FHWA-VA-EIS-99-01-F
State Project: 0064-114-F12, PE-102

HAMPTON ROADS CROSSING STUDY
FINAL ENVIRONMENTAL IMPACT STATEMENT &
SECTION 4(F) EVALUATION

U.S. Department of Transportation – Federal Highway Administration
and
Virginia Department of Transportation

Submitted Pursuant to:
42 U.S.C. 4332(2)(c); 23 U.S.C. 128(a);
49 U.S.C. 303(c); 16 U.S.C. 470(f); 23 CFR 450.318

Cooperating Agencies
US Army Corps of Engineers - Norfolk District, US Environmental Protection Agency - Region III,
US Fish and Wildlife Service, National Marine Fisheries Service

2/28/01
Date of Approval
Chief Engineer
Virginia Department of Transportation

3/1/01
Date of Approval
Division Administrator
Federal Highway Administration

The following persons may be contacted for additional information concerning this document.

Mr. Earl T. Robb
Environmental Administrator
Virginia Department of Transportation
1201 East Broad Street
Richmond, VA 23219
(804) 786-4559

Mr. Ed Sundra
FHWA
400 North Eighth Street
Room 750
Richmond, VA 23240-0249
(804) 775-3337

This Hampton Roads Crossing Study final environmental impact statement has been prepared to
determine the impact of a proposed new crossing of Hampton Roads in southeastern Virginia. The
primary project purpose is to develop intermodal alternatives that can work together to improve
accessibility, mobility, and goods movement in the Hampton Roads metropolitan area to help relieve
the congestion that occurs at the I-64 Hampton Roads Bridge Tunnel. Project termini include the I-64
and I-664 interchange in Hampton; the I-64 and I-564 interchange in Norfolk; VA 164 near Coast
Guard Boulevard in Portsmouth; and the I-64, I-264, and I-664 interchange in Chesapeake.
### Glossary of Commonly Used Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway Transportation Officials</td>
</tr>
<tr>
<td>ACHP</td>
<td>Advisory Council on Historic Preservation</td>
</tr>
<tr>
<td>ADT</td>
<td>Average Daily Traffic</td>
</tr>
<tr>
<td>AWOIS</td>
<td>Automated Wreck and Obstruction Information System</td>
</tr>
<tr>
<td>BTU's</td>
<td>British Thermal Units</td>
</tr>
<tr>
<td>CAA</td>
<td>Clean Air Act</td>
</tr>
<tr>
<td>CAAA</td>
<td>Clean Air Act Amendments of 1990</td>
</tr>
<tr>
<td>CALTRANS</td>
<td>California Department of Transportation</td>
</tr>
<tr>
<td>CEQ</td>
<td>President’s Council on Environmental Quality</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>CMS</td>
<td>Congestion Management System</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon Monoxide</td>
</tr>
<tr>
<td>CTB</td>
<td>Virginia Commonwealth Transportation Board</td>
</tr>
<tr>
<td>CZMA</td>
<td>Coastal Zone Management Act</td>
</tr>
<tr>
<td>DEIS</td>
<td>Draft Environmental Impact Statement</td>
</tr>
<tr>
<td>DEQ</td>
<td>Virginia Department of Environmental Quality</td>
</tr>
<tr>
<td>DOD</td>
<td>Department of Defense</td>
</tr>
<tr>
<td>DOI</td>
<td>United States Department of the Interior</td>
</tr>
<tr>
<td>EO</td>
<td>Executive Order</td>
</tr>
<tr>
<td>ER-M</td>
<td>Effect Range – Median</td>
</tr>
<tr>
<td>ESA</td>
<td>Endangered Species Act</td>
</tr>
<tr>
<td>FEIS</td>
<td>Final Environmental Impact Statement</td>
</tr>
<tr>
<td>FEMA</td>
<td>Federal Emergency Management Administration</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>FONSI</td>
<td>Finding of No Significant Impact</td>
</tr>
<tr>
<td>FTA</td>
<td>Federal Transit Administration</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>GTIS</td>
<td>Graphic Traffic Information System</td>
</tr>
<tr>
<td>HC</td>
<td>Hydrocarbons</td>
</tr>
<tr>
<td>HOV</td>
<td>High Occupancy Vehicle</td>
</tr>
<tr>
<td>HRBT</td>
<td>I-64 Hampton Roads Bridge Tunnel</td>
</tr>
<tr>
<td>HRPDC</td>
<td>Hampton Roads Planning District Commission</td>
</tr>
<tr>
<td>HUD</td>
<td>United States Department of Housing and Urban Development</td>
</tr>
<tr>
<td>ISTEAA</td>
<td>Intermodal Surface Transportation Efficiency Act</td>
</tr>
<tr>
<td>JRIA</td>
<td>James River Institute of Archeology</td>
</tr>
<tr>
<td>LOS</td>
<td>Level of Service</td>
</tr>
<tr>
<td>LRT</td>
<td>Light Rail Transit</td>
</tr>
<tr>
<td>LWCFA</td>
<td>Land and Water Conservation Fund Act</td>
</tr>
<tr>
<td>MIS</td>
<td>Major Investment Study</td>
</tr>
<tr>
<td>MMMBT</td>
<td>I-664 Monitor Merrimac Memorial Bridge Tunnel</td>
</tr>
<tr>
<td>MMAPA</td>
<td>Marine Mammal Protection Act</td>
</tr>
<tr>
<td>MPO</td>
<td>Metropolitan Planning Organization</td>
</tr>
<tr>
<td>MSA</td>
<td>Metropolitan Statistical Area</td>
</tr>
<tr>
<td>NAAQS</td>
<td>National Ambient Air Quality Standards</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
</tr>
<tr>
<td>NHL</td>
<td>National Historic Landmark</td>
</tr>
<tr>
<td>NHS</td>
<td>National Highway System</td>
</tr>
<tr>
<td>NMFS</td>
<td>National Marine Fisheries Service</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>NOAA</td>
<td>National Oceanographic and Atmospheric Administration</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrogen Oxides</td>
</tr>
<tr>
<td>NRCS</td>
<td>Natural Resource Conservation Service (formerly SCS)</td>
</tr>
<tr>
<td>NRHP</td>
<td>National Register of Historic Places</td>
</tr>
<tr>
<td>O/D</td>
<td>Origin and Destination</td>
</tr>
<tr>
<td>OEP</td>
<td>Office of Environmental Policy</td>
</tr>
<tr>
<td>PCBs</td>
<td>Polychlorinated Byphenyls</td>
</tr>
<tr>
<td>Ppm</td>
<td>Parts per Million</td>
</tr>
<tr>
<td>Ppt</td>
<td>Parts Per Thousand</td>
</tr>
<tr>
<td>RFP</td>
<td>Request for Proposal</td>
</tr>
<tr>
<td>ROD</td>
<td>Record of Decision</td>
</tr>
<tr>
<td>SAV</td>
<td>Submerged Aquatic Vegetation</td>
</tr>
<tr>
<td>SCS</td>
<td>Soil Conservation Service (currently NRCS)</td>
</tr>
<tr>
<td>SDWA</td>
<td>Safe Drinking Water Act of 1974</td>
</tr>
<tr>
<td>SIP</td>
<td>State Implementation Plan</td>
</tr>
<tr>
<td>SOV</td>
<td>Single Occupancy Vehicle</td>
</tr>
<tr>
<td>SOx</td>
<td>Sulfur Oxides</td>
</tr>
<tr>
<td>SSLs</td>
<td>Sediment Screening Levels</td>
</tr>
<tr>
<td>STIP</td>
<td>Statewide Transportation Improvement Program</td>
</tr>
<tr>
<td>SVOCs</td>
<td>Semivolatile Organic Compounds</td>
</tr>
<tr>
<td>TAZ</td>
<td>Traffic Analysis Zone</td>
</tr>
<tr>
<td>TDM</td>
<td>Transportation Demand Management</td>
</tr>
<tr>
<td>TIP</td>
<td>Transportation Improvement Program</td>
</tr>
<tr>
<td>TOC</td>
<td>Total Organic Carbon</td>
</tr>
<tr>
<td>TRB</td>
<td>Transportation Research Board</td>
</tr>
<tr>
<td>TRT</td>
<td>Tidewater Regional Transit</td>
</tr>
<tr>
<td>TSM</td>
<td>Transportation System Management</td>
</tr>
<tr>
<td>TSP</td>
<td>Total Suspended Particulate</td>
</tr>
<tr>
<td>TSS</td>
<td>Total Suspended Solids</td>
</tr>
<tr>
<td>USC</td>
<td>United States Code</td>
</tr>
<tr>
<td>USDOT</td>
<td>United States Department of Transportation</td>
</tr>
<tr>
<td>USEPA</td>
<td>United States Environmental Protection Agency</td>
</tr>
<tr>
<td>USFWS</td>
<td>United States Fish and Wildlife Service</td>
</tr>
<tr>
<td>VAC</td>
<td>Virginia Advisory Committee</td>
</tr>
<tr>
<td>VCRMA</td>
<td>Virginia Coastal Resources Management Act</td>
</tr>
<tr>
<td>VCRMP</td>
<td>Virginia Coastal Resources Management Program</td>
</tr>
<tr>
<td>VDACS</td>
<td>Virginia Department of Agriculture and Consumer Services</td>
</tr>
<tr>
<td>VDCR</td>
<td>Virginia Department of Conservation and Recreation</td>
</tr>
<tr>
<td>VDEQ</td>
<td>Virginia Department of Environmental Quality (formerly Water Control Board)</td>
</tr>
<tr>
<td>VDGIF</td>
<td>Virginia Department of Game and Inland Fisheries</td>
</tr>
<tr>
<td>VDHR</td>
<td>Virginia Department of Historic Resources</td>
</tr>
<tr>
<td>VDOT</td>
<td>Virginia Department of Transportation</td>
</tr>
<tr>
<td>VDRPT</td>
<td>Virginia Department of Rail and Public Transportation</td>
</tr>
<tr>
<td>VIMS</td>
<td>Virginia Institute of Marine Science</td>
</tr>
<tr>
<td>VMRC</td>
<td>Virginia Marine Resources Commission</td>
</tr>
<tr>
<td>VMSM</td>
<td>Virginia Marine Science Museum</td>
</tr>
<tr>
<td>VMT</td>
<td>Vehicle Miles Traveled</td>
</tr>
<tr>
<td>VOCs</td>
<td>Volatile Organic Compounds</td>
</tr>
</tbody>
</table>
C. THIRD SCREENING OF ALTERNATIVES

III. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY IN THE DEIS

A. FULL TYPICAL SECTION WITHIN OR ALONG CSXT RAIL CORRIDOR
B. NEW CROSSING PARALLEL TO EXISTING I-664 MONITOR MERRIMAC MEMORIAL BRIDGE TUNNEL
C. NEW CROSSING FROM NEWPORT NEWS TO NORFOLK OPERATING AS A SEPARATE FACILITY FROM EXISTING I-664 MONITOR MERRIMAC MEMORIAL BRIDGE TUNNEL
D. NEW CROSSING FROM NEWPORT NEWS TO NORFOLK WITHOUT THE VA 164 CONNECTION

IV. ALTERNATIVES ADVANCED FOR FURTHER STUDY IN THE DEIS

A. NO-BUILD ALTERNATIVE
B. CANDIDATE BUILD ALTERNATIVES
C. PREFERRED ALTERNATIVE
D. PROJECT SCHEDULE

CHAPTER 3: AFFECTED ENVIRONMENT

I. TRANSPORTATION

A. TRAFFIC
B. PUBLIC TRANSPORTATION
C. HIGHWAYS
D. TRANSPORTATION PLAN
E. FREIGHT

II. LAND USE

A. REGIONAL LAND USE OVERVIEW
B. DEVELOPMENT TRENDS

III. POPULATION CHARACTERISTICS

A. MINORITY POPULATION
B. AGE
C. LOW-INCOME GROUPS
D. WORK DISABILITY
E. VEHICLES

IV. ECONOMIC PROFILE

A. EMPLOYMENT AND INCOME
B. ECONOMIC BASE

V. VISUAL AND AESTHETIC CONDITIONS

VI. AIR QUALITY

A. EXISTING CONDITIONS
B. REGIONAL COMPLIANCE WITH THE STANDARDS

VII. NOISE AND VIBRATION

A. NOISE CRITERIA
B. EXISTING NOISE CONDITIONS
VIII. ECOSYSTEMS

A. NATIVE WILDLIFE
B. EXISTING VEGETATION IN THE STUDY AREA
C. RARE, THREATENED, AND ENDANGERED SPECIES
D. CRITICAL HABITAT
E. WILDLIFE AND WATERFOWL REFUGES

IX. WATER RESOURCES

A. SURFACE WATERS
B. GROUNDWATER
C. AQUATIC SPECIES

X. FLOODPLAINS

XI. WETLANDS

XII. HAZARDOUS WASTE SITES

XIII. COASTAL BARRIERS AND COASTAL ZONE

XIV. FARMLANDS

XV. PARKLANDS

XVI. HISTORIC AND ARCHAEOLOGICAL RESOURCES

A. ARCHITECTURAL RESOURCES
B. TERRESTRIAL ARCHAEOLOGICAL RESOURCES
C. UNDERWATER CULTURAL RESOURCES

CHAPTER 4: ENVIRONMENTAL ANALYSIS AND CONSEQUENCES

I. TRAFFIC, TRANSIT, AND SAFETY

A. 2018 TRAFFIC VOLUMES AND VOLUME/CAPACITY RATIO
B. 2018 ORIGIN AND DESTINATION PATTERNS
C. TRAVEL TIME
D. DEDICATED MULTI-MODAL FACILITY
E. SAFETY
F. SHIPPING CHANNELS

II. LAND USE

A. LAND USE CONVERSION
B. DEVELOPMENT
C. CONSISTENCY WITH AREA’S COMPREHENSIVE PLAN

III. SOCIAL IMPACTS

A. POPULATION
B. COMMUNITY COHESION
C. EMERGENCY SERVICES

IV. RELOCATION IMPACTS

A. METHODOLOGY
B. POTENTIAL RELOCATIONS
C. ENVIRONMENTAL JUSTICE/SPECIAL GROUPS
D. MITIGATION ............................................................................................................................. 249
E. PROPOSED PROJECT AND PERMIT SEQUENCING ............................................................. 258

XIV. ENERGY ...................................................................................................................................... 258
A. ENERGY ANALYSIS ................................................................................................................ 258
B. EXISTING ENVIRONMENT ...................................................................................................... 259
C. IMPACTS ..................................................................................................................................... 259
D. MITIGATION ............................................................................................................................. 262

XV. HAZARDOUS WASTE SITES ....................................................................................................... 262
A. METHODOLOGY ...................................................................................................................... 262
B. IMPACTS ..................................................................................................................................... 263
C. MITIGATION ............................................................................................................................. 266

XVI. FARMLANDS ............................................................................................................................ 266

XVII. PUBLIC PARKLANDS ............................................................................................................ 268

XVIII. HISTORIC AND ARCHAEOLOGICAL RESOURCES ............................................................ 268
A. ARCHITECTURAL RESOURCES ............................................................................................ 268
B. TERRESTRIAL ARCHAEOLOGICAL RESOURCES ................................................................ 271
C. UNDERWATER CULTURAL RESOURCES ........................................................................... 272

XIX. PERMITS ................................................................................................................................... 273
XX. SECONDARY AND CUMULATIVE IMPACTS ........................................................................ 274
A. METHODOLOGY ...................................................................................................................... 274
B. SOCIOECONOMIC IMPACTS .................................................................................................. 274
C. NATURAL RESOURCE IMPACTS .......................................................................................... 276

XXI. CONSTRUCTION IMPACTS .................................................................................................. 277
A. AIR QUALITY ........................................................................................................................... 277
B. NOISE ......................................................................................................................................... 278
C. WATER QUALITY .................................................................................................................... 279
D. MAINTENANCE AND CONTROL OF TRAFFIC ................................................................... 280
E. HEALTH AND SAFETY ............................................................................................................ 280
F. POLLUTION CONTROL ........................................................................................................... 280

XXII. RELATIONSHIP OF LOCAL SHORT-TERM USES VS. LONG-TERM PRODUCTIVITY ........ 281

XXIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES .......... 281

CHAPTER 5: SECTION 4(F) EVALUATION ..................................................................................... 283
I. HAMPTON INSTITUTE ..................................................................................................................... 283
II. PASTURE POINT HISTORIC DISTRICT ...................................................................................... 284

CHAPTER 6: LIST OF PREPARERS .............................................................................................. 287

CHAPTER 7: LIST OF FEIS RECIPIENTS ...................................................................................... 291
CHAPTER 8: COMMENTS AND COORDINATION ...............................................................293
I. INTRODUCTION .................................................................................................................................293
II. MAJOR INVESTMENT STUDY ......................................................................................................... 293
   A. COORDINATING COMMITTEE ................................................................................................. 294
   B. RESOURCE AGENCIES ........................................................................................................... 294
   C. PUBLIC INVOLVEMENT .......................................................................................................... 294
III. ENVIRONMENTAL IMPACT STATEMENT ............................................................................. 297
   A. SCOPING MEETINGS ............................................................................................................. 297
   B. PUBLIC INVOLVEMENT .......................................................................................................... 298

ATTACHMENT I: SUMMARY OF MIS PUBLIC HEARING COMMENTS
ATTACHMENT II: PROJECT NEWSLETTERS
ATTACHMENT III: SCOPING MEETING MINUTES
ATTACHMENT IV: SUMMARY OF DEIS/LOCATION PUBLIC HEARINGS
ATTACHMENT V: AGENCY AND PUBLIC COMMENTS ON DEIS AND RESPONSES TO COMMENTS
ATTACHMENT VI: AGENCY LETTERS

CHAPTER 9: REFERENCES .................................................................................................................1

APPENDIX A: 404 (B)(1) ALTERNATIVES ANALYSIS

APPENDIX B: BIOLOGICAL ASSESSMENT OF THE SEA TURTLES OF THE CHESAPEAKE BAY

APPENDIX C: BIOLOGICAL ASSESSMENT FOR THE 3RD CROSSING OF HAMPTON ROADS FOR PIPING PLOVERS (CHARADRIUS MELODUS)

OTHER TECHNICAL APPENDICES TO FEIS (BOUND SEPARATELY)
   AIR QUALITY AND ENERGY TECHNICAL APPENDIX
   COMPENDIUM OF TECHNICAL TRAFFIC INFORMATION
   CULTURAL RESOURCES SURVEY
   NATURAL RESOURCES TECHNICAL APPENDIX
   NOISE AND VIBRATION TECHNICAL APPENDIX
   SOCIAL AND ECONOMIC TECHNICAL APPENDIX
   THREE DIMENSIONAL HYDRODYNAMIC-SEDIMENTATION MODELING STUDY (VIMS, 1999)
LIST OF TABLES

Table S-1: Criteria for Evaluating Project Purpose and Project Needs ............................................. S-9
Table S-2: Transportation Issues ....................................................................................................... S-15
Table S-3: Summary of Environmental Consequences ..................................................................... S-18

Table 1-1: Transportation Issues, Trends, and Deficiencies ............................................................. 5
Table 1-2: Criteria for Evaluating Project Purpose and Project Needs ............................................. 9

Table 2-1: Criteria for Evaluating Project Purpose and Project Needs ............................................. 16
Table 2-2: Third Screening of Solutions ........................................................................................... 25

Table 3-1: Annual Average Daily Traffic Volumes at Crossings of Hampton Roads ..................... 45
Table 3-2: Hampton Roads Bridge Tunnel Traffic and Delay Data ................................................. 45
Table 3-3: Hampton Roads Bridge Tunnel Accident Rates ............................................................. 47
Table 3-4: 1990 and Projected 2018 Hampton Roads Crossings ................................................ ... 49
Table 3-5: Imports and Exports of Atlantic Coast Ports in 1995 ..................................................... 55
Table 3-6: Port Related Truck Volume ............................................................................................ 55
Table 3-7: Distribution of Hampton Roads Freight Traffic ............................................................ 57
Table 3-8: Population Trends in the Study Area ............................................................................. 60
Table 3-9: Population Groups in Study Area ................................................................................... 61
Table 3-10: Employment Trends in the Study Area ........................................................................ 68
Table 3-11: Per Capita Income in Study Area .................................................................................. 69
Table 3-12: National Ambient Air Quality Standards ...................................................................... 75
Table 3-13: FHWA Noise Abatement Criteria ................................................................................ 76
Table 3-14: Summary of Short-Term Noise Measurements ........................................................... 79
Table 3-15: Summary of Long-Term Noise Measurements ........................................................... 81
Table 3-16: Ground-Borne Vibration Impact Criteria ...................................................................... 84
Table 3-17: Species Identified Through Agency Coordination ...................................................... 89
Table 3-18: Floodplains Surrounding the Candidate Build Alternatives ......................................... 102

Table 4-1: No-Build Percent Increase in Average Daily Traffic Volumes ..................................... 114
Table 4-2: Transportation Issues .................................................................................................... 115
Table 4-3: 2018 Vehicle Miles Traveled (VMT) ............................................................................ 119
Table 4-4: 2018 Truck Traffic Volumes ....................................................................................... 120
Table 4-5: Peak Hour Travel Time-Savings from the No-Build .................................................... 121
Table 4-6: Transit System Characteristics ...................................................................................... 124
Table 4-7: 1990 and 2015 Densities .............................................................................................. 125
Table 4-8: Potential Population Affected ....................................................................................... 129
Table 4-9: Communities with Potential Displacements ................................................................. 130
Table 4-10: Relocations ................................................................................................................... 132
Table 4-11: Study Area Housing Information ............................................................................... 133
Table 4-12: Available Replacement Housing ............................................................................... 133
Table 4-13: Environmental Justice Data ......................................................................................... 136
Table 4-14: Environmental Justice Household Data ................................................................... 139
Table 4-15: Environmental Justice: Residential Noise Impact .................................................... 140
Table 4-16: Construction Related Employment ............................................................................ 149
Table 4-17: Potential Visual Impacts ............................................................................................. 150
Table 4-18: MOBILE 5.0A Input Parameters ............................................................................... 159
Table 4-19: CAL3QHC Input Parameters ..................................................................................... 160
Table 4-20: 1-Hour Predicted Highest Carbon Monoxide Concentrations ................................. 161
Table 4-21: Predicted Daily 1990, 2005, & 2018 Ozone Precursors ........................................... 164
Table 4-22: Computed Existing and Future Traffic-Noise Levels ................................................. 169
Table 4-23: Total Residential Noise Impact .................................................................................. 172
Table 4-24: Noise Impact at School Playgrounds, Parks, and Recreation Areas ......................... 174
Table 4-25: Total Cost of Noise Barriers by Alternative ............................................................... 179
Table 4-26: Summary of Noise Barriers Recommended for Further Consideration ................. 180
Table 4-27: Stream Water Quality Field Measurements ............................................................... 196
Table 4-28: Waterbodies Crossed .................................................................................................. 197
Table 4-29: Estimate of Dredging and Fill Quantities ................................................................... 199
Table 4-30: Habitat Impact and Creation by Portal Islands ......................................................... 211
Table 4-31: Hardshell Clam Loss ................................................................................................... 213
Table 4-32: Functions and Values Assessment ............................................................................. 218
Table 4-33: Determining Factors to Achieve a High Rating ....................................................... 220
Table 4-34: Summary of Wetland Impacts .................................................................................... 223
Table 4-35: Wetland Inventory ....................................................................................................... 223
Table 4-36: Avoidance and Minimization Table for Preferred Alternative (CBA 9) by Segment and Proposed Segment Construction Sequence .................................................. 250
Table 4-37: Construction Energy Consumption .......................................................................... 260
Table 4-38: Maintenance Energy Consumption ......................................................................... 260
Table 4-39: Direct Operating Energy Consumption .................................................................... 261
Table 4-40: Total Annual Energy Consumption ......................................................................... 261
Table 4-41: Potential Hazardous Material/Waste Sites ................................................................. 264
Table 4-42: Farmland Soils by Candidate Build Alternative ......................................................... 268

Table 8-1: MIS Development Meetings ......................................................................................... 295
Table 8-2: Federal, State, and Local Agency Meetings ................................................................. 299

**LIST OF FIGURES**

Figure S-1: Regional Location Map .............................................................................................. S-2
Figure S-2: Hampton Roads Study Area ....................................................................................... S-3
Figure S-3: Candidate Build Alternatives .................................................................................... S-11
Figure S-4: Typical Sections of Optional Tunnel Designs ............................................................. S-12

Figure 1-1: Regional Location Map .............................................................................................. 2
Figure 1-2: Hampton Roads Study Area ....................................................................................... 3
Figure 1-3: 2015 No-Build Peak Period Spread .......................................................................... 10

Figure 2-1: Five Wide Transportation Corridors Carried Forward to Second Screening .......... 15
Figure 2-2: Transportation Corridors Studied in Third Screening ............................................. 21
Figure 2-3: Candidate Build Alternative 1 .................................................................................. 33
Figure 2-4: Candidate Build Alternative 2 .................................................................................. 35
Figure 2-5: Candidate Build Alternative 9 .................................................................................. 36
Figure 2-6: Typical Sections of Optional Tunnel Designs ............................................................. 39
LIST OF EXHIBITS

Exhibit S-1: Commonwealth Transportation Board Resolution ................................................. S-20
Exhibit 2-1: Commonwealth Transportation Board Resolution .................................................. 41
SUMMARY

I. DESCRIPTION OF PROPOSED ACTION

VDOT, in cooperation with the Federal Highway Administration (FHWA) is proposing to construct a new bridge-tunnel crossing of Hampton Roads in southeastern Virginia. “Hampton Roads” is the name of the water body and harbor located between the mouth of the James River (to the west) and the Chesapeake Bay (to the east). However, the term “Hampton Roads” has been adopted locally, and in this document, to also refer to the metropolitan region that surrounds the Hampton Roads Harbor in southeastern Virginia (Figure S-1). The study area includes the cities of Chesapeake, Hampton, Poquoson, Newport News, Norfolk, Suffolk, and Virginia Beach, as well as the counties of Isle of Wight and York (Figure S-2).

Project termini include the I-64 and I-664 interchange in Hampton; the I-64 and I-564 interchange in Norfolk; VA 164 near Coast Guard Boulevard in Portsmouth; and the I-64, I-264, and I-664 interchange in Chesapeake.

II. PROJECT HISTORY

Section 1107 of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) allocated demonstration funds for “…highway projects demonstrating innovative techniques of highway construction and finance.” The I-64 crossing of Hampton Roads was included as one of these innovative projects. In 1992, the Virginia General Assembly passed Joint Resolution 132, which directed the Virginia Department of Transportation (VDOT) to conduct a study on congestion at the Hampton Roads Bridge Tunnel. The subsequent VDOT study stated that short-term measures would not solve congestion at the Hampton Roads Bridge Tunnel, and that a long-term, large-scale solution would be required. The Hampton Roads Crossing Study was initiated in 1993 in response to these two actions, and the results of the VDOT study.

Prior to the development of this Final Environmental Impact Statement (FEIS), a Major Investment Study (MIS) was conducted in accordance with the Joint Statewide Metropolitan Planning Regulations (23 CFR 450) (VDOT, 1997). Decision points in the Hampton Roads Crossing Study MIS process included:
Establish Purpose and Need: Purpose and Need for the project was approved in late 1994 (Hampton Roads Crossing Study Final Purpose and Need Statement and Technical Appendix).

Develop Initial Solutions: A preliminary list of 45 possible solutions was developed during 1995. This list was reduced based on criteria established by the Purpose and Need document and the Coordinating Committee.

Develop Transportation Corridors: Further refinement and combinations of the original solutions resulted in the development of 11 individual Transportation Corridors in early 1996.

MPO Selection of Locally Preferred Alternative: On July 16, 1997, the Hampton Roads Metropolitan Planning Organization (MPO) recommended Transportation Corridor 9 as the Locally Preferred Corridor based on the MIS findings and citizen input from the MIS public hearings. The MPO also endorsed continuing to improve and study the CSX corridor for a transit component.

CTB Endorsement of Locally Preferred Alternative: On September 18, 1997, the Commonwealth Transportation Board (CTB) passed a resolution which expressed its good faith intent to facilitate and develop the Hampton Roads Transportation Crossing identified as Transportation Corridor 9, which consists of a facility that includes a Bridge/Tunnel from I-564 in Norfolk to I-664 in Newport News with a connection from this new facility to the Western Freeway (Route 164), in Portsmouth and with the CSX Transportation Corridor on the Peninsula for the transit component as adopted by the MPO.

The Hampton Roads Crossing Study Draft Environmental Impact Statement (DEIS) was published in October of 1999, and DEIS/Location Public Hearings were held on January 24, March 1 and March 2, 2000 (Hearings previously scheduled for January 26 and 27, 2000 were cancelled due to inclement weather and rescheduled for the March dates.). This FEIS incorporates, by reference, the analysis contained in the DEIS and responds to comments on that document. This FEIS also identifies Candidate Build Alternative 9 as the Preferred Alternative.

Text that is underlined in the FEIS represents instances where new text has been added based on comments received on the DEIS from the public and interested agencies.
III. OTHER PROPOSED MAJOR GOVERNMENTAL ACTIONS

A. I-64 IMPROVEMENTS

The I-64 Major Investment Study (MIS) was initiated by VDOT, in cooperation with FHWA, in June of 1996 to examine the 75-mile corridor that extends from Richmond to Hampton and Newport News. This multi-modal transportation study is examining both the I-64 highway corridor and the CSXT railroad corridor. The Richmond and Hampton Roads MPOs have recently selected a Locally Preferred Alternative (LPA). This alternative consists of operational, highway, rail, and transit improvements in the I-64 and CSXT corridors.

High Speed intercity rail is a key component of the LPA, which was adopted by both the Hampton Roads Metropolitan Planning Organization and the Richmond Metropolitan Planning Organization. The LPA recommends that the rail corridor be improved in order to allow for increased speed and frequency of passenger trains. The plan calls for double tracking the entire Richmond to Newport News corridor, constructing three new stations and improving the facilities at the existing stations. Frequencies would be increased from the current two round trips per day to eight round trips. Newport News to Richmond travel times would be reduced from the current 100 minutes to 66 minutes for local trains and 53 minutes for express trains.

B. TRANSAMERICA HIGHWAY

VDOT, in cooperation with FHWA, has conducted the TransAmerica Corridor Feasibility Study. The purpose of this planning and environmental study was to identify and evaluate transportation improvements linking Beckley, West Virginia, to the Virginia localities of Roanoke, Lynchburg, Petersburg, and Virginia Beach.

C. SOUTHSIDE LIGHT RAIL STUDIES

Hampton Roads Transit (HRT) recently completed an EIS for the Norfolk/Virginia Beach light rail project. However, in November of 1999, the City of Virginia Beach withdrew its support for the segment to the oceanfront. HRT is currently working on a supplemental EIS to study a Norfolk only segment. In addition, HRT is set to begin alternative analyses on a connection from Norfolk to Chesapeake, a connection from Norfolk to Portsmouth, and an extension of the Norfolk segment to Naval Base Norfolk.
D. CSXT CORRIDOR
The city of Newport News has recently completed the CSXT Corridor MIS. Initiated in September 1996, the MIS examined potential transportation improvements in a 32-mile corridor along the CSXT rail right-of-way linking downtown areas of Williamsburg, Newport News, and Hampton. Six alternatives, ranging from No-Build to a fully automated rail system, were developed and evaluated in the MIS. Alternative 7, which emerged as a combination of the Enhanced Bus Alternative and the Light Rail Transit (LRT) System, was selected by the MPO as the Locally Preferred Alternative on March 18, 1998. It is anticipated that an EIS for the project will be initiated in January of 2001.

E. CRANEY ISLAND EXPANSION
In July of 1996, the Virginia General Assembly authorized the Craney Island Study Committee, which is comprised of representatives from the Hampton Roads Maritime Association, the Virginia Port Authority, U.S. Army Corps of Engineers (Corps) and the City of Portsmouth, to examine the current use and future expansion of the Craney Island Management Disposal Facility (Craney Island). The expansion of Craney Island to the east for the development of a fourth container port facility as well as the use of Craney Island for the placement of dredged materials continues to be the focus of this study committee.

Additionally, under a resolution passed by Congress on September 14, 1997, the Corps is conducting a study to determine the federal interest in the potential eastward expansion of Craney Island through creation of a fourth cell to increase its capacity. The resolution directs that the Corps give specific attention to rapid filling of the fourth cell to accommodate anticipated port expansion. It will also examine the operation of the existing facility while extending its useful life. A reconnaissance study was completed in March of 1999, and once federal interest is established, the Corps will conduct a feasibility study for the expansion. The feasibility study will be concluded in the year 2001.

F. I-564 INTERMODAL CONNECTOR
The I-564 Intermodal Connector begins at I-564 in Norfolk with a flyover bridge heading west. It crosses over Hampton Boulevard and ties into Navy Base Norfolk and Norfolk International Terminals at Virginia Avenue. It is a four lane facility designed to interstate standards with enough right-of-way and median dimensions to add multimodal lanes (i.e. HOV, busway, or passenger rail) in the future. Environmental studies are being completed. Public hearings are scheduled for November 1, 2000.
IV. PROJECT PURPOSE AND SUPPORTING NEEDS

The Purpose and Need Study identified the transportation problems in the Hampton Roads region specifically concentrating on transportation deficiencies related to transportation needs between the Peninsula and the Southside. The details of the Purpose and Need Study were presented in the Hampton Roads Crossing Study Final Purpose and Need Statement and Technical Appendix (Purpose and Need Document) of November of 1994. The Purpose and Need Document identified a project purpose, supported by transportation needs in the region that must be addressed in order to meet that purpose.

A. PROJECT PURPOSE

The primary project purpose is to develop and analyze intermodal alternatives that can work together to improve accessibility, mobility, and goods movement in the Hampton Roads metropolitan area to help relieve the congestion that occurs at the existing I-64 Hampton Roads Bridge Tunnel.

B. PROJECT NEEDS SUPPORTING THE PROJECT PURPOSE

In order to satisfy the project purpose, certain project needs must also be met. The Purpose and Need Document presented three categories of needs:

- The combination of the decreasing performance of the transportation system and increasing pressures due to growth in population and employment, emphasizes the need to develop intermodal alternatives that can work together to improve accessibility, mobility, and goods movement in the Hampton Roads area.
- There is a need to address the decreasing performance of the transportation system in a manner which will positively contribute to the most cost effective utilization of transportation investments that have already been made in the region.
- Of equal importance in planning for transportation needs in the Hampton Roads area is environmental protection and enhancement.

V. ALTERNATIVES CONSIDERED

A broad range of alternatives was considered for this project. The consideration of alternatives began with the Hampton Roads Crossing Study MIS (VDOT, 1997) and is concluding in this Final Environmental Impact Statement (DEIS). The alternatives, the analysis of each of the alternatives,
and the reasons for the dismissal of certain alternatives during the three-step screening process developed for the MIS has been incorporated into this FEIS. The incorporation of the range of MIS alternatives and their analysis into this FEIS is consistent with the intent of both Council of Environmental Quality (CEQ) and Federal Highway Administration (FHWA) regulations (40 CFR 1500 and 23 CFR 771 respectively).

The development of the range of alternatives and the screening process was developed through a series of public meetings and in cooperation with the Hampton Roads Crossing Study Coordinating Committee (Coordinating Committee). The Coordinating Committee was established by VDOT and included: FHWA; Federal Transit Administration (FTA); VDOT; Virginia Department of Rail and Public Transportation (VDRPT); representatives of the Hampton Roads Metropolitan Planning Organization; local public officials; and environmental agency representatives. The Coordinating Committee also included representatives from transit commissions, rail providers, port operators, and the military.

The Hampton Roads Crossing Study initially developed 45 alternatives that ranged from congestion management strategies to constructing a new crossing. The evaluation criteria identified in Table S-1 were used to develop alternatives that best met both the project purpose and the supporting project needs. The various alternatives suggested and considered for this project were then tested against each of these criteria in three sequenced screenings. Following this screening process, four alternatives were carried forward for detailed study in the DEIS. The alternatives are described below.

A. NO-BUILD ALTERNATIVE
The No-Build Alternative for the DEIS is defined as currently planned highway, bicycle, pedestrian, and transit improvements defined in the Hampton Roads 2018 Regional Transportation Plan (HRPC, 1998. Existing roadways would continue to be maintained and operated. The improvements identified are those that could be funded by projected transportation revenues.

While the results of the screening process indicate that the No-Build Alternative would not meet the project purpose and the supporting project needs, it was retained in the DEIS as a comparison to the Candidate Build Alternatives. This is consistent with CEQ regulations [40 CFR 1502.14 (d)].
### TABLE S-I

**CRITERIA FOR EVALUATING PROJECT PURPOSE AND PROJECT NEEDS**

<table>
<thead>
<tr>
<th>Project Purpose</th>
<th>Evaluation Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>The primary project purpose is to develop and analyze intermodal alternatives that can work together to</td>
<td>1. Will the alternative reduce peak hour volumes at the Hampton Roads Bridge Tunnel</td>
</tr>
<tr>
<td>improve accessibility, mobility, and goods movement in the Hampton Roads metropolitan area to help relieve</td>
<td>by 10 percent or more?</td>
</tr>
<tr>
<td>the congestion that occurs at the existing I-64 Hampton Roads Bridge Tunnel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Project Needs</strong></td>
<td><strong>Evaluation Criteria</strong></td>
</tr>
<tr>
<td>“The combination of the decreasing performance of the transportation system and increasing pressures due</td>
<td>2. Will the alternative address existing and future Origin and Destination patterns</td>
</tr>
<tr>
<td>to growth in population and employment, emphasizes the need to develop intermodal alternatives that</td>
<td>between the Southside and the Peninsula?</td>
</tr>
<tr>
<td>can work together to improve accessibility, mobility, and goods movement in the Hampton Roads area.”</td>
<td>3. Will the alternative provide a direct connection to the major ports or serve as</td>
</tr>
<tr>
<td></td>
<td>a major freight corridor?</td>
</tr>
<tr>
<td>“There is a need to address the decreasing performance of the transportation system in a manner which</td>
<td>4. Will the alternative connect to an existing expressway on the Peninsula and the</td>
</tr>
<tr>
<td>will positively contribute to the most cost effective utilization of transportation investments that</td>
<td>Southside?</td>
</tr>
<tr>
<td>have already been made in the region.”</td>
<td>5. What is the relative cost of the alternative?</td>
</tr>
<tr>
<td></td>
<td>6. What is the relative ease of implementing the alternative?</td>
</tr>
<tr>
<td>“Of equal importance in planning for transportation needs in the Hampton Roads area is environmental</td>
<td></td>
</tr>
<tr>
<td>protection and enhancement.”</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
B. CANDIDATE BUILD ALTERNATIVES

Three Candidate Build Alternatives were selected for detailed study in the DEIS (Figure S-3). Two potential tunnel designs are under consideration for each of the Candidate Build Alternatives: the steel tube design and the concrete tube design (Figure S-4). The steel tube design, which is similar to the existing I-664 tunnel, is based on a generally circular tube section that provides space above and below the travelway for ventilation. The ventilation is handled with a fully transverse system. Fresh air is supplied from ducts under the traffic, passed through the travelway, and exhausted in ducts above the ceiling. The overall height of the circular, steel, tube section is 12.1 meters (40 feet).

The concrete tube design offers some advantages over the steel tube design due to its smaller outside dimensions. The concrete tube design is rectangular in section and employs a jet air longitudinal ventilation system that supplies fresh from one end of the tunnel and pumps it longitudinally in accordance to traffic movements, prevailing winds, and climatic conditions. The overall height of the concrete tube section is 9.1 meters (30 feet). The reduced height decreases the area and volume of dredging required for the tunnel, thereby reducing excavation costs and habitat impacts.

1. Candidate Build Alternative 1

Candidate Build Alternative 1 would provide a new crossing parallel to the existing I-64 Hampton Roads Bridge Tunnel. On the Peninsula, Candidate Build Alternative 1 begins at the I-664 interchange in Hampton and would widen I-64 to the I-564 interchange in Norfolk. A paralleling, three-tube tunnel typical section to the west of the existing I-64 Hampton Roads Bridge Tunnel would cross Hampton Roads. Two of the tubes would carry two lanes each of eastbound vehicular traffic. The third tube would be used for multimodal travel, and would be dimensioned to accommodate all multimodal possibilities: HOV, passenger rail and/or bus travel. Westbound vehicular traffic would use the four travel lanes in the existing I-64 tunnel tubes.

- **Termini:** Peninsula, I-64 and I-664 interchange in Hampton.
  Southside, I-64 and I-564 interchange in Norfolk
- **Design:** One bridge-tunnel with 4 conventional travel lanes, and 2 lanes for multimodal use. Widen I-64 to 8 conventional travel lanes and 2 additional lanes for multimodal use.
- **Accomodated Modes:** SOV, HOV, Trucks, Buses, Passenger Rail
FIGURE S-3
CANDIDATE BUILD ALTERNATIVES
FIGURE S-4
TYPICAL SECTIONS OF OPTIONAL TUNNEL DESIGNS
2. **Candidate Build Alternative 2**

Candidate Build Alternative 2 includes all of Candidate Build Alternative 1, and it also includes a portion of Candidate Build Alternative 9. This portion begins at the I-564 and I-64 interchange in Norfolk, crosses the Elizabeth River, runs along the east side of Craney Island, and then connects to VA 164 (Western Freeway) in Portsmouth.

- **Termini**: Peninsula, I-64 and I-664 interchange in Hampton. Southside, I-64 and I-564 interchange in Norfolk; and VA 164 in Portsmouth

- **Design**: One bridge-tunnel crossing of Hampton Roads with 4 conventional travel lanes, and 2 lanes for multimodal use. One bridge-tunnel with 4 conventional travel lanes to cross the entrance to the Elizabeth River. Widen I-64 to 8 conventional travel lanes and 2 additional lanes for multimodal use. Widen I-564 in Norfolk to 8 conventional travel lanes and 2 additional lanes for multimodal use. New roadway along existing railroad track from I-564 to Hampton Boulevard (VA 337) in Norfolk with 4 conventional lanes and 2 additional lanes for multimodal use. New roadway from Hampton Boulevard (VA 337) in Norfolk to VA 164 in Portsmouth with 4 conventional travel lanes.

- **Accommodated Modes**: SOV, HOV, Trucks, Buses, Passenger Rail

3. **Candidate Build Alternative 9**

Candidate Build Alternative 9 would provide a new crossing parallel to the I-664 Monitor Merrimac Memorial Bridge Tunnel with a connection from the new bridge tunnel to Norfolk and Portsmouth. On the Peninsula, Candidate Build Alternative 9 begins at the I-64 interchange in Hampton and would widen I-664 to the I-64/I-264 interchange in Chesapeake. Candidate Build Alternative 9 includes a new interchange near the south approach structure of the Monitor Merrimac Memorial Bridge Tunnel connecting to a new roadway and bridge tunnel extending from I-664 to I-564 in Norfolk. This interchange would provide access to both the existing Monitor Merrimac Memorial Bridge Tunnel as well as the new parallel bridge tunnel. Candidate Build Alternative 9 also includes a connection along the east side of Craney Island to VA 164 (Western Freeway) in Portsmouth.

A paralleling, three-tube tunnel typical section to the west of the existing I-664 Monitor Merrimac Memorial Bridge Tunnel would cross Hampton Roads. Two of the tubes would carry two lanes each of eastbound vehicular traffic. The third tube would be used for multimodal travel, and would be dimensioned to accommodate all multimodal possibilities: HOV, passenger rail and/or bus travel. Westbound vehicular traffic would use the four travel lanes in the existing I-664 tunnel tubes. A
three-tube tunnel typical section would cross the entrance to the Elizabeth River and connect to Norfolk. Eastbound and westbound vehicular traffic would be carried in two of the tubes, while the third tube would be used for multimodal travel.

- **Termini**: Peninsula, I-64 and I-664 interchange in Hampton.
  - Southside, I-64 and I-564 interchange in Norfolk;
  - I-64, I-664, and I-264 interchange in Chesapeake; and
  - VA 164 in Portsmouth
- **Design**: Two bridge-tunnels with 4 conventional travel lanes, and 2 lanes for multimodal use. Widen I-664 on the Peninsula to 8 conventional travel lanes and 2 additional lanes for multimodal use. Widen I-664 on the Southside to 6 conventional travel lanes. New roadway from the interchange over the water south of the Monitor Merrimac Memorial Bridge Tunnel to I-564 in Norfolk with 4 conventional travel lanes and 2 lanes for multimodal use. Widen I-564 in Norfolk to 8 conventional travel lanes and 2 additional lanes for multimodal use. New roadway to VA 164 in Portsmouth with 4 conventional travel lanes.
- **Accomodated Modes**: SOV, HOV, Trucks, Buses, Passenger Rail

VI. SUMMARY OF ENVIRONMENTAL CONSEQUENCES

A summary of transportation issues for the No-Build Alternative and each of the Candidate Build Alternatives is presented in Table S-2. A summary of the social and environmental consequences is presented in Table S-3.

