This section describes the No Action Alternative or the baseline condition if the Navy would not enter into a lease with the USNA AA/F, and it does not establish a new USNA AA/F Alumni Service Center and Headquarters facility on NSA Annapolis property through new construction or renovation of an existing facility. The USNA AA and the NAF would continue to operate in five separate facilities on or around NSA Annapolis and hold alumni events at Ogle Hall. At the Perry Center site, existing Buildings 51, 194, 92, 974, and 340 would not be demolished and the current functions of Building 51 (the NSA Annapolis Mail Center) and Building 194 (CHRIMP) would remain onsite. Analysis of the No Action Alternative assumes background development and growth through the year 2020, the same year the USNA AA and NAF would move into a newly constructed facility if Action Alternative 1 or 2 were to be implemented.

4.1.1 Pedestrian Network

The Annapolis Transit Development Plan of 2010 encourages limiting the growth of automobile use through improving other modes, including improving the infrastructure to support pedestrians (MTA, 2010). Specific improvements for the study area are proposed in the West Annapolis Sector Study. In the area of the NSA Annapolis Upper Yard, countdown pedestrian indicators are proposed along Baltimore Annapolis Boulevard where it intersects King George Street and where it intersects Bowyer Road at Gate 8. Closing gaps in the existing sidewalk network is recommended in the adjacent West Annapolis neighborhood, as well as finishing the addition of Americans with Disabilities Act (ADA)-compliant ramps at all intersections (Environmental Resources Management, 2015). In the 2015-2020 Capital Improvement Program, some of the projects (not specified) from the West Annapolis Sector Study for pedestrian improvements were funded (City of Annapolis, 2015).

The Maryland SHA currently has planned improvements to sidewalks within the study area on Baltimore Annapolis Boulevard and King George Street (Maryland SHA, 2014). The extent of improvements would run from the existing sidewalks at the Severn River Bridge along Baltimore Annapolis Boulevard south to King George Street and then east to the Perry Center Driveway. Sidewalks in this area are currently only 4 feet wide, next to the road and bordered by fences, creating an unsafe environment for pedestrians. The Maryland SHA project would bring the sidewalks to comply with the ADA by widening them to 5 feet, including relocating fencing where necessary and installing ADA-compliant curb ramps at intersections. Bus stops in the project area would be improved to have 8-foot by 5-foot ADA-compliant landing areas. The completed project would enhance pedestrian access to the Upper Yard and Perry Center for those commuting on foot and provide bus commuters improved access to bus stops on Baltimore Annapolis Boulevard. Attachment 3 contains the Maryland SHA designs.

4.1.2 Bicycle Network

The Annapolis Bicycle Master Plan of 2011 serves as the city's guide for expanding and improving its bicycle facilities. Within the 1-mile bicycle study area numerous facilities are proposed, some of which are also included in the West Annapolis Sector Study. In addition, according to the Annapolis Comprehensive Plan 2009–2014 Update, the area around the NSA Annapolis Upper Yard is recognized as needing improved bicycle facilities because of crowded roads (City of Annapolis, 2014). The city's 2015–2020 Capital Improvement Program included funding to implement proposed bicycle facility improvements in West Annapolis recommended in the Bicycle Master Plan and West Annapolis Sector

Study (City of Annapolis, 2015). Figure 4-1 illustrates the future bicycle network for Annapolis as proposed in the city's 2011 Bicycle Master Plan. Note that the facilities shown were proposed in 2011 and many were programmed for completion in 0 to 5 years before the No-build Condition date of 2020 (Toole Design Group, LLC, 2011). However, as of December 2015, the only facilities to be implemented were some of the signed bicycle routes. It should also be noted that some of these facilities are programmed for long-term completion, meaning that they may not be completed by 2020. The most significant proposed improvements with near-term implementation dates in the study area are a multi-use trail paralleling Baltimore Annapolis Boulevard between the Severn River Bridge and Taylor Avenue, bicycle lanes along Taylor Avenue between Baltimore Annapolis Boulevard, the multi-use Poplar Trail, and a share the road bicycle route along the length of King George Street. These proposed facilities would allow bicyclists to reach existing bicycle facilities, like the Poplar Trail, as well as bicycle friendly streets of the West Annapolis neighborhood, without riding in travel lanes on the congested Baltimore Annapolis Boulevard and Taylor Avenue.

The Maryland SHA planned sidewalk improvements along Baltimore Annapolis Boulevard and King George Street, as discussed in the Pedestrian Network section above, may limit the usefulness of the planned share the road facilities along King George Street by the Perry Center. Because of space constrains in this area, the widened sidewalks may use a portion of the existing lanes on King George Street. Currently, these lanes are 14 feet wide each. Increasing the sidewalk width to 5 feet on each side of the road may reduce travel lanes width to 13 feet each for several hundred feet of the road. This would reduce the travel lane space available for bicycles to share the road with cars (Maryland SHA, 2014).

4.1.3 Public Transit

MTA is currently in the process of implementing system-wide service changes and improvements under its Baltimorelink Plan (Maryland Transit Administration, 2015). For the City of Annapolis, the most significant service change would be the addition of a commuter bus route between Baltimore and Annapolis/Kent Island in early 2017. In addition to inbound morning trips and outbound afternoon trips, this service would feature reverse commute trips, allowing Baltimore City residents to commute to Annapolis. In mid-2017, the Route 14 local bus from Annapolis to Patapasco would be replaced with a similar service, the LocalLink 70. Service would be similar to the existing Route 14 but with a reduction in frequency from 45 minutes to 60 minutes. Evening hours would also be reduced from the current near midnight end of service to 10:00 p.m. on weekdays, 11:00 p.m. on Saturday and 9:00 p.m. on Sunday.

The Annapolis Transit Development Plan lays out alternatives for improving Annapolis Transit service to the study area. Increasing frequency to 90 minutes headways is recommended, but no weekend service is recommended (MTA, 2010). Note that when the Transit Development Plan was completed in 2010, no weekend Annapolis Transit service was available to the study area. Since then, the C40 route serving the study area, as described in the Transit Development Plan, has been superseded by the Gold Route (discussed in the Existing Condition, Section 3.5.1.1), which provides weekday and weekend service on 2-hour headways in each direction. Stops around the NSA Annapolis Upper Yard on the Gold Route have relatively low volumes compared to other Annapolis Transit stops, and are not targeted for significant service improvements by the Transit Development Plan.

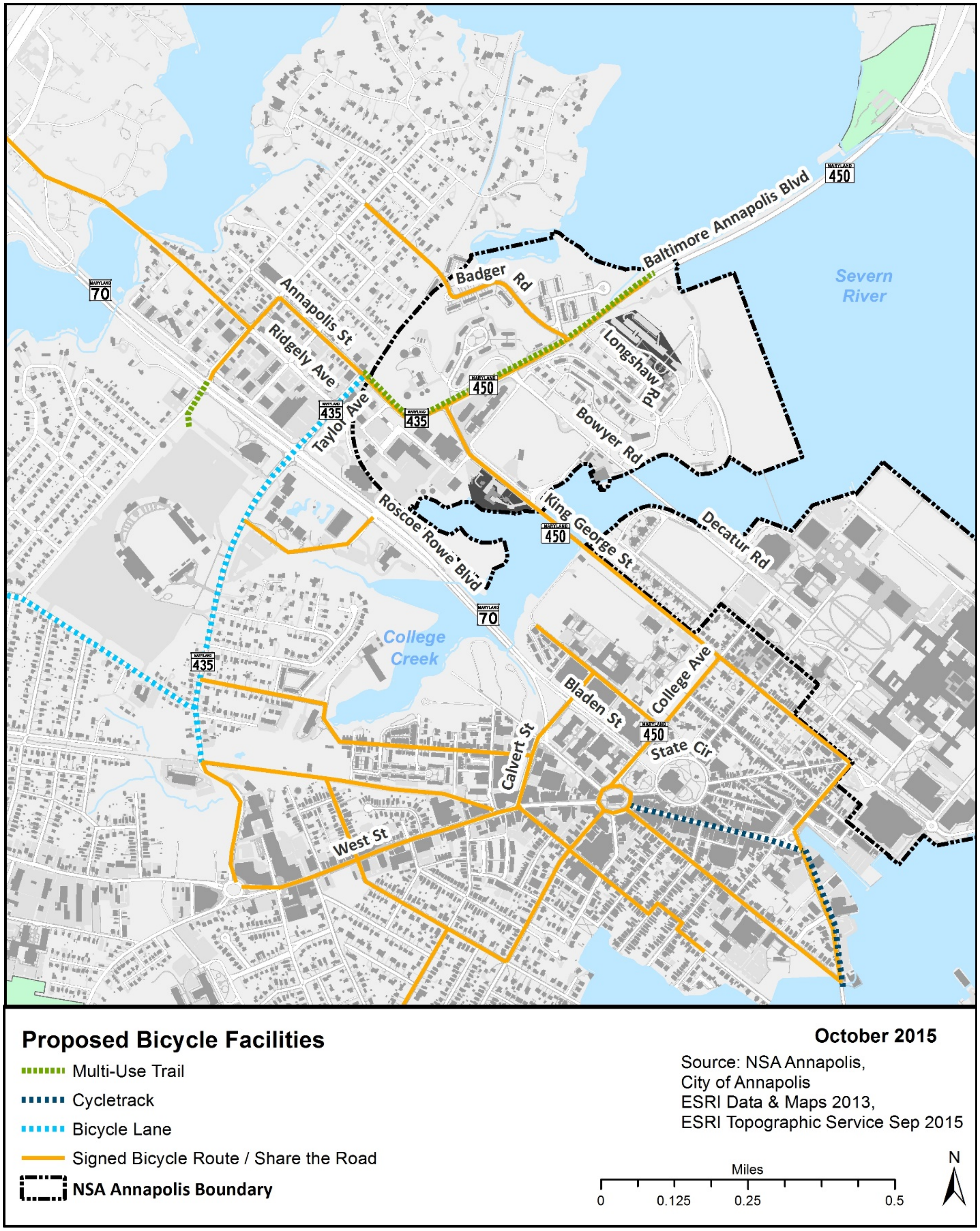


Figure 4-1 Proposed Bicycle Facilities

4.1.4 Parking

The City of Annapolis Comprehensive Plan restricts the development of long-term parking lots to areas outside the city center by connecting shuttle busses and restricts the addition of short-term parking capacity to the city center (City of Annapolis, Maryland, 2009). Given that the immediate area surrounding the upper yard is already developed, it is unlikely additional long term or short term public parking will be provided by Annapolis.

4.1.5 Traffic Section

The No Action Alternative includes various programmed transportation improvements in the study area, growth in existing traffic volumes through the same horizon year as the action alternatives or 2020, and trips generated by approved and unbuilt development projects that are reasonably foreseeable. Volumes are then used as an input, along with delay, signal timing, and geometrics, to evaluate traffic operations and queuing at signalized and unsignalized intersections to determine the impacts of traffic growth.

The following section describes the process for analyzing traffic for the No Action Alternative and the results of the analysis. Note that the procedures to forecast future traffic volumes throughout this transportation study include rounding; therefore, totals may not add up to the precise value indicated.

4.1.5.1 Background Growth

Background growth was added to the roadway network to account for vehicle trips traveling through the study area during the AM and PM peak hours. These trips are important to include because they account for vehicle volume growth from land use changes outside of the study area. Based on the process presented in the transportation scoping letter from the Navy to the City of Annapolis, an analysis of AADT values helped to develop background growth rates because they provide a historical reference. Six years of historical data were used to determine a historical average growth. The latest available Maryland SHA historical average daily vehicle counts were compared from 2009–2014 to provide an average annual growth rate to apply to the study area roadways (Maryland SHA, 2009–2014).

The comparison separated roadways into principal arterials and minor arterials based on Anne Arundel County's assigned functional classification map (Figure 3-2). The principal arterials examined in the study area had negative average growth trends (-1.0 percent) and the minor arterials examined had 0.3 percent growth. Based on the transportation scoping letter from the Navy to the City of Annapolis, a 0.3 percent per year growth was applied to all study area roadways, providing a conservative estimate of future growth. This equated to a 1.509 percent growth over 5 years.

4.1.5.2 Planned Developments

Based on a search of planned developments in Anne Arundel County (over 20 projects west of City of Annapolis) and City of Annapolis (Crystal Springs Mixed-Use Development approximately 2.0 miles southwest of the study area) it was determined that none are located near the study area or would create vehicle through trips through the study area.

4.1.5.3 Background Roadway Improvements

A roadway improvement is planned along Baltimore Annapolis Boulevard between Bowyer Road and King George Street. According to an e-mail from the City of Annapolis, this project is not in the project pipeline and not expected to be constructed by 2020 (Nash, 2016). No other roadway improvement projects were planned, other than the Maryland SHA proposed sidewalk improvement project along King George Street that is covered in Section 4.1.1, *Pedestrian Network*.

It is assumed that the traffic signal timings would be reviewed by the City of Annapolis to improve the operations and reduce queueing. Following the transportation scoping letter from the Navy to the City of Annapolis, all three signalized intersections were optimized by adjusting the amount of time a GREEN light is displayed for each approach without changing the total amount of time programmed to cycle through all the GREEN, YELLOW, and RED time for each approach. This is also called cycle length. In addition, the two signalized intersections along Baltimore Annapolis Boulevard (Intersections #2 and #3) were updated to coordinated signals with offsets assigned to increase the probability of vehicles traveling through one intersection to arrive at the other intersection with a GREEN light displaying. This reduces potential queuing caused by two signalized intersections in proximity to each other.

4.1.5.4 Complete No Action Condition

The background growth was added to each study area intersection to account for growth between 2015 and 2020. Because no developments or roadway improvements were planned, the added background growth represented the No Action Alternative turning movement volumes. Figure 4-2 shows the background growth added to each intersection, and Figure 4-3 shows the No Action turning movement volumes.

4.1.5.5 No Action Alternative Intersection Operations Analysis

Based on the Synchro™ signalized intersection analysis results, all of the study area intersections would operate at overall acceptable conditions during the morning and afternoon peak hours. Overall operating conditions during mid-day would also operate at an acceptable level.

The following individual intersection approaches that primarily serve the Navy would operate under unacceptable conditions during peak hours:

- Northbound at the intersection of Baltimore Annapolis Boulevard and Bowyer Road and Perry Circle (Intersection #3) during the AM, mid-day, and PM peak hours
- Southbound at the intersection of Baltimore Annapolis Boulevard and Bowyer Road and Perry Circle (Intersection #3) during the AM and PM peak hours

Based on the unsignalized intersection analysis, all approaches would operate at acceptable conditions during the peak hours.

The average LOS for the various approaches to the intersection and the overall intersection LOS grade are depicted in Figure 4-4, Figure 4-5, and Figure 4-6 for AM, PM and mid-day peak hours, respectively. Table 4-1 shows the results of the LOS capacity analysis and the intersection vehicle delay for the No Action Alternative during the AM and PM peak hours. Table 4-2 shows the results of the LOS capacity analysis and the intersection vehicle delay for the No Action Alternative during the mid-day peak hour.

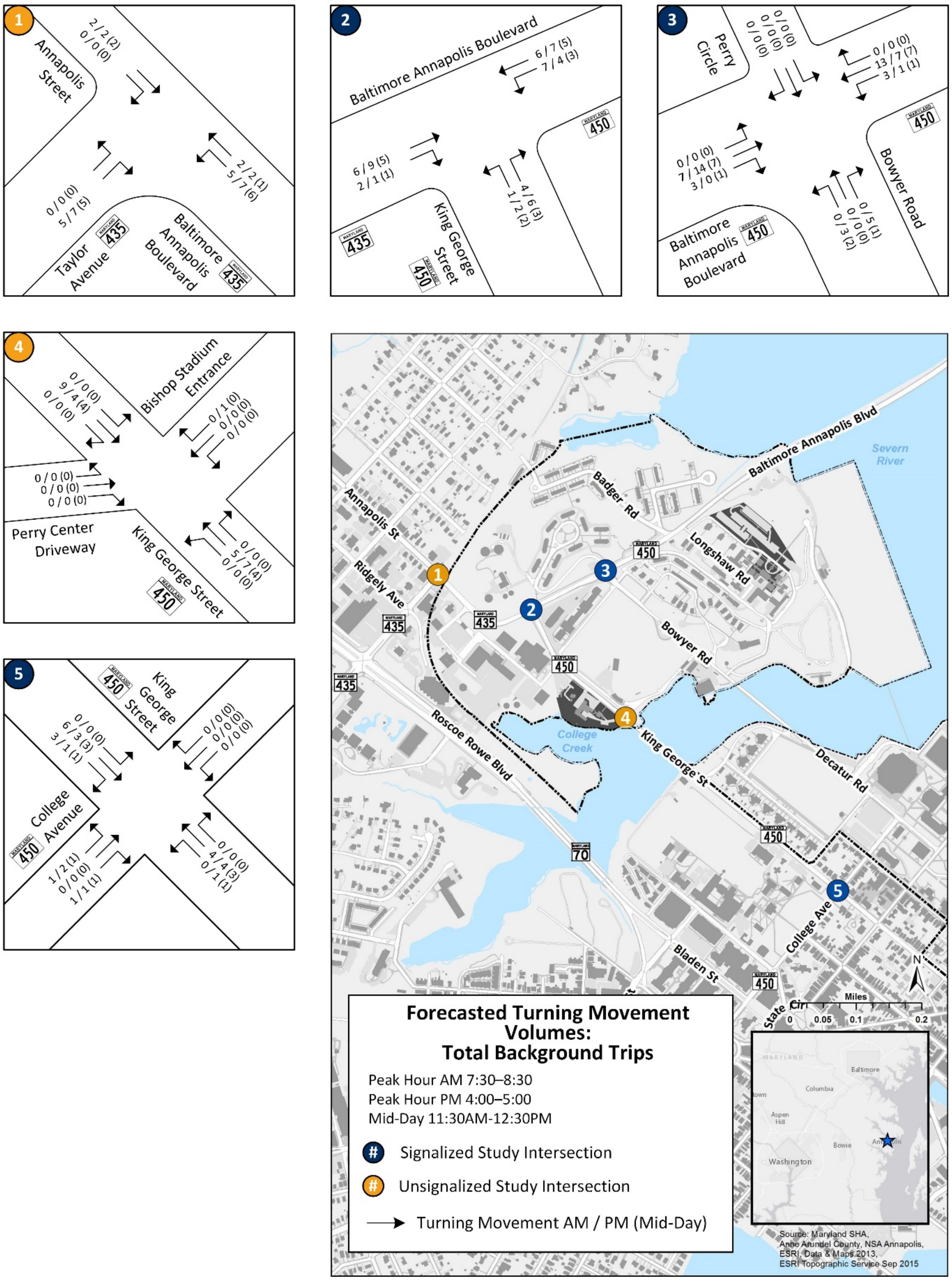


Figure 4-2 Background Growth Vehicle Trip Generation

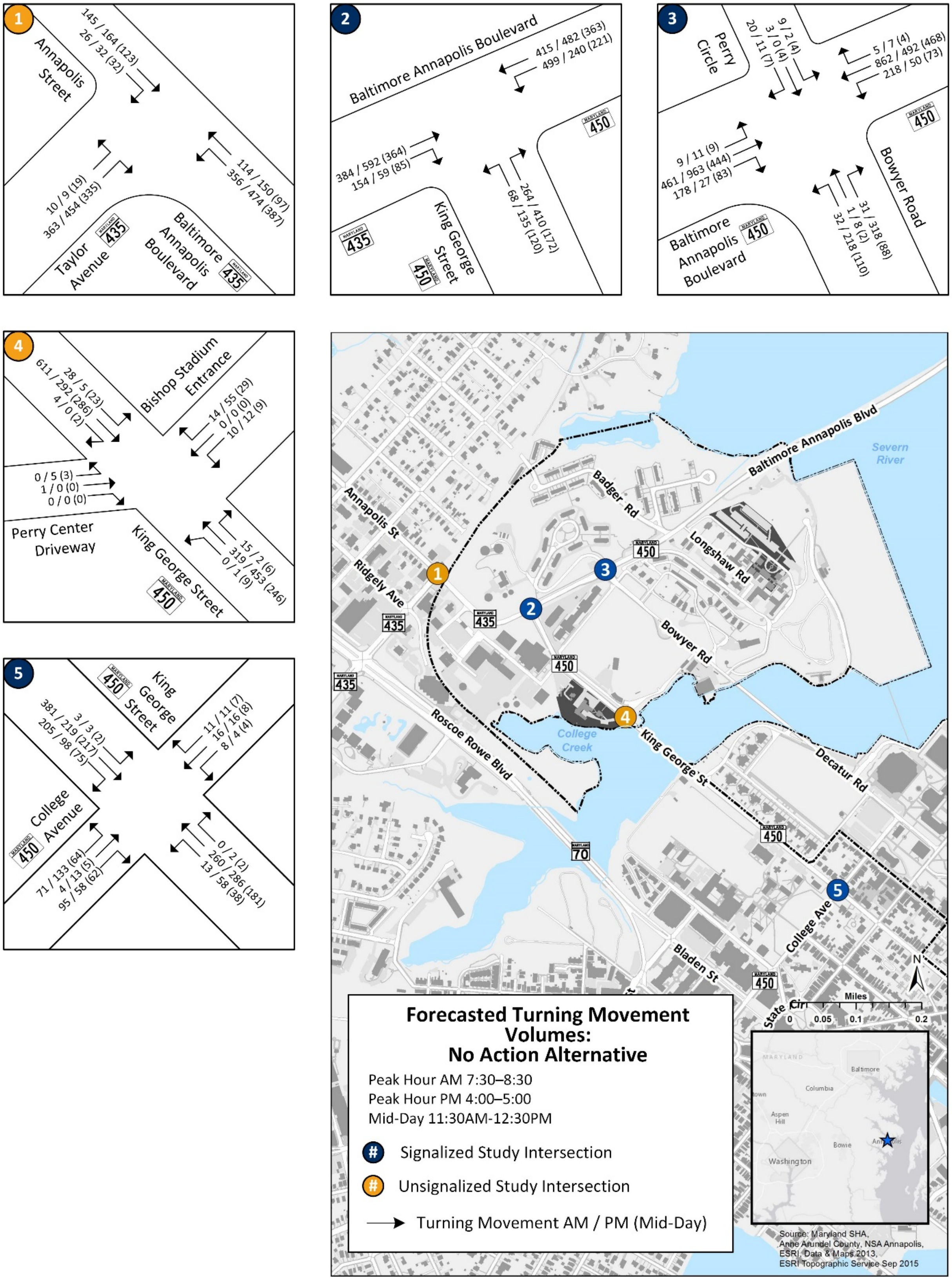
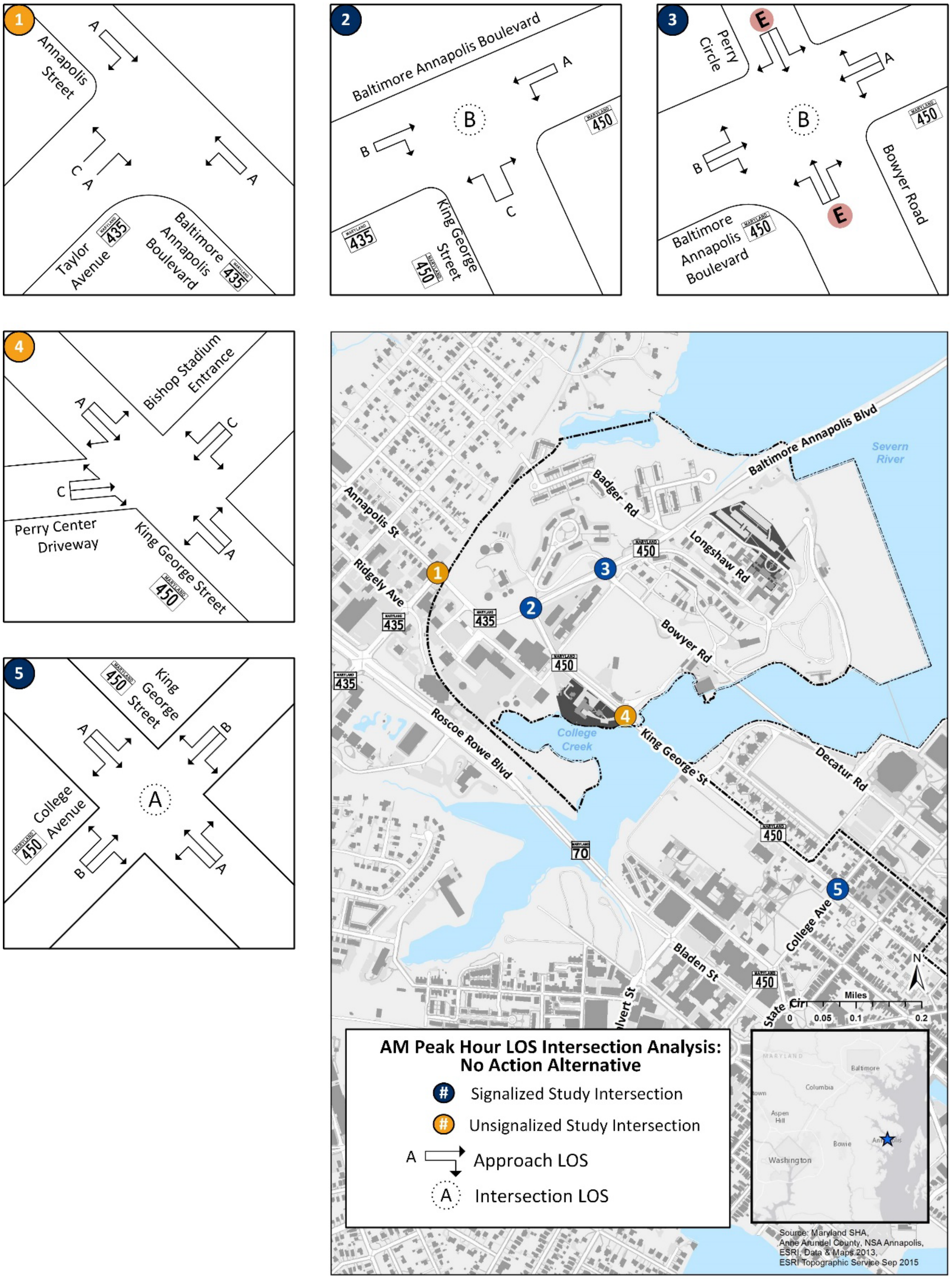
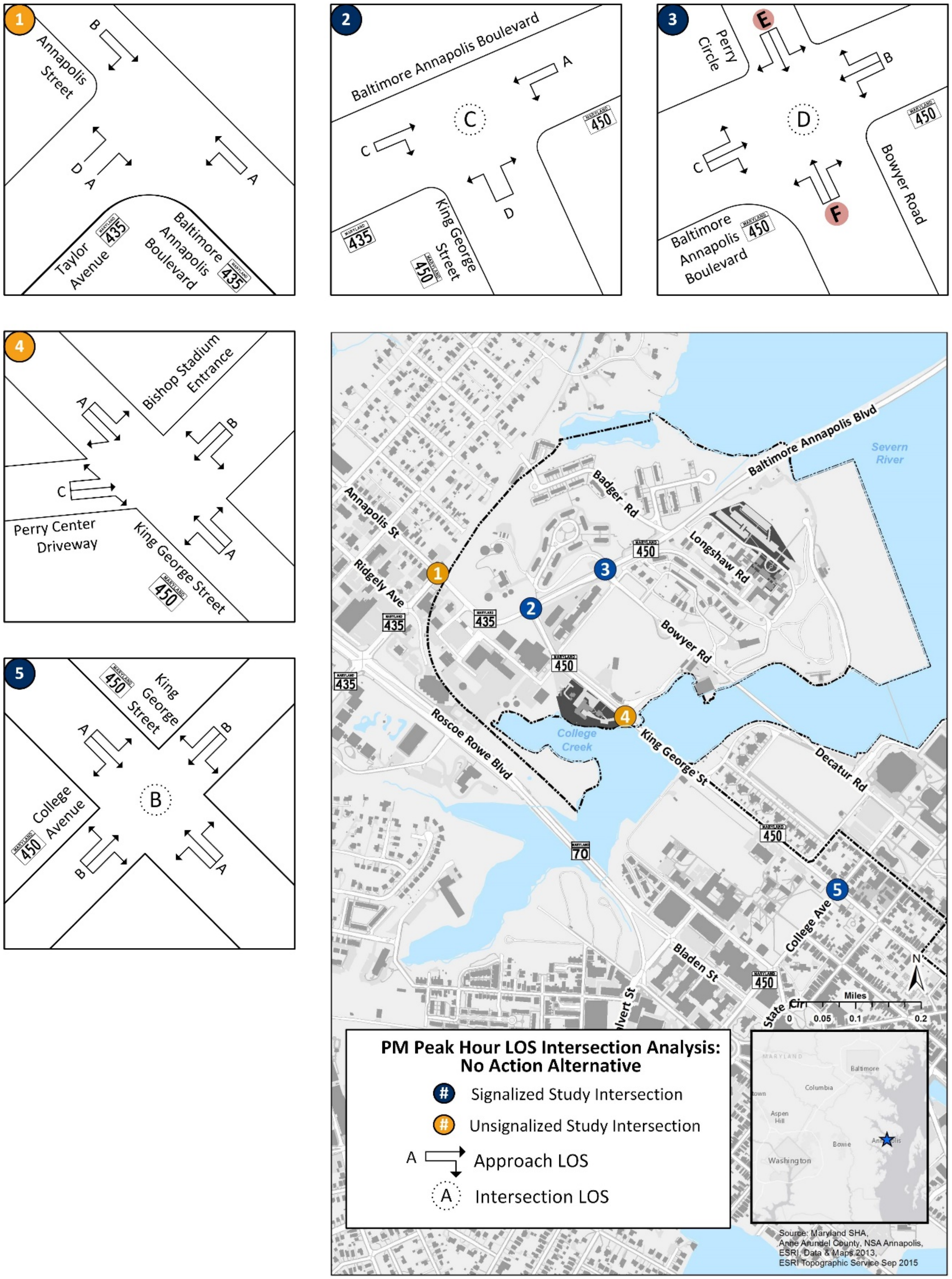


Figure 4-3 No Action Alternative Turning Movement Volumes



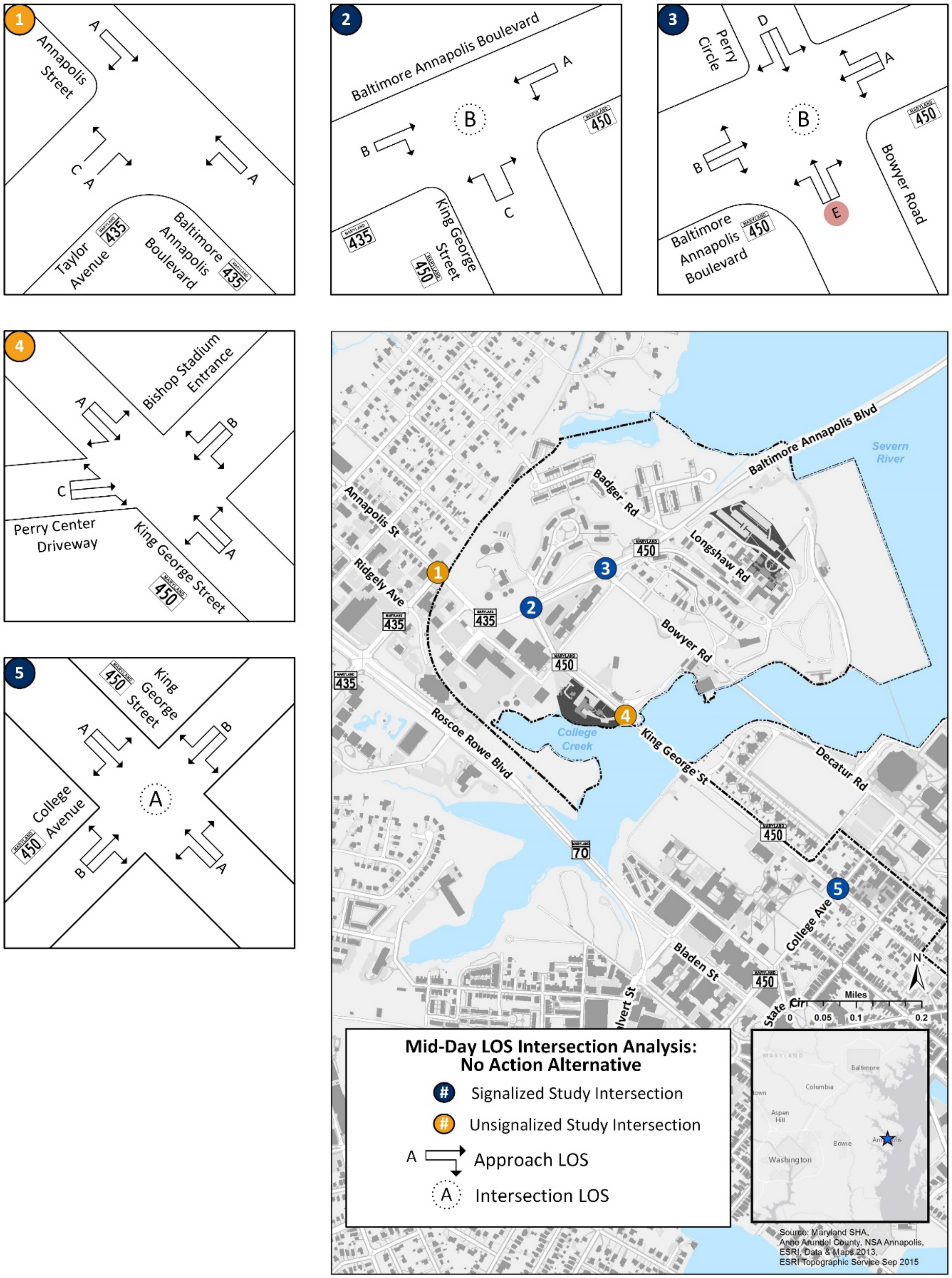
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-4 No Action Alternative Intersection LOS (AM Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-5 No Action Alternative Intersection LOS (PM Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-6 No Action Alternative Intersection LOS (Mid-Day Peak Hour)

Table 4-1 No Action Alternative AM and PM Peak Hour Operations Analysis

#	Intersection and Approach	Lane Group	AM Peak Hour V/C Ratio	AM Peak Hour Delay (sec/veh)	AM Peak Hour LOS	PM Peak Hour V/C Ratio	PM Peak Hour Delay (sec/veh)	PM Peak Hour LOS
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC) [a]**							
	EB (Annapolis St)	TR	0.20	9.9	A	0.26	10.7	B
	EB Overall (Annapolis St)			**9.9**	**A**		**10.7**	**B**
	WB (Baltimore Annapolis Blvd)	L	-	-	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	-	-	-	-	-	-
	WB Overall (Baltimore Annapolis Blvd)			**-**	**-**		**-**	**-**
	NB (Taylor Avenue)	L	0.04	18.5	C	0.06	27.5	D
	NB (Taylor Avenue)	R	-	0.0	A	-	0.0	A
	NB Overall (Taylor Avenue)			**18.5**	**C**		**27.5**	**D**
	Overall			**2.9**	**-**		**2.8**	**-**
2	**King George Street & Baltimore Annapolis Boulevard (Signalized) [b]**							
	EB (Baltimore Annapolis Blvd)	T	0.47	16.3	B	0.70	21.8	C
	EB (Baltimore Annapolis Blvd)	R	0.11	12.0	B	0.04	11.7	B
	EB Overall (Baltimore Annapolis Blvd)			**15.1**	**B**		**20.9**	**C**
	WB (Baltimore Annapolis Blvd)	L	0.70	8.1	A	0.51	13.3	B
	WB (Baltimore Annapolis Blvd)	T	0.32	3.5	A	0.41	5.8	A
	WB Overall (Baltimore Annapolis Blvd)			**6.0**	**A**		**8.3**	**A**
	WB (King George St)	L	0.32	33.4	C	0.40	32.3	C
	WB (King George St)	R	0.45	18.8	B	0.87	44.9	D
	WB Overall (King George St)			**21.8**	**C**		**41.8**	**D**
	Overall			**11.7**	**B**		**22.1**	**C**
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized) [b]**							
	EB (Baltimore Annapolis Blvd)	L	0.02	6.1	A	0.02	11.6	B
	EB (Baltimore Annapolis Blvd)	T	0.36	9.1	A	0.90	35.2	D
	EB (Baltimore Annapolis Blvd)	R	0.12	14.5	B	0.02	12.5	B
	EB Overall (Baltimore Annapolis Blvd)			**10.6**	**B**		**34.3**	**C**
	WB (Baltimore Annapolis Blvd)	L	0.31	4.1	A	0.37	37.2	D
	WB (Baltimore Annapolis Blvd)	TR	0.58	6.6	A	0.42	12.9	B
	WB Overall (Baltimore Annapolis Blvd)			**6.1**	**A**		**15.1**	**B**
	NB (Bowyer Rd)	LT	0.42	77.3	E	0.94	112.1	F
	NB (Bowyer Rd)	R	0.02	62.2	E	0.58	63.4	E
	NB Overall (Bowyer Rd)			**70.0**	**E**		**83.7**	**F**
	SB (Perry Cir)	LTR	0.16	72.8	E	0.01	58.9	E
	SB Overall (Perry Cir)			**72.8**	**E**		**58.9**	**E**
	Overall			**11.1**	**B**		**42.2**	**D**

Table 4-1 No Action Alternative AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS
4	**King George Street & Perry Center & Bishop Stadium (TWSC)** [a]							
	EB (Perry Center)	LTR	0.01	23.7	C	0.03	23.7	C
	EB Overall (Perry Center)			**23.7**	**C**		**23.7**	**C**
	WB (Bishop Stadium)	L	0.07	27.5	D	0.06	20.8	C
	WB (Bishop Stadium)	TR	0.02	10.6	B	0.13	13.1	B
	WB Overall (Bishop Stadium)			**17.6**	**C**		**14.5**	**B**
	WB (King George St)	LTR	-	0.0	A	0.00	8.0	A
	WB Overall (King George St)			**0.0**	**-**		**0.0**	**-**
	EB (King George St)	LTR	0.03	8.1	A	0.01	8.6	A
	EB Overall (King George St)			**0.4**	**-**		**0.1**	**-**
	Overall			**0.7**	**-**		**1.4**	**-**
5	**College Avenue & King George Street (Signalized)** [b]							
	EB (King George St)	LTR	0.56	7.3	A	0.40	8.6	A
	EB Overall (EB King George St)			**7.3**	**A**		**8.6**	**A**
	WB (King George St)	LTR	0.27	5.2	A	0.51	9.6	A
	WB Overall (King George St)			**5.2**	**A**		**9.6**	**A**
	NB (College Ave)	LTR	0.42	19.9	B	0.56	18.1	B
	NB Overall (College Ave)			**19.9**	**B**		**18.1**	**B**
	SB (College Ave)	LTR	0.10	16.8	B	0.06	12.9	B
	SB Overall (College Ave)			**16.8**	**B**		**12.9**	**B**
	Overall			**9.0**	**A**		**11.3**	**B**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2010 results

[b] Highway Capacity Software 2000 results

Table 4-2 No Action Alternative Mid-Day Operations Analysis

#	Intersection and Approach	Lane Group	Mid-Day		
			V/C Ratio	Delay (sec/veh)	LOS
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC) [a]**				
	EB (Annapolis St)	TR	0.18	9.7	A
	EB Overall (Annapolis St)			**9.7**	**A**
	WB (Baltimore Annapolis Blvd)	L	**-**	**-**	**-**
	WB (Baltimore Annapolis Blvd)	T	-	-	-
	WB Overall (Baltimore Annapolis Blvd)			**-**	**-**
	NB (Taylor Avenue)	L	0.08	20.4	C
	NB (Taylor Avenue)	R	-	0.0	A
	NB Overall (Taylor Avenue)			**20.4**	**C**
	Overall			**2.9**	**-**
2	**King George Street & Baltimore Annapolis Boulevard (Signalized) [b]**				
	EB (Baltimore Annapolis Blvd)	T	0.50	15.3	B
	EB (Baltimore Annapolis Blvd)	R	0.06	10.6	B
	EB Overall (Baltimore Annapolis Blvd)			**14.4**	**B**
	WB (Baltimore Annapolis Blvd)	L	0.41	4.2	A
	WB (Baltimore Annapolis Blvd)	T	0.33	4.3	A
	WB Overall (Baltimore Annapolis Blvd)			**4.3**	**A**
	WB (King George St)	L	0.44	27.8	C
	WB (King George St)	R	0.32	15.6	B
	WB Overall (King George St)			**20.6**	**C**
	Overall			**11.3**	**B**
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized) [b]**				
	EB (Baltimore Annapolis Blvd)	L	0.02	7.9	A
	EB (Baltimore Annapolis Blvd)	T	0.40	11.8	B
	EB (Baltimore Annapolis Blvd)	R	0.06	11.9	B
	EB Overall (Baltimore Annapolis Blvd)			**11.8**	**B**
	WB (Baltimore Annapolis Blvd)	L	0.13	6.9	A
	WB (Baltimore Annapolis Blvd)	TR	0.38	8.4	A
	WB Overall (Baltimore Annapolis Blvd)			**8.2**	**A**
	NB (Bowyer Rd)	LT	0.67	67.7	E
	NB (Bowyer Rd)	R	0.06	46.9	D
	NB Overall (Bowyer Rd)			**58.6**	**E**
	SB (Perry Cir)	LTR	0.04	53.0	D
	SB Overall (Perry Cir)			**53.0**	**D**
	Overall			**17.9**	**B**

Table 4-2 No Action Alternative Mid-Day Operations Analysis (continued)

#	Intersection and Approach	Lane Group	Mid-Day V/C Ratio	Mid-Day Delay (sec/veh)	Mid-Day LOS
4	**King George Street & Perry Center & Bishop Stadium (TWSC) [a]**				
	EB (Perry Center)	LTR	0.01	17.3	C
	EB Overall (Perry Center)			**17.3**	**C**
	WB (Bishop Stadium)	L	0.03	15.3	C
	WB (Bishop Stadium)	TR	0.04	10.0	B
	WB Overall (Bishop Stadium)			**11.3**	**B**
	WB (King George St)	LTR	0.01	8.0	A
	WB Overall (King George St)			**0.3**	**-**
	EB (King George St)	LTR	0.02	7.9	A
	EB Overall (King George St)			**0.6**	**-**
	Overall			**1.2**	**-**
5	**College Avenue & King George Street (Signalized) [b]**				
	EB (King George St)	LTR	0.32	6.1	A
	EB Overall (EB King George St)			**6.1**	**A**
	WB (King George St)	LTR	0.28	5.8	A
	WB Overall (King George St)			**5.8**	**A**
	NB (College Ave)	LTR	0.34	16.9	B
	NB Overall (College Ave)			**16.9**	**B**
	SB (College Ave)	LTR	0.05	14.5	B
	SB Overall (College Ave)			**14.5**	**B**
	Overall			**8.4**	**A**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2010 results

[b] Highway Capacity Software 2000 results

4.1.5.6 No Action Alternative Intersection Queueing Analysis

Based on the Synchro™ results, the only intersection to receive failing queue lengths would be the intersection of Bowyer Road and Perry Circle with Baltimore Annapolis Boulevard (Intersection #3), and only during the PM peak hour at the 95th percentile. The Baltimore Annapolis Boulevard eastbound through approach would have a 95th percentile length of 1,441 feet, exceeding its 597-foot storage capacity. The Bowyer Road northbound left and through approach would have a 95th percentile queue length of 467 feet, also exceeding its 433-foot storage capacity. All of the results are depicted below in Tables 4-3 and 4-4.

Table 4-3 No Action Alternative AM and PM Peak Hours Queuing Analysis

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	AM Peak Hour		PM Peak Hour	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)**						
	EB (Annapolis St)	TR	521	-	18	-	25
	WB (Baltimore Annapolis Blvd)	L	376	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	376	-	-	-	-
	NB (Taylor Avenue)	L	359	-	3	-	5
	NB (Taylor Avenue)	R	359	-	-	-	-
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)**						
	EB (Baltimore Annapolis Blvd)	T	471	125	256	275	409
	EB (Baltimore Annapolis Blvd)	R	471	0	37	0	20
	WB (Baltimore Annapolis Blvd)	L	450	68	100	37	m73
	WB (Baltimore Annapolis Blvd)	T	597	58	77	98	m169
	WB (King George St)	L	400	32	71	69	124
	WB (King George St)	R	375	102	131	205	320
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)**						
	EB (Baltimore Annapolis Blvd)	L	125	3	m8	5	m7
	EB (Baltimore Annapolis Blvd)	T	597	164	306	938	#1441
	EB (Baltimore Annapolis Blvd)	R	150	17	51	0	m0
	WB (Baltimore Annapolis Blvd)	L	350	42	72	19	35
	WB (Baltimore Annapolis Blvd)	TR	510	284	432	266	341
	NB (Bowyer Rd)	LT	433	35	72	289	#467
	NB (Bowyer Rd)	R	310	0	27	183	296
	SB (Perry Cir)	LTR	184	12	49	0	0
4	**King George Street & Perry Center & Bishop Stadium (TWSC)**						
	EB (Perry Center)	LTR	292	-	0	-	3
	WB (Bishop Stadium)	L	234	-	5	-	5
	WB (Bishop Stadium)	TR	234	-	3	-	13
	WB (King George St)	LTR	2203	-	0	-	0
	EB (King George St)	LTR	693	-	3	-	0

Table 4-3 No Action Alternative AM and PM Peak Hours Queuing Analysis (continued)

#	*Intersection and Approach*	*Lane Group*	*Turning Bay/Link Length (feet)*	*AM Peak Hour*		*PM Peak Hour*	
				Queue Length 50th (ft)	*Queue Length 95th (ft)*	*Queue Length 50th (ft)*	*Queue Length 95th (ft)*
5	**College Avenue & King George Street (Signalized)**						
	EB (King George St)	LTR	2123	83	162	51	101
	WB (King George St)	LTR	327	37	70	71	133
	NB (College Ave)	LTR	354	16	65	41	95
	SB (College Ave)	LTR	275	5	24	4	20

Notes:

\# 95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

Table 4-4 No Action Alternative Mid-Day Queuing Analysis

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	Mid Day	
				Queue Length 50th (ft)	Queue Length 95th (ft)
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)**				
	EB (Annapolis St)	TR	521	-	18
	WB (Baltimore Annapolis Blvd)	L	376	-	-
	WB (Baltimore Annapolis Blvd)	T	376	-	-
	NB (Taylor Avenue)	L	359	-	8
	NB (Taylor Avenue)	R	359	-	-
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)**				
	EB (Baltimore Annapolis Blvd)	T	471	121	208
	EB (Baltimore Annapolis Blvd)	R	471	0	24
	WB (Baltimore Annapolis Blvd)	L	450	28	39
	WB (Baltimore Annapolis Blvd)	T	597	62	71
	WB (King George St)	L	400	51	99
	WB (King George St)	R	375	56	96
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)**				
	EB (Baltimore Annapolis Blvd)	L	125	3	m9
	EB (Baltimore Annapolis Blvd)	T	597	174	296
	EB (Baltimore Annapolis Blvd)	R	150	8	35
	WB (Baltimore Annapolis Blvd)	L	350	18	40
	WB (Baltimore Annapolis Blvd)	TR	510	159	262
	NB (Bowyer Rd)	LT	433	105	165
	NB (Bowyer Rd)	R	310	0	39
	SB (Perry Cir)	LTR	184	6	27
4	**King George Street & Perry Center & Bishop Stadium (TWSC)**				
	EB (Perry Center)	LTR	292	-	0
	WB (Bishop Stadium)	L	234	-	3
	WB (Bishop Stadium)	TR	234	-	3
	WB (King George St)	LTR	2203	-	0
	EB (King George St)	LTR	693	-	3

Table 4-4 No Action Alternative Mid-Day Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	Mid Day	
				Queue Length 50th (ft)	Queue Length 95th (ft)
5	**College Avenue & King George Street (Signalized)**				
	EB (King George St)	LTR	2123	36	83
	WB (King George St)	LTR	327	32	72
	NB (College Ave)	LTR	354	15	48
	SB (College Ave)	LTR	275	2	13

Notes:

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

4.1.6 No Action Alternative Travel Time Analysis

Synchro™ provides the estimated travel time between two points based on the signal timing, vehicle volumes, intersection operation, and queuing. Because the traffic signals were assumed to be optimized for this analysis, the travel times are faster than the existing condition. The same two routes were analyze using Synchro™ between King George Street and College Avenue (Intersection #5) and Baltimore Annapolis Boulevard and Bowyer Street /Perry Circle (Intersection #3) also called the northern route and between King George Street and College Avenue (Intersection #5) and Baltimore Annapolis Boulevard and Taylor Avenue/Annapolis Street (Intersection #1) also called the southern route

Based in the Synchro™ analysis, the AM peak covering both routes would range between two and two and a half minutes with a minimum travel time of one minute and fifty-one seconds and a maximum travel time of two minutes and twenty-two seconds. The mid-day times would be similar to the morning travel times with a maximum of four seconds separating the two periods. The PM peak period would have the largest difference in travel times ranging from a low of one minute and fifty-two seconds to a high of three minutes and seven seconds. Table 4-5 contains the No Action Alternative travel times by route by time of day.