VII. PREFERRED ALTERNATIVE

Results of the DEIS study as well as public and resource agency comments were presented to the Virginia Commonwealth Transportation Board (CTB). On July 20, 2000, the CTB voted to identify Candidate Build Alternative 9 as the approved location (Exhibit 1). The CTB’s decision was based on Alternative 9’s abilities to best meet the primary project purpose and its underlying needs. In fact, Candidate Build Alternative 9 is the only alternative that addresses all aspects of purpose and need (see Table S-2). Candidate Build Alternative 9 also does the best job of improving total mobility between the Southside and the Peninsula (see Table S-2). Candidate Build Alternative 9 can also be constructed in usable segments with each segment: 1) contributing to project purpose and need and; 2) having logical termini and independent utility.
<table>
<thead>
<tr>
<th>FACILITY</th>
<th>2018 ADT</th>
<th>NO-BUILD</th>
<th>CBA 1</th>
<th>CBA 2</th>
<th>CBA 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-64 Hampton Roads Bridge Tunnel</td>
<td>118,000</td>
<td>145,000</td>
<td>142,000</td>
<td>98,000</td>
<td>2,450</td>
</tr>
<tr>
<td>I-664 Monitor Merrimac Memorial Bridge Tunnel</td>
<td>76,000</td>
<td>61,000</td>
<td>60,000</td>
<td>143,000</td>
<td>1,788</td>
</tr>
<tr>
<td>New Crossing (I-664 - VA 164 connection) (CBA 9)</td>
<td>49,000</td>
<td>45,000</td>
<td>42,000</td>
<td>44,000</td>
<td>1,100</td>
</tr>
<tr>
<td>New Crossing (I-564-VA 164 connection) (CBA 2 + 9)</td>
<td>34,000</td>
<td>33,000</td>
<td>32,000</td>
<td>33,000</td>
<td>0.63</td>
</tr>
<tr>
<td>US 17 James River Bridge</td>
<td>34,000</td>
<td>33,000</td>
<td>32,000</td>
<td>33,000</td>
<td>0.63</td>
</tr>
<tr>
<td>Total Trips between Peninsula and Southside</td>
<td>243,000</td>
<td>251,000</td>
<td>244,000</td>
<td>285,000</td>
<td></td>
</tr>
<tr>
<td>Peninsula</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-64 (I-664 to Mercury Blvd.)</td>
<td>153,000</td>
<td>168,000</td>
<td>167,000</td>
<td>163,000</td>
<td>2,038</td>
</tr>
<tr>
<td>I-64 (I-64 - Downtown Newport News)</td>
<td>77,000</td>
<td>75,000</td>
<td>72,000</td>
<td>136,000</td>
<td>1,700</td>
</tr>
<tr>
<td>Jefferson Avenue (I-664 - Mercury Blvd.)</td>
<td>34,000</td>
<td>33,000</td>
<td>32,000</td>
<td>33,000</td>
<td>0.63</td>
</tr>
<tr>
<td>Southside</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-64 (I-564 - Rt. 44)</td>
<td>158,000</td>
<td>170,000</td>
<td>171,000</td>
<td>171,000</td>
<td>2,850</td>
</tr>
<tr>
<td>I-64 (I-464 - I-664)</td>
<td>117,000</td>
<td>105,000</td>
<td>102,000</td>
<td>107,000</td>
<td>1,783</td>
</tr>
<tr>
<td>VA 164 Connection (Where applicable)</td>
<td>69,000</td>
<td>67,000</td>
<td>62,000</td>
<td>63,000</td>
<td>1,575</td>
</tr>
<tr>
<td>VA 164 Western Freeway(Coast Guard-Bayview Blvd)</td>
<td>179,000</td>
<td>178,000</td>
<td>179,000</td>
<td>182,000</td>
<td>2,275</td>
</tr>
</tbody>
</table>
TABLE S-2: TRANSPORTATION ISSUES (CONTINUED)

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>NO-BUILD ¹</th>
<th>2018 ADT</th>
<th>2018 Pk Hr Per Lane Vol.²</th>
<th>2018 Pk Hr Per Lane Vol./3,4</th>
<th>2018 ADT/</th>
<th>2018 Pk Hr Per Lane Vol./</th>
<th>2018 ADT/</th>
<th>2018 Pk Hr Per Lane Vol./</th>
<th>2018 ADT/</th>
<th>2018 Pk Hr Per Lane Vol./</th>
<th>2018 ADT/</th>
<th>2018 Pk Hr Per Lane Vol./</th>
<th>2018 ADT/</th>
<th>2018 Pk Hr V/C/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton Blvd. (Lafayette River - Midtown Tunnel )</td>
<td>56,000</td>
<td>933</td>
<td>1.10</td>
<td>51,000</td>
<td>-9%</td>
<td>850</td>
<td>-9%</td>
<td>1.00</td>
<td>38,000</td>
<td>-32%</td>
<td>633</td>
<td>-32%</td>
<td>0.75</td>
<td>35,000</td>
</tr>
<tr>
<td>I-264 Downtown Tunnel</td>
<td>104,000</td>
<td>2,600</td>
<td>1.53</td>
<td>96,000</td>
<td>-8%</td>
<td>2,400</td>
<td>-8%</td>
<td>1.41</td>
<td>94,000</td>
<td>-10%</td>
<td>2,350</td>
<td>-10%</td>
<td>1.38</td>
<td>93,000</td>
</tr>
<tr>
<td>US 58 Midtown Tunnel</td>
<td>55,000</td>
<td>2,750</td>
<td>1.72</td>
<td>59,000</td>
<td>7%</td>
<td>2,950</td>
<td>7%</td>
<td>1.84</td>
<td>58,000</td>
<td>5%</td>
<td>2,900</td>
<td>5%</td>
<td>1.81</td>
<td>41,000</td>
</tr>
</tbody>
</table>

Access to Major Port Facilities

Provides New Direct Access to Norfolk International Terminals (NIT) | X | X | X | X
Implements Access to NIT | X | X | X | X
Implements Access to Newport News Marine Terminal and Newport News Shipbuilding | X | X | X | X
Implements Access to Portsmouth Marine Terminal | X | X | X | X
Provides New Direct Access to Craney Island (Possible location of 4th Marine Terminal) | X | X | X | X

Access to Naval Base Norfolk (NBN)

Provides New Direct Access to NBN | X | X | X | X
Implements Access to NBN | X | X | X | X
Implements Access between Naval Base Norfolk and the Naval Supply Center, Naval Hospital, and Naval Shipyard in Portsmouth | X | X | X | X

Multimodal Component

Ability to accommodate HOV lanes, Exclusive Bus Lanes, and/or Passenger Rail across Hampton Roads | X | X | X | X

Cost

| Cost Estimate ($ in Billions) | 1.2 | 2.0 | 2.7 |

1. Defined as the Hampton Roads 2018 Regional Transportation Plan, which is funded for $6 billion
2. Peak Hour Per Lane Volumes = (ADT/ number of lanes) *0.10
3. V/C calculated for conventional lanes of traffic only, does not include projected HOV traffic volumes using the multi-modal lanes
4. Range of per lane capacity = 1,600 - 2,250 for interstate facilities, Midtown Tunnel, James River Bridge, and VA 164; 825-875 for Hampton Blvd. and Jefferson Ave.
5. Cost Estimate in 1999 dollars
### TABLE S-3

**SUMMARY OF ENVIRONMENTAL CONSEQUENCES**

<table>
<thead>
<tr>
<th>Issue</th>
<th>CBA 1</th>
<th>CBA 2</th>
<th>CBA 9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relocations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Residential Units</td>
<td>128</td>
<td>128</td>
<td>38</td>
</tr>
<tr>
<td># Businesses</td>
<td>8</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td># Churches</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td># Community Facilities</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td># Government Bldg’s</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td># Utilities</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td># Total Relocations</td>
<td>138</td>
<td>141</td>
<td>49</td>
</tr>
<tr>
<td><strong>Environmental Justice</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relocations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Residences Occupied by</td>
<td>42</td>
<td>42</td>
<td>36</td>
</tr>
<tr>
<td>Minorities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Residences Occupied by</td>
<td>16</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>Persons of Low-Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Exceedances NAAQS 1-hour &amp; 8-hour criteria for CO</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Residences Approach or</td>
<td>554</td>
<td>539</td>
<td>187</td>
</tr>
<tr>
<td>Exceed NAC (Absolute Impact)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing along Alternative</td>
<td>368</td>
<td>373</td>
<td>66</td>
</tr>
<tr>
<td>No-Build along Alternative</td>
<td>388</td>
<td>394</td>
<td>110</td>
</tr>
<tr>
<td># Residences with Substantial Increase (Relative Impact)</td>
<td>11</td>
<td>11</td>
<td>25</td>
</tr>
<tr>
<td># Residences with both</td>
<td>43</td>
<td>43</td>
<td>27</td>
</tr>
<tr>
<td>Absolute and Relative Impacts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environmental Justice</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Residences Occupied by</td>
<td>178</td>
<td>155</td>
<td>176</td>
</tr>
<tr>
<td>Minorities w/Absolute Impacts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Residences Occupied by</td>
<td>82</td>
<td>72</td>
<td>51</td>
</tr>
<tr>
<td>Persons of Low Income w/Absolute Impacts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Protected Species</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federally Listed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loggerhead Sea Turtle and</td>
<td>No adverse impact due to</td>
<td>No adverse impact due to</td>
<td>No adverse impact due to</td>
</tr>
<tr>
<td>Kemp’s Ridley Sea Turtle</td>
<td>time of year restrictions on</td>
<td>time of year restrictions on</td>
<td>time of year restrictions on</td>
</tr>
<tr>
<td></td>
<td>dredging</td>
<td>dredging</td>
<td>dredging</td>
</tr>
<tr>
<td>Piping Plover</td>
<td>No Adverse Impact</td>
<td>No Adverse Impact</td>
<td>No Adverse Impact</td>
</tr>
<tr>
<td><strong>State Listed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dismal Swamp Shrew</td>
<td>No Adverse Impact</td>
<td>No Adverse Impact</td>
<td>No Adverse Impact</td>
</tr>
<tr>
<td>Peregrine Falcon</td>
<td>No Adverse Impact</td>
<td>No Adverse Impact</td>
<td>No Adverse Impact</td>
</tr>
<tr>
<td>Canebrake Rattlesnake</td>
<td>No Adverse Impact</td>
<td>No Adverse Impact</td>
<td>No Adverse Impact</td>
</tr>
<tr>
<td><strong>Marine Mammals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlantic Bottlenose Dolphin</td>
<td>Highly mobile species,</td>
<td>Highly mobile species,</td>
<td>Highly mobile species,</td>
</tr>
<tr>
<td>and Harbor Porpoise</td>
<td>impacts not expected</td>
<td>impacts not expected</td>
<td>impacts not expected</td>
</tr>
</tbody>
</table>

1. The No-Build is defined as the 2018 regional transportation plan. Projects included in the plan will require social and environmental impacts.
### Table S-3

**Summary of Environmental Consequences (Continued)**

<table>
<thead>
<tr>
<th>Issue</th>
<th>CBA 1</th>
<th>CBA 2</th>
<th>CBA 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Length of Waterbodies Crossed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridge Tunnel</td>
<td>5,750 meters (18,860 feet)</td>
<td>9,300 meters (30,505 feet)</td>
<td>14,750 meters (48,380 feet)</td>
</tr>
<tr>
<td>Bridged</td>
<td>3,285 meters (10,775 feet)</td>
<td>3,310 meters (10,855 feet)</td>
<td>185 meters (595 feet)</td>
</tr>
<tr>
<td>Culverted</td>
<td>205 meters (665 feet)</td>
<td>920 meters (3,010 feet)</td>
<td>1,650 meters (5,410 feet)</td>
</tr>
<tr>
<td>Impacts to Public Water Supply or Wellhead Protection Area?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Impact Sole Source Aquifer?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Water Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impacts to Public Water Supply or Wellhead Protection Area?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Impact Sole Source Aquifer?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Aquatic Resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benthic Habitat Impacted²</td>
<td>29-32 hectares (72-79 acres)</td>
<td>50-55 hectares (124-136 acres)</td>
<td>47-51 hectares (116-126 acres)</td>
</tr>
<tr>
<td>Benthic Habitat Created by the Island and Tunnel Armor Stone³</td>
<td>30-34 hectares (74-84 acres)</td>
<td>49-56 hectares (121-138 acres)</td>
<td>44-49 hectares (108-121 acres)</td>
</tr>
<tr>
<td>Wetlands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct (Encroachment)</td>
<td>0.56 hectares (1.40 acres)</td>
<td>3.38 hectares (8.40 acres)</td>
<td>4.55 hectares (11.29 acres)³</td>
</tr>
<tr>
<td>Indirect (Bridged)</td>
<td>0.90 hectares (2.22 acres)</td>
<td>2.00 hectares (4.95 acres)</td>
<td>1.45 hectares (3.58 acres)</td>
</tr>
<tr>
<td>Function/Value Assessment for Wetland Encroachments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1.26 hectares (3.13 acres)</td>
<td>2.96 hectares (7.35 acres)</td>
<td></td>
</tr>
<tr>
<td>Moderate to Low</td>
<td>0.06 hectares (0.16 acres)</td>
<td>1.38 hectares (3.43 acres)</td>
<td>1.33 hectares (3.31 acres)</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.46 hectares (1.14 acres)</td>
<td>0.70 hectares (1.74 acres)</td>
<td>0.25 hectares (0.63 acres)</td>
</tr>
<tr>
<td>Moderate to High</td>
<td>0.04 hectares (0.10 acres)</td>
<td>0.04 hectares (0.10 acres)</td>
<td></td>
</tr>
</tbody>
</table>

1. The No-Build is defined as the 2018 regional transportation plan. Projects included in the plan will require social and environmental impacts.
2. Range represents the difference between the concrete and the steel tunnel typical sections (see Section V.B).
3. In addition to the tunnel armor stone, the estimate for habitat area created by tunnels also includes the sediments which will settle after construction and reestablish as natural habitat for benthic species.
4. Of the 11.29 acres of wetlands directly impacted, 3.4 acres will be permitted for the I-564 Intermodal Connector project.
### TABLE S-3

**SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)**

<table>
<thead>
<tr>
<th>Issue</th>
<th>CBA 1</th>
<th>CBA 2</th>
<th>CBA 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historic Resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># NRHP Listed Sites</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td># NRHP Considered Eligible Historic Districts</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total # “Adverse Effect”</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Section 4(f) Resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of Publicly Owned Park, Recreation Area, Wildlife or Waterfowl Refuge?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Use of National Register listed, eligible, or considered eligible lands</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Hazardous Waste Sites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total # of Potential Properties</td>
<td>7</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>Farmlands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substantial Impacts to Prime, Unique, Statewide Important Soils?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Area of Prime Farmland Soils within Alternative</td>
<td>0.9 hectares (2.3 acres)</td>
<td>6.1 hectares (15.2 acres)</td>
<td>47.2 hectares (116.6 acres)</td>
</tr>
</tbody>
</table>

1. The No-Build is defined as the 2018 regional transportation plan. Projects included in the plan will require social and environmental impacts.
EXHIBIT S-1
RESOLUTION
OF THE
COMMONWEALTH TRANSPORTATION BOARD

July 20, 2000

MOTION

Made By: Mr. Prettyman  Seconded By: Mr. Humphreys  Action: Motion Carried

Title: Location: I-64 Hampton Roads Third Crossing

WHEREAS, in accordance with the statutes of the Commonwealth of Virginia and policies of the Commonwealth Transportation Board, Location Public Hearings were held from 4:00 p.m. to 7:00 p.m. on January 24, 2000, at the Heritage High School located at 5800 Marshall Avenue in the City of Newport News, March 1, 2000, at the Sewell’s Point Elementary School located at 7928 Hampton Boulevard in the City of Norfolk, and March 2, 2000, at the Churchland Academy Elementary School located at 4061 River Shore Road in the City of Portsmouth, for the purpose of considering the proposed Location of the I-64 Hampton Roads Third Crossing; State Project: 0064-114-F12, PE-102, Federal Project NH-64-3(341); and

WHEREAS, proper notice was given in advance, and all those present were given a full opportunity to express their opinions and recommendations for or against the proposed project as presented, and their statements being duly recorded; and

WHEREAS, the economic, social, and environmental effects of the proposed project have been examined and given proper consideration, and this evidence, along with all other, has been carefully reviewed.

NOW, THEREFORE, BE IT RESOLVED that the Location be approved as Candidate Build Alternative 9 in accordance with the plan as proposed and presented at the said Location Public Hearings by the Department’s Engineers.

####
The proposed segments for the Preferred Alternative and the construction sequence is:

1. A new bridge tunnel and roadway from existing Monitor Merrimac Memorial Bridge Tunnel to I-564 in Norfolk with 4 conventional travel lanes and 2 lanes for multimodal use. Widen I-564 in Norfolk to 8 conventional travel lanes and 2 multimodal use lanes.

2. A new bridge tunnel parallel to existing I-664 Monitor Merrimac Memorial Bridge Tunnel with two tubes of the tunnel carrying 4 conventional travel lanes and one tube carrying 2 multimodal use lanes.

3. A 4 lane connection from the new facility, just east of Craney Island, running south to VA 164 in Portsmouth.

4. Widen I-664 on the Peninsula to 8 conventional travel lanes and 2 additional lanes for multimodal use

5. Widen I-664 on the Southside to 6 conventional travel lanes

Candidate Build Alternative 9 requires fewer estimated residential relocations than either of the other two alternatives. Candidate Build Alternative 9 would require the relocation of 38 residential units, potentially impacting 101 people. Candidate Build Alternatives 1 and 2 would each require the relocation of 128 residential units, with both alternatives potentially impacting 368 people. Although minor, Candidate Build Alternative 9 is also the alternative that has the least disproportionate impact on minority populations as required by E.O. 12898 (Environmental Justice). Candidate Build Alternatives 1 and 2 relocate 42 residential units occupied by minorities and 16 residential units occupied by persons of low income. Candidate Build Alternative 9 relocates 36 minority residential units and 12 low income units.

VIII. ISSUES TO BE RESOLVED
There are no major unresolved issues.

IX. ONLY PRACTICABLE ALTERNATIVE FINDING
In accordance with Executive Orders 11988 and 11990, this portion of the FEIS documents the basis for the finding that the Preferred Alternative as described herein is the only practicable alternative.
A. FLOODPLAIN FINDING  
The No-Build Alternative is defined as the 2018 regional transportation plan. Projects included in the plan may impact existing 100 and 500-year return period floodplains. The No-Build Alternative is not practicable in that it does not meet project purpose and need.

Because of the crossing of Hampton Roads and the many waterbodies located in the region, each of the three Candidate Build Alternatives carried forward in the DEIS will impact 100-year floodplain areas as identified on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps. Because Candidate Build Alternative 9 was determined to be the only alternative that fully met the project’s purpose and need, it is considered to be the only practicable alternative. Candidate Build Alternative 9 will impact 100-year floodplains associated with the Hampton Roads, Elizabeth River, Craney Island Creek, Bailey Creek, Drum Point Creek, Goose Creek, and Streeter Creek. It will also impact coastal flooding zones (“V” zones) associated with the Hampton Roads and the Elizabeth River.

During the final design phase of the Preferred Alternative, a detailed Location Hydraulic Study will be performed in accordance with 23 CFR 650. The study will determine if the 100-year base flood elevations will increase due to the construction of the new facility within the impacted floodplains. The detailed hydraulic analysis will demonstrate that adequate measures will have been taken to ensure that any floodplain encroachments will not increase the risk of flooding to adjacent properties and comply with all federal, state, and local floodplain regulations (44 CFR Part 60.3, Floodplain management criteria for flood prone areas, and Part 65.12, Revision of flood insurance rate maps to reflect base flood elevations caused by proposed encroachments).

In accordance with Executive Order 11988 and 23 CFR 650 Subpart A, it has been determined that based on the above considerations, there is no practicable alternative to the proposed construction in floodplains, and the proposed action will include all practicable measures to minimize harm to floodplains which may result from such use.

B. WETLAND FINDING  
A comparison of wetland encroachments among the three alternatives carried forward in the DEIS revealed that each of the three alternatives contained wetlands. Because Candidate Build Alternative 9 was determined to be the only alternative that fully met the project’s purpose and need, it is considered
to be the only practicable alternative. The question then was what appropriate and practicable measures could be developed to minimize encroachments (e.g., design features, location of the alignment within the 1000' wide preferred corridor). Measures to avoid or minimize encroachment were analyzed as part of the FEIS process. As a result of those efforts, direct wetland encroachment was reduced from the 18 acres reported in the DEIS to 11.3 acres. Additional avoidance and minimization measures will be considered during final design activities. It should also be noted that of the 11.3 acres directly impacted by the Preferred Alternative, 3.4 acres will be included in the permit for the I-564 Intermodal connector project. An alternative analysis prepared in accordance with Section 404 of the Clean Water Act is provided in Appendix A. This wetlands finding is presented in accordance with Executive Order 11990.

Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.

X. OTHER FEDERAL ACTIONS AND PERMITS REQUIRED

Federal and state laws and regulations require that various environmental permits or approvals be acquired prior to the start of project-related construction activities. The following permits or compliances would be required:

- Compliance with Executive Order 11990 (protection of wetlands) and Section 404 permits (Clean Water Act) from the U.S. Army Corps of Engineers
- Section 10 permit (Rivers and Harbors Act) from the U.S. Army Corps of Engineers
- Virginia Water Protection Permit from the Commonwealth of Virginia, Department of Environmental Quality
- Subaqueous Bed Permit (Virginia Water Law) from the Virginia Marine Resources Commission
- U.S. Coast Guard permit
- Compliance with the Endangered Species Act (ESA)
- Compliance with Section 106 of the Natural Historic Preservation Act
- Compliance with Section 4(f) of the 1966 Department of Transportation Act
- Compliance with Executive Order 12898 on Environmental Justice
Approvals of various types also may be required for highway projects. A consistency determination related to the Coastal Zone Management Act would be required because the project is located in the coastal zone. Approvals under Virginia’s Chesapeake Bay Protection Act are not required because public roads are exempt from the requirement of that Act provided the project complies with the requirements of the erosion and sediment control standards and the stormwater management standards. The project will be constructed in accordance with the Erosion and Sediment Control Law and Stormwater Management Act.

As discussed previously, this project will be designed and built in segments. This approach can be adopted because each of the proposed segments of Candidate Build Alternative 9, the Preferred Alternative, has logical termini and independent utility and each segment independently contributes to serving the project’s primary purpose and underlying needs. Because each of the segments will require years of engineering design and construction, and because each may require sequential identification of separate or non-traditional funding sources, it is proposed that Section 404 permits be issued as each segment enters the final design process.

Sequential design and construction of large complicated projects is consistent with FHWA regulations and guidance (23 CFR 771.111 (f)(1) and Development of Logical Project Termini). It is also consistent with the Corp of Engineers’ general policy of only permitting highway construction projects that have independent utility and logical termini and represent single and complete projects.
CHAPTER 1

PURPOSE AND NEED

I. DESCRIPTION OF THE STUDY AREA

The study area for the Hampton Roads Crossing Study encompasses a 170 square kilometer (650 square mile) area. “Hampton Roads” is the name of the water body and harbor located between the mouth of the James River (to the west) and the Chesapeake Bay (to the east). However, the term “Hampton Roads” has been adopted locally, and in this document, to also refer to the metropolitan region that surrounds the Hampton Roads Harbor in southeastern Virginia (Figure 1-1).

Land masses define the Hampton Roads region’s north and south sides. The Peninsula is that land mass north of the Hampton Roads harbor, and is generally considered to end at the City of Williamsburg. For this study, it includes the cities of Hampton, Poquoson, and Newport News, as well as York County. The Southside is that land mass extending south of the Hampton Roads harbor to the Virginia/North Carolina state line. For this study, it includes the cities of Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach, as well as Isle of Wight County (Figure 1-2).

II. NEED FOR TRANSPORTATION IMPROVEMENTS

Section 1107 of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) allocated demonstration funds for “…highway projects demonstrating innovative techniques of highway construction and finance.” The 1-64 crossing of Hampton Roads was included as one of these innovative projects. In 1992, the Virginia General Assembly passed Joint Resolution 132, which directed the Virginia Department of Transportation (VDOT) to conduct a study on the Hampton Roads Bridge Tunnel. The VDOT study found that short-term measures would not solve congestion at the Hampton Roads Bridge Tunnel, and that a long-term, large-scale solution would be required.

The Purpose and Need Study identified the transportation problems in the Hampton Roads region specifically concentrating on transportation deficiencies as they are related to transportation needs between the Peninsula and the Southside. The details of the Purpose and Need Study were presented in the Hampton Roads Crossing Study Final Purpose and Need Statement and Technical Appendix (Purpose and Need Document) of November of 1994.
FIGURE 1-1
REGIONAL LOCATION MAP
The Purpose and Need Study considered all modes of transportation operating in the Hampton Roads region. These include the following:

- Highways
- Aviation Facilities
- Waterways and Port Facilities
- Rail
- Public Transit
- Bicycle and Pedestrian Facilities

Trends in the use of each mode were analyzed and were presented in the Purpose and Need Document. In addition, performance or capacity deficiencies of each were noted. The performance analysis included analyses of capacity, accident statistics, and system linkage. In order to better understand the effectiveness of the transportation system, intermodal transfer points, existing alternatives to single occupant vehicle (SOV) facilities, environmental factors related to transportation, and emergency evacuation needs were also examined. Table 1-1 provides a summary of the transportation issues, trends and deficiencies presented in the Purpose and Need Document.

III. PROJECT PURPOSE AND SUPPORTING NEEDS

The Purpose and Need Document identified a project purpose, supported by transportation needs in the region that must be addressed in order to meet that purpose.

B. PROJECT PURPOSE

The primary project purpose is to develop and analyze intermodal alternatives that can work together to improve accessibility, mobility, and goods movement in the Hampton Roads metropolitan area to help relieve the congestion that occurs at the existing I-64 Hampton Roads Bridge Tunnel.

B. PROJECT NEEDS SUPPORTING THE PROJECT PURPOSE

In order to satisfy the project purpose, certain project needs must be addressed. The Purpose and Need Document presented three categories of needs:

- The combination of the decreasing performance of the transportation system and increasing pressures due to growth in population and employment, emphasizes the need to develop inter-
### TABLE 1-1

**TRANSPORTATION ISSUES, TRENDS AND DEFICIENCIES**

(Table taken from the 1994 Purpose and Need Statement and Technical Appendix)

<table>
<thead>
<tr>
<th>TRANSPORTATION ISSUE OR MODE</th>
<th>TRENDS</th>
<th>DEFICIENCIES</th>
</tr>
</thead>
</table>
| Highways                         | ♦ Volumes on 1-64 are expected to increase 95% by 2015  
♦ Volumes on 34% of the proposed NHS in the study area are expected to increase over 100% by 2015  
♦ Volumes on VA 44 are expected to increase 87% by 2015  
♦ Volumes on US 17 are expected to increase 117% by 2015 | ♦ 57% of 1-64 currently operates at LOS F  
♦ By 2015, 100% of 1-64 will be functioning at LOS F  
♦ 25% of the proposed NHS in Hampton roads currently operates at LOS E or F  
♦ 18% of the proposed NHS operates at LOS F  
♦ By 2015, nearly 50% of the proposed NHS will be functioning at LOS E or F  
♦ By 2015, approximately 42% of the NHS will be functioning at LOS F |
| Aviation                         | ♦ Passenger enplanements at the Norfolk International Airport increased 40.7% from 1980 to 1990 and cargo increased 24% from 1991 to 1992  
♦ Passenger enplanements increased by 44.5% at the Newport News/Williamsburg International Airport from 1980 to 1990 and cargo decreased by 20% from 1991 to 1992  
♦ 89% of airplane trips taken by residents of the Peninsula and Southside departed from Norfolk International in 1990 | ♦ Neither rail nor transit serves airport passengers at either the Norfolk International Airport or the Newport News/Williamsburg International Airport |
♦ The port facilities in Norfolk, Newport News, and Portsmouth are expanding to meet projected increased demand  
♦ Truck traffic into the ports is expected to increase by at least 100% by the year 2010  
♦ The interaction and movement of goods between the local port facilities is significant and impacts many of the study routes | ♦ Highway and rail access to the port facilities must be improved from the west to accommodate growth and intermodal transfer of goods |

12/11/00
### TABLE 1-1 (Con’t)

**TRANSPORTATION ISSUES, TRENDS AND DEFICIENCIES**

(Table taken from the 1994 Purpose and Need Statement and Technical Appendix)

<table>
<thead>
<tr>
<th>TRANSPORTATION ISSUE OR MODE</th>
<th>TRENDS</th>
<th>DEFICIENCIES</th>
</tr>
</thead>
</table>
| Rail                          | ♦ Amtrak ridership increased 29% from 1989 to 1991  
♦ Rail moves over 27 million metric tons (30 million gross tons) of general freight per year on the Southside and the Peninsula  
♦ In addition to general freight, CSXT moved 11 million metric tons (12 million gross tons) of coal on the Peninsula in 1993  
♦ On the Southside, Norfolk Southern moved 25 million metric tons (27.5 million gross tons) of coal in 1993  
♦ Rail cargo levels are increasing as goods movements increase at the port facilities | ♦ Amtrak does not directly access the Southside  
♦ The only access to and from the Southside is via a special bus  
♦ Southside demand for Amtrak services is increasing  
♦ There are no light rail facilities in the study area  
♦ The heavy rail facilities on the Southside and Peninsula are not linked | |
| Public Transit                | ♦ TRT ridership decreased 43% from 1980 to 1993  
♦ Pentran ridership increased 17% from 1980 to 1993  
♦ Only 2% of all commuters in the region use public transit  
♦ Commuter bus service connects the Southside and the Peninsula through the Hampton Roads Bridge Tunnel and the Monitor-Merrimac Memorial Bridge Tunnel | ♦ There are only two transit connections between the Southside and the Peninsula  
♦ Due to increased development activity, Pentran may require new routes to connect the shopping centers along Jefferson Ave and Denbigh Blvd.  
♦ Pentran may require expanded route service north of Denbigh Blvd. on Jefferson Ave.  
♦ Current Pentran service does not meet demand for Sunday service on the fixed route system  
♦ TRT needs to implement a trunk system to connect major activity centers on the Southside. TRT needs to maximize timed transfer opportunities and provide additional express/HOV services  
♦ There is a need for TRT service expansion to southern Virginia Beach, Kempsville, western Portsmouth, Northampton Blvd., Lynnhaven Mall, Greenbrier Mall, and Suffolk |
<table>
<thead>
<tr>
<th>TRANSPORTATION ISSUE OR MODE</th>
<th>TRENDS</th>
<th>DEFICIENCIES</th>
</tr>
</thead>
</table>
| Bicycle and Pedestrian Facilities | ♦ There are approximately 169 kilometers (105 miles) of bikeways in the study area  
♦ Bicycle facilities are mainly used for recreational travel in the study area | ♦ There are no bicycle or pedestrian linkages between the Southside and Peninsula  
♦ Neither bikeways nor pedestrian facilities provide any regular relief from congestion |
| Intermodal Transfer Points | ♦ There are 58 transfer points in the study area | ♦ Of the 58 transfer points, 25 are port facilities and 20 are park and ride lots  
♦ There are only 13 other transfer points |
| Alternatives to Single Occupancy Vehicle (SOV) Facilities | ♦ 76% of the commuters in Hampton Roads use SOV facilities  
♦ 15% carpool  
♦ 2% use public transit  
♦ There are 27 kilometers (17 miles) of High Occupancy Vehicle (HOV) lanes on the Southside  
♦ Alternatives to SOV facilities are currently under study in Hampton Roads | ♦ There are no HOV facilities on the Peninsula  
♦ Other than the HOV facilities on the Southside, there are currently no substantial alternatives to SOVs in the region |
| Environmental Factors | ♦ The area is currently classified as a marginal non-attainment area for ozone  
♦ Non-point sources, such as highways, are contributors to water pollution primarily through water runoff containing petroleum product residues | ♦ In order to meet the requirements of the Clean Air Act, the region must implement transportation solutions that help to reduce Vehicle Miles Traveled and emissions  
♦ The Hampton Roads area must develop transportation alternatives that minimize the impact to water quality, particularly to the Chesapeake Bay |
| Emergency Services | ♦ Within the last century, there have been three severe hurricanes  
♦ An average of two hurricanes a year come close enough to affect Virginia | ♦ There is a need to efficiently evacuate the “at risk” population in the event of an emergency |
modal alternatives that can work together to improve accessibility, mobility, and goods movement in the Hampton Roads area.

♦ There is a need to address the decreasing performance of the transportation system in a manner which will positively contribute to the most cost effective utilization of transportation investments that have already been made in the region.

♦ Of equal importance in planning for transportation needs in the Hampton Roads area is environmental protection and enhancement.

Criteria were developed to evaluate each alternative’s ability to meet the project purpose and the underlying needs that must be addressed in order to satisfy the project purpose. Those criteria and their relationship to both the project purpose and needs are identified in Table 1-2.

IV. MAJOR FINDINGS OF THE PURPOSE AND NEED STUDY

A. HAMPTON ROADS BRIDGE TUNNEL CONGESTION STUDY

A contributor to congestion at the Hampton Roads Bridge Tunnel is the fact that the facility frequently operates at capacity during the peak hour. As daily volumes continue to grow, congestion is likely to spread out over a longer time period. The duration of congested periods will increase causing the “rush hour” to become a “rush period” (Figure 1-3). If no improvements are made by the year 2015, westbound traffic could experience peak conditions between 6 AM and 8 PM, and eastbound peak conditions could exist between 6AM and 6 PM. (The westbound peak is slightly higher because of the slightly reduced capacity in the older tunnel.) It should be noted that these results assume average weekday, incident-free travel. Therefore this is a conservative estimate of peak-hour spread.

The projected growth in traffic and the extension of the peak-hour spread are expected to contribute to a growth in the number of incidents occurring at the Hampton Roads Bridge Tunnel. As incidents grow, the number of vehicles caught in periods of congestion will likely grow. In 1995, the Highway Advisory Radio warning message was activated 243 times to alert motorists of delays at the Hampton Roads Bridge Tunnel of 15 minutes or more. However, information contained in a report prepared by the VDOT’s Suffolk District in 1993 indicates that the actual number of delays and periods of congestion are far more, numbering an average of seven a day. If no improvements are made by 2015, the number of incidents causing delays of 15 minutes or longer at the Hampton Roads Bridge Tunnel could reach 21 a day or nearly one every hour. These estimates are conservative, in that they are based
# TABLE 1-2

**CRITERIA FOR EVALUATING PROJECT PURPOSE AND PROJECT NEEDS**

<table>
<thead>
<tr>
<th>Project Purpose</th>
<th>Evaluation Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>The primary project purpose is to develop and analyze intermodal alternatives</td>
<td>2. Will the alternative reduce peak hour volumes at the Hampton Roads Bridge Tunnel by 10 percent or more?</td>
</tr>
<tr>
<td>that can work together to improve accessibility, mobility, and goods movement in</td>
<td></td>
</tr>
<tr>
<td>the Hampton Roads metropolitan area to help relieve the congestion that occurs</td>
<td></td>
</tr>
<tr>
<td>at the existing 1-64 Hampton Roads Bridge Tunnel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Will the alternative address existing and future Origin and Destination patterns between the Southside and the Peninsula?</td>
</tr>
<tr>
<td></td>
<td>8. Will the alternative provide a direct connection to the major ports or serve as a major freight corridor?</td>
</tr>
<tr>
<td></td>
<td>9. Will the alternative connect to an existing expressway on the Peninsula and the Southside?</td>
</tr>
<tr>
<td></td>
<td>10. What is the relative cost of the alternative?</td>
</tr>
<tr>
<td></td>
<td>11. What is the relative ease of implementing the alternative?</td>
</tr>
<tr>
<td>“The combination of the decreasing performance of the transportation system and</td>
<td></td>
</tr>
<tr>
<td>increasing pressures due to growth in population and employment, emphasizes the</td>
<td></td>
</tr>
<tr>
<td>need to develop intermodal alternatives that can work together to improve</td>
<td></td>
</tr>
<tr>
<td>accessibility, mobility, and goods movement in the Hampton Roads area.”</td>
<td></td>
</tr>
<tr>
<td>“There is a need to address the decreasing performance of the transportation</td>
<td></td>
</tr>
<tr>
<td>system in a manner which will positively contribute to the most cost effective</td>
<td></td>
</tr>
<tr>
<td>utilization of transportation investments that have already been made in the</td>
<td></td>
</tr>
<tr>
<td>region.”</td>
<td></td>
</tr>
<tr>
<td>“Of equal importance in planning for transportation needs in the Hampton Roads</td>
<td></td>
</tr>
<tr>
<td>area is environmental protection and enhancement.”</td>
<td></td>
</tr>
</tbody>
</table>
FIGURE 1-3
2015 NO-BUILD
PEAK PERIOD SPREAD
on the assumption that the rate of incidents will grow at only twice the rate of average daily traffic (ADT), while between 1993 and 1994 alone, incidents increased nearly 20 times the growth in ADT.

B. REGIONAL TRANSPORTATION DEMANDS STUDY
Because social and economic demand are often key factors in determining a project's need (USDOT FHWA, 1987), the Purpose and Need Document examined the key economic factors for the Hampton Roads region. These included:

- **Accessibility** – Access between the Southside and the Peninsula is currently limited to three crossings, and congestion at two (i.e. Hampton Roads Bridge Tunnel, James River Bridge) of these crossings affect commuting and goods movement. Current access is not sufficient to accommodate new growth areas.

- **Population and Employment** – New population and employment growth in all areas of the region will increase the pressure on the transportation system to provide connections to jobs and services.

- **Military Facilities** – The transportation network must support the movement of supplies and people to and from the military bases located throughout the study area.

- **Tourism** – The tourism industry generates an estimated 4 million visitors each year that use the transportation network (Virginia Business, 1993). According to a 1992 Virginia Beach Overnight Visitor profile, the primary mode of transportation for tourists is the automobile. The transportation network needs to continue to support the region’s growing tourism industry.

- **Port and Shipbuilding Facilities** – The port and shipbuilding industry has a large presence in Hampton Roads. Expected increases in tonnage will continue to increase the volumes of freight moving to and from the local ports via freight rail, highways, and waterways. Linking port facilities to the transportation network is required to improve the efficient transfer of goods and to maintain the economic growth and vitality of the port facilities. Therefore the transportation network must grow to support this growing component of the Hampton Roads region's economic base.
V. USE OF PROJECT PURPOSE AND NEED IN ALTERNATIVE DEVELOPMENT

The evaluation criteria identified in Table 1-2 were used to develop alternatives that best met both the project purpose and the supporting project needs. The various alternatives suggested and considered for this project were then tested against each of these criteria. A detailed discussion of alternatives considered is included in Chapter 2 of this Draft Environmental Impact Statement.
CHAPTER 2

ALTERNATIVES CONSIDERED

I. INTRODUCTION – ALTERNATIVES DEVELOPED

A range of possible alternatives was considered for this project. The consideration of alternatives began with the Hampton Roads Crossing Study Major Investment Study (MIS) (VDOT, 1997) and is concluding in this FEIS. The alternatives, the analysis of each of the alternatives, and the reasons for the dismissal of certain alternatives during the three-step screening process developed for the MIS has been incorporated into this FEIS. The incorporation of the range of MIS alternatives and their analysis into this FEIS is consistent with the intent of both Council of Environmental Quality (CEQ) and Federal Highway Administration (FHWA) regulations (40 CFR 1500 and 23 CFR 771 respectively).

As discussed below, the development of the range of alternatives and the screening process was developed through a series of public meetings and in cooperation with the Hampton Roads Crossing Study Coordinating Committee (Coordinating Committee). The Coordinating Committee was established by VDOT and included: FHWA; Federal Transit Administration (FTA); VDOT; Virginia Department of Rail and Public Transportation (VDRPT); representatives of the Hampton Roads Metropolitan Planning Organization; local public officials; and environmental agency representatives. The Coordinating Committee also included representatives from transit commissions, rail providers, port operators, and the military.

II. THE SCREENING AND SELECTION PROCESS

After the Purpose and Need Document received concurrence from the U.S. Fish and Wildlife Service (USFWS), FHWA, National Marine Fisheries Service (NMFS), U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (Corps) and the Coordinating Committee (November of 1994), a Major Investment Study (MIS) was conducted in accordance with the Joint Statewide and Metropolitan Planning Regulations (23 CFR 450).

The primary purpose of the MIS was to identify alternatives that addressed the transportation needs presented in the Purpose and Need Document. As discussed above, the range of alternatives developed for the MIS was developed in accordance with appropriate federal regulations (40 CFR 1502.14 (a); 23 CFR 771.123(c)) and FHWA TA 6640.8A to facilitate preparation of the NEPA documentation. The
MIS alternatives developed and the consideration of each has been incorporated into this FEIS. To determine those alternatives that would be carried forward for detailed study in the DEIS three sequenced screenings were conducted.

A. FIRST SCREENING OF ALTERNATIVES
The Hampton Roads Crossing Study initially developed a broad range of 45 alternatives that ranged from congestion management strategies to constructing a new crossing. This broad range of alternatives was developed through comments received from two sets of public meetings (August 10 and 11, 1994 and March 8 and 9, 1995) and meetings of the Coordinating Committee.

For the first screening of alternatives, criteria were developed to evaluate each alternative’s ability to meet the project purpose and its underlying needs. Those criteria and their relationship to both the project purpose and needs are identified in Table 2-1. In the first screening, each of the 45 alternatives was tested against each of these evaluation criteria.

Following this evaluation, 39 alternatives were eliminated from detailed study. Six alternatives were carried forward into the second screening (discussed below). These remaining six alternatives included the Operational Alternatives and five wide Transportation Corridors (Figure 2-1). The six alternatives were presented to the Coordinating Committee and were also presented at a third set of public meetings (September 20 and 21, 1995). The details of the evaluation of each of the 45 alternatives, including a list of alternatives, the screening criteria, and the screening results, are presented in Appendix A (Final Level I Analysis of Hampton Roads Crossing Solutions, September 1995).

B. SECOND SCREENING OF ALTERNATIVES
Following a meeting of the Coordinating Committee, where concurrence on alternatives dismissed from further consideration and alternatives carried forward was obtained, a third set of public meetings was held. The evaluation criteria and the results of the first screening (i.e., alternatives dismissed from further consideration and alternatives carried forward) were presented for public comment. After receiving public comments, iterations of each of the five wide Transportation Corridors and Operational Alternatives were subjected to an engineering feasibility analysis. In addition, each of the alternatives was analyzed to determine its ability to continue to meet the required traffic relief criterion. That criterion was defined as the ability of the alternative to reduce peak hour traffic at the Hampton Roads...
FIGURE 2-1
FIVE WIDE TRANSPORTATION CORRIDORS CARRIED FORWARD TO SECOND SCREENING
**TABLE 2-1**

**CRITERIA FOR EVALUATING PROJECT PURPOSE AND PROJECT NEEDS**

<table>
<thead>
<tr>
<th>Project Purpose</th>
<th>Evaluation Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>The primary project purpose is to develop and analyze intermodal alternatives</td>
<td>3. Will the alternative reduce peak hour volumes at the Hampton Roads Bridge Tunnel by 10 percent or more?</td>
</tr>
<tr>
<td>that can work together to improve accessibility, mobility, and goods movement in</td>
<td></td>
</tr>
<tr>
<td>the Hampton Roads metropolitan area to help relieve the congestion that occurs at</td>
<td></td>
</tr>
<tr>
<td>the existing I-64 Hampton Roads Bridge Tunnel.</td>
<td></td>
</tr>
<tr>
<td><strong>Project Needs</strong></td>
<td><strong>Evaluation Criteria</strong></td>
</tr>
<tr>
<td>“The combination of the decreasing performance of the transportation system and</td>
<td>12. Will the alternative address existing and future Origin and Destination patterns between the Southside and the Peninsula?</td>
</tr>
<tr>
<td>increasing pressures due to growth in population and employment, emphasizes the</td>
<td>13. Will the alternative provide a direct connection to the major ports or serve as a major freight corridor?</td>
</tr>
<tr>
<td>need to develop intermodal alternatives that can work together to improve</td>
<td></td>
</tr>
<tr>
<td>accessibility, mobility, and goods movement in the Hampton Roads area.”</td>
<td></td>
</tr>
<tr>
<td>“There is a need to address the decreasing performance of the transportation system in a manner which will positively contribute to the most cost effective utilization of transportation investments that have already been made in the region.”</td>
<td>14. Will the alternative connect to an existing expressway on the Peninsula and the Southside?</td>
</tr>
<tr>
<td>“Of equal importance in planning for transportation needs in the Hampton Roads area is environmental protection and enhancement.”</td>
<td>15. What is the relative cost of the alternative?</td>
</tr>
<tr>
<td>16. What is the relative ease of implementing the alternative?</td>
<td></td>
</tr>
</tbody>
</table>
Bridge Tunnel by 10% or more. This analysis utilized the Hampton Roads Crossing Study Regional Traffic Model developed for this project. Prior to this project, there were two separate traffic models, one for the Peninsula and one for the Southside. The new model combined and refined these two separate models. Details concerning this new model and its development are found in the *Hampton Roads Crossing Study Compendium of Technical Traffic Information* (VDOT, July 1996).

Based on this second screening, certain alternatives were eliminated from further study. In addition, some possible alternative components (e.g., high level bridges) were eliminated from further study, and some were slightly modified. Finally, the three alternatives which crossed Hampton Roads and the alternative along the CSXT railroad corridor were combined to form eleven individual Transportation Corridors. These eleven Transportation Corridors were carried forward in the MIS for the third screening.

1. **Alternatives Eliminated from Detailed Study in Second Screening**

   a. **US 460 Corridor**

   The Origin and Destination study performed as part of the new regional transportation model development found that in 2015, approximately 7.5% (or approximately 18,000 trips) of all trips crossing between the Peninsula and Southside are expected to have either an origin or a destination outside the region. Approximately 1% (or approximately 2,400 trips) of all 2015 trips are expected to have both an origin and destination outside the region. These 20,400 trips comprise a pool from which diversions could be made away from the existing crossings and the I-64 corridor, and into a new corridor. Full implementation of the TSM center and other intelligent transportation systems such as Advanced Traveler Information Systems could optimize diversions.

   The effectiveness of diverting trips to an expressway that would parallel the US 460 corridor from Suffolk to I-295 at Petersburg was evaluated as a solution that might meet the purpose and need of relieving congestion at the I-64 Hampton Roads Bridge Tunnel. Although a US 460 option could reduce total crossing trips, it was found that on an average day the US 460 option would only reduce congestion at the Hampton Roads Bridge Tunnel by approximately three percent (3%) over the 2015 No-Build condition, falling short of the 10% reduction criteria for this project. This indicated that an independent non-crossing solution to the problems investigated in the Hampton Roads Crossing Study would not meet the project purpose and need.
However, working in conjunction with any of the Transportation Corridors, a US 460 option could provide added benefits to the region. For example, during the peak tourist season, a total of approximately 35,000 additional visitor trips are made each day across Hampton Roads headed for tourist destinations in the region or in North Carolina. Approximately 50% of these additional trips use the Hampton Roads Bridge Tunnel, 30% use the I-664 Monitor Merrimac Memorial Bridge Tunnel, and 20% use the US 17 James River Bridge. During the tourist season, these visitor trips could be added to the potential diversionary pool discussed above, forming a total pool of approximately 55,400 trips. A rerouting of these trips would provide additional capacity at existing and future crossings, thereby allowing the crossings to better serve the primary local trips between the Southside and the Peninsula.

The US 460 corridor is included in a separate planning and environmental study, the TransAmerica Corridor Feasibility Study. The purpose of this study is to identify and evaluate transportation improvements linking Beckley, West Virginia to the Virginia localities of Roanoke, Lynchburg, Petersburg, and Virginia Beach.

b. Operational Alternatives
The Operational Alternatives, which would involve operational improvements to the existing transportation system, were examined. The Operational Alternatives examined were: transportation demand management (TDM) strategies; transportation systems management (TSM) strategies; congestion pricing; improved bus service; bikeways; and pedestrian trails.

The TSM and TDM strategies do not reduce 2015 average annual No-Build volumes at the Hampton Roads Bridge Tunnel by 10% or more, and have been eliminated from detailed study as stand-alone options. However, each of the Transportation Corridors can operate in conjunction with other implemented and planned TSM and TDM strategies for the Hampton Roads region.

The provision of bikeways and pedestrian trails as stand-alone options would not meet the purpose and need of the project. Additionally, law currently prohibits bicycles and pedestrians from traveling on Interstate highways. None of the Transportation Corridors interfere with the operation of existing or planned bikeway or pedestrian trails on the Peninsula or Southside.

The opportunity to improve bus service between the Peninsula and Southside is provided as a part of each Transportation Corridor through the incorporation of the multi-modal tube for each tunnel crossing of Hampton Roads (see typical section, Figure 2-6).
c. High Level Bridges

High level bridges were considered for all of the Transportation Corridors crossing Hampton Roads, but were eliminated from further study. A high-level bridge crossing near the Hampton Roads Bridge Tunnel or at the Elizabeth River crossing would conflict with the required clear zone of the Norfolk Naval Air Station. Also, the Navy historically has opposed a high level bridge over channels used by their ships in the Hampton Roads area. Additionally, concern has been expressed by the Hampton Roads Maritime Association that a high level bridge may limit ship size and hinder future access to the ports of Hampton Roads. There was general concurrence from the Hampton Roads Crossing Study Coordinating Committee to eliminate high level bridges from further detailed study.

d. Grades Flatter Than Three Percent for Freight Rail/High-Speed Passenger Rail

A heavy freight rail or high-speed passenger rail crossing that would connect southern Newport News with Norfolk International Terminal was initially evaluated. The grades required for conventional passenger rail and rapid transit are compatible with the design parameters established for the existing and proposed bridge-tunnels across Hampton Roads (i.e. grades 3% or higher). However, the current state of technology and normal methods of operation for heavy freight rail and high-speed passenger rail require grades of one percent or less. Based on the flatter grades, a tunnel for heavy freight rail or high-speed passenger rail would extend for over a mile beyond a practical landing point at Norfolk International Terminal. There was general concurrence from the Hampton Roads Crossing Study Coordinating Committee to limit grades in the tunnel to three percent or greater.

Future technological developments or changes in current operational methods may allow high-speed passenger rail or heavy freight rail to travel through tunnels with grades of three percent or greater.

2. Alternatives Carried Forward to the Third Screening

a. No-Build

The No-Build was defined in the MIS as currently planned highway, bicycle, pedestrian, and transit improvements defined in the Hampton Roads 2015 Regional Transportation Plan (HRPDC, 1995a). Existing roadways would continue to be maintained and operated. The No-Build also included ongoing Transportation Demand Management and Congestion Management System activities. These activities are identified in the following documents: Congestion Mitigation and Air Quality Program (HRPDC,
Intelligent Vehicle-Highway System (IVHS) Activities in the Virginia Department of Transportation, April 1994 Update (Virginia Transportation Research Council, 1994); and the Hampton Roads 2015 Regional Transportation Plan.

b. Transportation Corridors

- Corridor 1 would provide a new crossing parallel to the existing I-64 Hampton Roads Bridge Tunnel.
- Corridors 2, 3, 5, 6, 8, 9, 10, and 11 would provide a new crossing from Newport News to Norfolk, and each provide a direction connection from the Peninsula to Norfolk International Terminals and Naval Base Norfolk. Each of these corridors would improve access between Norfolk and Newport News Marine Terminal and Newport News Shipbuilding and Drydock Company.
- Corridors 4 and 7 would provide a crossing parallel to the existing I-664 Monitor Merrimac Memorial Bridge Tunnel.
- Corridors 8, 9, 10, and 11 would provide a new interchange located south of the existing I-664 Monitor Merrimac Memorial Bridge Tunnel, and each would provide a new connection from Southside I-664 to Norfolk.
- Corridors 3, 6, 9, and 11 would provide a new connection to VA 164 in Portsmouth, and each provide a new direction connection from VA 164 to Norfolk International Terminals and Naval Base Norfolk. Each of these corridors would improve access between Naval Base Norfolk and the Naval Hospital, Naval Shipyards, and Naval Supply Center located in Portsmouth.
- Corridors 5, 6, 7, 10, and 11 would provide a new transportation facility along the CSXT railroad corridor from downtown Newport News to I-64 near Bland Boulevard.

Each of the Transportation Corridors would include a three tube tunnel crossing. Two of the tubes would carry two travel lanes each for conventional traffic. The third tube could be used for multi-modal purposes. These purposes could include reversible HOV lanes, an exclusive busway, exclusive truck lanes, and/or a passenger rail system.

Each of the 11 Transportation Corridors (Figure 2-2) carried forward to the third screening were originally represented as an area within which a narrower transportation facility could be placed. Conceptual engineering studies were completed for the second screening of alternatives, and it was determined that a functioning facility could be built within each Transportation Corridor. The
Transportation Corridors and the associated transportation facilities within each were developed through a process of progressively narrowing down wide corridors using environmental and socio-economic data gathered from secondary data sources and field verification.

The narrowing process was facilitated by use of the project GIS which was developed in consultation with, and demonstrated for, representatives from various environmental resource agencies (i.e. U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and the U.S. Army Corps of Engineers). The narrowing process involved four (4) steps. The steps were:

1) The initial, 600-meter (2,000-foot) wide corridors were overlain with pertinent environmental and socio-economic information.

2) The 600-meter (2,000-foot) wide corridors were further narrowed to 300-meter (1,000-foot) wide corridors occupying linear areas within each of the 600-meter (2,000-foot) wide that were identified by the GIS as areas of fewer impacts.

3) A 150-meter (500-foot) wide corridor was identified within each 300-meter (1,000-foot) wide corridor, representing the areas where the fewest impacts were expected to occur. The environmental data presented in the third screening (MIS) was based on this corridor width of 150 meters (500 feet).

4) Finally, a conceptual engineering alignment and right-of-way, developed on current digital mapping, was placed within each 150-meter wide (500-foot) corridor. That alignment and associated right-of-way represented an actual possible alignment of which the construction would result in the fewest impacts within each of the 11 Transportation Corridors. The social and economic discussion and parkland inventory presented in the third screening (MIS) was based on this corridor width of 85 meters (275 feet).

C. THIRD SCREENING OF ALTERNATIVES

In addition to documenting the process used for the first two screenings, the primary purpose of the MIS was to present the results of the third screening of potential alternatives. As stated above, eleven individual Transportation Corridors were presented in the MIS along with the No-Build Alternative. The MIS examined financial requirements for, and effectiveness of, various solutions to address the transportation problem, and as required by the regulations, it also evaluated potential environmental effects within the Transportation Corridors so that a locally preferred corridor could be selected.
1. Evaluation Criteria

The third screening of alternatives applied both quantitative and qualitative analysis to the evaluation criteria utilized in the first screening discussed above. Table 2-2 summarizes the evaluation criteria results for the No-Build and each of the 11 Transportation Corridors studied in the MIS. The evaluation criteria for the third screening of alternatives included:

- Will the alternative reduce peak hour volumes at the Hampton Roads Bridge Tunnel by 10 percent or more?
- Will the alternative address existing and future Origin and Destination patterns between the Peninsula and the Southside?
- Will the alternative provide a direct connection to the major ports or serve as a major freight corridor?
- Will the alternative connect to an existing expressway on the Peninsula and the Southside?
- What is the relative cost of the alternative?
- What is the relative ease of implementing the alternative?

a. Reduce Hampton Roads Bridge Tunnel volumes by 10% or more

The percent change in annual average daily traffic volumes and per lane traffic volumes as compared to the No-Build are included in Table 2-2. This information came from the new regional transportation model developed for the Hampton Roads Crossing Study. A decrease in the per lane volumes indicates a decrease in congestion. Each of the Transportation Corridors reduced 2015 per lane traffic volumes at the Hampton Roads Bridge Tunnel by ten percent or more.

Table 2-2 also presents the volume/capacity (V/C) ratio for the No-Build and each Transportation Corridor based on the provision of additional conventional traffic lanes. V/C ratios less than 1 are operating with less volume than the capacity of the facility. Those that are greater than 1 are operating with more volume than the capacity of the facility. Therefore, the higher the number, the greater the congestion and delay expected in the year 2015. Each of the Transportation Corridors is expected to reduce the V/C ratio at the Hampton Roads Bridge Tunnel as compared to the No-Build (Table 2-2).

b. Address existing and future origin and destination patterns between the Peninsula and Southside

Origin and destination data for trips across the Hampton Roads Bridge Tunnel, Monitor Merrimac Memorial Bridge Tunnel, and the James River Bridge were collected by VDOT in 1992 and 1993, and
THIS PAGE INTENTIONALLY LEFT BLANK
## Third Screening of Solutions

### Project Purpose and Supporting Needs

**Project Purpose**

The primary project purpose is to develop and analyze intermodal alternatives that can work together to improve accessibility, mobility, and goods movement in the Hampton Roads area to help relieve congestion at the existing I-64 Hampton Roads Bridge Tunnel.

**Supporting Needs Evaluation Criteria**

<table>
<thead>
<tr>
<th>TC 1</th>
<th>TC 2</th>
<th>TC 3</th>
<th>TC 4</th>
<th>TC 8</th>
<th>TC 9</th>
<th>TC 5</th>
<th>TC 6</th>
<th>TC 7</th>
<th>TC 10</th>
<th>TC 11</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reduce HRBT volumes by 10% or more</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015 ADT</td>
<td>111,000</td>
<td>143,000</td>
<td>84,000</td>
<td>85,000</td>
<td>98,000</td>
<td>84,000</td>
<td>82,000</td>
<td>78,000</td>
<td>84,000</td>
<td>97,000</td>
</tr>
<tr>
<td>(% change from No-Build)</td>
<td>(+29%)</td>
<td>(-24%)</td>
<td>(-23%)</td>
<td>(-12%)</td>
<td>(-24%)</td>
<td>(-26%)</td>
<td>(-30%)</td>
<td>(-24%)</td>
<td>(-13%)</td>
<td>(-26%)</td>
</tr>
<tr>
<td>2015 per lane volumes</td>
<td>27,750</td>
<td>17,875</td>
<td>21,000</td>
<td>21,250</td>
<td>24,500</td>
<td>21,000</td>
<td>20,500</td>
<td>19,500</td>
<td>21,000</td>
<td>24,250</td>
</tr>
<tr>
<td>(% change from No-Build)</td>
<td>(-36%)</td>
<td>(-24%)</td>
<td>(-23%)</td>
<td>(-12%)</td>
<td>(-24%)</td>
<td>(-26%)</td>
<td>(-30%)</td>
<td>(-24%)</td>
<td>(-13%)</td>
<td>(-26%)</td>
</tr>
<tr>
<td>2015 Peak Hour V/C</td>
<td>1.63</td>
<td>1.00</td>
<td>1.24</td>
<td>1.25</td>
<td>1.44</td>
<td>1.23</td>
<td>1.21</td>
<td>1.15</td>
<td>1.23</td>
<td>1.43</td>
</tr>
</tbody>
</table>

### Project Needs

**Address existing + future O&D patterns between the Peninsula and Southside**

- X X X X X X X X X

**Provide direct connection to major ports**

- Provides new direct access to Norfolk International Terminals (NIT)
  - X X X X X X X X X

- Improves access to NIT
  - X X X X X X X X X

- Improves access to Newport News Marine Terminal and Newport News Shipbuilding
  - X X X X X X X X X

- Improves access to Portsmouth Marine Terminal
  - X X X X

- Provides new direct access to Craney Island (Possible location of 4th Marine Terminal)
  - X X X X

**Connect to an existing expressway**

- X X X X X X X X X X X

**Estimated Planning Cost**

- $1.5 B
- $1.9 B
- $2.1 B
- $1.6 B
- $2.2 B
- $2.4 B
- $2.6 B
- $2.8 B
- $2.2 B
- $3.2 B
- $3.3 B

**Ease of Implementation**

<table>
<thead>
<tr>
<th>Social Inventory from MIS</th>
<th>900-1500</th>
<th>900-1500</th>
<th>900-1500</th>
<th>900-1500</th>
<th>900-1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Unit Inventory</td>
<td>180</td>
<td>900</td>
<td>900</td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>Business Unit Inventory</td>
<td>21</td>
<td>92</td>
<td>95</td>
<td>38</td>
<td>40</td>
</tr>
<tr>
<td>Community Facility Inventory</td>
<td>7</td>
<td>11</td>
<td>11</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Environmental Inventory from MIS</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Area Wetlands (acres)</td>
<td>47</td>
<td>35</td>
<td>111</td>
<td>128</td>
<td>136</td>
</tr>
<tr>
<td>Hazardous Waste Sites</td>
<td>15</td>
<td>49</td>
<td>53</td>
<td>31</td>
<td>36</td>
</tr>
<tr>
<td>Threatened/Endangered Species</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

1. Defined as the Hampton Roads 2015 Regional Transportation Plan, which is funded for $3.5 billion.
2. Range reflects varying uses of existing CSX railroad corridor right-of-way.
were supplemented in 1994 with an additional survey conducted as a part of the development of the new transportation model developed for the Hampton Roads Crossing Study. Baseline data for both 1990 and 2015 were developed. Primarily, the results of the origin and destination survey indicate that Norfolk and Virginia Beach will remain the primary origins and destinations on the Southside, and Hampton and Newport News the primary origins and destinations on the Peninsula. As depicted in Table 2-2, with the exception of Transportation Corridors 4 and 7, each of the Transportation Corridors address existing and future origin and destination patterns between the Peninsula and the Southside.

c. **Provide direct connection to major ports**

Each Transportation Corridor’s provision of new direct access or improved access to major port facilities is listed in Table 2-2. Military facilities are also an important part of the region’s economy. As stated in the November 1994 Purpose and Need Document, “The transportation network must support the movement of supplies and people to and from the military bases located throughout the study area.” Transportation Corridors 2, 3, 5, 6, 8, 9, 10, and 11 each provide new direct access to Naval Base Norfolk, and Transportation Corridor 1 improves access to Naval Base Norfolk. In addition, Transportation Corridors 3, 6, 9, and 11 each provide new improved access between Naval Base Norfolk and the Naval facilities located in Portsmouth (i.e. Naval Shipyards, Naval Hospital, and the Naval Supply Center).

d. **Connect to an existing expressway**

Each of the Transportation Corridors contribute to the most cost effective utilization of transportation investments that have already been made in the region by connecting to an existing expressway on the Southside and the Peninsula.

e. **Estimated Cost**

The estimated cost for each of the Transportation Corridors ranged from $1.5 billion to $3.3 billion.

f. **Ease of Implementation**

A summary of the social and environmental issues identified in the MIS is included in Table 2-2 under the criteria “Ease of Implementation”. To give consideration to environmental and social factors, the impacts of each of the conceptual alignments developed within each of the 11 Transportation Corridors was analyzed. The social inventory in the MIS was based on an 85-meter (275-foot) wide conceptual
alignment located within each of the Transportation Corridors. The environmental inventory was based on a 150-meter (500-foot) wide conceptual alignment. Using the project GIS, gross numbers of resources within each of the conceptual alignments were determined. These numbers were used as a relative “impact index” to compare the magnitude of differences among the Transportation Corridors.

The social inventory includes the number of residential units, business units, and community facilities within each of the Transportation Corridors. The cultural resources inventory includes the number of recorded archaeological sites and historic structures. The areal extent of wetlands occurring within the 150-meter (500-foot) wide Transportation Corridor is also included in Table 2-2. The areal extent presented in the table, however, does not represent the actual extent of encroachment proposed for any of the Transportation Corridors. The hazardous waste inventory was obtained from state and federal databases. The possible presence of threatened and endangered species within each of the Transportation Corridors was obtained through coordination with the appropriate federal and state resource agencies.

2. Results of Third Screening

Based on this third screening of alternatives, the Hampton Roads Metropolitan Planning Organization (MPO) concluded the MIS by selecting Transportation Corridor 9 as the locally preferred corridor in July of 1997. The Commonwealth Transportation Board endorsed the MPO’s conclusion of the MIS in September of 1997.

Certain alternatives were eliminated from further detailed study based on this third screening, and these alternatives were not carried forward in the DEIS (see below). In addition to Transportation Corridor 9, Transportation Corridor 1 was carried forward for more detailed study. The concepts for Transportation Corridors 1 and 9 were refined for the DEIS and from this point forth these alternatives will be termed “Candidate Build Alternatives”. A third Candidate Build Alternative was developed to be carried forward in the DEIS. This alternative, Candidate Build Alternative 2, was previously suggested during the MIS phase and was suggested again at the DEIS scoping meeting. A modification to the VA 164 connection has also been made. The connection to VA 164 originally crossed the middle of the Craney Island Management Disposal Facility (Craney Island). Based on correspondence and several meetings with the Corps of Engineers, it was decided that the alignment would shift to the east side of the island.
III. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY IN THE DEIS

Based on the third screening of alternatives, the following alternatives are eliminated from further detailed study in the DEIS.

A. FULL TYPICAL SECTION WITHIN OR ALONG CSXT RAIL CORRIDOR

Transportation Corridors 5, 6, 7, 10, and 11 each included a new transportation facility along the CSXT railroad corridor from downtown Newport News to I-64 near Bland Boulevard. As a full typical section, these Transportation Corridors are being eliminated from further detailed study based on the criteria of ease of implementation and cost (Table 2-2).

A full typical section adjacent to the existing railroad right-of-way would bring the total potential displacements for each of these Transportation Corridors to 1,500 residential units. If the corridor was elevated above the CSXT railroad corridor, potential relocations could be reduced to around 900 residential units. However, it would cost approximately $350 million more to construct the elevated facility, bringing the total cost of the corridor to about $1 billion. In addition, an elevated facility located within the existing CSXT railroad corridor presents operational and safety issues.

In addition, by including the CSXT corridor extension, Transportation Corridors 5, 6, 7, 10, and 11 could each encroach upon areas that contain potential habitat for the Small Whorled Pogonia, the Canebrake Rattlesnake, and the Mabee’s Salamander. The Small Whorled Pogonia is federally listed as Threatened and state listed as Endangered. The Canebrake Rattlesnake is state listed as Endangered, and the Mabee’s Salamander is state listed as Threatened.

Although Transportation Corridors 5, 6, 7, 10, and 11, as a full typical section, were eliminated from further detailed study in the DEIS, a separate initiative, the CSXT Corridor MIS, examined transit alternatives within the CSXT rail corridor between the cities of Williamsburg, Newport News, and Hampton. Any new crossing of Hampton Roads will allow for the provision of transit within the CSXT corridor.
B. NEW CROSSING PARALLEL TO EXISTING I-664 MONITOR MERRIMAC MEMORIAL BRIDGE TUNNEL

Transportation Corridor 4 would provide a new crossing parallel to the existing I-664 Monitor Merrimac Memorial Bridge Tunnel, and it would widen I-664 on the Southside and on the Peninsula. Transportation Corridor 4 is being eliminated from further detailed study based on its inability to reduce traffic at the Hampton Roads Bridge Tunnel, address Origin and Destination patterns, and provide a direct connection to the major ports (Table 2-2).

When compared to the other Transportation Corridors, it provides the least amount of reduction in projected year 2015 per lane traffic volumes at the Hampton Roads Bridge Tunnel. Transportation Corridor 4 does not address existing and future origin and destination patterns between the Peninsula and the Southside. In addition, it does not provide any new access to the ports, the potential fourth marine terminal on Craney Island, or the Naval facilities, and it does not provide for a diversion point from I-64 during congestion causing incidents. Transportation Corridor 4 has therefore been eliminated from further detailed study.

C. NEW CROSSING FROM NEWPORT NEWS TO NORFOLK OPERATING AS A SEPARATE FACILITY FROM EXISTING I-664 MONITOR MERRIMAC MEMORIAL BRIDGE TUNNEL

Transportation Corridors 2 and 3 would provide a new crossing from Norfolk to Newport News. Transportation Corridor 3 also includes a connection to VA 164 in Portsmouth. These Transportation Corridors are being eliminated from further detailed study based on the ease of implementation criterion (Table 2-2). Both of these Transportation Corridors would operate as a separate facility from the Monitor Merrimac Memorial Bridge Tunnel and are located to the east of I-664. In order to avoid King-Lincoln Park, a potential Section 4(f) property, and to be located far enough away from I-664 on the Peninsula, the new facilities had to traverse a densely populated area of southern Newport News and had the potential to displace 900 residential units. Because of this high number of potential displacements, Transportation Corridors 2 and 3 have been eliminated from further detailed study.

D. NEW CROSSING FROM NEWPORT NEWS TO NORFOLK WITHOUT THE VA 164 CONNECTION

Transportation Corridor 8 is the same as Transportation Corridor 9, but it does not include the VA 164 connection and its associated benefits. Because it does not include the VA 164 connection, it does not
provide new access to Portsmouth Marine Terminal or to the potential fourth marine terminal on the east side of Craney Island. In addition, it does not provide improved access between Naval Base Norfolk and the Naval installations located in Portsmouth, and it does not provide for a diversion point from I-64 during congestion causing incidents. Therefore, Transportation Corridor 8 has been eliminated from further detailed study.

IV. ALTERNATIVES ADVANCED FOR FURTHER STUDY IN THE DEIS

A. NO-BUILD ALTERNATIVE
The No-Build Alternative is defined as currently planned highway, bicycle, pedestrian, and transit improvements defined in the Hampton Roads 2018 Regional Transportation Plan (HRPDC, 1998). Existing roadways would continue to be maintained and operated. The improvements identified are those that could be funded by projected transportation revenues, which are estimated to be 6 billion for the region through the year 2018. Of this 6 billion, 2.5 billion is for maintenance.

The No-Build Alternative will not meet the purpose and need for the project. It does not reduce 2015 per lane traffic volumes at the Hampton Roads Bridge Tunnel by 10% or more. As daily volumes continue to grow, congestion is likely to spread out over a longer time period. If nothing is done at the Hampton Roads Bridge Tunnel, the number of incidents causing delays of 15 minutes or longer could reach 21 a day, or nearly one every hour, in the year 2015. In addition, the No-Build Alternative does not provide for additional connections between port and military facilities, and there will be no ability to connect passenger rail across Hampton Roads. The No-Build Alternative was not recommended for further study, but it was retained in the DEIS as a comparison to the Candidate Build Alternatives. This is consistent with CEQ regulations [40 CFR 1502.14 (d)].

B. CANDIDATE BUILD ALTERNATIVES
Three Candidate Build Alternatives have been carried forward for detailed study. Preliminary highway and bridge-tunnel engineering studies were made for each Candidate Build Alternative based on optimum-design approaches which, in turn, minimized (within the limits of preliminary design) adverse effects. In order to accommodate future growth, each of the Candidate Build Alternatives can accommodate HOV, buses, or passenger rail. From the beginning of this project, it has been recognized that multimodal needs are an important consideration. At all meetings with the Coordinating
Committee, the committee reinforced the importance of a flexible multimodal option. Early in the MIS phase, all project alternatives were developed to include a flexible multimodal component, and the Candidate Build Alternatives continue to include this flexible multimodal component. The multimodal component of each of the Candidate Build Alternatives has been designed in height and width adequate to support whatever mode is needed in the future in the corridor (i.e. passenger rail, buses, HOV). As stated previously in this chapter, the only modes that have been eliminated are those requiring grades flatter than three percent. The flexibility of the multimodal tube is important due to the regional planning studies that are currently being prepared on the Southside and the Peninsula. Hampton Roads Transit (HRT) is currently working on a supplemental EIS to study a light rail system in the city of Norfolk. In addition, HRT is set to begin alternative analyses on a connection from Norfolk to Chesapeake, a connection from Norfolk to Portsmouth, and an extension of the Norfolk segment to Naval Base Norfolk. On the Peninsula, the city of Newport News has completed the CSXT Corridor MIS, which examined potential transportation improvements in a 32-mile corridor along the CSXT rail right-of-way linking downtown areas of Williamsburg, Newport News, and Hampton. It is anticipated that an EIS to study light rail in this corridor will initiated in January of 2001. High Speed intercity rail connecting Newport News and Richmond is also a component of the Locally Preferred Alternative, which was adopted by both the Hampton Roads Metropolitan Planning Organization and the Richmond Metropolitan Planning Organization, for the I-64 Major Investment Study. Each of the Candidate Build Alternatives will have the ability to tie into these light rail facilities if they are constructed in the future.

The three Candidate Build Alternatives and some design components of each are described below.

1. **Description of Candidate Build Alternatives**

   a. **Candidate Build Alternative 1**

   Candidate Build Alternative 1 would provide a new crossing parallel to the existing I-64 Hampton Roads Bridge Tunnel (Figure 2-3). On the Peninsula, Candidate Build Alternative 1 begins at the I-664 interchange in Hampton and would widen I-64 to the I-564 interchange in Norfolk. A paralleling, three-tube tunnel typical section to the west of the existing I-64 Hampton Roads Bridge Tunnel would cross Hampton Roads. Two of the tubes would carry two lanes each of eastbound vehicular traffic. The third tube would be used for multimodal travel, and would be dimensioned to accommodate all multimodal possibilities: HOV, passenger rail and/or bus travel. Westbound vehicular traffic would use the four travel lanes in the existing I-64 tunnel tubes.
Termini: Peninsula, I-64 and I-664 interchange in Hampton.
Southside, I-64 and I-564 interchange in Norfolk

Design: One bridge-tunnel with four conventional travel lanes, and two lanes for multimodal use. Widen I-64 to eight conventional travel lanes and two additional lanes for multimodal use.

Accommodated Modes: SOV, HOV, Trucks, Buses, Passenger Rail

**b. Candidate Build Alternative 2**
Candidate Build Alternative 2 includes all of Candidate Build Alternative 1, and it also includes a portion of Candidate Build Alternative 9. This portion begins at the I-564 and I-64 interchange in Norfolk, crosses the Elizabeth River, runs along the east side of Craney Island, and then connects to VA 164 (Western Freeway) in Portsmouth. (Figure 2-4)

Termini: Peninsula, I-64 and I-664 interchange in Hampton.
Southside, I-64 and I-564 interchange in Norfolk; and VA 164 in Portsmouth

Design: One bridge-tunnel crossing of Hampton Roads with four conventional travel lanes, and two lanes for multimodal use. One bridge-tunnel with four conventional travel lanes to cross the entrance to the Elizabeth River. Widen I-64 to eight conventional travel lanes and two additional lanes for multimodal use. Widen I-564 in Norfolk to eight conventional travel lanes and two additional lanes for multimodal use. New roadway along existing railroad track from I-564 to Hampton Boulevard in Norfolk with four conventional lanes and two additional lanes for multimodal use. New roadway from Hampton Boulevard in Norfolk to VA 164 in Portsmouth with four conventional travel lanes.

Accommodated Modes: SOV, HOV, Trucks, Buses, Passenger Rail

**c. Candidate Build Alternative 9**
Candidate Build Alternative 9 would provide a new crossing parallel to the existing I-664 Monitor Merrimac Memorial Bridge Tunnel with a connection from the new bridge tunnel to Norfolk and Portsmouth (Figure 2-5). On the Peninsula, Candidate Build Alternative 9 begins at the I-64 interchange in Hampton and would widen I-664 to the I-64/I-264 interchange in Chesapeake. Candidate Build Alternative 9 includes a new interchange near the south approach structure of the Monitor Merrimac Memorial Bridge Tunnel connecting to a new roadway and bridge tunnel extending from
FIGURE 2-5
CANDIDATE BUILD ALTERNATIVE 9
I- 664 to I-564 in Norfolk. This new interchange would provide access to both the existing Monitor Merrimac Memorial Bridge Tunnel as well as the new parallel bridge tunnel. Candidate Build Alternative 9 also includes a connection along the east side of Craney Island to VA 164 (Western Freeway) in Portsmouth.

A paralleling, three-tube tunnel typical section to the west of the existing I-664 Monitor Merrimac Memorial Bridge Tunnel would cross Hampton Roads. Two of the tubes would carry two lanes each of eastbound vehicular traffic. The third tube would be used for multimodal travel, and would be dimensioned to accommodate all multimodal possibilities: HOV, passenger rail and/or bus travel. Westbound vehicular traffic would use the four travel lanes in the existing I-664 tunnel tubes. A three-tube tunnel typical section would cross the Elizabeth River and connect to Norfolk. Eastbound and westbound vehicular traffic would be carried in two of the tubes, while the third tube would be used for multimodal travel.

- **Termini:** Peninsula, I-64 and I-664 interchange in Hampton. Southside, I-64 and I-564 interchange in Norfolk; I-64, I-664, and I-264 interchange in Chesapeake; and VA 164 in Portsmouth

- **Design:** Two bridge-tunnels with four conventional travel lanes, and two lanes for multimodal use. Widen I-664 on the Peninsula to eight conventional travel lanes and two additional lanes for multimodal use. Widen I-664 on the Southside to six conventional travel lanes. New roadway from the interchange over the water south of the Monitor Merrimac Memorial Bridge Tunnel to I-564 in Norfolk with four conventional travel lanes and two lanes for multimodal use. Widen I-564 in Norfolk to eight conventional travel lanes and two additional lanes for multimodal use. New roadway to VA 164 in Portsmouth with four conventional travel lanes.

- **Accommodated Modes:** SOV, HOV, Trucks, Buses, Passenger Rail

## 2. Design Components

### a. Roadway

Design criteria were established to meet all applicable VDOT, FHWA, and AASHTO criteria. The overall design for the Candidate Build Alternatives is a limited access urban freeway at 110 kph (~ 65 mph).
b. **Tunnels**

Ships entering Hampton Roads from the sea follow the Thimble Shoal Channel into the deep waters of Hampton Roads. Two channels then extend through Hampton Roads. The Newport News Channel extends 11.1 kilometers (6.9 miles) westward from Hampton Roads to Newport News. The Newport News Channel is 245 meters (800 feet) wide and 15 meters (50 feet) deep. The Norfolk Harbor Channel extends from the Hampton Roads Bridge Tunnel into the Southside cities of Norfolk, Portsmouth, and Chesapeake via the Elizabeth River. Between Hampton Roads and Sewell’s Point Terminals in Norfolk, the channel is 305 meters (1,000 feet) wide and 15 meters (50 feet) deep. Authorized improvements by the Corps of Engineers provide for deepening both the Newport News Channel and the Norfolk Channel to 17 meters (55 feet) (HRMA, 1997).

Candidate Build Alternative 1 will cross the Newport News Channel. Candidate Build Alternatives 2 and 9 cross the Newport News Channel and the Norfolk Harbor Channel. In order to maintain the navigable shipping channels, tunnel construction will be of the submerged tube-type in which the tube sections will be placed in a dredged trench on the bay bottom in a position below the future shipping channel.

Two potential tunnel designs are under consideration: the steel tube design and the concrete tube design (Figure 2-6). The steel tube design is similar to the existing I-664 tunnel with the exception that three tubes are proposed. I-664 was designed as a two tube, four lane tunnel. This tunnel design is based on a generally circular tube section that provides space above and below the travelway for ventilation. The ventilation is handled with a fully transverse system. Fresh air is supplied from ducts under the traffic, passed through the travelway, and exhausted in ducts above the ceiling. The overall height of the circular, steel tube section is 12.1 meters (40 feet).

The concrete tube design offers some advantages over the steel tube design due to its smaller outside dimensions. The concrete tube design is rectangular in section and employs a jet air longitudinal ventilation system that supplies fresh from one end of the tunnel and pumps it longitudinally in accordance to traffic movements, prevailing winds, and climatic conditions. The overall height of the concrete tube section is 9.1 meters (30 feet). The reduced height decreases the area and volume of dredging required for the tunnel, thereby reducing excavation costs and habitat impacts. While this design is not typically used in the United States, it has been used for several European and Far East tunnels. Manufacturing of the tunnel tubes is usually done in close proximity to the project site due to their small flotation factor although long tows on other projects have met with success.
FIGURE 2-6
TYPICAL SECTIONS OF OPTIONAL TUNNEL DESIGNS
c. **Islands**

Each tunnel will originate on artificial islands built on either side of the shipping channels. Candidate Build Alternative 1 will require two islands, one on each side of the Newport News Channel. Candidate Build Alternatives 2 and 9 will each require three islands, one on each side of the Newport News Channel and one on the west side of the Norfolk Harbor Channel. Each of the islands will measure about 87 meters (285 feet) wide at their tops.

**C. PREFERRED ALTERNATIVE**

Results of the DEIS study as well as public and resource agency comments were presented to the Virginia Commonwealth Transportation Board (CTB). On July 20, 2000, the CTB voted to identify Candidate Build Alternative 9 as the approved location (Exhibit 1). The CTB’s decision was based on Alternative 9’s abilities to best meet the primary project purpose and its underlying needs. In fact, Candidate Build Alternative 9 is the only alternative that addresses all aspects of purpose and need (see Table S-2). Candidate Build Alternative 9 also does the best job of improving total mobility between the Southside and the Peninsula (see Table S-2). Candidate Build Alternative 9 can also be constructed in usable segments with each segment: 1) contributing to project purpose and need and; 2) having logical termini and independent utility. The proposed segments for the Preferred Alternative and the construction sequence is:

1. A new bridge tunnel and roadway from existing Monitor Merrimac Memorial Bridge Tunnel to I-564 in Norfolk with 4 conventional travel lanes and 2 lanes for multimodal use. Widen I-564 in Norfolk to 8 conventional travel lanes and 2 multimodal use lanes.
2. A new bridge tunnel parallel to existing I-664 Monitor Merrimac Memorial Bridge Tunnel with two tubes of the tunnel carrying 4 conventional travel lanes and one tube carrying 2 multimodal use lanes.
3. A 4 lane connection from the new facility, just east of Craney Island, running south to VA 164 in Portsmouth.
4. Widen I-664 on the Peninsula to 8 conventional travel lanes and 2 additional lanes for multimodal use
5. Widen I-664 on the Southside to 6 conventional travel lanes
EXHIBIT 2-1
RESOLUTION
OF THE
COMMONWEALTH TRANSPORTATION BOARD

July 20, 2000

MOTION

Made By: Mr. Prettyman Seconded By: Mr. Humphreys Action: Motion Carried

Title: Location : I-64 Hampton Roads Third Crossing

WHEREAS, in accordance with the statutes of the Commonwealth of Virginia and policies of the Commonwealth Transportation Board, Location Public Hearings were held from 4:00 p.m. to 7:00 p.m. on January 24, 2000, at the Heritage High School located at 5800 Marshall Avenue in the City of Newport News, March 1, 2000, at the Sewell’s Point Elementary School located at 7928 Hampton Boulevard in the City of Norfolk, and March 2, 2000, at the Churchland Academy Elementary School located at 4061 River Shore Road in the City of Portsmouth, for the purpose of considering the proposed Location of the I-64 Hampton Roads Third Crossing; State Project: 0064-114-F12, PE-102, Federal Project NH-64-3(341); and

WHEREAS, proper notice was given in advance, and all those present were given a full opportunity to express their opinions and recommendations for or against the proposed project as presented, and their statements being duly recorded; and

WHEREAS, the economic, social, and environmental effects of the proposed project have been examined and given proper consideration, and this evidence, along with all other, has been carefully reviewed.

NOW, THEREFORE, BE IT RESOLVED that the Location be approved as Candidate Build Alternative 9 in accordance with the plan as proposed and presented at the said Location Public Hearings by the Department’s Engineers.

###

WE KEEP VIRGINIA MOVING
Candidate Build Alternative 9 requires fewer estimated residential relocations than either of the other two alternatives. Candidate Build Alternative 9 would require the relocation of 38 residential units, potentially impact 101 people. Candidate Build Alternatives 1 and 2 would each require the relocation of 128 residential units, with both alternatives potentially impacting 368 people. Although minor, Candidate Build Alternative 9 is also the alternative that has the least disproportionate impact on minority populations as required by E.O. 12898 (Environmental Justice). Candidate Build Alternatives 1 and 2 relocate 42 residential units occupied by minorities and 16 residential units occupied by persons of low income. Candidate Build Alternative 9 relocates 36 minority residential units and 12 low income units.

D. PROJECT SCHEDULE

Once funding has been established, the estimated project schedule is as follows:

- Preliminary Engineering: Year 2001-2006
- Right-of-Way: Year 2004-2010
- Construction: Year 2005-2022
CHAPTER 3

AFFECTED ENVIRONMENT

This chapter provides a description of the existing social, natural, and physical environments in the study area. Due to the large size of the study area, some sections of this chapter are described with particular emphasis on the areas surrounding each of the Candidate Build Alternatives.

I. TRANSPORTATION

A. TRAFFIC

Figure 3-1 presents the 1994 annual average daily traffic volumes for major roadways in the study area. Three crossings currently connect the densely populated urban areas on the Peninsula and the Southside. The three crossings are the I-64 Hampton Roads Bridge Tunnel, the I-664 Monitor Merrimac Memorial Bridge Tunnel, and the US 17 James River Bridge. Interstate 64 is the major roadway connector in the study area, forming a loop along with I-664, through the metropolitan areas (Figure 3-1). Annual average daily traffic volumes at the Hampton Roads Bridge Tunnel, the Monitor Merrimac Memorial Bridge Tunnel, and the James River Bridge are provided in Table 3-1. The increasing demand to cross between these two urban areas creates congestion. The heaviest levels of congestion are currently experienced at the Hampton Roads Bridge Tunnel. This congestion restricts access to major employers, ports, residential areas, shopping areas, and tourist attractions. This congestion has been steadily increasing, and is expected to continue to increase (Table 3-1).

Transportation problems experienced at the Hampton Roads Bridge Tunnel were identified through analysis of traffic volumes, delays, incidents, clearance times, and diversions. The high traffic volumes at the Hampton Roads Bridge Tunnel often lead to congestion and delays. For example:

- On 34 percent of the days in 1993, traffic delays greater than or equal to 15 minutes occurred. In 1994 and 1995, 45 percent of the days had traffic delays of 15 minutes or more.
- The number of 30 minute or more delays increased 150 percent in 1995 over 1993 (Table 3-2)
- By 2015, the number of incidents causing delays of 15 minutes or longer could reach nearly one every hour of each day

Traffic congestion at the Hampton Roads Bridge Tunnel can be partially relieved when traffic diverts to the Monitor Merrimac Memorial Bridge Tunnel. Delay message signs along I-64 and VA 44 are activated if delays at the Hampton Roads Bridge Tunnel exceed 15 minutes.
### TABLE 3-1

**ANNUAL AVERAGE DAILY TRAFFIC VOLUMES AT CROSSINGS OF HAMPTON ROADS**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton Roads Bridge Tunnel</td>
<td></td>
<td>75,300</td>
<td>76,900</td>
<td>82,000</td>
<td>81,129</td>
<td>82,330</td>
<td>9%</td>
<td>118,000</td>
<td>45%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitor Merrimac Memorial Bridge Tunnel</td>
<td></td>
<td>26,200</td>
<td>29,400</td>
<td>33,300</td>
<td>36,190</td>
<td>39,000</td>
<td>49%</td>
<td>76,000</td>
<td>110%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>James River Bridge</td>
<td></td>
<td>22,800</td>
<td>23,000</td>
<td>24,600</td>
<td>22,000</td>
<td>NA</td>
<td>-4%</td>
<td>49,000</td>
<td>123%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Virginia Department of Transportation, 1995, 1996, 1997; City of Newport News, 1994; Transportation Model, 2018

### TABLE 3-2

**HAMPTON ROADS BRIDGE TUNNEL TRAFFIC AND DELAY* DATA**

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>1994</th>
<th>1995</th>
<th>2-Year Percent Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Annual Daily Traffic</td>
<td>75,300</td>
<td>76,900</td>
<td>82,000</td>
<td>9%</td>
</tr>
<tr>
<td>Days with Delays</td>
<td>124 (34%)</td>
<td>165 (45%)</td>
<td>164 (45%)</td>
<td>33%</td>
</tr>
<tr>
<td>Number of Delays</td>
<td>157</td>
<td>216</td>
<td>243</td>
<td>55%</td>
</tr>
<tr>
<td>Number of Westbound Delays</td>
<td>95</td>
<td>142</td>
<td>150</td>
<td>58%</td>
</tr>
<tr>
<td>Number of Eastbound Delays</td>
<td>62</td>
<td>74</td>
<td>93</td>
<td>50%</td>
</tr>
<tr>
<td>30+ Minute Delays</td>
<td>80</td>
<td>155</td>
<td>200</td>
<td>150%</td>
</tr>
</tbody>
</table>

* Delay of 15 Minutes or More
Accident rates for the Hampton Roads Bridge Tunnel as compared to the state interstate average are provided in Table 3-3. These rates demonstrate an increasing trend in property damage and personal injury. The state interstate average is not available from 1995 to the present. In 1997, two hundred and seventy five accidents occurred on the Hampton Roads Bridge Tunnel, and 55 accidents occurred on the Monitor Merrimac Memorial Bridge Tunnel.

1. Trip Making

Three surveys were conducted to determine the characteristics of trips made within the region. A Home Interview Survey was conducted to determine the trip purposes of travelers within the region; an Origin and Destination Survey was conducted to determine the beginning and end points of trips that start within the region and end outside the region; and a Visitor Survey was conducted to determine the trip characteristics of visitors to the region. The completed surveys, along with other detailed technical information is included in the Compendium of Technical Traffic Information (VDOT, July, 1996), which is incorporated by reference into this FEIS.

a. Trip Purpose (Home Interview Survey)

The home interview survey was conducted in 1994 by the Gallup Organization, using a statistically valid, nationally accepted survey methodology. The survey collected data from nearly 2,260 households in the region. The information obtained from this survey was validated by comparison with home interview surveys from other areas and with the 1990 Census.

The home interview survey categorizes trips according to purpose and by origin and destination. The trip origin is where the trip starts. The trip destination is where the trip ends. A trip that either starts or ends at home is called a “home-based trip.” A trip that starts at home and ends at work is called a “home-based work trip.” A trip that neither starts nor ends at home is called a “non-home-based trip.” A trip that starts at home and ends somewhere besides work is called a “home-based other trip.”

Extrapolation from the home interview survey results revealed that on a typical weekday nearly 3,255,000 trips are made by residents living in Hampton Roads.

- On average, about 6.6 household person trips are made each day in the region.
- About 23 percent of the trips occur between home and work. The home to work trips peak between the hours of 7:00 a.m. and 9:00 a.m., and again between 4:30 p.m. and 6:30 p.m.
TABLE 3-3

HAMPTON ROADS BRIDGE TUNNEL ACCIDENT RATES*

<table>
<thead>
<tr>
<th></th>
<th>Crash Rate</th>
<th>Injury Rate</th>
<th>Fatality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastbound</td>
<td>68</td>
<td>48</td>
<td>0.0</td>
</tr>
<tr>
<td>Westbound</td>
<td>104</td>
<td>37</td>
<td>0.9</td>
</tr>
<tr>
<td>State Interstate Average</td>
<td>67</td>
<td>39</td>
<td>0.5</td>
</tr>
<tr>
<td>1992</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastbound</td>
<td>50</td>
<td>43</td>
<td>0.0</td>
</tr>
<tr>
<td>Westbound</td>
<td>118</td>
<td>54</td>
<td>2.0</td>
</tr>
<tr>
<td>State Interstate Average</td>
<td>65</td>
<td>39</td>
<td>0.5</td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastbound</td>
<td>70</td>
<td>53</td>
<td>0.0</td>
</tr>
<tr>
<td>Westbound</td>
<td>126</td>
<td>94</td>
<td>2.1</td>
</tr>
<tr>
<td>State Interstate Average</td>
<td>66</td>
<td>42</td>
<td>0.7</td>
</tr>
<tr>
<td>1994</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastbound</td>
<td>52</td>
<td>44</td>
<td>0.8</td>
</tr>
<tr>
<td>Westbound</td>
<td>168</td>
<td>112</td>
<td>0.0</td>
</tr>
<tr>
<td>State Interstate Average</td>
<td>69</td>
<td>42</td>
<td>0.8</td>
</tr>
<tr>
<td>1995**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastbound</td>
<td>96</td>
<td>69</td>
<td>0.0</td>
</tr>
<tr>
<td>Westbound</td>
<td>124</td>
<td>81</td>
<td>0.0</td>
</tr>
</tbody>
</table>

* Rates are expressed per 100 million vehicle miles travel
** State Interstate Average is not available for 1995
Source: VDOT statistics
• About 25 percent of the total home to work trips include at least one stop to or from work for secondary activities, such as day care, cleaners, food service, or service stations.

• Nearly 47 percent of trips are from home to a location other than work. Major trip destinations are shopping, social and recreational, and personal business. These trips are relatively evenly distributed throughout the day between the hours of 7:00 a.m. and 6:30 p.m.

• About 29 percent of trips neither begin nor end at home. These trips typically are for work, shopping, personal business, or recreational. The majority of these non-home trips peak during mid-day, between the hours of 11:00 a.m. and 1:00 p.m.

• About 1 percent of all trips begin and end outside the region, and are referred to as “through trips.”

• About 10 percent of all trips end outside the region, and are referred to as “external trips.”

• About 53 percent of all external trips take place during off-peak hours.

• About 54 percent of all trips take place during off-peak hours.

b. Trip Destination (Origin and Destination Survey)

Origin and destination data was collected by VDOT in 1992 and 1993, and was supplemented in 1994 with an additional survey conducted as a part of the Hampton Roads Crossing Study. The primary purpose of the surveys was to gather data on patterns for trips that either begin or end outside the region, or both begin and end outside the region. Additionally, for trips across the Hampton Roads Bridge Tunnel, the Monitor Merrimac Memorial Bridge Tunnel, and the James River Bridge, the origin and destination survey provided information for all trips that cross the three existing facilities and both begin and end inside the region. Baseline data for both 1990 and 2018 were developed (Table 3-4).

Generally, the results of the origin and destination survey indicate that Norfolk and Virginia Beach will remain the primary origins and destinations on the Southside, and Hampton and Newport News the primary origins and destinations on the Peninsula. Also, as a percentage of all trips, external trips beginning and ending outside the region are expected to slightly decrease by 2018, indicating continued growth in the number of internal regional trips between the Peninsula and Southside. Some of the specific data derived from the study are:

• 1990 crossing trips, Southside to Peninsula: 41% of these trips began in Norfolk, and 19% began in Virginia Beach. 37% ended in Hampton, and 36% ended in Newport News. Only 6% began outside the region, and only 12% ended outside the region.
### TABLE 3-4

**1990 AND PROJECTED 2018 HAMPTON ROADS CROSSINGS**
(includes Trips Beginning and/or Ending in the Hampton Roads region)

#### Total Trips North Across the Water from the Southside to the Peninsula

<table>
<thead>
<tr>
<th>Origin</th>
<th>% of Trips 1990</th>
<th>% of Trips 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chesapeake</td>
<td>10%</td>
<td>13%</td>
</tr>
<tr>
<td>Isle of Wight</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>Norfolk</td>
<td>41%</td>
<td>36%</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Suffolk</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Virginia Beach</td>
<td>19%</td>
<td>22%</td>
</tr>
<tr>
<td>Outside the Region</td>
<td>6%</td>
<td>4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Destination</th>
<th>% of Trips 1990</th>
<th>% of Trips 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloucester</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Hampton</td>
<td>37%</td>
<td>44%</td>
</tr>
<tr>
<td>James City</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Newport News</td>
<td>36%</td>
<td>24%</td>
</tr>
<tr>
<td>Poquoson</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Williamsburg</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>York</td>
<td>5%</td>
<td>8%</td>
</tr>
<tr>
<td>Outside the Region</td>
<td>12%</td>
<td>11%</td>
</tr>
</tbody>
</table>

#### Total Trips South Across the Water from the Peninsula to the Southside

<table>
<thead>
<tr>
<th>Origin</th>
<th>% of Trips 1990</th>
<th>% of Trips 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloucester</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Hampton</td>
<td>34%</td>
<td>32%</td>
</tr>
<tr>
<td>James City</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Newport News</td>
<td>39%</td>
<td>41%</td>
</tr>
<tr>
<td>Poquoson</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Williamsburg</td>
<td>6%</td>
<td>7%</td>
</tr>
<tr>
<td>York</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Outside the Region</td>
<td>13%</td>
<td>11%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Destination</th>
<th>% of Trips 1990</th>
<th>% of Trips 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chesapeake</td>
<td>12%</td>
<td>17%</td>
</tr>
<tr>
<td>Isle of Wight</td>
<td>9%</td>
<td>11%</td>
</tr>
<tr>
<td>Norfolk</td>
<td>30%</td>
<td>22%</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>Suffolk</td>
<td>6%</td>
<td>9%</td>
</tr>
<tr>
<td>Virginia Beach</td>
<td>30%</td>
<td>31%</td>
</tr>
<tr>
<td>Outside the Region</td>
<td>6%</td>
<td>4%</td>
</tr>
</tbody>
</table>
1990 crossing trips, Peninsula to Southside: 39% of these trips began in Newport News, and 34% began in Hampton. 30% ended in Norfolk, and 30% ended in Virginia Beach. Only 13% began outside the region, and only 6% ended outside the region.

2018 crossing trips, Southside to Peninsula: 36% of these trips are expected to begin in Norfolk, and 22% are expected to begin in Virginia Beach. 44% are expected to end in Hampton, and 24% are expected to end in Newport News. Only 4% are expected to begin outside the region, and only 11% are expected to end outside the region.

2018 crossing trips, Peninsula to Southside: 41% of these trips are expected to begin in Newport News, and 32% are expected to begin in Hampton. 31% are expected to end in Virginia Beach, and 22% are expected to end in Norfolk. Only 11% are expected to begin outside the region, and 4% are expected to end outside the region.

c. Visitor Trips (Visitor Survey)

New visitor surveys were conducted, and visitor surveys prepared by others were reviewed, to better understand the trip-making characteristics of visitors to the region. New visitor surveys were conducted at three locations: Williamsburg, Norfolk Waterside, and Virginia Beach Boardwalk. Visitor surveys from six convention center and visitor bureaus in the Hampton Roads area also were compiled and reviewed for additional information.

The information gathered shows that visitors account for over 35,000 daily trips across Hampton Roads every year, with these trips peaking during the months of April through September. About 50 percent of all visitor trips from outside the region crossing Hampton Roads currently utilize the I-64 Hampton Roads Bridge Tunnel. About 30 percent of these visitor trips use the Monitor Merrimac Memorial Bridge Tunnel, and about 20 percent use the James River Bridge.

2. Mode of Travel

The home interview survey determined that 93 percent of all household trips were by private vehicle, and that nearly one percent used transit. The remaining six percent either traveled on motorcycle, walked, rode a bicycle, or used some other mode of travel. The 1990 Census indicates that of the work trips in Hampton Roads, nearly 76 percent of commuters drove in a single occupant vehicle, while nearly 15 percent carpooled.
B. PUBLIC TRANSPORTATION

The Home Interview Survey found that approximately one percent of the population in the Hampton Roads area uses public transit for all trips.

1. Public Bus Service

Public bus service in the Hampton Roads area is provided by Hampton Roads Transit. Commuter bus service connects the Southside and the Peninsula. The first route of the Cross Roads Service Plan travels through the Hampton Roads Bridge Tunnel from the Wards Corner-Naval Base area of Norfolk to the Hampton Transit Center on Pembroke Avenue, and then travels to the Newport News Transit Center on 34th Street. The second route uses the Monitor Merrimac Memorial Bridge Tunnel to travel from Newport News to the Churchland and Chesapeake Square shopping malls in Chesapeake. Total ridership for the two routes combined was 86,693 for the fiscal year 1997 with an average of 7,224 riders per month. A third route is planned which will connect Hampton and Newport News with Williamsburg, and will be implemented when funding becomes available (TRT, 1998).

2. Passenger Rail

Amtrak operates passenger rail service to the Newport News Passenger Station. This service connects Newport News with the Northeast corridor via The Colonial, providing once a day service. Ridership in 1995 at the Newport News station was 119,710, a 15.5 percent increase from 1994 (VDRPT, 1996). Connecting service to the Southside is by bus service provided by Amtrak.

Hampton Roads Transit (HRT) is currently working on a supplemental EIS to study a light rail system in the city of Norfolk. In addition, HRT is set to begin alternative analyses on a connection from Norfolk to Chesapeake, a connection from Norfolk to Portsmouth, and an extension of the Norfolk segment to Naval Base Norfolk. On the Peninsula, the city of Newport News has completed the CSXT Corridor MIS, which examined potential transportation improvements in a 32-mile corridor along the CSXT rail right-of-way linking downtown areas of Williamsburg, Newport News, and Hampton. It is anticipated that an EIS to study light rail in this corridor will initiated in January of 2001.

3. Ferry Service

The Elizabeth River Ferry is operated by HRT and provides year-round service between Waterside, in Norfolk, and Portside, in Portsmouth. Total ridership during 1997 was 436,572, and average daily
ridership in 1997 was 1,202 riders (TRT, 1998). The HarborLink fast ferry service, a wholly owned subsidiary of MetroMarine Holdings, Inc., was started on June 24, 1999. It provides service between Nauticus in Norfolk to the Air and Space Center in Hampton.

C. HIGHWAYS

1. Physical Characteristics

The I-64 Hampton Roads Bridge Tunnel currently carries two travel lanes in each directional tube (4 total travel lanes). The westbound tunnel opened in 1957. Its internal height is 4.15 meters (13.6 feet), which causes some restriction of trucks using the tunnel. The eastbound tunnel was added in 1976. Its internal height is 4.5 meters (14.6 feet), the current standard, which allows unrestricted use by trucks.

On the Peninsula, I-64 west of the Hampton Roads Bridge Tunnel currently carries three lanes in each direction to US 17 in Newport News. From there to the west, the highway carries two lanes of traffic in each direction. Between US 17 and VA 143 (Jefferson Avenue), construction is underway to widen I-64 to three lanes in each direction. In March 1997, the MPO approved an additional lane in each direction that would carry HOV only during peak hours from I-664 to Jefferson Avenue (east of VA 105). An I-64 MIS was initiated in June of 1996 to examine the 75-mile corridor that extends from Richmond to Hampton and Newport News. This multi-modal transportation study is examining both the I-64 highway corridor and the CSXT railroad corridor. The Richmond and Hampton Roads MPOs have recently selected a Locally Preferred Alternative. This alternative consists of operational, highway, rail, and transit improvements in the I-64 and CSXT corridors.

On the Southside, I-64 carries two lanes of traffic in each direction to the I-564 interchange; from there, it carries three lanes in each direction plus two HOV lanes. Near Battlefield Boulevard in Chesapeake, the highway narrows again to two lanes in each direction, and continues to its intersection with I-664.