Table 4-5 No Action Alternative Travel Time

Route	*Direction*	*AM (7:00–9:00 a.m.)*	*Mid-day (11:00 a.m.–1:00 p.m.)*	*PM (4:00–6:00 p.m.)*
Southern	To College Avenue	1:51	1:50	1:52
	From College Avenue	2:10	2:06	2:14
Northern	To College Avenue	2:13	2:11	2:23
	From College Avenue	2:22	2:22	3:07

4.2 Action Alternative 1—Perry Center Site

The Navy would enter into a ground lease with the USNA AA/F, and USNA AA/F would construct a new Alumni Service Center and Headquarters facility on NSA Annapolis property located at the Perry Center in the southwest portion of the Upper Yard (Figure 4-7). The proposed project site is located along King George Street and contains five buildings, including the NSA Annapolis Mail Center, the CHRIMP facility, and the unoccupied former Superintendent’s gardener’s quarters, including outbuildings.

The new USNA AA/F Alumni Service Center and Headquarters building would be a 29,000-square-foot facility and would include a parking lot that could accommodate approximately 90 to 120 vehicles. The USNA AA would relocate its staff and functions to the new facility and would continue to use property in the City of Annapolis for events (Figure 4-7). The NAF’s current space lease with the Navy for use of Beach Hall would be terminated and NAF would relocate its staff and functions to the new facility. In addition to office space, the new USNA AA/F facility would include a reception area; a kitchen, mess, and vending area; and a multi-purpose/banquet area that could accommodate up to 300 people.

It is assumed that the multipurpose room would primarily host functions on weekday evenings or weekends and would therefore occur outside the AM, PM, or mid-day peak hour. To be conservative, the mid-day analysis was performed based on an event occurring between 11:00 am and 1:00 pm on a weekday; however, it should be noted that this would only occur a few times a year and not on a regular basis.

To accommodate new construction, the five existing buildings (Buildings 51, 194, 92, 974, and 340) on the proposed project site would be demolished and existing functions would be relocated to new facilities. Building 51 is a 2,790-square-foot building located in the southeastern portion of the project site that houses the NSA Annapolis Mail Center. Building 194, located in the central part of the project site, is an 11,312-square-foot building that functions as the CHRIMP facility. Building 92 is a 1,795-square-foot unoccupied, dilapidated building located in the northwestern portion of the project area. It was the former Superintendent’s gardener’s quarters. Building 974 is a 360-square-foot garage and Building 340 is a 130-square-foot equipment shed. Both are associated with Building 92 and are unoccupied and deteriorating.

The NSA Annapolis Mail Center would be relocated to one of two possible locations: either to Building 15NS on the North Severn area of NSA Annapolis or to the location of Building 619 in the northwestern portion of the Perry Center (Figure 4-7). Building 619 would be demolished, and a prefabricated facility would be constructed within its footprint. The current storage of materials at Building 619 is not

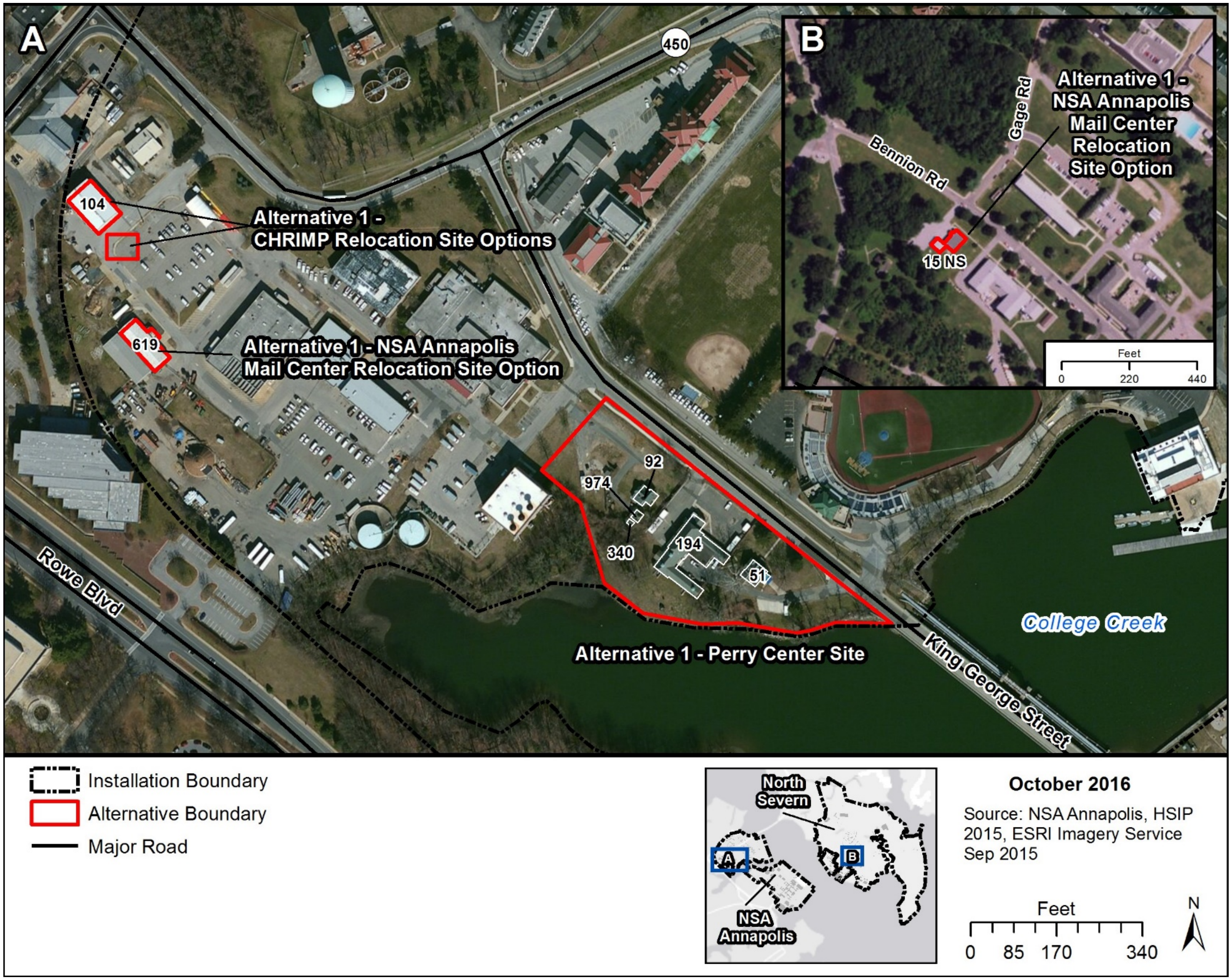


Figure 4-7 Alternative 1—Perry Center Site Location

required, so this function would not be relocated. For the Building 15NS location, because the number of vehicles used for mail delivery would be minimal and because trips would occur in a linear travel path from the facility to all pick up and drop off points covering the NSA Annapolis installation, the number of additional vehicle trips to the peak hour roadway network would be negligible. For the Building 619 location at the Perry Center, this site is in proximity to the current mail center location; therefore, there would be no change in the number of vehicle trips during the peak hour time periods.

The CHRIMP facility would be relocated to either Building 104 within the northwest portion of the Perry Center or to a new prefabricated facility constructed adjacent to Building 104 (Figure 4-7). Building 104 is a ready room (warehouse/storage facility) for the Base Operating Support contractor; this function would be relocated to other Base Operating Support facilities on the Perry Center and would have no impact on traffic.

Because only two employees work at the CHRIMP and the new facility would be in close proximity to the existing CHRIMP facility, there would be no change in the number of vehicle trips during the peak hour time periods.

In summary, under Action Alternative 1, the following buildings would be constructed and the following buildings would be demolished.

Construct the following buildings:

- 29,000-square-foot building to house USNA AA/F
- Parking lot to house 120 vehicles

Demolish the following buildings:

- 2,790-square-foot Building 51 that houses NSA Annapolis Mail Center
- 11,312-square-foot Building 194 that houses the CHRIMP facility
- 1,795-square-foot Building 92 that was former Superintendent's gardener's quarters (unoccupied)
- 360-square-foot Building 974 garage (unoccupied)
- 130 -square-foot Building 340 equipment shed (unoccupied)

The final site plan has not been developed, but the following three alternative plans provide a sense of how the site could be developed. The concept plans include the location of the main building, 90 parking spaces, walkways, and locations of site driveways. Figures 4-8 through 4-10 show three possible design options.

Design Option 1 – Site Plan

Figure 4-8 Alternative 1—Design Option 1

Design Option 2

Figure 4-9 Alternative 1—Design Option 2

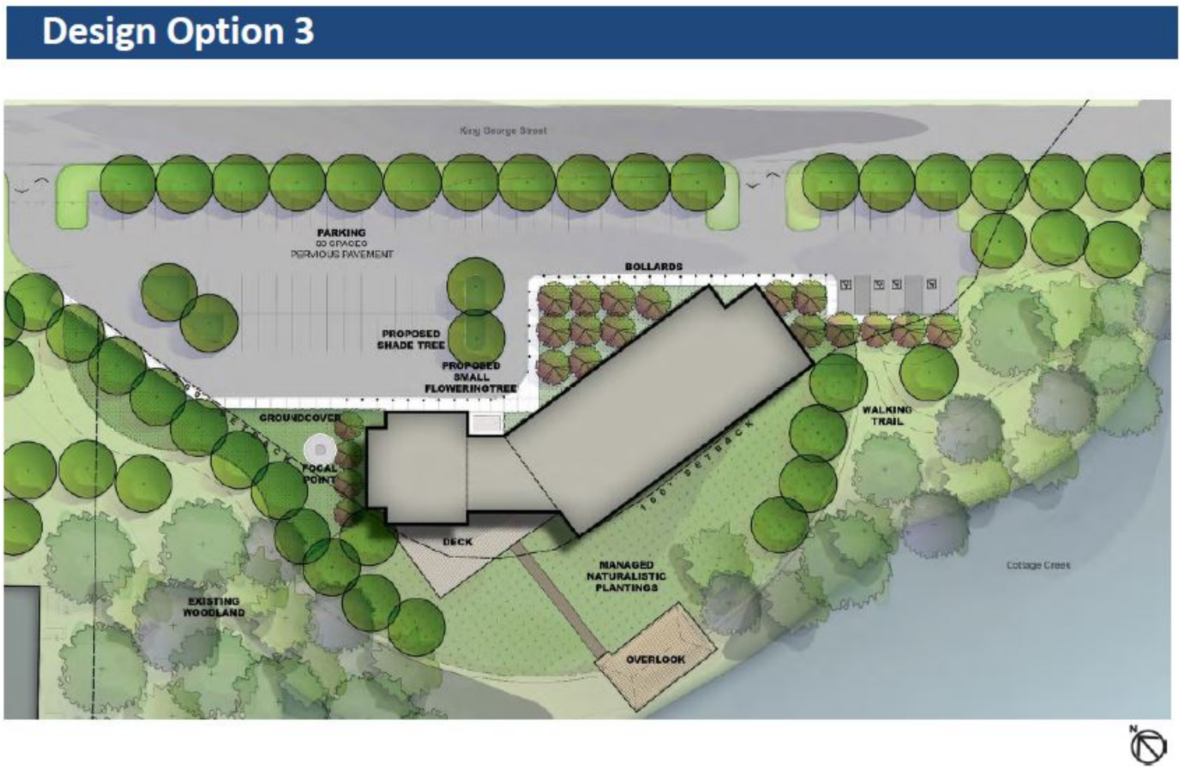


Figure 4-10 Alternative 1—Design Option 3

4.2.1 Pedestrian Network

Under Action Alternative 1, the Perry Center site would directly tie into the planned sidewalk improvements along King George Street. In addition, new pedestrian crossing would be striped at the unsignalized intersection of King George Street and Perry Center site (exit only)/ Bishop Stadium. The pedestrian crossing, which would provide a safe location to cross between Bishop Stadium and Perry Center site, would include the proper signing to alert drivers of its existence.

Assuming proper signing is posted at the Perry Center site driveways alerting pedestrians to an active driveway, pedestrians should not be affected. Currently, the sidewalks near the Action Alternative 1 site are lightly used. The West Annapolis Sector Study recorded between 10 and 20 peak hour pedestrians at the intersection between King George Street and Baltimore Annapolis Boulevard; therefore, the pedestrian network should be able to handle increases in pedestrian traffic from the new USNA AA/F Alumni Service Center and Headquarters Building.

The proposed new pedestrian crossing requires an evaluation to determine whether a pedestrian signal would be necessary based on the forecasted traffic and pedestrian volumes. The data collected in November 2015 indicated that 15, 9, and 27 pedestrians crossed King George Street during the AM, mid-day, and PM peak hours, respectively. The total forecasted vehicular volume along King George Street under Action Alternative 1 would be 982, 669, and 754 vehicles per hour during the AM, mid-day, and PM peak hours, respectively. The distance to the closest intersection (signalized or unsignalized) would be 1,100 feet from the Perry Center site.

The *Manual of Uniform Traffic Control Devices* (MUTCD) provides guidance for evaluating the need for a pedestrian signal at a pedestrian crossing. According to the MUTCD, the following conditions must be met for the pedestrian peak hour warrant test:

- The closest intersection (signalized or unsignalized) must be at least 300 feet.
- The plotted point on the graph (Figure 4-11) must fall above the curve (FHWA, 2012).

All three plotted points representing the three peak hour periods fall below the curve; therefore, the intersection does not meet the warrant to add a pedestrian signal for this crossing.

The MUTCD also provides a 4-hour pedestrian warrant test, but it requires four plotted points in a graph to fall above the curve. Because the highest traffic volume forecasted to occur along King George Street is 982 vehicles, the lowest pedestrian count required to meet the warrant is more than 125 pedestrians per hour. A separate traffic count was obtained over a 3-day period and recorded the King George volumes for both directions. The highest four volumes were 871, 792, 759, and 720 and requires between 150 pedestrians per hour and 200 pedestrians per hour. These pedestrian values are well above the existing maximum pedestrian volume of 27; therefore, the 4-hour warrant is not met.

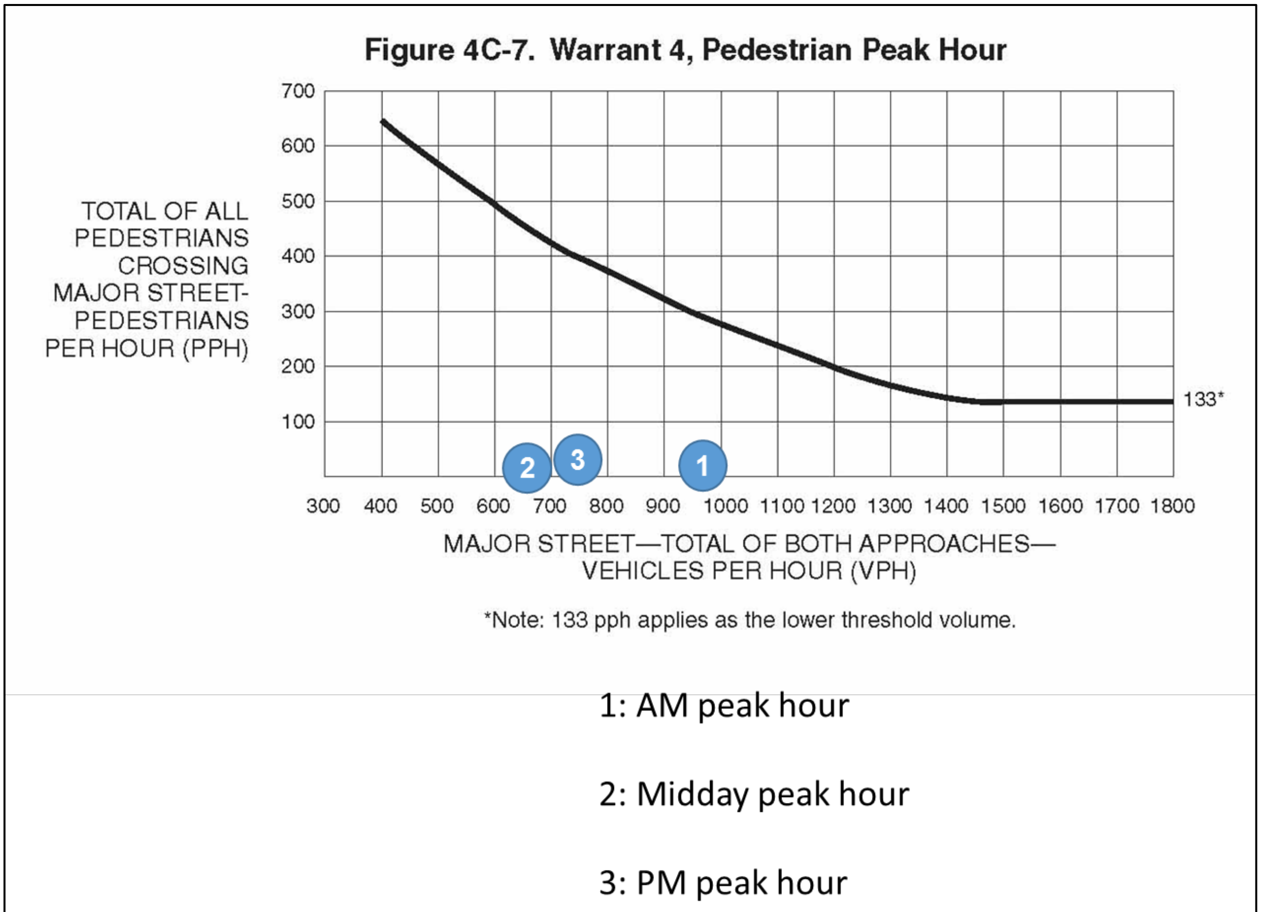


Figure 4-11 MUTCD Pedestrian Peak Hour Warrant Graph

In terms of striping a new crosswalk at King George Street and Perry Center site (exit)/ Bishop Stadium (Intersection #4), the HCM provides guidance to calculate the difference in time between using the existing nearest crosswalk or a proposed crosswalk. The nearest location for a pedestrian to safely cross King George Street is located at King George Street and Baltimore Annapolis Boulevard (Intersection #2), a roundtrip distance of 2,250 feet, including the distance to cross King George Street. According to the HCM, the time per person to walk to Intersection #2 and walk back along the other side of the King George Street would be approximately 9 to 11 minutes, depending on the pedestrian's walking speed (TRB, 2010). If a crosswalk were available to cross at Intersection #4, it would take less than 10 seconds to cross King George Street. Based on this comparison, a new crosswalk is warranted at Intersection #4 to avoid a safety issue that could be caused by pedestrians choosing to cross at a location without a crosswalk and proper signing, rather than walking to Intersection #2 to cross.

Maryland SHA provides road safety audit checklists, many of which are relevant to the placement of a crosswalk and include on-street parking, roadway design, intersection control, bicycle/pedestrian special needs, signs and lighting, and physical objects. No on-street parking is allowed in either direction along King George Street in the vicinity of the proposed crosswalk; only a straight two-lane roadway section with proposed signed bicycle route and sidewalks is situated on both sides of the roadway. The proposed intersection would operate as a two-way, STOP-controlled intersection, requiring vehicles to stop along King George Street if a pedestrian is crossing the road. There are no needs specific to bicycles; however, a crosswalk is needed at this location because of the long walk to access the next closest designated crossing (see previous paragraph). This location has no lighting or signs, but lighting and signing would need to be added if a new crosswalk is placed at this location. Fences line both sides of the street but do not obstruct the visibility of the roadway from the pedestrian's perspective or the visibility of pedestrians from the driver's perspective.

4.2.2 Bicycle Network

Under Action Alternative 1, the Perry Center site would directly tie into the planned signed bicycle route along King George Street. Assuming proper signing is posted to alert bicyclists of the active driveway serving the Perry Center site, bicyclists should not be affected as a result of implementing Action Alternative 1. Observations of bicycle use along King George Street near the Upper Yard indicate the bicycle use is light in the area. Thus, the planned bicycle network should be able to handle an increase in use from the new USNA AA/F building.

4.2.3 Public Transit

Under Action Alternative 1, the public transit network located near the Perry Center would not undergo changes in levels of service or operation hours. The closest bus stop, served by both Annapolis Transit and the MTA local bus, would be at the corner of King George Street and Baltimore Annapolis Boulevard, a distance of 800 feet from the Action Alternative 1 site. Commuters would be able to reach the bus stop from the Perry Center site via the planned sidewalk improvements.

4.2.4 Parking

Under Action Alternative 1, the Perry Center site would include between 90 and 120 parking spaces. Assuming the low range, 79 parking spaces for employees and 11 for visitors would be a sufficient number to accommodate commuters and visitors to the Perry Center site. If a mid-day event were to occur, it is assumed that the 79 employees would be asked to park elsewhere, thus freeing up the spaces at the Perry Center site. It is also assumed that the 86 spaces at Bishop Stadium would be freed up for event parking as well, leaving approximately 25 spaces short of the potential demand of 200 vehicles. Those additional vehicles could be accommodated on the northwest corner of the existing Perry Center; however, the traffic model placed all vehicles destined to the Perry Center site at Perry Center and Bishop Stadium. These assumptions provide a conservative approach (i.e., worst case scenario) to the traffic analysis by assigning all of the visitors attending a mid-day event to access off-street parking at the Perry Center site and Bishop Stadium, thus placing all forecasted traffic at the Perry Center/Bishop Stadium intersection in the immediate vicinity of the Alumni Service Center and Headquarters facility. However, because of daily use of the parking lots, a number of visitors likely would park at other locations or use available on-street parking, which would lessen the traffic impact along King George Street. A shuttle bus could be required to provide the employees, as well as event visitors, access between their parked vehicles and the Perry Center site.

4.2.5 Traffic Section

The future projected traffic analysis is based on the development scenario outlined in Design Option 1, very similar to the other two conceptual plans containing two driveways connecting the Perry Center site to King George Street. The driveway to the west would operate as an entrance only and the driveway to the east would serve as an exit only. Figure 4-12 illustrates the change in lane geometry for Action Alternative 1.

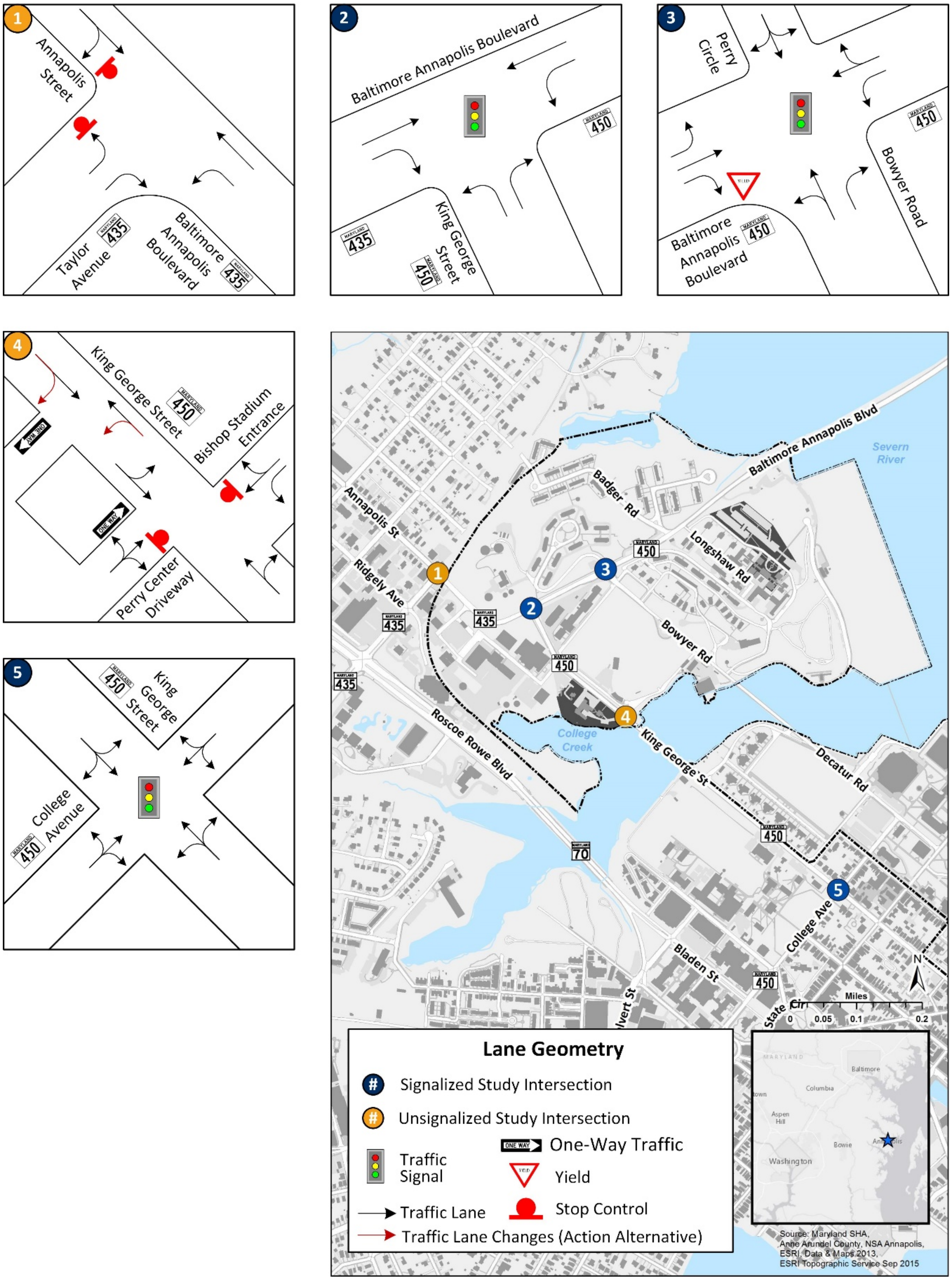


Figure 4-12 Action Alternative 1 Lane Geometry

The following two sections describe the process used to project future traffic volumes. First, the trip generation is covered, followed by the modal split and trip distribution to develop the future forecasted traffic volumes.

4.2.5.1 Trip Generation

Trip generation refers to the total number of person trips created by the Perry Center site during the AM and PM peak hours each workday. Following the transportation scoping letter from the Navy to the City of Annapolis, the Institute of Transportation Engineers (ITE) *Trip Generation Manual 9th Edition* was used to forecast the number of peak hour trips that would be produced based on 120 people (employees and visitors). Based on the use being for an office within the USNA, the single tenant office building land use category was used, relying on the number of employees to determine the total peak hour trips. According to ITE, the total trips generated would be 64 during the AM peak hour and 61 during the PM peak hour. The average rate was used to calculate the total number of employees because the fitted curve equation produces unrealistic volumes from the low number of employees. Table 4-6 contains the ITE formulas to derive the total trips, and Table 4-7 contains the Action Alternative 1 trip generation.

Table 4-6 Institute of Transportation Engineers Land Use Code 715 – Single Use Tenant Office Building

Time Period	Independent Variable	Average Rate	Directional Distribution	
			Entering	Exiting
AM peak hour	120 employees	0.53	89%	11%
PM peak hour	120 employees	0.51	15%	85%

Table 4-7 Action Alternative 1 Trip Generation

Source	Independent Variable	Time Period	IN	OUT	TOTAL
ITE Land Use Code 715	120 employees	AM peak hour	57	7	64
	120 employees	PM peak hour	9	52	61

The mid-day peak hour person trip generation assumes full capacity in the multipurpose room and equates to 300 people for a conservative analysis.

4.2.5.2 Modal Split

For the AM and PM vehicle trips, the ITE rates were used to develop the trip generation. Because the ITE rates were developed based on a similar suburban environment with a limited amount of transit and some carpooling occurring, the full ITE rate was used to forecast the vehicle trips.

For the mid-day events, following the transportation scoping letter from the Navy to the City of Annapolis, it was assumed that some of the attendees would carpool. Therefore, based on 1.5 person vehicle occupancy, approximately 200 vehicle trips would occur. It is reasonable to assume that an event could begin or end during the mid-day peak period. Following a conservative evaluation, the analysis added the event-based trips as 100 percent inbound and a separate evaluation of the event-based trips as 100 percent outbound. It is unlikely that the trips would occur at the same time; consequently, the analysis examines both scenarios separately. The terms *inbound mid-day* and *outbound mid-day* are used to describe these two mid-day scenarios. Following the transportation scoping letter from the Navy to the City of Annapolis, it is also assumed that any truck traffic to serve the multi-purpose room would arrive and depart during off-peak hours and outside the mid-day peak hour as well.

4.2.5.3 Trip Distribution

Trip distribution represents the origin-destination pattern by percentage for trips generated by the Perry Center site to/from points beyond the study area boundary. For example, 53 percent of the vehicle trips are destined to Taylor Road and points west, 30 percent of vehicle trips are destined to the Naval Academy Bridge, and 17 percent of vehicle trips are destined to downtown Annapolis. This process sums to 100 percent. The trip assignment reflects the estimated number of trips between the Perry Center site and the study area boundary by selecting which route within the study to assign the trip.

For the AM and PM peak hour, the trip distribution was developed by grouping together the zip codes surrounding Annapolis into distribution zones based on the geographic relationship to the primary roadway network access from the Perry Center site. A full list of employee zip codes was loaded into a database. The database was connected to distribution zones to create a list of the total number of employees by distribution.

Even though the USNA AA/F employees work at several locations southeast of the study area along King George Street and may already be traveling through the study area, removing these trips would be difficult to pinpoint; therefore, new trips were added to the study area to represent all employees and visitors. It is also possible that based on the location of the existing USNA AA/F facilities, most of the existing trips do not travel through the study area. Adding all the USNA AA/F employee and visitor trips to the study area network ensures the worst case scenario is covered in the traffic impact analysis.

Table 4-8 summarizes the total number and percentage of employees by distribution zone. Figure 4-13 shows the Action Alternative 1 AM and PM trip distribution, and Figure 4-14 shows the Action Alternative 1 AM and PM vehicle trip generation in the study area.

Table 4-8 Action Alternative 1 AM and PM Peak Hour Trip Distribution

Destination	Roadway	Total Employees	Percent
Annapolis	MD 450 southbound	13	17%
North and east	MD 450 northbound	23	30%
West and south	Taylor Avenue	41	53%
TOTAL		**77**	**100%**

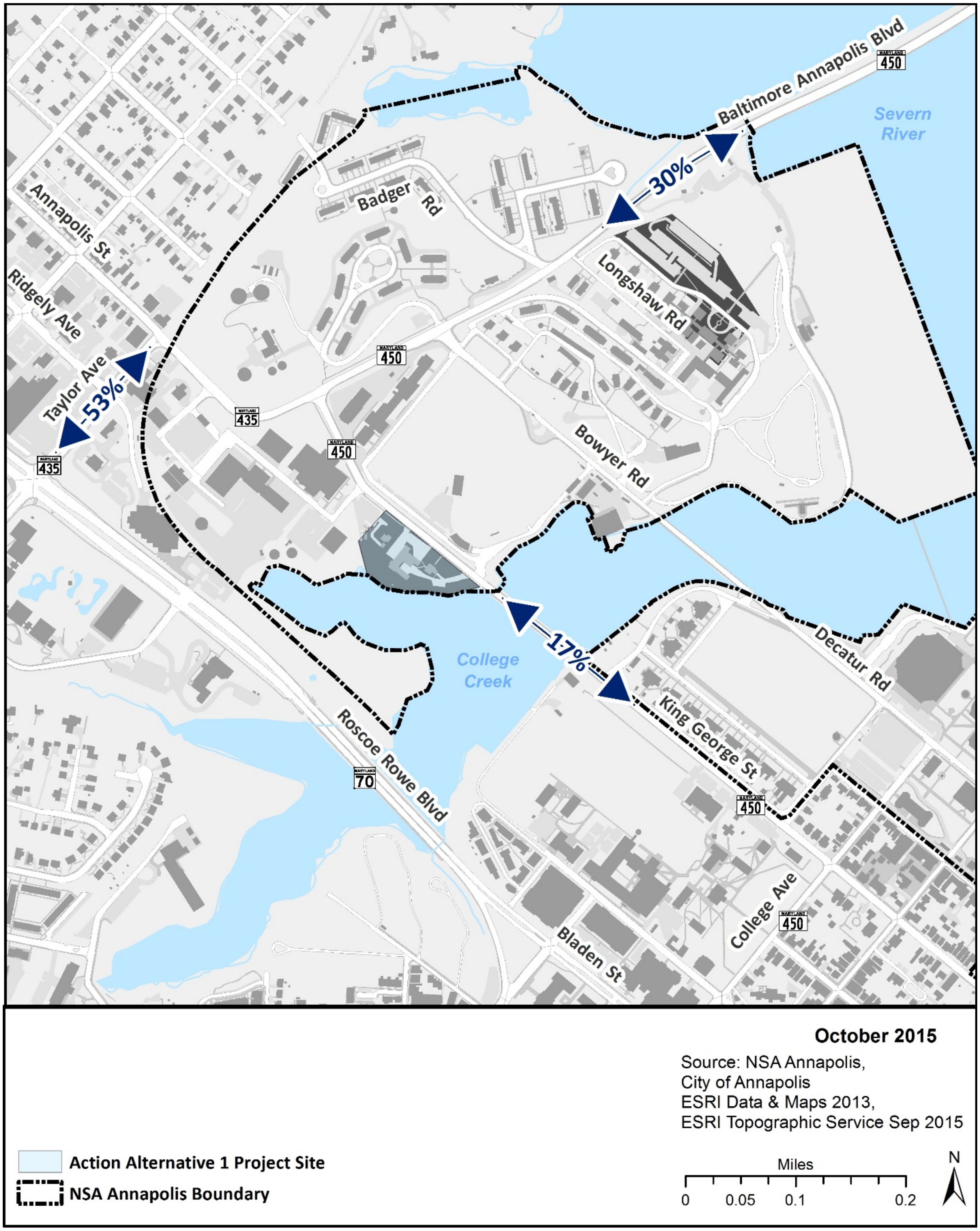


Figure 4-13 Action Alternative 1 AM and PM Trip Distribution

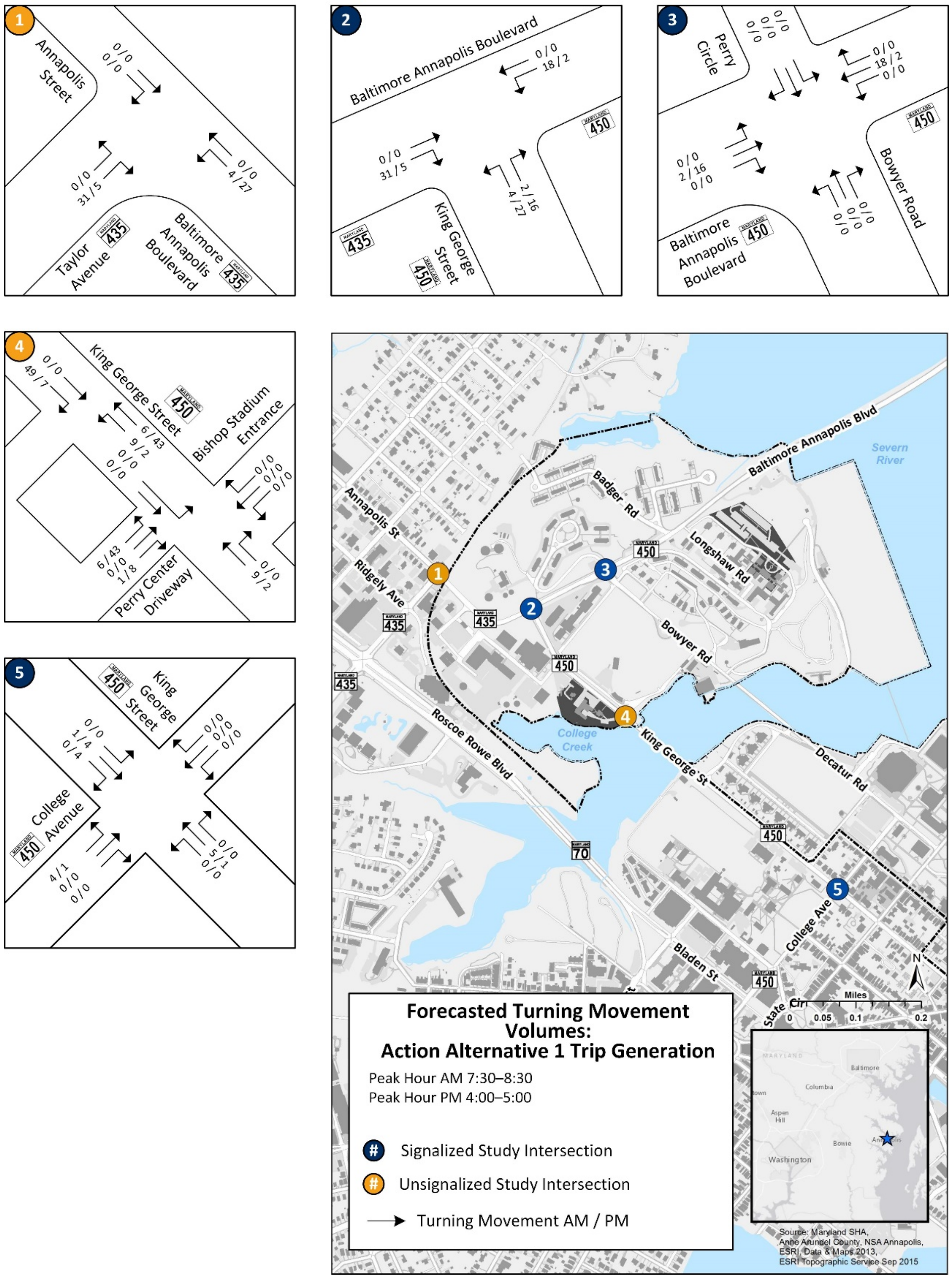


Figure 4-14 Action Alternative 1 AM and PM Vehicle Trip Generation

For the mid-day, the vehicle distribution to and from the site followed the existing condition volumes along King George Street. The study area turning movement volumes provided study area trip distribution patterns. It was assumed that trips would be destined or originate along King George Street to the southeast, College Avenue to the southwest, Baltimore Annapolis Boulevard to the east, and Taylor Avenue to the southwest. Table 4-9 shows the mid-day trip distribution percentage. Figure 4-15 shows the Action Alternative 1 mid-day trip distribution, and Figure 4-16 shows the Action Alternative 1 mid-day vehicle trip generation in the study area.

Table 4-9 Action Alternative 1 Mid-Day Trip Distribution

Destination	Roadway	Total Vehicles	Percent
Annapolis	MD 450 southbound	38	19%
North and east	MD 450 northbound	54	27%
West and south	Taylor Avenue	108	54%
TOTAL		**200**	**100%**

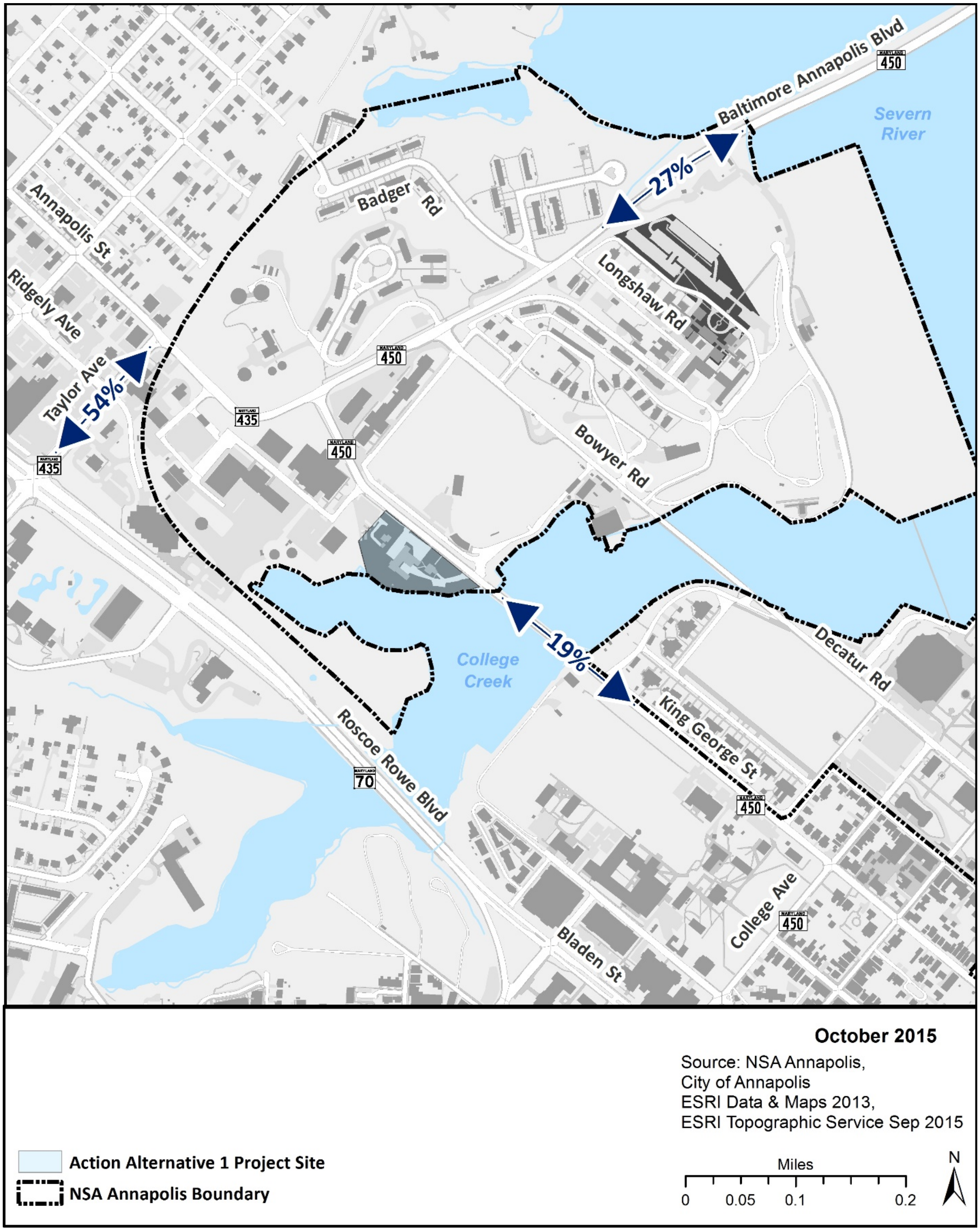


Figure 4-15 Action Alternative 1 Mid-Day Trip Distribution

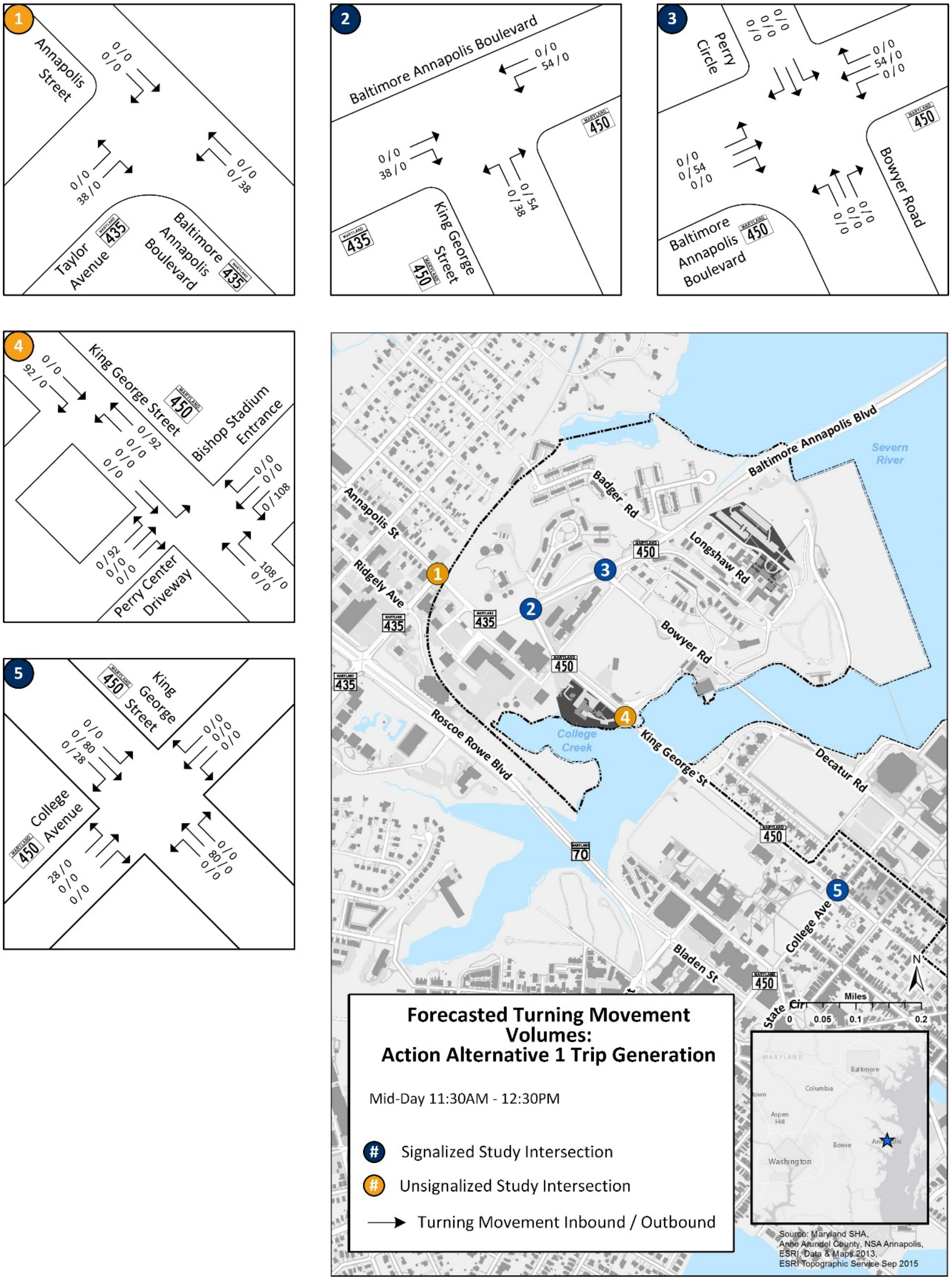


Figure 4-16 Action Alternative 1 Mid-Day Inbound and Outbound Vehicle Trip Generation

4.2.5.4 Complete Action Alternative 1

The Action Alternative 1 vehicle trips were added to each study area intersection using the No Action Alternative as a base. The existing vehicle volumes entering and exiting the Perry Center site were removed because the existing site activity would be relocated; therefore, no other volumes from other study area intersections were removed because the trip distribution from the existing Perry Center site is unknown. This provides for a conservative analysis approach because some of existing trips most likely already enter or exit through the study area intersections. Also the existing trips created by the CHRIMP facility would shift to the northern portion of the Perry Center site. The total vehicle trips represents the 2020 Action Alternative 1. Figure 4-17 shows the Action Alternative 1 AM and PM peak hour turning movement volumes, and Figure 4-18 shows the Action Alternative 1 mid-day inbound and outbound turning movement volumes.