The I-664 Monitor Merrimac Memorial Bridge Tunnel contains two travel lanes within each directional tube (four total travel lanes). The internal height of the tunnels is 4.5 meters (14.6 feet). I-664 carries three lanes in each direction north of the Monitor-Merrimac Memorial Bridge Tunnel to its intersection with I-64. South of the Bridge Tunnel, I-664 carries two lanes in each direction to its terminus with I-264 and I-64 in Chesapeake.
The US 17 James River Bridge carries two lanes of traffic in each direction. This bridge is a lift span structure. US 17 north of the James River Bridge (Mercury Boulevard) carries two lanes of traffic in each direction. Closer to downtown Newport News, it is an urban arterial road with four lanes in each direction plus a two lane service road in each direction. South of the James River Bridge, US 17 carries two lanes in each direction.

2. Improvements

Improvements are currently underway at the Hampton Roads Bridge Tunnel. The southwest and northwest approach bridges are being widened to provide an emergency shoulder for the entire length of the bridges. Other ongoing safety improvements include improving the curve areas as well as improving the variable message overhead signing. The Highway Advisory Radio transmitter system is being replaced with an AM/FM Rebroadcast System. Each of the two new stations, one on the Peninsula and one on the Southside, will have a coverage radius of over 20 miles. These stations will include traffic information for the entire region.

A Traffic Management System (TMS) is being installed which will allow for real time monitoring and management of traffic. The first phase of the TMS, completed in 1998, involves 38 cameras mounted on 15 meter (50 foot) towers and about 600 magnetic detector loops which will monitor 19 miles of highway on the Southside. The information will be fed to computers located in the Suffolk district TMS Center located at I-64 and Indian River Road. Changeable Message Signs and Motorist Advisory Signs are controlled from the TMS Center. The TMS Center will be linked with the three existing traffic control and surveillance systems at the Hampton Roads Bridge Tunnel, the Monitor Merrimac Memorial Bridge Tunnel, and the I-264 Downtown Tunnel which connects Norfolk and Portsmouth across the Elizabeth River.

In a related effort, traffic flow and volume information is being incorporated into a Graphic Traffic Information System (GTIS). This system will provide a graphical display of traffic conditions. This information will be made accessible to the operators of the three tunnel facilities, local municipalities, and the media.

D. TRANSPORTATION PLAN

The Hampton Roads 2018 Regional Transportation Plan identified the fiscally constrained long-term and short-term transportation strategies and actions planned through the year 2018. Multimodal
improvements are considered, including highway, freight, transit, bicycle, and pedestrian facilities. The improvements planned in the region are identified in Appendix C. The projected transportation revenues for this period are $6 billion, of which $2.5 billion is for maintenance.

E. FREIGHT

1. Ports
The Port of Hampton Roads includes the State of Virginia’s general cargo facilities (Norfolk International Terminal, Newport News Marine Terminal, and Portsmouth Marine Terminal) as well as numerous private facilities. These public and private port facilities are centered in five major areas: Newport News; northwest Norfolk; southwest Norfolk; the Eastern Branch of the Elizabeth River; and the Southern Branch of the Elizabeth River. Shipping, freight rail, and trucking are all integral components of the port economy. Port-related facilities include container terminals, coal terminals, grain handling terminals, oil handling facilities, and storage warehouses.

The Port of Hampton Roads is the largest on the east coast in total tonnage of international water-borne commerce, with over 55 million short tons of cargo being handled in Hampton Roads in 1998 (Table 3-5). The majority of this tonnage is coal that arrives in Hampton Roads to be sent overseas.

In July of 1996, the Virginia General Assembly authorized the Craney Island study committee, which is comprised of representatives from the Hampton Roads Maritime Association, the Virginia Port Authority, U.S. Army Corps of Engineers (Corps) and the City of Portsmouth, to examine the current use and future expansion of the Craney Island Management Disposal Facility (Craney Island). The expansion of Craney Island to the east for the development of a fourth container port facility as well as the use of Craney Island for the placement of dredged materials continues to be the focus of this study committee. Additionally, under a resolution passed by Congress on September 14, 1997, the Corps is conducting a study to determine the federal interest in the potential eastward expansion of Craney Island through creation of a fourth cell to increase its capacity. The resolution directs that the Corps give specific attention to rapid filling of the fourth cell to accommodate anticipated port expansion. It will also examine the operation of the existing facility while extending its useful life. The Corps is currently conducting a feasibility study for the expansion. The feasibility study will be concluded in the year 2001.
TABLE 3-5

IMPORTS AND EXPORTS OF ATLANTIC COAST PORTS IN 1998

IN SHORT TONS (000s)

<table>
<thead>
<tr>
<th>Port</th>
<th>Exports</th>
<th>Imports</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton Roads</td>
<td>44,182.5</td>
<td>11,551.0</td>
<td>55,733.5</td>
</tr>
<tr>
<td>Baltimore</td>
<td>9,124.4</td>
<td>16,150.0</td>
<td>25,274.4</td>
</tr>
<tr>
<td>Charleston</td>
<td>6,116.5</td>
<td>6,920.0</td>
<td>13,036.5</td>
</tr>
<tr>
<td>New York</td>
<td>6,873.7</td>
<td>54,635.7</td>
<td>61,509.4</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>603.8</td>
<td>36,972.8</td>
<td>37,576.6</td>
</tr>
<tr>
<td>Savannah</td>
<td>6,249.9</td>
<td>8,179.4</td>
<td>14,429.3</td>
</tr>
</tbody>
</table>

Source: Hampton Roads Maritime Association, 2000

TABLE 3-6

PORT RELATED TRUCK VOLUME

<table>
<thead>
<tr>
<th>Port</th>
<th>1991</th>
<th>1999</th>
<th>2010</th>
<th>Average Annual Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newport News Marine Terminal</td>
<td>21,000</td>
<td>85,056</td>
<td>126,000</td>
<td>26%</td>
</tr>
<tr>
<td>Norfolk Marine Terminals</td>
<td>191,000</td>
<td>297,292</td>
<td>522,000</td>
<td>9%</td>
</tr>
<tr>
<td>Portsmouth Marine Terminals</td>
<td>137,000</td>
<td>269,261</td>
<td>322,000</td>
<td>7%</td>
</tr>
</tbody>
</table>

Source: Virginia Port Authority, 2000
2. **Trucking**

Motor carrier movements are concentrated at the major commercial port facilities and the Norfolk Naval Base. Trucking at the Norfolk International Terminal and Portsmouth Marine Terminal is expected to more than double between 1991 and the year 2010 (Virginia Port Authority, 1993) (Table 3-6). Trucking in 1992 constituted nearly one-quarter of the domestic inbound freight movement and over half of the domestic outbound freight movement in Hampton Roads (Table 3-7). By 2002, the tonnage of domestic inbound and outbound freight moved by truck is projected to increase by 57% over 1992 (Reebie Associates, Inc. 1992).

The regional movement of trucking is concentrated on I-64, I-664, US 58, and US 460. Trucking from the Southside to the Peninsula is restricted at the Hampton Roads Bridge Tunnel due to the internal height constraints of the older westbound tube. At the Monitor Merrimac Memorial Bridge Tunnel, the height conforms to current design specifications. Therefore, outbound truck traffic from the Southside generally uses the Monitor Merrimac Memorial Bridge Tunnel rather than the Hampton Roads Bridge Tunnel (Tidewater Motor Truck Association, 1994).

3. **Freight Rail**

The two primary freight rail carriers present in the Hampton Roads area are Norfolk Southern, which serves the Southside, and CSXT, which concentrates on access to the Peninsula, although it also owns Seaboard System Railroad, which is located on the Southside. Freight rail moves over 27 million metric tons (30 million gross tons) of general freight per year in the Hampton Roads area (VDRPT, 1996). In addition to general freight, CSXT moved 11 million metric tons (12 million gross tons) of coal on the Peninsula in 1993 (CSX, 1994). Norfolk Southern moved 25 million metric tons (27.5 million gross tons) of coal in 1993 (Lamberts Points Docks, 1994). Freight rail cargo levels are expected to increase in the future as port cargo increases.

II. **LAND USE**

A. **REGIONAL LAND USE OVERVIEW**

Existing land use and land cover classifications were determined using land cover data from the Virginia Department of Game and Inland Fisheries (VDGIF). Land use and land cover classifications within the study area are generally based on Anderson Land Use and Land Cover Classifications.
# TABLE 3-7

## DISTRIBUTION OF HAMPTON ROADS FREIGHT TRAFFIC

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tonnage</td>
<td>Percent of Total</td>
<td>Tonnage</td>
<td>Percent of Total</td>
</tr>
<tr>
<td>Rail</td>
<td>35,565,000</td>
<td>60%</td>
<td>3,599,000</td>
<td>11%</td>
</tr>
<tr>
<td>Truck</td>
<td>13,776,000</td>
<td>24%</td>
<td>19,692,000</td>
<td>60%</td>
</tr>
<tr>
<td>Water &amp; Air</td>
<td>9,511,000</td>
<td>16%</td>
<td>9,413,000</td>
<td>29%</td>
</tr>
<tr>
<td>Total</td>
<td>58,852,000</td>
<td>100%</td>
<td>32,704,000</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Reebie Associates, Inc. Transearch Database, 1992
(Anderson et al., 1976). These have been slightly modified by VDGIF. The classifications include the following: deciduous forest land; coniferous forest land; mixed forest land; shrubland; herbaceous land; open water; disturbed land; and coastal wetlands. The classification disturbed land includes urban and built-up land, residential, commercial, industrial, transportation, communication, and utility land uses.

The majority of the land within the cities of Norfolk, Hampton, Portsmouth, and Newport News is classified as disturbed land. Suffolk and Chesapeake are not as densely developed and contain a mix of the eight land use and land cover classifications. The area associated with the proposed project is generally urban or currently contains major transportation facilities (e.g. I-664).

**B. DEVELOPMENT TRENDS**

All communities within the study area have zoning and land use plans. The I-64 corridor from Hampton to Norfolk and the I-664 corridor from Hampton to Newport News are already heavily developed. On the Southside, in addition to the development that currently occurs, there is a number of proposed, planned, and approved development plans along the I-664 corridor in the cities of Suffolk and Chesapeake.

**III. POPULATION CHARACTERISTICS**

Figure 3-2 shows the current regional population density in the study area. Projected population growth for the Hampton Roads region is provided in Table 3-8. In April of 1992, the Census Bureau revised the 1990 population counts for the jurisdictions that comprise the Hampton Roads region. This adjustment is reflected in Table 3-8.

The population in Hampton Roads, as in most metropolitan areas of the United States, is diverse in racial make-up and in the degree of economic well being. Some population characteristics for the area are presented in Table 3-9.

**A. MINORITY POPULATION**

The 1990 U.S. Census divides the population into five race categories: American Indian/Eskimo/Aleut; Asian/Pacific Islander; Black; Other; and White. All categories except White were combined to form the Minority population. Ethnic origin, including Hispanic origin, was also
### TABLE 3- 8

**POPULATION TRENDS IN THE STUDY AREA**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton Roads</td>
<td>1,129,174</td>
<td>1,346,116</td>
<td>19%</td>
<td>1,400,300</td>
<td>1,581,618</td>
<td>13%</td>
</tr>
<tr>
<td>Southside</td>
<td>817,465</td>
<td>987,427</td>
<td>21%</td>
<td>1,019,300</td>
<td>1,166,460</td>
<td>14%</td>
</tr>
<tr>
<td>Chesapeake</td>
<td>114,486</td>
<td>151,982</td>
<td>33%</td>
<td>177,900</td>
<td>236,159</td>
<td>33%</td>
</tr>
<tr>
<td>Isle of Wight County</td>
<td>21,603</td>
<td>25,053</td>
<td>16%</td>
<td>27,000</td>
<td>361,36*</td>
<td>34%</td>
</tr>
<tr>
<td>Norfolk</td>
<td>266,979</td>
<td>261,250</td>
<td>-2%</td>
<td>238,800</td>
<td>209,790</td>
<td>-12%</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>104,577</td>
<td>103,910</td>
<td>-1%</td>
<td>102,100</td>
<td>104,240</td>
<td>2%</td>
</tr>
<tr>
<td>Suffolk</td>
<td>47,621</td>
<td>52,143</td>
<td>9%</td>
<td>54,300</td>
<td>110,749</td>
<td>104%</td>
</tr>
<tr>
<td>Virginia Beach</td>
<td>262,199</td>
<td>393,089</td>
<td>50%</td>
<td>419,200</td>
<td>505,522</td>
<td>21%</td>
</tr>
<tr>
<td>Peninsula</td>
<td>311,709</td>
<td>358,689</td>
<td>15%</td>
<td>381,000</td>
<td>415,158</td>
<td>9%</td>
</tr>
<tr>
<td>Hampton</td>
<td>122,617</td>
<td>133,811</td>
<td>9%</td>
<td>137,900</td>
<td>135,783</td>
<td>-2%</td>
</tr>
<tr>
<td>Newport News</td>
<td>144,903</td>
<td>171,439</td>
<td>18%</td>
<td>179,100</td>
<td>196,956</td>
<td>10%</td>
</tr>
<tr>
<td>Poquoson</td>
<td>8,726</td>
<td>11,005</td>
<td>26%</td>
<td>11,400</td>
<td>14,300</td>
<td>25%</td>
</tr>
<tr>
<td>York County</td>
<td>35,463</td>
<td>42,434</td>
<td>20%</td>
<td>52,600</td>
<td>68,119</td>
<td>30%</td>
</tr>
</tbody>
</table>

Source: 1980 and 1990 Census

1994 (Provisional estimate): Weldon Cooper Center for Public Service, University of Virginia

2018: HRPDC 2018 Regional Transportation Plan, March 1988

* Isle of Wight 2018 estimate not available. Its estimate is for 2015 from the HRPDC 2015 Population Forecast Change, July 1995
# TABLE 3-9

**POPULATION GROUPS IN STUDY AREA**

<table>
<thead>
<tr>
<th>City/County</th>
<th>Portion of Population Over 65</th>
<th>Portion of Minority Population</th>
<th>Portion of Population in Poverty</th>
<th>Portion of Workforce Disabled</th>
<th>Portion of Households with No Vehicles Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton Roads</td>
<td>8.9%</td>
<td>33.1%</td>
<td>11.8%</td>
<td>8.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Southside</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chesapeake</td>
<td>8.4%</td>
<td>29.3%</td>
<td>9.0%</td>
<td>7.4%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Isle of Wight County</td>
<td>11.2%</td>
<td>32.2%</td>
<td>11.1%</td>
<td>8.6%</td>
<td>8.9%</td>
</tr>
<tr>
<td>Norfolk</td>
<td>10.5%</td>
<td>43.3%</td>
<td>19.3%</td>
<td>9.2%</td>
<td>17.7%</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>13.7%</td>
<td>48.6%</td>
<td>17.7%</td>
<td>10.7%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Suffolk</td>
<td>13.0%</td>
<td>45.3%</td>
<td>17.3%</td>
<td>10.8%</td>
<td>16.2%</td>
</tr>
<tr>
<td>Virginia Beach</td>
<td>5.9%</td>
<td>19.5%</td>
<td>5.9%</td>
<td>6.0%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Peninsula</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hampton</td>
<td>9.5%</td>
<td>41.6%</td>
<td>10.8%</td>
<td>8.4%</td>
<td>9.4%</td>
</tr>
<tr>
<td>Newport News</td>
<td>9.3%</td>
<td>37.3%</td>
<td>14.0%</td>
<td>8.7%</td>
<td>12.6%</td>
</tr>
<tr>
<td>Poquoson</td>
<td>8.4%</td>
<td>2.5%</td>
<td>2.8%</td>
<td>6.7%</td>
<td>1.9%</td>
</tr>
<tr>
<td>York County</td>
<td>7.5%</td>
<td>18.7%</td>
<td>4.8%</td>
<td>6.8%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

Source: 1990 U.S. Census
analyzed. Hispanic origin is listed by the Census as an ethnic origin, separate from race. The regional average of the Hispanic population is 2%.

On a regional basis, minorities represent approximately one-third of the total population. The four urban cities, Hampton, Newport News, Norfolk, and Portsmouth, have the highest percentages of minorities, while the suburban municipalities such as Chesapeake, Poquoson, Virginia Beach, and York County have lower percentages (Figure 3-3).

B. AGE
The region’s elderly population is defined as those 65 and over. In Hampton Roads, approximately 9% of the population is in this category. The City of Virginia Beach has the lowest percentage of elderly (5.9%), due in part to the in-migration of younger people and families during the high population growth period during the 1980’s. For other cities, especially the City of Norfolk, the presence of military bases and their associated personnel lowers the elderly portion of the total population. The cities with the highest percentage of those 65 and over are Portsmouth (13.7%) and Suffolk (13.0%).

C. LOW-INCOME GROUPS
Low-income groups are defined as people whose median household income is below the Department of Health and Human Services (HHS) poverty guidelines (USDOT, 1995). The regional percentage of the population with low income as defined by HHS is 12%. The cities of Norfolk (19.3%), Portsmouth (17.7%), and Suffolk (17.3%) have the highest percentage of low-income populations (Figure 3-4).

D. WORK DISABILITY
According to the U.S. Census, a work disability is a health condition that lasts more than six months and limits the amount or kind of work that a person can do. This statistic includes that portion of the workforce population between the ages of 16 and 64 with a disability. The regional average is 8%, and does not vary much within the region.
FIGURE 3-3
PERCENT MINORITY GREATER THAN REGIONAL AVERAGE BY CENSUS TRACT

* REGIONAL AVERAGE BASED ON 33%
FIGURE 3-4
PERCENT LOW-INCOME GREATER THAN REGIONAL AVERAGE BY CENSUS TRACT

* REGIONAL AVERAGE BASED ON 12%
E. VEHICLES

The number of households without vehicles available helps to measure the relative dependence on transit. The regional average is 10%. The four urban cities (Hampton, Newport News, Norfolk, Portsmouth) have a higher percentage of households without a vehicle available. Primarily suburban communities such as Chesapeake (6.5%) and York County (3.4%) have much lower percentages of households with no vehicles available.

IV. ECONOMIC PROFILE

Unless otherwise indicated, data presented in this section was taken from the 1997 HRPDC Economic Outlook prepared by the Hampton Roads Planning District Commission (HRPDC, 1997a). Hampton Roads is the 27th largest metropolitan statistical area (MSA) in the United States. Over 1.4 million people live in this region along the Chesapeake Bay and Atlantic Ocean. The MSA definition includes nine cities and six counties:

<table>
<thead>
<tr>
<th>CITIES</th>
<th>COUNTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chesapeake</td>
<td>Gloucester</td>
</tr>
<tr>
<td>Hampton</td>
<td>York</td>
</tr>
<tr>
<td>Newport News</td>
<td>Isle of Wight</td>
</tr>
<tr>
<td>Norfolk</td>
<td>Currituck, NC</td>
</tr>
<tr>
<td>Poquoson</td>
<td>James City</td>
</tr>
<tr>
<td></td>
<td>Mathews</td>
</tr>
</tbody>
</table>

The project study area is smaller and does not include Mathews County, Gloucester County, James City County, Currituck County or the City of Williamsburg.

A. EMPLOYMENT AND INCOME

Figure 3-5 shows the current regional employment density. During the period of 1970 to 1994, the Hampton Roads region added jobs at an annual rate of 2.6%. This rate is slightly above the national average of 2.4% annual job growth rate for the same period but below the state of Virginia’s 3.2% annual job growth rate. During the 1970-1994 period, the Peninsula experienced slightly higher rates of growth in employment than the Southside. Over the period, total employment (including military) on the Peninsula expanded at an average annual rate of 2.8 percent. This compares to an annual average rate of 2.3 percent for the Southside.
FIGURE 3-5
EMPLOYMENT DENSITY
(PERSONS / ACRE)
Jurisdictions ranked by rate of growth in annual employment were:

- Chesapeake 10.2%
- Virginia Beach 8.1%
- Hampton 2.1%
- Newport News 1.7%
- Suffolk 1.0%
- Portsmouth 0.4%
- Norfolk 0.3%

Projected employment growth for the Hampton Roads region is provided in Table 3-10. As shown in the table, the HRPDC projects steady employment growth for the Hampton Roads region.

While employment has been increasing, growth rate in regional real per capita income has been declining at 0.08% annually. “This slow pace of decline is, in part, related to the deceleration in the rise of the region’s labor force participation rate as well as in the rotation of the region’s workforce to lower paying jobs” (HRPDC, 1996a). Per capita income in the Hampton Roads region in 1994 ranged from $16,965 in the City of Portsmouth to $23,561 in James City County/Williamsburg (Table 3-11).

B. ECONOMIC BASE

The Hampton Roads region has an economic base dominated by four primary sectors: military, port, ship building/ship repair, and tourism. Commercial and retail activities result from and are supported by these four base sectors of the regional economy. Historically, the military sector has had the most influence on the region’s economy. The defense build-up of the 1980s had positive results in every sector of the local economy, particularly in residential, commercial, and office construction. As the economy grew, so did regional population.

1. Military

The military plays a vital role in the Hampton Roads economy. Hampton Roads has one of the largest concentrations of military personnel in the world, comprising more than 14 percent of total employment in the MSA. Although military employment has been in decline nationally, Hampton Roads was one of only a few communities nationally to gain military employment in the 1995 round of base closures. In November 1996, Naval officials announced plans to eliminate 325 civilian jobs at the Norfolk Naval Shipyard and three hundred other military jobs in the region. These losses will be
### TABLE 3-10

**EMPLOYMENT TRENDS IN THE STUDY AREA**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton Roads</td>
<td>613,646</td>
<td>791,714</td>
<td>29%</td>
<td>804,845</td>
<td>1,040,060</td>
<td>29%</td>
</tr>
<tr>
<td>Southside</td>
<td>455,481</td>
<td>588,581</td>
<td>29%</td>
<td>601,090</td>
<td>770,196</td>
<td>28%</td>
</tr>
<tr>
<td>Chesapeake</td>
<td>32,126</td>
<td>62,096</td>
<td>93%</td>
<td>77,529</td>
<td>117,994</td>
<td>52%</td>
</tr>
<tr>
<td>Isle of Wight County</td>
<td>11,852</td>
<td>12,142</td>
<td>2%</td>
<td>13,344</td>
<td>19,039*</td>
<td>43%</td>
</tr>
<tr>
<td>Norfolk</td>
<td>227,685</td>
<td>251,046</td>
<td>10%</td>
<td>236,569</td>
<td>256,085</td>
<td>8%</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>53,917</td>
<td>58,641</td>
<td>9%</td>
<td>53,146</td>
<td>59,960</td>
<td>13%</td>
</tr>
<tr>
<td>Suffolk</td>
<td>19,627</td>
<td>20,570</td>
<td>5%</td>
<td>22,256</td>
<td>50,214</td>
<td>126%</td>
</tr>
<tr>
<td>Virginia Beach</td>
<td>110,274</td>
<td>184,086</td>
<td>67%</td>
<td>198,246</td>
<td>266,904</td>
<td>35%</td>
</tr>
<tr>
<td>Peninsula</td>
<td>158,165</td>
<td>203,133</td>
<td>28%</td>
<td>203,755</td>
<td>269,864</td>
<td>32%</td>
</tr>
<tr>
<td>Hampton</td>
<td>60,663</td>
<td>74,547</td>
<td>23%</td>
<td>76,097</td>
<td>90,301</td>
<td>19%</td>
</tr>
<tr>
<td>Newport News</td>
<td>84,965</td>
<td>108,308</td>
<td>27%</td>
<td>106,472</td>
<td>140,809</td>
<td>32%</td>
</tr>
<tr>
<td>Poquoson and York County</td>
<td>12,537</td>
<td>20,278</td>
<td>62%</td>
<td>21,186</td>
<td>38,754</td>
<td>83%</td>
</tr>
</tbody>
</table>


* Isle of Wight 2018 estimate not available. Its estimate is for 2015 from the HRPDC 2015 Regional Transportation Plan
### TABLE 3-11

**PER CAPITA INCOME IN STUDY AREA**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Southside</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chesapeake</td>
<td>$8,908</td>
<td>$16,914</td>
<td>$17,919</td>
<td>$18,647</td>
</tr>
<tr>
<td>Isle of Wight County</td>
<td>$8,708</td>
<td>$16,428</td>
<td>$17,858</td>
<td>$19,139</td>
</tr>
<tr>
<td>Norfolk</td>
<td>$8,785</td>
<td>$14,850</td>
<td>$16,424</td>
<td>$17,888</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>$8,562</td>
<td>$14,780</td>
<td>$16,079</td>
<td>$16,965</td>
</tr>
<tr>
<td>Suffolk</td>
<td>$8,550</td>
<td>$15,868</td>
<td>$17,343</td>
<td>$18,383</td>
</tr>
<tr>
<td>Virginia Beach</td>
<td>$10,286</td>
<td>$18,933</td>
<td>$19,884</td>
<td>$20,797</td>
</tr>
<tr>
<td>Peninsula</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hampton</td>
<td>$8,202</td>
<td>$15,119</td>
<td>$16,458</td>
<td>$16,972</td>
</tr>
<tr>
<td>Newport News</td>
<td>$8,791</td>
<td>$15,371</td>
<td>$16,816</td>
<td>$17,708</td>
</tr>
<tr>
<td>Poquoson and York County</td>
<td>$9,511</td>
<td>$19,615</td>
<td>$20,839</td>
<td>$21,384</td>
</tr>
</tbody>
</table>

Source: Hampton Roads Data Book, HRPDC, June 1996b – quote their source as Bureau of Economic Analysis
more than offset by the continued growth at Oceana Naval Air Station in Virginia Beach and the
addition of the Military Traffic Management Command (MTMC) to Fort Eustis in Newport News. In
total, the Oceana realignment will result in 5,098 new jobs on the base. Fort Eustis is expected to add
472 civilian and military jobs by the year 2000.

Department of Defense (DOD) expenditures and obligations in Hampton Roads totaled $4.67 billion in 1996. Norfolk was the recipient of the largest expenditures receiving $2.0 billion or 43 percent of the 1996 total. The region’s proposed military construction budget for 1998 is in excess of $136 million, more than 60 percent of the $223.8 million budgeted for construction in Virginia.

2. Port of Virginia

Hampton Roads is home to one of the deepest and largest natural harbors in the world. The Port of Virginia is called upon by 80 percent of the world’s leading shipping lines with 5,900 sailings annually. The Port of Virginia itself consists of three marine terminals and one inland terminal located outside of the region. The marine terminals, known as the Norfolk International Terminal, the Portsmouth Marine Terminal, and Newport News Marine Terminal, are owned and managed by the Virginia Port Authority and are operated by Virginia International Terminals.

Because of substantial public investment, the Port is a hub of regional economic activity generating many jobs, and providing a large source of revenues for the cities and counties of Hampton Roads. According to a study from Old Dominion University entitled Economic Impact and Rate of Return of Virginia’s Ports on the Commonwealth, in 1995, the Virginia Port generated 120,000 jobs in Virginia, $342 million in annual tax revenues to the Commonwealth, and $3.0 billion in wages for Virginians.

As part of its planning efforts, the Port of Virginia has retained the services of a consultant to forecast future tonnages likely to move through the harbor. That consultant, Vickerman-Zachary-Miller (VZM), has projected that tonnages will increase substantially over the next two decades. More specifically, VZM projects that container tonnages will increase by 4.3 percent per year between 1996 and the year 2020. This represents an expansion of 175 percent. Breakbulk tonnages are projected to grow by 3.0 percent per year or by 103 percent over the same period. (HRPDC, 1997b)

These projected increases in trade will add to employment at the Port. For example, if total tonnage (general and bulk cargo) moving through the harbor was assumed to increase by just 2.0 percent per year from 1997 until the year 2020 and employment per ton and cargo mix remain the same, it would
not be unreasonable for direct local employment at the Port to increase from 19,860 currently to nearly 32,000, an increase of over 12,000 jobs. Assuming that each of those jobs were to generate nearly one additional job in the regional economy, total job creation associated with increases in international trade at the Port of Virginia could produce an additional twenty thousand or more jobs in Hampton Roads. Many of these jobs would pay high wages given the capital intensive nature of goods movement activities. (HRPDC, 1997b)

In an effort to ensure that facilities will be available to handle the projected cargo tonnages, the Port of Virginia is expanding Norfolk International Terminals onto a 300-acre parcel of land north of the terminal’s current operations. This represents an investment of some four hundred million dollars and will include new wharfs, cranes, and storage and staging areas for containers. In addition, as discussed previously in Section 3.1E, a committee has been assembled to study the feasibility of constructing a fourth marine terminal on the east side of Craney Island. This fourth marine terminal is expected to have the capacity to handle millions of tons of cargo. Total employment at the Craney Island facility is projected to be over 4,600. (HRPDC, 1997b)

3. Shipbuilding and Ship Repair
Shipbuilding has long been a mainstay of the regional economy. Despite a cutback in Naval spending, the future for military work in the yards of Hampton Roads is positive. These expectations are fueled by several events:

- The U.S. Navy is likely to acquire new aircraft carriers, and Newport News Shipbuilding is the only shipyard capable of building them.
- Newport News Shipbuilding and Electric Boat in Connecticut, at the prompting of the Pentagon, have entered into an agreement to construct the next generation of submarines jointly. In April of 1994, it was projected that employment at Newport News Shipbuilding would fall to between 14,000 and 15,000 by the end of 1996. However, with the likelihood that the yard will continue to build submarines and with prospects for other new orders, the yard’s actual employment has remained above 17,000.
- Contracts for overhauls have also been received by area shipyards, helping them to maintain their employment levels.
- In order to decrease its dependence on the U.S. Navy and insure its own growth well into the next century, Newport News Shipbuilding is marketing to foreign navies.
4. Tourism and Conventions/Conferences

Visitor spending accounted directly or indirectly for 16,500 jobs for the residents of Hampton Roads in 1995 with 11,000 of those jobs in Virginia Beach. Tourism is also a substantial source of tax revenue for other area jurisdictions. In 1996, vacationers in Virginia Beach generated $38.7 million in tax revenue.

To encourage additional tourism the region has added additional facilities to its already extensive array of attractions. For example, the $52 million National Maritime Center (Nauticus) opened on the waterfront in downtown Norfolk in 1994. In addition, a 20,000-seat amphitheater was opened in Virginia Beach in 1996, and a PGA championship golf course is under construction.

The region has also experienced success in promoting tourism by packaging vacations, an approach that offers admission to a variety of attractions in the area. In 1997, officials from Virginia Beach and the historic sites around Williamsburg collaborated to offer another package combining attractions in Hampton Roads. Tourism officials hope the new package, entitled “Surf, Sun and Revolutionary Fun”, will enable the area to compete with Disney World and Myrtle Beach. To further bolster tourism, local officials are attempting to market Hampton Roads as an East Coast golfing mecca.

5. Regional Interaction

The Peninsula and the Southside are separated by one of the world’s largest and deepest harbors, the Hampton Roads. Prior to the construction of transportation facilities linking the two areas, both developed in relative isolation. The James River Bridge was originally constructed in the late 1920s and was expanded to 4 lanes in 1980. The first bridge tunnel at the site of the current Hampton Roads Bridge Tunnel, a two lane tunnel facility, was opened in 1957. A second parallel tunnel and bridge facility was opened in 1976. In May 1992, the Monitor Merrimac Memorial Bridge Tunnel was opened. Traffic using these facilities has increased constantly and is expected to continue to grow. The increase in traffic across the Hampton Roads has exceeded the growth in the region’s population. For example, from 1975 to 1996, population in the Hampton Roads region increased by 1.4 percent annually. By contrast, compound annual growth rates for traffic on the Hampton Roads Bridge Tunnel, and the James River Bridge were 5.9 percent and 3.3 percent respectively. The Monitor Merrimac Memorial Bridge Tunnel experienced a 5.2 percent increase in traffic volume in 1996 over the previous year. These statistics and the results of the origin and destination study presented in Section I above indicate that, to a large extent, traffic growth at the three crossings was due to people traveling between communities on the Peninsula and the Southside. From these data, it is clear that the two sides of the harbor are
becoming more closely linked economically.

V. VISUAL AND AESTHETIC CONDITIONS

Visual experience is dependent upon the pattern of the land (the topography), the pattern of water bodies, vegetation patterns, and the patterns of man-made development. The topography in the study area is relatively flat. Elevated structures are easily visible in the study area due to the relatively flat topography. Conversely, viewers do not have to be very high in elevation to have a long range view of the surrounding area unless the view is obstructed by structures or trees. The water body of Hampton Roads separates the Peninsula and the Southside. The majority of the land in Hampton, Newport News, Norfolk, and Portsmouth consists of man-made development. Suffolk and Chesapeake contain a mix of urban, suburban, and rural land. However, the smaller area associated with the proposed project is generally urban or currently contains major transportation facilities (e.g. I-664).

VI. AIR QUALITY

A. EXISTING CONDITIONS

The Hampton Roads area is located within Region 3 of the United States Environmental Protection Agency's (EPA) jurisdiction. The agencies that are involved with air quality in this region are the EPA and the Virginia Department of Environmental Quality (DEQ).

The Clean Air Act directed the Environmental Protection Agency to establish standards for clean outdoor air. The EPA has promulgated the National Ambient Air Quality Standards (NAAQS) for six atmospheric pollutants: Carbon Monoxide (CO), Ozone (O₃), Nitrogen Dioxide (NO₂), Sulfur Dioxide (SO₂), Particulate Matter (PM₁₀) and lead (Pb). The NAAQS are shown in (Table 3-12) and represent levels of these pollutants and exposure periods that pose no significant threat to human health or welfare. Virginia adheres to these standards and has an additional standard for total suspended particulates.

Currently, air monitoring is conducted for these pollutants at various locations throughout the Commonwealth of Virginia. Most are operated under the National Air Monitoring System (NAMS) and/or the State and Local Air Monitoring System (SLAMS) program. As a result of the Clean Air Act Amendments and based on historical monitoring data, the study area is designated as a maintenance/attainment area for O₃ and is in attainment for all other NAAQS pollutants. The terms
“nonattainment” and “attainment” refer to the status of the various pollutants described in the National Ambient Air Quality Standards (Table 3-12). If the pollutant exceeds the standard more than 1.0 times on average over the course of a three year period, then the pollutant is considered in nonattainment of the standard.

B. REGIONAL COMPLIANCE WITH THE STANDARDS
When a major project is located in a nonattainment area, it must be on an approved Transportation Improvement Plan (TIP)/Long Range Plan (LRP)/State Implementation Plan (SIP) or meet a series of requirements in order for the project to be approved. The project is located in an area designated as a maintenance area under the one hour standard for O₃.

VII. NOISE AND VIBRATION

A. NOISE CRITERIA
The noise impacts of the proposed alternatives for the Hampton Roads Crossing were assessed in accordance with Federal Highway Administration (FHWA), Virginia Department of Transportation (VDOT) and Federal Transit Administration (FTA) noise assessment guidelines. The FHWA guidelines are set forth in 23 CFR Part 772. In order to determine the degree of impact of traffic noise on human activity, the Noise Abatement Criteria (NAC) established by the FHWA regulation were used (see Table 3-13). For mass transit projects that are included as part of a highway improvement or a new highway project, FTA guidelines reference the FHWA regulation and the NAC are used to assess noise impact from the project.

The NAC are given in terms of the hourly, A-weighted, equivalent sound level in decibels (dBA). The A-weighted sound level is a single number measure of sound intensity with weighted frequency characteristics that corresponds to human subjective response to noise. Most environmental noise (and the A-weighted sound level) fluctuates from moment to moment, and it is common practice to characterize the fluctuating level by a single number called the equivalent sound level (Lₑq). The Lₑq is the value or level of a steady, non-fluctuating sound that represents the same sound energy as the actual time-varying sound evaluated over the same time period. For traffic noise assessment, Lₑq is typically evaluated over a one-hour period, and may be denoted as Lₑq (h).
### TABLE 3-12

**NATIONAL AMBIENT AIR QUALITY STANDARDS**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Time of Average</th>
<th>Primary Standard</th>
<th>Secondary Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$</td>
<td>Ann. Geo. Mean 24-hour</td>
<td>50 ug/m$^3$ 150 ug/m$^3$</td>
<td>50 ug/m$^3$ 150 ug/m$^3$</td>
</tr>
<tr>
<td>SO$_2$</td>
<td>Ann. Arith. Mean 24-hour</td>
<td>80 ug/m$^3$ 365 ug/m$^3$ none</td>
<td>None None 1300 ug/m$^3$</td>
</tr>
<tr>
<td>NO$_2$</td>
<td>Ann. Arith. Mean</td>
<td>100 ug/m$^3$</td>
<td>100 ug/m$^3$</td>
</tr>
<tr>
<td>CO</td>
<td>8-hour</td>
<td>10 mg/m$^3$ (9 ppm)</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>40 mg/m$^3$ (35 ppm)</td>
<td>None</td>
</tr>
<tr>
<td>O$_3$</td>
<td>1-hour</td>
<td>0.12 ppm 235 ug/m$^3$</td>
<td>0.12 ppm 235 ug/m$^3$</td>
</tr>
<tr>
<td>Pb</td>
<td>Quarterly Arith. Mean</td>
<td>1.5 ppm</td>
<td>1.5 ppm</td>
</tr>
</tbody>
</table>

**Virginia Ambient Air Quality Standard**

| Total Suspended Particulates | Ann. Geo. Mean 24-hour | 75 ug/m$^3$ 260 ug/m$^3$ | (60 ug/m$^3$ guide) 150 ug/m$^3$ |

Source: United States Environmental Protection Agency

- ug/m$^3$ = micrograms per cubic meter of air
- mg/m$^3$ = milligrams per cubic meter of air
- ppm = parts per million
- Ann. Geo. Mean = Annual Geometric Mean
- Ann. Arith. Mean = Annual Arithmetic Mean

Note: All standards with averaging times of 24 hours or less are not to be exceeded more than once per year.
**TABLE 3-13**

**FHWA NOISE ABATEMENT CRITERIA**

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>Leq(h)(^1)</th>
<th>Description of Activity Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>57 (Exterior)</td>
<td>Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.</td>
</tr>
<tr>
<td>B</td>
<td>67 (Exterior)</td>
<td>Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals</td>
</tr>
<tr>
<td>C</td>
<td>72 (Exterior)</td>
<td>Developed lands, properties, or activities not included in Categories A or B above.</td>
</tr>
<tr>
<td>D</td>
<td>--</td>
<td>Undeveloped lands.</td>
</tr>
<tr>
<td>E</td>
<td>52 (Interior)</td>
<td>Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.</td>
</tr>
</tbody>
</table>

1. Hourly A-weighted sound level (dBA)

Noise-sensitive land uses potentially affected by this project are in Category B and consist of residential areas, schools and recreation areas where outdoor activity occurs. Noise impact occurs when the predicted design-year Build Alternative noise levels in the project area “approach or exceed” the NAC during the loudest hour of the day. As shown in (Table 3-13, the applicable NAC for exterior activities in Category B is 67 dBA L\(_{eq}\)(h). VDOT defines the word “approach” to mean when the loudest-hour L\(_{eq}\) is 1 dB less than the NAC. Therefore, noise impact occurs when future build noise levels reach 66 dBA L\(_{eq}\) for Activity Category B. Noise impact also occurs when predicted project noise levels substantially exceed existing noise levels. An increase of 10 decibels or more is considered substantial.

When the predicted design-year Build alternative noise levels in the study area approach or exceed the NAC during the loudest hour of the day, noise impact occurs and consideration of traffic-noise abatement measures is necessary. Noise abatement will be considered reasonable and feasible unless it is found that such mitigation measures will cause adverse social, economic or environmental effects that outweigh the benefits received.

Noise levels in the project study area were determined for the existing (1994) conditions, the design-year (2018) No-build conditions, and the design-year Build conditions.
B. EXISTING NOISE CONDITIONS

To assess existing noise conditions, noise measurements were conducted in the study area during the months of April and June 1996. These measurements characterized existing noise levels in the study area but were not necessarily during the loudest hour of the day and included noise from sources other than traffic, such as aircraft and freight train operations. Figure 3-6 shows the location of each of the noise measurement sites. The measured noise levels are shown in Table 3-14 and are expressed as equivalent sound levels (L_{eq}). As described in detail in the previous section, the L_{eq} is a sound-energy average of the fluctuating sound level measured over a period of time, and is measured in units of A-weighted decibels (dBA).

Short-term noise measurements of 15 to 45 minutes duration were conducted at a total of 71 sites. Twenty-two of these sites are along a corridor studied previously that is not under consideration for this FEIS. The data collection procedure involved measurement of individual one-minute L_{eq}s, so that periods including events that were not representative or traffic-related could be excluded later. Specifically, minutes that included aircraft noise events were logged, and the total measurement period L_{eq} was determined both with and without the minutes that included these events. By comparing the two totals, the significance of the aircraft events to the overall noise level during the period can be determined.

Portions of the study area are remote from activity centers, with comparatively low existing L_{eq} noise levels in the 40s (dBA). Measured L_{eq}s ranged from a low of 45 to 46 dBA at Tidewater Community College (Site 16) to a high of 71 dBA at 730 Birch Street in Hampton (Site 54). Highway and local street traffic represent the dominant sources of existing noise in the Hampton Roads study corridors. In the vicinity of the Norfolk Naval Air Station (NAS), aircraft operations also contribute to the existing noise environment. Since aircraft operations noise is intermittent and depends very strongly on wind direction and time of day, noise from aircraft was not included in the definition of "existing" noise levels with respect to the project. The sound levels shown under "w/o A/C" in Table 3-14 were used to represent the existing noise environment. This conservative approach ensures that areas that receive intermittent aircraft noise are not assumed to have a consistently high existing noise level simply because aircraft were flying overhead during the noise measurement period. Further, due to its intermittent nature, aircraft noise does not consistently "mask" (cover up) traffic noise of the same or lower L_{eq}, and therefore is frequently not included in the representation of existing background noise in traffic noise studies.
FIGURE 3-6
NOISE AND VIBRATION MEASUREMENT SITES

LEGEND
6N NOISE SITE
4V VIBRATION SITE
### TABLE 3-14
**SUMMARY OF SHORT-TERM NOISE MEASUREMENTS**

<table>
<thead>
<tr>
<th>Site</th>
<th>Address</th>
<th>Locality</th>
<th>Leq (dBA)</th>
<th>A/C</th>
<th>Dominant Noise Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>end of Wycliff Road</td>
<td>Portsmouth</td>
<td>52</td>
<td>51</td>
<td>distant traffic; birds; wind in trees</td>
</tr>
<tr>
<td>2</td>
<td>End of Crenshaw Ct. extension</td>
<td>Hampton</td>
<td>62</td>
<td>62</td>
<td>distant I-64 traffic</td>
</tr>
<tr>
<td>3</td>
<td>729 Back River Ave</td>
<td>Hampton</td>
<td>61</td>
<td>61</td>
<td>traffic on N. Armistead; distant I-64 traffic</td>
</tr>
<tr>
<td>4</td>
<td>809 Langley</td>
<td>Hampton</td>
<td>67</td>
<td>67</td>
<td>I-64 traffic; aircraft</td>
</tr>
<tr>
<td>5</td>
<td>523 Wine St</td>
<td>Hampton</td>
<td>57</td>
<td>57</td>
<td>I-64 &amp; Pembroke Ave. traffic</td>
</tr>
<tr>
<td>6</td>
<td>Hampton University</td>
<td>Hampton</td>
<td>55</td>
<td>54</td>
<td>local traffic; distant I-64 traffic; aircraft</td>
</tr>
<tr>
<td>7</td>
<td>68 Boxwood</td>
<td>Hampton</td>
<td>67</td>
<td>67</td>
<td>I-64 traffic</td>
</tr>
<tr>
<td>8</td>
<td>VA Hospital</td>
<td>Hampton</td>
<td>51</td>
<td>51</td>
<td>local traffic; parking lot activity</td>
</tr>
<tr>
<td>9</td>
<td>207 National</td>
<td>Hampton</td>
<td>64</td>
<td>64</td>
<td>I-64 traffic</td>
</tr>
<tr>
<td>10</td>
<td>1566 Lea View Ave</td>
<td>Norfolk</td>
<td>65</td>
<td>65</td>
<td>I-64 traffic; wind</td>
</tr>
<tr>
<td>11</td>
<td>1109 Little Bay Ave</td>
<td>Norfolk</td>
<td>61</td>
<td>61</td>
<td>I-64 traffic</td>
</tr>
<tr>
<td>12</td>
<td>Willoughby Housing (U.S. Navy) #8434</td>
<td>Norfolk</td>
<td>54</td>
<td>53</td>
<td>NAS operations; distant I-64 traffic; birds</td>
</tr>
<tr>
<td>13</td>
<td>9273 Peachtree</td>
<td>Norfolk</td>
<td>62</td>
<td>59</td>
<td>NAS operations; distant I-64 traffic; birds</td>
</tr>
<tr>
<td>14</td>
<td>Landale &amp; Semnes</td>
<td>Norfolk</td>
<td>67</td>
<td>66</td>
<td>I-64 traffic; aircraft operations</td>
</tr>
<tr>
<td>15</td>
<td>8829 Commodore Dr</td>
<td>Norfolk</td>
<td>62</td>
<td>55</td>
<td>NAS operations; distant I-64 traffic</td>
</tr>
<tr>
<td>17</td>
<td>Old Town Point Road cul-de-sac</td>
<td>Portsmouth</td>
<td>69</td>
<td>69</td>
<td>traffic on I-664</td>
</tr>
<tr>
<td>20</td>
<td>640 34th Street (½block from Jefferson)</td>
<td>Newport News</td>
<td>58</td>
<td>57</td>
<td>distant traffic; traffic on 34th</td>
</tr>
<tr>
<td>41</td>
<td>John Marshall ES</td>
<td>Newport News</td>
<td>56</td>
<td>56</td>
<td>traffic on Madison; industrial activity</td>
</tr>
<tr>
<td>42</td>
<td>14th Street @ Jefferson Avenue</td>
<td>Newport News</td>
<td>62</td>
<td>62</td>
<td>traffic on Jefferson; distant traffic on I-664</td>
</tr>
<tr>
<td>43</td>
<td>664 Ridley Cir</td>
<td>Newport News</td>
<td>55</td>
<td>55</td>
<td>parking lot activity; neighborhood activity</td>
</tr>
<tr>
<td>44</td>
<td>King-Lincoln Park (picnic area at waterside)</td>
<td>Newport News</td>
<td>56</td>
<td>56</td>
<td>a/c overflights; industrial noise sources; distant traffic on I-664; birds; wind; children</td>
</tr>
<tr>
<td>45</td>
<td>9257 Phillip Ave</td>
<td>Norfolk</td>
<td>66</td>
<td>66</td>
<td>traffic on I-64; aircraft operations</td>
</tr>
<tr>
<td>46</td>
<td>Greenbrier @ Glen Myrtle</td>
<td>Norfolk</td>
<td>61</td>
<td>52</td>
<td>local traffic; activity in the community; a/c overflights</td>
</tr>
<tr>
<td>47</td>
<td>corner of Bradford &amp; Gloucester</td>
<td>Norfolk</td>
<td>57</td>
<td>56</td>
<td>traffic on I-564</td>
</tr>
</tbody>
</table>

1. w/o A/C = without aircraft (sound level computed without periods dominated by aircraft noise)
<table>
<thead>
<tr>
<th>Site</th>
<th>Address</th>
<th>Locality</th>
<th>Leq (dBA) (\text{total} \quad \text{A/C}^1)</th>
<th>Dominant Noise Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>Fleet Park (U.S. Navy)</td>
<td>Norfolk</td>
<td>62 48</td>
<td>departures from NAS; distant traffic &amp; construction</td>
</tr>
<tr>
<td>49</td>
<td>Camp Allen Elementary School (U.S. Navy)</td>
<td>Norfolk</td>
<td>63 52</td>
<td>local street traffic; distant traffic on I-564; departures from NAS</td>
</tr>
<tr>
<td>50</td>
<td>End of Colbert</td>
<td>Hampton</td>
<td>64 64</td>
<td>traffic on I-64</td>
</tr>
<tr>
<td>51</td>
<td>20 Balmoral St.</td>
<td>Hampton</td>
<td>57 57</td>
<td>I-664 traffic</td>
</tr>
<tr>
<td>52</td>
<td>224 Prince James Dr.</td>
<td>Hampton</td>
<td>57 57</td>
<td>I-664 traffic; aircraft</td>
</tr>
<tr>
<td>53</td>
<td>146 Garrett Dr.</td>
<td>Hampton</td>
<td>62 62</td>
<td>I-664 traffic; aircraft</td>
</tr>
<tr>
<td>54</td>
<td>730 Birch St.</td>
<td>Hampton</td>
<td>71 71</td>
<td>I-664 traffic</td>
</tr>
<tr>
<td>55</td>
<td>Duke St.</td>
<td>Newport News</td>
<td>66 66</td>
<td>I-664 traffic; 39th traffic</td>
</tr>
<tr>
<td>56</td>
<td>1127 41st St.</td>
<td>Newport News</td>
<td>56 56</td>
<td>local traffic; distant I-664</td>
</tr>
<tr>
<td>57</td>
<td>3617 Madison Ave.</td>
<td>Newport News</td>
<td>63 63</td>
<td>I-664 traffic</td>
</tr>
<tr>
<td>58</td>
<td>Harbor Lane</td>
<td>Newport News</td>
<td>58 55</td>
<td>birds; local street traffic; distant traffic on I-664</td>
</tr>
<tr>
<td>59</td>
<td>across from 5024 John St.</td>
<td>Chesapeake</td>
<td>55 55</td>
<td>distant traffic on I-664; traffic on off-ramp; birds</td>
</tr>
<tr>
<td>60</td>
<td>off of Gum Rd.</td>
<td>Chesapeake</td>
<td>66 66</td>
<td>traffic on I-664</td>
</tr>
<tr>
<td>61</td>
<td>end of Old Jolliff Rd.</td>
<td>Chesapeake</td>
<td>58 58</td>
<td>traffic on I-664; trucks on on-ramp; birds</td>
</tr>
<tr>
<td>62</td>
<td>end of Woodland Rd.</td>
<td>Chesapeake</td>
<td>67 67</td>
<td>traffic on I-664</td>
</tr>
<tr>
<td>63</td>
<td>Branchview (off of Jolliff Rd.)</td>
<td>Chesapeake</td>
<td>67 67</td>
<td>traffic on I-664 &amp; off-ramp</td>
</tr>
<tr>
<td>64</td>
<td>Homestead La.</td>
<td>Chesapeake</td>
<td>65 64</td>
<td>traffic on Interstate &amp; Military Highway</td>
</tr>
<tr>
<td>65</td>
<td>end of Sunny Brook Ter.</td>
<td>Chesapeake</td>
<td>61 59</td>
<td>traffic on I-264; freight train whistle</td>
</tr>
<tr>
<td>66</td>
<td>Avocet Ct.</td>
<td>Portsmouth</td>
<td>53 51</td>
<td>distant traffic on Rte. 164 &amp; W. Norfolk Rd.; birds; activity in community</td>
</tr>
<tr>
<td>68</td>
<td>Wesley Mem. Church</td>
<td>Norfolk</td>
<td>68 68</td>
<td>traffic on Little Creek; repair garage</td>
</tr>
<tr>
<td>69</td>
<td>Sewells Point Golf Course</td>
<td>Norfolk</td>
<td>66 66</td>
<td>traffic on I-564</td>
</tr>
<tr>
<td>70</td>
<td>9239 Coleman</td>
<td>Norfolk</td>
<td>62 54</td>
<td>aircraft operations; local traffic; distant I-64</td>
</tr>
<tr>
<td>71</td>
<td>end of Orange St.</td>
<td>Norfolk</td>
<td>67 66</td>
<td>I-64; aircraft operations</td>
</tr>
</tbody>
</table>

1. w/o A/C = without aircraft (sound level computed without periods dominated by aircraft noise)
Long-term measurements of 22 to 24 hours duration were conducted at two sites in the study area to determine the daily cycle of fluctuations in noise levels and the loudest hour of the day. The sites were adjacent to I-64 and I-664, and the noise environment was dominated by traffic on those interstates. The hourly $L_{eq}$s remained relatively constant throughout the measurement period, varying no more than 10 dBA. A summary of the long-term noise measurement results is provided in Table 3-15. This table shows the measured $L_{eq}$s for the loudest hours at each site, as well as the day/night average sound level ($L_{dn}$). The $L_{dn}$ is a 24-hour equivalent sound level with a 10-dBA penalty applied to nighttime noise between 10 PM and 7 AM.