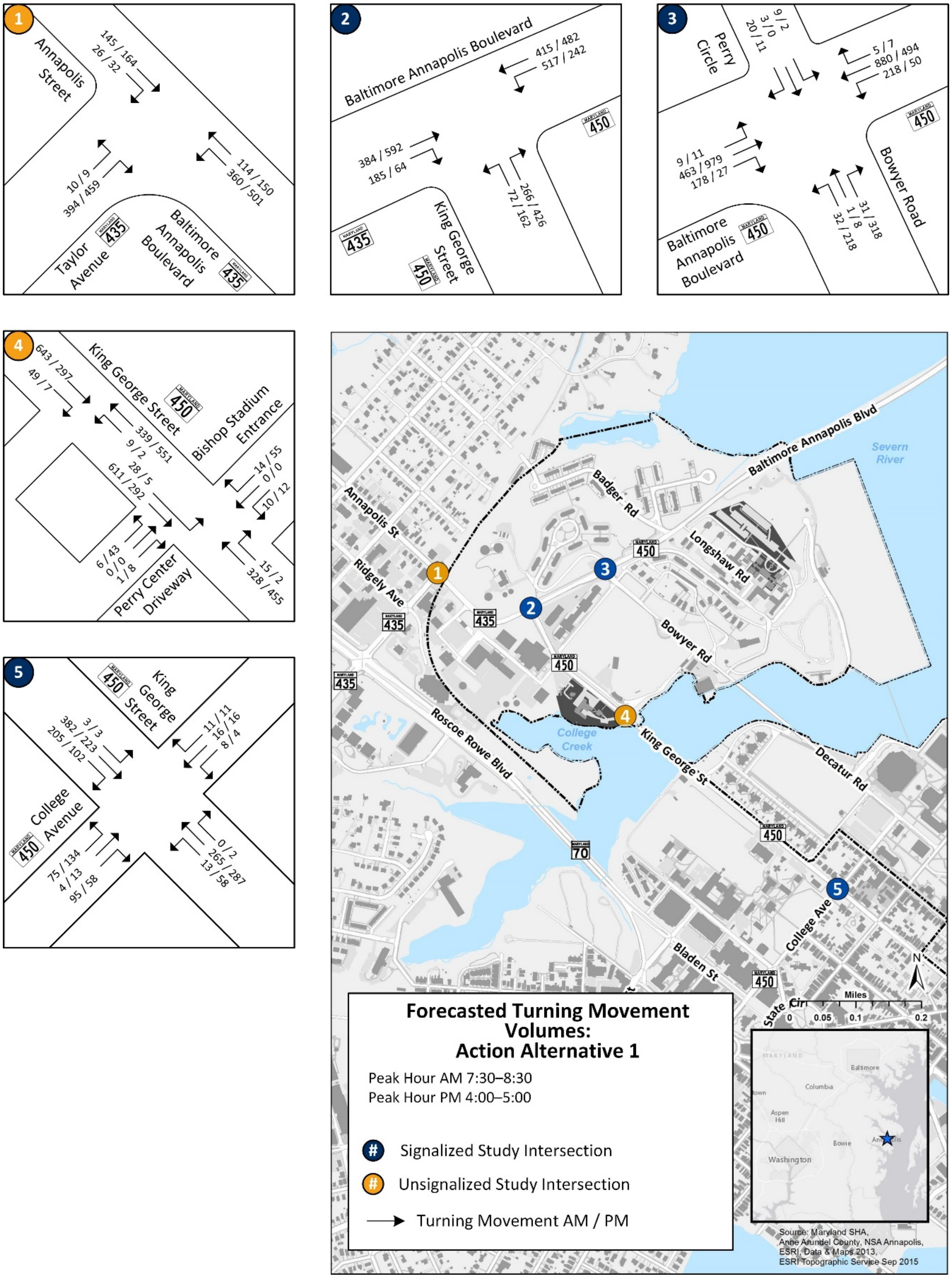


Figure 4-17 Action Alternative 1 AM and PM Peak Hour Turning Movement Volumes

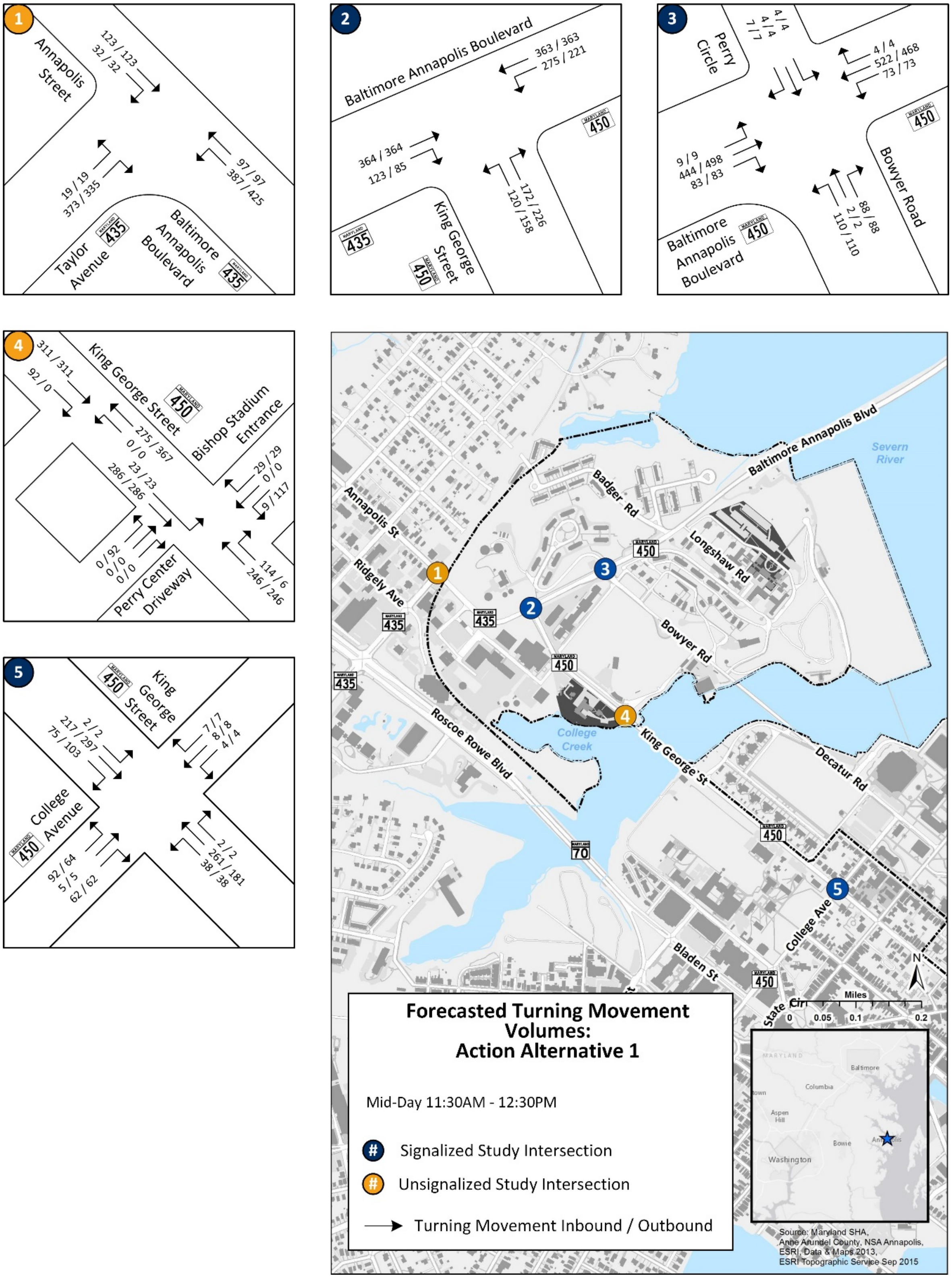


Figure 4-18 Action Alternative 1 Inbound and Outbound Mid-Day Turning Movement Volumes

4.2.5.5 Action Alternative 1 Intersection Operations Analysis

Based on the Synchro™ signalized intersection analysis results, all of the study area intersections would operate at overall acceptable conditions during the AM and PM peak hours. Overall operating conditions during mid-day would also operate at acceptable levels.

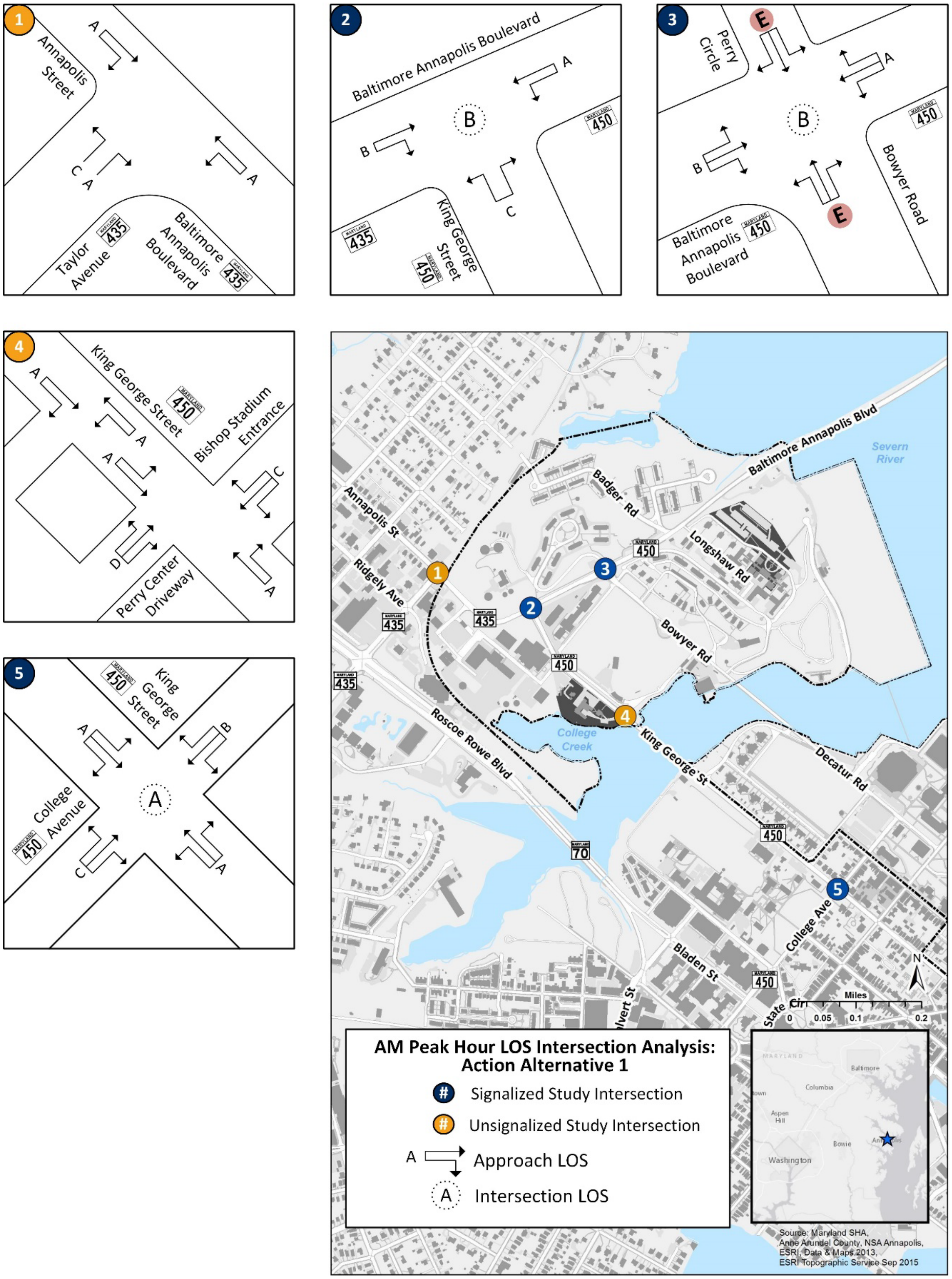
Individual signalized intersection approaches would operate at acceptable conditions for Intersections #2 and #5. The Bowyer Road and Perry Circle approaches at Intersection #3 (primarily used by the Navy) would operate under unacceptable conditions. When compared to the No Action Alternative, these approaches would operate as follows:

- During the AM peak hour, the northbound Bowyer Road and southbound Perry Circle approaches would continue to operate at LOS E and experience no increase in vehicle delay.
- During the mid-day inbound and outbound peak hours, the northbound Bowyer Road approach would continue operate at LOS E and experience less than a second increase in vehicle delay; the southbound Perry Circle approach would continue to operate at LOS D.
- During the PM peak hour, the northbound Bowyer Road approach would continue to operate at LOS F and experience no increase in vehicle delay; the southbound Perry Circle approach would continue to operate at LOS E and experience no increase in vehicle delay.

Based on the unsignalized intersection analysis, all approaches would operate at acceptable conditions during the peak hours.

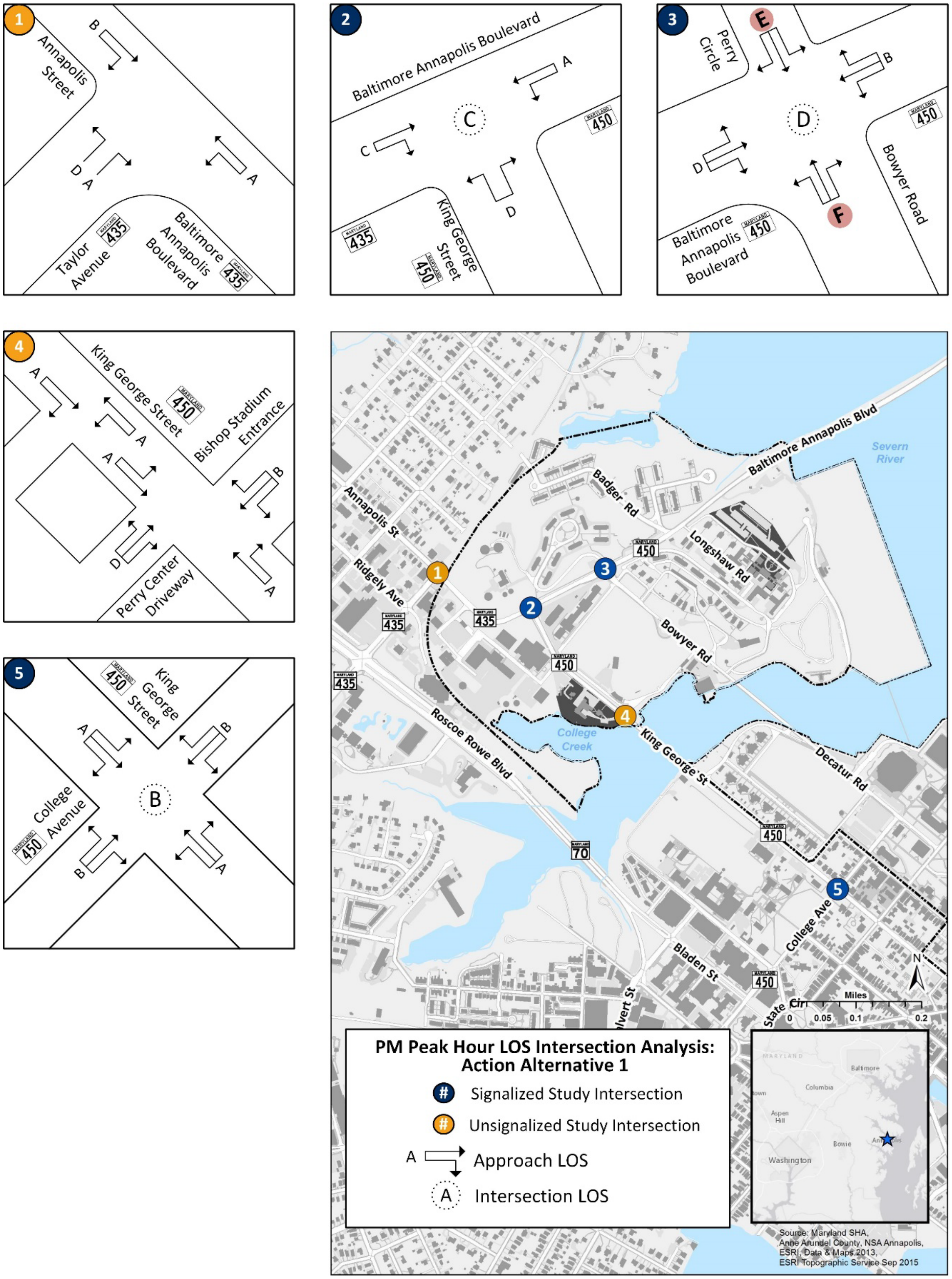
The average LOS for the various approaches to the intersection and the overall intersection LOS grade are depicted in Figure 4-19, Figure 4-20, Figure 4-21, and Figure 4-22 for AM, PM, inbound mid-day, and outbound mid-day peak hours, respectively. Table 4-10 shows the results of the LOS capacity analysis and the intersection vehicle delay for the Action Alternative 1 compared to the No Action Alternative during the AM and PM peak hours. Table 4-11 shows the results of the LOS capacity analysis and the intersection vehicle delay for Action Alternative 1 compared to the No Action Alternative during the inbound and outbound mid-day peak hour.

The traffic analysis for Alternative 1 evaluated the impacts of the proposed Perry Center site containing two curb cuts (i.e. driveway entrances), one to serve vehicles entering the site and the other to serve vehicles exiting the site. This analysis assessed the worst case scenario for all vehicles exiting the Perry Center site through one driveway. If the design results in more curb cuts (i.e., providing multiple exit points), the mid-day and PM peak hour traffic would result in a more distributed traffic pattern and reduce the forecasted vehicle delay along the Perry Center driveway approaches to King George Street.



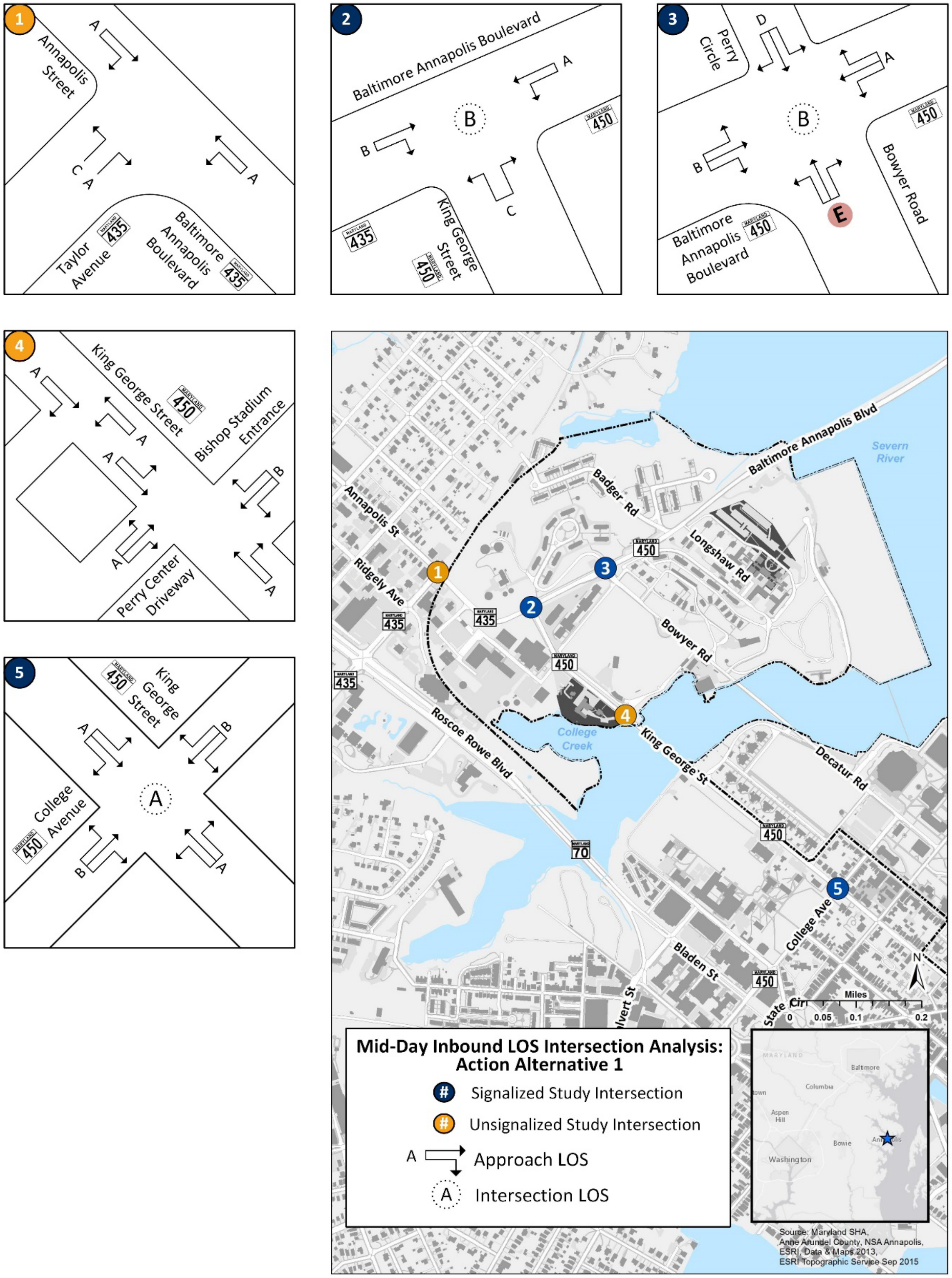
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-19 Action Alternative 1 Intersection LOS (AM Peak Hour)



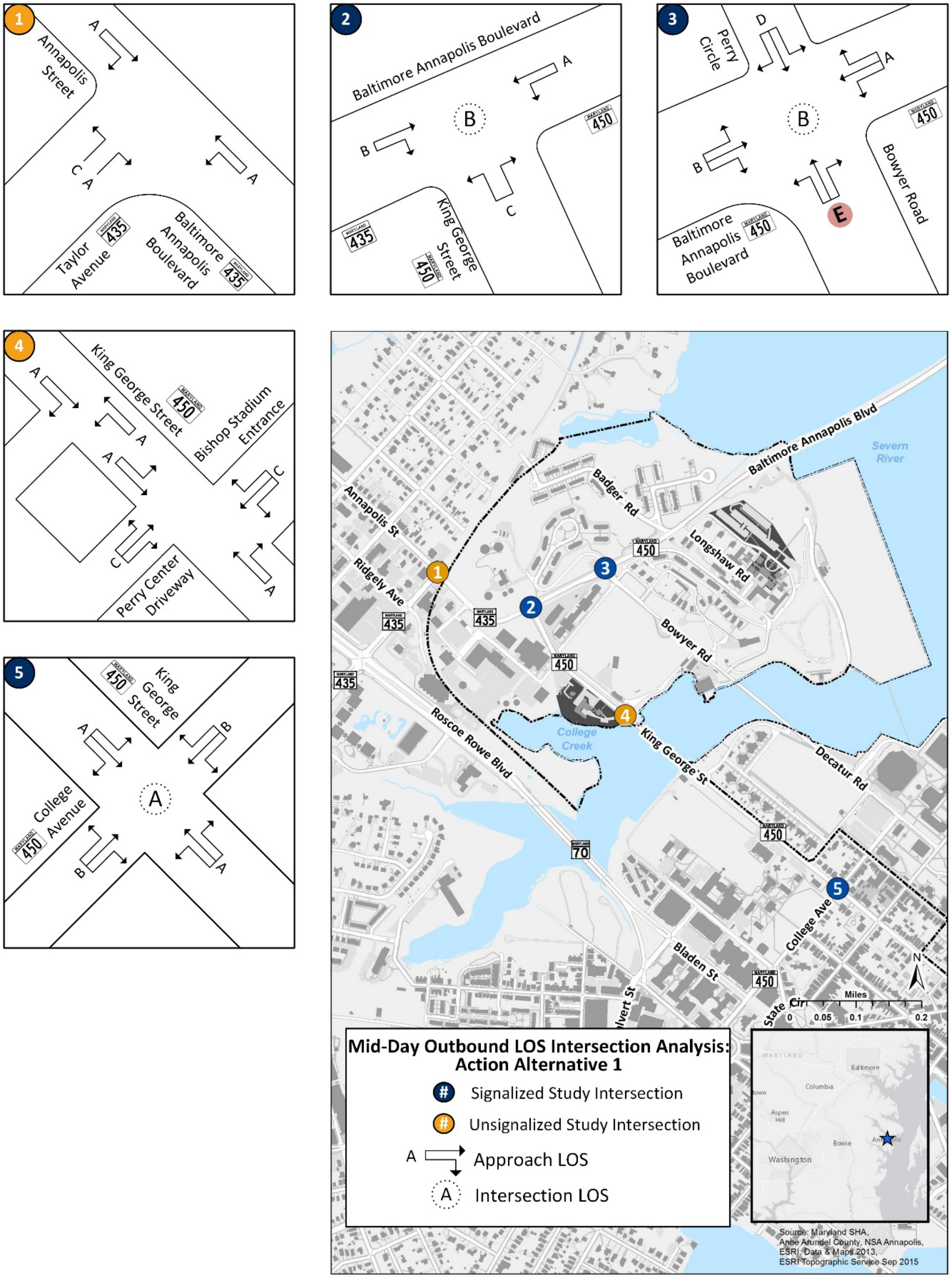
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-20 Action Alternative 1 Intersection LOS (PM Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-21 Action Alternative 1 Intersection LOS (Inbound Mid-Day Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-22 Action Alternative 1 Intersection LOS (Outbound Mid-Day Peak Hour)

Table 4-10 Action Alternative 1 AM and PM Peak Hour Operations Analysis Compared to the No Action Alternative

#	Intersection and Approach	Lane Group	No Action Alternative						Action Alternative 1					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)** [a]													
	EB (Annapolis St)	TR	0.20	9.9	A	0.26	10.7	B	0.20	9.9	A	0.26	10.7	B
	EB Overall (Annapolis St)			**9.9**	**A**		**10.7**	**B**		**9.9**	**A**		**10.7**	**B**
	WB (Baltimore Annapolis Blvd)	L	-	-	-	-	-	-	-	-	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	-	-	-	-	-	-	-	-	-	-	-	-
	WB Overall (Baltimore Annapolis Blvd)			**-**	**-**		**-**	**-**		**-**	**-**		**-**	**-**
	NB (Taylor Avenue)	L	0.04	18.5	C	0.06	27.5	D	0.04	18.7	C	0.06	29.6	D
	NB (Taylor Avenue)	R	-	0.0	A	-	0.0	A	-	0.0	A	-	0.0	A
	NB Overall (Taylor Avenue)			**18.5**	**C**		**27.5**	**D**		**18.7**	**C**		**29.6**	**D**
	Overall			**2.9**	**-**		**2.8**	**-**		**2.9**	**-**		**2.8**	**-**
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)** [b]													
	EB (Baltimore Annapolis Blvd)	T	0.47	16.3	B	0.70	21.8	C	0.48	16.6	B	0.70	22.3	C
	EB (Baltimore Annapolis Blvd)	R	0.11	12.0	B	0.04	11.7	B	0.13	12.5	B	0.05	11.9	B
	EB Overall (Baltimore Annapolis Blvd)			**15.1**	**B**		**20.9**	**C**		**15.3**	**B**		**21.3**	**C**
	WB (Baltimore Annapolis Blvd)	L	0.70	8.1	A	0.51	13.3	B	0.72	9.1	A	0.52	13.9	B
	WB (Baltimore Annapolis Blvd)	T	0.32	3.5	A	0.41	5.8	A	0.32	3.4	A	0.41	5.9	A
	WB Overall (Baltimore Annapolis Blvd)			**6.0**	**A**		**8.3**	**A**		**6.6**	**A**		**8.6**	**A**
	WB (King George St)	L	0.32	33.4	C	0.40	32.3	C	0.34	33.6	C	0.47	33.0	C
	WB (King George St)	R	0.45	18.8	B	0.87	44.9	D	0.45	18.5	B	0.89	47.4	D
	WB Overall (King George St)			**21.8**	**C**		**41.8**	**D**		**21.8**	**C**		**43.4**	**D**
	Overall			**11.7**	**B**		**22.1**	**C**		**12.0**	**B**		**23.2**	**C**

Table 4-10 Action Alternative 1 AM and PM Peak Hour Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative						Action Alternative 1					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)** [b]													
	EB (Baltimore Annapolis Blvd)	L	0.02	6.1	A	0.02	11.6	B	0.02	6.1	A	0.02	11.6	B
	EB (Baltimore Annapolis Blvd)	T	0.36	9.1	A	0.90	35.2	D	0.36	9.1	A	0.91	36.9	D
	EB (Baltimore Annapolis Blvd)	R	0.12	14.5	B	0.02	12.5	B	0.12	14.3	B	0.02	12.4	B
	EB Overall (Baltimore Annapolis Blvd)			**10.6**	**B**		**34.3**	**C**		**10.5**	**B**		**36.0**	**D**
	WB (Baltimore Annapolis Blvd)	L	0.31	4.1	A	0.37	37.2	D	0.31	4.1	A	0.40	39.9	D
	WB (Baltimore Annapolis Blvd)	TR	0.58	6.6	A	0.42	12.9	B	0.59	6.8	A	0.42	12.9	B
	WB Overall (Baltimore Annapolis Blvd)			**6.1**	**A**		**15.1**	**B**		**6.3**	**A**		**15.4**	**B**
	NB (Bowyer Rd)	LT	0.42	77.3	E	0.94	112.1	F	0.42	77.3	E	0.94	112.1	F
	NB (Bowyer Rd)	R	0.02	62.2	E	0.58	63.4	E	0.02	62.2	E	0.59	63.5	E
	NB Overall (Bowyer Rd)			**70.0**	**E**		**83.7**	**F**		**70.0**	**E**		**83.7**	**F**
	SB (Perry Cir)	LTR	0.16	72.8	E	0.01	58.9	E	0.16	72.8	E	0.01	58.9	E
	SB Overall (Perry Cir)			**72.8**	**E**		**58.9**	**E**		**72.8**	**E**		**58.9**	**E**
	Overall			**11.1**	**B**		**42.2**	**D**		**11.1**	**B**		**43.0**	**D**

Table 4-10 Action Alternative 1 AM and PM Peak Hour Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative						Action Alternative 1					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS
4	**King George Street & Perry Center & Bishop Stadium (TWSC)** [a]													
	EB (Perry Center)	LTR	0.01	23.7	C	0.03	23.7	C	0.04	25.7	D	0.25	26.3	D
	EB Overall (Perry Center)			**23.7**	**C**		**23.7**	**C**		**25.7**	**D**		**26.3**	**D**
	WB (Bishop Stadium)	L	0.07	27.5	D	0.06	20.8	C	0.07	28.0	D	0.06	21.2	C
	WB (Bishop Stadium)	TR	0.02	10.6	B	0.13	13.1	B	0.03	10.7	B	0.13	13.1	B
	WB Overall (Bishop Stadium)			**17.6**	**C**		**14.5**	**B**		**17.9**	**C**		**14.6**	**B**
	WB (King George St)	LTR	-	0.0	A	-	-	-	-	-	-	-	-	-
	WB (King George St)	TR	-	-	-	0.00	8.0	A	-	0.0	A	-	0.0	A
	WB Overall (King George St)			**0.0**	**-**		**0.0**	**-**		**0.0**	**-**		**0.0**	**-**
	EB (King George St)	LTR	0.03	8.1	A	-	-	-	-	-	-	-	-	-
	EB (King George St)	LT	-	-	-	0.01	8.6	A	0.03	8.2	A	0.01	8.6	A
	EB Overall (King George St)			**0.4**	**-**		**0.1**	**-**		**0.4**	**-**		**0.1**	**-**
	Overall			**0.7**	**-**		**1.4**	**-**		**0.9**	**-**		**2.6**	**-**

Table 4-10 Action Alternative 1 AM and PM Peak Hour Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative						Action Alternative 1					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS
5	**College Avenue & King George Street (Signalized)** [b]													
	EB (King George St)	LTR	0.56	7.3	A	0.40	8.6	A	0.56	7.3	A	0.41	8.7	A
	EB Overall (EB King George St)			**7.3**	**A**		**8.6**	**A**		**7.3**	**A**		**8.7**	**A**
	WB (King George St)	LTR	0.27	5.2	A	0.51	9.6	A	0.28	5.2	A	0.52	9.7	A
	WB Overall (King George St)			**5.2**	**A**		**9.6**	**A**		**5.2**	**A**		**9.7**	**A**
	NB (College Ave)	LTR	0.42	19.9	B	0.56	18.1	B	0.44	20.3	C	0.57	18.1	B
	NB Overall (College Ave)			**19.9**	**B**		**18.1**	**B**		**20.3**	**C**		**18.1**	**B**
	SB (College Ave)	LTR	0.10	16.8	B	0.06	12.9	B	0.11	16.9	B	0.06	13.0	B
	SB Overall (College Ave)			**16.8**	**B**		**12.9**	**B**		**16.9**	**B**		**13.0**	**B**
	Overall			**9.0**	**A**		**11.3**	**B**		**9.1**	**A**		**11.3**	**B**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2010 results

[b] Highway Capacity Software 2000 results

Table 4-11 Action Alternative 1 Inbound and Outbound Mid-Day Operations Analysis Compared to the No Action Alternative

#	*Intersection and Approach*	*Lane Group*	No Action Alternative *Mid-Day* *V/C Ratio*	*Delay (sec/veh)*	*LOS*	Action Alternative 1 *Mid-Day (Inbound)* *V/C Ratio*	*Delay (sec/veh)*	*LOS*	*Mid-Day (Outbound)* *V/C Ratio*	*Delay (sec/veh)*	*LOS*
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)** [a]										
	EB (Annapolis St)	TR	0.18	9.7	A	0.18	9.7	A	0.18	9.7	A
	EB Overall (Annapolis St)			**9.7**	**A**		**9.7**	**A**		**9.7**	**A**
	WB (Baltimore Annapolis Blvd)	L	-	-	-	-	-	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	-	-	-	-	-	-	-	-	-
	WB Overall (Baltimore Annapolis Blvd)			**-**	**-**		**-**	**-**		**-**	**-**
	NB (Taylor Avenue)	L	0.08	20.4	C	0.08	19.8	C	0.09	21.7	C
	NB (Taylor Avenue)	R	-	0.0	A	-	0.0	A	-	0.0	A
	NB Overall (Taylor Avenue)			**20.4**	**C**		**19.8**	**C**		**21.7**	**C**
	Overall			**2.9**	**-**		**2.9**	**-**		**2.8**	**-**
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)** [b]										
	EB (Baltimore Annapolis Blvd)	T	0.50	15.3	B	0.46	14.9	B	0.46	14.9	B
	EB (Baltimore Annapolis Blvd)	R	0.06	10.6	B	0.09	10.9	B	0.06	10.7	B
	EB Overall (Baltimore Annapolis Blvd)			**14.4**	**B**		**13.9**	**B**		**14.1**	**B**
	WB (Baltimore Annapolis Blvd)	L	0.41	4.2	A	0.44	4.0	A	0.37	3.9	A
	WB (Baltimore Annapolis Blvd)	T	0.33	4.3	A	0.31	3.8	A	0.31	4.2	A
	WB Overall (Baltimore Annapolis Blvd)			**4.3**	**A**		**3.9**	**A**		**4.1**	**A**
	WB (King George St)	L	0.44	27.8	C	0.42	27.7	C	0.52	28.6	C
	WB (King George St)	R	0.32	15.6	B	0.30	15.2	B	0.39	16.2	B
	WB Overall (King George St)			**20.6**	**C**		**20.4**	**C**		**21.3**	**C**
	Overall			**11.3**	**B**		**10.7**	**B**		**11.9**	**B**

Table 4-11 Action Alternative 1 Inbound and Outbound Mid-Day Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative			Action Alternative 1					
			Mid-Day			Mid-Day (Inbound)			Mid-Day (Outbound)		
			V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)** [b]										
	EB (Baltimore Annapolis Blvd)	L	0.02	7.9	A	0.02	8.3	A	0.02	8.6	A
	EB (Baltimore Annapolis Blvd)	T	0.40	11.8	B	0.40	12.3	B	0.44	12.8	B
	EB (Baltimore Annapolis Blvd)	R	0.06	11.9	B	0.06	12.8	B	0.06	11.3	B
	EB Overall (Baltimore Annapolis Blvd)			**11.8**	**B**		**12.3**	**B**		**12.5**	**B**
	WB (Baltimore Annapolis Blvd)	L	0.13	6.9	A	0.12	6.9	A	0.13	7.3	A
	WB (Baltimore Annapolis Blvd)	TR	0.38	8.4	A	0.40	8.7	A	0.36	8.2	A
	WB Overall (Baltimore Annapolis Blvd)			**8.2**	**A**		**8.5**	**A**		**8.1**	**A**
	NB (Bowyer Rd)	LT	0.67	67.7	E	0.69	69.2	E	0.69	69.2	E
	NB (Bowyer Rd)	R	0.06	46.9	D	0.07	46.1	D	0.07	46.1	D
	NB Overall (Bowyer Rd)			**58.6**	**E**		**59.0**	**E**		**59.0**	**E**
	SB (Perry Cir)	LTR	0.04	53.0	D	0.04	51.9	D	0.04	51.9	D
	SB Overall (Perry Cir)			**53.0**	**D**		**51.9**	**D**		**51.9**	**D**
	Overall			**17.9**	**B**		**18.0**	**B**		**18.1**	**B**

Table 4-11 Action Alternative 1 Inbound and Outbound Mid-Day Operations Analysis Compared to the No Action Alternative (continued)

#	*Intersection and Approach*	*Lane Group*	**No Action Alternative**			**Action Alternative 1**					
			Mid-Day			*Mid-Day (Inbound)*			*Mid-Day (Outbound)*		
			V/C Ratio	*Delay (sec/ veh)*	*LOS*	*V/C Ratio*	*Delay (sec/ veh)*	*LOS*	*V/C Ratio*	*Delay (sec/ veh)*	*LOS*
4	**King George Street & Perry Center & Bishop Stadium (TWSC)** [a]										
	EB (Perry Center)	LTR	0.01	17.3	C	-	0.0	A	0.30	20.0	C
	EB Overall (Perry Center)			**17.3**	**C**		**0.0**	**A**		**20.0**	**C**
	WB (Bishop Stadium)	L	0.03	15.3	C	0.03	16.3	C	0.37	20.5	C
	WB (Bishop Stadium)	TR	0.04	10.0	B	0.05	10.6	B	0.05	10.1	B
	WB Overall (Bishop Stadium)			**11.3**	**B**		**12.0**	**B**		**18.4**	**C**
	WB (King George St)	LTR	0.01	8.0	A	-	-	-	-	-	-
	WB (King George St)	TR	-	-	-	-	0.0	A	-	0.0	A
	WB Overall (King George St)			**0.3**	**-**		**0.0**	**-**		**0.0**	**-**
	EB (King George St)	LTR	0.02	7.9	A	-	-	-	-	-	-
	EB (King George St)	LT	-	-	-	0.02	8.2	A	0.02	7.9	A
	EB Overall (King George St)			**0.6**	**-**		**0.6**	**-**		**0.6**	**-**
	Overall			**1.2**	**-**		**0.9**	**-**		**5.9**	**-**

Table 4-11 Action Alternative 1 Inbound and Outbound Mid-Day Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative Mid-Day V/C Ratio	No Action Alternative Mid-Day Delay (sec/veh)	No Action Alternative Mid-Day LOS	Action Alternative 1 Mid-Day (Inbound) V/C Ratio	Action Alternative 1 Mid-Day (Inbound) Delay (sec/veh)	Action Alternative 1 Mid-Day (Inbound) LOS	Action Alternative 1 Mid-Day (Outbound) V/C Ratio	Action Alternative 1 Mid-Day (Outbound) Delay (sec/veh)	Action Alternative 1 Mid-Day (Outbound) LOS
5	**College Avenue & King George Street (Signalized) [b]**										
	EB (King George St)	LTR	0.32	6.1	A	0.30	6.1	A	0.40	6.3	A
	EB Overall (EB King George St)			**6.1**	**A**		**6.1**	**A**		**6.3**	**A**
	WB (King George St)	LTR	0.28	5.8	A	0.34	6.3	A	0.25	5.5	A
	WB Overall (King George St)			**5.8**	**A**		**6.3**	**A**		**5.5**	**A**
	NB (College Ave)	LTR	0.34	16.9	B	0.43	17.8	B	0.33	17.4	B
	NB Overall (College Ave)			**16.9**	**B**		**17.8**	**B**		**17.4**	**B**
	SB (College Ave)	LTR	0.05	14.5	B	0.04	14.4	B	0.05	15.1	B
	SB Overall (College Ave)			**14.5**	**B**		**14.4**	**B**		**15.1**	**B**
	Overall			**8.4**	**A**		**8.8**	**A**		**8.2**	**A**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2010 results

[b] Highway Capacity Software 2000 results

4.2.5.6 Action Alternative 1 Intersection Queueing Analysis

Based on the Synchro™ results, the only intersection to receive failing queue lengths would be the intersection of Bowyer Road and Perry Circle with Baltimore Annapolis Boulevard (Intersection #3) and only during the PM peak hour at the 95th percentile. When compared to the No Action Alternative, the queue lengths would increase as follows:

- During the PM peak hour, the eastbound Baltimore Annapolis Boulevard approach queue length would increase from 1,441 feet to 1,483 feet, thus adding a few additional queued vehicles to this approach.

All of the results are depicted below in Tables 4-12 and 4-13.

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Table 4-12 Action Alternative 1 AM and PM Peak Hours Queuing Analysis Compared to the No Action Alternative

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No Action Alternative				Action Alternative 1			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)**										
	EB (Annapolis St)	TR	521	-	18	-	25	-	18	-	25
	WB (Baltimore Annapolis Blvd)	L	376	-	-	-	-	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	376	-	-	-	-	-	-	-	-
	NB (Taylor Avenue)	L	359	-	3	-	5	-	3	-	5
	NB (Taylor Avenue)	R	359	-	-	-	-	-	-	-	-
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)**										
	EB (Baltimore Annapolis Blvd)	T	471	125	256	275	409	126	256	275	409
	EB (Baltimore Annapolis Blvd)	R	471	0	37	0	20	0	41	0	21
	WB (Baltimore Annapolis Blvd)	L	450	68	100	37	m73	72	117	38	m74
	WB (Baltimore Annapolis Blvd)	T	597	58	77	98	m169	58	77	99	m170
	WB (King George St)	L	400	32	71	69	124	34	74	84	146
	WB (King George St)	R	375	102	131	205	320	102	132	216	337
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)**										
	EB (Baltimore Annapolis Blvd)	L	125	3	m8	5	m7	3	m8	5	m8
	EB (Baltimore Annapolis Blvd)	T	597	164	306	938	#1441	165	307	960	#1483
	EB (Baltimore Annapolis Blvd)	R	150	17	51	0	m0	17	50	0	m0
	WB (Baltimore Annapolis Blvd)	L	350	42	72	19	35	42	72	19	42
	WB (Baltimore Annapolis Blvd)	TR	510	284	432	266	341	295	450	267	343
	NB (Bowyer Rd)	LT	433	35	72	289	#467	35	72	289	#467
	NB (Bowyer Rd)	R	310	0	27	183	296	0	27	187	300
	SB (Perry Cir)	LTR	184	12	49	0	0	12	49	0	0

Table 4-12 Action Alternative 1 AM and PM Peak Hours Queuing Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No Action Alternative				Action Alternative 1			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
4	**King George Street & Perry Center & Bishop Stadium (TWSC)**										
	EB (Perry Center)	LTR	292	-	0	-	3	-	3	-	25
	WB (Bishop Stadium)	L	234	-	5	-	5	-	5	-	5
	WB (Bishop Stadium)	TR	234	-	3	-	13	-	3	-	13
	WB (King George St)	LTR	2203	-	0	-	-	-	-	-	-
	WB (King George St)	TR	2203	-	-	-	0	-	0	-	0
	EB (King George St)	LTR	693	-	3	-	-	-	-	-	-
	EB (King George St)	LT	392	-	-	-	0	-	3	-	0
5	**College Avenue & King George Street (Signalized)**										
	EB (King George St)	LTR	2123	83	162	51	101	84	162	53	103
	WB (King George St)	LTR	327	37	70	71	133	38	71	72	134
	NB (College Ave)	LTR	354	16	65	41	95	17	67	42	96
	SB (College Ave)	LTR	275	5	24	4	20	5	24	4	20

Notes:

\# 95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

Table 4-13 Action Alternative 1 Inbound and Outbound Mid-Day Queuing Analysis Compared to the No Action Alternative

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No Action Alternative		Action Alternative 1			
				Mid-Day		Mid-Day (Inbound)		Mid-Day (Outbound)	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)**								
	EB (Annapolis St)	TR	521	-	18	-	15	-	15
	WB (Baltimore Annapolis Blvd)	L	376	-	-	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	376	-	-	-	-	-	-
	NB (Taylor Avenue)	L	359	-	8	-	5	-	8
	NB (Taylor Avenue)	R	359	-	-	-	-	-	-
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)**								
	EB (Baltimore Annapolis Blvd)	T	471	121	208	109	191	107	191
	EB (Baltimore Annapolis Blvd)	R	471	0	24	0	28	0	24
	WB (Baltimore Annapolis Blvd)	L	450	28	39	32	47	25	37
	WB (Baltimore Annapolis Blvd)	T	597	62	71	48	67	48	65
	WB (King George St)	L	400	51	99	47	93	63	119
	WB (King George St)	R	375	56	96	51	90	71	118
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)**								
	EB (Baltimore Annapolis Blvd)	L	125	3	m9	3	m8	3	m8
	EB (Baltimore Annapolis Blvd)	T	597	174	296	169	290	189	342
	EB (Baltimore Annapolis Blvd)	R	150	8	35	8	34	6	30
	WB (Baltimore Annapolis Blvd)	L	350	18	40	18	41	18	41
	WB (Baltimore Annapolis Blvd)	TR	510	159	262	176	294	152	256
	NB (Bowyer Rd)	LT	433	105	165	101	161	101	161
	NB (Bowyer Rd)	R	310	0	39	0	38	0	38
	SB (Perry Cir)	LTR	184	6	27	6	26	6	26

Table 4-13 Action Alternative 1 Inbound and Outbound Mid-Day Queuing Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No Action Alternative		Action Alternative 1			
				Mid-Day		Mid-Day (Inbound)		Mid-Day (Outbound)	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
4	**King George Street & Perry Center & Bishop Stadium (TWSC)**								
	EB (Perry Center)	LTR	292	-	0	-	-	-	33
	WB (Bishop Stadium)	L	234	-	3	-	3	-	40
	WB (Bishop Stadium)	TR	234	-	3	-	5	-	3
	WB (King George St)	LTR	2203	-	-	-	-	-	-
	WB (King George St)	TR	2203	-	0	-	0	-	0
	EB (King George St)	LTR	693	-	-	-	-	-	-
	EB (King George St)	LT	392	-	3	-	3	-	3
5	**College Avenue & King George Street (Signalized)**								
	EB (King George St)	LTR	2123	36	83	34	77	49	110
	WB (King George St)	LTR	327	32	72	43	92	29	66
	NB (College Ave)	LTR	354	15	48	21	58	14	52
	SB (College Ave)	LTR	275	2	13	2	13	2	15

Notes:

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

4.2.6 Action Alternative 1 Travel Time Analysis

Based in the Synchro™ analysis, the AM peak covering both routes would range between two and two and a half minutes with a minimum travel time of one minute and fifty-one seconds and a maximum travel time of two minutes and twenty-one seconds. The mid-day times would be similar to the morning travel times with a maximum of five seconds separating the two periods. The PM peak period would have the largest difference in travel times ranging from a low of one minute and fifty-two seconds to a high of three minutes and ten seconds. Action Alternative 1 would result in a maximum of three additional seconds (1 percent increase) when compared to the No Action Alternative. The 3 additional seconds is on top of the travel time that would occur under the No Action Alternative or if the relocation of staff, demolition of buildings, relocation of Navy functions, and construction of a new building at the Perry Center site did not occur. Table 4-14 contains the Action Alternative 1 AM and PM travel times by route. Table 4-15 contains the Action Alternative 1 Mid-day travel times by route compared to the No Action Alternative.