The measured existing noise levels were used to establish a baseline for evaluating future noise impact from the project roads. In areas remote from major roadways, Existing (and No-build) noise levels were estimated based upon measurements nearby or in similar types of areas. However, in areas near roadways for which traffic data was developed as part of the project, Existing and No-build levels were computed from the appropriate loudest-hour traffic data. The computation methods and computed levels are reported in the Chapter 4, Section VIII.

### TABLE 3-15

**SUMMARY OF LONG-TERM NOISE MEASUREMENTS**

<table>
<thead>
<tr>
<th>Site: Description</th>
<th>Measurement Period</th>
<th>Loudest Hour</th>
<th>Ldn (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Begin Date-Time</td>
<td>End Date-Time</td>
<td>Leq (dBA)</td>
</tr>
<tr>
<td>72: Grammel St., Norfolk</td>
<td>4/23/96 – 10:10</td>
<td>4/24/96 – 11:38</td>
<td>77, 75</td>
</tr>
<tr>
<td>74: 30th St., Newport News</td>
<td>4/25/96 – 14:36</td>
<td>4/26/96 – 13:01</td>
<td>65</td>
</tr>
</tbody>
</table>

* Based on a 22-hour interval

### C. VIBRATION CRITERIA

Impact due to vibration from LRT operations was assessed based on the maximum projected root-mean-square (RMS) ground vibration velocity level as measured on the exterior ground surface at the building line location closest to the track. This level is expressed in decibels relative to a reference velocity of $10^{-6}$ inch per second. The abbreviation “VdB” is used for vibration decibels to avoid confusion with noise decibels. The criteria are given in terms of velocity because the sensitivity of humans, buildings and equipment to vibration has typically been found to correspond to a constant of vibration velocity.
amplitude within the frequency range of most concern for environmental vibration (roughly 5 to 100 Hz). Although the peak particle velocity (PPV) is commonly used to quantify vibration amplitude for blast damage criteria, response to train vibration is better related to the RMS amplitude, defined as the average of the squared amplitude of the signal over a one-second time period. Although velocity is normally described in units of inches per second in the United States, the decibel notation, which acts to compress the range of numbers required to describe vibration, is also commonly used.

The effects of ground-borne vibration include feelable movement of the building floors, rattling of windows, items on shelves or walls, and "rumbling" sounds. In extreme cases, vibration can cause damage to buildings. However, damage is not normally a factor for transportation projects, the occasional exception being impact-type pile driving or blasting during construction. Annoyance with vibration often occurs when the level exceeds the threshold of perception by about 10 VdB. This is at least 20 VdB below the damage threshold for fragile buildings. Vibration levels caused by typical events are given in Figure 3-7.

The Federal Transit Administration (FTA) has developed impact criteria for acceptable levels of ground-borne vibration (USDOT, FTA, 1995). Experience with ground-borne vibration from rail systems and other common vibration sources suggests that:

- The threshold of vibration perception for most humans is around 65 VdB, levels in the 70 to 75 VdB range are often noticeable but acceptable, and levels greater than 80 VdB are often considered unacceptable.

- For urban transit systems with 10 to 20 trains per hour throughout the day, limits for acceptable levels of residential ground-borne vibration are usually between 70 and 75 VdB.

- For human annoyance, there is some relationship between the number of events and the degree of annoyance caused by the vibration. It is intuitive to expect that more frequent vibration events, or events that last longer, will be more annoying to building occupants. Because of the limited amount of information available, there is no clear basis for defining this tradeoff. To account for most commuter rail systems having fewer daily operations than the typical urban transit line, the criteria in the FTA Guidance Manual (ref. 1) include an 8 VdB higher impact threshold if there are fewer than 70 trains per day.
FIGURE 3-7
TYPICAL GROUND-BOURNE VIBRATION LEVELS AND RESPONSES
• Ground-borne vibration from any type of train operations will rarely be high enough to cause any sort of building damage, even minor cosmetic damage. The only real concern is that the vibration will be intrusive to building occupants or interfere with vibration sensitive equipment.

Table 3-16 summarizes the FTA impact criteria for ground-borne vibration. These criteria are based on previous standards, criteria, and design goals including ANSI S3.29 (Acoustical Society of America, 1983) and the noise and vibration guidelines of the American Public Transit Association (1981).

**TABLE 3-16**

**GROUND-BORNE VIBRATION IMPACT CRITERIA**

<table>
<thead>
<tr>
<th>Land Use Category</th>
<th>Ground-Borne Vibration Impact (VdB re 1 micro inch/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequent(^1) Events</td>
</tr>
<tr>
<td>Category 1: Buildings where low ambient vibration is essential for interior operations.</td>
<td>65 VdB(^3)</td>
</tr>
<tr>
<td>Category 2: Residences and buildings where people normally sleep.</td>
<td>72 VdB</td>
</tr>
<tr>
<td>Category 3: Institutional land uses with primarily daytime use.</td>
<td>75 VdB</td>
</tr>
</tbody>
</table>

1. "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.
3. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optica.

D. **EXISTING VIBRATION CONDITIONS**

1. **Identification of Sensitive Areas**

Vibration-sensitive land use along the I-664 corridor through Hampton and Newport News includes single family homes, apartment buildings, and recreational land use. The nearest homes are approximately 50 meters (165 feet) from the proposed track centerline. The track centerline is assumed to be between the two directions of highway traffic, in the center of the corridor. East of Powhatan Parkway, the athletic fields at Hampton High School abut the study corridor.

Land use along the I-64 corridor through Hampton and Norfolk includes single family homes, multi-family homes, and recreational land use. The nearest homes are approximately 55 meters (180 feet)
from the proposed track centerline. Generally, the track centerline would be located between the two
directions of highway traffic along this corridor, except in the vicinity of the Hampton River crossing
where the multimodal lanes tie into the CSX rail corridor.

Land use along I-564 and the proposed Norfolk Connector consists of commercial properties near
Hampton Boulevard, military property, and residential properties. The closest homes are approximately
80 meters (260 feet) from the track centerline in the vicinity of the I-564 / I-64 interchange. Recreational land use also abuts the study corridor and includes Fleet Park and Sewells Point Golf Club.

2. Ambient Vibration Measurements

Although ambient vibration is rarely an issue, since it is almost always below the threshold of human
perception, a limited number of measurements are usually performed to document existing vibration
levels. Measurements of vibration are particularly important when there are existing freight train
operations in the light rail transit corridor, because the vibration from freight trains will usually be
substantially higher than the light rail transit vibration. Along the proposed Norfolk Connector, ambient
vibration sources include rail traffic on a freight line that runs south of the Norfolk NAS.

Existing vibration caused by two CSX freight trains was measured near the Hines Middle School in
Newport News. The measured levels from the CSX trains are typical for freight operations, with a
maximum near 81 VdB at 21 meters (70 feet), falling to a maximum near 77 VdB at a distance of 67
meters (220 feet). One of the trains produced feelable vibration out to a distance of at least 52 meters
(170 feet). The vibration levels created by the existing train traffic are expected to be about 10 VdB
higher than levels caused by LRT operations along the same corridor.

3. Measurement of Vibration Propagation Characteristics in the Study Area

A key factor in projecting levels of ground-borne vibration is the rate at which the vibration attenuates
as it propagates away from the source. Although it is conceptually possible to estimate propagation
characteristics based on geological data, experience indicates that direct correlations between
attenuation rates and geologic parameters are difficult, and often impossible, to determine. A common
approach is to use in situ measurements to estimate the propagation characteristics. This approach uses
a dropped weight as the vibration source and measures the resulting vibration pulses at various distances
from the source. A load cell (force transducer) is used to measure the force input to the ground and
calibrated vibration transducers are used to measure the vibration pulses at various distances from the
source as shown in Figure 3-8. The frequency-dependent propagation characteristics are derived from the transfer function relationships of the ground-surface vibration and the force. This relationship between the force caused by the dropped weight and the vibration pulse is called the transfer mobility.

Propagation tests were performed at a total of seven sites in Norfolk, Portsmouth, Hampton and Newport News for the MIS. Of those seven sites, only three are located along LRT corridors that are under consideration for this EIS. The measurement sites were selected to represent the different geologic formations along the corridor where vibration impacts are possible, including areas on either side of Hampton Roads. Figure 3-6 shows the locations of the vibration measurement sites shown with a “V” suffix. The results of the propagation tests are discussed in Chapter 4. Each vibration measurement site that is relevant to this FEIS is described below:

- Site 4V. Along the eastern edge of Parking lot #10 at Hampton University, Hampton.
- Site 5V. North of the baseball field at the Willoughby Elementary School playground on 4th View Street, Norfolk.
- Site 6V. Softball field #3 at Fleet Park near Norfolk Naval Air Station, Norfolk.

VIII. ECOSYSTEMS

A. NATIVE WILDLIFE

Because of dense urban and suburban development, wildlife species present in the majority of the study area are those species (e.g. gray squirrel, opossum, raccoon, white-tailed deer, mockingbird, bluejay) capable of adapting to such environments. Some areas within the study area that retain some characteristics of natural vegetation (e.g. wetland and waterbody margins, protected areas) may contain more specialized, less man-compatible wildlife (e.g. dismal swamp southeastern shrew, canebrake rattlesnake). A listing of the vertebrate species that may occur within the study area is contained in the Natural Resources Technical Appendix to this FEIS.

B. EXISTING VEGETATION IN THE STUDY AREA

The vegetation in the study area is that vegetation typically found in areas of dense urban and suburban development. It primarily consists of lawn grasses, ornamental and native trees and shrubs and a variety of decorative herbaceous species. Some pockets of native, mostly second growth trees (e.g. white oak, red maple, sweet gum) and shrubs are present. Strips of forest, shrub and herbaceous species, both
FIGURE 3-8
TEST CONFIGURATION FOR MEASURING TRANSFER MOBILITY
upland and wetland, are frequently found along rivers, streams and tidal areas, and adjacent to some transportation corridors. A listing of plant species that occur in the general study area is contained in the Natural Resources Technical Appendix.

C. RARE, THREATENED, AND ENDANGERED SPECIES

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1543) declares the intention of Congress to protect all federally listed Threatened and Endangered species and designated Critical Habitat of such species occurring both in the United States and abroad. Endangered species are defined as those species in danger of extinction throughout all or a significant portion of their range. Threatened species are defined as those species that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range. The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) are the federal agencies responsible for ESA compliance.

The Commonwealth of Virginia also provides protection to animal species deemed Threatened or Endangered within the state (Virginia Code §29.1-230 et seq.). The Department of Game and Inland Fisheries (DGIF) is responsible for compliance with the state program. The Department of Conservation and Recreation (VDCR) -Division of Natural Heritage maintains a database of sensitive species in the state. The Commonwealth of Virginia also provides protection to plant and insect species deemed Threatened or Endangered within the state (Virginia Code §3.1-1020 et seq.). The Department of Agriculture and Consumer Services (VDACS) is responsible for compliance with the state program for plant and insect species.

In addition to the species listed as Threatened and Endangered, federally listed Candidate species and state listed special concern species were identified. The Candidate and special concern species are not legally protected, but these species should be considered in the planning process.

Although some marine mammals are protected under the ESA, all marine mammals are protected under the Marine Mammal Protection Act. The nature of the concerns regarding potential impacts to marine mammals are similar for both Acts. Thus, all marine mammals that frequent the study area are addressed in this section.

Known or potential populations of Threatened or Endangered Species, Species of Special Concern, and marine mammals within the area surrounding the Candidate Build Alternatives were identified through coordination with the USFWS, NMFS, DGIF, VDNH, and VDACS (Table 3-17). Correspondence from
### TABLE 3-17

**SPECIES IDENTIFIED THROUGH AGENCY COORDINATION**

<table>
<thead>
<tr>
<th>COMMON NAME</th>
<th>SCIENTIFIC NAME</th>
<th>FEDERAL LISTING</th>
<th>STATE LISTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kemp’s Ridley Sea Turtle¹</td>
<td>Lepidochelys kempi</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Loggerhead Sea Turtle¹</td>
<td>Caretta caretta</td>
<td>Threatened</td>
<td>Endangered</td>
</tr>
<tr>
<td>Atlantic Green Sea Turtle⁴</td>
<td>Chelonia mydas</td>
<td>Threatened</td>
<td>Threatened</td>
</tr>
<tr>
<td>Piping Plover²,³</td>
<td>Charadrius melodus</td>
<td>Threatened</td>
<td>Threatened</td>
</tr>
<tr>
<td>Peregrine Falcon²,³</td>
<td>Falco peregrinus</td>
<td></td>
<td>Endangered</td>
</tr>
<tr>
<td>Dismal Swamp Southeastern Shrew²,⁴</td>
<td>Sorex longirostris fisheri</td>
<td></td>
<td>Threatened</td>
</tr>
<tr>
<td>Atlantic Bottlenose Dolphin¹,⁴</td>
<td>Tursiops truncatus</td>
<td>Marine Mammal</td>
<td></td>
</tr>
<tr>
<td>Harbor Porpoise¹</td>
<td>Phocoena phocoena</td>
<td>Marine Mammal,</td>
<td>Special Concern</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canebrake Rattlesnake²</td>
<td>Crotalus horridus atricaudatus</td>
<td></td>
<td>Endangered</td>
</tr>
<tr>
<td>Oak Toad³</td>
<td>Bufo quercicus</td>
<td>Special Concern</td>
<td></td>
</tr>
<tr>
<td>Great Egret³,⁴</td>
<td>Casmerodius albus egretta</td>
<td>Special Concern</td>
<td></td>
</tr>
<tr>
<td>Yellow-crowned Night-heron⁴</td>
<td>Nyctanassa violacea violaceus</td>
<td>Special Concern</td>
<td></td>
</tr>
<tr>
<td>Least Tern³,⁴</td>
<td>Sterna antillarum</td>
<td>Special Concern</td>
<td></td>
</tr>
<tr>
<td>Common Barn-owl⁴</td>
<td>Tyto alba</td>
<td>Special Concern</td>
<td></td>
</tr>
<tr>
<td>Forster’s Tern⁴</td>
<td>Sterna forsteri</td>
<td>Special Concern</td>
<td></td>
</tr>
<tr>
<td>Caspian Tern⁴</td>
<td>Sterna caspia</td>
<td>Special Concern</td>
<td></td>
</tr>
<tr>
<td>Atlantic Sturgeon⁴</td>
<td>Acipenser oxyrhynchus</td>
<td>Special Concern</td>
<td></td>
</tr>
</tbody>
</table>

¹ NMFS October 25, 1995 letter
² USFWS July 22, 1998 letter and December 8, 1998 letter
³ VDCR December 17, 1998 letter
⁴ VDGIF December 20, 1995 letter
each of the agencies is included in Chapter 7. No documented Threatened or Endangered plant species within the Candidate Build Alternatives have been identified. The federal and state listed threatened and endangered animal species and the marine mammal species are discussed below.

1. **Sea Turtles**

Juvenile Kemp’s Ridley Sea Turtles (*Lepidochelys kempii*) and juvenile Loggerhead Sea Turtles (*Caretta caretta*) use the Chesapeake Bay and adjacent waters (e.g. Hampton Roads) as a foraging area. The Atlantic Green Sea Turtle (*Chelonia mydas*), a federally and state listed threatened species, was referenced by the VDGIF as having the potential to occur in the study area. The Green Sea Turtle has been reported as occasional visitors to the Chesapeake Bay (Brady, 1925), but the densities at that time are not known (Musick 1972, 1979). A verified occurrence of the Green Sea Turtle has not been reported for over 20 years (Bellmund et al., 1987). Atlantic Green Sea Turtles do not nest in Virginia.

The two sea turtle species that occur regularly and in relatively large numbers are the Loggerhead and Kemp’s Ridley Sea Turtles. The Chesapeake Bay is an important foraging area for juvenile Loggerhead and Kemp’s Ridley Sea Turtles during the warmer months (Byles, 1988; Bellmund et al., 1987; Keinath and Musick 1991a, 1991b; Keinath et al., 1987, 1991; Lutcavage, 1981; Lutcavage and Musick, 1985; Musick et al., 1985a).

a. **Loggerhead Sea Turtle**

The Loggerhead Sea Turtle is federally listed as threatened and state listed as endangered. It is a common visitor to the Chesapeake Bay and its estuarine tributaries during the spring, summer, and fall. Hampton Roads is an estuarine tributary to the Chesapeake Bay. Foraging occurs in the river mouths and in the channels of the Bay (Bellmund et al., 1987; Carr, 1952; Ernst and Barbour, 1972; Hardy, 1969). The majority of the Loggerheads’ diet consists of benthic crustaceans (primarily horseshoe crabs) and bivalves. The Loggerheads’ diet also includes jellyfish, sponges, bivalves, gastropods, squid, crabs, shrimp, barnacles, fish, and sea grasses (Allen, 1984; Bellmund et al., 1987).

Although nesting has been reported occasionally on the barrier islands and in Back Bay National Wildlife Refuge, the evidence suggests that the Chesapeake Bay is more important as a nursery for immature Loggerheads than as a nesting beach (Allen, 1984; Bellmund et al., 1987; Musick, J.A., 1983). Juveniles become residents for the summer along channel edges (5 to 13 meters deep) and forage back and forth along the bottom within a home range of 10 to 80 square kilometers. An
estimated 3,600 Loggerhead Sea Turtles visited the Chesapeake Bay in 1983 (Allen, 1984). In 1984, it was estimated that 5,670 turtles inhabited the lower Chesapeake Bay (Bellmund et. al, 1987). VIMS has estimated that between 2,000 and 10,000 Loggerhead Sea Turtles use the Bay during the summer each year (Byles, 1988; Keinath et al., 1987; Keinath et al., 1994).

b. Kemp’s Ridley Sea Turtle
The Kemp’s Ridley Sea Turtle is federally and state listed as endangered. The Kemp’s Ridley is the second most abundant sea turtle in the Chesapeake Bay. The only known nesting ground of Kemp’s Ridley is on a single beach in the Gulf of Mexico (NMFS, 1995; USFWS, 1992). Young Kemp’s Ridleys feed on sargassum and associated species. More mature Kemp’s Ridleys feed primarily on shelled benthic invertebrates, especially the Blue Crab (Callinectes sapidus) (Bellmund, 1987; NMFS, 1995; USFWS, 1992). The occurrence of substantial numbers of immature turtles (perhaps 500 to 700) (J.A. Musick, 1983) in the Chesapeake Bay suggests that this species relies upon the Bay as a nursery ground.

c. Loggerhead and Kemp’s Ridley Sea Turtle Migration
Migration of juvenile sea turtles into and out of the Chesapeake Bay follows the 19° and 20° isotherm (Allen, 1984). Based on data from the VIMS sea turtle stranding network and aerial surveys, turtles are present within the Chesapeake Bay each year from May to November, which coincides with water temperatures in excess of 16 to 18 degrees Celsius (Bellmund et al., 1987; CETAP, 1982a, b; Lutz, et al., 1997; Musick et al., 1985; Shoop et al., 1981).

During the spring, sea turtles tend to congregate near the mouth of the Bay. As the waters get warmer, usually during the last week of May, the turtles enter to forge in the same river systems that they used the previous year. This concentrated migration into the Bay, which occurs between May 15 and June 30, is also the peak of turtle mortality (Musick, et al., 1984; Lutcavage & Musick, 1985). During the fall, the sea turtles begin to migrate out of the Bay in a more diffuse pattern than they used to enter the Bay. This emigration usually coincides with a pronounced decrease in temperature, usually caused by northeastern storms which occur in October or November (Bellmund et al., 1987; Keinath et al., 1987, 1994; Lutcavage and Musick, 1985; Musick, 1988; Musick et al., 1985b).
After leaving the Bay, the turtles return to their wintering sites from Cape Hatteras, North Carolina to as far south as Florida (Allen, 1984). There is no evidence of turtle brumation in Virginia during the winter months (Lutz et al., 1997).

2. **Piping Plover**
The Piping Plover (*Charadrius melodus*) is federally and state listed as threatened. Piping plovers nest on coastal beaches above the high tide line or other sandy areas. In the study area, they nest on Craney Island. They are found in Virginia from mid-March through late July, at which time they migrate southward (Cross, 1991).

3. **State Listed Species**
   a. **Dismal Swamp Southeastern Shrew**
The Dismal Swamp Southeastern Shrew (*Sorex longirostris fisheri*) is state listed as threatened. The species was delisted from federal protection on February 28, 2000. This Dismal Swamp subspecies of the Southeastern Shrew is believed to occur only in the historical Dismal Swamp within the Virginia cities of Chesapeake, Suffolk, and Virginia Beach, and the North Carolina counties of Camden, Currituck, and Perquimans (Rose and Padgett, 1991). Within the Swamp, the highest densities are found in recently clear-cut and regenerating forests, and grassy and brushy roadsides. The lowest densities are found in mature pine and deciduous forests (USFWS, 1994).

   b. **Canebrake Rattlesnake**
The Canebrake Rattlesnake (*Crotalus horridus atricaudatus*) is state listed as endangered. The preferred habitat of the Canebrake Rattlesnake is mature hardwood forest containing numerous logs and a layer of leaves and humus. They also occupy mixed forests, cane fields, and swampy areas (Mitchell and Schwab, 1991).

   c. **Peregrine Falcon**
The Peregrine Falcon (*Falco peregrinus*) is state listed as endangered. It was delisted from federal protection on August 25, 1999. Peregrine Falcons nest on bridges and other elevated structures throughout Hampton Roads.
4. Marine Mammals
The Atlantic Bottlenose Dolphin (*Tursiops truncatus*) is a species protected by the Marine Mammal Protection Act (MMPA). It is not listed as Threatened or Endangered under the ESA, but is listed as “depleted” under the MMPA. Depletion occurs when a population falls below its optimum sustainable level (USDOT, 1993). Bottlenose Dolphins are seen in Virginia’s waters and in Hampton Roads from May through October, with sporadic sightings in April, November, December, and other winter months (VMSM, 1996).

The Harbor Porpoise (*Phocoena phocoena*) is a federal Candidate species, and is a marine mammal protected by the MMPA. Harbor Porpoises have been documented in Virginia’s coastal waters from January through March and have been found stranded along the coast from March through May. Harbor porpoises are rarely sighted in the Hampton Roads harbor because of their shy behavior around boats and tendency to travel in small groups (VMSM, 1996).

D. CRITICAL HABITAT
Critical habitat has not been designated for any of the species listed above.

E. WILDLIFE AND WATERFOWL REFUGES
Wildlife refuges in the study area include Plum Tree Island National Wildlife Refuge in Poquoson, Great Dismal Swamp National Wildlife Refuge in Suffolk and Chesapeake, Nansemond National Wildlife Refuge in Suffolk, and Back Bay National Wildlife Refuge in Virginia Beach. No wildlife refuges are located within the areas traversed by the Candidate Build Alternatives.

IX. WATER RESOURCES
A. SURFACE WATERS
Hampton Roads connects to the Chesapeake Bay, the largest estuary in North America. Hampton Roads is formed by the confluence of the James River, the Elizabeth River, and the Nansemond River. The James River contributes 12 percent of the total freshwater flow to the Chesapeake Bay and has a drainage area of 26,400 square kilometers (10,200 square miles), which is just over 25 percent of the Virginia’s land area (DEQ, 1994). The study area also contains numerous freshwater rivers, streams, lakes and ponds. Streams and rivers typically are wide, slow moving, and tidally influenced, with relatively wide floodplains.
1. **Classification**

In Eastern Virginia where freshwater trout streams do not occur, the waters are classified by geographic types. Basic water quality standards are tied to these geographic types. There are seven of these classes; four of these are represented in the study area:

- Class I - Open Ocean
- Class II - Estuarine Waters
- Class III - Non-tidal Waters
- Class VII - Swamp Water

2. **Water Quality Standards**

The surface waters in the Hampton Roads typically are heavily influenced by urban development. The State has listed those waterbodies that do not meet the numeric and narrative water quality standards that were adopted to protect water quality. The following monitored water bodies in the Hampton Roads area do not meet the water quality standards: Nansemond River, Shingle Creek, Elizabeth River, Eastern Branch Elizabeth River, Southern Branch Elizabeth River, and the Lafayette River (DEQ, 1996).

3. **Outstanding State Resource Waters**

There are no surface waters in the study area designated as Outstanding State Resource Waters (DEQ, 1994).

4. **Public Surface Water Supplies**

There are no public surface water supplies that would be affected by the project.

5. **Scenic Rivers**

In 1968, Congress passed the National Wild and Scenic Rivers Act (NWSRA), Public Law 90-542, to preserve and protect wild and scenic rivers and their immediate environments. The Virginia Scenic Rivers Act of 1970 (Title 10, Chapter 15, Section 10-167 through 10-175 of the Code of Virginia) also provides a means to identify and protect those rivers or streams with natural, scenic, historic, and/or recreational qualities that are deemed of significance in the Commonwealth. There are no federal or state listed Wild and Scenic Rivers that would be affected by the project.
6. Sediments
The Environmental Protection Agency (EPA) and the Virginia Department of Environmental Quality (DEQ) measure sediment quality in Hampton Roads. Components in the sediments that are monitored include numerous metals, pesticides, and organic substances. The levels of these contaminants are compared to values called “Effect Range - Median: (ER-M)” given by the National Oceanic and Atmospheric Administration (NOAA, 1991). ER-M is the concentration above which adverse biological effects are frequently or always observed or predicted among aquatic species tested. Neither EPA’s monitoring (1985-1989) nor DEQ’s monitoring (1989-1993) found sediments exceeding the ER-M concentrations (Dauer, 1993; DEQ, 1994).

B. GROUNDWATER
The groundwater system in southeastern Virginia consists of one water table aquifer and seven confined aquifers. The aquifers are, in descending order: the Columbia Aquifer (commonly referred to as the water table); the Yorktown-Eastover Aquifer; the Chickahominy-Piney Point Aquifer; the Aquia Aquifer; the Virginia Beach Aquifer; the Upper Potomac Aquifer; the Middle Potomac Aquifer; and the Lower Potomac Aquifer.

The upper two aquifers serve as the principal sources of recharge to the region’s deeper aquifers and are the primary sources of discharge to surface waters. The water quality of these aquifers is considered good, although they may have elevated levels of chloride, sodium, iron, and acidity from natural resources (Southeastern Virginia Planning District Commission, 1990).

There are no designated sole-source aquifers in the study area regulated by Section 1424(e) of the Safe Drinking Water Act of 1974, as amended in 1986 (SDWA) (DEQ, 1995). In addition, there are no wellhead protection areas in the study area regulated by Section 1428 of the SDWA (DEQ, 1995).

C. AQUATIC SPECIES
The waterbodies located in the Hampton Roads region provide food, water, cover, and nesting or nursery areas to a variety of aquatic species. This biological community supports a large commercial and sport fishery in the region.
1. **Fish**

Numerous fish species occur in the waterbodies located in the study area. Some of these species are *anadromous*, meaning they spend a portion of their life cycle in the ocean, and then travel into freshwater to spawn. Other fish species include *marine* species, which inhabit the Chesapeake Bay, Hampton Roads, and adjacent tidal rivers; and *freshwater* species, which inhabit the non-tidal rivers, streams, lakes, and ponds in the study area. A listing of fish species that occur in the study area is provided in the *Natural Resources Technical Appendix*.

Common anadromous species found in the Hampton Roads and other estuarine waters in the study area include: alewife (*Alosa pseudoharengus*), blueback herring(*Alosa aestivalis*); shad (*Alosa sapidissima* and *A. mediocris*); striped bass (*Morone saxitilis*), and white perch (*Morone americana*). The alewife, blueback herring, and shad species have spawning and nursery areas upstream in the James River and other coastal tributaries and use the Hampton Roads for passage between upstream and coastal habitats (Klauda et al. 1991a, 1991b). The onset of alewife spawning migrations is typically from early to mid-March through April. The primary spawning runs of blueback herring begin in early April about three to four weeks after the peak alewife runs (Klauda et al., 1991a). Spawning runs for American shad typically begin in mid-February to early March, peak during April, and are over by early June. Hickory shad spawning runs may precede American shad runs and typically begin during March and April. Peak spawning activity occurs between late April and early June (Klauda et al. 1991b). Striped bass and white perch also have spawning and nursery areas upstream in the James River and other coastal tributaries (Setzler-Hamilton, 1991a, 1991b). Striped bass occur year-round in Hampton Roads (correspondence from VDGIF, 2/7/00), while white perch typically are found in Hampton Roads only during March and April (Land et al, 1995).

2. **Submerged Aquatic Vegetation**

The term “submerged aquatic vegetation” (SAV) refers to vascular plants that live and grow below the water surface. There are 15 species of SAV found in Chesapeake Bay and its tidal tributaries. Species distributions are mainly determined by their salinity tolerance. Eelgrass (*Zostera marina*) is the SAV species found in Hampton Roads. Figure 3-9 depicts the locations of the eelgrass beds in Hampton Roads. Eelgrass, unlike other Chesapeake Bay SAV, is a true “seagrass” and is found in salinities of 10 to 35 ppt (Hurley, 1991).
3. Benthos

Organisms that inhabit bottom sediments are commonly called benthos. These creatures, which include shellfish, use a variety of habitats, such as pier pilings, rock jetties, oyster reefs, and the bottom sediments. Benthic species which occur in Hampton Roads are listed in the Natural Resources Technical Appendix.

Three commercially important benthic species found in the study area are the hard clam (*Mercenaria mercenaria*), the blue crab (*Callinectes sapidus*), and the oyster (*Crassostrea virginica*). Hard clams constitute a major fishery in Hampton Roads during the summer (VMRC, 1995). Clams are capable of living in a variety of sediment types, but higher abundances are found in coarse-grained sediments. Mean population densities of hard clams vary throughout Hampton Roads (Figure 3-10). The highest density area is located within and on the sides of the shipping channel. This area contains 32,000 to 37,000 clams per hectare (13,000 to 15,000 clams per acre). The lowest density area is around Craney Island and the mouth of the Elizabeth River. This area contains 0 to 1,200 clams per hectare (0 to 500 clams per acre) (Wesson, 1995).

The blue crab requires a variety of habitats to complete its life cycle. Females spawn in the spring, predominantly in the southern part of the Chesapeake Bay (Figure 3-11). Newly hatched larvae are carried by the current to offshore areas, where they develop during the summer. The post-larvae stages and juveniles that remained offshore from previous years return to the Chesapeake Bay in late summer and fall. Juveniles and adults that overwintered in the Chesapeake Bay disperse upstream into tidal rivers and the northern part of the Bay. In the fall most crabs move into the southern part of the Chesapeake Bay, where they hibernate during the winter on the bottom. An unknown number of individuals do not move as far south as the majority, and hibernate in Hampton Roads. In particular, males may be found in low densities in the winter in Hampton Roads and the lower James River (Van Heukelem, 1991).

Trawl surveys in the Hampton Roads, Chesapeake Bay, and James River show that except for some low density areas (see above) blue crab are absent from Hampton Roads and the James River during January and February. Beginning in March, the blue crab is found in the Hampton Roads, and by April are found in good numbers in the James River (Land et al., 1995). Overwintering blue crabs, predominantly mature females, are found in the lower Bay generally in basin areas deeper than 9 meters (27 feet) (Van Heukelem, 1991). Mature and nearly mature females also may be found in the deeper portions of rivers. Submerged aquatic vegetation beds are important nursery habitat for blue crabs. Because of concern for
the blue crab population, a blue crab management area was established in the Hampton Roads between the Hampton Roads Bridge Tunnel and the Monitor Merrimac Memorial Bridge Tunnel within which dredging for crabs is not allowed.

The oyster is generally found in relatively shallow areas that have adequate substrate for attachment. Although they once were an important commercial fishery, harvestable oyster populations have dropped to their lowest level in history. The oyster’s reproductive success, however, is considered to be still in a healthy range and management plans have been developed with the goal of preserving oyster stocks while maintaining a viable fishery (EPA, 1995b). The only harvestable oyster population left in the study area is located upstream of the James River Bridge (R. Mann, Virginia Institute of Marine Science, personal communication 1996).

If water quality is inadequate, shellfish beds can be closed (condemned) to commercial harvest. Hampton Roads is a shellfish condemnation area. In areas that are condemned, harvested shellfish must first be relayed to approved waters for depuration (purging) for 15 days before marketing. Relaying is only allowed when the water temperature is above 10 degrees Centigrade (50 degrees Fahrenheit). The harvesting of shellfish is prohibited in both the Elizabeth and Lafayette Rivers (DEQ, 1994).

4. Other Flora and Fauna
Phytoplankton are floating, mostly microscopic, plants or algae. They are the most plentiful plants in the Chesapeake Bay and its tributaries, and they form the base of the food chain (EPA, 1995a). Zooplankton refers to the community of floating, often microscopic animals. They also contribute substantially to the food chain of Hampton Roads. Jellyfish are larger forms of zooplankton, and are common in the study area. Phytoplankton and zooplankton species which occur in Hampton Roads are listed in the Natural Resources Technical Appendix.

X. FLOODPLAINS
Protection of floodplains and floodways is required by Executive Order 11988, Floodplain Management; US DOT Order 5650.2, Floodplain Management and Protection; FHPM 6-7-3-2, Location and Hydraulic Design of Encroachments on Floodplains; and 23 CFR Part 650 Subpart A, Location Hydraulics Study. The intent of these regulations is to prevent or minimize highway encroachments within floodplains, where practicable, and to avoid supporting land use development where it is incompatible with floodplains.
The Federal Emergency Management Agency (FEMA) officially designates floodplains where substantial flooding occurs near development. Encroachment within a floodway could result in increased flood elevations and, possibly, additional property damages during a flood event. The minimum federal standards set by FEMA limit such flood elevation increases to one foot, provided that hazardous velocities are not produced.

Officially designated 100-year floodplains and coastal flood zones were identified in the study area using mapping provided by FEMA. Because of the large number and extent of floodplains within the study area, only water bodies surrounding the Candidate Build Alternatives that have 100-year floodplains and coastal flood zones are listed in Table 3-18.

### TABLE 3-18

**FLOODPLAINS SURROUNDING THE CANDIDATE BUILD ALTERNATIVES**

<table>
<thead>
<tr>
<th>Locality</th>
<th>100-Year Floodplain</th>
<th>Coastal Flood Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton, Newport News, Norfolk, and Suffolk</td>
<td>Hampton Roads</td>
<td>Hampton Roads</td>
</tr>
<tr>
<td>Hampton</td>
<td>Brights Creek, Hampton River, Newmarket Creek, Johns Creek</td>
<td></td>
</tr>
<tr>
<td>Norfolk</td>
<td>Elizabeth River, Willoughby Bay, Mason Creek, Oasts Creek</td>
<td>Elizabeth River, Willoughby Bay</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>Craney Island Creek</td>
<td></td>
</tr>
<tr>
<td>Chesapeake</td>
<td>Bailey Creek, Drum Point Creek, Goose Creek</td>
<td></td>
</tr>
<tr>
<td>Suffolk</td>
<td>Streeter Creek</td>
<td></td>
</tr>
</tbody>
</table>

### XI. WETLANDS

Executive Order 11990, *Protection of Wetlands*, established a national policy to “avoid to the extent possible the long-term and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.” Wetlands are defined by the US Army Corps of Engineers 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. Wetlands generally include swamps, marshes, bogs and similar areas” (33 CFR 328.3(b), Regulatory Programs of the Corps of Engineers; Final Rule).

Although the study area is generally characterized as supporting dense urban and suburban development, wetland systems frequently occur along waterbodies and in scattered undeveloped areas. Those wetland systems located within the study area are characterized by a mosaic of wetland types including palustrine forested, palustrine emergent, estuarine, lacustrine, and riverine. Wetland systems in the study area are usually bordered by a transportation facility or residential, commercial, or industrial development.

XII. HAZARDOUS WASTE SITES

The Hampton Roads region has a long history as a seaport, strategic center of military bases and center for ship building, ship repair and related heavy industry. These facilities have a history of generating, storing, transporting, and disposing of hazardous materials. These activities have resulted in hazardous landfills, underground storage tanks, hazardous material generation and transport.

In addition, commercial facilities within the area service both industry and the growing work force and residential population of the area. Municipal landfills, gas stations, power generators and other commercial facilities produce, store and dispose of hazardous wastes within Hampton Roads.

Because of this long history of business and industry, sources of hazardous wastes in Hampton Roads include, but are not limited to: CERCLIS (Superfund) sites; emergency response sites; spill incident sites; RCRIS generators; bulk petroleum and coal storage facilities; leaking underground storage tanks; toxic substance generators; landfills; and illegal dumping sites. Potential areas of concern may involve hazardous waste generators, handlers, transporters, as well as disposal and treatment facilities and/or operators.

XIII. COASTAL BARRIERS AND COASTAL ZONE

The Coastal Barrier Resources Act and the Coastal Barrier Improvement Act of 1990 establishes certain coastal areas to be protected by prohibiting the expenditure of federal funds for new and expanded transportation facilities within designated coastal barrier units. Review of the Coastal Barrier Resources Systems maps dated October 24, 1990 shows that there are protected areas within the study area in the cities of Hampton and Virginia Beach. However, there are no coastal barriers or protected areas...
traversed by the Candidate Build Alternatives.

The study area is located in the Commonwealth of Virginia’s designated coastal zone, and the project is therefore required to conform with the Virginia Coastal Resources Management Act (VCRMA). With the exception of barrier islands and coastal primary sand dunes and beaches, resources associated with the VCRMA are protected by enforceable programs that are already in place. There are no barrier islands or coastal primary sand dunes or beaches located in the vicinity of the Candidate Build Alternatives (VCRMP, 1992).

XIV. FARMLANDS

According to FHWA’s Technical Advisory T6640.8A, protected farmland includes prime soils, unique soils, soils other than prime or unique that are of statewide importance, and soils other than prime or unique that are of local importance. Within each state, the Natural Resources Conservation Service (NRCS) District Conservationist is responsible for defining soil types as best suited for crop production when the soils have exhibited certain criteria such as slope, texture, and moisture availability without excessive erosion. Coordination has been initiated with the three NRCS district offices responsible for the study area, and NRCS Soil Surveys and listings of prime, unique, statewide, and locally important farmlands soils were obtained.

XV. PARKLANDS

Because of the large number of public parks located within the study area, this section describes only those public parks and recreation areas that are located in the vicinity of the Candidate Build Alternatives. The cities of Hampton, Newport News, and Norfolk consider their public schools to be public recreation areas, and schools of these cities located near the Candidate Build Alternatives are also identified.

1. Hampton

The following public parks and recreation areas are located in Hampton near the Candidate Build Alternatives.

*Bluebird Gap Farm* is located on Pine Chapel Road, and is owned by the City of Hampton. The farm serves as an educational resource center and features over 200 domestic and wild animals, a children’s
playground, a picnic area, and a nature trail.

The *Woodlands Golf Course* is located on Woodland Road and is owned by the City of Hampton. Facilities include an 18-hole golf course, pro shop, snack bar, and locker rooms.

*River Street Park* is a neighborhood park located on the north bank of the Hampton River adjacent to existing I-64, and is owned by the City of Hampton. It is a mowed area on the corner of River Street and Pembroke Avenue. There are no organized activities at the park; it is only used for passive recreation such as occasional picnics by neighborhood residents.

The *Park Place Neighborhood Park* is located on the corner of 50th Street and Childs Avenue. It is owned by the City of Hampton, and it contains basketball courts and a baseball field.

*Hampton High School* is located adjacent to I-664 off of Queen Street. Outdoor recreational facilities include athletic fields and tennis courts.

### 2. Newport News

The following public parks and recreation areas are located in Newport News in the vicinity of Candidate Build Alternative 9.

*King Lincoln Park* is located at the southern end of Jefferson Avenue and is owned by the City of Newport News. Facilities include a beach, fishing pier, basketball courts, volleyball courts, picnic shelters, tennis courts, playground equipment, interpretive center, and restrooms.

The *29th Street Mini-Park* is located in the 500th block of 29th Street. It is owned by the City of Newport News and contains a basketball court and playground equipment.

### 3. Norfolk

The following public parks and recreation areas are located in the vicinity of Candidate Build Alternatives 1 and 2.

*The Willoughby Boat Ramp* is located on 13th View Street at Bayville Street and is owned by the City of Norfolk. Facilities include a parking lot, two boat ramps, and restrooms.
Willoughby Elementary School is located on 4th View Street near Government Avenue and is owned by
the City of Norfolk. Outdoor recreational facilities consist of a playground, basketball courts, and an
athletic field. The facilities are open to the public and serve both organized and walk-on activities.

XVI. HISTORIC AND ARCHAEOLOGICAL RESOURCES

An intensive cultural resources survey was conducted for the entire length of the Candidate Build
Alternatives in compliance with the National Historic Preservation Act of 1966, (Public Law 89-665;
Section 106), as amended; the Procedures for the Protection of Historic Properties (36 CFR 800); the
Archaeological and Historic Preservation Act of 1974; Executive Order 11593; 36 CFR 660-666, as
appropriate; the Procedures for Determining Site Eligibility for the National Register of Historic Places
(36 CFR 63); and recommendations as to site significance (36 CFR 60.4 [a through d]). The survey,
which included archaeological, architectural, and underwater fieldwork, was conducted in conformance
with the guidelines established by the Virginia Division of Historic Preservation (VDHR). The purpose
of the study was to determine the potential impacts to cultural resources in the Candidate Build
Alternatives.

The study included background research to develop a historic context and to inventory known historic
and archaeological properties within and near the proposed Candidate Build Alternatives. This was
followed by fieldwork to record structures or features of potential historic significance in the Candidate
Build Alternative study corridors. Evaluation of field data was conducted and recommendations were
made for each potentially significant resource identified. Background research included an examination
of archaeological site files, cultural resource survey reports, and listings of historic properties at the
VDHR in Richmond and a review of historic maps and secondary histories found at the Library of
Virginia in Richmond; the National Archives and the Library of Congress in Washington, D.C.; and in
repositories in Norfolk, Virginia; and Philadelphia, Pennsylvania.

A. ARCHITECTURAL RESOURCES

1. Survey Methodology

Prior to the field documentation of architectural resources, fieldworkers established the Area of
Potential Effect (APE) for the Candidate Build Alternatives. Utilizing project mapping, the surveyors
visually inspected each of the corridors under study to determine those areas that might be exposed to
direct physical, aural, or visual impacts by the proposed undertaking. The size of the APE subsequently
established often varied according to the terrain, the existing density of the built environment, and the proximity of resources to pre-existing interstate highways. For major portions of the three Candidate Build Alternatives situated in relatively dense urban settings, the proposed undertaking involves construction within existing interstate highway right-of-way or areas immediately adjacent to existing highway. Because this construction would not potentially introduce any new aural or visual intrusions, the APE for these portions typically included properties within or immediately adjacent to the project limits depicted on project mapping. Other portions of the Candidate Build Alternatives entail new construction in previously undeveloped areas of the Hampton Roads region. In order to account for potential aural and visual impacts in these areas that would experience new construction, the APE typically consisted of an area 150 meters (500 feet) to either side of the Candidate Build Alternative’s center line. As the topography of the region consists primarily of relatively flat coastal plain, rolling or hilly terrain did not greatly contribute to limiting sight lines or viewsheds. Mature tree growth did limit potential visual impacts in some areas.

Field survey consisted of the documentation of each 50 year or older architectural resource identified within the APEs for the three Candidate Build Alternatives. Surveyors assigned a preliminary resource number to each 50 year or older primary resource and marked its location on project mapping. Documentation of the resources included at least one 35mm black-and-white photograph of each building on the property. Surveyors recorded the resource’s current fabric, condition, setting, an approximate date of construction, and its overall integrity in field notes. Fieldworkers also gathered information on associated outbuildings and the resource’s surrounding property. When possible, surveyors interviewed property owners and tenants to gather additional data concerning resource construction, use, and history. Surveyors also consulted the several cities’ tax records for tax parcel and owner information, and dates of construction. Survey files at VDHR were also reviewed for information on previously documented resources in or near the Candidate Build Alternatives. VDHR possessed data on four resources within the APEs for the three Candidate Build Alternatives. One of these four resources, the Pasture Point Historic District (114-5008), was recommended as potentially eligible for the National Register in 1997. In September 1998 VDHR and VDOT determined that a portion of the recommended historic district was eligible for listing on the National Register.

2. Results of the Architectural Survey

The Candidate Build Alternatives primarily traverse dense suburban neighborhoods. One-to-two story dwellings composed of a variety of materials constructed between 1900 and 1950 comprise the predominate building stock. Other resource types found within the APEs include swimming pools, a
store, a grain trans-shipment center, and a gymnasium/auditorium. The architectural survey identified one National Register-listed resource (the Hampton Institute) and one National Register-eligible resource (the Pasture Point Historic District) within the areas of potential effect (APEs) for architecture. In addition to three previously recorded architectural resources, 101 resources 50 years or older within the APEs that had not been previously documented were identified. These 104 additional resources do not possess significant historical associations, embody distinctive architectural styles, or construction techniques, or contain information important to the study of history, and are recommended as not eligible for the National Register.

B. TERRESTRIAL ARCHAEOLOGICAL RESOURCES

Terrestrial archaeological fieldwork consisted of a comprehensive pedestrian survey of undeveloped portions of the project area to evaluate the landscape and environmental conditions for prehistoric and historic resource potential. The undeveloped portions of the project area included open spaces within the heavily urbanized environment, woodlands, open fields, and cultivated fields. A program of systematic subsurface shovel testing along linear transects was conducted within portions of the Candidate Build Alternative study corridors that had not been impacted by modern development. Shovel tests were excavated at 20-meter intervals along transects. Excavated soil was separated by natural stratum and screened through 1/4-inch hardware cloth. All historic and prehistoric artifacts observed in the screens were recovered for analysis. To determine the presence or absence of a site, additional shovel tests were excavated at closer intervals in areas where artifacts had been initially recovered from undisturbed deposits.

The terrestrial archaeological survey resulted in the identification of six previously unrecorded archaeological sites (Sites 44HT89, 44HT90, 44CS244, 44CS245, 44CS246, and LBA-5 [temporary site number]) within the Candidate Build Alternative study corridors. Three of the sites are recommended potentially eligible for the National Register of Historic Places (National Register). Two of the potentially eligible sites are in the City of Hampton in Candidate Build Alternatives 1 and 2 (Sites 44HT89 and 44HT90), and one site is in the City of Chesapeake in Candidate Build Alternative 9 (Site 44CS244). Sites 44CS245 and 44CS246, both recorded in the City of Chesapeake in Candidate Build Alternative 9, and Site LBA-5 (temporary site number), recorded in the City of Portsmouth in Candidate Build Alternatives 2 and 9, are not recommended eligible for the National Register.
1. Potentially Eligible Newly Recorded Sites

a. Site 44HT89

Site 44HT89 (360 x 150 meters [1,180 x 492 feet]) occupies a strategic location at the southern-most tip of the City of Hampton and is referred to as Strawberry Banks. The site contains a prehistoric Woodland component and corresponds to the historic grounds of the Roseland Manor built in 1885 (VDHR Architectural Resource 114-3). Prior to its destruction by fire in 1985, the Roseland Manor was evaluated as eligible for the National Register. A domestic archaeological assemblage recovered from the property during the present survey includes a variety of ceramic wares dating from the late nineteenth to early twentieth century. The artifacts are presumably associated with the historic occupation of the manor. A mid-nineteenth century military component of the site is also suggested by the recovery of military artifacts, which may indicate Civil War-era utilization of the site by soldiers from nearby Fort Monroe. Discreet loci of Woodland prehistoric artifacts and concentrations of historic artifacts, the latter suggestive of former structures, were identified during the survey. As such, the site has the potential to contain both subsurface historic and prehistoric features beneath landscape deposits, and is recommended as potentially eligible for the National Register under Criterion D.

b. Site 44HT90

Site 44HT90 (80 x 40 meters [260 x 130 feet]) includes a historic refuse deposit located on the north bank of Jones Creek within the boundaries of the National Register-listed Hampton University in the City of Hampton. A frame house is located within the site, 40 meters (130 feet) south of the creek. A high concentration of late nineteenth and early twentieth century artifacts was identified in a primary refuse deposit context near the bank of the creek. The site may be associated with the Hampton National Soldiers Home or the Hampton Normal and Agricultural Institute (1870-1930) formerly located in the site vicinity. Of the 255 artifacts recovered from the site, including pharmaceutical glass dating from 1880-1915, most were from the primary refuse deposit in Shovel Test P-2. Because the deposit is undisturbed and tightly datable, its contents may possess a high research potential on local and regional history, and the site may be a contributing element of the National Register property. As such, the site is recommended as potentially eligible for the National Register under Criterion D.

c. Site 44CS244

Site 44CS244 (120 x 25 meters [394 x 82 feet]) contains both prehistoric and historic components and is located on the bank of a small, ephemeral drainage of Goose Creek approximately 250 meters (820 feet) south of the creek in the City of Chesapeake. In the immediate vicinity of the site is an abandoned road
berm. Thirty historic artifacts recovered from the site include locally made kaolin pipe bowl and stem fragments, which were found in sub-plowzone deposits. Other artifacts include fragments of shell, metal, brick, bottle glass and ceramics, two of which are whitewares dating to no later than 1915. The presence of historic artifacts in sub-plowzone deposits indicates a potential for subsurface features, possibly associated with the remnants of a yet undiscovered dwelling in the vicinity. Prehistoric artifacts recovered from the site include two biface reduction flakes and one early reduction flake. One flake was recovered from a sub-plowzone deposit. Further investigation of the site is recommended to assess its National Register eligibility.

2. Potentially Eligible Previously Recorded Sites

During the archaeological survey, all previously recorded sites (N=29) within the Candidate Build Alternative study corridors were re-visited to determine present condition and to assess their National Register-eligibility. The survey found that 23 sites have been either completely or mostly removed by past construction activities and would therefore not be affected by new construction. Of the six extant sites, one is a cemetery in the City of Chesapeake (44CS93 - Old New Hope Cemetery) in Candidate Build Alternative 9, and five are prehistoric/historic artifact scatters in the City of Portsmouth, (44PM15, 44PM25, 44PM26, 44PM27, and 44PM28) in Candidate Build Alternatives 2 and 9. Use of the Old New Hope Cemetery (44CS93) in the City of Chesapeake dates from the 1920s to the present. Field examination of the five Portsmouth sites during the present survey resulted in the recommendation that none are eligible for the National Register under Criterion D.

C. UNDERWATER CULTURAL RESOURCES

The overwater portions of the Candidate Build Alternative study corridors were surveyed using a cesium magnetometer and acoustic recorder to collect magnetic and acoustic remote sensing data from the sub-marine floors within the study corridors. The purpose of the underwater survey was to locate any potential submerged cultural resources. All magnetic and acoustic targets were recorded onto a computer interfaced with positional data obtained from a Differential Global Positioning System (DGPS).

The overwater portions of Candidate Build Alternative 1 surveyed include:

1. The north side of Willoughby Bay - approximately 1,400 meters; water depth at mean low water ranged from 1.5 to 4.0 meters;
2. Hampton Roads Entrance Reach east of Old point Comfort - approximately 5,500
meters; water depth ranged from 1.5 meters to 22.0 meters (in shipping channel);

3. Hampton River - approximately 250 meters; water depth ranged from 2.0 meters to 4.5 meters.

The overwater portions of Candidate Build Alternative 9 surveyed include:

4. Hampton Roads, between Newport News and Suffolk - approximately 5,900 meters; water depth ranged from 1.5 meters to 23.0 meters (in shipping channel);

5. Hampton Roads, from the existing Monitor-Merrimac tunnel island across the top of Craney Island to Norfolk - approximately 6,400 meters; water depth ranged from 3.0 to 22.0 meters;

6. Elizabeth River, along the east side of Craney Island, approximately 2,800 meters; water depth ranged from 1.5 to 4.0 meters;

7. Hampton Roads, from above the northeast corner of Craney Island to Norfolk - approximately 2,300 meters; water depth ranged from 3.0 to 22.0 meters.

The overwater portions of Candidate Build Alternative 2 included all of those for Candidate Build Alternative 1, plus Numbers 6 and 7 from Candidate Build Alternative 9.

Seventy-eight targets were identified. However, many of the targets were identified as modern debris or sections of pipe, and only 30 of the 78 generated remote sensing signatures that were suggestive of submerged cultural resources.
CHAPTER 4
ENVIRONMENTAL ANALYSIS AND CONSEQUENCES

I. TRAFFIC, TRANSIT, AND SAFETY

A. 2018 TRAFFIC VOLUMES AND VOLUME/CAPACITY RATIO

The 2018 average daily traffic volumes were obtained from the Hampton Roads Crossing Study Regional Traffic Model. The traffic model was developed using local land use projections provided by the Hampton Roads Planning District Commission (Hampton Roads 2015 Economic Forecast, August 1994). In addition, three surveys were conducted to determine the characteristics of trips made within the region. A Home Interview Survey was conducted to determine the trip purposes of travelers within the region; an Origin and Destination Survey was conducted to determine the beginning and end points of trips that start within the region and end outside of the region; and a Visitor Survey was conducted to determine the trip characteristics of visitors to the region. More information on the development of the transportation model, the completed surveys, and other detailed technical information is included in the Compendium of Technical Traffic Information (VDOT, July 1996) which is incorporated by reference into this document.

Table 4-1 lists the percent increase in average daily traffic volumes for the No-Build from 1994 to 2018 for each crossing, as well as other important transportation facilities. A summary of 2018 average daily and peak hour per lane traffic volumes for the each of the Candidate Build Alternatives and the No Build is presented in Table 4-2. An increase in total trips between the Peninsula and the Southside from the No-Build represents increased mobility across Hampton Roads. The percent change in traffic volumes as compared to the No Build is also included in Table 4-2. A decrease in the peak hour per lane volumes represents a decrease in congestion. The preliminary planning cost estimate for each of the Candidate Build Alternatives is also included in Table 4-2.

Table 4-2 also presents the volume over capacity (V/C) ratio for each Candidate Build Alternative based on the provision of additional conventional traffic lanes. Unlike the more traditionally used Level of Service (LOS), which serves as a gross indicator of levels of congestion, the V/C ratio allows for a finer analysis or discrimination of the “intensity” or degree of congestion. For example, if traffic on a particular roadway is at stop-and-go conditions for a certain period of the day, that roadway is generally termed as being LOS F. However, even at LOS F, there are different degrees- that is, if a
**TABLE 4-1**

**NO-BUILD PERCENT INCREASE**

**IN AVERAGE DAILY TRAFFIC VOLUMES FROM 1994 TO 2018**

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>NO-BUILD</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1994</td>
<td>2018</td>
<td>% Increase</td>
<td>1994-2018</td>
</tr>
<tr>
<td>I-64 Hampton Roads Bridge Tunnel</td>
<td>77,000</td>
<td>118,000</td>
<td>53%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-664 Monitor Merrimac Memorial Bridge Tunnel</td>
<td>29,400</td>
<td>76,000</td>
<td>159%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 17 James River Bridge</td>
<td>23,000</td>
<td>49,000</td>
<td>113%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-64 (I-664 – Mercury Blvd.)</td>
<td>101,000</td>
<td>153,000</td>
<td>51%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-664 (I-64 – Downtown Newport News)</td>
<td>50,000</td>
<td>77,000</td>
<td>54%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VA 143 Jefferson Avenue (I-664 – Mercury Blvd.)</td>
<td>25,000</td>
<td>34,000</td>
<td>36%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VA 337 Hampton Blvd. (Lafayette River–Midtown Tunnel)</td>
<td>46,000</td>
<td>56,000</td>
<td>22%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-64 (I-564 – Rt. 44)</td>
<td>137,000</td>
<td>158,000</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-64 (I-464 – I-664)</td>
<td>54,000</td>
<td>117,000</td>
<td>117%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-264 Downtown Tunnel</td>
<td>83,000</td>
<td>104,000</td>
<td>25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 58 Midtown Tunnel</td>
<td>30,000</td>
<td>55,000</td>
<td>83%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VA 164 Western Freeway (I-664 – Midtown Tunnel)</td>
<td>28,000</td>
<td>63,000</td>
<td>125%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FACILITY</td>
<td>2018 ADT</td>
<td>2018 Pk Hr Per Lane Vol</td>
<td>2018 Pk Hr Per Lane Vol/Change from No-Build</td>
<td>2018 Pk Hr V/C/Change from No-Build</td>
<td>2018 ADT/Change from No-Build</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>-------------------------</td>
<td>------------------------------------------</td>
<td>----------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>I-64 Hampton Roads Bridge Tunnel</td>
<td>118,000</td>
<td>2,950 1.74</td>
<td>145,000 23% 1.813 -39% 0.90</td>
<td>142,000 20% 1.775 -40% 0.89</td>
<td>98,000 -17% 2,450 1.44</td>
</tr>
<tr>
<td>I-664 Monitor Merrimac Memorial Bridge Tunnel</td>
<td>76,000</td>
<td>1,900 1.09</td>
<td>61,000 -20% 1.525 -20% 0.87</td>
<td>60,000 -21% 1.500 -21% 0.86</td>
<td>143,000 88% 1.788 -6% 0.90</td>
</tr>
<tr>
<td>New Crossing (I-664 - VA 164 connection) (CBA 9)</td>
<td>48,000</td>
<td>1,200 0.69</td>
<td>45,000 -8% 1,125 -8% 0.66</td>
<td>42,000 -14% 1,050 -14% 0.62</td>
<td>44,000 -10% 1,100 -10% 0.65</td>
</tr>
<tr>
<td>US 17 James River Bridge</td>
<td>49,000</td>
<td>1,225 0.72</td>
<td>50,000 -8% 1,125 -8% 0.66</td>
<td>42,000 -14% 1,050 -14% 0.62</td>
<td>44,000 -10% 1,100 -10% 0.65</td>
</tr>
<tr>
<td><strong>Total Trips between Peninsula and Southside</strong></td>
<td>243,000</td>
<td>251,000</td>
<td>244,000</td>
<td>285,000</td>
<td>8,000 3.3%</td>
</tr>
<tr>
<td>Peninsula</td>
<td>I-64 (I-664 to Mercury Blvd.)</td>
<td>153,000</td>
<td>1,913 0.85</td>
<td>168,000 10% 2,100 10% 0.93</td>
<td>167,000 9% 2,088 9% 0.93</td>
</tr>
<tr>
<td></td>
<td>I-664 (I-64 - Downtown Newport News)</td>
<td>77,000</td>
<td>1,283 0.70</td>
<td>75,000 -3% 1,250 -3% 0.68</td>
<td>72,000 -6% 1,200 -6% 0.66</td>
</tr>
<tr>
<td></td>
<td>Jefferson Avenue (I-664 - Mercury Blvd.)</td>
<td>34,000</td>
<td>567 0.69</td>
<td>33,000 -3% 550 -3% 0.67</td>
<td>32,000 -6% 533 -6% 0.65</td>
</tr>
<tr>
<td>Southside</td>
<td>I-64 (I-564 - Rt. 44)</td>
<td>158,000</td>
<td>2,633 1.21</td>
<td>170,000 8% 2,833 8% 1.30</td>
<td>171,000 8% 2,850 8% 1.31</td>
</tr>
<tr>
<td></td>
<td>I-64 (I-464 - I-664)</td>
<td>117,000</td>
<td>1,950 0.87</td>
<td>105,000 -10% 1,750 -10% 0.78</td>
<td>102,000 -13% 1,700 -13% 0.76</td>
</tr>
<tr>
<td></td>
<td>VA 164 Connection (Where applicable)</td>
<td>48,000</td>
<td>12,000 0.66</td>
<td>48,000</td>
<td>39,000 975 0.53</td>
</tr>
<tr>
<td></td>
<td>VA 164 Western Freeway(Coast Guard-Bayview Blvd)</td>
<td>69,000</td>
<td>1,725 0.86</td>
<td>67,000 -3% 1,675 -3% 0.84</td>
<td>62,000 -10% 1,550 -10% 0.78</td>
</tr>
<tr>
<td></td>
<td>I-264 (Newtown Rd - Witchduck Rd)</td>
<td>179,000</td>
<td>2,238 1.05</td>
<td>178,000 -1% 2,225 -1% 1.05</td>
<td>179,000 0% 2,238 0% 1.05</td>
</tr>
<tr>
<td>FACILITY</td>
<td>NO-BUILD¹</td>
<td>CBA 1</td>
<td>CBA 2</td>
<td>CBA 9</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>-----------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2018 ADT</td>
<td>2018 Pk Hr Per Lane Vol.²</td>
<td>2018 Pk Hr Per Lane V/C³,⁴</td>
<td>2018 ADT/</td>
<td>2018 Pk Hr Per Lane Vol./</td>
</tr>
<tr>
<td>Hampton Blvd. (Lafayette River - Midtown Tunnel )</td>
<td>56,000</td>
<td>933</td>
<td>1.10</td>
<td>51,000</td>
<td>850</td>
</tr>
<tr>
<td>I-264 Downtown Tunnel</td>
<td>104,000</td>
<td>2,600</td>
<td>1.53</td>
<td>96,000</td>
<td>2,400</td>
</tr>
<tr>
<td>US 58 Midtown Tunnel</td>
<td>55,000</td>
<td>2,750</td>
<td>1.72</td>
<td>59,000</td>
<td>2,950</td>
</tr>
</tbody>
</table>

**Access to Major Port Facilities**

| Provides New Direct Access to Norfolk International Terminals (NIT) | X | X |
| Improves Access to NIT | X | X |
| Improves Access to Newport News Marine Terminal and Newport News Shipbuilding | X |
| Improves Access to Portsmouth Marine Terminal | X | X |
| Provides New Direct Access to Craney Island (Possible location of 4th Marine Terminal) | X | X |

**Access to Naval Base Norfolk (NBN)**

| Provides New Direct Access to NBN | X | X |
| Improves Access to NBN | X | X |
| Improves Access between Naval Base Norfolk and the Naval Supply Center, Naval Hospital, and Naval Shipyard in Portsmouth | X | X |

**Multimodal Component**

| Ability to accommodate HOV lanes, Exclusive Bus Lanes, and/or Passenger Rail across Hampton Roads | X | X | X |

**Cost**

| Cost Estimate ($ in Billions) | $1.2 | $2.0 | $2.7 |

1. Defined as the Hampton Roads 2018 Regional Transportation Plan, which is funded for $6 billion
2. Peak Hour Per Lane Volumes = (ADT/ number of lanes) * 0.10
3. V/C calculated for conventional lanes of traffic only, does not include projected HOV traffic volumes using the multi-modal lanes
4. Range of per lane capacity = 1,600 - 2,250 for interstate facilities, Midtown Tunnel, James River Bridge, and VA 164; 825-875 for Hampton Blvd. and Jefferson Ave.
5. Cost Estimate in 1999 dollars
vehicle is sitting in stop-and-go traffic daily for 10 minutes or 30 minutes, it is still LOS F. A V/C ratio of 1.00 represents the beginning of LOS F. The higher the V/C ratio, the more congestion can be expected. Candidate Build Alternatives that reduce V/C ratios can be expected to result in less congestion. The following shows the relationship between the different levels of service and the V/C ratio.

**LEVEL OF SERVICE – VOLUME/CAPACITY RELATIONSHIP**

<table>
<thead>
<tr>
<th>LEVEL OF SERVICE</th>
<th>V/C RATIO RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.00 – 0.04</td>
</tr>
<tr>
<td>B</td>
<td>0.05 – 0.16</td>
</tr>
<tr>
<td>C</td>
<td>0.17 – 0.32</td>
</tr>
<tr>
<td>D</td>
<td>0.33 – 0.57</td>
</tr>
<tr>
<td>E</td>
<td>0.58 – 0.99</td>
</tr>
<tr>
<td>F</td>
<td>≥ 1.00</td>
</tr>
</tbody>
</table>

Source: AASHTO, 1994

1. **No-Build Alternative**

Under the No-Build, 118,000 vehicles per day are projected to use the HRBT in 2018; a 53 percent increase from the 1994 average daily traffic volume (Table 4-1). As discussed in Chapter 1, if nothing is done, westbound traffic at the Hampton Roads Bridge Tunnel could experience peak “rush hour” conditions between 6 AM and 8 PM. Eastbound peak conditions could exist between 6 AM and 6 PM (see Figure 1-3). In addition, the number of incidents causing delays of 15 minutes or longer at the HRBT could reach 21 a day or nearly one every hour.

2. **Candidate Build Alternatives**

Each Candidate Build Alternative is projected to reduce the 2018 peak hour per lane traffic volumes and V/C ratio at the Hampton Roads Bridge Tunnel from the No-Build Alternative (Table 4-2).

   a. **Hampton Roads Bridge Tunnel**

By adding four new conventional lanes and the two-lane multimodal tube, Candidate Build Alternatives 1 and 2 more than double the capacity of the Hampton Roads Bridge Tunnel and reduce the peak hour per lane traffic volumes by about 40 percent. The average daily traffic volumes for Candidate Build Alternatives 1 and 2 are projected to increase 23 and 20 percent from the No-Build Alternative. Candidate Build Alternative 9 reduces the peak hour per lane traffic volumes at the Hampton Roads Bridge Tunnel by 17 percent from the No-Build Alternative.
b. **Monitor Merrimac Memorial Bridge Tunnel**

By providing four new conventional lanes and the two-lane multimodal tube, Candidate Build Alternative 9 more than doubles the capacity of the Monitor Merrimac Memorial Bridge Tunnel and reduces the peak hour per lane traffic volumes by 6 percent. The average daily traffic volume for Candidate Build Alternative 9 at the Monitor Merrimac Memorial Bridge Tunnel is projected to increase 88 percent from the No-Build Alternative, and the peak hour per lane traffic volumes are reduced six percent. Candidate Build Alternatives 1 and 2 are both projected to reduce the peak hour per lane volumes by about 20 percent from the No-Build Alternative.

c. **Increased Mobility Across Hampton Roads**

An increase in total daily trips between the Peninsula and the Southside from the No-Build Alternative represents increased mobility across Hampton Roads. With Candidate Build Alternative 9, 285,000 daily trips are projected to occur between the Peninsula and the Southside. This represents a 17 percent increase from the No-Build Alternative. Candidate Build Alternative 1 provides a three percent increase in total trips across Hampton Roads and Candidate Build Alternative 2 provides less than a 1 percent increase in total trips when compared to the No-Build Alternative.

d. **Vehicle Miles Traveled**

Table 4-3 presents the projected 2018 Vehicle Miles Traveled (VMT) for each Candidate Build Alternative as well as all of the projects in the Constrained Long Range Plan.

e. **Truck Traffic Volumes**

Table 4-4 shows the percentage of truck traffic projected to cross Hampton Roads in 2018 for each of the alternatives.

B. **2018 ORIGIN AND DESTINATION PATTERNS**

Projected 2018 Origin and Destination patterns between the Southside and the Peninsula were presented in Chapter 3 in Table 3-4. That table included trips beginning and/or ending in Hampton Roads. Thirty-six percent of the trips crossing Hampton Roads from the Southside to the Peninsula begin in Norfolk, and 22 percent begin in Virginia Beach. Forty-four percent of all trips across Hampton Roads end in Hampton, and 24 percent end in Newport News. Of the trips crossing Hampton Roads from the Peninsula to the Southside, 41 percent begin in Newport News, and 32
TABLE 4-3
2018 VEHICLE MILES TRAVELED (VMT)
Nobuild
Interstate
Principal Arterials
Minor Arterials
Minor Collectors
Local
TOTAL

CBA 1
Interstate
Principal Arterials
Minor Arterials
Minor Collectors
Local
TOTAL

CBA 2
Interstate
Principal Arterials
Minor Arterials
Minor Collectors
Local
TOTAL

CBA 9
Interstate
Principal Arterials
Minor Arterials
Minor Collectors
Local
TOTAL

Chesapeake Norfolk
Portsmouth Suffolk
Va Beach Isle of Wight Glouchester Hampton
James City Newport News Poquoson Williamsburg York
TOTAL
3,019,488 2,409,640
778,960
713,936 2,223,608
1,472,649 1,250,271
1,663,783
12,645 1,100,907 14,645,887
911,383 1,473,284
222,269 1,180,007 1,037,011
90,923
419,951
289,178
149,487
758,713
38,787
679,131
7,250,124
827,115
912,419
262,369
392,975 2,690,501
319,266
22,521
853,121
259,377
792,567
48,093
44,488
197,045
7,621,857
244,650
153,599
26,030
627,162
562,684
104,377
132,142
225,024
373,792
399,118
15,421
20,858
144,077
3,028,934
446,445
309,402
132,245
162,526
995,892
87,064
58,160
209,017
154,041
369,695
13,816
9,983
139,108
3,087,394
5,449,081

5,258,344

1,421,873

3,076,606

7,509,696

601,630

632,774

3,048,989

2,186,968

3,983,876

77,330

126,761

2,260,268

35,634,196

TOTAL
Chesapeake Norfolk
Portsmouth Suffolk
Va Beach Isle of Wight Glouchester Hampton
James City Newport News Poquoson Williamsburg York
2,916,581 2,494,295
745,508
693,793 2,222,311
1,705,439 1,255,754
1,641,468
13,381 1,096,858 14,785,388
914,745 1,497,174
213,950 1,168,862 1,039,979
89,486
421,973
288,994
147,477
732,211
38,547
679,831
7,233,229
819,677
878,517
259,516
389,174 2,713,477
315,613
22,753
808,678
262,117
794,485
47,942
45,017
196,816
7,553,782
245,672
147,868
26,340
620,463
561,774
103,889
130,141
220,712
372,196
395,779
15,369
20,816
140,683
3,001,702
446,041
309,386
132,050
162,340
993,585
87,051
58,122
208,669
153,709
369,957
13,810
9,970
138,444
3,083,134
5,342,716

5,327,240

1,377,364

3,034,632

7,531,126

596,039

632,989

3,232,492

2,191,253

3,933,900

77,121

127,731

2,252,632

35,657,235

TOTAL
Chesapeake Norfolk
Portsmouth Suffolk
Va Beach Isle of Wight Glouchester Hampton
James City Newport News Poquoson Williamsburg York
2,870,281 2,467,055
749,403
683,411 2,202,026
1,669,089 1,211,645
1,607,104
13,214 1,054,339 14,527,567
888,734 1,359,718
197,200 1,136,003 1,034,241
86,500
411,828
287,327
143,021
717,998
37,494
666,503
6,966,567
808,921
843,388
258,128
383,713 2,696,193
304,019
23,291
801,133
255,210
787,010
48,036
44,408
194,927
7,448,377
238,619
140,762
26,345
584,016
557,857
101,089
118,571
217,609
359,857
392,659
15,359
20,574
140,357
2,913,674
445,303
309,762
131,957
161,178
992,280
85,508
57,201
208,285
152,838
369,588
13,796
9,900
137,810
3,075,406
5,251,858

5,120,685

1,363,033

2,948,321

7,482,597

577,116

610,891

3,183,443

2,122,571

3,874,359

77,191

125,590

2,193,936

34,931,591

Chesapeake Norfolk
Portsmouth Suffolk
Va Beach Isle of Wight Glouchester Hampton
James City Newport News Poquoson Williamsburg York
TOTAL
2,842,059 2,421,697
703,813
682,463 2,216,695
1,705,733 1,329,427
1,733,256
23,597 1,003,723 14,662,463
917,987 1,341,341
179,463 1,109,313
999,869
76,528
423,556
281,741
108,455
701,469
37,240
677,116
6,854,078
876,140
882,713
274,547
438,147 2,785,335
259,809
25,201
765,197
295,309
782,761
47,599
49,501
163,853
7,646,112
262,597
140,909
26,291
617,873
499,933
96,256
125,908
214,680
348,684
380,023
15,382
22,053
134,541
2,885,130
443,407
310,618
130,565
160,130
973,820
87,172
56,778
207,149
147,765
365,176
13,789
10,070
128,223
3,034,662
5,342,190

5,097,278

1,314,679

3,007,926

7,475,652

519,765

631,443

3,174,500

2,229,640

3,962,685

76,770

142,461

2,107,456

35,082,445


### TABLE 4-4

**2018 TRUCK TRAFFIC VOLUMES**

<table>
<thead>
<tr>
<th></th>
<th>Hampton Roads Bridge Tunnel</th>
<th>Monitor Merrimac Memorial Bridge Tunnel</th>
<th>New Crossing (I-664-VA 164 connection) (CBA 9)</th>
<th>New Crossing (I-564-VA 164 connection) (CBA 2+9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No-Build Alternative</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018 ADT</td>
<td>118,000</td>
<td>76,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy Truck Volume</td>
<td>2,360 (2%)</td>
<td>3,040 (4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Trucks Volume</td>
<td>2,360 (2%)</td>
<td>2,280 (3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Candidate Build Alternative 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018 ADT</td>
<td>145,000</td>
<td>61,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy Truck Volume</td>
<td>5,800 (4%)</td>
<td>2,440 (4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Trucks Volume</td>
<td>2,900 (2%)</td>
<td>1,830 (3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Candidate Build Alternative 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018 ADT</td>
<td>142,000</td>
<td>60,000</td>
<td>48,000</td>
<td></td>
</tr>
<tr>
<td>Heavy Truck Volume</td>
<td>5,680 (4%)</td>
<td>2,400 (4%)</td>
<td>1,920 (4%)</td>
<td></td>
</tr>
<tr>
<td>Medium Trucks Volume</td>
<td>2,840 (2%)</td>
<td>1,800 (3%)</td>
<td>1,440 (3%)</td>
<td></td>
</tr>
<tr>
<td><strong>Candidate Build Alternative 9</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018 ADT</td>
<td>98,000</td>
<td>143,000</td>
<td>75,000</td>
<td>89,000</td>
</tr>
<tr>
<td>Heavy Truck Volume</td>
<td>2,940 (3%)</td>
<td>5,720 (4%)</td>
<td>2,250 (3%)</td>
<td>3,560 (4%)</td>
</tr>
<tr>
<td>Medium Trucks Volume</td>
<td>1,960 (2%)</td>
<td>4,290 (3%)</td>
<td>2,250 (3%)</td>
<td>2,670 (3%)</td>
</tr>
</tbody>
</table>

Heavy Trucks = 3 axle and larger  
Medium Trucks = 2 axle, 6 tires
percent begin in Hampton. Thirty-one percent of all trips across the water end in Virginia Beach, and 22 percent end in Norfolk. Each of the Candidate Build Alternatives serves Origin and Destination patterns between the Southside and the Peninsula.

C. TRAVEL TIME

Travel time for each of the Candidate Build Alternatives and the No-Build was determined among selected sites on the Peninsula and selected sites on the Southside using the Hampton Roads Crossing Study Regional Traffic Model. Table 4-5 lists the travel time-savings for each Candidate Build Alternative as compared to the No-Build Alternative. Each of the Candidate Build Alternatives provides travel time-savings from the No-Build. The greatest amount of overall travel time-savings is provided by Candidate Build Alternative 2.

TABLE 4-5

PEAK HOUR TRAVEL TIME-SAVINGS FROM THE NO-BUILD

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Travel Time-Savings (in minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No-Build Travel Time</td>
<td>CBA 1</td>
</tr>
<tr>
<td>I-64/I-664 Interchange</td>
<td>Norfok Naval Base¹</td>
<td>56</td>
</tr>
<tr>
<td>I-64/I-664 Interchange</td>
<td>Norfolk International Terminals²</td>
<td>55</td>
</tr>
<tr>
<td>I-64/I-664 Interchange</td>
<td>I-64/I-264/Rt. 44 Interchange</td>
<td>55</td>
</tr>
<tr>
<td>I-64/I-664 Interchange</td>
<td>I-64/I-464 Interchange</td>
<td>54</td>
</tr>
<tr>
<td>I-64/I-664 Interchange</td>
<td>Downtown Norfolk³</td>
<td>48</td>
</tr>
<tr>
<td>Downtown Newport News³</td>
<td>Norfok Naval Base</td>
<td>55</td>
</tr>
<tr>
<td>Downtown Newport News</td>
<td>Norfolk International Terminals</td>
<td>53</td>
</tr>
<tr>
<td>Downtown Newport News</td>
<td>I-64/I-264/Rt. 44 Interchange</td>
<td>47</td>
</tr>
<tr>
<td>Downtown Newport News</td>
<td>I-64/I-464 Interchange</td>
<td>46</td>
</tr>
<tr>
<td>Downtown Newport News</td>
<td>Downtown Norfolk</td>
<td>40</td>
</tr>
<tr>
<td><strong>Total Time Savings for All Destinations</strong></td>
<td><strong>174</strong></td>
<td><strong>181</strong></td>
</tr>
</tbody>
</table>

1. Intersection of Hampton Boulevard and Admiral Taussig Boulevard
2. Intersection of Hampton Boulevard and International Terminal Boulevard
3. Intersection of City Hall Avenue and St. Paul Boulevard
4. Intersection of 26th Street and Warwick Boulevard
D. DEDICATED MULTI-MODAL FACILITY

In order to accommodate future growth, each of the Candidate Build Alternatives will accommodate HOV, buses, or passenger rail. Each crossing will include a three-tube tunnel section. Two of the tubes will carry 4 conventional travel lanes, and the third tube could be used for HOV lanes, an exclusive busway, or passenger rail to manage transportation demand (Figure 4-1). In a hypothetical scenario of the evolution of the multi-modal tube, it could initially carry HOVs and buses. As demand increases, the tube could be converted into an exclusive busway. As demand continues to increase and should a rail system be developed on the Peninsula and the Southside, the tunnel could easily be converted into a passenger rail system. Using barriers, a busway could be operated in conjunction with either an HOV lane or a passenger rail system.

1. Linkage to Existing and Planned Multi-modal Facilities

Each of the Candidate Build Alternatives will connect with the existing HOV system on the Southside by tying into the I-64 reversible HOV lanes at I-564. On the Peninsula, the MPO approved in March 1997 an additional lane in each direction that would carry HOV on I-64 during peak hours from I-664 to Jefferson Avenue (east of VA 105). Each of the Candidate Build Alternatives will directly tie into these HOV lanes on the Peninsula.

As discussed in Chapter 3 (Section I.B.), Hampton Roads Transit (HRT) is currently working on a supplemental EIS to study a light rail system in the city of Norfolk. In addition, HRT is set to begin alternative analyses on a connection from Norfolk to Chesapeake, a connection from Norfolk to Portsmouth, and an extension of the Norfolk segment to Naval Base Norfolk. On the Peninsula, the city of Newport News has completed the CSXT Corridor MIS, which examined potential transportation improvements in a 32-mile corridor along the CSXT rail right-of-way linking downtown areas of Williamsburg, Newport News, and Hampton. It is anticipated that an EIS to study light rail in this corridor will initiated in January of 2001. High Speed intercity rail connecting Newport News and Richmond is also a component of the Locally Preferred Alternative, which was adopted by both the Hampton Roads Metropolitan Planning Organization and the Richmond Metropolitan Planning Organization, for the I-64 Major Investment Study. If these light rail facilities are constructed on the Southside and the Peninsula, the No-Build Alternative would not provide for the opportunity to connect these new facilities across Hampton Roads. Each of the Candidate Build Alternatives will have the ability to tie into these light rail facilities if they are constructed in the future.
2. Capacity Comparison

Table 4-6 shows transit system characteristics for buses, light rail transit, and rapid rail transit. In order to demonstrate how the multi-modal tube could increase person trips across Hampton Roads, the line capacity of each of the transit modes is compared to the capacity of a conventional highway lane (2,600 persons/hour). Based on current conditions on the I-64 reversible HOV-2 facility, it is assumed that the average occupancy is 2.2 persons per car. Compared to a conventional highway lane, a one lane HOV-2 facility could provide the equivalent of 1.7 conventional highway lanes. A one-lane busway could provide, depending on the frequency and number of buses, the equivalent of 1.5 to 4.6 conventional highway lanes. Light rail transit operating on a single track could provide, depending on the frequency and number of cars, the equivalent of 2.3 to 7.7 conventional highway lanes. Depending on the frequency and number of cars, rapid rail transit operating on a single track could provide the equivalent of 3.8 to 27.7 conventional highway lanes.

**TABLE 4-6**

**TRANSIT SYSTEM CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Bus (Busway)</th>
<th>Light Rail Transit</th>
<th>Rapid Rail Transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spaces per Vehicle</td>
<td>40-120</td>
<td>110-250</td>
<td>140-280</td>
</tr>
<tr>
<td>Vehicles per Transit Unit¹</td>
<td>1</td>
<td>1-4</td>
<td>1-10</td>
</tr>
<tr>
<td>Transit Unit Capacity (spaces/transit unit)</td>
<td>40-120</td>
<td>110-600</td>
<td>140-2400</td>
</tr>
<tr>
<td>Maximum Frequency (transit unit/hour)</td>
<td>60-90</td>
<td>40-90</td>
<td>20-40</td>
</tr>
<tr>
<td>Line Capacity (spaces/hour)²</td>
<td>4,000-12,000</td>
<td>6,000-20,000</td>
<td>10,000-72,000</td>
</tr>
<tr>
<td>Number of Equivalent Conventional Highway lanes³ (in one direction)</td>
<td>1.5 - 4.6</td>
<td>2.3 - 7.7</td>
<td>3.8 – 27.7</td>
</tr>
</tbody>
</table>

¹ A transit unit may be a single vehicle unit or a train with several vehicles.

² Line capacity is the maximum number of spaces transit vehicles can carry past a point along the line during 1 hour. Single lane for buses; single track for rail

³ Conventional highway lane capacity = 2,600 persons per hour


3. Land Use Densities

Greater land use densities provide more opportunity for transit use. Table 4-7 lists the 1990 and 2015 per acre household and employment densities by segment for each Candidate Build Alternative. Automobile densities are also included in Table 4-5. However, unlike residential and employment densities, lower densities of automobiles are more conducive to transit use. Table 4-7 is broken into 5 segments that are located within each of the Candidate Build Alternatives. The width of the segment
represents a 10- minute walk time distance in each direction from the center line of the Candidate Build Alternative.

Although the highest expected percent increases from 1990 to 2015 occur along I-664 from Hampton Roads to the I-64/I-264 interchange, this segment contains the lowest expected actual density per acre automobiles, households, and employment. The highest expected density per acre of households occurs along I-64 in Norfolk from Hampton Roads to the I-564 interchange. However, the highest density per acre of automobiles also occurs in this segment. The segment in Norfolk along I-564 from Norfolk International Terminals to the I-64 interchange contains the highest density per acre of employment.

**TABLE 4-7**

**1990 AND 2015 DENSITIES**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I-64</td>
<td>I-664</td>
<td>Interchange</td>
<td>1, 2</td>
<td>3.1</td>
<td>3.6</td>
<td>+16%</td>
<td>2.0</td>
<td>2.3</td>
<td>+15%</td>
<td>4.6</td>
<td>5.4</td>
<td>+17%</td>
</tr>
<tr>
<td>I-64</td>
<td>HRBT</td>
<td>I-564</td>
<td>1, 2</td>
<td>4.1</td>
<td>3.9</td>
<td>-5%</td>
<td>3.1</td>
<td>2.8</td>
<td>-10%</td>
<td>2.6</td>
<td>2.8</td>
<td>+8%</td>
</tr>
<tr>
<td>I-664</td>
<td>I-64</td>
<td>Interchange</td>
<td>9</td>
<td>1.9</td>
<td>1.8</td>
<td>-5%</td>
<td>2.2</td>
<td>2.1</td>
<td>-5%</td>
<td>6.1</td>
<td>8.1</td>
<td>+33%</td>
</tr>
<tr>
<td>I-564</td>
<td>NIT</td>
<td>I-64</td>
<td>Interchange</td>
<td>2, 9</td>
<td>2.5</td>
<td>2.5</td>
<td>0%</td>
<td>1.4</td>
<td>1.4</td>
<td>0%</td>
<td>7.1</td>
<td>9.1</td>
</tr>
<tr>
<td>I-664</td>
<td>Hampton Roads</td>
<td>I-64/I-264</td>
<td>Interchange</td>
<td>9</td>
<td>0.7</td>
<td>1.7</td>
<td>+143%</td>
<td>0.4</td>
<td>0.9</td>
<td>+125%</td>
<td>0.2</td>
<td>1.9</td>
</tr>
</tbody>
</table>

**E. SAFETY**

Each Candidate Build Alternative’s ability to accommodate diversion during incidents hinges on the number of routing options available. The provision of crossover connections between facilities, tunnels, approach roadways and connections to other facilities maximizes the available options. The ability of each of the Candidate Build Alternatives to accommodate diversions or rerouting in the event of an incident in a tunnel can be divided into two separate categories: advance diversion and local diversion. Advance diversion is rerouting in advance of the actual area where an incident occurs. This type of diversion enables motorists to avoid the immediate area of the incident altogether. Local diversion is rerouting in the immediate area of an incident.
1. Advance Diversion
For the No-Build and Candidate Build Alternatives 1, 2, and 9, the major decision point for advance diversion on the Peninsula is the existing I-64/I-664 interchange in Hampton. The decision point for advance diversion is not as definitive on the Southside and is dependent upon one’s location. Candidate Build Alternatives 2 and 9 each include the VA 164 connector and improve diversion capabilities by providing additional access.

2. Local Diversion
Local diversion capabilities will be enhanced by Candidate Build Alternative 9 which provides a new crossing between Norfolk and Newport News. The new crossing provides a local diversion to the I-664 Monitor Merrimac Memorial Bridge Tunnel from the north shore and the I-64 Hampton Roads Bridge Tunnel from the south shore. The VA 164 connection and the east connection to I-564 on Candidate Build Alternatives 2 and 9 can be used as local diversion routes for one another if incidents south of their intersection occur.

F. SHIPPING CHANNELS
As discussed in Chapter 2, ships entering Hampton Roads from the sea follow the Thimble Shoal Channel into the deep waters of Hampton Roads. Two channels then extend through Hampton Roads. The Newport News Channel extends 11.1 kilometers (6.9 miles) westward from Hampton Roads to Newport News. The Norfolk Harbor Channel extends from the Hampton Roads Bridge Tunnel into the Southside cities of Norfolk, Portsmouth, and Chesapeake via the Elizabeth River. Authorized improvements provide for deepening both the Newport News Channel and the Norfolk Channel to 17 meters (55 feet) (HRMA, 1997).

Candidate Build Alternatives 1 and 2 will cross the Newport News Channel parallel to the existing Hampton Roads Bridge Tunnel. Candidate Build Alternative 9 will cross the Newport News Channel parallel to the existing Monitor Merrimac Memorial Bridge Tunnel. Candidate Build Alternatives 2 and 9 will also cross the Norfolk Harbor Channel. In order to maintain the navigable shipping channels, tunnel construction will be of the submerged tube-type in which the tube sections will be placed in a dredged trench on the bay bottom in a position below the future shipping channel.
Candidate Build Alternative 1 and the portions of Candidate Build Alternatives 2 and 9 that place a new crossing near an existing crossing may provide a safer environment for boaters with less visual impact. The introduction of new piers and the attendant roadway between Newport News, Norfolk, and Portsmouth for Candidate Build Alternative 9 and between Norfolk and Portsmouth for Candidate Build Alternative 2 increases the potential for boating accidents.

II. LAND USE

A. LAND USE CONVERSION
Because each of the Candidate Build Alternatives is parallel to and incorporates existing interstate systems, most of the construction will occur within the existing interstate right-of-way. For example, in the cities of Chesapeake and Suffolk, over 90 percent of Candidate Build Alternative 9 remains within the existing I-664 right-of-way. However, each Candidate Build Alternative would require conversion of some additional land to transportation use. The largest amount of land required for conversion under each of the Candidate Build Alternatives is currently defined as urban and built-up land, residential, commercial, industrial, transportation, communication, and utility land uses. Each of the Candidate Build Alternatives will cross open water. A discussion of open water impacts is discussed in Section X.B: Waterbody Crossings.

B. DEVELOPMENT
Developable land in the vicinity of the alternatives has been either fully developed or is planned for development. The I-64 corridor through Hampton and Norfolk and the I-664 corridor through Hampton and Newport News are already heavily developed. In addition to the development that currently occurs, there are a number of proposed, planned, and approved development plans along the I-664 corridor in the cities of Suffolk and Chesapeake on the Southside (Chesapeake’s Western Branch Area Plan, 1995, Suffolk Zoning Map, 1998). In the city of Portsmouth, the area traversed by the VA 164 connection south of Craney Island and the U.S. Coast Guard Center is zoned for heavy manufacturing (Portsmouth Zoning Map, 1997).

C. CONSISTENCY WITH AREA’S COMPREHENSIVE PLAN
All communities within the study area have developed and adopted comprehensive plans or are in the process of updating and amending their comprehensive plans. The No-Build Alternative, as defined by this study, includes all of those transportation facility improvements and new facilities included in
the 2018 Regional Transportation Plan developed and adopted by the Metropolitan Planning Organization (MPO). Because all of the municipalities in the study area are represented on the MPO, the No-Build, as defined, is consistent with each municipality’s comprehensive plan.

A third crossing of the Hampton Roads is specifically mentioned in the comprehensive plans of two study area municipalities, the cities of Hampton and Norfolk. The comprehensive plans of three other project area municipalities (Newport News, Portsmouth and Chesapeake) mention the importance of the integration of their transportation networks with the regional system. Comprehensive plans of the other study area municipalities do not specifically discuss a third crossing.

Partially to ensure that Candidate Build Alternatives developed for this study are consistent with the plans of study area municipalities, the Hampton Roads Crossing Study Coordinating Committee was established for the MIS phase of this study. As discussed in Chapter 2, study area municipalities and representatives of the MPO are represented on the Coordinating Committee. Their participation on the Coordinating Committee has ensured consistency with the plans of the cities within the study area.

The Hampton Roads MPO concluded the MIS by selecting Transportation Corridor 9 (Candidate Build Alternative 9) as the locally preferred corridor in July of 1997. The Commonwealth Transportation Board endorsed the MPO’s conclusion of the MIS in September of 1997. On July 20, 2000, the CTB voted to identify Candidate Build Alternative 9 as the approved location.

III. SOCIAL IMPACTS

A. POPULATION

Small segments of the study area’s total 1.3 million population could be directly affected by each of the Candidate Build Alternatives through potential residential relocations. In order to assess the project impacts on the population, the number of potential relocations and US Census population data were used to estimate the number of persons affected (Table 4-8). The number of residential relocations was multiplied by the number of people per occupied housing unit in 1990. More detailed housing statistics appear in this chapter in Section IV: Relocation Impacts.
TABLE 4-8

POTENTIAL POPULATION AFFECTED

<table>
<thead>
<tr>
<th>Candidate Build Alternative&lt;sup&gt;1&lt;/sup&gt;</th>
<th>City</th>
<th>Residential Unit Relocations</th>
<th>Persons per Occupied Housing Unit</th>
<th>Persons Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBA 1 Hampton</td>
<td>25</td>
<td>2.69</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>CBA 1 Norfolk</td>
<td>103</td>
<td>2.92</td>
<td>301</td>
<td></td>
</tr>
<tr>
<td>CBA 2 Hampton</td>
<td>25</td>
<td>2.69</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>CBA 2 Norfolk</td>
<td>103</td>
<td>2.92</td>
<td>301</td>
<td></td>
</tr>
<tr>
<td>CBA 2 Portsmouth</td>
<td>0</td>
<td>2.68</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>CBA 9 Hampton</td>
<td>5</td>
<td>2.69</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>CBA 9 Newport News</td>
<td>33</td>
<td>2.66</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>CBA 9 Norfolk</td>
<td>0</td>
<td>2.92</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>CBA 9 Portsmouth</td>
<td>0</td>
<td>2.68</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>CBA 9 Suffolk</td>
<td>0</td>
<td>2.82</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>CBA 9 Chesapeake</td>
<td>0</td>
<td>2.92</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total CBA 1</td>
<td></td>
<td></td>
<td>368</td>
<td></td>
</tr>
<tr>
<td>Total CBA 2</td>
<td></td>
<td></td>
<td>368</td>
<td></td>
</tr>
<tr>
<td>Total CBA 9</td>
<td></td>
<td></td>
<td>101</td>
<td></td>
</tr>
</tbody>
</table>

1. The No-Build is defined as the 2018 regional transportation plan. Projects included in the plan will require residential unit relocations.

B. COMMUNITY COHESION

1. Changes in Accessibility and Mobility

Economic opportunities will result from the new connections and/or increased accessibility to the neighborhoods and economic centers located in the vicinity of the Candidate Build Alternatives. Candidate Build Alternative 9 provides a new direct link between the cities of Newport News, Norfolk, and Portsmouth, and it also provides a new Southside I-664 to Norfolk connection. By adding four new conventional lanes and two multi-modal lanes, accessibility to the neighborhoods connected by Candidate Build Alternative 9 is improved.

In Hampton and Norfolk, Candidate Build Alternatives 1 and 2 parallel and incorporate existing I-64 and do not provide new access to neighborhoods. However, by adding four new conventional lanes and two multi-modal lanes, accessibility to the neighborhoods connected by Candidate Build Alternatives 1 and 2 is improved. Candidate Build Alternative 2 also includes a connection to VA 164 in Portsmouth and will provide a new direct link between the cities of Norfolk and Portsmouth.
Negative changes in accessibility will not occur under any of the Candidate Build Alternatives. Each of the Candidate Build Alternatives generally parallels and is incorporated into an existing interstate highway. No access points along the interstate systems are eliminated, and no major neighborhood disruptions are expected. Candidate Build Alternatives 1 and 2 parallel and incorporate the existing I-64 right-of-way in Norfolk and Hampton. Candidate Build Alternative 9 parallels and incorporates the existing I-664 right-of-way in Hampton, Newport News, Suffolk, and Chesapeake. In Norfolk, Candidate Build Alternatives 2 and 9 each parallel and incorporate the existing I-564 right-of-way and an existing railroad corridor.

The connection to VA 164 in Portsmouth, which is included in Candidate Build Alternatives 2 and 9, will be located on a new alignment. One neighborhood, Hatton Point, is located near the southern terminus with VA 164, an existing controlled access expressway. No access points are eliminated for this neighborhood, and the neighborhood is not directly impacted.

2. Community Displacements

Because each of the Candidate Build Alternatives is incorporated within an existing interstate or railroad corridor or traverse an area that is not developed, no communities will be bisected and travel patterns will not be disrupted. Some residential, business, and community facility displacements will occur in Hampton, Newport News, and Norfolk (Table 4-9).

<table>
<thead>
<tr>
<th>Candidate Build Alternative</th>
<th>City</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBA 1 and 2</td>
<td>Hampton</td>
<td>Hampton University</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Phoebus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Langley Park</td>
</tr>
<tr>
<td>CBA 1 and 2</td>
<td>Norfolk</td>
<td>Willoughby</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ocean View</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commodore Park</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Granby Shores</td>
</tr>
<tr>
<td>CBA 9</td>
<td>Hampton</td>
<td>Azalea Gardens</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Park Place</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Greenbriar</td>
</tr>
<tr>
<td></td>
<td>Newport News</td>
<td>Newsome Park</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Southeastern Newport News</td>
</tr>
</tbody>
</table>
The displacements within each community, however, represent a minimal amount of the total housing and employment within the community. There are areas within each of the communities to which residents, businesses, and community facilities could relocate. Therefore, negative impacts to the cohesion of the communities are not expected.