Table 4-14 Action Alternative 1 AM and PM Travel Time Compared to the No Action Alternative

Route	*Direction*	*AM (7:00–9:00 a.m.)*	*PM (4:00–6:00 p.m.)*	*AM (7:00–9:00 a.m.)*	*PM (4:00–6:00 p.m.)*
		No Action Alternative		*Action Alternative 1*	
Southern	To College Avenue	1:51	1:52	1:51	1:52
	From College Avenue	2:10	2:14	2:11	2:15
Northern	To College Avenue	2:13	2:23	2:14	2:24
	From College Avenue	2:22	3:07	2:21	3:10

Table 4-15 Action Alternative 1 Mid-day Travel Time Compared to the No Action Alternative

Route	*Direction*	*Mid-day (11:00 a.m.–1:00 p.m.)*	*Inbound Mid-day (11:00 a.m.–1:00 p.m.)*	*Outbound Mid-day (11:00 a.m.–1:00 p.m.)*
		No Action Alternative	*Action Alternative 1*	
Southern	To College Avenue	1:50	1:49	1:50
	From College Avenue	2:06	2:06	2:07
Northern	To College Avenue	2:11	2:11	2:11
	From College Avenue	2:22	2:23	2:24

4.3 Action Alternative 2—Renovate/Reuse Building 250 (Hospital Point)

The Navy would enter into a space lease with the USNA AA/F for use of Building 250 located along Wood Road at Hospital Point within the eastern portion of the NSA Annapolis Upper Yard (Figure 4-23). Building 250 is the Naval Health Clinic Annapolis, but it will be vacated in 2016 as part of an unrelated action. Following execution of the space lease, USNA AA/F would renovate the interior of Building 250 to meet their needs and staff would relocate once the renovation is complete. Under this alternative, construction of a new parking lot would not be required because ample parking, associated with the health clinic, exists immediately to the north of the building.

Consistent with Action Alternative 1, the mid-day analysis was performed based on an event occurring between 11:00 a.m. and 1:00 p.m. on a weekday; however, it should be noted that this would only occur a few times a year and not on a regular basis.

4.3.1 Pedestrian Network

Under Action Alternative 2, the Building 250 site already connects to the NSA Annapolis internal sidewalk network. Pedestrians can access the Upper Yard at Gate 8 and use the existing sidewalk network to reach the project site. Appropriate sidewalk connections are provided to the existing sidewalks on Baltimore Annapolis Boulevard and would be improved with the planned Baltimore Annapolis Boulevard sidewalk improvements; therefore, pedestrians should not be affected under Action Alternative 2.

4.3.2 Bicycle Network

According to the NSA Annapolis Master Plan, bicycles are permitted on the Lower or Upper Yards by NSA Annapolis employees only (NSA Annapolis, 2012). Bicyclist can enter the Upper Yard at Gate 8 and use the existing internal roadway network to reach the Building 250 site. Appropriate bicycle connections within USNA exist to the bicycle route on Baltimore Annapolis Boulevard; therefore, bicyclists should not be affected under Action Alternative 2.

4.3.3 Public Transit

Under Action Alternative 2, the public transit network near Building 250 and outside Gate 8 would not undergo changes in levels of service or operation hours. The closest Annapolis Transit bus stop is located near Gate 8, a walkable distance of 1,200 feet. The nearest MTA local bus stop is another 300 feet north on Baltimore Annapolis Boulevard. Both bus stops can be reached using the NSA Annapolis internal sidewalk network and the existing sidewalk on Baltimore Annapolis Boulevard. Planned sidewalk improvements along Baltimore Annapolis Boulevard will improve access to both bus stops.

4.3.4 Parking

Under Action Alternative 2, the 274 parking spaces at Hospital Point would provide ample parking for the 79 employees and visitors, as well as a sufficient number of spaces to accommodate expected workers and visitors to the site for other NSA Annapolis tenant commands in the area. If a mid-day event were to occur, the remaining spaces at Hospital Point would be used but may fall short of meeting the potential demand of 200 vehicles. In that event, overflow spaces could be used along Ramsey Road, where numerous parallel parking spaces exist.

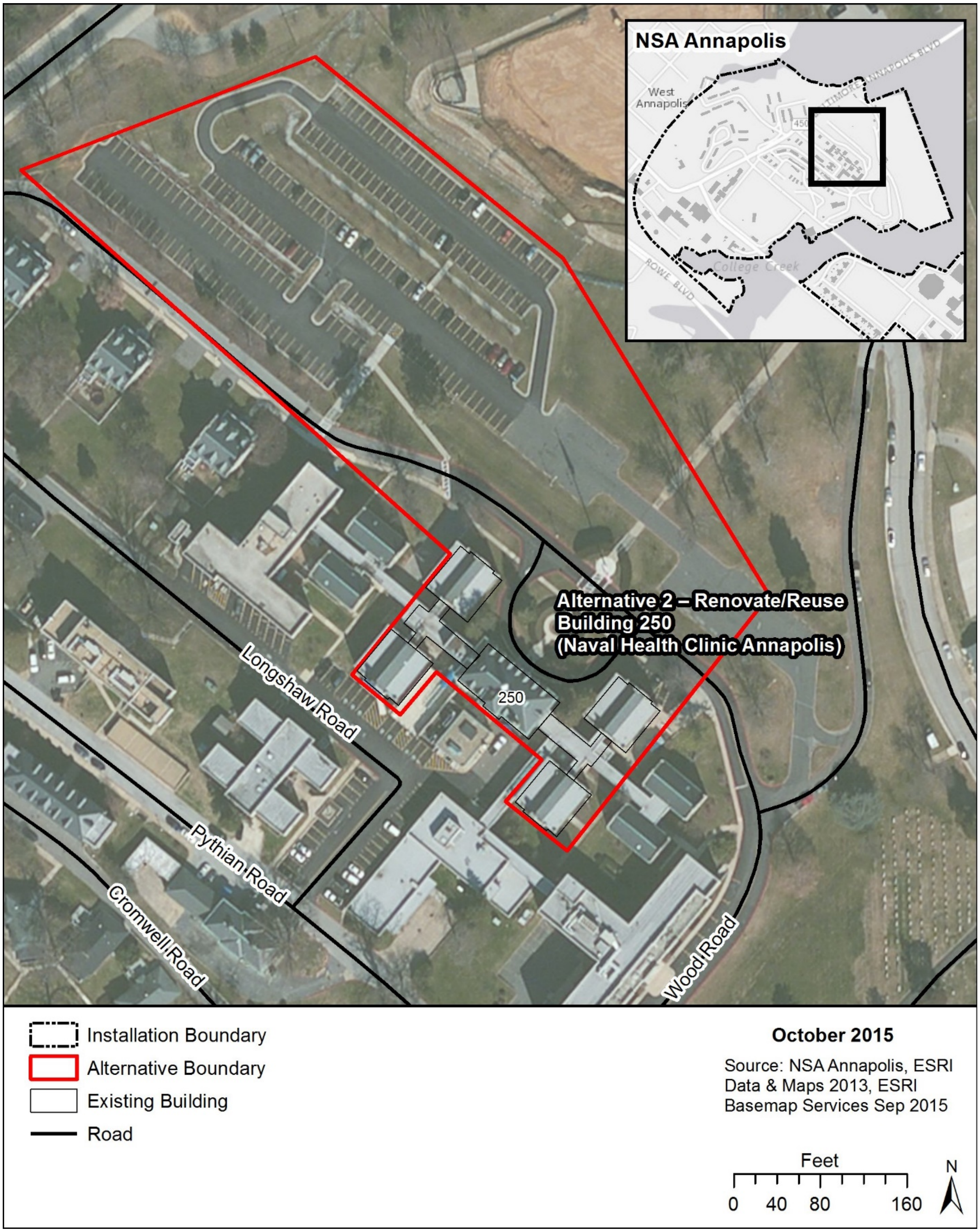


Figure 4-23 Action Alternative 2—Renovate/Reuse Building 250 Location

4.3.5 Traffic Section

Access to the site would occur through NSA Annapolis Gate 8 along Bowyer Road to enter the Upper Yard, followed by turning left turn onto Phythian Road and turning right onto Wood Road. Wood Road would continue to provide access to the Hospital Point parking area, the primary parking lot that would service Building 250.

The following sections describe the process used to project future traffic volumes. First, the trip generation is covered, followed by the modal split and trip distribution to develop the future forecasted traffic volumes.

4.3.5.1 Trip Generation

The trip generation refers to the total number of person trips created by the Building 250 location during the AM and PM peak hours for each workday. Using the same process as Action Alternative 1 and outlined in the transportation scoping letter from the Navy to the City of Annapolis, the ITE *Trip Generation Manual 9th Edition* was used to forecast the number of peak hour trips that would be produced based on 120 people (employees and visitors). The same number of trips are forecasted as Action Alternative 1, a total of 64 during the AM peak hour and 61 during the PM peak hour (Table 4-12).

The mid-day peak hour person trip generation follows the same assumptions as Action Alternative 1 or 300 people.

4.3.5.2 Modal Split

The same process was used for Action Alternative 2 as was used for Action Alternative 1 to develop the AM, mid-day, and PM peak hour model split. This process relied on the ITE rate to forecast the vehicle trips for the AM and PM peak hour and assumed approximately 200 vehicle trips for the mid-day peak hour.

4.3.5.3 Trip Distribution

For the AM and PM peak hour, the same trip distribution was used for Action Alternative 2 as was used for Action Alternative 1 (Figure 4-13). The only difference is the location of the trips originate or terminate at NSA Annapolis Gate 8 rather than Perry Center site. Figure 4-24 shows the Action Alternative 2 AM and PM trip distribution, and Figure 4-25 shows the Action Alternative 2 AM and PM vehicle trip generation in the study area.

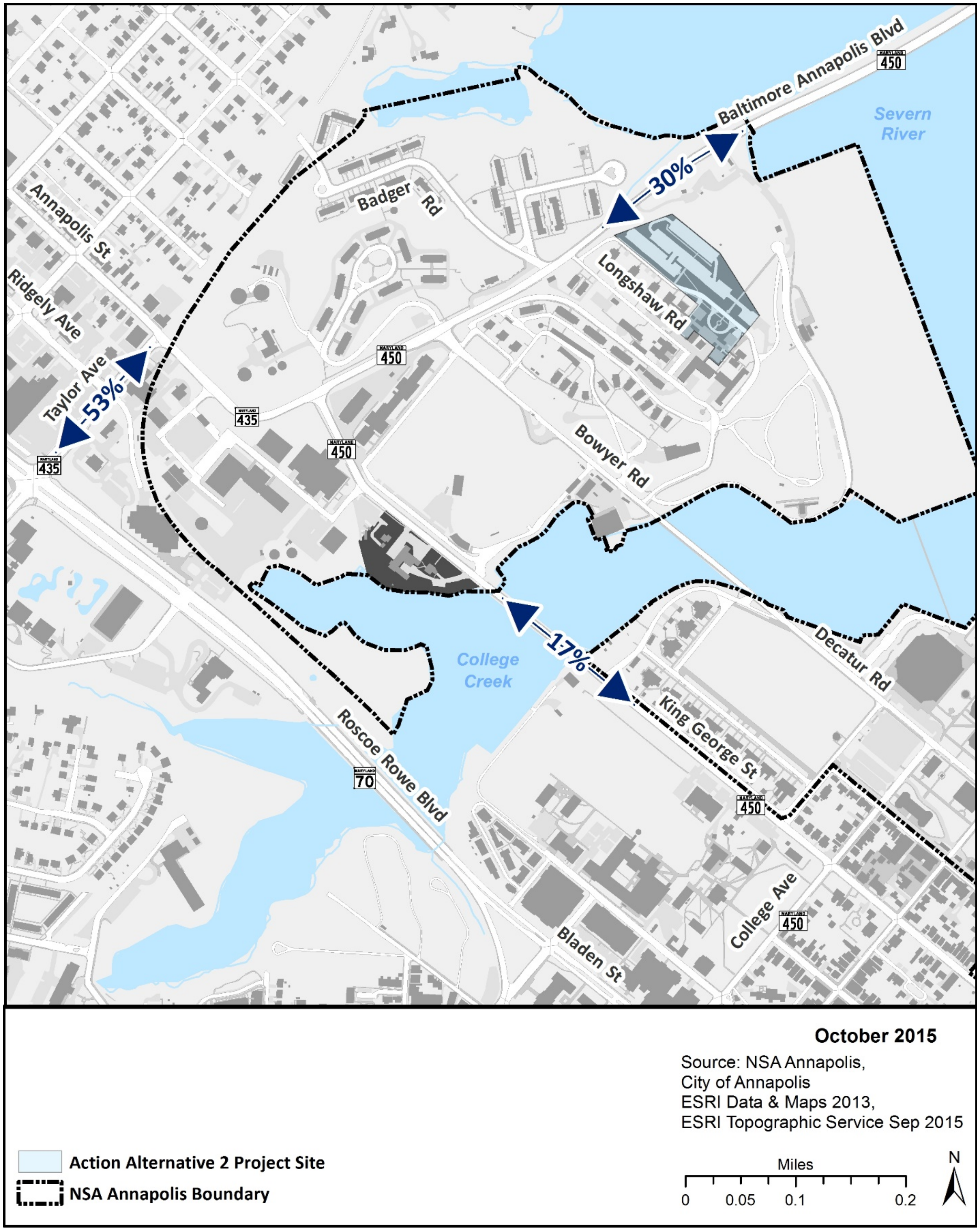


Figure 4-24 Action Alternative 2 AM and PM Trip Distribution

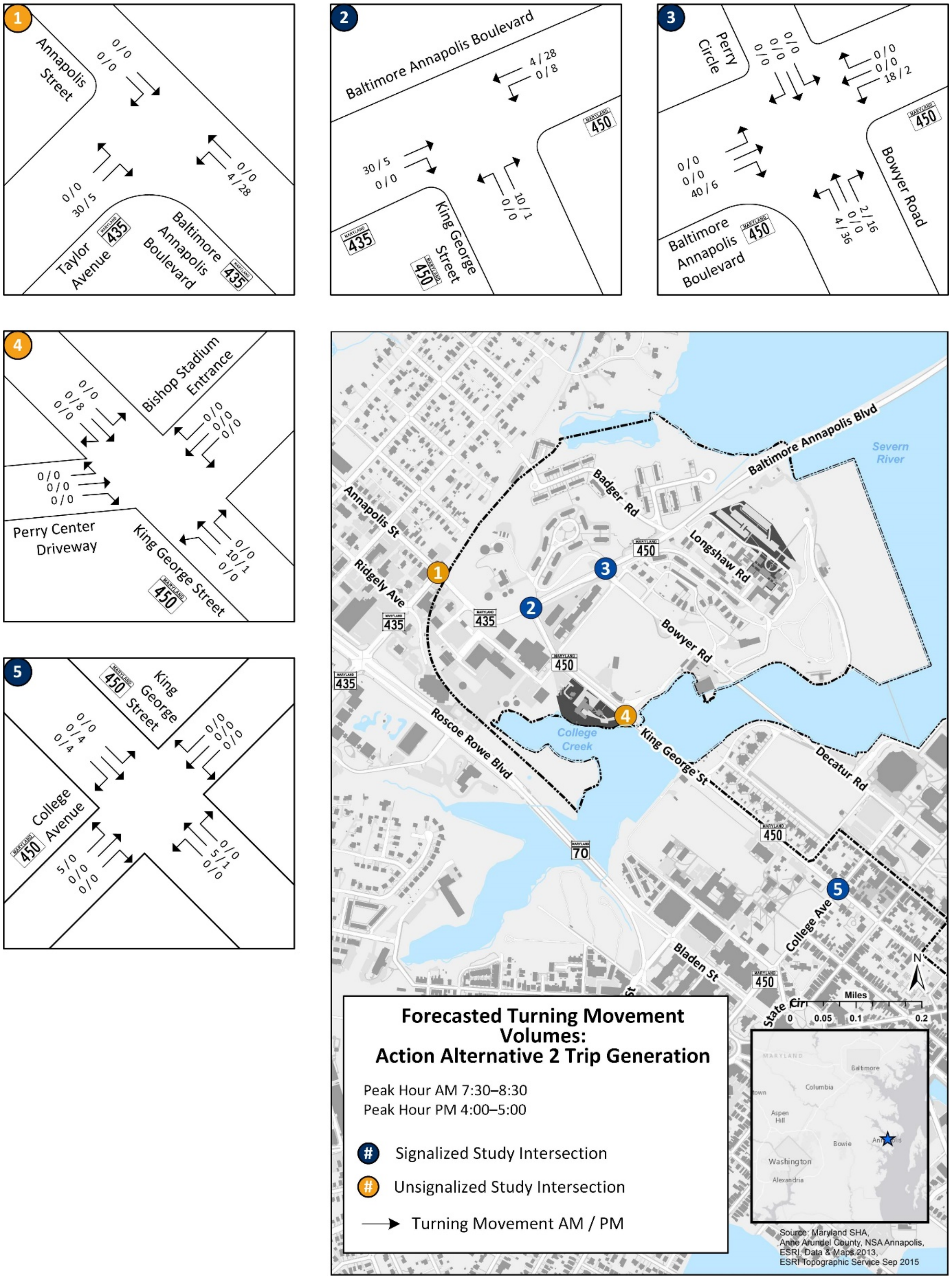


Figure 4-25 Action Alternative 2 AM and PM Vehicle Trip Generation

For the mid-day, the vehicle distribution to and from the site followed the existing condition volumes along Baltimore Annapolis Boulevard. The study area turning movement volumes provided study area trip distribution patterns. It was assumed that trips would be destined or originate along King George Street to the southeast, College Avenue to the southwest, Baltimore Annapolis Boulevard to the east, and Taylor Avenue to the southwest. Figure 4-26 shows the Action Alternative 2 mid-day inbound and outbound trip distribution. Figure 4-27 shows the forecasted mid-day vehicle trips. Table 4-16 shows the mid-day trip distribution percentage separated by inbound and outbound flows.

Table 4-16 Action Alternative 2 Mid-Day Trip Distribution

Destination	Roadway	Total Inbound Vehicles	Total Outbound Vehicles	Inbound Percentage	Outbound Percent
Annapolis	MD 450 southbound	32	38	16%	19%
North and east	MD 450 northbound	100	100	50%	50%
West and south	Taylor Avenue	68	62	34%	31%
TOTAL		**200**	**200**	**100%**	**100%**

4.3.5.4 Complete Action Alternative 2

Under Action Alternative 2, vehicle trips were added to each study area intersection using the No Action Alternative as a base. The total vehicle trips represents the 2020 Action Alternative 2. Figure 4-28 shows the Action Alternative 2 AM and PM peak hour turning movement volumes, and Figure 4-29 shows the Action Alternative 2 inbound mid-day and outbound mid-day turning movement volumes.

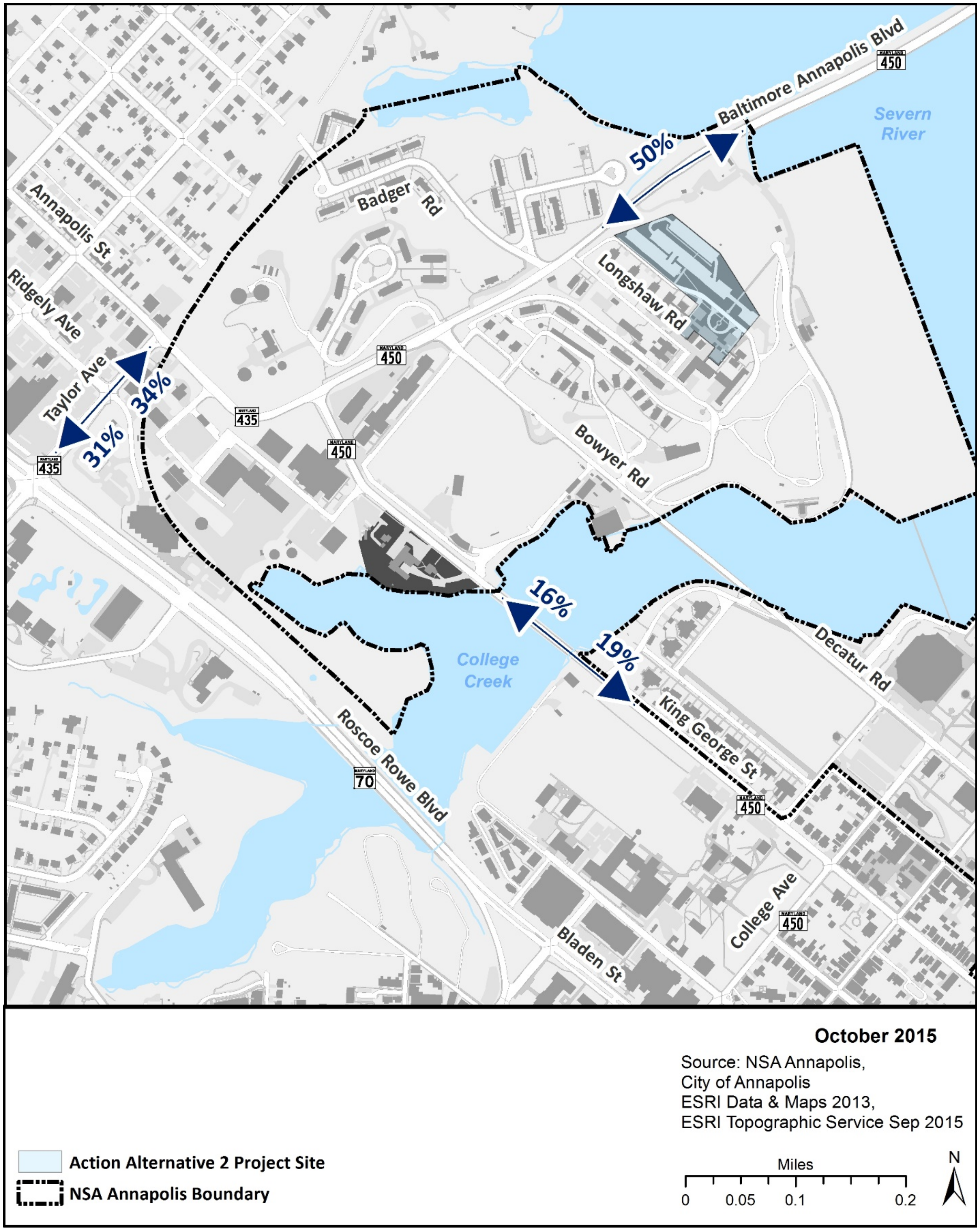


Figure 4-26 Action Alternative 2 Mid-Day Trip Distribution

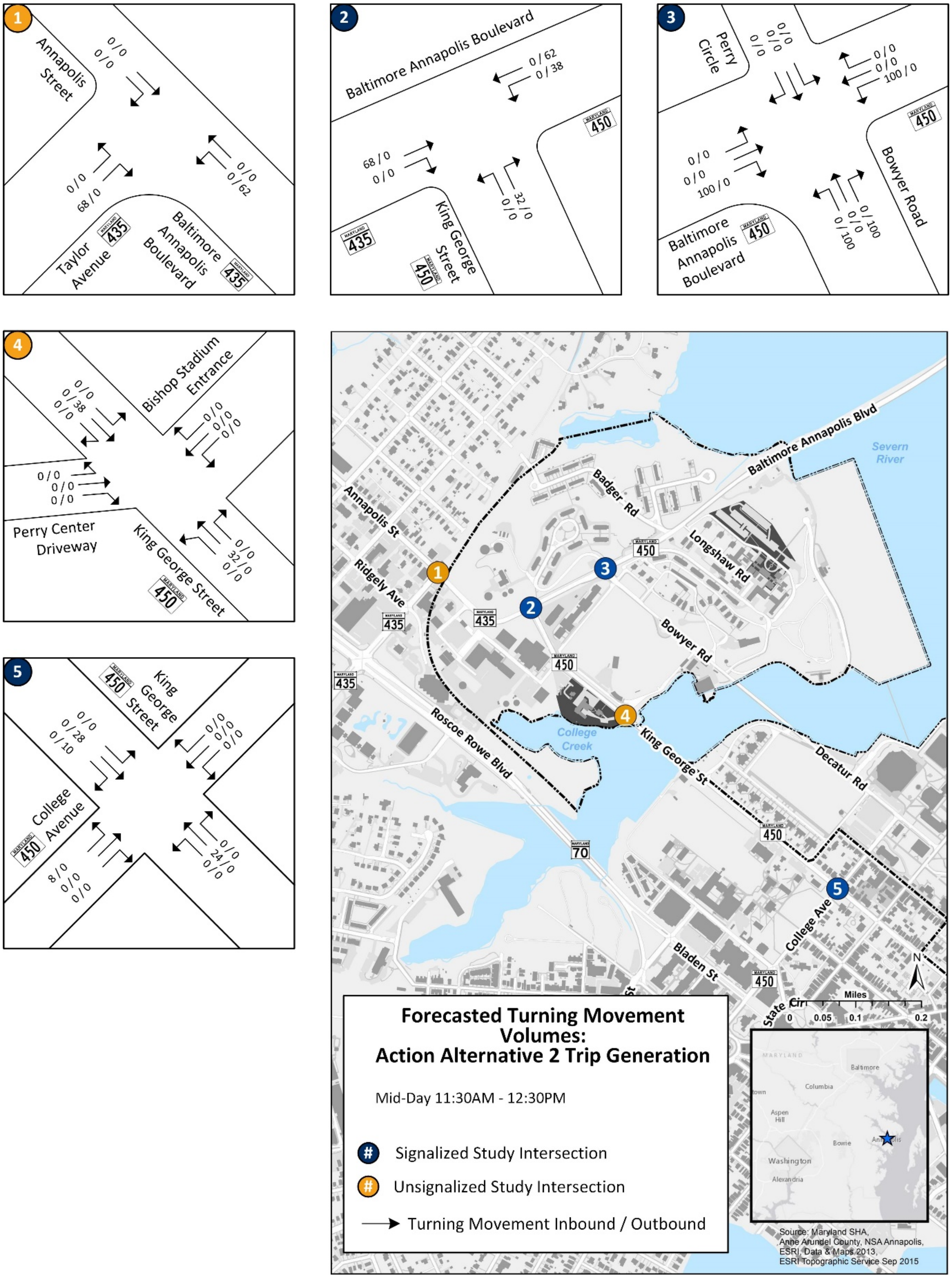


Figure 4-27 Action Alternative 2 Inbound and Outbound Mid-Day Vehicle Trip Generation

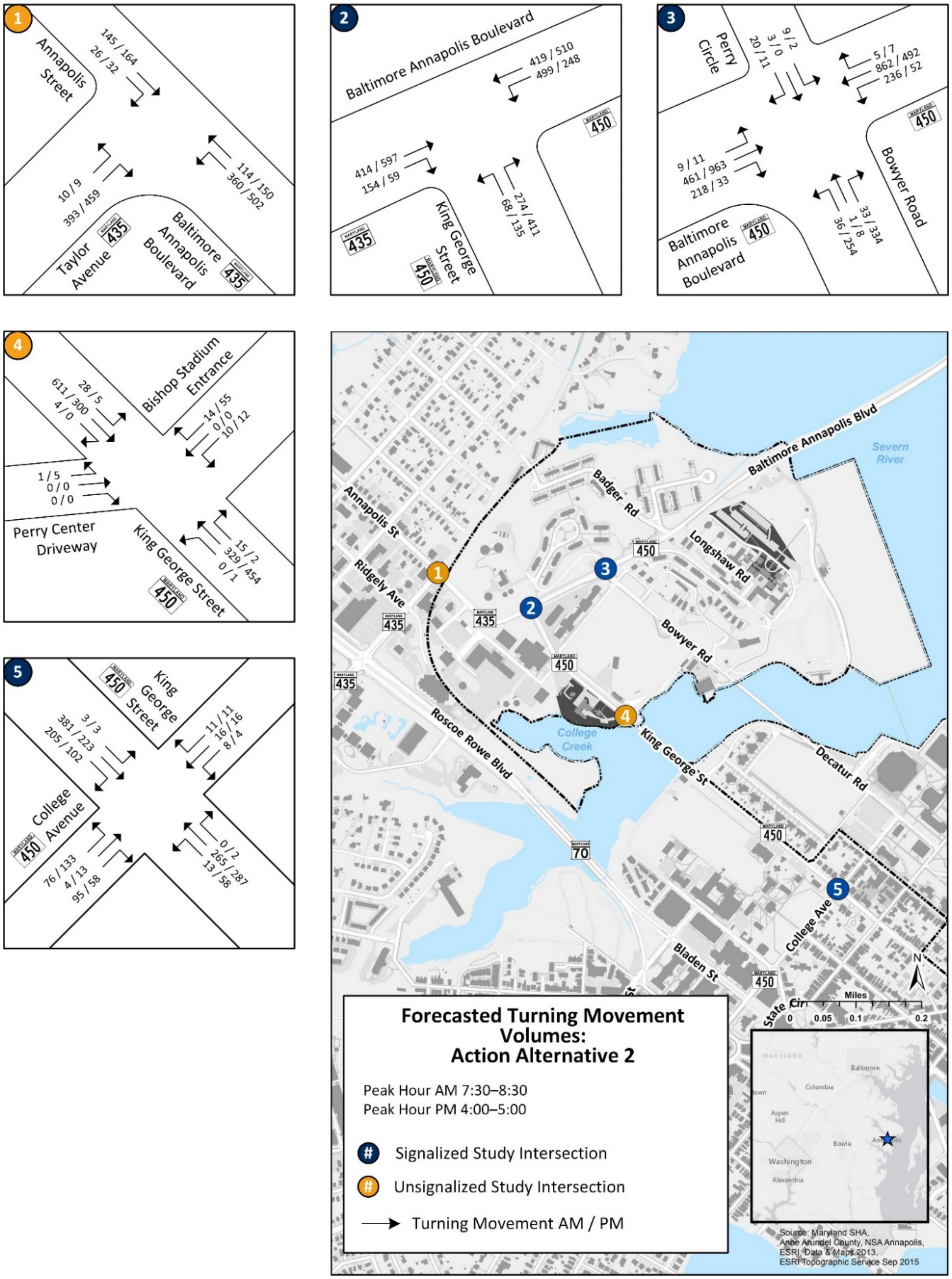


Figure 4-28 Action Alternative 2 AM and PM Peak Hour Turning Movement Volumes

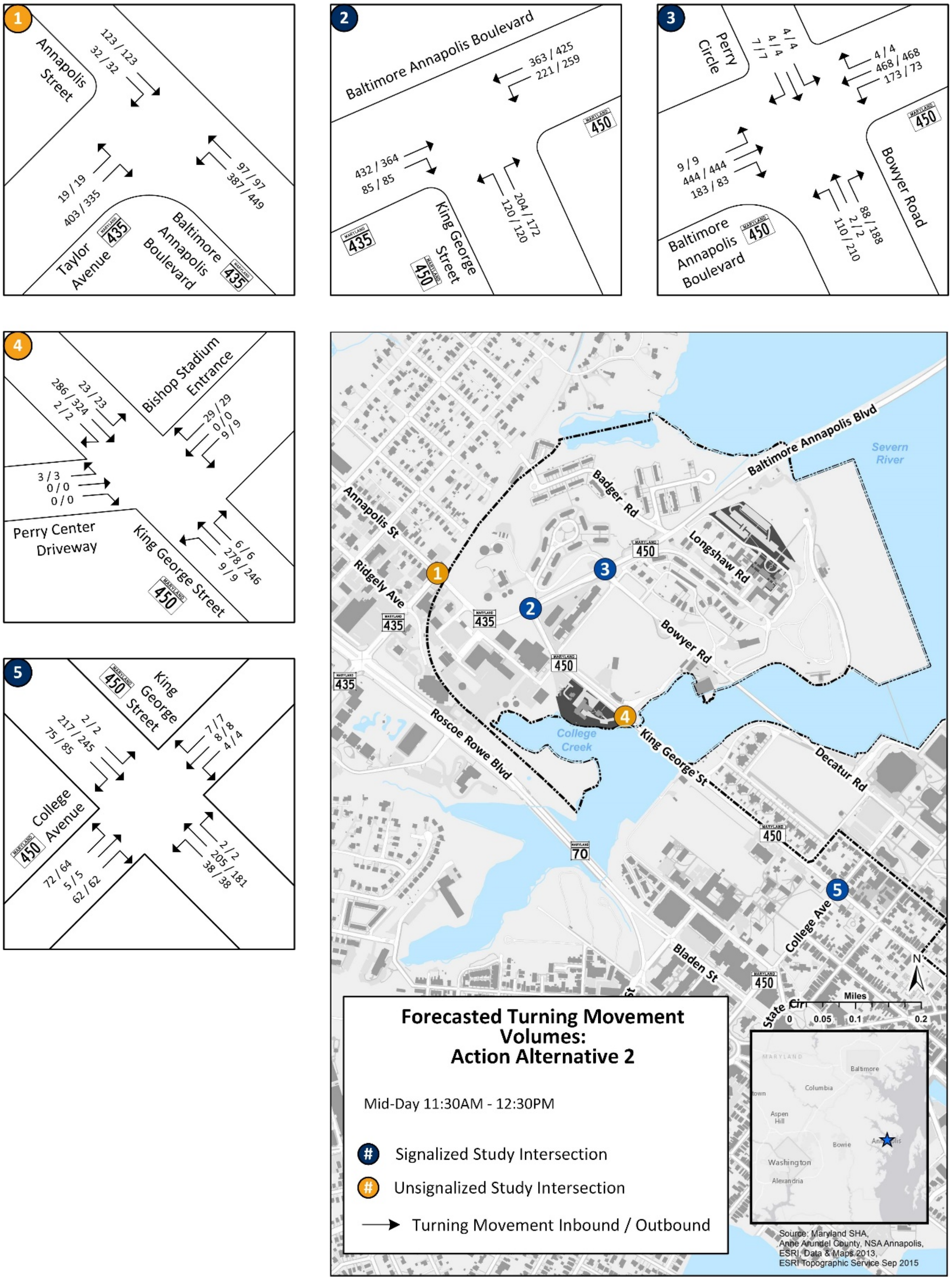


Figure 4-29 Action Alternative 2 Inbound and Outbound Mid-Day Turning Movement Volumes

4.3.5.5 Action Alternative 2 Intersection Operations Analysis

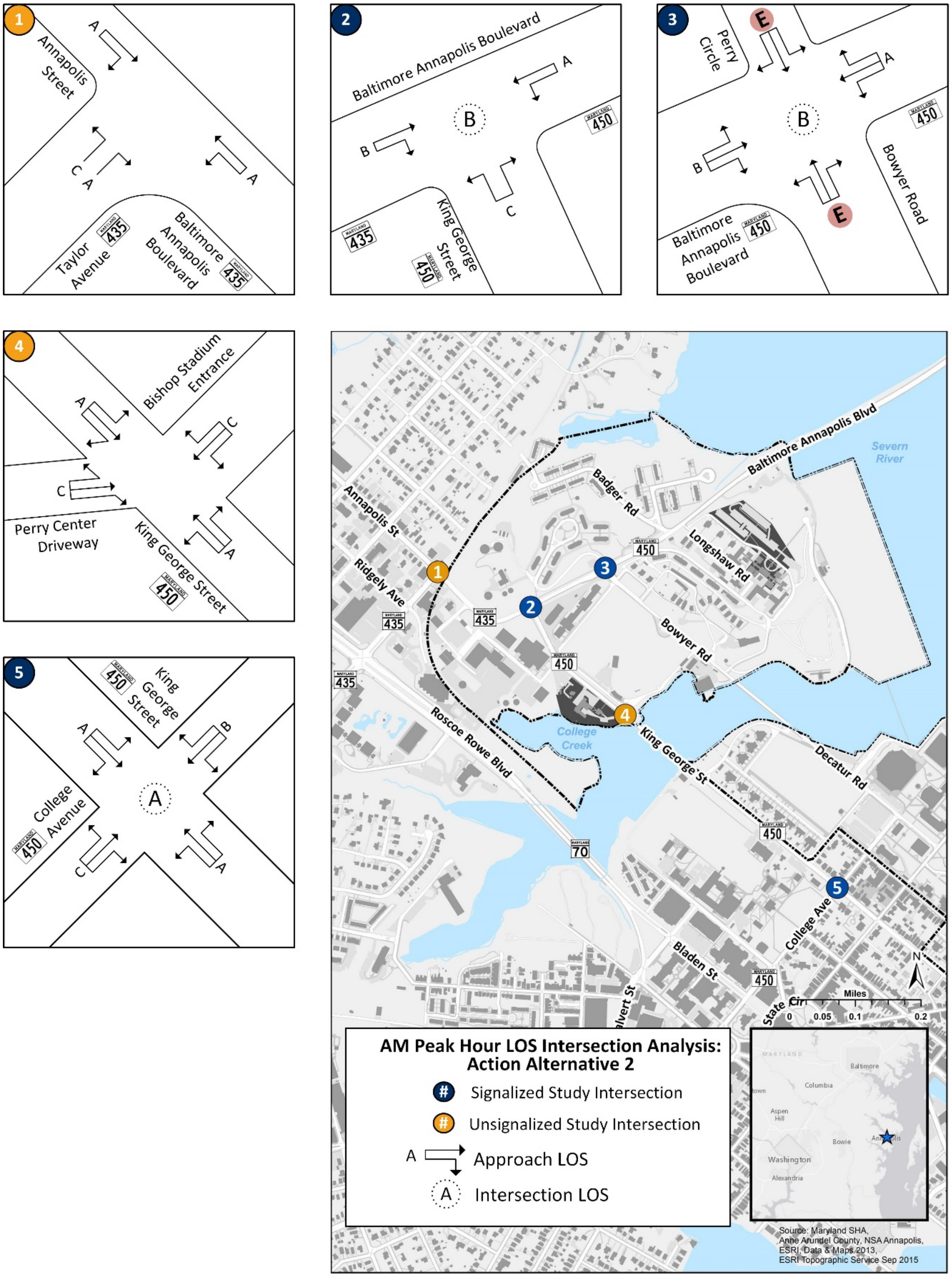
Based on the Synchro™ signalized intersection analysis results, all of the study area intersections would operate at overall acceptable conditions during the AM and PM peak hours. Overall operating conditions during mid-day would also operate at acceptable levels.

Individual signalized intersection approaches would operate at acceptable conditions for Intersections #2 and #3. The Bowyer Road and Perry Circle approaches at Intersection #3 (primarily used by the Navy) would operate under unacceptable conditions. When compared to the No Action Alternative, these approaches would operate as follows:

- During the AM peak hour, the northbound Bowyer Road and southbound Perry Circle approaches would continue to operate at LOS E and experience no increase in vehicle delay
- During the mid-day inbound and outbound peak hours, the northbound Bowyer Road approach would continue operate at LOS E and experience no increase in vehicle delay; the southbound Perry Circle approach would continue to operate at LOS D
- During the PM peak hour, the northbound Bowyer Road approach would continue to operate at LOS F and experience a 30 second increase in vehicle delay; the southbound Perry Circle approach would continue to operate at LOS E and experience no increase in vehicle delay

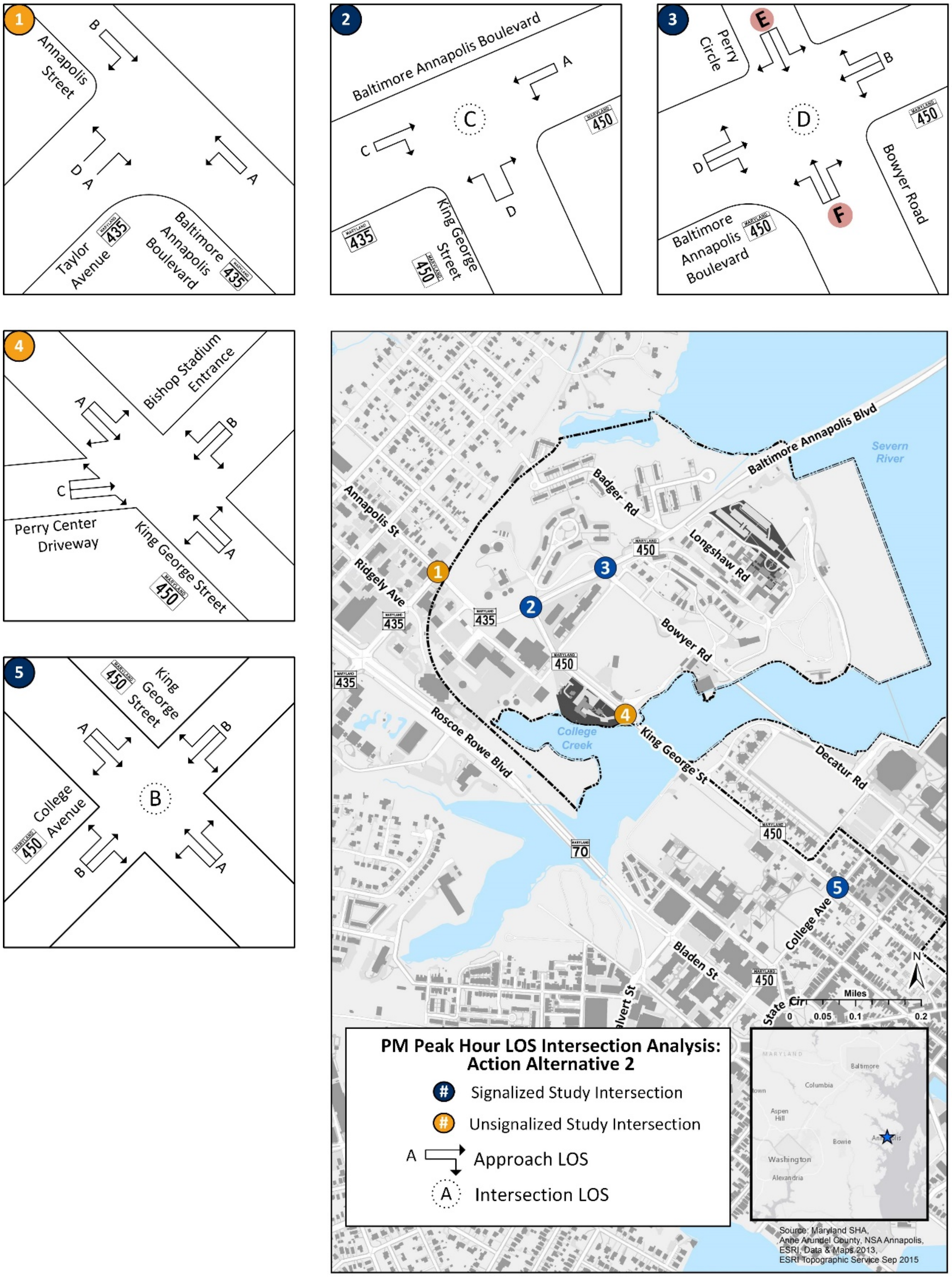
Based on the unsignalized intersection analysis, all approaches would operate at acceptable conditions during the peak hours.

The average LOS for the various approaches to the intersection and the overall intersection LOS grade are depicted in Figure 4-30, Figure 4-31, Figure 4-32, and Figure 4-33 for AM, PM, mid-day inbound, and mid-day outbound peak hours, respectively. Table 4-17 shows the results of the LOS capacity analysis and the intersection vehicle delay for the Action Alternative 2 compared to the No Action Alternative during the AM and PM peak hours. Table 4-18 shows the results of the LOS capacity analysis and the intersection vehicle delay for Action Alternative 2 compared to the No Action Alternative during the inbound and outbound mid-day peak hour.