C. EMERGENCY SERVICES
The Candidate Build Alternatives will have positive impacts on highway and traffic safety. These benefits would consist primarily of improved response time for emergency service providers. Section 1 of this chapter discusses the travel time savings for each Candidate Build Alternative as compared to the No-Build. Each of the Candidate Build Alternatives provides travel time savings from the No-Build.

Within the cities of Hampton, Newport News, Norfolk, Suffolk, and Chesapeake, impacts to fire and police zones are not expected because of the existence of a transportation facility within these zones. In fact, higher capacity along I-64, I-664, and I-564 will allow for faster response times to incidents by the respective fire and police units. Within the City of Portsmouth, Candidate Build Alternatives 2 and 9 travel through two police zones (261 and 262) and one fire zone (3). Candidate Build Alternatives 2 and 9 will affect the coverage of police zone 262 because each will include an interstate facility where there are currently no interstate facilities. Fire zone 3 may also be affected by Candidate Build Alternatives 2 and 9 because it will need to be extended to cover the new transportation facility.

Mitigation of short-term negative impacts of construction include prudent scheduling and programming of the various phases of construction, and the provision of construction detours and informative signing. Public safety service providers will be kept fully aware of project scheduling, planned road closings, and alternative route designations. Emergency agencies and schools will be informed regularly of temporary detour routes or areas of potential delays during construction.

IV: RELOCATION IMPACTS

A. METHODOLOGY
Baseline information was obtained from aerial photography and field verification. Special groups information was obtained from the U.S. Department of Commerce, Bureau of the Census. These groups are defined as those which have the potential to be specially benefited or harmed by the
Alternatives (USDOT, 1987). For the study area, these groups include the population over 65 years of age, households with no vehicles available, the population 16 years and over with a disability, minority groups, and low-income groups. Identification of these groups is consistent with FHWA TA 6640.8A and Executive Order 12898 on Environmental Justice.

B. POTENTIAL RELOCATIONS
Potential relocations within each of the Candidate Build Alternatives are identified in Table 4-10. Individual businesses are listed in the Social and Economic Technical Appendix to this FEIS. Avoidance of utilities will be a priority during final design.

**TABLE 4-10**
**RELOCATIONS**

<table>
<thead>
<tr>
<th>Type of Displacement</th>
<th>Candidate Build Alternative 1</th>
<th>Candidate Build Alternative 2</th>
<th>Candidate Build Alternative 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>74</td>
<td>74</td>
<td>27</td>
</tr>
<tr>
<td>Multi-family Building</td>
<td>7 buildings (54 units)</td>
<td>7 buildings (54 units)</td>
<td>2 buildings (11 units)</td>
</tr>
<tr>
<td>Total Residential Units</td>
<td>128</td>
<td>128</td>
<td>38</td>
</tr>
<tr>
<td>Business</td>
<td>8</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Church</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Community Facility</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Cemetery</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Government Building</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Public Park</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Utility</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>138</td>
<td>141</td>
<td>49</td>
</tr>
</tbody>
</table>

1. The No-Build is defined as the 2018 regional transportation plan. Projects included in the plan will require displacements.

In addition to potential relocations, each of the Candidate Build Alternatives will require the acquisition of property only or property easements. For instance, both Candidate Build Alternatives 2 and 9 cross property of the Naval Fuel Depot and U.S. Coast Guard in the city of Portsmouth. Because no buildings were taken and these facilities will continue to be able to operate, these properties were not included in the potential relocations table. Issues such as this will be addressed during final design when a Stage I Right-of-Way report is prepared. In addition, refinements during final design may result in fewer relocations.
Housing statistics for the cities in 1990 are presented in Table 4-11. These vacancy rates are for 1990. Only minor changes are expected to have occurred since that time. The Federal Home Loan Bank System - Residential Unit Survey was also reviewed in order to evaluate the quantity of available housing for displaced residents. This survey was completed in June 1994 and prepared in coordination with the U.S. Department of Housing and Urban Development. General housing availability has not changed significantly since June 1994 and therefore this data is considered to reflect current conditions. The survey provides data on existing houses, apartments, and mobile homes, and those under construction. The survey encompasses all housing units in the survey area served by post offices which have delivery routes. Table 4-12 shows the total number of new and previously owned/occupied units in each of the potentially impacted cities.

**TABLE 4-11**

**STUDY AREA HOUSING INFORMATION**

<table>
<thead>
<tr>
<th>Location</th>
<th>Owner Occupied Units</th>
<th>Renter Occupied Units</th>
<th>Vacancy</th>
<th>Average Size (Number of Bedrooms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton</td>
<td>54.9%</td>
<td>37.8%</td>
<td>7.37%</td>
<td>2.66</td>
</tr>
<tr>
<td>Newport News</td>
<td>45.9%</td>
<td>45.8%</td>
<td>8.28%</td>
<td>2.52</td>
</tr>
<tr>
<td>Norfolk</td>
<td>39.9%</td>
<td>50.7%</td>
<td>9.40%</td>
<td>2.36</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>51.2%</td>
<td>40.4%</td>
<td>8.38%</td>
<td>2.50</td>
</tr>
<tr>
<td>Suffolk</td>
<td>62.7%</td>
<td>29.8%</td>
<td>7.47%</td>
<td>2.76</td>
</tr>
<tr>
<td>Chesapeake</td>
<td>68.0%</td>
<td>25.2%</td>
<td>6.78%</td>
<td>2.88</td>
</tr>
</tbody>
</table>

Source: U.S. Bureau of Census, 1992

**TABLE 4-12**

**AVAILABLE REPLACEMENT HOUSING**

<table>
<thead>
<tr>
<th>Location</th>
<th>Hampton</th>
<th>Newport News</th>
<th>Norfolk</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>133</td>
<td>164</td>
<td>125</td>
</tr>
<tr>
<td>Previously Owned/Occupied</td>
<td>1,966</td>
<td>3,176</td>
<td>5,737</td>
</tr>
<tr>
<td>Under Construction</td>
<td>783</td>
<td>275</td>
<td>154</td>
</tr>
<tr>
<td>Total</td>
<td>2,882</td>
<td>3,615</td>
<td>6,016</td>
</tr>
</tbody>
</table>

Source: Federal Home Loan Bank System, Occupancy Survey, June 1994
Minimization of displacement impacts will be incorporated into the final highway design. Ultimately, relocation may be required. Based on the vacancy data from the U.S. Census and the U.S. Department of Housing and Urban Development, there should be sufficient vacancy to relocate within the cities. Acquisition and relocation would proceed in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Any individual, family, business, farm operation, or non-profit organization being displaced because of the acquisition of real property, in whole or in part, is eligible to receive reimbursement for fair market value of property acquired and moving costs. Displaced property owners would be provided relocation assistance advisory services. Relocation resources would be made available to all residents and businesses without discrimination.

Replacement housing is available in all of the cities. However, there may be some last resort rent supplements and last resort replacement housing payments necessary. Last resort housing payments would be used in order to place the relocatees in decent, safe, and sanitary housing, if necessary. In any event, replacement housing would be provided for all displacements.

C. ENVIRONMENTAL JUSTICE/SPECIAL GROUPS

Executive Order (EO) 12898 - “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” was issued by President Clinton on February 11, 1994. The purpose of this EO is to promote non-discrimination in federal programs substantially affecting human health and the environment, and to provide minority communities and low-income communities access to information on, and an opportunity for public participation in, matters relating to human health and the environment. This review provides information on the minority and low-income public outreach effort and an overview of the potentially impacted populations within each Candidate Build Alternative.

1. Public Outreach Effort

Since the beginning of this project in 1993, the public outreach program sought input from minority and low-income populations. The public outreach program includes newsletters, public information meetings, a telephone hotline number, and an Internet home page site.

To date, four newsletters have been printed and approximately 3,300 copies of each have been distributed throughout Hampton Roads. The newsletters provide up to date information regarding the project as well as notices about upcoming public meetings. Special distribution efforts were made to
assure that the newsletters reached minority and low-income groups. The newsletters were delivered to 92 special distribution points including local community centers, churches, public libraries, social service centers, public housing centers, and senior centers. A telephone survey of local social service agencies helped to identify churches with outreach programs. These churches were used as newsletter drop off points.

There have been three sets of public meetings: August 10 and 11, 1994, March 8 and 9, 1995, and September 20 and 21, 1995. A set of MIS public hearings was held on May 21 and 22, 1997. For each set of public meetings and public hearings, one was held on the Southside and one on the Peninsula. These meetings were advertised by placards placed in public buses, local newspaper advertisements, as well as on local television and radio stations. A special effort was made to hold all meetings at locations accessible by public transit and persons with disabilities.

2. Minority and Low-Income Populations

Executive Order 12898 on Environmental Justice requires consideration of minority and low-income groups. Low-income groups are defined as people “whose median household income is below the Department of Health and Human Services poverty guidelines” (USDOT, 1995). Poverty statistics presented here are from the U.S. Census and are “the standard to be used by federal agencies for statistical purposes” (U.S. Department of Commerce, 1992). The average poverty threshold for a family of three in the lower 48 states and District of Columbia in 1998 is $13,650 (Federal Register, 1998). The Final USDOT order on Environmental Justice was issued on February 3, 1997. This order is an important part of the strategy the USDOT is using to assess environmental justice impacts. According to the final strategy, disproportionately high and adverse impacts to minority and/or low-income populations occur when: (a) The adverse impact is predominantly borne by a minority population and/or a low-income population, or (b) The adverse impact that will be suffered by the minority population and/or low-income population is more severe or greater in magnitude than the adverse impact that will be suffered by the non-minority population and/or non-low-income population.

In the study area cities, the portion of people in poverty decreased in all the cities except Newport News between 1980 and 1990 (Table 4-13). The minority portion of the population increased in all the study area cities except Suffolk.
### TABLE 4-13

**ENVIRONMENTAL JUSTICE DATA**

<table>
<thead>
<tr>
<th>City</th>
<th>Percentage Minority Population</th>
<th>Percentage Population in Poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton</td>
<td>35.9%</td>
<td>41.6%</td>
</tr>
<tr>
<td>Newport News</td>
<td>33.8%</td>
<td>37.3%</td>
</tr>
<tr>
<td>Norfolk</td>
<td>38.9%</td>
<td>43.3%</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>46.2%</td>
<td>48.6%</td>
</tr>
<tr>
<td>Suffolk</td>
<td>48.0%</td>
<td>45.3%</td>
</tr>
<tr>
<td>Chesapeake</td>
<td>29.0%</td>
<td>29.3%</td>
</tr>
</tbody>
</table>


The Candidate Build Alternatives traverse census tracts with a minority population ranging from 7 percent to 99 percent and a low income population ranging from 1 percent to 78 percent. Additionally, because of the geographic location of minority and low-income populations on the north side of Hampton Roads, any possible crossing alternative will pass through these communities (Figures 4-2 and 4-3). Because each of the Candidate Build Alternatives passes through census tracts with minority and low-income populations above the regional average, all of the Candidate Build Alternatives will potentially have a disproportionate impact on minority and low-income populations. However, other alternatives that would have had greater impacts on the minority and low-income populations have been dismissed because of these impacts.

To minimize environmental impacts, relocations, and cost, each of the Candidate Build Alternatives incorporate and parallel existing interstate facilities. All residential relocations occur to residences currently located adjacent to an existing interstate facility. Additionally, planning and design measures will be examined in the development of the project (including environmental mitigation measures, relocation assistance and other available measures) to further reduce the impacts on minority and low-income populations.

Table 4-14 lists the census tracts in which residential unit relocations occur. Although, relocations will occur for each of the Candidate Build Alternatives in census tracts with percent minority and low income populations higher than the regional average, the number of households relocated represent a very small portion of the total households in the census tract (Table 4-14). In addition, as discussed in Section IV.B. Potential Relocations, adequate housing is available within each community to adequately house any minority or low-income member of the displaced population.
FIGURE 4-2
PERCENT MINORITY GREATER THAN REGIONAL AVERAGE BY CENSUS TRACT

* REGIONAL AVERAGE BASED ON 33%
FIGURE 4-3
PERCENT LOW-INCOME GREATER THAN REGIONAL AVERAGE BY CENSUS TRACT

* REGIONAL AVERAGE BASED ON 12%
TABLE 4-14
ENVIRONMENTAL JUSTICE: HOUSEHOLD DATA

<table>
<thead>
<tr>
<th>CBA</th>
<th>City</th>
<th>Census Tract</th>
<th>Total Households in Census Tract</th>
<th>Percent of Population Minority in Census Tract</th>
<th>Percent of Population Low Income in Census Tract</th>
<th>Residential Relocations</th>
<th>% of Total Households in Census Tract</th>
<th>Total Units</th>
<th># of Units Occupied by Minorities¹</th>
<th># of Units Occupied by Persons of Low-Income¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>Hampton</td>
<td>106.02</td>
<td>798</td>
<td>94%</td>
<td>37%</td>
<td></td>
<td>14</td>
<td>0</td>
<td>14</td>
<td>1.75%</td>
</tr>
<tr>
<td>1 and 2</td>
<td>Hampton</td>
<td>106.01</td>
<td>1,222</td>
<td>74%</td>
<td>22%</td>
<td></td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>0.49%</td>
</tr>
<tr>
<td>1 and 2</td>
<td>Hampton</td>
<td>113</td>
<td>1,039</td>
<td>55%</td>
<td>12%</td>
<td></td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0.29%</td>
</tr>
<tr>
<td>1 and 2</td>
<td>Hampton</td>
<td>114</td>
<td>81*</td>
<td>99%</td>
<td>1%</td>
<td></td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1.23%</td>
</tr>
<tr>
<td>1 and 2</td>
<td>Hampton</td>
<td>108</td>
<td>2,223</td>
<td>30%</td>
<td>4%</td>
<td></td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0.04%</td>
</tr>
<tr>
<td>1 and 2</td>
<td>Norfolk</td>
<td>8</td>
<td>962</td>
<td>41%</td>
<td>9%</td>
<td></td>
<td>15</td>
<td>2 buildings (20 units)</td>
<td>35</td>
<td>3.64%</td>
</tr>
<tr>
<td>1 and 2</td>
<td>Norfolk</td>
<td>5</td>
<td>1,484</td>
<td>16%</td>
<td>10%</td>
<td></td>
<td>30</td>
<td>1 building (2 units)</td>
<td>32</td>
<td>2.16%</td>
</tr>
<tr>
<td>1 and 2</td>
<td>Norfolk</td>
<td>4</td>
<td>2,342</td>
<td>7%</td>
<td>10%</td>
<td></td>
<td>4</td>
<td>4 buildings (32 units)</td>
<td>36</td>
<td>1.54%</td>
</tr>
<tr>
<td>9</td>
<td>Hampton</td>
<td>105</td>
<td>4,065</td>
<td>66%</td>
<td>27%</td>
<td></td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>0.10%</td>
</tr>
<tr>
<td>9</td>
<td>Newport News</td>
<td>308</td>
<td>1,214</td>
<td>99%</td>
<td>23%</td>
<td></td>
<td>21</td>
<td>0</td>
<td>21</td>
<td>1.73%</td>
</tr>
<tr>
<td>9</td>
<td>Newport News</td>
<td>304</td>
<td>1,763</td>
<td>99%</td>
<td>38%</td>
<td></td>
<td>1</td>
<td>1 building (3 units)</td>
<td>4</td>
<td>0.23%</td>
</tr>
<tr>
<td>9</td>
<td>Newport News</td>
<td>302</td>
<td>1,638</td>
<td>99%</td>
<td>79%</td>
<td></td>
<td>0</td>
<td>1 building (8 units)</td>
<td>8</td>
<td>0.49%</td>
</tr>
</tbody>
</table>

1. Assumption: Number of units occupied by minorities and persons of low-income are homogeneously distributed in census tract. Estimate derived by multiplying total units being relocated by percent of population minority and low income in census tract.

* Census Tract 114 includes Hampton University. Total households include the campus dormitories.
The estimated number of minority and low income dwelling units affected by noise are listed in Table 4-15. In order to calculate these numbers, it was assumed that the number of minority and low income dwelling units in each census tract were homogeneously distributed throughout the census tract. The estimate of dwelling units affected by noise was derived by multiplying the total units affected in the census tract by the percent of population minority and low income in the census tract. For the noise analysis, the No-Build Alternative is more narrowly defined and describes the traffic noise impacts along the alternative in 2018 if the alternative is not built. Further information on noise impacts is included in Section VIII.C of this chapter.

**TABLE 4-15**

**ENVIRONMENTAL JUSTICE: RESIDENTIAL NOISE IMPACT**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Number of Dwelling Units Exposed to Traffic Noise Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Minority Occupied Units¹</td>
</tr>
<tr>
<td>Candidate Build Alternative 1</td>
<td>178</td>
</tr>
<tr>
<td>Alternative 1 – No-Build²</td>
<td>79</td>
</tr>
<tr>
<td>Candidate Build Alternative 2</td>
<td>155</td>
</tr>
<tr>
<td>Alternative 2 – No-Build²</td>
<td>81</td>
</tr>
<tr>
<td>Candidate Build Alternative 9</td>
<td>176</td>
</tr>
<tr>
<td>Alternative 9 – No-Build²</td>
<td>65</td>
</tr>
</tbody>
</table>

1. Assumption: Number of units occupied by minorities and persons of low-income are homogeneously distributed in census tract. Estimate derived by multiplying total units being relocated by percent of population minority and low income in census tract.
2. For the noise analysis, the No-Build is defined as the traffic noise impacts in 2018 along the alternative if the alternative is not built.

3. **Other Population Groups**

Special population groups were defined as the population over the age of 65, the workforce population with a disability, and those households without a vehicle. While certain census tracts traversed by the Candidate Build Alternatives contain percentages of the population that are higher than the regional average for these special groups, no special groups will be differentially impacted by any of the Candidate Build Alternatives. By providing increased access for conventional traffic as well as transit, each of the Candidate Build Alternatives may positively affect these special population groups.
V. ECONOMIC IMPACTS

Each of the Candidate Build Alternatives will have generally similar, broad, region-wide impacts, but their localized or city by city impacts could vary. The No-Build is also expected to have broad, region-wide impacts.

A. IMPACTS OF THE NO-BUILD

Because the No-Build does not provide for any new connections between the Southside and the Peninsula, it would not improve accessibility between these two areas. Without a new crossing, travel options between the Southside and the Peninsula would remain the same. However due to projected increases in traffic, negative consequences could occur, including impeding the flow of goods and services between the Southside and the Peninsula, could occur. Additionally, delay times at each of the crossings would increase under the No-Build; thus increasing the travel time. Delay time and travel time increases would have negative economic and social consequences. The Hampton Roads Planning District Commission prepared a report titled, “The Estimated Impact of Not Constructing the Third Crossing” in July of 1997, which discusses these and other issues (HRPDC, 1997b). The following information in this section on the No-Build Alternative is taken from that report:

The No-Build Alternative will primarily impact the regional economy through an increase in the cost of moving people and goods across the Hampton Roads harbor. This cost includes the unproductive use of time waiting in traffic and the cost of operating a vehicle while delayed. In addition, there can be a significant “inventory cost” associated with the length of time that a trip takes since capital (vehicles and the cargoes they contain) is tied up in an unproductive use. Finally, the reliability of travel is significant to motorists and shippers because failing to get to a destination on time can force an alteration of schedules and can cause freight receivers to increase their inventory levels so as to guard against stockouts with a consequent increase in inventory holding costs. Such cost increases have a variety of important implications for the regional economy. Some of the more important of these impacts which will arise from these higher transportation costs are outlined below:

1. Port of Virginia

The Port of Virginia includes the State of Virginia’s general cargo facilities (Norfolk International Terminals, Newport News Marine Terminal, Portsmouth Marine Terminal) as well as numerous private cargo facilities (coal, grain, etc.). The operation of the Port generates considerable business for the region and produces a substantial impact upon the Hampton Roads economy each year. Given the
important role truck traffic plays in meeting the needs of the Port, and given the importance of the area’s tunnels to truck movements, it can be assumed that the Port of Virginia is dependent in large measure upon the efficient movement of goods across the Hampton Roads harbor. This dependence upon the region’s highway and tunnel system will only increase in future years since the Port Authority projects that its three terminals will add over 576,000 annual truck arrivals between now and the year 2015. In addition, should traffic across the harbor continue to grow without a corresponding increase in the capacity of the highway system to accommodate that increase, it is likely that the pace of growth imbedded in the port’s projections (See Chapter 3: Section IV.B) will be in jeopardy (HRPDC, 1997b).

2. Tourism Industry

Growing congestion at the Hampton Roads Bridge Tunnel threatens to curtail growth in the region’s tourism industry. Because a large segment of visitors travel to the area using I-64, this is especially true for that component of the industry located on the Southside. However, Peninsula attractions are also vulnerable to congestion at the tunnels because many of the visitors (and local residents) come from the Southside on day trips.

In addition to threatening the industry’s future growth, the current level of tourist activity may also be at risk from growing congestion. Those motorists who find the benefit of using the tunnel to exceed the cost will cross the harbor. Those who find that the cost exceeds the benefit will choose not to make the trip. The threat to the travel industry is that as the cost of congestion rises, tourists may increasingly decide not to travel through the tunnel when making cost-benefit comparisons because they are discretionary tunnel users while others who have little choice decide to use the tunnel. Over time, this process has the potential to substantially decrease the percent of all tunnel users who are tourist. Should the percent of tunnel users who are tourists decline substantially faster than the percent increase in tunnel traffic, the result would be fewer tourists and less business for travel operations, especially on the Southside. (HRPDC, 1997b).

3. Value of Time Lost

In addition to providing the previous information on ports and tourism, the Hampton Roads Planning District Commission report also estimated the value of time lost in transit. The report stated that while it cannot be known for certain how much people value their time while in transit, an estimate can be made of the value of the time lost by Hampton Roads residents when they are delayed at area tunnels.
This estimate was obtained by the Hampton Roads Planning District Commission through a series of multiplications. These multiplications suggest that the value of the time lost by tunnel travelers in 1997 will be nearly 1.8 million dollars. The value of these delays will increase over time as traffic volumes grow and the number of delays increase. Because traffic engineers estimate that without a new tunnel the combined number of incidents on the two tunnels will increase by twenty percent per year, the Planning District Commission estimated that the annual value of time lost in delays will grow to over 48 million dollars by the year 2015, expressed in 1997 dollars. When the value of these delays is summed for all of the years between 1997 and 2015, total time lost by these delays is estimated to have a value of 280 million dollars when expressed in 1997 dollars (HRPDC, 1997b).

4. Job Opportunities
The Hampton Roads Planning District Commission report also found that growing congestion at the Hampton Roads Bridge Tunnel threatens to reduce the availability of job opportunities to area residents. Unless this congestion can be alleviated, area residents will be unwilling to search for or accept jobs on the opposing sides of the harbor since the commute which would be required would simply be unacceptable. This, in effect, limits the number of job opportunities to those jobs located on the same side of the harbor on which the job seeker resides. Furthermore, congestion restricts the labor shed for businesses to the labor pool located nearby and excludes the large reservoir of labor residing on the opposite side of Hampton Roads. (HRPDC, 1997b)

5. Cost of Living
Because congestion and delays will continue to grow at the Hampton Roads Bridge Tunnel and eventually at the Monitor Merrimac Memorial Bridge Tunnel under the No-Build Alternative, the Hampton Roads Planning District Commission report found that it is likely that, over the long term, the cost of living will tend to increase.

Local transportation costs can impact upon the local cost of living via several channels. Like land costs, transportation costs eventually get capitalized into the cost of goods and services consumed in a local marketplace. The cost of transporting goods is, in reality, a production cost since the process of production is not complete until goods are in the hands of consumers. If goods are brought into a region for sale, the price must be set high enough so as to cover all costs including shipping costs. Higher transportation costs mean higher prices for goods brought into the community. An additional way in which local prices are impacted by local transportation costs is through the cost of importing
raw materials and other inputs into a region so that they can be assembled into manufactured products for local consumption. And finally, transportation costs determine the number of firms that may compete within a local market because many producers are located at varying distances from the market. Because competition tends to drive down prices, higher transportation costs can be expected to increase the cost of living (HRPDC, 1997b).

B. ECONOMIC INFLUENCES OF CANDIDATE BUILD ALTERNATIVES

Any additional crossing will expand options available for residents, visitors, and businesses to access both the Southside and the Peninsula. This increase in interaction will likely result in a higher level of economic integration on a regional level. As discussed in Chapter 3 (Section IV.B), there are three major components to the economic base of the Hampton Roads area: ports/shipbuilding; military; and tourism.

1. Port of Virginia and Support Facilities

Each of the Candidate Build Alternatives contributes to enhancing the movement of motor carriers between the local port and shipbuilding facilities. Figure 4-4 shows the location of the major port and shipbuilding facilities in Hampton Roads and depicts the location of each of the Candidate Build Alternatives in relation to these facilities. The facilities are concentrated in five general locations: downtown Newport News, northwest Norfolk, southwest Norfolk, the Eastern Branch of the Elizabeth River, and the Southern Branch of the Elizabeth River. As depicted in Figure 4-4, Candidate Build Alternatives 2 and 9 provide the most interactions with these areas. The improved access will reduce the time and cost of the movement of people and goods between the port facilities.

Candidate Build Alternative 9 will provide a new direct link between the cities of Norfolk and Newport News. Although there may be some temporary construction-related disruption at Norfolk International Terminals, it will also provide new direct access across the Hampton Roads to Norfolk International Terminals. Economic opportunities will result from the connection between Norfolk International Terminals and the Newport News Marine Terminal. The connection will reduce the time and cost of the movement of freight between these two ports.

The VA 164 connection included in Candidate Build Alternatives 2 and 9 travels along the east side of Craney Island. Craney Island currently serves as a repository for dredged material. As discussed in Chapter 3 (Section I.F.), the expansion of Craney Island to the east for the development of a fourth
container port facility as well as the continued use of Craney Island for the placement of dredged materials is being studied by the Corps. In addition to providing access to a potential fourth marine terminal on Craney Island, Candidate Build Alternatives 2 and 9 also provide a connection from VA 164 to Norfolk International Terminals and Naval Base Norfolk.

Candidate Build Alternative 9 includes an interchange with existing I-664 near the south approach structure of the Monitor Merrimac Memorial Bridge Tunnel. This interchange will provide a connection between I-664 on the Southside and I-564 in Norfolk. In addition to providing new access between the cities of Norfolk and Suffolk, this connection will provide new Southside access to Norfolk International Terminals.

2. Military

The Final Purpose and Need Statement identified the need to support the movement of people and goods to and from the region’s military bases. Candidate Build Alternative 9 provides a new direct connection from the Peninsula to Naval Base Norfolk, the world’s largest naval base (Virginia Business, 1996). By improving I-64, Candidate Build Alternative 1 and 2 improve access to the naval base from the Peninsula. In addition, Candidate Build Alternatives 2 and 9 provide additional eastern access to Naval Base Norfolk and Norfolk International Terminals from I-64.

The connection to VA 164 in Portsmouth, which is included in both Candidate Build Alternatives 2 and 9, will provide new direct access between the cities of Norfolk and Portsmouth. The VA 164 connection will improve accessibility between Naval Base Norfolk and the following naval facilities located in Portsmouth:

- Naval Supply Center located to the south of Craney Island Dredged Material Management Area (CIDMMA)
- Portsmouth Naval Hospital which is currently undergoing expansion to become the largest naval hospital in the country
- Norfolk Naval Shipyard which is located near downtown Portsmouth.
KEY FOR FIGURE 4-4
Port Facilities

A. Dominion Terminal Associates  Newport News Marine Terminal
   ESSROC  Newport News Shipbuilding & Drydock Co.
   Koch Fuels, Inc.  Pier IX Terminal Company
   McAllister Towing of Virginia, Inc.  Virginia Maritime Piers

B. Cargill North  Norfolk International Terminals
   Lehigh Portland Cement Co.  U.S. Naval Station
   Nissan Motors

C. Associated Naval Architects, Inc.  Portsmouth Marine Terminal, Inc.
   Lambert’s Point Docks, Inc.  The Jonathon Corp.
   Moon Engineering Co., Inc.  U.S. Army Engineer District, Norfolk
   Norfolk Oil Transit, Inc.  U.S. Coast Guard Support Center
   Norfolk Southern

D. Allied Terminals, Norfolk  Moran Towing of Virginia, Inc.
   Berkley Machine Works and Foundry Co.  NOAA, Atlantic Marine Center
   Chevron  Norfolk Shipbuilding & Drydock Corp.,
   Colonna’s Shipyard, Inc.  Brambleton Plant and Berkley Plant
   Lyon Shipyard Inc.  Tarmac
   Marine Hydraulics International  Todd Marine Enterprises
   MARPOL, Inc  Virginia Dry Dock Corp.
   Metro Machine Corporation

E. Alcoa  Jacobsen Metal
   Allied Terminals, Chesapeake  Lafarge Calcium Aluminates, Inc.
   Amoco Oil Company  Louis Dreyfus Energy Corp.
   Atlantic Energy, Inc.  Marine Oil Service, Inc.
   B.P. Oil Corporation  Miller Oil Company
   Blue Circle Atlantic, Inc.  Mobil Oil Corporation
   Cargill South Elevator  Norfolk Naval Shipyard
   Carter Marine  Olympic Marine Services
   Chesapeake Fertilizer  Southern States
   Chesapeake West  Steuart Transportation
   Crown Central Petroleum Company  Tarmac
   Davis Grain Company  Texaco Refining & Marketing
   Elizabeth River Terminals, Inc.  Tri-Port Terminals, Inc.
   Hess Oil  U.S. Gypsum Company
   Huntsman Corp.  Whitehorse Marine, Inc.
   IMTT-Chesapeake

Source: Hampton Roads Maritime Association, 1997
3. **Tourism**

As discussed previously, growing congestion at the Hampton Roads Bridge Tunnel threatens to curtail growth in the region’s tourism industry. This is especially true for that component of the industry located on the Southside because a large segment of visitors travel to the area using I-64. However, Peninsula attractions are also vulnerable to congestion at the tunnels because many of the visitors (and local residents) come from the Southside on day trips.

Each of the Candidate Build Alternatives reduce congestion at the Hampton Roads Bridge Tunnel and improve travel times between the Peninsula and the Southside from the No-Build Alternative. In addition to reducing the time it takes to travel between the Peninsula and the Southside, this increase in accessibility will make it easier for visitors to travel between tourist destinations located on the Peninsula and the Southside.

C. **BUSINESS RELOCATIONS**

Table 4-10 shows an inventory of businesses located within each Candidate Build Alternative. Any direct impacts to businesses could have negative consequences for business earnings, employment, household income (via the loss of employment), and tax revenue (via the loss of tax-paying businesses). The magnitude of these negative consequences depends primarily upon the likelihood of the businesses relocating within the area. Because of the range of the number and types of business areas throughout the region and within the study area, relocation within the area would be feasible.

D. **CONSTRUCTION AND OPERATIONS EMPLOYMENT**

Project related effects on employment would occur in terms of the short-term employment created during the 10-year construction period and the long-term employment created for the operation of the transportation facility. A study by the Illinois Department of Transportation estimated that the short-term employment impacts due to highway construction was 32.6 jobs per $1 million cost of construction (1980). These are short-term, onsite and offsite jobs and include skilled and unskilled laborers, equipment operators, management, and other industries related directly with construction and are usually filled by the local labor force. The offsite jobs are generated primarily by the manufacturing and transportation of construction materials. Table 4-16 shows the estimated amount of short-term jobs created by each Candidate Build Alternative.
TABLE 4-16
CONSTRUCTION RELATED EMPLOYMENT

<table>
<thead>
<tr>
<th>Candidate Build Alternative</th>
<th>Estimated Cost of Construction</th>
<th>Estimate of Short-Term Jobs Created</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1.2 billion</td>
<td>39,120</td>
</tr>
<tr>
<td>2</td>
<td>$2.1 billion</td>
<td>68,460</td>
</tr>
<tr>
<td>9</td>
<td>$2.7 billion</td>
<td>88,020</td>
</tr>
</tbody>
</table>

Long-term operation jobs include skilled and unskilled positions required for tunnel and bridge operation and maintenance as well as for the operation and maintenance of any bus and/or light rail public transit system. The number and potential economic impact of these jobs will depend on the size and scope of the transit corridor.

VI. VISUAL AND AESTHETIC

This visual analysis entails assessing visual sites with consideration of views both from the Candidate Build Alternatives and of the Candidate Build Alternatives in accordance with FHWA’s Visual Impact Assessment for Highway Projects (USDOT, 1990).

A. METHODOLOGY

In order to assess project impacts, a rating scale was used to determine the degree of change in a particular viewshed based on the following definitions:

- *No Impact* - The project will not be visible to viewers of the facility; thus, no impacts would occur.
- *Low Impact* - The view of the proposed facility will produce a low impact if a view of the facility is partially obstructed; if the visual resources in the viewshed are of minimal quality; if there are other sources of visual intrusions in the viewshed; or if there is little or no visual contrast between the proposed facility and the existing landscape unit.
- *Medium Impact* - The view of the proposed facility will produce a medium impact if the facility produces an obvious change in the viewshed; or if there is a moderate contrast between the proposed facility and the existing landscape unit.
- *High Impact* - The view of the proposed facility will produce a high impact if the facility is located in the foreground of the viewshed resulting in a strong contrast with the surrounding landscape unit; if the facility alters the distinctive qualities of the viewshed; or if the proposed facility is located within areas of visual diversity.

The viewsheds for this project were based on the geographic areas from which each Candidate Build Alternative can be seen (i.e. areas surrounding each Candidate Build Alternative). Within each
viewshed, particular views are indicative of the character of the viewshed. Viewers identified in the study area are residents along existing roadways, persons using the existing roadways, and persons who would use the Candidate Build Alternatives.

B. IMPACT ASSESSMENT

1. Views From the Facility
The principal viewers from the transportation facility include commuters, local residents, and visitors to the area. Construction of any of the Candidate Build Alternatives would create additional views of Hampton Roads and the cityscape in areas where the road is elevated.

2. Views of the Facility
Key viewers and views were identified which could be affected by each of the Candidate Build Alternatives. Key views were assessed for each Candidate Build Alternative (Table 4-17) and include parks, recreation areas, schools, and cemeteries. The impacts of the alternatives on the views is generally low due to the presence of I-64 or I-664 in the foreground of the existing views from these resources as well as the visually eclectic nature of the study area.

**TABLE 4-17**

**POTENTIAL VISUAL IMPACTS**

<table>
<thead>
<tr>
<th>View</th>
<th>CBA 1</th>
<th>CBA 2</th>
<th>CBA 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bluebird Gap Farm</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Y.H. Thomas Park</td>
<td>None</td>
<td>None</td>
<td>N/A</td>
</tr>
<tr>
<td>River Street Park</td>
<td>Low</td>
<td>Low</td>
<td>N/A</td>
</tr>
<tr>
<td>Woodlands Golf Course and Tennis Center</td>
<td>Low</td>
<td>Low</td>
<td>N/A</td>
</tr>
<tr>
<td>Hampton National Cemetery</td>
<td>Low</td>
<td>Low</td>
<td>N/A</td>
</tr>
<tr>
<td>Willoughby Boat Ramp</td>
<td>Low</td>
<td>Low</td>
<td>N/A</td>
</tr>
<tr>
<td>Captain’s Quarters Nature Center and Park</td>
<td>Low</td>
<td>Low</td>
<td>N/A</td>
</tr>
<tr>
<td>Willoughby Elementary School</td>
<td>Low</td>
<td>Low</td>
<td>N/A</td>
</tr>
<tr>
<td>Breezy Point Park</td>
<td>Low</td>
<td>Low</td>
<td>N/A</td>
</tr>
<tr>
<td>Forest Lawn Cemetery</td>
<td>Low</td>
<td>Low</td>
<td>N/A</td>
</tr>
<tr>
<td>Greenlawn Memorial Cemetery</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Booker T. Washington Middle School</td>
<td>N/A</td>
<td>N/A</td>
<td>Low</td>
</tr>
<tr>
<td>Newsome Park Middle School</td>
<td>N/A</td>
<td>N/A</td>
<td>Low</td>
</tr>
<tr>
<td>29th Street Mini-Park</td>
<td>N/A</td>
<td>N/A</td>
<td>Low</td>
</tr>
<tr>
<td>King Lincoln Park</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Hebron Cemetery</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Un-named Cemetery on Stationhouse Road</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
</tr>
</tbody>
</table>
C. POST-CONSTRUCTION COMPUTER VISUAL SIMULATIONS

Post-construction computer simulations were completed for three areas traversed by the Candidate Build Alternatives. The first simulation depicts a visual area traversed by both Candidate Build Alternatives 1 and 2 and portrays the alternative as it crosses Hampton Roads and enters the city of Hampton (Figure 4-5). The original photo for this simulation was taken from the north island of the existing I-64 Hampton Roads Bridge Tunnel looking towards the Strawberry Banks Hotel in Hampton (Figure 4-6).

The other simulations show visual areas included in Candidate Build Alternative 9. Figure 4-7 depicts the interchange north of Craney Island and the beginning of the VA 164 connection. The original photo was taken from the Elizabeth River to the east facing Craney Island (Figure 4-8). Figure 4-9 depicts the north island of Candidate Build Alternative 9 as the alternative enters the city of Newport News. The original photo was taken from the north island of the existing I-664 Monitor Merrimac Memorial Bridge Tunnel looking towards southern Newport News (Figure 4-10).

VII. AIR QUALITY

The primary source of air pollution emissions associated with the project are those caused by motor vehicles using the roadway system. An air quality assessment was performed following the guidelines and recommendations of the Virginia Department of Transportation (VDOT), the Virginia Department of Environmental Quality (DEQ) and the Environmental Protection Agency (EPA) - Region 3 in Philadelphia, PA.

This report discusses the methodology used and the predicted impacts to the local air quality from the implementation or non-implementation of the Candidate Build Alternatives. Construction mitigation measures and other mitigation measures, if any, are also addressed.

A. METHODOLOGY

A microscale analysis was performed in order to predict the effects of carbon monoxide (CO) changes to local air quality from the construction of the transportation facility. The microscale analysis predicts the generation and dispersion of CO in the immediate project vicinity. The years 1995 (existing year), 2005 (proposed opening year) and 2018 (design year) were analyzed and compared to the National Ambient Air Quality Standard (NAAQS).
Motor vehicle emission rates were computed using the EPA's MOBILE 5.0a emissions model (March, 1993). The emission factors were developed by the Virginia Department of Transportation for consistency with the Commonwealth's other projects. The updated 2018 emission factors were developed by Baker using the same method used by VDOT to develop the originally proposed 2015 design year. The only change was the input of "18" versus "15" in the Mobile model as a result of the design year change. Carbon monoxide concentrations from highway vehicles were calculated by using CAL3QHC (CALINE3), a Gaussian dispersion model. The updated 2018 travel demand data and the 2018 MOBILE 5.0a emission factors are included in the Air Quality and Energy Technical Appendix to this FEIS.

A worst-case approach was taken for nearly all meteorological conditions. Three-hundred and sixty wind directions were analyzed at 1 degree intervals to determine the maximum CO concentrations. Other factors included a wind speed of one meter per second, a neutral atmospheric condition (D), a mixing height of 1000 meters (3280 feet) and ambient temperatures representing minimum and maximum temperatures for the average coldest month for the microscale analysis and the average warmest month for the mesoscale analysis.

Table 4-18

MOBILE 5.0A INPUT PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region Low Altitude</td>
<td>Mobile 5.0a default</td>
</tr>
<tr>
<td>Tampering Rates</td>
<td>Mobile 5.0a default</td>
</tr>
<tr>
<td>Inspection/Maintenance</td>
<td>No</td>
</tr>
<tr>
<td>Anti-Tampering Program</td>
<td>No</td>
</tr>
</tbody>
</table>
| Ambient Temperature (Carbon Monoxide) | Minimum -10°C (14°F)  
Maximum 3°C (38°F)  |
| Ambient Temperature (Ozone)        |Minimum 22°C (71°F)  
Maximum 34°C (94°F)  |
| Vehicle Mix                        |Mobile 5.0a default                         |
| Vehicle Miles Traveled             |Mobile 5.0 default                          |
| Vehicle Mileage                    |Mobile 5.0a annual mileage accumulation     |
| Vehicle Emission Rates             |Mobile 5.0a basic exhaust emission rates    |
| Reformulated Gas                   |Credit Taken                                |
| Exhaust Emission Factors           |No correction factors                       |
| Years Analyzed                     |1990, 1995, 2005, 2018                      |
TABLE 4-19
CAL3QHC INPUT PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability Class</td>
<td>D (Neutral)</td>
</tr>
<tr>
<td>Surface Roughness</td>
<td>150 cm-urban type terrain</td>
</tr>
<tr>
<td>Wind Speed</td>
<td>1 meter/second</td>
</tr>
<tr>
<td>Wind Direction</td>
<td>0-359 @ 1° intervals</td>
</tr>
<tr>
<td>Mixing Height</td>
<td>1000 meters</td>
</tr>
<tr>
<td>Receptor Locations</td>
<td>As shown in text</td>
</tr>
<tr>
<td>Receptor Height</td>
<td>1.8m (6 feet)</td>
</tr>
<tr>
<td>Persistence Factor</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Background Concentrations 1-Hour</td>
<td>6.0 ppm</td>
</tr>
<tr>
<td>Background Concentrations 8-Hour</td>
<td>3.0 ppm</td>
</tr>
<tr>
<td>Traffic Volumes</td>
<td>Peak period volumes</td>
</tr>
<tr>
<td>Traffic Speeds</td>
<td>Worst case for the greatest volumes, based on MINUTP model congested speed outputs</td>
</tr>
</tbody>
</table>

Modeling was done for the peak one-hour condition. A background concentration of 6.0 ppm for the 1-hour concentration was used to account for CO sources outside the study area. This value was added to the one-hour results. Tables 4-18 and 4-19 show the inputs used for the MOBILE 5.0a and the CAL3QHC air quality models, respectively.

Speeds for the roadways and the proposed facility were based on the functional type (interstate, major arterials, minor arterials or other roads) and location (urban, suburban, fringe or rural) of the particular road. They were also based on the congested speeds of the MINUTP travel demand forecasting model at Level of Service C.

Receptor sites along the roadway were chosen at locations where the highest CO concentrations can be expected and the general public has access during the analysis periods. These sites were placed at various representative points on adjoining property right-of-way lines where people activity may occur. The CO concentrations were compiled to include the project roadway and background concentrations.

A mesoscale or "regional" analysis was performed for the project because the study area is listed as a maintenance area for ozone (O3). The regional analysis predicts the generation of precursors in the
project vicinity. The years 1990 (base year), 2005 (proposed opening year) and 2018 (design year) were analyzed and compared to the requirements established by the Clean Air Act Amendments of 1990.

B. MICROSCALE ANALYSIS

Worst link case CO sites were investigated. None of the predicted opening year or design year 1-hour analysis sites exceeded the one-hour criteria of 35 ppm as identified in the National Ambient Air Quality Standards (NAAQS). These predicted concentrations also did not exceed the eight-hour concentration criteria of 9 ppm; therefore an eight-hour analysis was not performed because the eight-hour concentrations are always less than the 1-hour concentrations. Table 4-20 shows the predicted highest one-hour CO receptor concentrations for all the Candidate Build Alternatives for the existing year 1995, the proposed opening year 2005, and the design year 2018. These concentrations are located in areas where the greatest traffic volumes are predicted and at their closest point to a property right-of-way line, typical of where human activity may occur. The traffic volumes used are at their slowest predicted speed, based on congested speeds generated by the travel demand forecast model at Level of Service C constraints. These predicted concentrations also include a one-hour background level of 6.0 ppm. Eight-hour predictions, if necessary, would include a background level of 3.0 ppm.

**TABLE 4-20**

**1-HOUR PREDICTED HIGHEST CARBON MONOXIDE CONCENTRATIONS**

<table>
<thead>
<tr>
<th></th>
<th>Receptor 1 I-64 South</th>
<th>Receptor 2 I-64 North</th>
<th>Receptor 3 I-664 North</th>
<th>Receptor 4 I-664 South</th>
<th>Receptor 5 I-564</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXISTING 1995</td>
<td>9.6</td>
<td>9.1</td>
<td>7.3</td>
<td>8.8</td>
<td>8.2</td>
</tr>
<tr>
<td>2005 NO-BUILD</td>
<td>8.2</td>
<td>7.9</td>
<td>6.9</td>
<td>7.8</td>
<td>7.3</td>
</tr>
<tr>
<td>2005 CBA 1</td>
<td>8.2</td>
<td>N/A</td>
<td>6.8</td>
<td>N/A</td>
<td>7.2</td>
</tr>
<tr>
<td>2005 CBA 2</td>
<td>8.2</td>
<td>N/A</td>
<td>6.8</td>
<td>N/A</td>
<td>7.2</td>
</tr>
<tr>
<td>2005 CBA 9</td>
<td>8.2</td>
<td>N/A</td>
<td>7.2</td>
<td>7.8</td>
<td>7.4</td>
</tr>
<tr>
<td>2018 NO-BUILD</td>
<td>8.2</td>
<td>8.1</td>
<td>7.3</td>
<td>8.1</td>
<td>7.3</td>
</tr>
<tr>
<td>2018 CBA 1</td>
<td>8.5</td>
<td>N/A</td>
<td>7.2</td>
<td>N/A</td>
<td>7.2</td>
</tr>
<tr>
<td>2018 CBA 2</td>
<td>8.5</td>
<td>N/A</td>
<td>7.2</td>
<td>N/A</td>
<td>7.2</td>
</tr>
<tr>
<td>2018 CBA 9</td>
<td>8.5</td>
<td>N/A</td>
<td>8.4</td>
<td>8.0</td>
<td>7.9</td>
</tr>
</tbody>
</table>

NAAQS: 1-HOUR = 35 ppm
NAAQS: 8-HOUR = 9 ppm
The predicted concentrations include a 1-hour background CO level of 6.0 ppm.

12/11/00 161
Receptors were chosen to represent the worst possible CO locations along the proposed Candidate Build Alternatives. A total of 5 worst case receptors were able to represent all the existing, No-Build and Candidate Build Alternatives. These receptors are able to represent more than one of the Candidate Build Alternatives because they share common corridors and are also the worst case link locations for this study. They were also chosen based on the greatest predicted traffic volumes traveling at the slowest operating speed for that alternative. Receptor 1 is located in the I-64 corridor immediately south of the I-564 interchange on the Southside. Receptor 2 is also located in the I-64 corridor, but immediately north of the I-664 interchange on the Peninsula. Receptor 3 is located in the I-664 corridor north of the Monitor Merrimac Bridge-Tunnel. Receptor 4 is also located in the I-664 corridor near its interchange with I-264 and US 460 in the southern end of the project area. Receptor 5 is located in the I-564 corridor near the US Norfolk Naval Air Station and close to where proposed new alignments may interchange with this existing route. Figure 4-11 shows the location of these receptors in the study area.

The highest predicted one-hour CO concentration for the year 2005 No-Build is 8.2 ppm at receptor 1. The highest predicted one-hour concentration for the year 2015 No-Build is 8.2 ppm also at receptor 1. Based on these results, no exceedances of either the one or eight-hour criteria are predicted to occur at any receptor for the No-Build for the opening year or the design year.

The highest predicted one-hour CO concentration of all the 2005 Candidate Build Alternatives is 8.2 ppm. This concentration level occurs at receptor 1 for all of the Candidate Build Alternatives. The highest predicted one-hour concentration of all the 2018 Candidate Build Alternatives is 8.5 ppm. This occurs at receptor 1 for Candidate Build Alternatives 1, 2, and 9. Based on these results, no exceedances of either the one or eight-hour criteria are predicted to occur at any receptor for any Candidate Build Alternative.

C. MESOSCALE ANALYSIS

This project is in an attainment/maintenance area in the Virginia State Implementation Plan. The project is also part of the approved 1999-2002 TIP. A mesoscale analysis was performed to analyze the proposed project's effect on the precursors of ozone, volatile organic compounds (VOCs) and nitrogen oxides (NOx). Table 4-21 shows the total differences in kilograms and tons per day between the base year 1990, the proposed opening year 2005 and design year 2018 No-Builds, and the proposed opening year and design year Candidate Build Alternatives. Additional information on the VOC and NOx calculations is included in the Air Quality and Energy Technical Appendix.
TABLE 4-21
PREDICTED DAILY 1990, 2005, & 2018 OZONE PRECURSORS

<table>
<thead>
<tr>
<th></th>
<th>Volatile Organic Compounds (VOC’s) (kgs. per day)</th>
<th>Volatile Organic Compounds (VOC’s) (tons per day)</th>
<th>Nitrogen Oxides (NOx) (kgs. per day)</th>
<th>Nitrogen Oxides (NOx) (tons per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990 Base Year</td>
<td>99,774</td>
<td>109.751</td>
<td>62,316</td>
<td>68.548</td>
</tr>
<tr>
<td>2005 No-Build</td>
<td>39,428</td>
<td>43.371</td>
<td>58,519</td>
<td>64.371</td>
</tr>
<tr>
<td>2005 CBA 1</td>
<td>36,185</td>
<td>39.804</td>
<td>57,449</td>
<td>63.194</td>
</tr>
<tr>
<td>2005 CBA 2</td>
<td>36,224</td>
<td>39.846</td>
<td>57,282</td>
<td>63.010</td>
</tr>
<tr>
<td>2005 CBA 9</td>
<td>36,760</td>
<td>40.436</td>
<td>58,416</td>
<td>64.258</td>
</tr>
<tr>
<td>2018 No-Build</td>
<td>58,518</td>
<td>64.369</td>
<td>86.383</td>
<td>95.022</td>
</tr>
<tr>
<td>2018 CBA 1</td>
<td>48,439</td>
<td>53.283</td>
<td>65,636</td>
<td>70.140</td>
</tr>
<tr>
<td>2018 CBA 2</td>
<td>48,440</td>
<td>53.284</td>
<td>65,639</td>
<td>71.215</td>
</tr>
<tr>
<td>2018 CBA 9</td>
<td>49,519</td>
<td>54.471</td>
<td>67,129</td>
<td>73.842</td>
</tr>
</tbody>
</table>

Table 4-21 shows that the predicted VOC levels for each of the opening year 2005 Candidate Build Alternatives are less than both the 1990 base year and the predicted 2005 No-Build levels. The predicted VOC levels for each of the design year 2018 Candidate Build Alternatives are also less than the 1990 base year and the predicted design year 2018 No-Build levels.