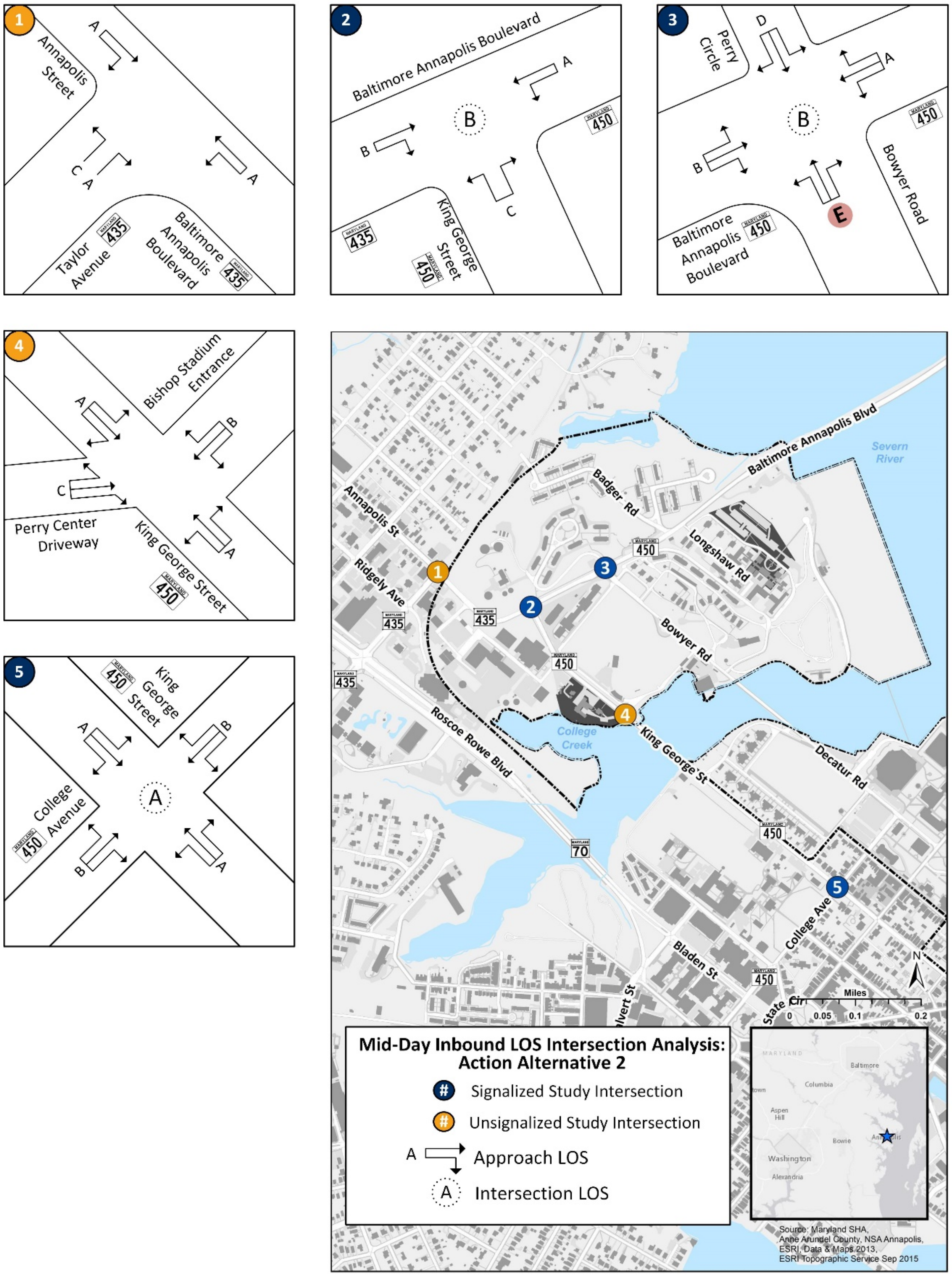
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-30 Action Alternative 2 Intersection LOS (AM Peak Hour)



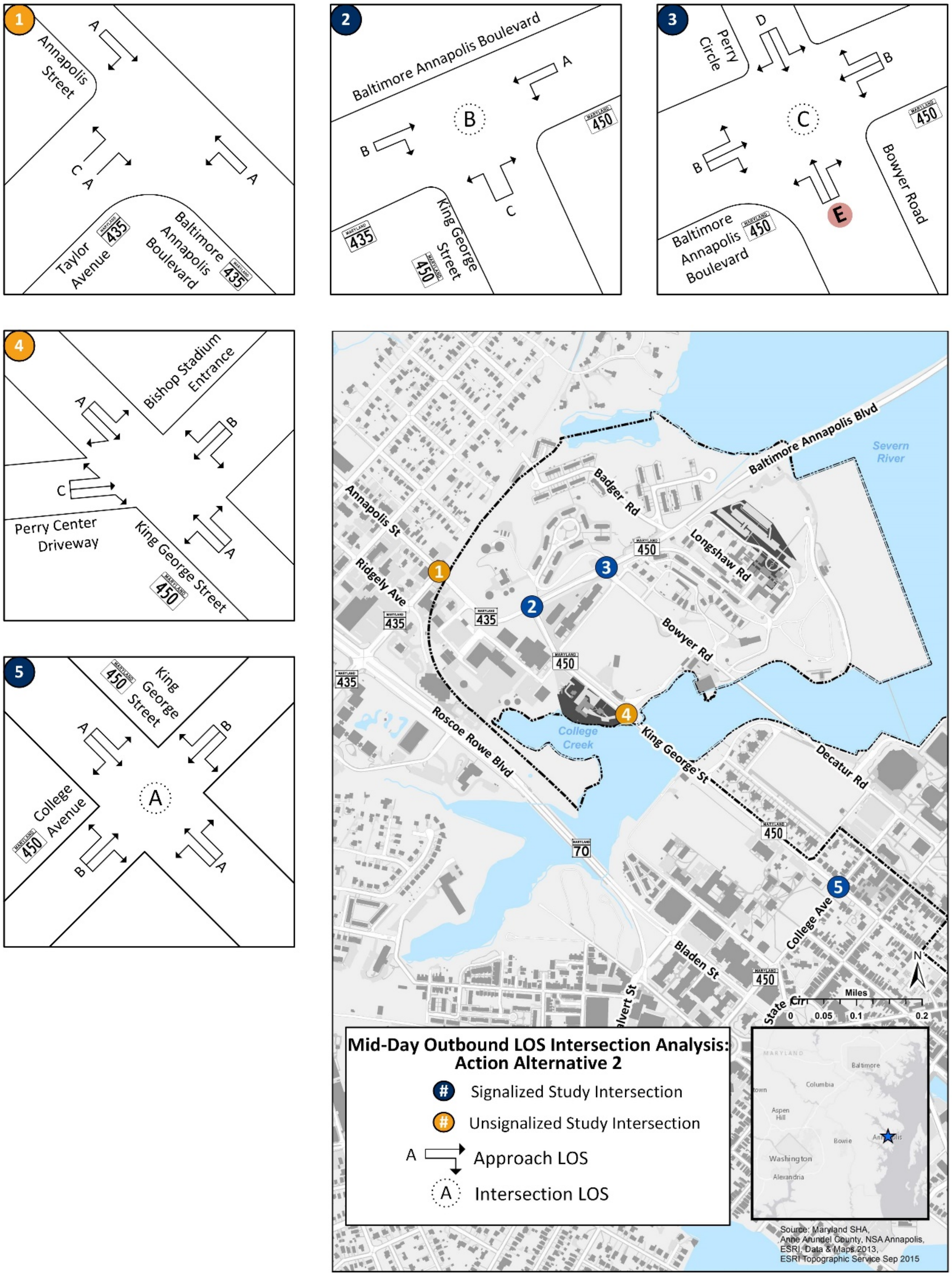
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-31 Action Alternative 2 Intersection LOS (PM Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-32 Action Alternative 2 Intersection LOS (Inbound Mid-Day Peak Hour)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 4-33 Action Alternative 2 Intersection LOS (Outbound Mid-Day Peak Hour)

Table 4-17 Action Alternative 2 AM and PM Peak Hour Operations Analysis Compared to the No Action Alternative

#	Intersection and Approach	Lane Group	No Action Alternative						Action Alternative 2					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)** [a]													
	EB (Annapolis St)	TR	0.20	9.9	A	0.26	10.7	B	0.20	9.9	A	0.26	10.7	B
	EB Overall (Annapolis St)			**9.9**	**A**		**10.7**	**B**		**9.9**	**A**		**10.7**	**B**
	WB (Baltimore Annapolis Blvd)	L	-	-	-	-	-	-	-	-	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	-	-	-	-	-	-	-	-	-	-	-	-
	WB Overall (Baltimore Annapolis Blvd)			-	-		-	-		-	-		-	-
	NB (Taylor Avenue)	L	0.04	18.5	C	0.06	27.5	D	0.04	18.7	C	0.06	29.6	D
	NB (Taylor Avenue)	R	-	0.0	A	-	0.0	A	-	0.0	A	-	0.0	A
	NB Overall (Taylor Avenue)			**18.5**	**C**		**27.5**	**D**		**18.7**	**C**		**29.6**	**D**
	Overall			**2.9**	**-**		**2.8**	**-**		**2.9**	**-**		**2.8**	**-**
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)** [b]													
	EB (Baltimore Annapolis Blvd)	T	0.47	16.3	B	0.70	21.8	C	0.52	17.3	B	0.70	22.0	C
	EB (Baltimore Annapolis Blvd)	R	0.11	12.0	B	0.04	11.7	B	0.11	12.3	B	0.04	11.7	B
	EB Overall (Baltimore Annapolis Blvd)			**15.1**	**B**		**20.9**	**C**		**15.9**	**B**		**21.1**	**C**
	WB (Baltimore Annapolis Blvd)	L	0.70	8.1	A	0.51	13.3	B	0.72	9.5	A	0.54	14.1	B
	WB (Baltimore Annapolis Blvd)	T	0.32	3.5	A	0.41	5.8	A	0.32	3.4	A	0.43	5.6	A
	WB Overall (Baltimore Annapolis Blvd)			**6.0**	**A**		**8.3**	**A**		**6.7**	**A**		**8.4**	**A**
	WB (King George St)	L	0.32	33.4	C	0.40	32.3	C	0.32	33.4	C	0.40	32.3	C
	WB (King George St)	R	0.45	18.8	B	0.87	44.9	D	0.46	18.7	B	0.87	45.1	D
	WB Overall (King George St)			**21.8**	**C**		**41.8**	**D**		**21.6**	**C**		**42.0**	**D**
	Overall			**11.7**	**B**		**22.1**	**C**		**12.4**	**B**		**22.0**	**C**

Table 4-17 Action Alternative 2 AM and PM Peak Hour Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative						Action Alternative 2					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)** [b]													
	EB (Baltimore Annapolis Blvd)	L	0.02	6.1	A	0.02	11.6	B	0.02	6.3	A	0.02	11.9	B
	EB (Baltimore Annapolis Blvd)	T	0.36	9.1	A	0.90	35.2	D	0.36	9.4	A	0.90	36.7	D
	EB (Baltimore Annapolis Blvd)	R	0.12	14.5	B	0.02	12.5	B	0.15	16.1	B	0.02	12.4	B
	EB Overall (Baltimore Annapolis Blvd)			**10.6**	**B**		**34.3**	**C**		**11.5**	**B**		**35.6**	**D**
	WB (Baltimore Annapolis Blvd)	L	0.31	4.1	A	0.37	37.2	D	0.34	4.3	A	0.41	38.8	D
	WB (Baltimore Annapolis Blvd)	TR	0.58	6.6	A	0.42	12.9	B	0.58	6.8	A	0.42	13.3	B
	WB Overall (Baltimore Annapolis Blvd)			**6.1**	**A**		**15.1**	**B**		**6.3**	**A**		**15.8**	**B**
	NB (Bowyer Rd)	LT	0.42	77.3	E	0.94	112.1	F	0.45	77.6	E	1.07	146.3	F
	NB (Bowyer Rd)	R	0.02	62.2	E	0.58	63.4	E	0.02	61.4	E	0.62	64.0	E
	NB Overall (Bowyer Rd)			**70.0**	**E**		**83.7**	**F**		**70.0**	**E**		**100.2**	**F**
	SB (Perry Cir)	LTR	0.16	72.8	E	0.01	58.9	E	0.16	72.3	E	0.01	58.1	E
	SB Overall (Perry Cir)			**72.8**	**E**		**58.9**	**E**		**72.3**	**E**		**58.1**	**E**
	Overall			**11.1**	**B**		**42.2**	**D**		**11.6**	**B**		**48.4**	**D**

Table 4-17 Action Alternative 2 AM and PM Peak Hour Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative						Action Alternative 2					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS
4	**King George Street & Perry Center & Bishop Stadium (TWSC)** [a]													
	EB (Perry Center)	LTR	0.01	23.7	C	0.03	23.7	C	0.01	24.0	C	0.03	24.1	C
	EB Overall (Perry Center)			**23.7**	**C**		**23.7**	**C**		**24.0**	**C**		**24.1**	**C**
	WB (Bishop Stadium)	L	0.07	27.5	D	0.06	20.8	C	0.07	28.0	D	0.06	21.2	C
	WB (Bishop Stadium)	TR	0.02	10.6	B	0.13	13.1	B	0.03	10.7	B	0.13	13.1	B
	WB Overall (Bishop Stadium)			**17.6**	**C**		**14.5**	**B**		**17.9**	**C**		**14.6**	**B**
	WB (King George St)	LTR	-	0.0	A	-	-	-	-	-	-	-	-	-
	WB (King George St)	TR	-	-	-	0.00	8.0	A	-	0.0	A	0.00	8.1	A
	WB Overall (King George St)			**0.0**	**-**		**0.0**	**-**		**0.0**	**-**		**0.0**	**-**
	EB (King George St)	LTR	0.03	8.1	A	-	-	-	-	-	-	-	-	-
	EB (King George St)	LT	-	-	-	0.01	8.6	A	0.03	8.2	A	0.01	8.6	A
	EB Overall (King George St)			**0.4**	**-**		**0.1**	**-**		**0.4**	**-**		**0.1**	**-**
	Overall			**0.7**	**-**		**1.4**	**-**		**0.7**	**-**		**1.3**	**-**

Table 4-17 Action Alternative 2 AM and PM Peak Hour Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative						Action Alternative 2					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS	V/C Ratio	Delay (sec/veh)	LOS
5	**College Avenue & King George Street (Signalized)** [b]													
	EB (King George St)	LTR	0.56	7.3	A	0.40	8.6	A	0.57	7.3	A	0.41	8.6	A
	EB Overall (EB King George St)			**7.3**	**A**		**8.6**	**A**		**7.3**	**A**		**8.6**	**A**
	WB (King George St)	LTR	0.27	5.2	A	0.51	9.6	A	0.28	5.2	A	0.51	9.6	A
	WB Overall (King George St)			**5.2**	**A**		**9.6**	**A**		**5.2**	**A**		**9.6**	**A**
	NB (College Ave)	LTR	0.42	19.9	B	0.56	18.1	B	0.44	20.1	C	0.56	18.1	B
	NB Overall (College Ave)			**19.9**	**B**		**18.1**	**B**		**20.1**	**C**		**18.1**	**B**
	SB (College Ave)	LTR	0.10	16.8	B	0.06	12.9	B	0.10	16.8	B	0.06	13.0	B
	SB Overall (College Ave)			**16.8**	**B**		**12.9**	**B**		**16.8**	**B**		**13.0**	**B**
	Overall			**9.0**	**A**		**11.3**	**B**		**9.2**	**A**		**11.3**	**B**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2010 results

[b] Highway Capacity Software 2000 results

Table 4-18 Action Alternative 2 Inbound and Outbound Mid-Day Operations Compared to the No Action Alternative Analysis

#	Intersection and Approach	Lane Group	No Action Alternative			Action Alternative 2					
			Mid-Day			*Mid-Day (Inbound)*			*Mid-Day (Outbound)*		
			V/C Ratio	*Delay (sec/ veh)*	*LOS*	*V/C Ratio*	*Delay (sec/ veh)*	*LOS*	*V/C Ratio*	*Delay (sec/ veh)*	*LOS*
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)** [a]										
	EB (Annapolis St)	TR	0.18	9.7	A	0.18	9.7	A	0.18	9.7	A
	EB Overall (Annapolis St)			**9.7**	**A**		**9.7**	**A**		**9.7**	**A**
	WB (Baltimore Annapolis Blvd)	L	-	-	-	-	-	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	-	-	-	-	-	-	-	-	-
	WB Overall (Baltimore Annapolis Blvd)			**-**	**-**		**-**	**-**		**-**	**-**
	NB (Taylor Avenue)	L	0.08	20.4	C	0.08	20.4	C	0.10	24.0	C
	NB (Taylor Avenue)	R	-	0.0	A	-	0.0	A	-	0.0	A
	NB Overall (Taylor Avenue)			**20.4**	**C**		**20.4**	**C**		**24.0**	**C**
	Overall			**2.9**	**-**		**2.9**	**-**		**2.7**	**-**
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)** [b]										
	EB (Baltimore Annapolis Blvd)	T	0.50	15.3	B	0.60	17.4	B	0.50	15.7	B
	EB (Baltimore Annapolis Blvd)	R	0.06	10.6	B	0.06	10.8	B	0.06	10.9	B
	EB Overall (Baltimore Annapolis Blvd)			**14.4**	**B**		**16.3**	**B**		**14.8**	**B**
	WB (Baltimore Annapolis Blvd)	L	0.41	4.2	A	0.46	5.1	A	0.47	4.7	A
	WB (Baltimore Annapolis Blvd)	T	0.33	4.3	A	0.34	4.5	A	0.39	4.6	A
	WB Overall (Baltimore Annapolis Blvd)			**4.3**	**A**		**4.7**	**A**		**4.6**	**A**
	WB (King George St)	L	0.44	27.8	C	0.43	27.4	C	0.45	27.9	C
	WB (King George St)	R	0.32	15.6	B	0.38	16.0	B	0.32	15.3	B
	WB Overall (King George St)			**20.6**	**C**		**20.2**	**C**		**20.5**	**C**
	Overall			**11.3**	**B**		**12.4**	**B**		**11.1**	**B**

Table 4-18 Action Alternative 2 Inbound and Outbound Mid-Day Operations Analysis Compared to the No Action Alternative (continued)

#	*Intersection and Approach*	*Lane Group*	No Action Alternative			Action Alternative 2					
			Mid-Day			*Mid-Day (Inbound)*			*Mid-Day (Outbound)*		
			V/C Ratio	*Delay (sec/veh)*	*LOS*	*V/C Ratio*	*Delay (sec/veh)*	*LOS*	*V/C Ratio*	*Delay (sec/veh)*	*LOS*
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)** [b]										
	EB (Baltimore Annapolis Blvd)	L	0.02	7.9	A	0.02	8.7	A	0.02	11.9	B
	EB (Baltimore Annapolis Blvd)	T	0.40	11.8	B	0.41	12.7	B	0.45	16.8	B
	EB (Baltimore Annapolis Blvd)	R	0.06	11.9	B	0.14	15.0	B	0.07	17.3	B
	EB Overall (Baltimore Annapolis Blvd)			**11.8**	**B**		**13.3**	**B**		**16.8**	**B**
	WB (Baltimore Annapolis Blvd)	L	0.13	6.9	A	0.31	7.8	A	0.15	10.6	B
	WB (Baltimore Annapolis Blvd)	TR	0.38	8.4	A	0.38	8.4	A	0.42	12.7	B
	WB Overall (Baltimore Annapolis Blvd)			**8.2**	**A**		**8.2**	**A**		**12.4**	**B**
	NB (Bowyer Rd)	LT	0.67	67.7	E	0.67	67.7	E	0.84	74.6	E
	NB (Bowyer Rd)	R	0.06	46.9	D	0.06	45.3	D	0.13	40.2	D
	NB Overall (Bowyer Rd)			**58.6**	**E**		**57.8**	**E**		**58.4**	**E**
	SB (Perry Cir)	LTR	0.04	53.0	D	0.04	53.0	D	0.03	45.1	D
	SB Overall (Perry Cir)			**53.0**	**D**		**53.0**	**D**		**45.1**	**D**
	Overall			**17.9**	**B**		**17.4**	**B**		**26.6**	**C**

Table 4-18 Action Alternative 2 Inbound and Outbound Mid-Day Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative			Action Alternative 2					
			Mid-Day			Mid-Day (Inbound)			Mid-Day (Outbound)		
			V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS
4	**King George Street & Perry Center & Bishop Stadium (TWSC)** [a]										
	EB (Perry Center)	LTR	0.01	17.3	C	0.01	18.0	C	0.01	18.1	C
	EB Overall (Perry Center)			**17.3**	**C**		**18.0**	**C**		**18.1**	**C**
	WB (Bishop Stadium)	L	0.03	15.3	C	0.03	15.9	C	0.03	16.0	C
	WB (Bishop Stadium)	TR	0.04	10.0	B	0.05	10.2	B	0.04	10.0	B
	WB Overall (Bishop Stadium)			**11.3**	**B**		**11.6**	**B**		**11.4**	**B**
	WB (King George St)	LTR	0.01	8.0	A	-	-	-	-	-	-
	WB (King George St)	TR	-	-	-	0.01	8.0	A	0.01	8.1	A
	WB Overall (King George St)			**0.3**	**-**		**0.2**	**-**		**0.3**	**-**
	EB (King George St)	LTR	0.02	7.9	A	-	-	-	-	-	-
	EB (King George St)	LT	-	-	-	0.02	8.0	A	0.02	7.9	A
	EB Overall (King George St)			**0.6**	**-**		**0.6**	**-**		**0.5**	**-**
	Overall			**1.2**	**-**		**1.1**	**-**		**1.1**	**-**

Table 4-18 Action Alternative 2 Inbound and Outbound Mid-Day Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative Mid-Day V/C Ratio	No Action Alternative Mid-Day Delay (sec/veh)	No Action Alternative Mid-Day LOS	Action Alternative 2 Mid-Day (Inbound) V/C Ratio	Action Alternative 2 Mid-Day (Inbound) Delay (sec/veh)	Action Alternative 2 Mid-Day (Inbound) LOS	Action Alternative 2 Mid-Day (Outbound) V/C Ratio	Action Alternative 2 Mid-Day (Outbound) Delay (sec/veh)	Action Alternative 2 Mid-Day (Outbound) LOS
5	**College Avenue & King George Street (Signalized)** [b]										
	EB (King George St)	LTR	0.32	6.1	A	0.32	6.1	A	0.36	6.2	A
	EB Overall (EB King George St)			**6.1**	**A**		**6.1**	**A**		**6.2**	**A**
	WB (King George St)	LTR	0.28	5.8	A	0.30	6.0	A	0.28	5.8	A
	WB Overall (King George St)			**5.8**	**A**		**6.0**	**A**		**5.8**	**A**
	NB (College Ave)	LTR	0.34	16.9	B	0.38	17.2	B	0.35	17.2	B
	NB Overall (College Ave)			**16.9**	**B**		**17.2**	**B**		**17.2**	**B**
	SB (College Ave)	LTR	0.05	14.5	B	0.05	14.5	B	0.05	14.8	B
	SB Overall (College Ave)			**14.5**	**B**		**14.5**	**B**		**14.8**	**B**
	Overall			**8.4**	**A**		**8.5**	**A**		**8.4**	**A**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2010 results

[b] Highway Capacity Software 2000 results

4.3.5.6 Action Alternative 2 Intersection Queueing Analysis

Based on the Synchro™ results, the only intersection to receive failing queue lengths would be the intersection of Bowyer Road and Perry Circle with Baltimore Annapolis Boulevard (Intersection #3), and only during the outbound mid-day and PM peak hours at the 95th percentile. When compared to the No Action Alternative, the queue lengths would increase as follows:

- During the mid-day outbound peak hour, the northbound Bowyer Road approach (primarily used by the Navy) queue length would increase from 105 feet to 297 feet, thus blocking access to the right turn bay.
- During the PM peak hour, the eastbound Baltimore Annapolis Boulevard approach queue length would increase from 1,441 feet to 1,442 feet, thus not adding any additional queued vehicles to this approach.
- During the PM peak hour, the northbound Bowyer Road approach (primarily used by the Navy) queue length would increase from 467 feet to 573 feet, thus adding more queued vehicles to an already failing approach.

All of the results are depicted below in Tables 4-19 and 4-20.

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Table 4-19 Action Alternative 2 AM and PM Peak Hours Queuing Analysis Compared to the No Action Alternative

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No Action Alternative				Action Alternative 2			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)**										
	EB (Annapolis St)	TR	521	-	18	-	25	-	18	-	25
	WB (Baltimore Annapolis Blvd)	L	376	-	-	-	-	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	376	-	-	-	-	-	-	-	-
	NB (Taylor Avenue)	L	359	-	3	-	5	-	3	-	5
	NB (Taylor Avenue)	R	359	-	-	-	-	-	-	-	-
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)**										
	EB (Baltimore Annapolis Blvd)	T	471	125	256	275	409	138	280	278	414
	EB (Baltimore Annapolis Blvd)	R	471	0	37	0	20	0	37	0	20
	WB (Baltimore Annapolis Blvd)	L	450	68	100	37	m73	68	118	36	m68
	WB (Baltimore Annapolis Blvd)	T	597	58	77	98	m169	58	77	99	m160
	WB (King George St)	L	400	32	71	69	124	32	71	69	124
	WB (King George St)	R	375	102	131	205	320	106	136	205	320
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)**										
	EB (Baltimore Annapolis Blvd)	L	125	3	m8	5	m7	3	m8	5	m7
	EB (Baltimore Annapolis Blvd)	T	597	164	306	938	#1441	166	311	936	#1442
	EB (Baltimore Annapolis Blvd)	R	150	17	51	0	m0	23	63	1	m1
	WB (Baltimore Annapolis Blvd)	L	350	42	72	19	35	47	80	20	40
	WB (Baltimore Annapolis Blvd)	TR	510	284	432	266	341	290	444	266	341
	NB (Bowyer Rd)	LT	433	35	72	289	#467	39	79	~370	#573
	NB (Bowyer Rd)	R	310	0	27	183	296	0	29	204	321
	SB (Perry Cir)	LTR	184	12	49	0	0	12	49	0	0

Table 4-19 Action Alternative 2 AM and PM Peak Hours Queuing Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No Action Alternative				Action Alternative 2			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
4	**King George Street & Perry Center & Bishop Stadium (TWSC)**										
	EB (Perry Center)	LTR	292	-	0	-	3	-	0	-	3
	WB (Bishop Stadium)	L	234	-	5	-	5	-	5	-	5
	WB (Bishop Stadium)	TR	234	-	3	-	13	-	3	-	13
	WB (King George St)	LTR	2203	-	0	-	-	-	-	-	-
	WB (King George St)	TR	2203	-	-	-	0	-	0	-	0
	EB (King George St)	LTR	693	-	3	-	-	-	-	-	-
	EB (King George St)	LT	392	-	-	-	0	-	3	-	0
5	**College Avenue & King George Street (Signalized)**										
	EB (King George St)	LTR	2123	83	162	51	101	83	162	53	103
	WB (King George St)	LTR	327	37	70	71	133	38	71	72	134
	NB (College Ave)	LTR	354	16	65	41	95	17	67	41	95
	SB (College Ave)	LTR	275	5	24	4	20	5	24	4	20

Notes:

~ Volume exceeds capacity, queue is theoretically infinite.

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

Table 4-20 Action Alternative 2 Inbound and Outbound Mid-Day Queuing Analysis Compared to the No Action Alternative

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No Action Alternative		Action Alternative 2			
				Mid-Day		Mid-Day (Inbound)		Mid-Day (Outbound)	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
1	**Taylor Avenue & Baltimore Annapolis Boulevard / Annapolis Street (TWSC)**								
	EB (Annapolis St)	TR	521	-	18	-	18	-	18
	WB (Baltimore Annapolis Blvd)	L	376	-	-	-	-	-	-
	WB (Baltimore Annapolis Blvd)	T	376	-	-	-	-	-	-
	NB (Taylor Avenue)	L	359	-	8	-	8	-	8
	NB (Taylor Avenue)	R	359	-	-	-	-	-	-
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)**								
	EB (Baltimore Annapolis Blvd)	T	471	121	208	152	257	124	208
	EB (Baltimore Annapolis Blvd)	R	471	0	24	0	24	0	24
	WB (Baltimore Annapolis Blvd)	L	450	28	39	28	39	29	52
	WB (Baltimore Annapolis Blvd)	T	597	62	71	62	71	55	88
	WB (King George St)	L	400	51	99	51	99	51	99
	WB (King George St)	R	375	56	96	69	114	55	96
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)**								
	EB (Baltimore Annapolis Blvd)	L	125	3	m9	3	m7	4	m9
	EB (Baltimore Annapolis Blvd)	T	597	174	296	201	308	235	306
	EB (Baltimore Annapolis Blvd)	R	150	8	35	25	62	9	35
	WB (Baltimore Annapolis Blvd)	L	350	18	40	45	85	24	47
	WB (Baltimore Annapolis Blvd)	TR	510	159	262	159	262	212	305
	NB (Bowyer Rd)	LT	433	105	165	105	165	196	#297
	NB (Bowyer Rd)	R	310	0	39	0	39	0	49
	SB (Perry Cir)	LTR	184	6	27	6	27	6	25

Table 4-20 Action Alternative 2 Inbound and Outbound Mid-Day Queuing Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No Action Alternative		Action Alternative 2			
				Mid-Day		Mid-Day (Inbound)		Mid-Day (Outbound)	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
4	**King George Street & Perry Center & Bishop Stadium (TWSC)**								
	EB (Perry Center)	LTR	292	-	0	-	0	-	0
	WB (Bishop Stadium)	L	234	-	3	-	3	-	3
	WB (Bishop Stadium)	TR	234	-	3	-	3	-	3
	WB (King George St)	LTR	2203	-	-	-	-	-	-
	WB (King George St)	TR	2203	-	0	-	0	-	0
	EB (King George St)	LTR	693	-	-	-	-	-	-
	EB (King George St)	LT	392	-	3	-	3	-	3
5	**College Avenue & King George Street (Signalized)**								
	EB (King George St)	LTR	2123	36	83	36	83	42	95
	WB (King George St)	LTR	327	32	72	36	80	32	71
	NB (College Ave)	LTR	354	15	48	17	51	15	51
	SB (College Ave)	LTR	275	2	13	2	13	2	14

Notes:

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

4.3.6 Action Alternative 2 Travel Time Analysis

Based on the Synchro™ analysis, the AM peak covering both routes would range between two and two and a half minutes with a minimum travel time of one minute and fifty-one seconds and a maximum travel time of two minutes and twenty-two seconds. The mid-day times would be similar to the morning travel times with a maximum of four seconds separating the two periods. The PM peak period would have the largest difference in travel times ranging from a low of one minute and fifty-two seconds to a high of three minutes and eight seconds. Action Alternative 2 would result in a maximum of five additional seconds (four percent increase) when compared to the No Action Alternative. The five additional seconds is on top of the travel time that would occur under the No Action Alternative or if the renovation of Building 250 and the relocation of staff did not occur. Table 4-21 contains the Action Alternative 2 AM and PM travel times by route. Table 4-22 contains the Action Alternative 2 Mid-day travel times by route compared to the No Action Alternative.

Table 4-21 Action Alternative 2 AM and PM Travel Time Compared to the No Action Alternative

Route	*Direction*	*AM (7:00–9:00 a.m.)*	*PM (4:00–6:00 p.m.)*	*AM (7:00–9:00 a.m.)*	*PM (4:00–6:00 p.m.)*
		No Action Alternative		*Action Alternative 2*	
Southern	To College Avenue	1:51	1:52	1:51	1:52
	From College Avenue	2:10	2:14	2:10	2:14
Northern	To College Avenue	2:13	2:23	2:14	2:24
	From College Avenue	2:22	3:07	2:22	3:08

Table 4-22 Action Alternative 2 Mid-day Travel Time Compared to the No Action Alternative

Route	*Direction*	*Mid-day (11:00 a.m.–1:00 p.m.)*	*Inbound Mid-day (11:00 a.m.–1:00 p.m.)*	*Outbound Mid-day (11:00 a.m.–1:00 p.m.)*
		No Action Alternative	*Action Alternative 2*	
Southern	To College Avenue	1:50	1:50	1:50
	From College Avenue	2:06	2:06	2:06
Northern	To College Avenue	2:11	2:12	2:16
	From College Avenue	2:22	2:24	2:27

4.3.7 Action Alternative 2 Entry Control Facility Analysis

Action Alternative 2 would add new vehicle trips through the Entry Control Facility (ECF) at Bowyer Road otherwise known as Gate 8. This facility, which operates with one inbound lane and one outbound lane and during the AM peak period, can operate with two personnel processing two vehicles simultaneously in tandem. It is assumed that one person would be processing vehicles during the mid-day period. Approximately 16 vehicles can queue before blocking access to Halligan Hall and 20 vehicles can queue before blocking Baltimore Annapolis Boulevard.

The Military Surface Deployment and Distribution Command Transportation Engineering Agency published *Traffic and Safety Engineering for Better Entry Control Facilities* in 2014 provides guidance for determining the maximum throughput for ECFs based on the number of lanes and number of personnel per lane. According the manual, a single lane with two personnel processing two vehicles concurrently can process between 400 to 600 vehicles per hour at the BRAVO Force Protection level (SDDCTEA, 2014). The average, or 500 vehicles, was used to evaluate the AM peak hour ECF operations, where operating at or below 500 vehicles per hour is considered “passing” and operating above 500 vehicles per hour is considered “failing.” According to the manual, a single lane with one person processing one vehicle can process between 325 to 450 vehicles per hour at the BRAVO Force Protection level (SDDCTEA, 2014). The average, or 375 vehicles, was used to evaluate the mid-day inbound peak hour ECF operations, where operating at or below 375 vehicles per hour is considered “passing” and operating above 375 vehicles per hour is considered “failing.”

The AM and mid-day peak hour volumes turning from Baltimore Annapolis Boulevard into Bowyer Road plus the though movements from Perry Circle were summed to create an ECF-bound volume. It is assumed that 5 percent of the existing and No Action Alternative volumes would turn right from Bowyer Road into Halligan Hall and would not enter the ECF; all 100 percent of the Action Alternative 2 volume would enter the ECF.

The calculated Peak Hour Factor (PHF) for the Baltimore Annapolis Boulevard at Bowyer Road/Perry Circle was used to adjust the inbound ECF volume to reflect that vehicles do not all arrive in a consistent manner for an entire hour. A PHF of 1.0 would reflect a uniform arrival rate for vehicles. According to the turning movement volumes collected for Intersection #3, the AM PHF is 0.97 and the mid-day PHF is 0.94.

Based on the analysis and assumptions, under Action Alternative 2, the Bowyer Road ECF passes under all conditions during the AM peak hour, while it fails during the mid-day outbound peak hour. During the mid-day outbound peak hour, at least eight vehicles would be carried over to the next hour demand (383 to 375). Table 4-23 contains the Bowyer Road ECF summary. The columns labeled adjusted volume reflect the percent of vehicles destined to Halligan Hall and the PHF.

Table 4-23 Bowyer Road ECF Summary

Alternative	***AM Peak Hour (PHF = 0.97)***				***Mid-day Inbound Peak Hour (PHF = 0.94)***			
	Maximum throughput per hour	ECF-Bound Volume	Adjusted Volume	Pass/Fail	Maximum throughput per hour	ECF-Bound Volume	Adjusted Volume	Pass/Fail
Existing Condition	500 vehicles	393	385	***Pass***	375 vehicles	158	168	***Pass***
No Action Alternative		399	391	***Pass***		160	170	***Pass***
Action Alternative 2 Condition		457	451	***Pass***		360	383	***Fail***

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5 Discussion of 2020 Condition Findings

The analysis focused on the study area intersections, travel time analysis, parking, and bicycle/pedestrian impacts. Together, these systems provide an overall examination of the potential impacts of implementing either of the two proposed 2020 action alternatives.

5.1 Study Area Intersection Analysis

The study relied on the HCM intersection analysis method (see Section 3.7.2 for a discussion of the HCM method). Based on the average vehicle delay, the HCM analysis determines the LOS, an A through F letter rating the intersection performances from the perspective of the driver. For each intersection, the differences between the projected 2020 No Action Alternative and the two action alternatives were measured.

Five intersections were analyzed for Action Alternative 1 (same as the existing condition and No Action Alternative), including the site driveway (exit only) because the proposed new entrance would operate at LOS A for all conditions and four other nearby intersections would serve the majority of site generated vehicle trips. Based on the Synchro™ analysis, all intersections would operate with an overall acceptable LOS (LOS D or better). Two intersection approaches primarily serving the Navy—Bowyer Road and Perry Circle at Baltimore Annapolis Boulevard (Intersection #3)—would operate at a failing LOS during all periods; however, the difference between the No Action Alternative and Action Alternative 1 vehicle delay and queue lengths would be within the thresholds established in the transportation assumptions. These differential thresholds include a less than 5-second-added vehicle delay and less than a 150-foot-added queue length for facilities operating at unacceptable levels under the No Action Alternative. All other approaches for both the signalized and unsignalized intersections would operate at acceptable levels. Therefore, implementing Action Alternative 1 would not significantly affect traffic.

For Action Alternative 2, five intersections (same as the existing condition and No Action Alternative) were analyzed. Based on the Synchro™ analysis, all intersections would operate with an overall acceptable LOS (LOS D or better). The same two intersection approaches primarily serving the Navy—Bowyer Road and Perry Circle at Baltimore Annapolis Boulevard (Intersection #3)—as Action Alternative 1 would operate at a failing LOS during all periods; however, only the PM peak hour would experience greater than a 5-second increase in vehicle delay difference between the No Action Alternative and Action Alternative 2. This differential would not be within the thresholds established in the transportation assumptions. During the mid-day outbound peak hour, the queue lengths would increase by more than 150 feet, greater than the thresholds established in the transportation assumptions; however, these impacts would only occur when the facility hosts an event. All other approaches for both the signalized and unsignalized intersections would operate at acceptable levels. Therefore, Action Alternative 2 would adversely affect traffic only along the northbound Bowyer Road approach (exclusively used by the Navy); it would not significantly affect traffic in any of the other study area intersections.

5.2 Travel Time Analysis

Travel times were analyzed using Synchro™ following the same two routes as driven for the existing condition. The times were estimated by Synchro™ taking into account the traffic signal timings, vehicle volumes, pedestrian counts, bicycle counts, and truck percentages.

Based on the Synchro™ analysis, the Action Alternative 1 travel times would increase by a maximum of 3 seconds or 1 percent when compared to the No Action Alternative (3:07 for No Action Alternative and 3:10 for Action Alternative 1). The additional 3 seconds is on top of the travel time that would occur under the No Action Alternative or if the relocation of Navy functions, demolition of buildings, construction of a new building, and relocation of staff, at the Perry Center site did not occur. Most of the travel times were similar to the No Action Alternative value.

Based on the Synchro™ analysis, the Action Alternative 2 travel times would increase by a maximum of 5 seconds or 4 percent when compared to the No Action Alternative (2:11 for No Action Alternative and 2:16 for Action Alternative 2). The additional 5 seconds is on top of the travel time that would occur under the No Action Alternative or if the renovation of Building 250 and relocation of staff did not occur. Most of the travel times were similar to the No Action Alternative value.

5.3 Parking Impacts

The existing condition parking facility inventory provided a base for determining how much parking would potentially be available for each action alternative site. Under Action Alternative 1, the Perry Center site would include between 90 and 120 parking spaces. Assuming 90 parking spaces, 79 would be for employees and 11 would be for visitors. If a mid-day event were to occur, it is assumed that the 79 employees would be asked to park elsewhere, thus freeing up the 90 spaces at the Perry Center site. It is also assumed that the 86 spaces at Bishop Stadium would be freed up for event parking as well, leaving approximately 25 spaces short of the potential demand of 200 vehicles. Those additional vehicles could be accommodated on the northwest corner of the existing Perry Center; however, the traffic model placed all vehicles destined to the Perry Center site at Perry Center and Bishop Stadium. These assumptions provide a conservative approach (i.e., worst case scenario) to the traffic analysis by assigning all of the visitors attending a mid-day event to access off-street parking at the Perry Center site and Bishop Stadium, thus placing all forecasted traffic at the Perry Center/Bishop Stadium intersection in the immediate vicinity of the Alumni Service Center and Headquarters facility. However, because of daily use of the parking lots, a number of visitors likely would park at other locations or use available on-street parking, which would lessen the traffic impact along King George Street. A shuttle bus could be required to provide the employees, as well as event visitors, access between their parked vehicles and the Perry Center site.

Under Action Alternative 2, the Hospital Point 274 parking spaces would provide ample parking for the 79 employees and visitors. If a mid-day event were to occur, the remaining spaces at Hospital Point would be used but may fall short of meeting the potential demand of 200 vehicles. In that event, overflow spaces could be used along Ramsey Road, where numerous parallel parking spaces exist.

While a plan has been developed to handle a mid-day event at either action alternative site, it is assumed that weekday events would rarely occur. Instead, the function hall would primarily host events during weekday evenings or on weekends, outside the peak hour of vehicle traffic and when parking would be available from all nearby parking lots.

5.4 Bicycle and Pedestrian Impacts

The bicycle and pedestrian networks were discussed in the existing condition, including existing sidewalk extent and widths, pedestrian counts, bicycle routes, and share the road bicycle zones.

Both action alternatives were evaluated for bicycle and pedestrian impacts. Under Action Alternative 1, the Perry Center site would directly tie into the planned Maryland SHA sidewalk improvements and planned bicycle route both along King George Street. Assuming proper signing is posted to alert bicyclists and pedestrians of the active driveway serving the Perry Center site, Action Alternative 1 would not significantly affect bicyclists and pedestrians. The proposed new crosswalk at King George Street and Perry Center site/Bishop Stadium (Intersection #4) would not require a pedestrian signal because of the low pedestrian volume in relationship to the forecasted vehicle volume along King George Street. Because the closest intersection (unsignalized or signalized) is greater than 1,000 feet away, the crosswalk and appropriate signing to alert drivers is warranted to address a potential safety issue that could be caused by pedestrians choosing to cross if the crosswalk was not present.

Under Action Alternative 2, the Building 250 site already connects to the NSA Annapolis internal sidewalk network. According to the NSA Annapolis Master Plan, bicycles are permitted on the Lower or Upper Yards by NSA Annapolis employees only (NSA Annapolis, 2012). Pedestrians and bicyclist can access the Upper Yard at Gate 8 and use its sidewalk and road network to the project site. Appropriate sidewalk connections are currently provided to the existing sidewalks on Baltimore Annapolis Boulevard and will be improved with the planned Baltimore Annapolis Boulevard sidewalk improvements. Appropriate connections are currently provided between Gate 8 and the existing signed bicycle route on Baltimore Annapolis Boulevard. Thus, Action Alternative 2 would not significantly affect the bicyclists and pedestrians.

5.5 Bowyer Road Entry Control Facility Impacts

The Bowyer Road ECF was discussed under Action Alternative 2 because that alternative would add all 100 percent of the forecasted trips generated through the Bowyer Road ECF. Under Action Alternative 2, vehicle trips entering the ECF would increase by 15 percent and 125 percent during the AM and mid-day peak hours, respectively. Based on an upper threshold of 500 vehicles per hour for an ECF with one lane and two personnel processing two vehicles concurrently, Action Alternative 2 would not create a queue from the ECF and would not affect Baltimore Annapolis Boulevard during the AM peak hour. Based on 375 vehicles per hour for an ECF with one lane and one person processing one vehicle at a time, Action Alternative 2 would create an eight-vehicle queue from the ECF and potentially affect Baltimore Annapolis Boulevard during the mid-day peak hour. It should be noted that this analysis does not take into consideration the effect the traffic signals might have on the vehicle arrival rates entering the ECF and would require a more substantial microsimulation analysis to fully evaluate.

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6 Construction Impacts

The construction conditions include parking, sidewalk, and truck access through proposed driveways at Perry Center site and Gate 8 to access Building 250. The parking section includes handling parking requirements during the construction period for both action alternatives. The sidewalk section includes discussion of the potential temporary impacts on the internal (Building 250 site) and external sidewalk network (both sites) from construction activities. The impacts from construction trucks would include any temporary measures recommended to mitigate potential queues.

6.1 Parking

The Perry Center site, CHRIMP facility, and NSA Annapolis Mail Center would require a temporary parking area for construction workers and trucks. Limited overflow parking could be considered across King George Street at Bishop Stadium. To minimize impacts, USNA AA/F would contractually limit construction workers to park within the construction site and lay down areas. It is anticipated that the limited construction parking would be used for contractor management staff, on-site government representatives, and visitors. Further, for those construction contractors who are unable to find parking at the Perry Center site or Bishop Stadium, USNA AA/F could consider allowing the use of the Navy-Marine Corps Memorial Stadium parking lot and provide a shuttle bus to transport the workers between the stadium and the site. USNA AA/F would require documented verification of these provisions, and to ensure compliance, it may conduct security inspections and verifications at the Perry Center site and off-site parking sites. The NSA Annapolis Mail Center option on North Severn would only require interior and some exterior renovations to Building 15NS. A small paved area located at the building site should provide adequate parking for construction works and lay down areas if necessary.

The Building 250 site would include access to the existing 200-plus-space parking lot that is currently used for the Naval Health Clinic. This access should provide adequate parking for construction workers as well as staging areas for trucks. USNA AA/F may conduct security inspections and verifications to ensure all users of the parking facility are part of the construction effort.

The number of peak trips to either site may temporarily increase from construction worker trips during the construction period, which is projected to last 24 months. USNA AA/F would seek to minimize impacts on parking and the road network during this period by ensuring construction worker parking is addressed and the mitigation strategies discussed in Section 8.0 are implemented.

6.2 Sidewalk Impacts

During the construction period, pedestrians along King George Street, around Building 250, and along Bennion Road near Building 15NS within NSA Annapolis would experience temporary sidewalk closings; temporary new sidewalk connections provided to compensate for the sidewalk closings, when necessary; and sidewalk impacts such as narrowed or torn-up sidewalks. These impacts would be short term, and no long-term impacts would occur. The Navy would seek to minimize these impacts by employing the mitigation strategies discussed in Section 8.0.

6.3 Construction Truck Impacts

Short-term impacts on traffic would result from dump trucks hauling debris while the existing buildings on the Perry Center site are being demolished. These impacts would occur until the parcel is clear of existing building materials. In addition, dump trucks would haul existing building materials from Building

250 and Building 15NS as part of the facility renovation, and delivery trucks would haul new building materials to both sites on a regular basis. These materials would include foundation materials and building materials for framing the interior and exterior walls and installing flooring for the Perry Center site. It is assumed that a construction management plan would be followed to reduce construction impacts on the roadway network during the peak hours from the trucking activity.

7 Proposed Action Recommendations

The existing condition provided a starting point for analyzing the study area. The 2020 No Action Alternative was then developed using the background trips. From the 2020 No Action Alternative, two 2020 action alternatives were analyzed to determine the effects on the study area roadways.

Based on the transportation scoping letter from the Navy to the City of Annapolis, for failing intersection approaches (LOS E or F), vehicle delay increases of less than 5 seconds and failing queue lengths increases of less than 150 feet are not considered to be significant. Based on the analysis performed in this study, when comparing the No Action Alternative with the two action alternatives, no intersections would degrade from LOS A-D to LOS E or F. Furthermore, the two intersection approaches that would operate at a failing LOS under the No Action Alternative would experience less than a 5-second increase in vehicle delay under Action Alternative 1. Under Action Alternative 2, the northbound Bowyer Road approach at Intersection #3 would require implementing mitigation to address the failing operations during the PM peak hour and failing queue length during the mid-day outbound peak hour.

The recommended mitigation strategy to address the issues identified under Action Alternative 2 would require an update to the traffic signal timings at both the Baltimore Annapolis Boulevard at Bowyer Road/Perry Circle intersection (Intersection #3) and Baltimore Annapolis Boulevard at King George Street intersection (Intersection #2). Both traffic signals would need to be updated because they would need to operate in conjunction with each other to ensure a smooth operation through the corridor. The update would involve changing the pedestrian-only phase to occur at the same time as the vehicles traveling parallel to the pedestrian crosswalk. Pedestrians would continue to have the right-of-way over right-turning vehicles. This type of intersection operation is very common. Signing following Maryland MUTCD standards should be displayed at both intersections to alert drivers planning to turn right to yield to pedestrians. Sign R10-15 “TURNING TRAFFIC YIELD TO PEDS” should be displayed (Maryland SHA, 2011). To avoid confusion of pedestrians and drivers, the traffic signal timings should be updated for all periods to provide a consistent operation and expectation for daily users of the intersections.

Based on the Synchro™ analysis, the AM peak hour and mid-day inbound and outbound peak hours would result in LOS D or better operation for all approaches at Intersections #2 and #3. The PM peak hour would result in the northbound Bowyer Road approach improving from LOS F to LOS E and the southbound Perry Circle approach would improve from LOS E to LOS C. Also based on the Synchro™ analysis, the AM peak hour and mid-day inbound and outbound peak hours would result in passing queue lengths. The PM peak hour would result in failing queue lengths for the eastbound Baltimore Annapolis Boulevard approach and northbound Bowyer Road approach; however, the queue lengths would be less than the No Action Alternative. The queue lengths would be reduced by 521 and 109 feet for the eastbound and northbound approaches, respectively. Therefore, all traffic impacts would be addressed through the proposed mitigation.

Figure 7-1 depicts the LOS for Intersections #2 and #3 during the AM and PM peak hours. Figure 7-2 depicts the LOS for Intersections #2 and #3 during the mid-day peak hours. Tables 7-1 and 7-2 present the Action Alternative 2 with mitigation AM, PM, and mid-day peak hour operations analysis compared to the No Action Alternative for Intersections #2 and #3. Tables 7-3 and 7-4 present the Action Alternative 2 with mitigation AM and PM, and mid-day peak hours queue analysis compared to the No Action Alternative for Intersections #2 and #3.

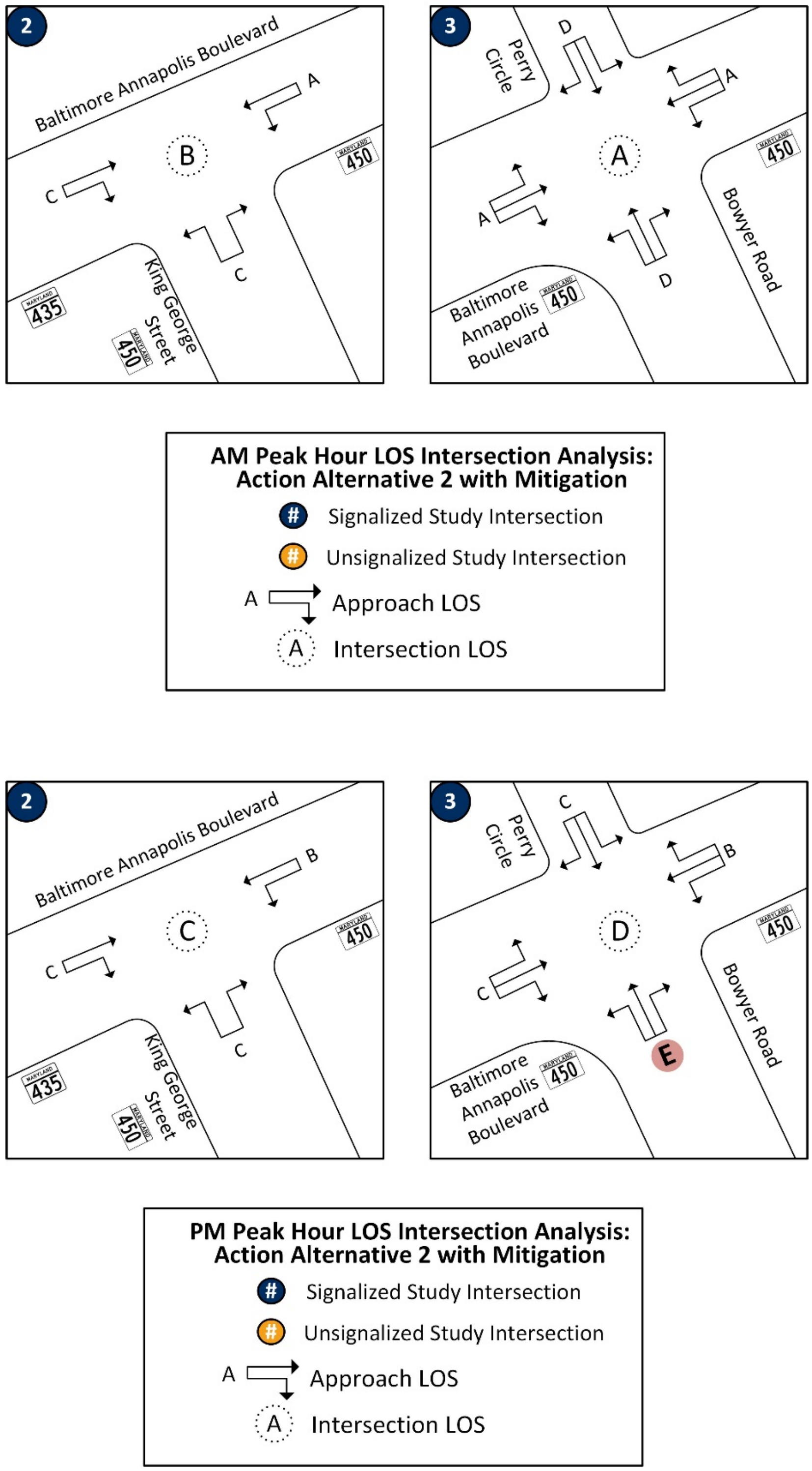
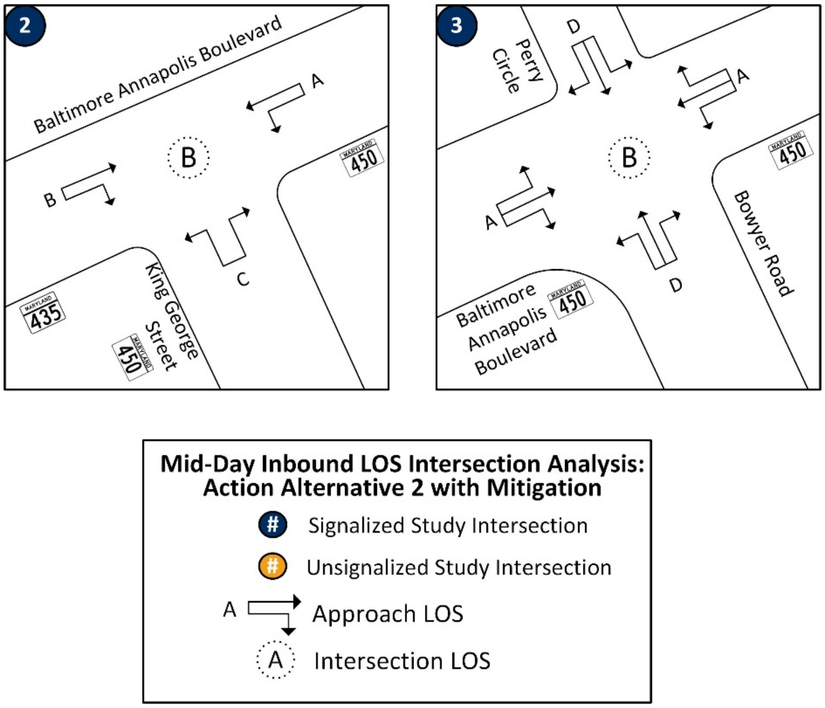


Figure 7-1 Action Alternative 2 with Mitigation LOS (AM and PM Peak Hours)



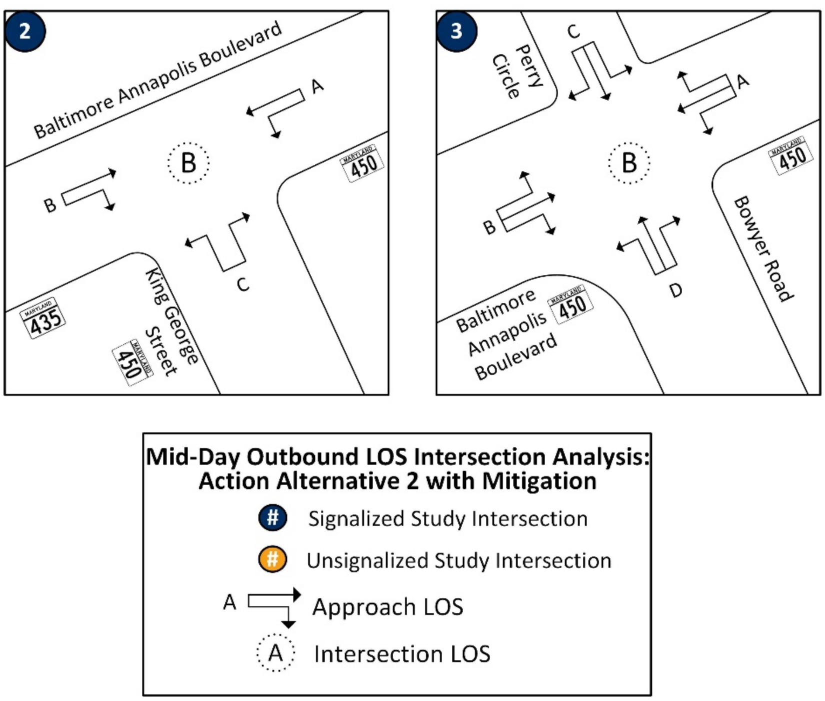


Figure 7-2 Action Alternative 2 with Mitigation LOS (Mid-day Outbound and Inbound Peak Hours)

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Table 7-1 Action Alternative 2 with Mitigation AM and PM Peak Hour Operations Analysis Compared to the No Action Alternative

#	*Intersection and Approach*	*Lane Group*	No Action Alternative						Action Alternative 2 with Mitigation					
			AM Peak Hour			*PM Peak Hour*			*AM Peak Hour*			*PM Peak Hour*		
			V/C Ratio	*Delay (sec/ veh)*	*LOS*	*V/C Ratio*	*Delay (sec/ veh)*	*LOS*	*V/C Ratio*	*Delay (sec/ veh)*	*LOS*	*V/C Ratio*	*Delay (sec/ veh)*	*LOS*
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)** [a]													
	EB (Baltimore Annapolis Blvd)	T	0.47	16.3	B	0.70	21.8	C	0.58	25.7	C	0.71	24.3	C
	EB (Baltimore Annapolis Blvd)	R	0.11	12.0	B	0.04	11.7	B	0.11	18.2	B	0.04	13.2	B
	EB Overall (Baltimore Annapolis Blvd)			**15.1**	**B**		**20.9**	**C**		**23.7**	**C**		**23.3**	**C**
	WB (Baltimore Annapolis Blvd)	L	0.70	8.1	A	0.51	13.3	B	0.59	9.7	A	0.64	15.1	B
	WB (Baltimore Annapolis Blvd)	T	0.32	3.5	A	0.41	5.8	A	0.30	3.4	A	0.45	8.1	A
	WB Overall (Baltimore Annapolis Blvd)			**6.0**	**A**		**8.3**	**A**		**6.8**	**A**		**10.4**	**B**
	WB (King George St)	L	0.32	33.4	C	0.40	32.3	C	0.35	43.0	D	0.35	32.6	C
	WB (King George St)	R	0.45	18.8	B	0.87	44.9	D	0.44	21.4	C	0.71	29.7	C
	WB Overall (King George St)			**21.8**	**C**		**41.8**	**D**		**25.7**	**C**		**30.4**	**C**
	Overall			**11.7**	**B**		**22.1**	**C**		**15.6**	**B**		**20.3**	**C**

Table 7-1 Action Alternative 2 with Mitigation AM and PM Peak Hour Operations Analysis Compared to the No Action Alternative (continued)

#	Intersection and Approach	Lane Group	No Action Alternative						Action Alternative 2 with Mitigation					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)** [a]													
	EB (Baltimore Annapolis Blvd)	L	0.02	6.1	A	0.02	11.6	B	0.02	2.1	A	0.03	9.4	A
	EB (Baltimore Annapolis Blvd)	T	0.36	9.1	A	0.90	35.2	D	0.37	3.1	A	0.98	34.8	C
	EB (Baltimore Annapolis Blvd)	R	0.12	14.5	B	0.02	12.5	B	0.15	0.3	A	0.02	9.4	A
	EB Overall (Baltimore Annapolis Blvd)			**10.6**	**B**		**34.3**	**C**		**2.2**	**A**		**33.6**	**C**
	WB (Baltimore Annapolis Blvd)	L	0.31	4.1	A	0.37	37.2	D	0.33	2.6	A	0.30	39.1	D
	WB (Baltimore Annapolis Blvd)	TR	0.58	6.6	A	0.42	12.9	B	0.58	4.4	A	0.42	7.8	A
	WB Overall (Baltimore Annapolis Blvd)			**6.1**	**A**		**15.1**	**B**		**4.1**	**A**		**10.8**	**B**
	NB (Bowyer Rd)	LT	0.42	77.3	E	0.94	112.1	F	0.48	51.0	D	1.03	101.5	F
	NB (Bowyer Rd)	R	0.02	62.2	E	0.58	63.4	E	0.02	36.3	D	0.60	33.9	C
	NB Overall (Bowyer Rd)			**70.0**	**E**		**83.7**	**F**		**44.1**	**D**		**63.6**	**E**
	SB (Perry Cir)	LTR	0.16	72.8	E	0.01	58.9	E	0.14	44.7	D	0.01	31.7	C
	SB Overall (Perry Cir)			**72.8**	**E**		**58.9**	**E**		**44.7**	**D**		**31.7**	**C**
	Overall			**11.1**	**B**		**42.2**	**D**		**5.5**	**A**		**36.1**	**D**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2000 results

Table 7-2 Action Alternative 2 with Mitigation Inbound and Outbound Mid-Day Operations Compared to the No Action Alternative Analysis

#	Intersection and Approach	Lane Group	No Action Alternative			Action Alternative 2 with Mitigation					
			Mid-Day			Mid-Day (Inbound)			Mid-Day (Outbound)		
			V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)** [a]										
	EB (Baltimore Annapolis Blvd)	T	0.50	15.3	B	0.49	15.1	B	0.41	14.0	B
	EB (Baltimore Annapolis Blvd)	R	0.06	10.6	B	0.06	10.3	B	0.06	10.3	B
	EB Overall (Baltimore Annapolis Blvd)			**14.4**	**B**		**14.3**	**B**		**13.3**	**B**
	WB (Baltimore Annapolis Blvd)	L	0.41	4.2	A	0.42	6.0	A	0.43	4.1	A
	WB (Baltimore Annapolis Blvd)	T	0.33	4.3	A	0.31	4.9	A	0.36	4.1	A
	WB Overall (Baltimore Annapolis Blvd)			**4.3**	**A**		**5.3**	**A**		**4.1**	**A**
	WB (King George St)	L	0.44	27.8	C	0.44	38.8	D	0.47	39.9	D
	WB (King George St)	R	0.32	15.6	B	0.44	27.1	C	0.37	26.0	C
	WB Overall (King George St)			**20.6**	**C**		**31.5**	**C**		**31.7**	**C**
	Overall			**11.3**	**B**		**14.5**	**B**		**12.6**	**B**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2000 results

Table 7-2 Action Alternative 2 with Mitigation Inbound and Outbound Mid-Day Operations Compared to the No Action Alternative Analysis (continued)

#	Intersection and Approach	Lane Group	No Action Alternative			Action Alternative 2 with Mitigation					
			Mid-Day			Mid-Day (Inbound)			Mid-Day (Outbound)		
			V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS	V/C Ratio	Delay (sec/ veh)	LOS
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)** [a]										
	EB (Baltimore Annapolis Blvd)	L	0.02	7.9	A	0.02	6.0	A	0.03	9.0	A
	EB (Baltimore Annapolis Blvd)	T	0.40	11.8	B	0.43	8.7	A	0.49	12.7	B
	EB (Baltimore Annapolis Blvd)	R	0.06	11.9	B	0.12	6.0	A	0.06	8.8	A
	EB Overall (Baltimore Annapolis Blvd)			**11.8**	**B**		**7.9**	**A**		**12.1**	**B**
	WB (Baltimore Annapolis Blvd)	L	0.13	6.9	A	0.30	5.3	A	0.13	10.6	B
	WB (Baltimore Annapolis Blvd)	TR	0.38	8.4	A	0.37	5.7	A	0.42	9.2	A
	WB Overall (Baltimore Annapolis Blvd)			**8.2**	**A**		**5.6**	**A**		**9.4**	**A**
	NB (Bowyer Rd)	LT	0.67	67.7	E	0.59	44.5	D	0.74	45.3	D
	NB (Bowyer Rd)	R	0.06	46.9	D	0.06	29.5	C	0.11	24.5	C
	NB Overall (Bowyer Rd)			**58.6**	**E**		**37.9**	**D**		**35.5**	**D**
	SB (Perry Cir)	LTR	0.04	53.0	D	0.04	36.3	D	0.03	30.0	C
	SB Overall (Perry Cir)			**53.0**	**D**		**36.3**	**D**		**30.0**	**C**
	Overall			**17.9**	**B**		**11.2**	**B**		**17.5**	**B**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

V/C = Volume to capacity ratio

Delay is Measured in Seconds Per Vehicle

Red cells denote approaches and lane groups operating at unacceptable conditions.

[a] Highway Capacity Software 2000 results

Table 7-3 Action Alternative 2 with Mitigation AM and PM Peak Hours Queuing Analysis Compared to the No Action Alternative

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No Action Alternative				Action Alternative 2 with Mitigation			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)**										
	EB (Baltimore Annapolis Blvd)	T	471	125	256	275	409	203	329	311	453
	EB (Baltimore Annapolis Blvd)	R	471	0	37	0	20	0	40	0	21
	WB (Baltimore Annapolis Blvd)	L	450	68	100	37	m73	63	118	52	m74
	WB (Baltimore Annapolis Blvd)	T	597	58	77	98	m169	57	87	161	m209
	WB (King George St)	L	400	32	71	69	124	42	82	76	132
	WB (King George St)	R	375	102	131	205	320	114	164	227	344
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)**										
	EB (Baltimore Annapolis Blvd)	L	125	3	m8	5	m7	1	m2	2	m4
	EB (Baltimore Annapolis Blvd)	T	597	164	306	938	#1441	38	68	423	#920
	EB (Baltimore Annapolis Blvd)	R	150	17	51	0	m0	0	1	0	m0
	WB (Baltimore Annapolis Blvd)	L	350	42	72	19	35	27	54	10	26
	WB (Baltimore Annapolis Blvd)	TR	510	284	432	266	341	172	307	133	193
	NB (Bowyer Rd)	LT	433	35	72	289	#467	23	54	~195	#358
	NB (Bowyer Rd)	R	310	0	27	183	296	0	23	144	243
	SB (Perry Cir)	LTR	184	12	49	0	0	7	35	0	0

Notes:

~ Volume exceeds capacity, queue is theoretically infinite.

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

Table 7-4 Action Alternative 2 with Mitigation Inbound and Outbound Mid-Day Queuing Analysis Compared to the No Action Alternative

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No Action Alternative		Action Alternative 2 with Mitigation			
				Mid-Day		Mid-Day (Inbound)		Mid-Day (Outbound)	
				Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)	Queue Length 50th (ft)	Queue Length 95th (ft)
2	**King George Street & Baltimore Annapolis Boulevard (Signalized)**								
	EB (Baltimore Annapolis Blvd)	T	471	121	208	183	292	142	252
	EB (Baltimore Annapolis Blvd)	R	471	0	24	0	24	0	26
	WB (Baltimore Annapolis Blvd)	L	450	28	39	44	63	32	47
	WB (Baltimore Annapolis Blvd)	T	597	62	71	78	102	56	93
	WB (King George St)	L	400	51	99	76	133	78	131
	WB (King George St)	R	375	56	96	112	167	94	134
3	**Bowyer Road & Perry Circle & Baltimore Annapolis Boulevard (Signalized)**								
	EB (Baltimore Annapolis Blvd)	L	125	3	m9	2	m6	3	m8
	EB (Baltimore Annapolis Blvd)	T	597	174	296	135	188	144	193
	EB (Baltimore Annapolis Blvd)	R	150	8	35	10	23	4	11
	WB (Baltimore Annapolis Blvd)	L	350	18	40	27	60	15	40
	WB (Baltimore Annapolis Blvd)	TR	510	159	262	98	185	136	255
	NB (Bowyer Rd)	LT	433	105	165	72	122	133	196
	NB (Bowyer Rd)	R	310	0	39	0	32	0	39
	SB (Perry Cir)	LTR	184	6	27	4	21	4	18

Notes:

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left/thru/right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

Ample existing and planned sidewalks and bicycle routes exist through the study area to accommodate new pedestrian and bicycle trips under the action alternatives. This holds true for King George Street in the vicinity of Perry Center and Baltimore Annapolis Boulevard near Gate 8. Therefore, no mitigation measures are recommended for the bicycle or pedestrian network.

It is also recommended that the Installation TMP continue to be implemented to reduce the number of vehicle trips on the roadway system by using the Annapolis Transit, Navy Transportation Department shuttles, vanpools, carpools, and bicycle trails. The sustained implementation of the TMP would continue to ensure that the transportation system in the area functions efficiently and adheres to the Executive Order 13693, *Planning for Federal Sustainability in the Next Decade*. The goal of Executive Order 13693 specific to this study relates to participating in a demand management program (White House, 2016).

The ECF was analyzed using a direct comparison of the forecasted volume to a published average maximum throughput given the existing one-lane operation. It is recommended that if Action Alternative 2 is chosen as the preferred alternative the Navy consider adding a second person to check credentials on days when mid-day events are scheduled, enabling the ECF to process two vehicles concurrently. Adding a second person would increase the mid-day inbound peak hour throughput and address the potential ECF impact to Baltimore Annapolis Boulevard. Based on the AM peak hour ECF analysis, the ECF would process more than the forecasted number of vehicles; however, it is suggested the Navy monitor the AM operations and implement a third person to check credentials if the queue affects Baltimore Annapolis Boulevard to allow three vehicles to be processed concurrently.

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8 Construction Recommendations

To keep the Perry Center and Building 250 sites functioning well, USNA AA/F would implement the following basic steps. To minimize impacts on parking from construction workers, USNA AA/F would contractually limit construction workers to park within the construction sites, designated overflow areas, and lay down areas. It is anticipated that the limited construction parking would be used for contractor management staff, on-site government representatives, and visitors. Further, for those construction contractors who do not receive on-site construction parking, USNA AA/F would contractually require the contractors to use alternative options to access the installation, such satellite parking and shuttles. USNA AA/F would require documented verification of these provisions and, to ensure compliance, may conduct security inspections and badge verifications at Perry Center or Building 250 sites or at the contractor-provided parking site. These steps would minimize the impact of the construction on the City of Annapolis and King George Street or Baltimore Annapolis Boulevard.

To address the sidewalk needs for the public to safely and easily pass the site access driveways, USNA AA/F would provide signing to alert pedestrians of closed sidewalks and direct them to the temporary or alternative existing sidewalks through construction zones. In addition, USNA AA/F construction contractors would install temporary barriers to protect pedestrians from vehicular traffic in areas where sidewalks are narrowed or shifted closer to the roadway. Lastly, any sidewalk shifts or closures would be signed to alert potential users of the pending sidewalk system changes.

USNA AA/F would contractually limit the construction contractors to stagger truck arrivals to minimize trucks from potentially blocking road while waiting to access either site. This approach may be more warranted for the Perry Center site, given the proximity of King George Street to the site. For the Building 250 site, ample space should be available truck parking while drivers wait to unload their materials.

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Attachment 1

Letter From Navy to City of Annapolis

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DEPARTMENT OF THE NAVY
NAVAL SUPPORT ACTIVITY ANNAPOLIS
58 BENNION ROAD
ANNAPOLIS, MD 21402

Mr. Pete Gutwald, Director
Department of Planning & Zoning City of Annapolis
145 Gorman Street, 3rd Floor
Annapolis, MD 21401

October 30, 2015

RE: United States Naval Academy Alumni Association and the Naval Academy Foundation Relocation Environmental Assessment Transportation Scoping Letter

Dear Mr. Gutwald:

The United States (U.S.) Department of the Navy (Navy) is initiating an Environmental Assessment (EA) to lease property to the United States Naval Academy Alumni Association/ Naval Academy Foundation (USNA AA/F) on Naval Support Activity Annapolis (NSAA), Maryland for construction of a new co-located USNA AA/F Alumni Services Center and Headquarters facility. The Proposed Action would be a multi-year, multi-phase action involving the potential relocation of existing Navy functions, a lease agreement, and demolition and construction/renovation activities, as necessary, prior to the USNA AA/F relocating staff and functions to the new facility. The new facility is needed because the USNA AA/F leadership, staff, and functional spaces are currently spread across five facilities on and around NSA Annapolis and the City of Annapolis (see attached Figure 1), resulting in a detrimental impact to cohesive operation and delivery of their mission to support and advocate for the USNA and the Brigade of Midshipmen.

This scoping letter provides a summary of the Proposed Action and the proposed methods for a transportation study the Navy is undertaking to aid in determining the potential transportation impacts of the Proposed Action to be analyzed in the EA. Additionally, the Navy is making several data requests from the City of Annapolis (City) for the transportation study. The Navy anticipates initiating data collection for the study in early November 2015 and completing the study report in 2016.

Proposed Action

The EA is analyzing the Navy's Proposed Action of entering into a lease agreement with the USNA AA/F, as well as a No Action Alternative. There are two site alternatives for implementing the Proposed Action: property on the Perry Center and Building 250 (see attached Figure 2). The Perry Center site is located within the southwestern portion of the USNA Upper Yard and is bounded by King George Street to the north and east and College Creek to the south and west. A new 29,000 square foot building is proposed for this site alternative along with parking for approximately 90 to 120 vehicles. The existing buildings on the site (Buildings 51, 92, 194, 974, and 340) would be demolished and the existing functions, the NSAA Mail Center and the consolidated hazardous material reutilization inventory management program (CHRIMP) facility, would be relocated. The NSAA Mail Center would be relocated to Building 275 at Hospital Point in the USNA Upper Yard, and the CHRIMP would be relocated to a new facility to be constructed adjacent to Building 571 on the Perry Center (Figure 2).

Under the second site alternative, Building 250 would be renovated to meet the needs of the USNAAA and the NAF. Building 250 is the Naval Health Clinic Annapolis Facility located next to Beach Hall on Wood Road at Hospital Point within the eastern portion of the USNA Upper Yard (Figure 2), which will be vacated in 2016. No new parking would be needed at this location as staff would use the existing parking lot. Under each site alternative for the Proposed Action it is estimated that 90 USNAAA and NAF staff would use the facility on a daily basis. The facility would also include a multi-purpose space that could accommodate up to 300 people for special events.

Transportation Study Methods

To aid in determining the potential impacts of the Proposed Action on the local traffic infrastructure the Navy is conducting a transportation study. The study methods consist of a study area, anticipated data collection, proposed facility analysis methods, and assumptions for developing future volumes alternatives.

<u>Proposed Study Area</u>

The study area is proposed to include the following five intersections:

1. Taylor Avenue and Baltimore Boulevard (unsignalized)
2. Baltimore Boulevard and MD 450 (King George Street/Baltimore Boulevard) (signalized)
3. MD 450 (Baltimore Boulevard) and Bowyer Road (signalized)
4. MD 450 (King George Street) and MD 450 (College Avenue) (signalized)
5. MD 450 (King George Street) and Baseball Stadium Entrance/ access to Perry Center

Figure 3, attached, shows the five intersections as well as the location of the Perry Center site and Building 250. The study area will cover the primary distribution of future forecasted vehicle trips generated by the Proposed Action and exceeds the City's recommended 1,000 foot minimum study area size.

<u>Anticipated Data Collection</u>

Data collection will include obtaining traffic counts at the five intersections during three time periods: 3-hour AM peak hour, 2-hour Mid-day, and 3-hour PM peak hour in 15-minute intervals. There will also be one automatic traffic recorder placed along King George Street near the Perry Center site to obtain a 72-hour count, provide supporting data to balance the traffic volumes and provide data if a signal warrant analysis is deemed necessary to service the Perry Center site. All counts will be obtained on a non-holiday week in early November.

The existing travel times will be obtained by driving through the corridor between King George Street/College Avenue to Taylor Avenue/Baltimore Boulevard. A total of three travel time runs (total of nine runs) will be obtained during each time period (AM peak hour, Mid-day, and PM peak hour).

It is requested that the City provide the latest traffic signal timings for the three signalized intersections.

Mr. Pete Gutwald
October 28, 2015
Page 3

Facility Operations Analysis Method

There will be several analysis methods employed to help evaluate the five study area intersections. The study will use the 2010 Highway Capacity Manual (HCM) procedures through the use of Synchro™ Traffic Analysis Software. This assumes the existing traffic signal timings are 2010 HCM compatible. If they are not compatible, then the 2000 HCM procedures will be followed. For example, exclusive pedestrian phases and two intersections coordinated together are not 2010 HCM compatible. The study will provide the volume to capacity ratio, vehicle delay, and level of service (LOS). A 30-minute control delay study was conducted on September 2 between 5:00 – 5:30 PM. Based on the survey a control delay of 28.3 seconds was calculated. This figure could be used to calibrate the unsignalized intersection operations analysis and determine a gap acceptance value. Since the control delay was below 50 seconds (the threshold for LOS E) based on minimal traffic congestion present during the evening commute, the Navy requests that if the City has a preferable gap acceptance value for use in the study that you please provide that information.

The study will evaluate the potential queuing that might occur using Synchro™ Traffic Analysis Software. For the signalized intersections, the 50th and 95th percentile queuing lengths in feet will be evaluated. For the unsignalized intersections only the 95th percentile queue lengths in feet will be evaluated.

The study will evaluate travel times under the future conditions using the Synchro™ Traffic Analysis Software arterial analysis module and provide the travel time between the same origin and destination points as the existing manual travel time runs.

Pedestrian and bicycle accommodation and safety will be discussed in a qualitative manner for covering the existing and future actions.

Transportation Assumptions

The assumptions cover the future No Action Alternative and the Proposed Action site alternatives.

No Action Alternative

For the No Action Alternative, the study will use a background growth rate of 0.3 percent annual growth. This rate was chosen based on the Maryland State Highway Administration average annual daily traffic historic counts between 2009 and 2014. For the principal arterials (Baltimore Boulevard east of King George Street and King George Street), the historic counts resulted in a -1.0 percent per year decline. The minor arterial (Baltimore Boulevard west of King George Street) resulted in a 0.3 percent per year growth. Both of these growth rates are far below the City's recommended 4.0 percent annual growth; however, to keep the analysis consistent and follow the historic pattern, a 0.3 percent annual growth rate would provide a conservative estimate of future background growth.

The study will include planned developments that would potentially impact the study area. Therefore, the Navy requests any information the City may have regarding planned future development projects within the study area. The Institute of Transportation Engineers (ITE) *Trip Generation Manual*

9th Edition will be used to develop future volume for the planned developments that do not already have a transportation impact study available.

It will be assumed that the traffic signal timings for the No Action Alternative will be optimized for the splits and offsets, if any, based on the existing cycle lengths and coordination plans.

Based on the 2015 *West Annapolis Sector Study*, there is a plan to improve Baltimore Boulevard between Bowyer Road and King George Street. This planned roadway improvement will be included if it is planned to be completed within the future year planning horizon. Therefore, the Navy requests the City provide the timeframe for completion of this roadway improvement.

Proposed Action

The ITE *Trip Generation Manual 9th Edition* will be used to forecast the number of peak hour trips that would be produced based on 120 employees for either site. Based on the use being for an office within the USNA, the single tenant office building land use category will be used relying on the number of employees to determine the total peak hour trips. According to ITE, the total trips generated would be 64 during the AM peak hour and 61 during the PM peak hour (Table 1). The average rate was used to calculate the total number of employees because the fitted curve equation produces unrealistic volumes from the low number of employees.

Table 1: Action Alternative Trip Generation

Source	Independent Variable	Time Period	IN	OUT	TOTAL
ITE Land Use Code 715	Employees	AM Peak Hour	57	7	64
		PM Peak Hour	9	52	61

For the mid-day events, it will be assumed that there would be 200 vehicle trips. It is reasonable to assume that an event could begin or end during the Mid-day peak period. Therefore, following a conservative evaluation, the analysis will add the event-based trips as 100 percent inbound and a separate evaluation of the event-based trips as 100 percent outbound. It is unlikely that the trips would occur at the same time; therefore, the analysis will examine both scenarios separately. The distribution will follow the existing traffic patterns to distribute the trips out of the sites and across the study area network. It is assumed that any truck traffic to serve the multi-purpose room would arrive and depart during off-peak hours and outside the Mid-day peak hour as well.

A parking study will be included to determine the existing on and off-street parking availability, the future planned parking, and the potential impact to the study area during normal operating days and during days with events planned in the multi-purpose room.

Next Steps

As discussed, the Navy is planning to initiate data collection for the transportation study in early November 2015 and is anticipating the study report being completed in 2016. The completed study will

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become a part of the EA. To facilitate the completion of the study, the Navy requests the following information from the City:

(1) The latest traffic signal timings for the three signalized intersections discussed.

(2) The value the City would like the Navy to use for gap acceptance at unsignalized intersections.

(3) The timeframe for the planned roadway improvement of Baltimore Boulevard between Bowyer Road and King George Street to be completed.

(4) Information regarding planned future development projects within the study area.

If you have any comments regarding this scoping letter or require additional information, please do not hesitate to contact Mr. William Sadlon at 202.685.0164 or by email at william.sadlon@navy.mil.

Sincerely,

LOGAN JONES
Captain, U.S. Navy
Commanding Officer

Cc: MD State Highway Administration

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October 28, 2015
Page 6

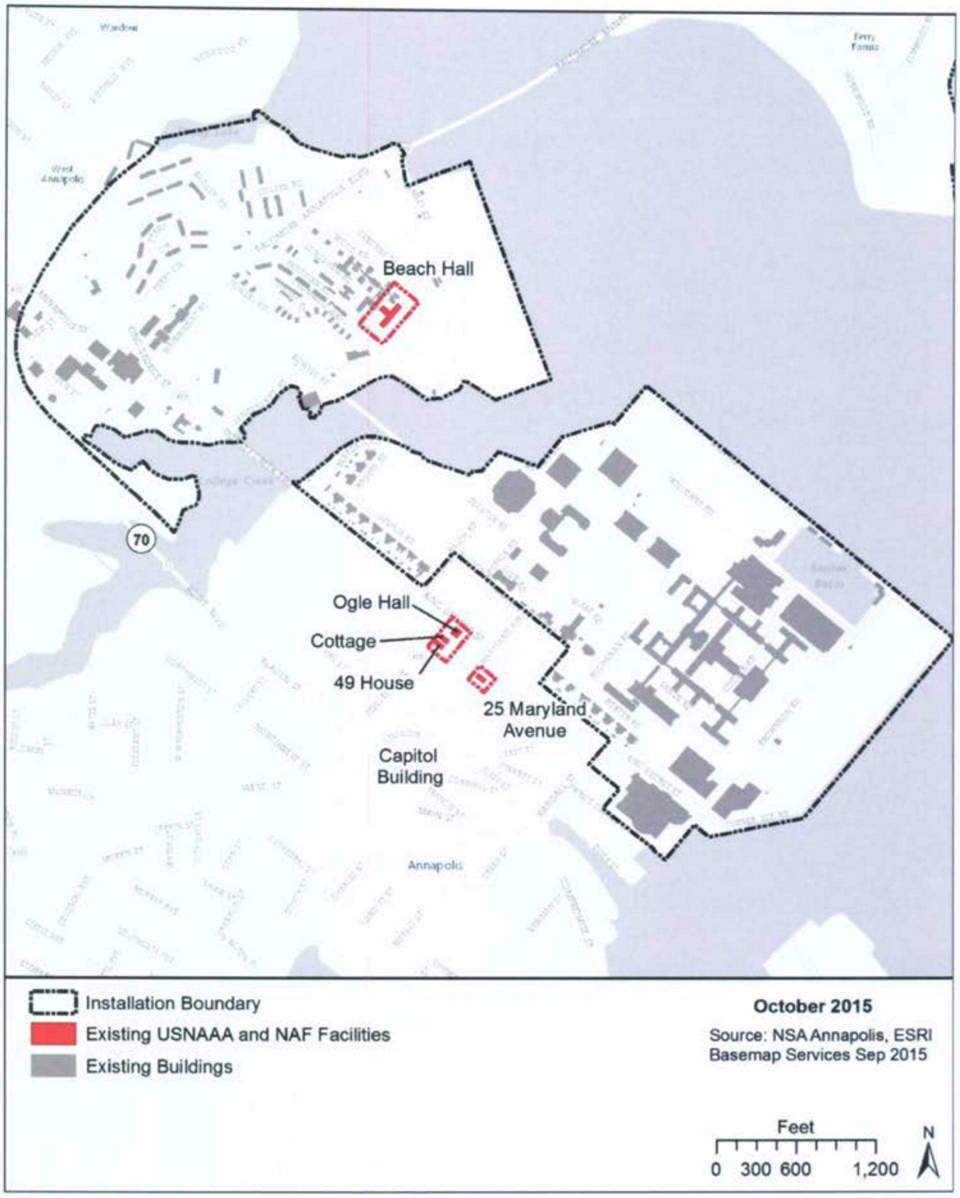

Figure 1 **Existing U.S. Naval Academy Alumni Association and Naval Academy Foundation Facilities**

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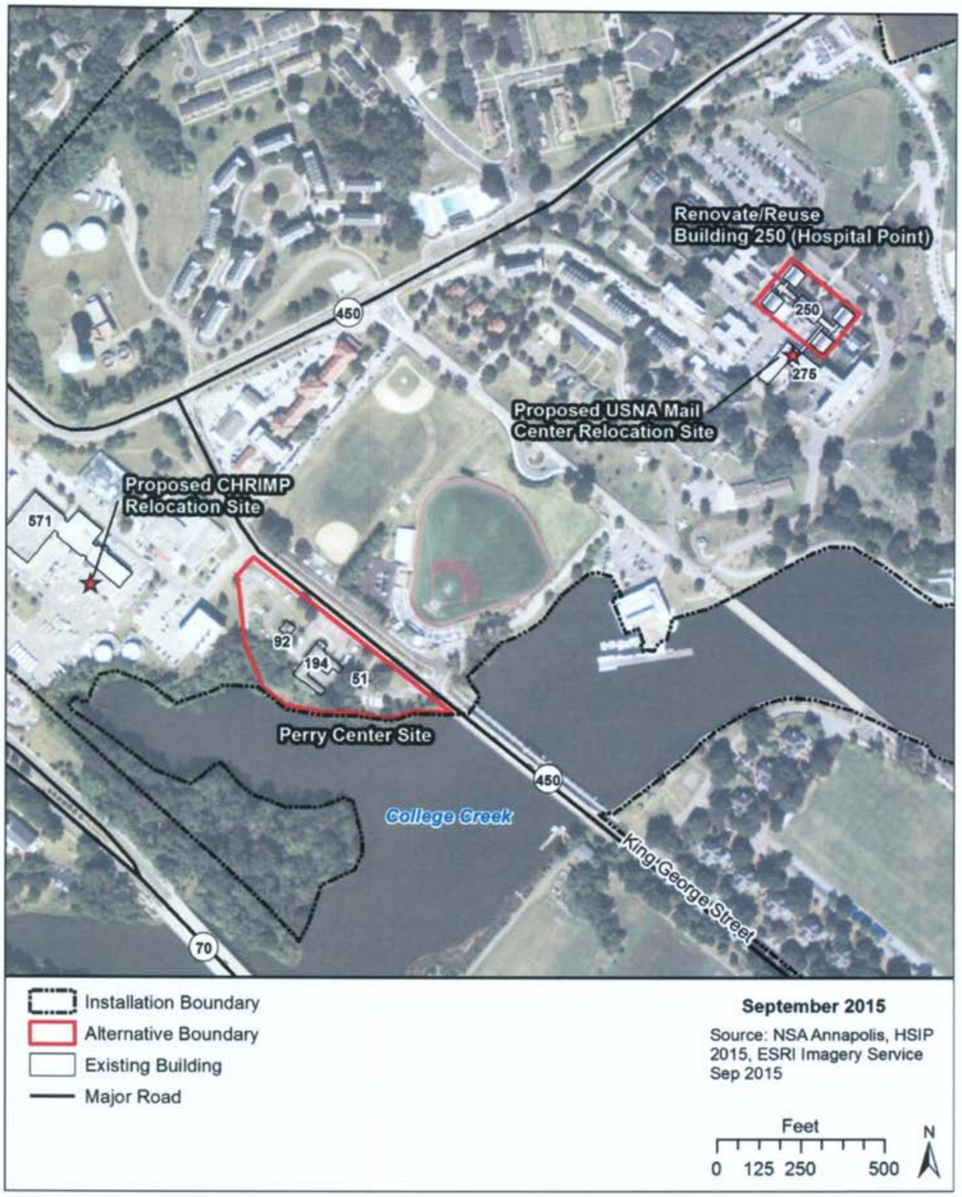

Figure 2 **Proposed Facility Locations**

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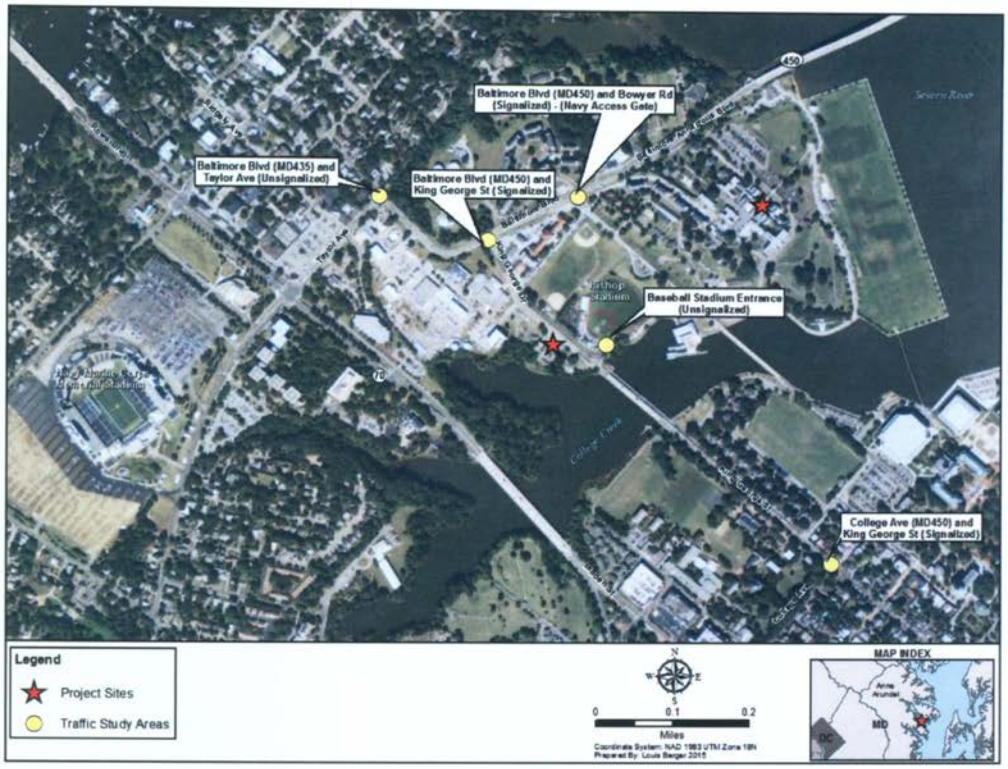

Figure 3 Proposed Transportation Study Area

Attachment 2

Traffic Counts

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Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: Taylor Ave -- Annapolis St/Baltimore Blvd

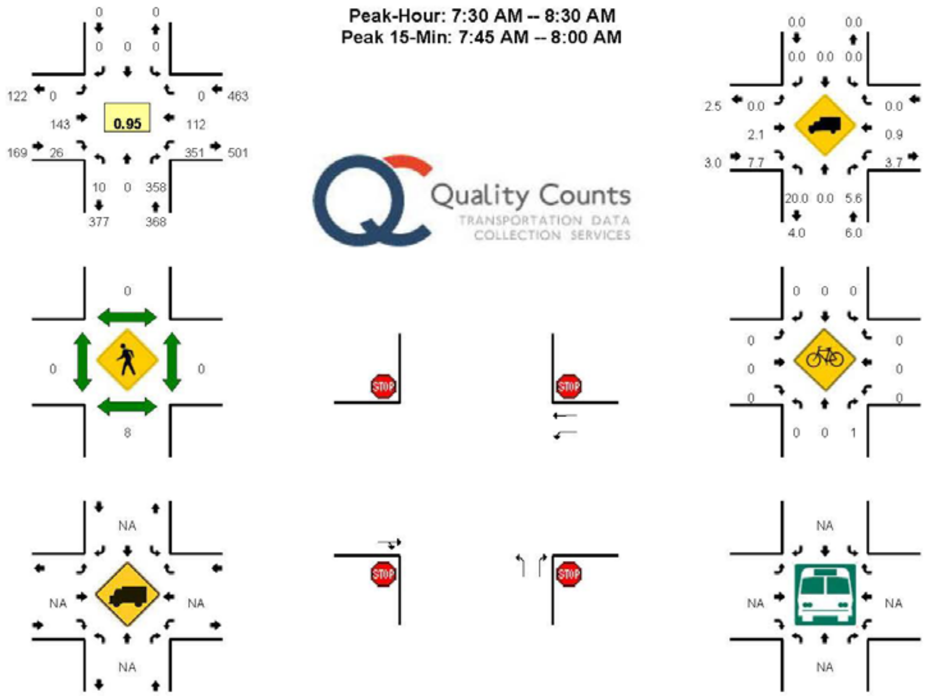
CITY/STATE: Annapolis, MD

QC JOB #: 13430601

DATE: Wed, Nov 18 2015

Peak-Hour: 7:30 AM -- 8:30 AM

Peak 15-Min: 7:45 AM -- 8:00 AM



15-Min Count Period Beginning At	Taylor Ave (Northbound)				Taylor Ave (Southbound)				Annapolis St/Baltimore Blvd (Eastbound)				Annapolis St/Baltimore Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	2	0	52	0	0	0	0	0	0	12	2	0	26	6	0	0	100	
6:15 AM	2	0	76	0	0	0	0	0	0	11	2	0	17	5	0	0	113	
6:30 AM	4	0	98	0	0	0	0	0	0	14	3	0	37	16	0	0	172	
6:45 AM	1	0	112	0	0	0	0	0	0	30	0	0	50	8	0	0	201	586
7:00 AM	2	0	99	0	0	0	0	0	0	26	4	0	66	6	0	0	203	689
7:15 AM	2	0	119	0	0	0	0	0	0	32	3	0	74	20	0	0	250	826
7:30 AM	1	0	97	0	0	0	0	0	0	36	6	0	87	24	0	0	251	905
7:45 AM	2	0	91	0	0	0	0	0	0	41	5	0	100	23	0	0	262	966
8:00 AM	4	0	81	0	0	0	0	0	0	33	8	0	85	31	0	0	242	1005
8:15 AM	3	0	89	0	0	0	0	0	0	33	7	0	79	34	0	0	245	1000
8:30 AM	2	0	76	0	0	0	0	0	0	41	5	0	98	24	0	0	246	995
8:45 AM	9	0	84	0	0	0	0	0	0	29	9	0	91	34	0	0	256	989

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	0	364	0	0	0	0	0	0	164	20	0	400	92	0	0	1048
Heavy Trucks	4	0	16		0	0	0		0	4	4		8	0	0		36
Pedestrians		16				0				0				0			16
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

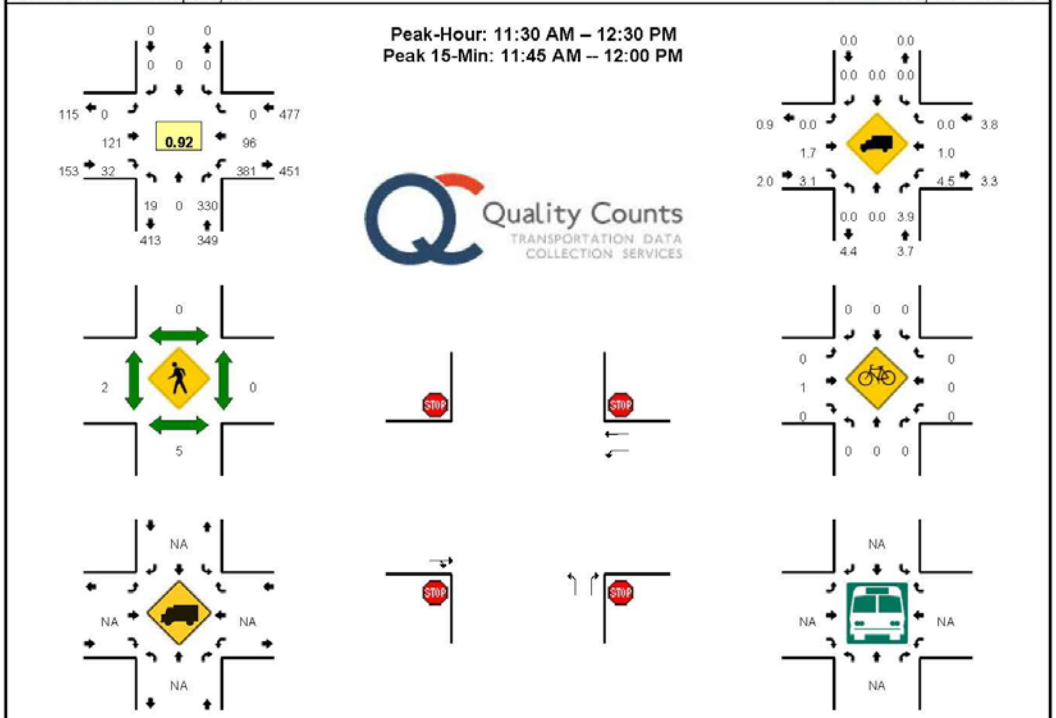
Comments:

Report generated on 12/4/2015 6:35 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined — Method for determining peak hour: Total Entering Volume

LOCATION: Taylor Ave -- Annapolis St/Baltimore Blvd — **QC JOB #:** 13430602
CITY/STATE: Annapolis, MD — **DATE:** Wed, Nov 18 2015



15-Min Count Period Beginning At	Taylor Ave (Northbound)				Taylor Ave (Southbound)				Annapolis St/Baltimore Blvd (Eastbound)				Annapolis St/Baltimore Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:00 AM	5	0	55	0	0	0	0	0	0	22	4	0	81	25	0	0	192	
11:15 AM	3	0	76	0	0	0	0	0	0	21	4	0	86	23	0	0	213	
11:30 AM	4	0	71	0	0	0	0	0	0	24	9	0	85	29	0	0	222	
11:45 AM	6	0	85	0	0	0	0	0	0	29	8	0	114	24	0	0	266	893
12:00 PM	6	0	81	0	0	0	0	0	0	37	9	0	98	22	0	0	253	954
12:15 PM	3	0	93	0	0	0	0	0	0	31	6	0	84	21	0	0	238	979
12:30 PM	5	0	85	0	0	0	0	0	0	19	9	0	65	18	0	0	201	958
12:45 PM	6	0	77	0	0	0	0	0	0	37	6	0	92	16	0	0	234	926

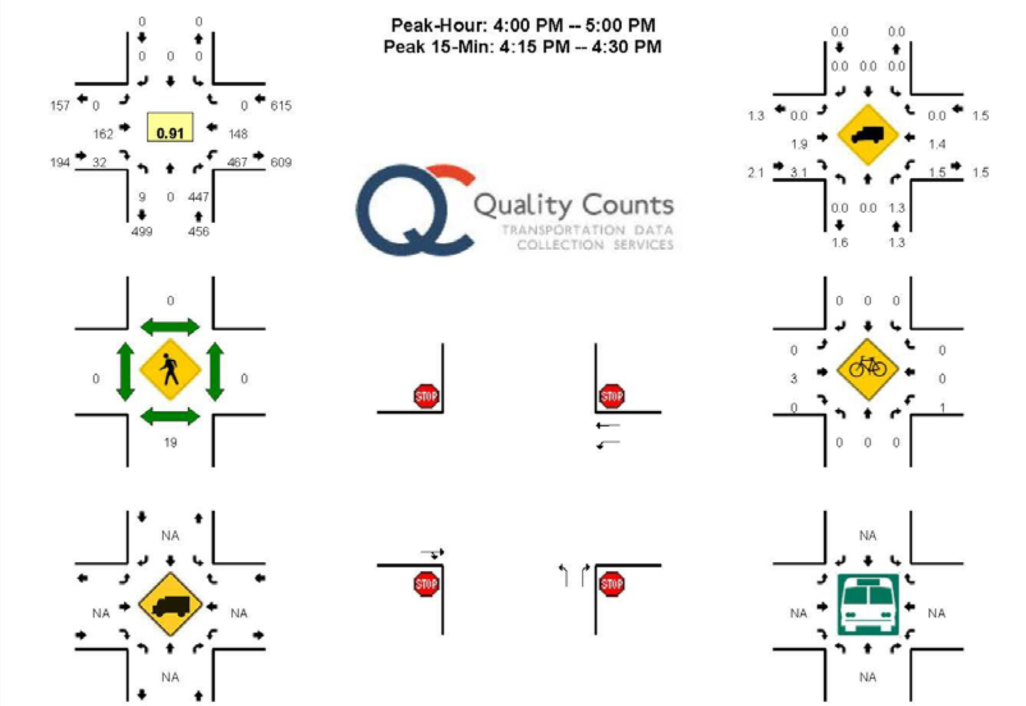
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	24	0	340	0	0	0	0	0	0	116	32	0	456	96	0	0	1064
Heavy Trucks	0	0	16		0	0	0		0	0	4		32	4	0		56
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/4/2015 6:37 AM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined Method for determining peak hour: Total Entering Volume

LOCATION: Taylor Ave -- Annapolis St/Baltimore Blvd **QC JOB #:** 13430603
CITY/STATE: Annapolis, MD **DATE:** Wed, Nov 18 2015



15-Min Count Period Beginning At	Taylor Ave (Northbound) Left	Thru	Right	U	Taylor Ave (Southbound) Left	Thru	Right	U	Annapolis St/Baltimore Blvd (Eastbound) Left	Thru	Right	U	Annapolis St/Baltimore Blvd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	4	0	100	0	0	0	0	0	0	29	7	0	134	40	0	0	314	
4:15 PM	3	0	107	0	0	0	0	0	0	49	6	0	148	36	0	0	349	
4:30 PM	1	0	127	0	0	0	0	0	0	35	12	0	91	35	0	0	301	
4:45 PM	1	0	113	0	0	0	0	0	0	49	7	0	94	37	0	0	301	1265
5:00 PM	2	0	132	0	0	0	0	0	0	65	7	0	97	37	0	0	340	1291
5:15 PM	0	0	112	0	0	0	0	0	0	46	6	0	89	45	0	0	298	1240
5:30 PM	6	0	111	0	0	0	0	0	0	53	6	0	80	24	0	0	280	1219
5:45 PM	1	0	99	0	0	0	0	0	0	30	6	0	75	20	0	0	231	1149
6:00 PM	2	0	72	0	0	0	0	0	0	29	9	0	63	21	0	0	196	1005
6:15 PM	4	0	97	0	0	0	0	0	0	38	9	0	75	16	0	0	239	946
6:30 PM	2	0	64	0	0	0	0	0	0	16	4	0	59	15	0	0	160	826
6:45 PM	2	0	79	0	0	0	0	0	0	14	2	0	56	17	0	0	170	765

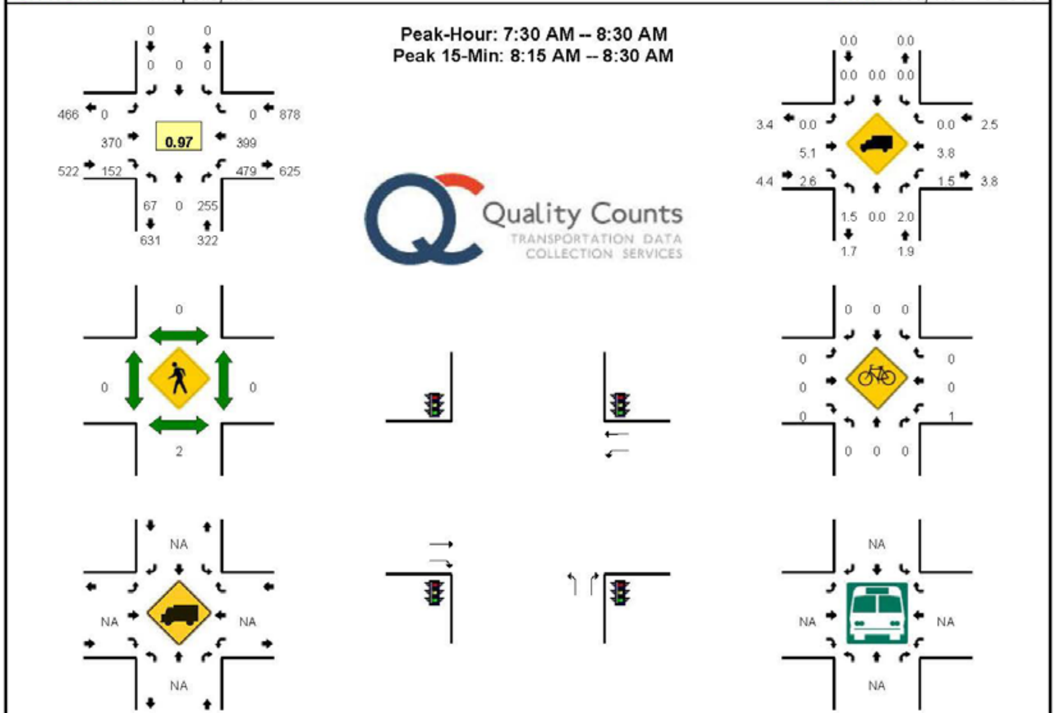
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	12	0	428	0	0	0	0	0	0	196	24	0	592	144	0	0	1396
Heavy Trucks	0	0	8		0	0	0		0	8	0		4	4	0		24
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	2	0		1	0	0		3
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/4/2015 7:26 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined   Method for determining peak hour: Total Entering Volume

LOCATION: King George Dr -- Balitmore Blvd   **QC JOB #:** 13430604
CITY/STATE: Annapolis, MD   **DATE:** Wed, Nov 18 2015



15-Min Count Period Beginning At	King George Dr (Northbound)				King George Dr (Southbound)				Balitmore Blvd (Eastbound)				Balitmore Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	4	0	11	0	0	0	0	0	0	49	13	0	24	27	0	0	128	
6:15 AM	5	0	24	0	0	0	0	0	0	65	20	0	31	18	0	0	163	
6:30 AM	11	0	23	0	0	0	0	0	0	81	25	0	54	50	0	0	244	
6:45 AM	11	0	31	0	0	0	0	0	0	79	39	0	53	54	0	0	267	802
7:00 AM	6	0	36	0	0	0	0	0	0	88	30	0	67	70	0	0	297	971
7:15 AM	15	0	57	0	0	0	0	0	0	105	36	0	99	87	0	0	399	1207
7:30 AM	16	0	48	0	0	0	0	0	0	94	42	0	143	95	0	0	438	1401
7:45 AM	22	0	57	0	0	0	0	0	0	97	44	0	113	103	0	0	436	1570
8:00 AM	14	0	70	0	0	0	0	0	0	99	26	0	98	99	0	0	406	1679
8:15 AM	15	0	80	0	0	0	0	0	0	80	40	0	125	102	0	0	442	1722
8:30 AM	20	0	67	0	0	0	0	0	0	78	35	0	102	108	0	0	410	1694
8:45 AM	21	0	44	0	0	0	0	0	0	96	24	0	94	100	0	0	379	1637

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	60	0	320	0	0	0	0	0	0	320	160	0	500	408	0	0	1768
Heavy Trucks	0	0	0		0	0	0		0	16	0		0	8	0		24
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

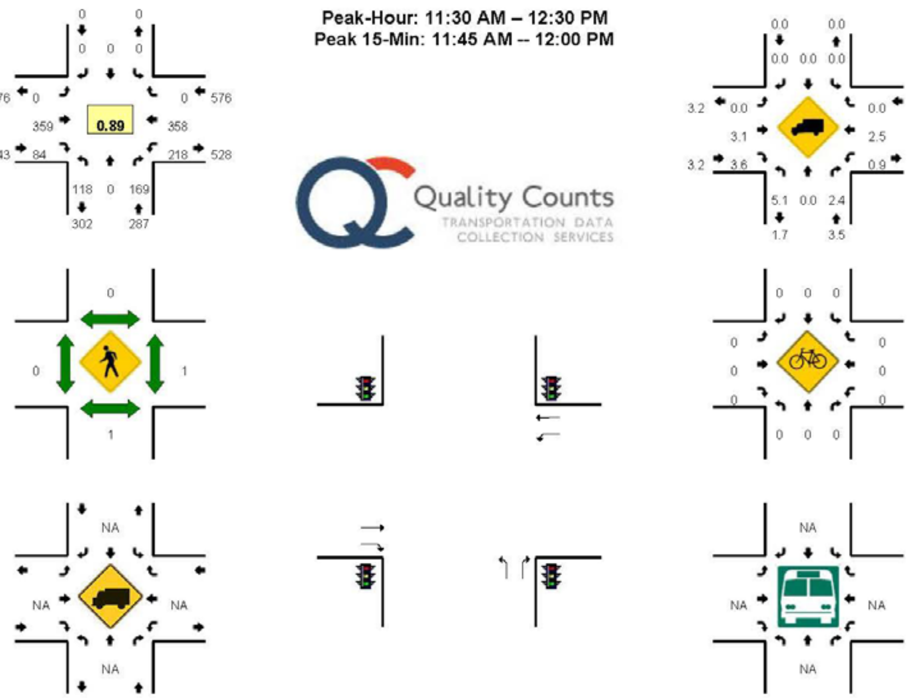
Comments:

Report generated on 12/4/2015 6:35 AM   SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: King George Dr -- Baltimore Blvd | **QC JOB #:** 13430605
CITY/STATE: Annapolis, MD | **DATE:** Wed, Nov 18 2015

Peak-Hour: 11:30 AM -- 12:30 PM
Peak 15-Min: 11:45 AM -- 12:00 PM



15-Min Count Period Beginning At	King George Dr (Northbound) Left	Thru	Right	U	King George Dr (Southbound) Left	Thru	Right	U	Baltimore Blvd (Eastbound) Left	Thru	Right	U	Baltimore Blvd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
11:00 AM	19	0	32	0	0	0	0	0	0	61	16	0	51	84	0	0	263	
11:15 AM	9	0	42	0	0	0	0	0	0	82	14	0	56	90	0	0	293	
11:30 AM	30	0	31	0	0	0	0	0	0	81	14	0	42	83	0	0	281	
11:45 AM	31	0	48	0	0	0	0	0	0	87	22	0	66	111	0	0	365	1202
12:00 PM	32	0	38	0	0	0	0	0	0	92	29	0	58	82	0	0	331	1270
12:15 PM	25	0	52	0	0	0	0	0	0	99	19	0	52	82	0	0	329	1306
12:30 PM	22	0	37	0	0	0	0	0	0	82	23	0	44	65	0	0	273	1298
12:45 PM	19	0	33	0	0	0	0	0	0	84	24	0	45	92	0	0	297	1230

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	124	0	192	0	0	0	0	0	0	348	88	0	264	444	0	0	1460
Heavy Trucks	12	0	0		0	0	0		0	8	8		4	16	0		48
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/4/2015 6:37 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: King George Dr -- Baltimore Blvd

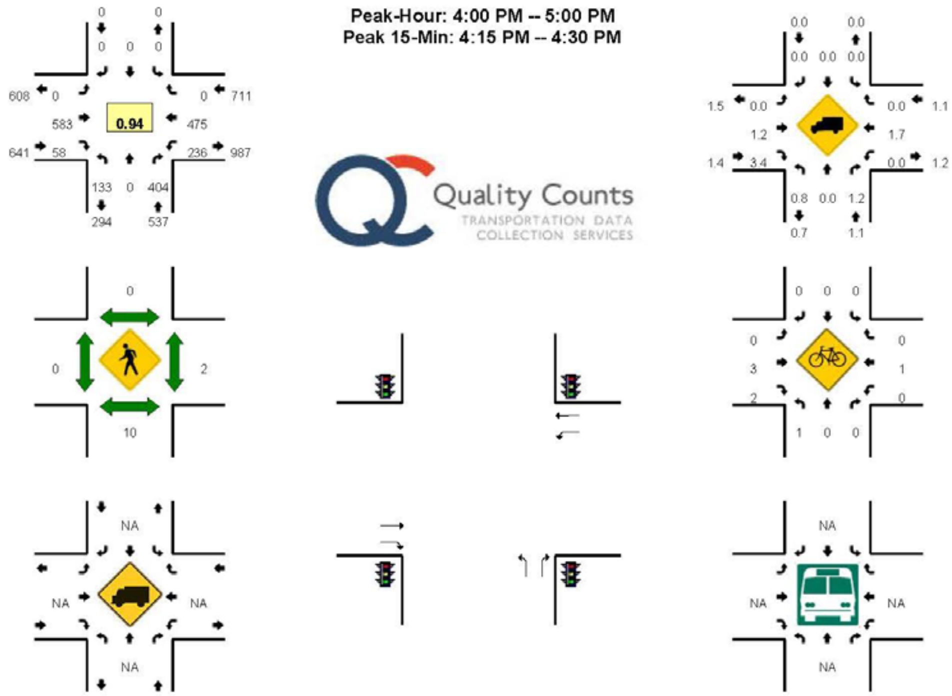
CITY/STATE: Annapolis, MD

QC JOB #: 13430606

DATE: Wed, Nov 18 2015

Peak-Hour: 4:00 PM -- 5:00 PM

Peak 15-Min: 4:15 PM -- 4:30 PM



15-Min Count Period Beginning At	King George Dr (Northbound)				King George Dr (Southbound)				Baltimore Blvd (Eastbound)				Baltimore Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	38	0	128	0	0	0	0	0	0	117	12	0	61	132	0	0	488	
4:15 PM	42	0	105	0	0	0	0	0	0	146	19	0	49	141	0	0	502	
4:30 PM	25	0	85	0	0	0	0	0	0	156	14	0	63	99	0	0	442	
4:45 PM	28	0	86	0	0	0	0	0	0	164	13	0	63	103	0	0	457	1889
5:00 PM	31	0	103	0	0	0	0	0	0	170	8	0	58	120	0	0	490	1891
5:15 PM	21	0	120	0	0	0	0	0	0	159	12	0	45	104	0	0	461	1850
5:30 PM	22	0	103	0	0	0	0	0	0	154	10	0	55	93	0	0	437	1845
5:45 PM	13	0	71	0	0	0	0	0	0	109	18	0	54	77	0	0	342	1730
6:00 PM	18	0	65	0	0	0	0	0	0	90	12	0	68	72	0	0	325	1565
6:15 PM	19	0	77	0	0	0	0	0	0	112	17	0	67	72	0	0	364	1468
6:30 PM	11	0	57	0	0	0	0	0	0	77	8	0	40	64	0	0	257	1288
6:45 PM	21	0	51	0	0	0	0	0	0	77	13	0	49	52	0	0	263	1209

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	168	0	420	0	0	0	0	0	0	584	76	0	196	564	0	0	2008
Heavy Trucks	4	0	0		0	0	0		0	16	0		0	0	0		20
Pedestrians		24				0				0				0			24
Bicycles	0	0	0		0	0	0		0	2	1		0	0	0		3
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/4/2015 7:25 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: Bowyer Rd/Perry Cir -- Baltimore Blvd

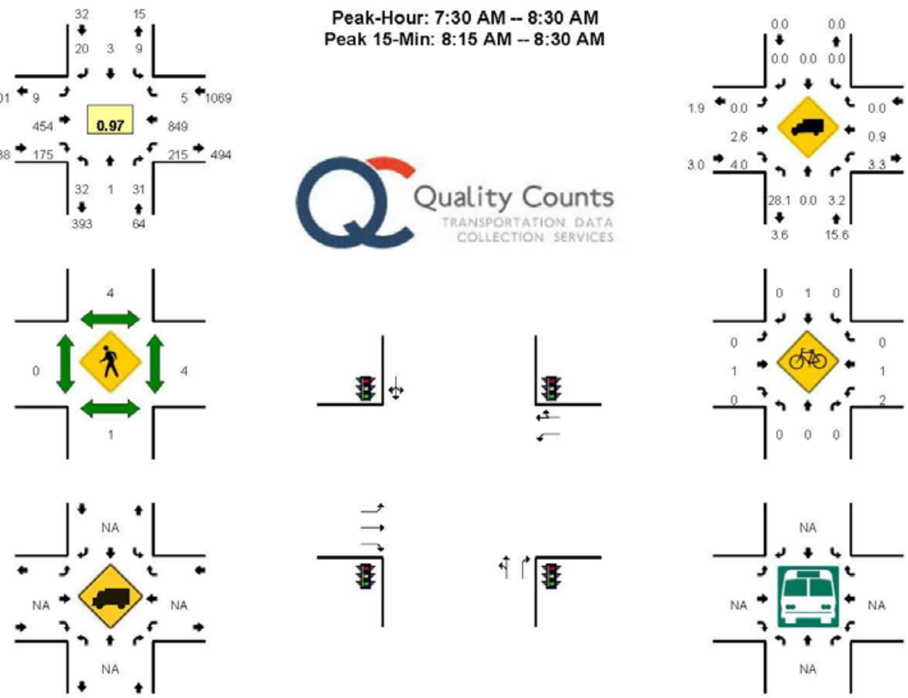
QC JOB #: 13430607

CITY/STATE: Annapolis, MD

DATE: Wed, Nov 18 2015

Peak-Hour: 7:30 AM -- 8:30 AM

Peak 15-Min: 8:15 AM -- 8:30 AM



15-Min Count Period Beginning At	Bowyer Rd/Perry Cir (Northbound)				Bowyer Rd/Perry Cir (Southbound)				Baltimore Blvd (Eastbound)				Baltimore Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	3	0	5	0	0	1	2	0	0	31	30	0	22	48	0	0	142	
6:15 AM	3	0	4	0	1	0	2	0	2	44	43	0	32	48	0	0	179	
6:30 AM	7	1	4	0	0	1	5	0	1	46	60	0	52	89	1	0	267	
6:45 AM	3	0	1	0	2	1	4	0	2	54	52	0	80	102	2	0	303	891
7:00 AM	11	0	9	0	1	2	4	0	1	61	56	0	82	126	0	0	353	1102
7:15 AM	12	0	4	0	2	0	3	0	1	91	83	0	66	160	0	0	422	1345
7:30 AM	6	1	4	0	0	0	7	0	3	86	52	0	65	235	1	0	460	1538
7:45 AM	9	0	9	0	4	1	7	0	1	106	50	0	57	202	1	0	447	1682
8:00 AM	9	0	11	0	5	1	1	0	3	119	39	0	55	185	1	0	429	1758
8:15 AM	8	0	7	0	0	1	5	0	2	143	34	0	38	227	2	0	467	1803
8:30 AM	15	0	3	0	0	0	2	0	0	114	37	0	39	192	2	0	404	1747
8:45 AM	13	0	18	0	1	1	4	0	2	99	39	0	27	177	2	0	383	1683

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	32	0	28	0	0	4	20	0	8	572	136	0	152	908	8	0	1868
Heavy Trucks	8	0	4		0	0	0		0	8	8		4	0	0		32
Pedestrians		0				4				0				4			8
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/4/2015 6:35 AM

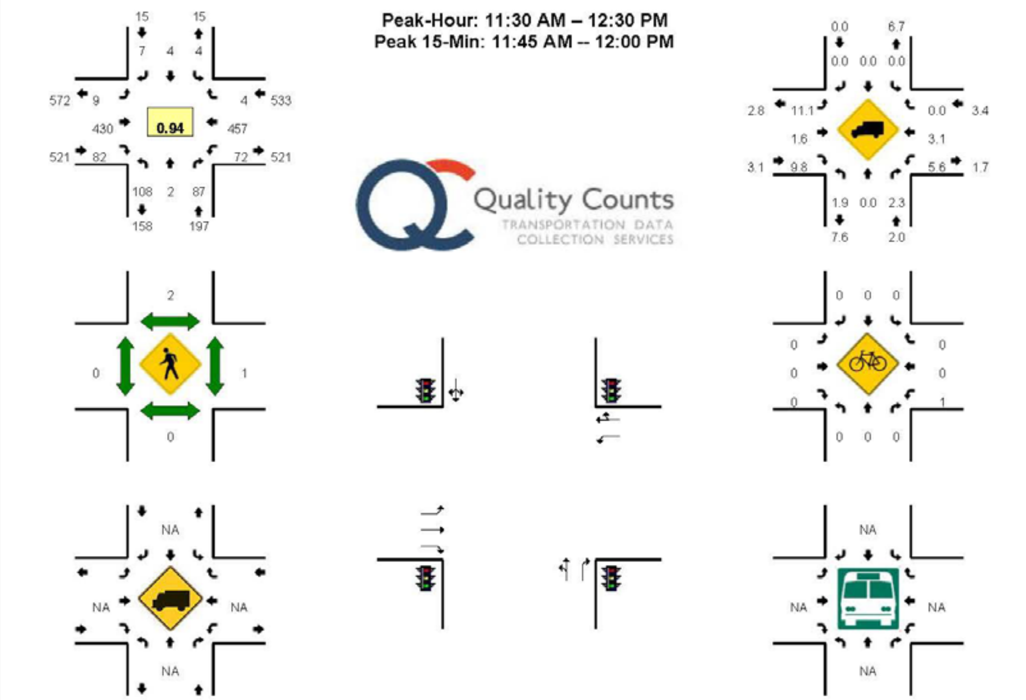
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: Bowyer Rd/Perry Cir -- Baltimore Blvd | **QC JOB #:** 13430608

CITY/STATE: Annapolis, MD | **DATE:** Wed, Nov 18 2015

Peak-Hour: 11:30 AM -- 12:30 PM
Peak 15-Min: 11:45 AM -- 12:00 PM



15-Min Count Period Beginning At	Bowyer Rd/Perry Cir (Northbound)				Bowyer Rd/Perry Cir (Southbound)				Baltimore Blvd (Eastbound)				Baltimore Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:00 AM	25	0	19	0	0	1	3	0	2	68	18	0	16	116	0	0	268	
11:15 AM	25	1	16	0	0	0	1	0	0	110	16	0	16	114	1	0	300	
11:30 AM	27	0	22	0	1	0	5	0	3	90	17	0	20	103	1	0	289	
11:45 AM	24	0	21	0	1	1	1	0	3	113	14	0	13	145	0	0	336	1193
12:00 PM	39	2	23	0	1	0	0	0	2	92	32	0	20	100	2	0	313	1238
12:15 PM	18	0	21	0	1	3	1	0	1	135	19	0	19	109	1	0	328	1266
12:30 PM	24	0	17	0	1	1	3	0	0	83	31	0	20	86	1	0	267	1244
12:45 PM	24	0	21	0	0	2	3	0	2	90	27	0	24	117	0	0	310	1218

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	96	0	84	0	4	4	4	0	12	452	56	0	52	580	0	0	1344
Heavy Trucks	4	0	0		0	0	0		0	4	4		4	20	0		36
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/4/2015 6:37 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: Bowyer Rd/Perry Cir -- Baltimore Blvd

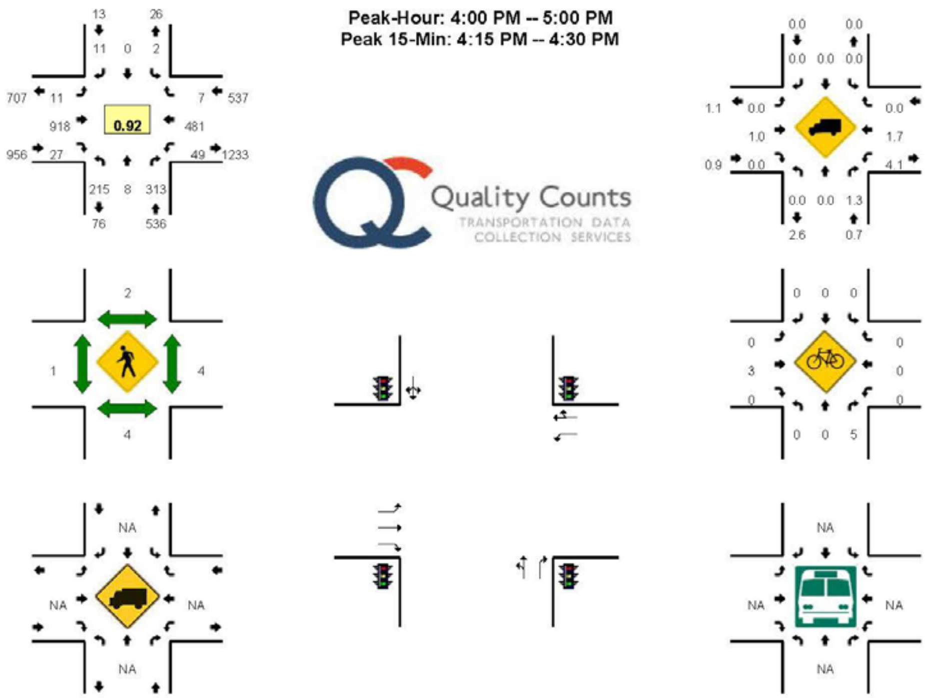
QC JOB #: 13430609

CITY/STATE: Annapolis, MD

DATE: Wed, Nov 18 2015

Peak-Hour: 4:00 PM -- 5:00 PM

Peak 15-Min: 4:15 PM -- 4:30 PM



15-Min Count Period Beginning At	Bowyer Rd/Perry Cir (Northbound) Left	Thru	Right	U	Bowyer Rd/Perry Cir (Southbound) Left	Thru	Right	U	Baltimore Blvd (Eastbound) Left	Thru	Right	U	Baltimore Blvd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	64	2	91	0	0	0	3	0	2	239	5	0	14	117	2	0	539	
4:15 PM	53	1	103	0	1	0	2	0	4	224	10	0	7	148	1	0	554	
4:30 PM	49	1	59	0	0	0	4	0	2	225	5	0	16	105	2	0	468	
4:45 PM	49	4	60	0	1	0	2	0	3	230	7	0	12	111	2	0	481	2042
5:00 PM	46	5	49	0	3	1	5	1	6	260	10	0	5	133	3	0	527	2030
5:15 PM	36	0	56	0	0	0	2	0	5	274	9	0	16	100	2	0	500	1976
5:30 PM	34	0	37	0	1	0	2	0	2	240	16	0	12	111	0	0	455	1963
5:45 PM	19	0	36	0	3	1	4	0	4	198	8	0	22	107	1	0	403	1885
6:00 PM	24	0	24	0	0	0	3	0	3	139	15	0	37	118	2	0	365	1723
6:15 PM	19	0	28	0	0	1	3	0	3	170	18	0	20	102	3	0	367	1590
6:30 PM	17	1	25	0	1	0	4	0	0	119	13	0	9	83	2	0	274	1409
6:45 PM	14	0	16	0	1	3	1	0	5	100	24	0	15	83	7	0	269	1275

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	212	4	412	0	4	0	8	0	16	896	40	0	28	592	4	0	2216
Heavy Trucks	0	0	4		0	0	0		0	12	0		0	0	0		16
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	2	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

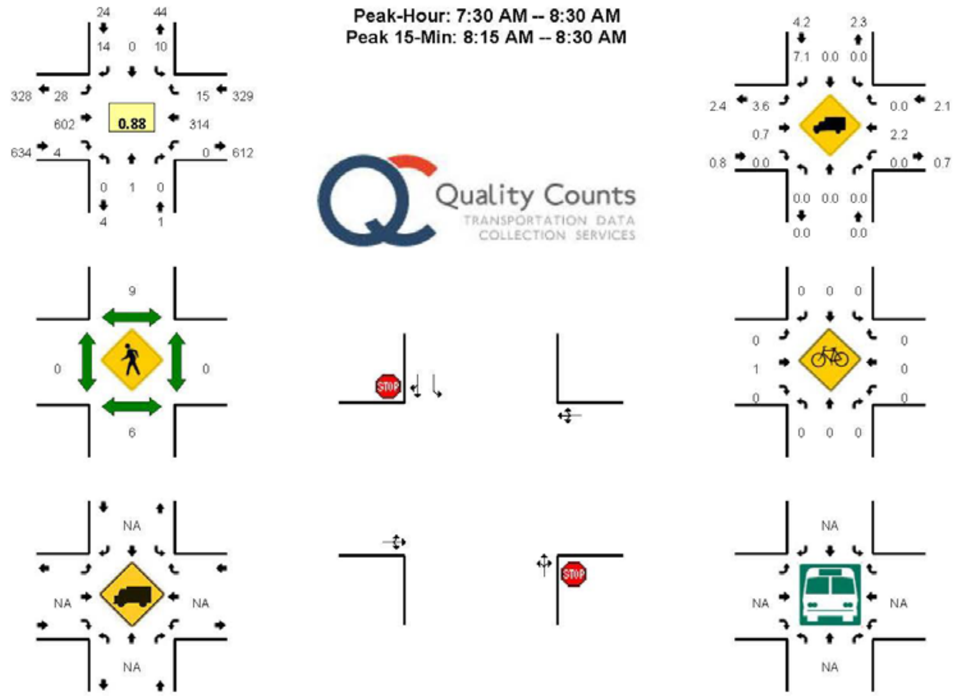
Report generated on 12/4/2015 7:24 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined Method for determining peak hour: Total Entering Volume

LOCATION: Stadium Dwy -- King George St **QC JOB #:** 13430610
CITY/STATE: Annapolis, MD **DATE:** Wed, Nov 18 2015

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 8:15 AM -- 8:30 AM



15-Min Count Period Beginning At	Stadium Dwy (Northbound) Left	Thru	Right	U	Stadium Dwy (Southbound) Left	Thru	Right	U	King George St (Eastbound) Left	Thru	Right	U	King George St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
6:00 AM	0	0	0	0	0	0	0	0	3	36	0	0	0	13	0	0	52	
6:15 AM	0	0	0	0	0	0	1	0	2	46	0	0	0	27	0	0	76	
6:30 AM	0	0	0	0	1	0	2	0	6	65	0	0	0	40	0	0	114	
6:45 AM	0	0	0	0	1	0	2	0	4	74	0	1	0	43	1	0	126	368
7:00 AM	1	0	0	0	2	0	0	0	9	85	1	0	0	45	2	0	145	461
7:15 AM	0	0	0	0	2	1	3	0	11	119	1	0	0	66	4	0	207	592
7:30 AM	0	0	0	0	1	0	4	0	10	173	0	0	0	57	2	0	247	725
7:45 AM	0	0	0	0	1	0	3	0	7	139	2	0	0	72	1	0	225	824
8:00 AM	0	0	0	0	4	0	3	0	5	121	1	0	0	98	4	0	236	915
8:15 AM	0	1	0	0	4	0	4	0	6	169	1	0	0	87	8	0	280	988
8:30 AM	0	0	1	0	1	0	2	0	2	117	2	0	0	86	1	2	214	955
8:45 AM	0	0	1	0	0	0	7	0	7	117	1	0	0	50	2	3	188	918

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	4	0	0	16	0	16	0	24	676	4	0	0	348	32	0	1120
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	4	0		4
Pedestrians		8				4				0				0			12
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/4/2015 6:35 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: Stadium Dwy -- King George St

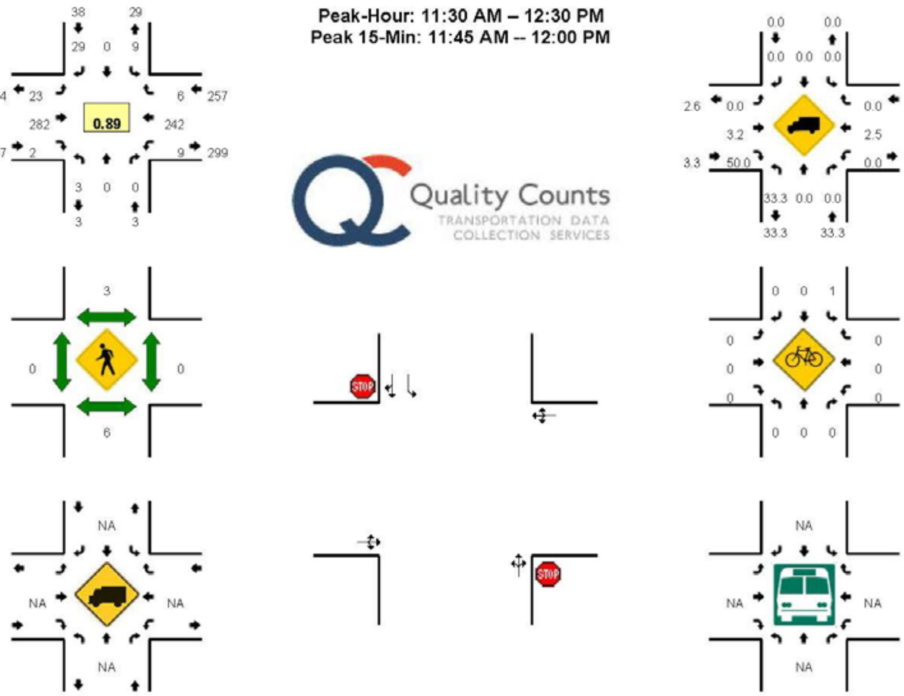
CITY/STATE: Annapolis, MD

QC JOB #: 13430611

DATE: Wed, Nov 18 2015

Peak-Hour: 11:30 AM -- 12:30 PM

Peak 15-Min: 11:45 AM -- 12:00 PM



15-Min Count Period Beginning At	Stadium Dwy (Northbound) Left	Thru	Right	U	Stadium Dwy (Southbound) Left	Thru	Right	U	King George St (Eastbound) Left	Thru	Right	U	King George St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
11:00 AM	1	0	0	0	1	0	5	0	4	71	0	0	0	46	1	0	129	
11:15 AM	0	0	0	0	1	0	5	0	2	59	0	0	0	47	1	0	115	
11:30 AM	1	0	0	0	1	0	8	0	4	54	1	0	0	55	1	2	127	
11:45 AM	0	0	0	0	6	0	12	0	5	78	0	0	0	62	3	4	170	541
12:00 PM	1	0	0	0	1	0	4	0	7	76	0	0	1	66	1	2	159	571
12:15 PM	1	0	0	0	1	0	5	0	7	74	1	0	0	59	1	0	149	605
12:30 PM	1	0	0	0	0	0	2	0	8	54	0	0	0	65	0	0	130	608
12:45 PM	2	0	0	0	2	0	5	0	4	71	0	0	1	47	3	0	135	573

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	0	0	0	24	0	48	0	20	312	0	0	0	248	12	16	680
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	4	0		8
Pedestrians		8				0				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

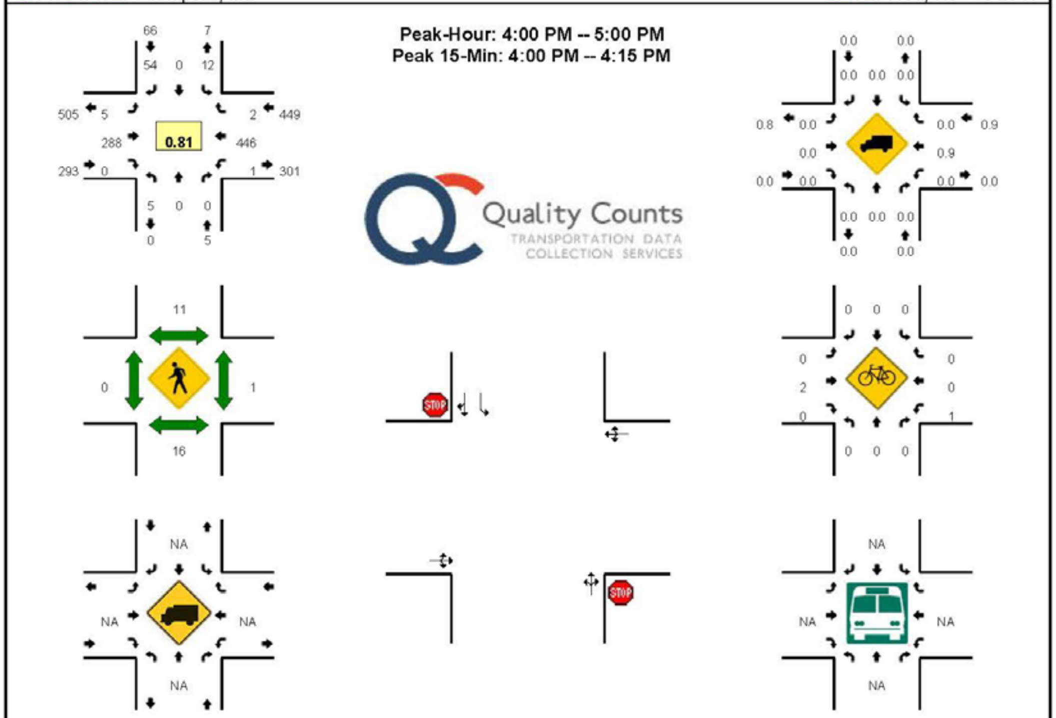
Comments:

Report generated on 12/4/2015 6:37 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: System Peak — Method for determining peak hour: Total Entering Volume

LOCATION: Stadium Dwy -- King George St — **QC JOB #:** 13430612
CITY/STATE: Annapolis, MD — **DATE:** Wed, Nov 18 2015



15-Min Count Period Beginning At	Stadium Dwy (Northbound) Left	Thru	Right	U	Stadium Dwy (Southbound) Left	Thru	Right	U	King George St (Eastbound) Left	Thru	Right	U	King George St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	2	0	0	0	5	0	21	0	2	70	0	0	0	150	1	1	252	
4:15 PM	3	0	0	0	2	0	9	0	1	73	0	0	0	96	0	0	184	
4:30 PM	0	0	0	0	3	0	13	0	2	70	0	0	0	99	0	0	187	
4:45 PM	0	0	0	0	2	0	11	0	0	75	0	0	0	101	1	0	190	813
5:00 PM	0	0	0	0	4	0	10	0	0	65	0	0	0	147	2	0	228	789
5:15 PM	0	0	0	0	2	0	3	0	0	58	0	0	0	126	5	0	194	799
5:30 PM	0	0	0	0	0	0	4	0	0	68	0	0	0	101	2	0	175	787
5:45 PM	0	0	0	0	0	0	1	0	0	69	0	0	0	83	0	0	153	750
6:00 PM	0	0	0	0	1	0	3	0	0	80	0	0	0	82	0	0	166	688
6:15 PM	0	0	0	0	0	0	2	0	1	84	0	0	0	85	0	0	172	666
6:30 PM	0	0	0	0	1	0	0	0	0	48	0	0	0	79	0	0	128	619
6:45 PM	0	0	0	0	2	0	1	0	1	57	0	0	0	56	0	0	117	583

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	8	0	0	0	20	0	84	0	8	280	0	0	0	600	4	4	1008
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	4	0		4
Pedestrians		28				8				0				0			36
Bicycles	0	0	0		0	0	0		0	1	0		0	0	0		1
Railroad																	
Stopped Buses																	

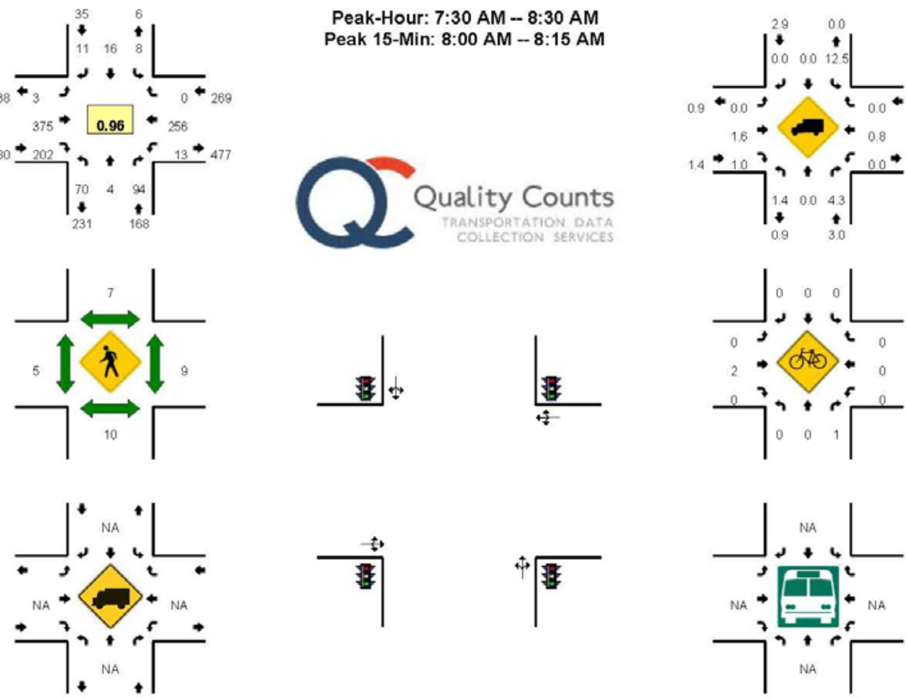
Comments:

Report generated on 12/4/2015 6:38 AM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: College Ave -- King George St | **QC JOB #:** 13430613
CITY/STATE: Annapolis, MD | **DATE:** Wed, Nov 18 2015

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 8:00 AM -- 8:15 AM



15-Min Count Period Beginning At	College Ave (Northbound)				College Ave (Southbound)				King George St (Eastbound)				King George St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	2	0	14	0	0	3	1	0	0	32	8	0	2	12	0	0	74	
6:15 AM	8	3	17	0	1	2	1	0	0	32	8	0	2	21	0	0	95	
6:30 AM	8	0	31	0	0	2	0	0	0	54	10	0	3	32	0	0	140	
6:45 AM	14	1	34	0	0	7	3	0	0	50	24	0	4	32	0	0	169	478
7:00 AM	7	0	37	0	1	3	0	0	0	65	20	0	4	42	0	0	179	583
7:15 AM	9	1	34	0	0	2	1	0	0	62	43	0	5	54	0	0	211	699
7:30 AM	13	2	23	0	5	3	2	0	1	96	71	0	3	51	0	0	270	829
7:45 AM	13	2	32	0	2	3	2	0	0	86	45	0	4	57	0	0	246	906
8:00 AM	26	0	23	0	1	7	2	0	1	94	37	1	5	76	0	0	273	1000
8:15 AM	18	0	16	0	0	3	5	0	0	99	49	0	1	72	0	0	263	1052
8:30 AM	14	0	14	0	0	3	3	0	1	76	45	0	7	69	0	0	232	1014
8:45 AM	16	1	26	0	1	2	0	0	0	76	38	0	4	41	0	0	205	973

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	104	0	92	0	4	28	8	0	4	376	148	4	20	304	0	0	1092
Heavy Trucks	0	0	4		0	0	0		0	12	0		0	0	0		16
Pedestrians		12				12				0				8			32
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/4/2015 6:35 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: College Ave -- King George St

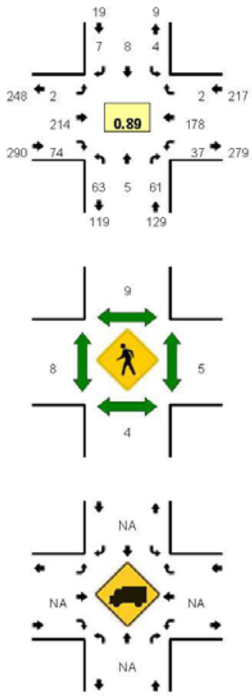
CITY/STATE: Annapolis, MD

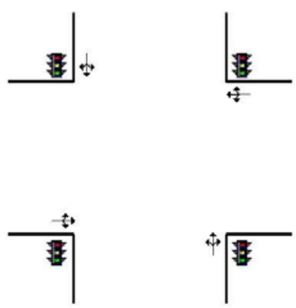
QC JOB #: 13430614

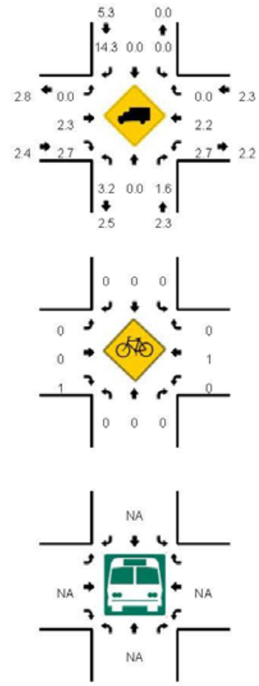
DATE: Wed, Nov 18 2015

Peak-Hour: 11:30 AM -- 12:30 PM

Peak 15-Min: 11:45 AM -- 12:00 PM







15-Min Count Period Beginning At	College Ave (Northbound)				College Ave (Southbound)				King George St (Eastbound)				King George St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:00 AM	4	3	11	0	1	2	0	0	0	62	12	0	6	41	1	0	143	
11:15 AM	9	1	20	0	0	3	0	0	0	37	17	0	4	35	1	0	127	
11:30 AM	16	0	10	0	0	2	2	0	0	48	13	0	4	34	0	0	129	
11:45 AM	18	0	14	0	2	3	1	0	0	63	21	0	10	51	1	0	184	583
12:00 PM	14	4	19	0	1	3	2	0	2	43	28	0	12	46	1	0	175	615
12:15 PM	15	1	18	0	1	0	2	0	0	60	12	0	11	47	0	0	167	655
12:30 PM	21	0	24	0	2	3	2	0	1	45	9	0	8	40	0	0	155	681
12:45 PM	13	0	14	0	4	2	3	0	1	52	18	0	5	33	0	0	145	642

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	72	0	56	0	8	12	4	0	0	252	84	0	40	204	4	0	736
Heavy Trucks	0	0	0		0	0	0		0	0	4		4	8	0		16
Pedestrians		12				0				8				8			28
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

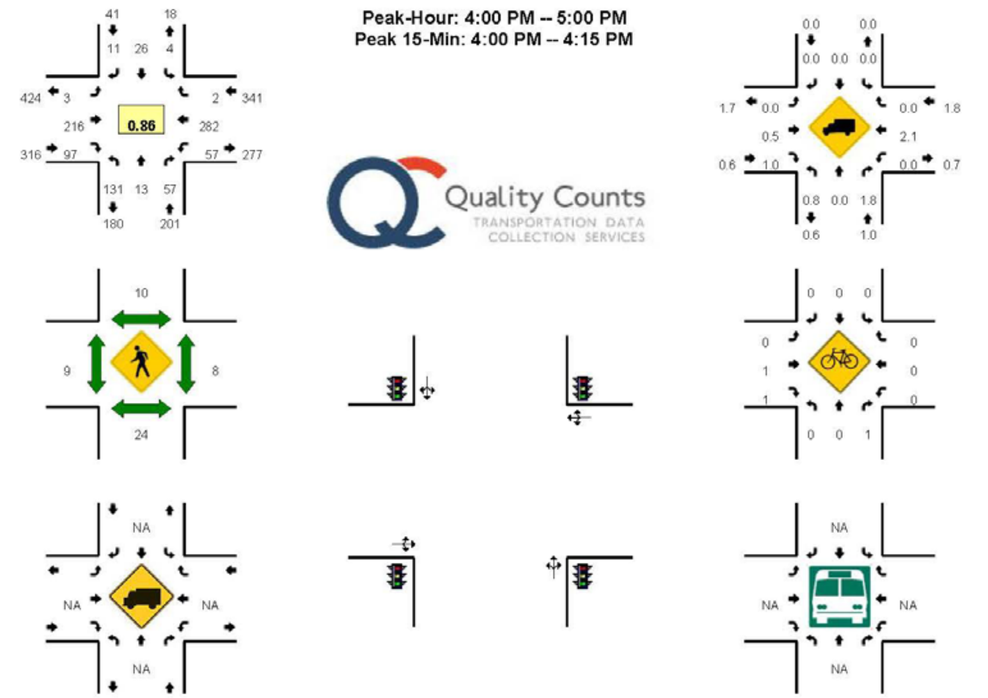
Report generated on 12/4/2015 6:37 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: System Peak | Method for determining peak hour: Total Entering Volume

LOCATION: College Ave -- King George St | **QC JOB #:** 13430615
CITY/STATE: Annapolis, MD | **DATE:** Wed, Nov 18 2015

Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:00 PM -- 4:15 PM



15-Min Count Period Beginning At	College Ave (Northbound)				College Ave (Southbound)				King George St (Eastbound)				King George St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	37	5	9	0	2	11	7	0	1	47	28	0	19	95	0	0	261	
4:15 PM	23	1	14	0	2	5	2	0	2	50	18	0	15	69	1	0	202	
4:30 PM	32	5	16	0	0	5	1	0	0	58	27	0	13	62	1	0	220	
4:45 PM	39	2	18	0	0	5	1	0	0	61	24	0	10	56	0	0	216	899
5:00 PM	52	4	18	0	0	6	2	0	0	54	18	0	11	98	0	0	263	901
5:15 PM	31	1	18	0	2	5	3	0	0	45	22	0	9	80	1	0	217	916
5:30 PM	21	1	37	0	1	5	1	0	1	52	16	0	7	81	0	0	223	919
5:45 PM	22	1	28	0	0	2	1	0	0	46	22	0	14	54	0	0	190	893
6:00 PM	30	1	28	0	0	2	1	0	1	65	24	0	12	52	0	0	216	846
6:15 PM	26	3	34	0	0	3	1	0	0	52	33	0	17	60	0	0	229	858
6:30 PM	16	0	22	0	1	1	3	0	0	33	8	1	9	56	0	0	150	785
6:45 PM	23	1	17	0	2	0	2	0	0	45	17	0	5	38	2	0	152	747

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	148	20	36	0	8	44	28	0	4	188	112	0	76	380	0	0	1044
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	4	0		4
Pedestrians		40				4				8				20			72
Bicycles	0	0	1		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/4/2015 6:38 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of report: Tube Count - Volume Data Page 1 of 1

LOCATION: King George St Just East of Juniper St **QC JOB #:** 13430616
SPECIFIC LOCATION: 0 ft from **DIRECTION:** EB
CITY/STATE: Annapolis , MD **DATE:** Nov 17 2015 - Nov 19 2015

Start Time	Mon	Tue 17-Nov-15	Wed 18-Nov-15	Thu 19-Nov-15	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		21	11	16		16			16	
1:00 AM		10	12	19		14			14	
2:00 AM		6	10	11		9			9	
3:00 AM		7	6	4		6			6	
4:00 AM		10	9	11		10			10	
5:00 AM		41	42	44		42			42	
6:00 AM		124	123	117		121			121	
7:00 AM		292	247	225		255			255	
8:00 AM		**313**	**334**	**271**		**306**			**306**	
9:00 AM		225	211	226		221			221	
10:00 AM		182	214	215		204			204	
11:00 AM		244	213	228		228			228	
12:00 PM		266	240	246		251			251	
1:00 PM		273	286	274		278			278	
2:00 PM		388	407	326		374			374	
3:00 PM		390	442	387		406			406	
4:00 PM		**531**	450	**449**		**477**			**477**	
5:00 PM		433	**466**	424		441			441	
6:00 PM		287	301	290		293			293	
7:00 PM		191	208	219		206			206	
8:00 PM		209	235	232		225			225	
9:00 PM		163	149	192		168			168	
10:00 PM		71	92	110		91			91	
11:00 PM		35	48	51		45			45	
Day Total		4712	4756	4587		4687			4687	
% Weekday Average		100.5%	101.5%	97.9%						
% Week Average		100.5%	101.5%	97.9%		100.0%				
AM Peak		8:00 AM	8:00 AM	8:00 AM		8:00 AM			8:00 AM	
Volume		313	334	271		306			306	
PM Peak		4:00 PM	5:00 PM	4:00 PM		4:00 PM			4:00 PM	
Volume		531	466	449		477			477	

Comments:

Report generated on 12/2/2015 9:47 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

Page 1 of 1

LOCATION: King George St Just East of Juniper St
QC JOB #: 13430616
SPECIFIC LOCATION: 0 ft from
DIRECTION: WB
CITY/STATE: Annapolis , MD
DATE: Nov 17 2015 - Nov 19 2015

Start Time	Mon	Tue 17-Nov-15	Wed 18-Nov-15	Thu 19-Nov-15	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		18	8	22		16			16	
1:00 AM		5	6	6		6			6	
2:00 AM		3	3	6		4			4	
3:00 AM		6	3	3		4			4	
4:00 AM		10	12	11		11			11	
5:00 AM		61	43	50		51			51	
6:00 AM		224	226	224		225			225	
7:00 AM		554	525	532		537			537	
8:00 AM		**585**	**534**	**576**		**565**			**565**	
9:00 AM		299	302	325		309			309	
10:00 AM		216	224	220		220			220	
11:00 AM		251	269	266		262			262	
12:00 PM		254	273	227		251			251	
1:00 PM		198	230	205		211			211	
2:00 PM		244	251	209		235			235	
3:00 PM		292	**316**	255		**288**			**288**	
4:00 PM		294	301	253		283			283	
5:00 PM		**319**	266	252		279			279	
6:00 PM		252	272	**301**		275			275	
7:00 PM		127	154	243		175			175	
8:00 PM		111	111	110		111			111	
9:00 PM		72	94	94		87			87	
10:00 PM		56	45	49		50			50	
11:00 PM		16	30	19		22			22	
Day Total		4467	4498	4458		4477			4477	
% Weekday Average		99.8%	100.5%	99.6%						
% Week Average		99.8%	100.5%	99.6%		100.0%				
AM Peak		8:00 AM	8:00 AM	8:00 AM		8:00 AM			8:00 AM	
Volume		585	534	576		565			565	
PM Peak		5:00 PM	3:00 PM	6:00 PM		3:00 PM			3:00 PM	
Volume		319	316	301		288			288	

Comments:

Report generated on 12/2/2015 9:47 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

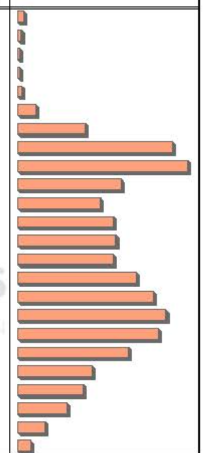
Page 1 of 1

LOCATION: King George St Just East of Juniper St
SPECIFIC LOCATION: 0 ft from
CITY/STATE: Annapolis , MD

QC JOB #: 13430616
DIRECTION: EB/WB
DATE: Nov 17 2015 - Nov 19 2015

Start Time	Mon	Tue 17-Nov-15	Wed 18-Nov-15	Thu 19-Nov-15	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic
12:00 AM		39	19	38		32			32
1:00 AM		15	18	25		19			19
2:00 AM		9	13	17		13			13
3:00 AM		13	9	7		10			10
4:00 AM		20	21	22		21			21
5:00 AM		102	85	94		94			94
6:00 AM		348	349	341		346			346
7:00 AM		846	772	757		792			792
8:00 AM		**898**	**868**	**847**		**871**			**871**
9:00 AM		524	513	551		529			529
10:00 AM		398	438	435		424			424
11:00 AM		495	482	494		490			490
12:00 PM		520	513	473		502			502
1:00 PM		471	516	479		489			489
2:00 PM		632	658	535		608			608
3:00 PM		682	**758**	642		694			694
4:00 PM		**825**	751	**702**		**759**			**759**
5:00 PM		752	732	676		720			720
6:00 PM		539	573	591		568			568
7:00 PM		318	362	462		381			381
8:00 PM		320	346	342		336			336
9:00 PM		235	243	286		255			255
10:00 PM		127	137	159		141			141
11:00 PM		51	78	70		66			66
Day Total		9179	9254	9045		9160			9160
% Weekday Average		100.2%	101.0%	98.7%					
% Week Average		100.2%	101.0%	98.7%		100.0%			
AM Peak		8:00 AM	8:00 AM	8:00 AM		8:00 AM			8:00 AM
Volume		898	868	847		871			871
PM Peak		4:00 PM	3:00 PM	4:00 PM		4:00 PM			4:00 PM
Volume		825	758	702		759			759

Average Week Profile



Comments:

Report generated on 12/2/2015 9:47 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Attachment 3

Maryland State Highway Administration Sidewalk Design

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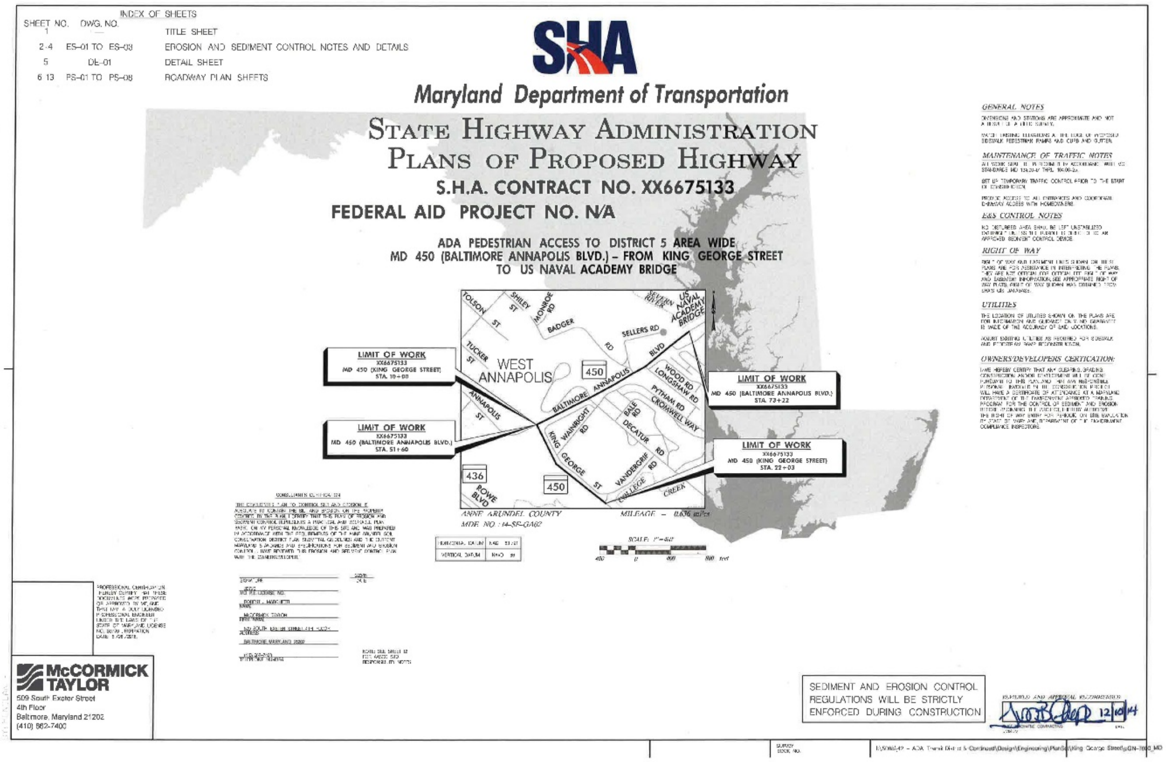
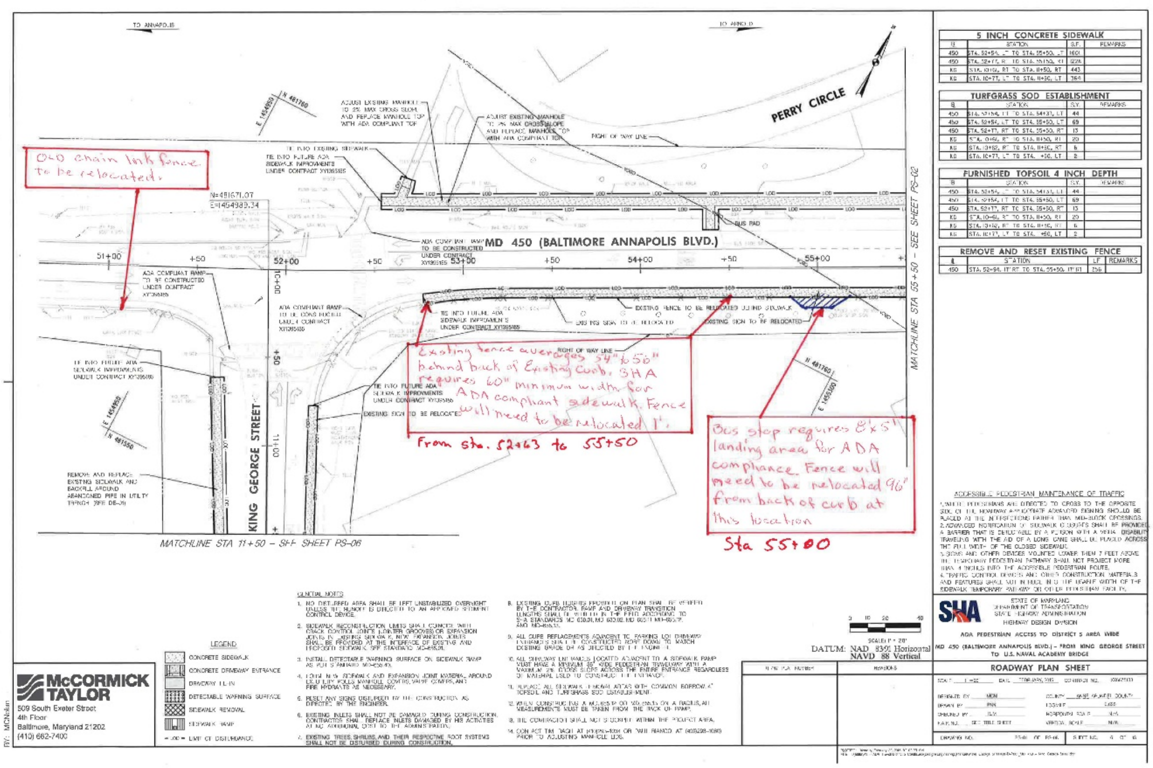
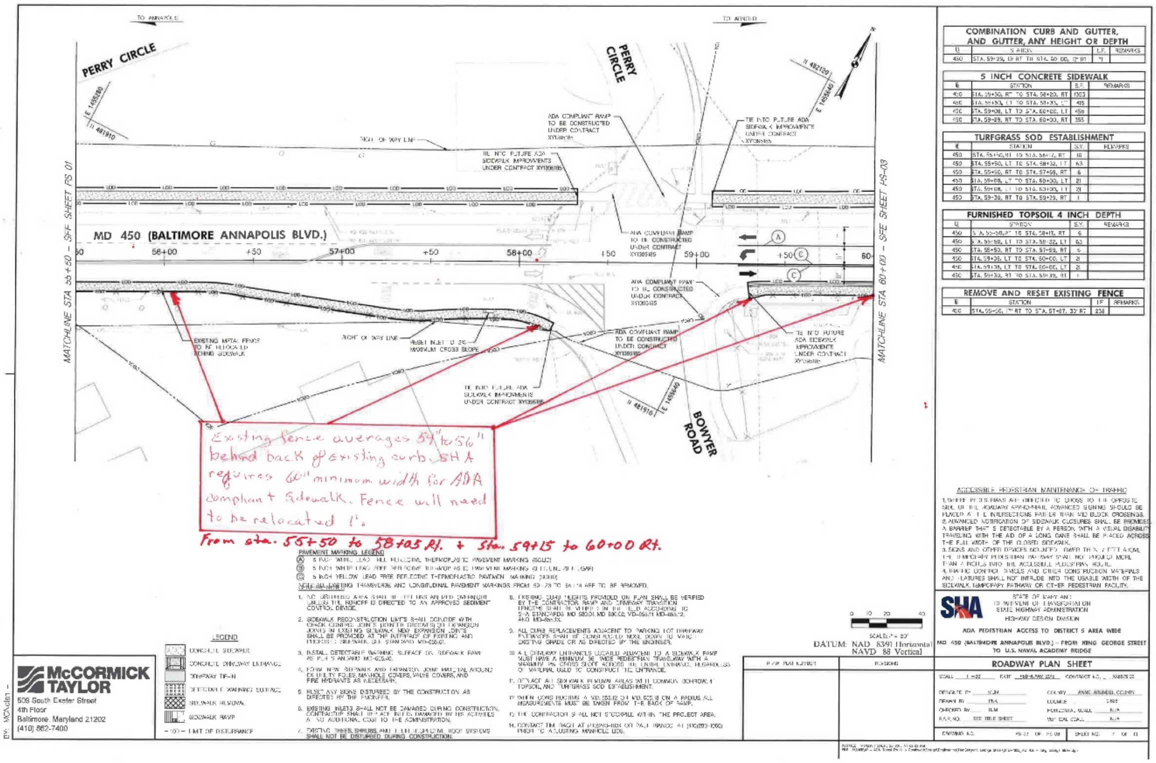
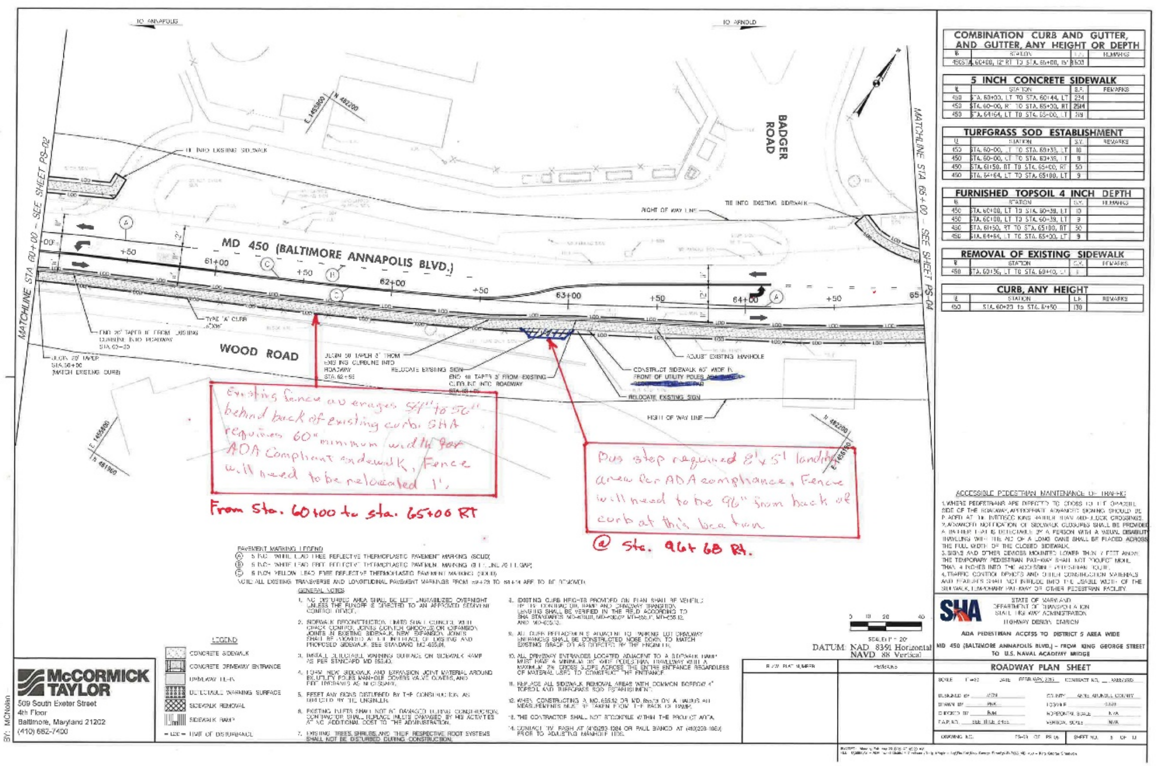


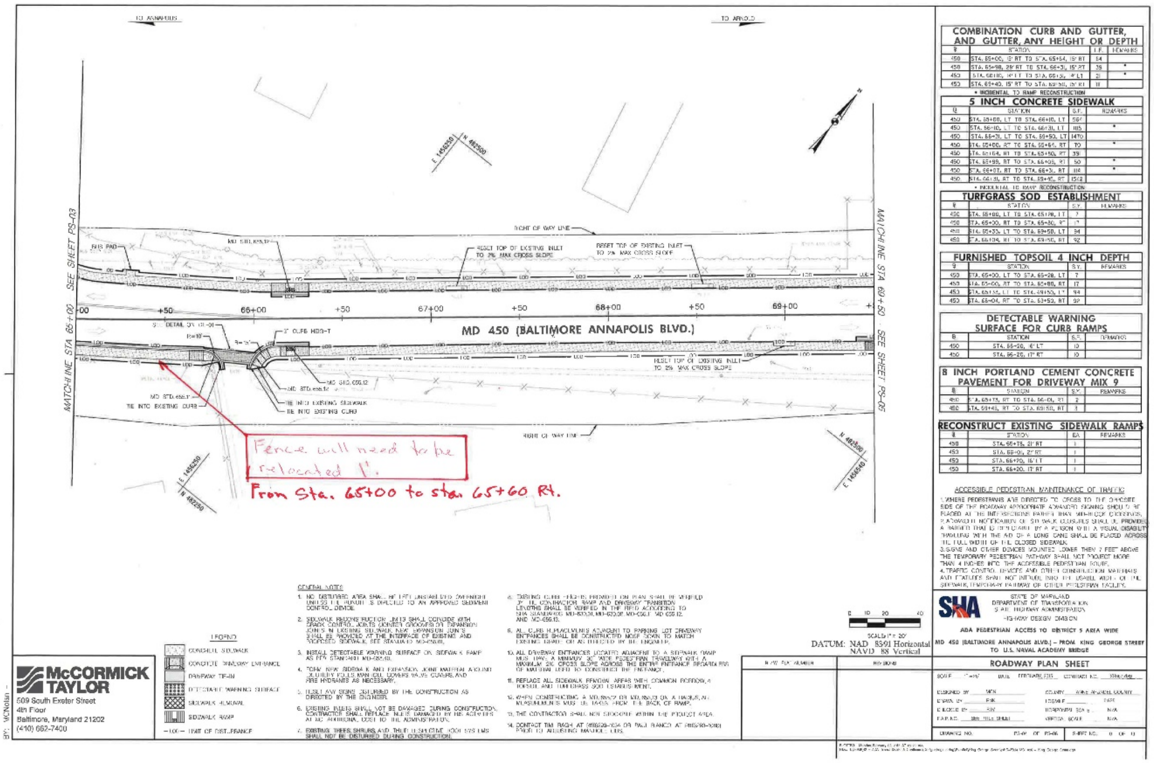
INDEX OF SHEETS
SHEET NO. DWG. NO.
1 — TITLE SHEET
2-4 ES-01 TO ES-03 EROSION AND SEDIMENT CONTROL NOTES AND DETAILS
5 DE-01 DETAIL SHEET
6-13 PS-01 TO PS-08 ROADWAY PLAN SHEETS
SHA
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
PLANS OF PROPOSED HIGHWAY
S.H.A. CONTRACT NO. XX6675133
FEDERAL AID PROJECT NO. N/A
ADA PEDESTRIAN ACCESS TO DISTRICT 5 AREA WIDE
MD 450 (BALTIMORE ANNAPOLIS BLVD.) - FROM KING GEORGE STREET TO US NAVAL ACADEMY BRIDGE
WEST ANNAPOLIS
LIMIT OF WORK
GENERAL NOTES
MAINTENANCE OF TRAFFIC NOTES
E&S CONTROL NOTES
RIGHT OF WAY
UTILITIES
OWNERS/DEVELOPERS CERTIFICATION
ANNE ARUNDEL COUNTY
McCORMICK TAYLOR
509 South Exeter Street
4th Floor
Baltimore, Maryland 21202
(410) 662-7400
SEDIMENT AND EROSION CONTROL REGULATIONS WILL BE STRICTLY ENFORCED DURING CONSTRUCTION

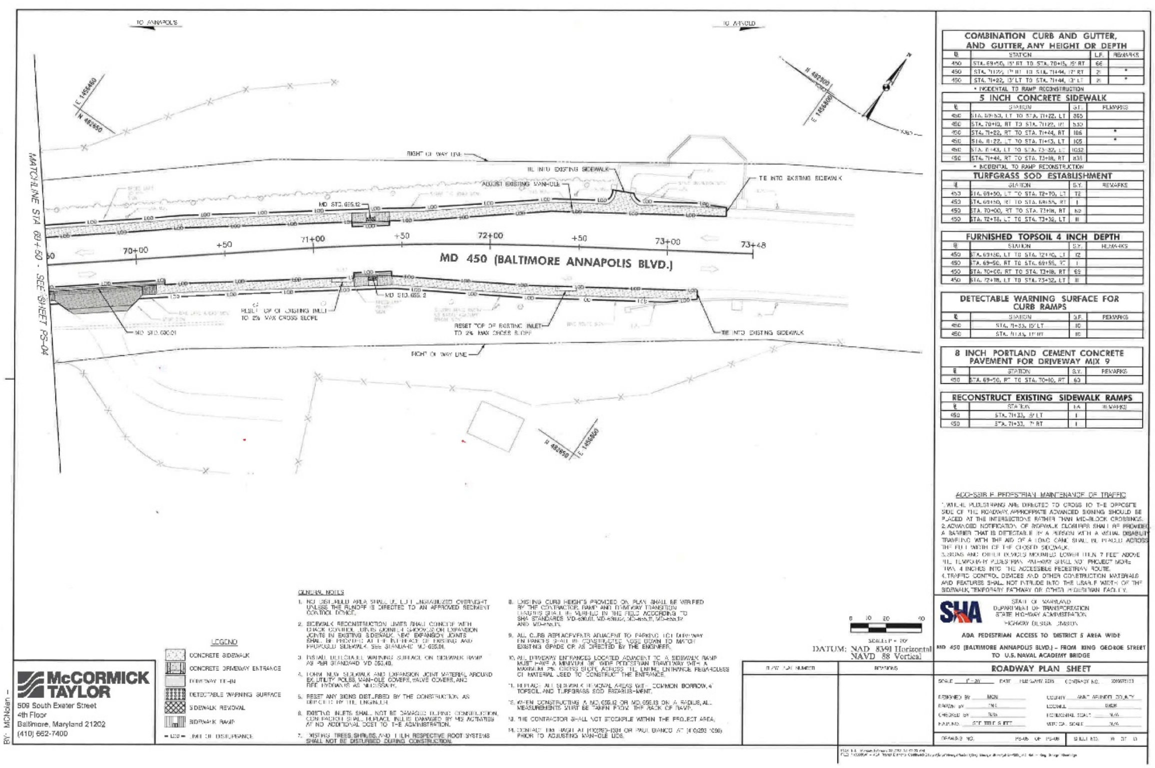


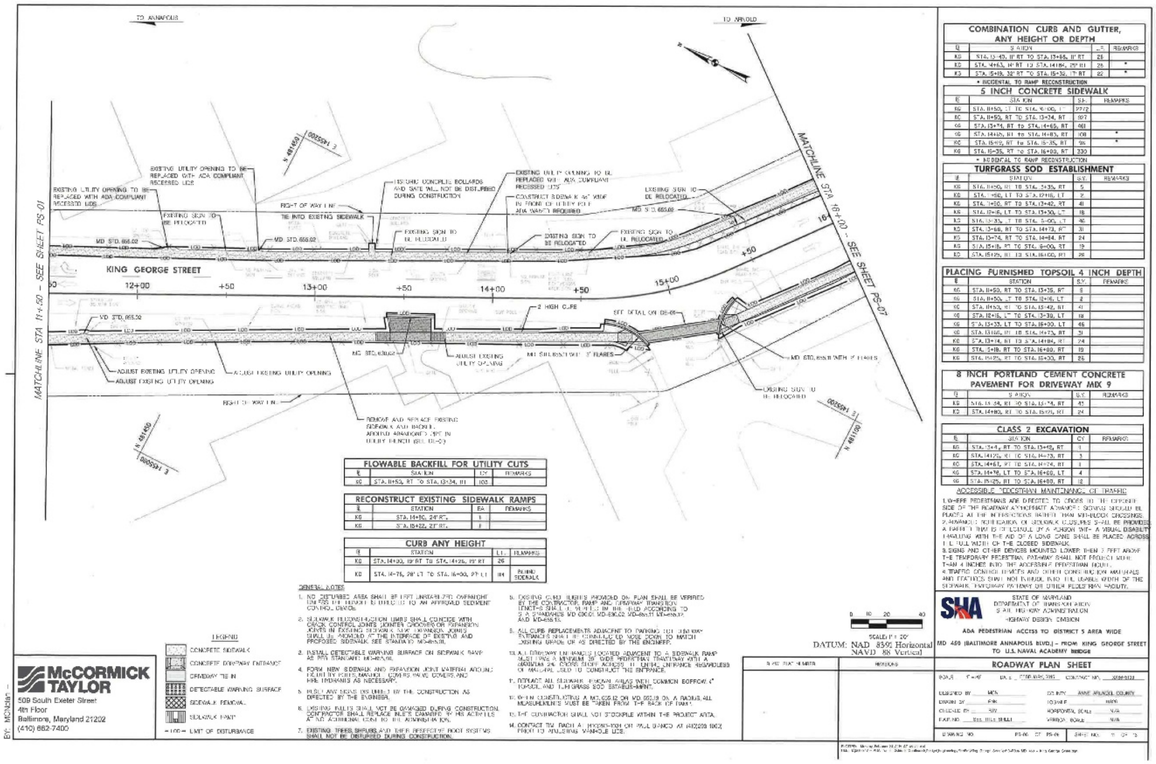
5 INCH CONCRETE SIDEWALK
TURFGRASS SOD ESTABLISHMENT
FURNISHED TOPSOIL 4 INCH DEPTH
REMOVE AND RESET EXISTING FENCE
PERRY CIRCLE
MD 450 (BALTIMORE ANNAPOLIS BLVD.)
KING GEORGE STREET
MATCHLINE STA 11+50 - SEE SHEET PS-06
MATCHLINE STA 55+50 - SEE SHEET PS-02
Old chain link fence to be relocated.
Existing fence averages 34" to 50" behind back of Existing Curb. SHA requires 60" minimum width for ADA compliant sidewalk. Fence will need to be relocated 1'.
From sta. 52+63 to 55+50
Bus stop requires 8'x5' landing area for ADA compliance. Fence will need to be relocated 96" from back of curb at this location
Sta 55+00
ACCESSIBLE PEDESTRIAN MAINTENANCE OF TRAFFIC
GENERAL NOTES
LEGEND
McCORMICK TAYLOR
509 South Exeter Street
4th Floor
Baltimore, Maryland 21202
(410) 662-7400
ROADWAY PLAN SHEET

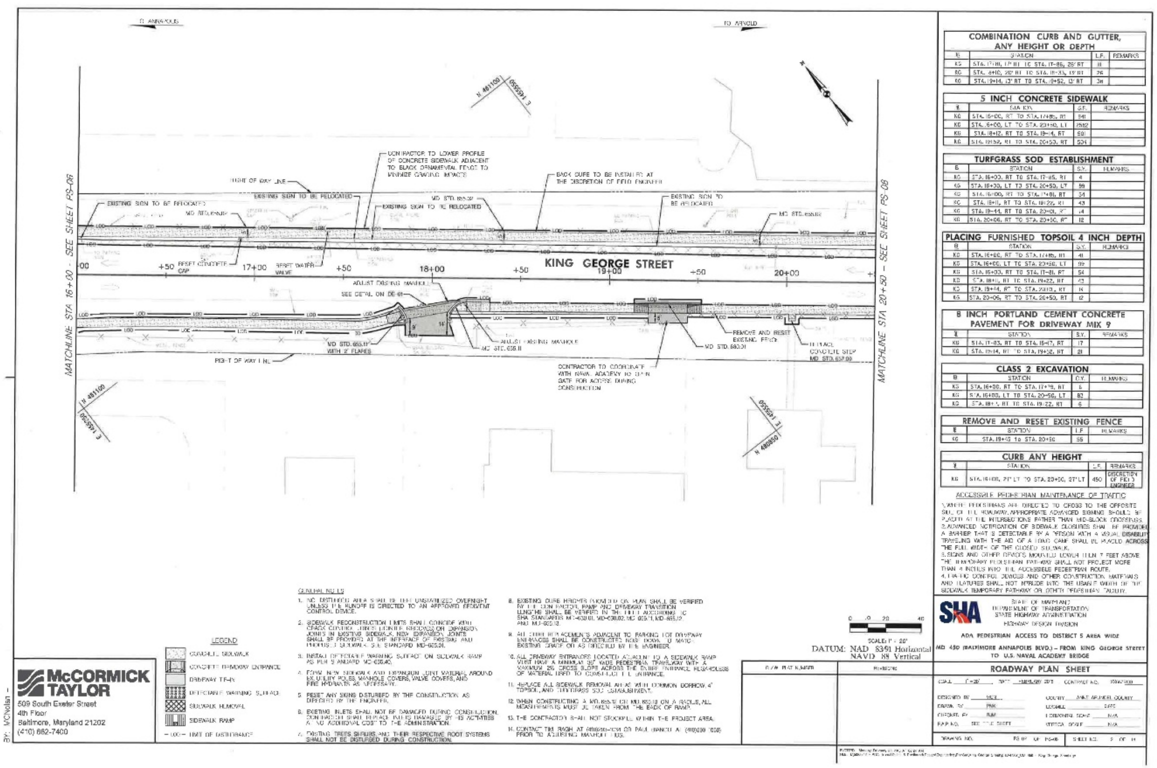

PERRY CIRCLE
MD 450 (BALTIMORE ANNAPOLIS BLVD.)
BOWYER ROAD
Existing fence averages 54" to 56" behind back of existing curb. SHA requires 60" minimum width for ADA compliant sidewalk. Fence will need to be relocated 1'.
From sta. 55+50 to 58+05 Rt. + Sta. 59+15 to 60+00 Rt.
COMBINATION CURB AND GUTTER, AND GUTTER ANY HEIGHT OR DEPTH
5 INCH CONCRETE SIDEWALK
TURFGRASS SOD ESTABLISHMENT
FURNISHED TOPSOIL 4 INCH DEPTH
REMOVE AND RESET EXISTING FENCE
McCORMICK TAYLOR
509 South Exeter Street
4th Floor
Baltimore, Maryland 21202
(410) 662-7400
SHA
ADA PEDESTRIAN ACCESS TO DISTRICT 5 AREA WIDE
ROADWAY PLAN SHEET

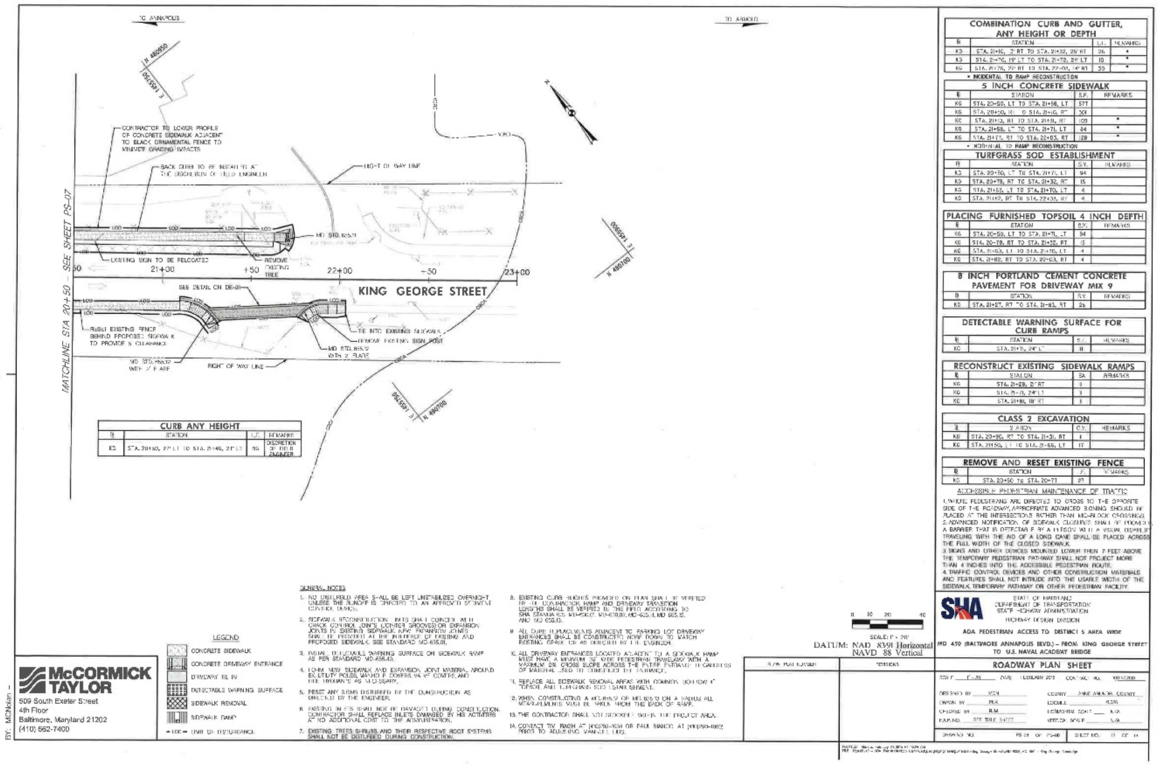

BADGER ROAD
MD 450 (BALTIMORE ANNAPOLIS BLVD.)
WOOD ROAD
ADJUST EXISTING MANHOLE
CONSTRUCT SIDEWALK 60" WIDE IN FRONT OF UTILITY POLES
RELOCATE EXISTING SIGN
RIGHT OF WAY LINE
Existing fence averages 54" to 56" behind back of existing curb. SHA requires 60" minimum width for ADA compliant sidewalk, Fence will need to be relocated 1'.
From Sta. 60+00 to sta. 65+00 RT
Bus stop required 8'x5' landing area for ADA compliance, Fence will need to be 96" from back of curb at this location
@ Sta. 96+68 Rt.
COMBINATION CURB AND GUTTER, AND GUTTER ANY HEIGHT OR DEPTH
5 INCH CONCRETE SIDEWALK
TURFGRASS SOD ESTABLISHMENT
FURNISHED TOPSOIL 4 INCH DEPTH
REMOVAL OF EXISTING SIDEWALK
CURB, ANY HEIGHT
McCORMICK TAYLOR
509 South Exeter Street
4th Floor
Baltimore, Maryland 21202
(410) 662-7400
SHA
ROADWAY PLAN SHEET


COMBINATION CURB AND GUTTER, ANY HEIGHT OR DEPTH
5 INCH CONCRETE SIDEWALK
TURFGRASS SOD ESTABLISHMENT
FURNISHED TOPSOIL 4 INCH DEPTH
DETECTABLE WARNING SURFACE FOR CURB RAMPS
8 INCH PORTLAND CEMENT CONCRETE PAVEMENT FOR DRIVEWAY MIX 9
RECONSTRUCT EXISTING SIDEWALK RAMPS
MD 450 (BALTIMORE ANNAPOLIS BLVD.)
Fence will need to be relocated 1'.
From Sta. 65+00 to sta. 65+60 Rt.
McCORMICK TAYLOR
509 South Exeter Street
4th Floor
Baltimore, Maryland 21202
(410) 662-7400
SHA
ROADWAY PLAN SHEET


COMBINATION CURB AND GUTTER, ANY HEIGHT OR DEPTH
5 INCH CONCRETE SIDEWALK
TURFGRASS SOD ESTABLISHMENT
FURNISHED TOPSOIL 4 INCH DEPTH
DETECTABLE WARNING SURFACE FOR CURB RAMPS
8 INCH PORTLAND CEMENT CONCRETE PAVEMENT FOR DRIVEWAY MIX 9
RECONSTRUCT EXISTING SIDEWALK RAMPS
MD 450 (BALTIMORE ANNAPOLIS BLVD.)
McCORMICK TAYLOR
509 South Exeter Street
4th Floor
Baltimore, Maryland 21202
(410) 662-7400
SHA
ROADWAY PLAN SHEET


KING GEORGE STREET
MATCHLINE STA 11+50 – SEE SHEET PS-01
MATCHLINE STA 16+00 – SEE SHEET PS-07
McCORMICK TAYLOR
509 South Exeter Street
4th Floor
Baltimore, Maryland 21202
(410) 662-7400
ADA PEDESTRIAN ACCESS TO DISTRICT 5 AREA WIDE
ROADWAY PLAN SHEET


KING GEORGE STREET
MATCHLINE STA 16+00 – SEE SHEET PS-06
MATCHLINE STA 20+50 – SEE SHEET PS-08
McCORMICK TAYLOR
509 South Exeter Street
4th Floor
Baltimore, Maryland 21202
(410) 662-7400
ADA PEDESTRIAN ACCESS TO DISTRICT 5 AREA WIDE
ROADWAY PLAN SHEET


KING GEORGE STREET
COMBINATION CURB AND GUTTER, ANY HEIGHT OR DEPTH
5 INCH CONCRETE SIDEWALK
TURFGRASS SOD ESTABLISHMENT
PLACING FURNISHED TOPSOIL 4 INCH DEPTH
8 INCH PORTLAND CEMENT CONCRETE PAVEMENT FOR DRIVEWAY MIX 9
DETECTABLE WARNING SURFACE FOR CURB RAMPS
RECONSTRUCT EXISTING SIDEWALK RAMPS
CLASS 2 EXCAVATION
REMOVE AND RESET EXISTING FENCE
CURB ANY HEIGHT
GENERAL NOTES
LEGEND
McCORMICK TAYLOR
509 South Exeter Street
4th Floor
Baltimore, Maryland 21202
(410) 662-7400
SHA
ROADWAY PLAN SHEET

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