Table 4-21 also shows that the predicted NOx levels for each of the opening year 2005 Candidate Build Alternatives are less than both the 1990 base year and the predicted 2005 No-Build levels. The No-Build and Build year 2018 emissions are greater than the 1990 NOx emission level. However, the predicted NOx levels for each of the design year 2018 Candidate Build Alternatives is less than the 2018 No-Build Alternative.

D. MITIGATION

The proposed project is in an attainment area for CO. Based on the predicted CO results, the construction of any of the Candidate Build Alternatives will not cause an exceedance of the NAAQS for Carbon Monoxide in any of the analysis years. The predicted Carbon Monoxide concentrations are below both the 1-hour and 8-hour criteria for all conditions. Therefore, no mitigation measures are required based on the results of the microscale analysis.
The proposed project is in a maintenance area for O₃. Based on the mesoscale results, each of the alternatives for the opening year 2005 has less predicted VOC and NOx than the 1990 base year and the 2005 No-Build levels.

All of the VOC levels for the design year 2018 are less than the 1990 base year and the 2018 No-Build Alternative. None of the design year 2018 NOx levels, including the No-Build, are less than the 1990 base year level. However, each of the Candidate Build Alternatives is less than the 2018 No-Build Alternative.

VIII. NOISE AND VIBRATION

A. NOISE ASSESSMENT METHOD

1. Definition of Terms

The A-weighted sound level, expressed in decibels (dBA), is a single number measure of sound intensity with weighted frequency characteristics that corresponds to human subjective response to noise. Most environmental noise (and the A-weighted sound level) fluctuates from moment to moment, and it is common practice to characterize the fluctuating level by a single number called the equivalent sound level ($L_{eq}$). The $L_{eq}$ is the value or level of a steady, non-fluctuating sound that represents the same sound energy as the actual time-varying sound evaluated over the same time period. For traffic noise assessment, $L_{eq}$ is typically evaluated over a one-hour period, and may be denoted as $L_{eq}(h)$. More detail on the terms and the noise impact criteria is given in Section 3.6.a.

2. Statement of Assumptions

The traffic data and engineering drawings developed for the environmental analysis were used as input to the noise model. In general, sound propagation over acoustically “soft” ground (e.g. lawn with an effective flow resistivity of 300 cgs Rayls) was assumed throughout the study area except where sound propagation occurred over acoustically “hard” ground (such as asphalt or water with an effective flow resistivity of 20,000 cgs Rayls). Acoustical shielding provided by 0.8-meter high parapets was assumed along the edge of shoulder of all elevated portions of roadways on structure, unless field observations showed otherwise for existing roadways. Shielding provided by the top edge of embankments (edge of road) was also accounted for in elevated areas on fill. Shielding from rows of houses and other structures was modeled according to FHWA guidelines. Existing noise barriers were modeled in the future case only if the widening of the highway would not require their removal. On-
ramps were extended along the mainline for a total distance of 2000 meters, or until the on-ramp intersected another ramp, whichever came first. By extending the on-ramps along the mainline, heavy trucks can reach the mainline speeds before the end of the ramp.

3. Traffic-Noise Prediction Model

All traffic noise calculations were performed using the FHWA-approved Traffic Noise Model (TNM) (Menge et. al, 1998) released by FHWA in April 1998 for use on Federal-aid highway noise studies nationwide. The TNM is a PC-computer implementation of a three-dimensional mathematical model and includes a new vehicle noise emissions database in one-third-octave bands. The new database incorporates slow-speed and accelerating vehicles, bus and motorcycle data, vehicles on grade, and vehicles on different pavement types. The TNM computes A-weighted $L_{eq}$, $L_{dn}$, or $L_{den}$ depending on user selection. Traffic control devices such as signals can be included, and the TNM computes vehicle speeds and emission levels accordingly. The TNM also computes sound level contours if requested.

The TNM incorporates state-of-the-art sound propagation and shielding algorithms. These algorithms are based on recent research on sound propagation over ground of different types and the shielding effects of barriers, berms, ground, buildings, and trees. All propagation calculations are performed in one-third-octave bands. The TNM does not account for atmospheric effects such as varying wind speed/direction or temperature gradients, i.e. the TNM propagation algorithms assume neutral atmospheric conditions.

The TNM has been shown to be quite accurate when computed sound levels are compared to measurements, and has been shown to be more accurate than its predecessor, STAMINA 2.0 / OPTIMA.

Traffic-noise levels in the project study area were determined for the existing (1994) conditions, the design-year (2018) No-Build conditions, and the design-year Build conditions. For this analysis, the No-Build is defined more narrowly and only includes the area along the alternative in 2018 if the alternative is not built. In areas where the project is a new location roadway, the measured noise levels were used as estimates for the Existing case and No-Build alternative. Noise impact was determined according to the criteria discussed in Chapter 3 (Section VII).
4. **Light Rail Transit Noise:**

For each of the Candidate Build Alternatives under consideration, multimodal facilities are included as part of the project, and would consist of either High Occupancy Vehicle (HOV) lanes or Light Rail Transit (LRT) trains. Through those corridors that include an LRT option, the trains were assumed to utilize a right-of-way within the median strip of the highway. As discussed in Chapter 3, when a mass transit project is included as part of a highway improvement, FTA guidelines reference the FHWA’s Noise Abatement Criteria (NAC) to assess noise impact from the project. As a result, the projected noise levels from LRT trains were computed in terms of the hourly A-weighted equivalent sound level. The assumptions used in the LRT noise analysis are outlined below and are based on Federal Transit Administration’s Guidance Manual (USDOT, FTA, 1995).

- **Reference source level:** For a well-maintained new system, a maximum A-weighted sound level \( L_{\text{max}} \) of 80 dBA was assumed at a distance of 15 meters (50 feet).
- **Speed:** The LRT trains were assumed to be traveling at a constant speed of 80 kph (50 mph). This assumption does not include any reduced speeds for trains as they approach / depart stations.
- **Vehicle size:** The LRT vehicles were assumed to be 29 meters (95 feet) long, and consist of two cars. This is a standard length for LRT vehicles; typically two cars are used during a peak hour.
- **Number of Vehicles:** Twenty vehicles per hour were assumed which is typical for peak hour and results in 6 minute headways in each direction.
- **Ground Effect:** Sound propagation was assumed to occur over acoustically “hard” ground. This assumption is appropriately conservative, but probably accurate, since the LRT tracks would be located along the median of the highway in most cases.

**B. COMPUTED NOISE LEVELS**

1. **Comparisons to the 1996 Hampton Roads Crossing Study MIS**

In general, computed noise levels for the current analysis are lower, but more accurate than the sound levels computed for the Hampton Roads Crossing Study MIS. Traffic noise calculations for the MIS were performed with a spreadsheet implementation of the FHWA Highway Traffic Noise Prediction Model. Because the objective of the MIS was to make comparisons between alternatives, the conservative spreadsheet model was appropriate for the desired level of analysis. In April 1998, the FHWA released its new state-of-the-art noise prediction model, the TNM, for use on projects.
nationwide. For this document, all traffic-noise levels were computed using the TNM, since the most accurate and detailed noise modeling was desired.

2. Computed Traffic-Noise Levels

Table 4-22 shows the computed noise levels at typical noise prediction locations and the distance to the edge of the nearest project roadway, for each Candidate Build Alternative. Figure 4-12 shows these locations in relation to existing roadways and the Candidate Build Alternatives. The noise prediction sites are shown with an "P" suffix to differentiate them from the measurement sites. Noise predictions were performed only in noise-sensitive areas within 300 m (1000 ft) of a Candidate Build Alternative; commercial and industrial areas were not selected for noise analysis.

The prediction sites summarized in Table 4-22 represent only a small fraction of the total number of sites that were modeled. Traffic-noise levels were computed at over 450 prediction sites for Alternatives 1 and 2, and over 600 prediction sites for Alternative 9.

Table 4-22 allows comparison of the computed noise levels for the loudest hour of the day for all cases. Generally, the noise levels at a certain receiver location vary by only a few decibels between Candidate Build Alternatives due to variations in the projected traffic volumes.

There are six existing noise barriers along major interstates on the Peninsula. Three of these noise barriers are located along I-664 in Hampton and Newport News; the other three noise barriers are located along I-64 in Hampton. At noise-sensitive locations behind existing barriers, noise levels for the Existing case and No-build Alternative were computed with the barriers in place. Wherever the project appears to require the removal of existing barriers, noise levels for the Candidate Build Alternatives were computed as if the barriers were not there. Consequently, future Build noise levels may be as much as 10 decibels higher than Existing / No-build noise levels at prediction sites with an existing barrier, as in the case of prediction site 9P.

As shown in Table 4-22, future Build L_{eq} levels are generally greater than computed noise levels for both Existing conditions and the future No-build alternative. However, future No-build noise levels are greater than future Build L_{eq} levels in several noise-sensitive areas, particularly along the I-664 corridor in Suffolk and Chesapeake. For example, future noise levels at prediction site 17P are expected to be 68 and 67 dBA L_{eq} for the No-Build and Candidate Build Alternatives, respectively.
**TABLE 4-22**  
**COMPUTED EXISTING AND FUTURE TRAFFIC -NOISE LEVELS**

<table>
<thead>
<tr>
<th>Pred. Site</th>
<th>Location</th>
<th>Locality</th>
<th>Loudest-Hour Leq (dBA) and Distance to Edge of Nearest Project Roadway in meters (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Exist Leq</strong></td>
</tr>
<tr>
<td>1P</td>
<td>End of Wycliff</td>
<td>Portsmouth</td>
<td>55</td>
</tr>
<tr>
<td>2P</td>
<td>End of Crenshaw Ct. Ext.</td>
<td>Hampton</td>
<td>65</td>
</tr>
<tr>
<td>3P</td>
<td>Back River Ave.</td>
<td>Hampton</td>
<td>60</td>
</tr>
<tr>
<td>4P</td>
<td>End of Langley Ave.</td>
<td>Hampton</td>
<td>57</td>
</tr>
<tr>
<td>5P</td>
<td>Corner of Wine &amp; Poplar</td>
<td>Hampton</td>
<td>58</td>
</tr>
<tr>
<td>6P</td>
<td>Hampton University</td>
<td>Hampton</td>
<td>53</td>
</tr>
<tr>
<td>7P</td>
<td>Woodlands Golf Course</td>
<td>Hampton</td>
<td>62</td>
</tr>
<tr>
<td>8P</td>
<td>VA Hospital</td>
<td>Hampton</td>
<td>57</td>
</tr>
<tr>
<td>9P</td>
<td>National Ave.</td>
<td>Hampton</td>
<td>61</td>
</tr>
<tr>
<td>10P</td>
<td>Lea View Ave.</td>
<td>Norfolk</td>
<td>64</td>
</tr>
<tr>
<td>11P</td>
<td>Little Bay Ave.</td>
<td>Norfolk</td>
<td>61</td>
</tr>
<tr>
<td>12P</td>
<td>Willoughby Housing (USN)</td>
<td>Norfolk</td>
<td>58</td>
</tr>
<tr>
<td>13P</td>
<td>Peachtree St.</td>
<td>Norfolk</td>
<td>58</td>
</tr>
<tr>
<td>14P</td>
<td>Landale &amp; Semmes</td>
<td>Norfolk</td>
<td>70</td>
</tr>
<tr>
<td>15P</td>
<td>Commodore Dr.</td>
<td>Norfolk</td>
<td>62</td>
</tr>
<tr>
<td>17P</td>
<td>Old Town Point Rd.</td>
<td>Suffolk</td>
<td>64</td>
</tr>
<tr>
<td>40P*</td>
<td>34th St. (1/2 block from Jefferson)</td>
<td>Newport News</td>
<td>58</td>
</tr>
<tr>
<td>42P</td>
<td>Jefferson Ave. between 14th &amp; 17th</td>
<td>Newport News</td>
<td>53</td>
</tr>
<tr>
<td>43P**</td>
<td>Ridley Cir.</td>
<td>Newport News</td>
<td>50</td>
</tr>
<tr>
<td>44P</td>
<td>King-Lincoln Park</td>
<td>Newport News</td>
<td>57</td>
</tr>
<tr>
<td>45P</td>
<td>Mason Creek Road at Ridgewell</td>
<td>Norfolk</td>
<td>67</td>
</tr>
<tr>
<td>46P</td>
<td>Greenbrier at Glen Myrtle</td>
<td>Norfolk</td>
<td>52</td>
</tr>
<tr>
<td>47P</td>
<td>Bradford &amp; Gloucester</td>
<td>Norfolk</td>
<td>61</td>
</tr>
</tbody>
</table>
## TABLE 4-22 (CONTINUED)

<table>
<thead>
<tr>
<th>Pred. Site</th>
<th>Location</th>
<th>Locality</th>
<th>Loudest-Hour Leq (dBA) and Distance to Edge of Nearest Project Roadway in meters (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>CBA 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leq</td>
</tr>
<tr>
<td>48P</td>
<td>Fleet Park (USN)</td>
<td>Norfolk</td>
<td>48</td>
</tr>
<tr>
<td>49P</td>
<td>CA Elem. School (USN)</td>
<td>Norfolk</td>
<td>52</td>
</tr>
<tr>
<td>50P</td>
<td>End of Colbert</td>
<td>Hampton</td>
<td>59</td>
</tr>
<tr>
<td>51P</td>
<td>Balmoral St.</td>
<td>Hampton</td>
<td>54</td>
</tr>
<tr>
<td>52P</td>
<td>Prince James Dr.</td>
<td>Hampton</td>
<td>58</td>
</tr>
<tr>
<td>53P</td>
<td>Garret Dr.</td>
<td>Hampton</td>
<td>63</td>
</tr>
<tr>
<td>54P</td>
<td>Birch Ave.</td>
<td>Hampton</td>
<td>65</td>
</tr>
<tr>
<td>55P</td>
<td>Duke St.</td>
<td>Newport News</td>
<td>66</td>
</tr>
<tr>
<td>56P</td>
<td>41st St. between Chestnut &amp; Roanoke</td>
<td>Newport News</td>
<td>66</td>
</tr>
<tr>
<td>57P</td>
<td>Madison Ave. (S. of I-664)</td>
<td>Newport News</td>
<td>59</td>
</tr>
<tr>
<td>58P***</td>
<td>Harbor Lane</td>
<td>Newport News</td>
<td>57</td>
</tr>
<tr>
<td>59P</td>
<td>John St.</td>
<td>Chesapeake</td>
<td>55</td>
</tr>
<tr>
<td>60P</td>
<td>Off of Gum Rd.</td>
<td>Chesapeake</td>
<td>64</td>
</tr>
<tr>
<td>61P</td>
<td>End of Old Jollif Rd.</td>
<td>Chesapeake</td>
<td>58</td>
</tr>
<tr>
<td>62P</td>
<td>End of Woodland Rd.</td>
<td>Chesapeake</td>
<td>66</td>
</tr>
<tr>
<td>63P</td>
<td>Branchview off of Jollif Rd.</td>
<td>Chesapeake</td>
<td>63</td>
</tr>
<tr>
<td>64P</td>
<td>Homestead Ln. off Homestead Rd.</td>
<td>Chesapeake</td>
<td>64</td>
</tr>
<tr>
<td>65P</td>
<td>End of Sunny Brook Tr.</td>
<td>Chesapeake</td>
<td>67</td>
</tr>
<tr>
<td>66P</td>
<td>Avocet Ct.</td>
<td>Portsmouth</td>
<td>53</td>
</tr>
<tr>
<td>68P</td>
<td>Wesley Mem. Church</td>
<td>Norfolk</td>
<td>0</td>
</tr>
<tr>
<td>69P</td>
<td>Sewells Point Golf Course</td>
<td>Norfolk</td>
<td>64</td>
</tr>
<tr>
<td>70P</td>
<td>Coleman between Ridgewell &amp; Duval</td>
<td>Norfolk</td>
<td>58</td>
</tr>
<tr>
<td>71P</td>
<td>End of Orange St.</td>
<td>Norfolk</td>
<td>68</td>
</tr>
</tbody>
</table>

Notes:  
* 225 m from mainline, 105 m from ramp that is elevated 12 m re: ground at receiver  
** 300+ m from mainline, 290 m from ramp  
*** 330 m from mainline, 100 m from ramp
FIGURE 4-12
TRAFFIC NOISE PREDICTION SITES

LEGEND
6P • NOISE PREDICTION SITE
Future No-Build noise levels are greater than future Build $L_{eq}$ levels because traffic volumes for the No-Build case are substantially greater than the traffic volumes for each of the Build Alternatives.

3. Computed LRT Noise Levels

Based on the assumptions in the previous section, noise levels due to the operation of LRT trains are expected to exceed 66 dBA $L_{eq}$ at a distance of 13.4 meters (44 feet) from the track centerline. For the majority of the sections of the Candidate Build Alternatives that include an LRT option, this distance is usually within the proposed right-of-way for the project. Furthermore, the contribution from LRT trains to overall sound levels in the community is less than the contribution from HOV lanes. Since the multimodal components of the project include options either for LRT trains or HOV lanes, noise levels due to the operation of LRT are not expected to cause additional noise impact.

C. TRAFFIC-NOISE IMPACT ASSESSMENT

Residential noise impact in the study area is expected to be greater under any of the Candidate Build Alternatives than under Existing conditions or the future No-build Alternative. Table 4-23 shows the total residential impact for each of the project alternatives.

**TABLE 4-23**

**TOTAL RESIDENTIAL NOISE IMPACT**

<table>
<thead>
<tr>
<th>Case</th>
<th>Type of Noise Impact*</th>
<th>Number of Dwelling Units Exposed to Traffic-Noise Impact by Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CBA 1</td>
</tr>
<tr>
<td>Build</td>
<td>Absolute</td>
<td>554</td>
</tr>
<tr>
<td></td>
<td>Relative</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Both</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>608</td>
</tr>
<tr>
<td>Existing</td>
<td>Absolute</td>
<td>368</td>
</tr>
<tr>
<td>No Build</td>
<td>Absolute</td>
<td>388</td>
</tr>
</tbody>
</table>

* Absolute = loudest-hour $L_{eq}$ approaches or exceeds the Noise Abatement Criteria, only
Relative = Project noise levels increase 10dBA or more above Existing noise levels, only
Both = loudest-hour $L_{eq}$ approaches or exceeds the NAC, and Project noise levels increase 10 dBA above existing noise levels
The table shows the number of impacted dwelling units in three separate categories of noise impact; these impact categories, or "types," are used throughout the noise impact discussion. "Absolute" impact is assessed where project noise levels approach or exceed 67 dBA $L_{eq}$ (defined as equal or exceeding 66 dBA), but the increase above existing is less than 10 dB. "Relative" impact is assessed where the Candidate Build Alternatives cause a substantial increase in the existing noise level - 10 dB or more - but the future level is less than 66 dBA $L_{eq}$. Impact of the type "Both" is assessed where both conditions exist; i.e. a 10 dB or more increase above the existing noise level and the predicted future noise levels approach or exceed 67 dBA $L_{eq}$.

Generally, noise impact of the types "Relative" and "Both" occur under alternatives that are new location roadways, whereas "Absolute" noise impact occurs under alternatives where an existing roadway would be widened. Noise impact of the types "Relative" and "Both" also can occur at noise-sensitive land uses that are behind an existing barrier, since in some areas the noise barrier would be removed to accommodate the Candidate Build Alternatives.

As shown in Table 4-23, Candidate Build Alternatives 1 and 2 would exhibit more noise impact than Candidate Build Alternative 9, primarily due to a higher density of multi-family dwellings, particularly in the Willoughby area of Norfolk. Fewer dwelling units are exposed to noise impact with Alternative 9 for two additional reasons. First, in many noise-sensitive areas along I-664 in Newport News, the highway would be at a much greater elevation than the community adjacent to it. At these locations, a direct line-of-sight from a prediction site to the traffic on the road would not exist. The edge of the road would create a “shadow zone,” and noise levels at sites adjacent to such an elevated road would be reduced substantially lower than for an at-grade roadway. A second reason for reduced noise impact under Candidate Build Alternative 9 is that most of the corridors on the Southside would traverse rural areas with a low density of noise-sensitive land use.

Noise impact is expected to occur at several non-residential noise-sensitive land uses throughout the study area. Table 4-24 shows a summary of noise impact for school playgrounds and athletic fields, parks, and recreation areas. This table shows how much of the affected property would be exposed to noise impact; i.e. it provides the average distance (in meters) from the proposed right-of-way to noise impact. With the exception of the Hampton High School, each of the noise-sensitive land uses in Table 4-24 is exposed to “Absolute” impact.
TABLE 4-24

NOISE IMPACT AT SCHOOL PLAYGROUNDS, PARKS, AND RECREATION AREAS

<table>
<thead>
<tr>
<th>Average Distance from Proposed Right-of-way to Noise Impact, in meters (feet)</th>
<th>Exist</th>
<th>No Build</th>
<th>CBA 1</th>
<th>CBA 2</th>
<th>CBA 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHOOL PLAYGROUNDS AND ATHLETIC FIELDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hampton High School</td>
<td>None</td>
<td>None</td>
<td>--</td>
<td>--</td>
<td>150 (500)</td>
</tr>
<tr>
<td>PARKS AND RECREATION AREAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woodlands Golf Course</td>
<td>55 (180)</td>
<td>75 (250)</td>
<td>60 (200)</td>
<td>60 (200)</td>
<td>--</td>
</tr>
<tr>
<td>Breezy Point Park (U.S. Navy)</td>
<td>65 (215)</td>
<td>90 (295)</td>
<td>90 (295)</td>
<td>90 (295)</td>
<td>--</td>
</tr>
<tr>
<td>Baseball diamond (U.S. Navy)</td>
<td>20 (65)</td>
<td>20 (65)</td>
<td>--</td>
<td>30 (100)</td>
<td>--</td>
</tr>
<tr>
<td>Park Place Playground</td>
<td>40 (130)</td>
<td>40 (130)</td>
<td>--</td>
<td>--</td>
<td>80 (260)</td>
</tr>
<tr>
<td>Fleet Park (U.S. Navy)</td>
<td>None</td>
<td>None</td>
<td>--</td>
<td>90 (295)</td>
<td>50 (165)</td>
</tr>
<tr>
<td>Sewells Point Golf Course (U.S. Navy)</td>
<td>50 (165)</td>
<td>50 (165)</td>
<td>--</td>
<td>70 (230)</td>
<td>70 (230)</td>
</tr>
</tbody>
</table>

Along the I-664 Corridor, the Hampton High School athletic fields are exposed to noise impact with Candidate Build Alternative 9, since it was assumed the existing noise barrier would be removed during the roadway widening under these alternatives. At the Hampton High School athletic fields, future Build noise levels approach or exceed the FHWA NAC, and cause a substantial increase over Existing noise levels. The Park Place Playground which is adjacent to Birch Avenue in Hampton is exposed to noise impact under Existing conditions, and would be exposed to noise impact under both the future No-build alternative and Candidate Build Alternative 9.

Along the I-64 Corridor in Hampton, noise impact is expected to occur at the Woodlands Golf Course for Existing conditions, under the future No-build alternative, and with Candidate Build Alternatives 1 and 2. In Norfolk, noise impact is expected to occur at an U.S. Navy recreational area near Mason Creek. This recreational area would be exposed to impact for Existing conditions, under the future No-build alternative and with Candidate Build Alternatives 1 and 2 as well.

For Candidate Build Alternatives 2 and 9 in Norfolk, noise impact is expected to occur at Fleet Park and Sewells Point Golf Club (both U.S. Navy). At Fleet Park, noise impact is expected to occur with
both Candidate Build Alternatives 2 and 9. The park would not be exposed to noise impact for Existing conditions or the future No-build alternative. At Sewells Point Golf Course, noise impact occurs for Existing conditions, under the future No-build alternative, and with Candidate Build Alternatives 2 and 9 as well.

The Captains Quarters Nature Center and Park along I-64 in Norfolk would not be exposed to noise impact under any conditions. Also, noise impact is not expected to occur at either King-Lincoln Park or Kingdom Hall both of which are in Newport News. Noise impact is not expected to occur at any of the playgrounds at the Northside Middle School, the Willoughby Elementary School, or the Ocean View Elementary School.

D. VIBRATION ASSESSMENT METHOD FOR LRT TRAINS

The vibration propagation measurements described in Chapter 3 were used to develop level-versus-distance curves for each site in the Hampton Roads study area. However, prior to developing those curves, an assumption had to be made about the source vibration levels associated with the rail vehicle and the track design. The source vibration level is referred to as the force density, and represents a measure of the forces imparted into the ground by the combined vehicle/track support system. The force density is assumed to be independent of the ground characteristics, so it is added to the transfer mobility measured at locations along the proposed corridor to predict the ground surface vibration velocity levels.

Since the train type has not yet been determined for this project, force densities from several other LRT systems were combined to produce an average. The light rail transit systems included in the average are located in Portland, Dallas, Sacramento and St. Louis. The force densities derived from each of these vehicles represent the most recent data available on light rail systems around the country. The vehicles operating on these systems all have relatively soft primary suspensions, which is an important factor in determining the force density levels. Other factors influencing force density are wheel and rail conditions, track design, and train speed. Thus, there is a considerable range in force densities even for similar vehicles, and use of an average force density level is warranted for projects at an early design stage in which neither vehicle type nor track design has been finalized.

The average force density level is then combined with the site-specific transfer mobility to yield the estimated vibration level as a function of distance. Curves for each of the vibration propagation sites were developed to generate a level-versus-distance curve that characterizes the vibration for each of
the propagation sites. For the corridors that include an LRT option as part of the project, only four of
the vibration propagation test sites from the MIS were located within the study area for this EIS. One
of the tests (King-Lincoln Park) appeared to be invalid and was excluded from the analysis. The three
remaining propagation tests, (Willoughby Elementary School, Hampton University and Fleet Park)
were combined to represent the general vibration curve for the study area.

The curve, shown in Figure 4-13, corresponds to the maximum RMS vibration velocity levels expected
from a typical light rail train at a speed of 50 mph. The curve also assumes ballast-and-tie track and
at-grade operations. If the LRT runs on sections of elevated tracks, ground-borne vibration levels will
be up to 10 dB lower, further reducing the possibility of impact.

Given the number of assumptions that were necessary for this analysis, the vibration assessment
should be re-evaluated to more precisely estimate expected vibration levels when the track location,
track characteristics, and vehicle type are chosen during final design.

E. VIBRATION IMPACT ASSESSMENT

The initial screening for vibration-sensitive land use showed that most of the land use along the
corridor is Category 2 (residences and buildings where people sleep). As described in Chapter 3, the
Federal Transit Administration has established an impact criterion of 72 VdB for Category 2 land use.
The vibration projections show (from Figure 4-13) that the farthest distance where vibration impact
would occur for the general curve is about 31 meters (100 feet) from the track centerline.

For this impact assessment, the transit tracks were assumed to be located between the two directions
of the highway, at the corridor centerline. Since the distance within which all property is expected to be
taken (the take line) is at about 43 meters (140 feet) from the center of the project alignment, vibration
impact from light rail transit operations is not expected to occur at any occupied property. To ensure
that there will be no vibration impact, a detailed screening of the Candidate Build Alternatives was
conducted to determine if any vibration sensitive structures were located close enough to the proposed
tracks to have vibration impact. There were no structures identified for any of the Candidate Build
Alternatives where vibration due to LRT trains is anticipated to cause impact.
F. TRAFFIC NOISE ABATEMENT MEASURES

FHWA has identified certain noise abatement measures that may be incorporated in projects to reduce traffic noise impact. Abatement measures that have been considered for this project include traffic management and alteration of horizontal and vertical alignment as alternative abatement measures, and the construction of noise barriers.

1. Alternative Abatement Measures

Traffic management measures that were considered for noise abatement include reduced speeds and truck restrictions for the Candidate Build Alternatives. Reduced speeds are not an effective noise mitigation measure, however, since a substantial decrease in speed is necessary to provide a significant noise reduction. A 16 kph (10 mph) reduction in speed will result in only a 2 dB decrease in noise level. Truck restrictions would not significantly reduce noise levels since automobiles are a major contributor to peak hour traffic noise levels. Because automobiles comprise over 90% of vehicle volume during the loudest hour only modest reductions in noise levels could be achieved by totally eliminating truck traffic. Further, such traffic management measures are in conflict with the intended use of the Candidate Build Alternatives.

Preliminary alignment alterations were made to avoid impact wherever possible before proposing any project alternate. The alteration of horizontal alignment is limited by the available right-of-way along the project corridors. Significant noise reduction at noise sensitive locations would require large alignment shifts that would necessitate additional property takings and could expose additional sites to project noise. Further alteration of vertical alignment is also not considered to be a feasible noise abatement measure. Depressing the roadway would require taking of additional property for the sloped embankments, or excessive costs for the construction of sound-absorptive retaining walls; elevating the roadway could allow noise to propagate farther into the community at higher levels.

2. Noise Barriers

The only remaining abatement measure investigated was the construction of noise barriers. The feasibility of noise barriers has been investigated at all locations where noise impact has been predicted to occur for each of the Candidate Build Alternatives. Where the construction of barriers was found to be physically practical, barrier noise reduction was computed based on roadway, barrier and receiver geometry.
Fourteen noise barriers have been found to be reasonable and feasible for noise-sensitive land uses with Candidate Build Alternative 1. For Candidate Build Alternative 2, eighteen noise barriers have been found to be reasonable and feasible for noise-sensitive areas, while sixteen noise barriers have been found to be reasonable and feasible with Candidate Build Alternative 9. Table 4-25 provides a summary of the total length of noise barriers, the total number of homes protected / benefited, and the total cost for noise barriers by alternative. Table 4-26 provides preliminary data for the noise barriers recommended for further consideration, including an approximate height and length, the estimated noise reduction or “insertion loss” (IL) provided by the barrier, estimates of total barrier cost, the number of protected and benefited dwelling units, and the cost per dwelling unit. The locations of those noise barriers under consideration are shown on Figure 4-14.

**TABLE 4-25**

**TOTAL COST OF NOISE BARRIERS BY ALTERNATIVE**

<table>
<thead>
<tr>
<th>CBA</th>
<th>Total Cost</th>
<th>Total Cost Minus Cost of Existing Barriers</th>
<th>Total Length (km)</th>
<th>No. of Homes Protected</th>
<th>No. of Homes Benefited</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$8,680,000</td>
<td>$7,350,000</td>
<td>13.7</td>
<td>594</td>
<td>121</td>
</tr>
<tr>
<td>2</td>
<td>$10,080,000</td>
<td>$8,750,000</td>
<td>16.0</td>
<td>563</td>
<td>478</td>
</tr>
<tr>
<td>9</td>
<td>$7,090,000</td>
<td>$5,510,000</td>
<td>12.3</td>
<td>200</td>
<td>337</td>
</tr>
</tbody>
</table>

Where noise barriers are physically practical and provide sufficient noise reduction (minimum of 5 dB), reasonableness of construction is based on cost-effectiveness criteria. Noise abatement is considered cost effective by VDOT at a cost of $30,000 or less per "protected" or "benefited" residential unit. A noise-sensitive land use is considered protected if it would be exposed to noise impact and noise abatement provides at least a 5 dBA noise reduction. If a noise-sensitive land use is not expected to be exposed to impact, but still would receive 5 dBA or more of noise reduction, the noise-sensitive land use is considered benefited. Noise barriers that exceed VDOT's cost-effectiveness criteria will receive further consideration during later studies, when the cost-effectiveness will be re-evaluated. At that point, should a particular barrier remain not cost effective, it will receive further consideration only if third-party funding becomes available.
<table>
<thead>
<tr>
<th>No.</th>
<th>Barrier #</th>
<th>Noise-Sensitive Area</th>
<th>Sites</th>
<th>Land Use</th>
<th>Leq(dBA) w/o Barrier</th>
<th>CBA</th>
<th>Height (m)</th>
<th>Length (m)</th>
<th>Insertion Loss (dB)</th>
<th>Total Cost</th>
<th>No. of Homes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hampton Terrace, Hampton High School</td>
<td>52P</td>
<td>SF/SC</td>
<td>56 to 72</td>
<td>9</td>
<td>2 to 4</td>
<td>1400</td>
<td>2 to 11</td>
<td>$751,100 (Total);</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$175,000 (Net)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Azalea Gardens</td>
<td>51P</td>
<td>SF</td>
<td>60 to 71</td>
<td>9</td>
<td>2.5 to 4.5</td>
<td>1100</td>
<td>2 to 9</td>
<td>$664,000 (Total);</td>
<td>33</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$174,000 (Net)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powhatan Park</td>
<td>53P</td>
<td>SF</td>
<td>55 to 68</td>
<td>9</td>
<td>2 to 3.5</td>
<td>700</td>
<td>1 to 7</td>
<td>$311,600</td>
<td>17</td>
<td>31</td>
</tr>
<tr>
<td>4</td>
<td>Birch Ave., Bird St., Park Place Playground</td>
<td>54P</td>
<td>SF/PK</td>
<td>59 to 68</td>
<td>9</td>
<td>3 to 4</td>
<td>500</td>
<td>0 to 8</td>
<td>$302,100</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>41st St. (between Orcutt St. &amp; Chestnut Ave.)</td>
<td>56P</td>
<td>SF/MF</td>
<td>56 to 68</td>
<td>9</td>
<td>2 to 6</td>
<td>1250</td>
<td>0 to 8</td>
<td>$841,200 (Total);</td>
<td>45</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$322,800 (Net)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>33rd St. (West of Jefferson Ave.)</td>
<td>SF</td>
<td>59 to 66</td>
<td>9</td>
<td>2.5 to 5.5</td>
<td>500</td>
<td>2 to 7</td>
<td>$392,600</td>
<td>1</td>
<td>42</td>
<td>$9,100</td>
</tr>
<tr>
<td>7</td>
<td>Hunters Ville, Wynnewood</td>
<td>17P</td>
<td>SF</td>
<td>56 to 68</td>
<td>9</td>
<td>3.5</td>
<td>750</td>
<td>2 to 5</td>
<td>$450,600</td>
<td>2</td>
<td>46</td>
</tr>
<tr>
<td>8</td>
<td>Jolliff Rd.</td>
<td>SF</td>
<td>61 to 68</td>
<td>9</td>
<td>3</td>
<td>200</td>
<td>2 to 5</td>
<td>$103,300</td>
<td>1</td>
<td>0</td>
<td>$103,300</td>
</tr>
<tr>
<td>9</td>
<td>Gum Rd.</td>
<td>60P</td>
<td>SF/SC</td>
<td>65 to 66</td>
<td>9</td>
<td>3.5</td>
<td>400</td>
<td>6</td>
<td>$239,200</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Woodland Dr.</td>
<td>62P</td>
<td>SF</td>
<td>67 to 69</td>
<td>9</td>
<td>3</td>
<td>500</td>
<td>5 to 8</td>
<td>$251,600</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>Old Soldier Rd.</td>
<td>63P</td>
<td>SF</td>
<td>60 to 66</td>
<td>9</td>
<td>3.5</td>
<td>400</td>
<td>2 to 6</td>
<td>$226,700</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Jolliff Rd./SR191</td>
<td>SF</td>
<td>60 to 68</td>
<td>9</td>
<td>3.5 to 4.5</td>
<td>250</td>
<td>1 to 6</td>
<td>$167,200</td>
<td>3</td>
<td>0</td>
<td>$55,700</td>
</tr>
<tr>
<td>13</td>
<td>Bowers Hill</td>
<td>64P</td>
<td>SF</td>
<td>60 to 68</td>
<td>9</td>
<td>3 to 6</td>
<td>850</td>
<td>1 to 9</td>
<td>$588,000</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>14</td>
<td>Goodman St., Cedar Grove Acres, Heartwood South</td>
<td>65P</td>
<td>SF</td>
<td>53 to 75</td>
<td>9</td>
<td>3 to 3.5</td>
<td>2000</td>
<td>1 to 11</td>
<td>$1,111,800</td>
<td>32</td>
<td>72</td>
</tr>
<tr>
<td>15</td>
<td>West Norfolk Rd., Goose Bay Dr.</td>
<td>66P</td>
<td>SF</td>
<td>66</td>
<td>2</td>
<td>5</td>
<td>270</td>
<td>7</td>
<td>$231,600</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>16.2</td>
<td>Fleet Park</td>
<td>48P</td>
<td>PK</td>
<td>64 to 67</td>
<td>2</td>
<td>2.5 to 3.5</td>
<td>750</td>
<td>5</td>
<td>$306,600</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>16.9</td>
<td>Fleet Park</td>
<td>48P</td>
<td>PK</td>
<td>64 to 65</td>
<td>2</td>
<td>2.5 to 3.5</td>
<td>800</td>
<td>5 to 6</td>
<td>$365,500</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>17.2</td>
<td>Sewells Point Golf Course</td>
<td>69P</td>
<td>PK</td>
<td>59 to 68</td>
<td>2</td>
<td>3.5</td>
<td>600</td>
<td>3 to 7</td>
<td>$352,500</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>17.9</td>
<td>Sewells Point Golf Course</td>
<td>69P</td>
<td>PK</td>
<td>59 to 69</td>
<td>9</td>
<td>3.5</td>
<td>600</td>
<td>5 to 8</td>
<td>$353,200</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>18</td>
<td>Rose Gardens, Bradford Ave., Michael Dr., Victory Dr.</td>
<td>47P</td>
<td>SF/MF</td>
<td>59 to 67</td>
<td>2</td>
<td>3 to 8</td>
<td>500</td>
<td>0 to 9</td>
<td>$474,900</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>19</td>
<td>Baseball field @ I-64/I-564</td>
<td>PK</td>
<td>63 to 66</td>
<td>2</td>
<td>2 to 3.5</td>
<td>400</td>
<td>2 to 5</td>
<td>$175,700</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>20</td>
<td>Horizon Plaza</td>
<td>MF</td>
<td>57 to 66</td>
<td>1</td>
<td>2.5 to 5.5</td>
<td>150</td>
<td>0 to 5</td>
<td>$140,500</td>
<td>12</td>
<td>0</td>
<td>$11,700</td>
</tr>
<tr>
<td>21.1</td>
<td>North of I-64 (Hampton River Bridge- Lasalle Ave.)</td>
<td>4P, 50P</td>
<td>SF/MF</td>
<td>60 to 72</td>
<td>1</td>
<td>2 to 5.5</td>
<td>2150</td>
<td>1 to 9</td>
<td>$1,180,800 (Total);</td>
<td>101</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$153,600 (Net)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.2</td>
<td>North of I-64 (Hampton River- Lasalle Ave.)</td>
<td>4P, 50P</td>
<td>SF/MF</td>
<td>60 to 67</td>
<td>2</td>
<td>2 to 5.5</td>
<td>2150</td>
<td>1 to 9</td>
<td>$1,180,800 (Total);</td>
<td>95</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$153,600 (Net)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.1</td>
<td>Langley Park</td>
<td>3P</td>
<td>SF</td>
<td>62 to 66</td>
<td>1</td>
<td>3 to 4</td>
<td>450</td>
<td>0 to 7</td>
<td>$251,400</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>22.2</td>
<td>Langley Park</td>
<td>3P</td>
<td>SF</td>
<td>62 to 66</td>
<td>2</td>
<td>3 to 4</td>
<td>450</td>
<td>0 to 7</td>
<td>$251,400</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>23.1</td>
<td>Washington St., Poplar Ave.</td>
<td>5P</td>
<td>SF</td>
<td>59 to 69</td>
<td>2</td>
<td>3 to 5.5</td>
<td>750</td>
<td>3 to 10</td>
<td>$496,000</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>23.2</td>
<td>Washington St., Poplar Ave.</td>
<td>5P</td>
<td>SF</td>
<td>59 to 69</td>
<td>2</td>
<td>3 to 5.5</td>
<td>750</td>
<td>3 to 10</td>
<td>$496,000</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>24.1</td>
<td>Woodlands Golf Course</td>
<td>PK</td>
<td>60 to 67</td>
<td>1</td>
<td>3.5 to 6.5</td>
<td>650</td>
<td>0 to 8</td>
<td>$579,800</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>24.2</td>
<td>Woodlands Golf Course</td>
<td>PK</td>
<td>60 to 67</td>
<td>2</td>
<td>3.5 to 6.5</td>
<td>650</td>
<td>0 to 8</td>
<td>$579,800</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
## TABLE 4-26
**SUMMARY OF NOISE BARRIERS RECOMMENDED FOR FURTHER CONSIDERATION**

<table>
<thead>
<tr>
<th>Barrier #</th>
<th>Noise-Sensitive Area</th>
<th>Sites</th>
<th>Land Use¹</th>
<th>Leq(dBA) w/o Barrier</th>
<th>CBA Height (m)</th>
<th>Length (m)</th>
<th>Insertion Loss (dB)²</th>
<th>Total Cost³</th>
<th>Protected⁴</th>
<th>Benefited⁵</th>
<th>Cost per Home</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.1</td>
<td>Emancipation Drive</td>
<td>SF</td>
<td>58 to 70</td>
<td>2.5 to 4</td>
<td>250</td>
<td>0 to 5</td>
<td>$118,400</td>
<td>$118,400</td>
<td>1</td>
<td>0</td>
<td>$118,400</td>
</tr>
<tr>
<td>25.2</td>
<td>Emancipation Drive</td>
<td>SF</td>
<td>58 to 70</td>
<td>2.5 to 4</td>
<td>250</td>
<td>0 to 5</td>
<td>$118,400</td>
<td>$118,400</td>
<td>1</td>
<td>0</td>
<td>$118,400</td>
</tr>
<tr>
<td>26.1</td>
<td>Cameron St.</td>
<td>SF</td>
<td>56 to 68</td>
<td>2.5</td>
<td>350</td>
<td>2 to 6</td>
<td>$134,100</td>
<td>$134,100</td>
<td>2</td>
<td>5</td>
<td>$19,200</td>
</tr>
<tr>
<td>26.2</td>
<td>Cameron St.</td>
<td>SF</td>
<td>56 to 68</td>
<td>2.5</td>
<td>350</td>
<td>2 to 6</td>
<td>$134,100</td>
<td>$134,100</td>
<td>2</td>
<td>5</td>
<td>$19,200</td>
</tr>
</tbody>
</table>

| 27.1 Mill Creek Terrace | 9P  | SF    | 61 to 74  | 2.5 to 4             | 650            | 3 to 9     | $357,500 (Total); $32,200 (Net) | 30          | 19         |            | $7,300 (Total); $700 (Net) |
| 27.2 Mill Creek Terrace | 9P  | SF    | 61 to 74  | 2.5 to 4             | 650            | 3 to 9     | $357,500 (Total); $32,200 (Net) | 23          | 26         |            | $7,300 (Total); $700 (Net) |
| 28.1 Bayside Street    | SF    | 65 to 68  | 3 to 4     | 600                 | 6 to 8         | $377,600   | $15,700             | $15,700     |
| 28.2 Bayside Street    | SF    | 64 to 67  | 3 to 4     | 600                 | 6 to 8         | $377,600   | $15,700             | $15,700     |
| 29.1 Executive Drive   | 15P   | SF/PK  | 58 to 71  | 2.0 to 6             | 1325           | 1 to 10    | $1,140,800           | $1,140,800  |
| 29.2 Executive Drive   | 15P   | SF/PK  | 58 to 71  | 2.0 to 6             | 1325           | 1 to 10    | $1,140,800           | $1,140,800  |
| 30.1 First View St./ Mason Creek Rd. | 13P, 71P | SF | 60 to 72  | 2.0 to 4.5           | 1325           | 2 to 7     | $530,600             | $530,600    |
| 30.2 First View St./ Mason Creek Rd. | 13P, 71P | SF | 59 to 72  | 2.0 to 4.5           | 1325           | 2 to 7     | $530,600             | $530,600    |
| 31.1 Ocean View Ave.   | 10P, 11P | SF/MF  | 62 to 69  | 3.0 to 8.5           | 1700           | 4 to 8     | $1,092,400           | $1,092,400  |
| 31.2 Ocean View Ave.   | 10P, 11P | SF/MF  | 62 to 67  | 3.0 to 8.5           | 1700           | 4 to 8     | $1,092,400           | $1,092,400  |
| 32.1 Ridgewell Ave.    | 45P, 53P, 71P | SF/MF  | 63 to 68  | 3.0 to 6.5           | 2000           | 1 to 8     | $1,419,400 (approx.) | 84          |
| 32.2 Ridgewell Ave.    | 45P, 53P, 71P | SF/MF  | 62 to 68  | 3.0 to 6.5           | 2000           | 1 to 8     | $1,419,400 (approx.) | 84          |
| 33.1 Rte. 460 & Bay View Blvd. | 14P | SF    | 60 to 73  | 2.0 to 5             | 1300           | 2 to 9     | $882,600             | $882,600    |
| 33.2 Rte. 460 & Bay View Blvd. | 14P | SF    | 60 to 73  | 2.0 to 5             | 1300           | 2 to 9     | $882,600             | $882,600    |

Notes:

1.) Land use:
   - SF = Single Family Homes
   - PK = Park or Recreation Area
   - SC = School
   - MF = Apartments, Townhouses, or Duplexes
   - PP = Proposed Park
   - PR = Proposed Residential

2.) Insertion loss of all noise-sensitive land uses behind the barrier.

3.) Total = Total cost of replacement noise barrier; Net = Cost of replacement barrier minus cost of existing barrier.

4.) A noise-sensitive land use is considered protected if it would be exposed to noise impact and noise abatement provides at least 5 dBA noise reduction.

5.) If a noise-sensitive land use is not expected to be exposed to impact, but still would receive 5 dBA or more of noise reduction, the land use is considered benefited.

---

**Notes:**

1.) Land use:
   - SF = Single Family Homes
   - PK = Park or Recreation Area
   - SC = School
   - MF = Apartments, Townhouses, or Duplexes
   - PP = Proposed Park
   - PR = Proposed Residential

2.) Insertion loss of all noise-sensitive land uses behind the barrier.

3.) Total = Total cost of replacement noise barrier; Net = Cost of replacement barrier minus cost of existing barrier.

4.) A noise-sensitive land use is considered protected if it would be exposed to noise impact and noise abatement provides at least 5 dBA noise reduction.

5.) If a noise-sensitive land use is not expected to be exposed to impact, but still would receive 5 dBA or more of noise reduction, the land use is considered benefited.
FIGURE 4-14
LOCATIONS OF NOISE BARRIERS UNDER CONSIDERATION
Where noise barriers would be elevated and on structure, the total cost of noise barriers excludes the cost of jersey barriers. That is, noise barriers would be constructed on top of jersey barriers.

The reasonableness and feasibility of noise barriers to reduce impacts to schools, parks and recreation areas are determined on a case-by-case basis. For non-residential land uses, the determination is based on cost, severity of impact, and amount of noise reduction. Barriers for schools, parks and recreation areas have been presented as potentially reasonable and feasible at this stage. Barriers for these areas will be evaluated in further detail during final design of the Preferred Alternative.

Noise barriers under consideration for Candidate Build Alternatives 1 and 2 would provide the minimum noise reduction at those portions of Woodlands Golf Course and Breezy Point Park that would be exposed to noise impact. Additional noise barriers under consideration for Candidate Build Alternative 2 are expected to provide the minimum noise reduction at a baseball diamond at Norfolk Naval Air Station, Sewells Point Golf Course, and Fleet Park. Noise barriers under consideration for Candidate Build Alternative 9 would provide the minimum noise reduction goal at the Hampton High School athletic fields, Park Place Playground, Fleet Park, and Sewells Point Golf Course.

All noise barrier analysis was performed using the TNM. First, a “line-of-sight” analysis was conducted to estimate the minimum barrier height to break the line-of-sight between heavy trucks on the roadway and exterior receivers at the ground-floor level of noise-sensitive areas. (The barrier height from the line-of-sight analysis represents the approximate height to achieve a noise reduction of 5 dB.) Using the barrier heights from the line-of-sight analysis as a starting point, noise barrier designs were then optimized to achieve the most cost-effective noise abatement measure for exterior activities affected by traffic noise.

In most areas, primarily along mainline sections, barriers were assumed to be located at the edge of the shoulder. This location (as near as possible to the roadway) usually results in the most efficient noise reduction for the greatest number of homes. For certain noise-sensitive areas that are very close to an elevated section of the highway, a barrier height of 2 meters would be sufficient to break the line-of-sight between trucks on the highway and a ground-floor receiver, and would provide the minimum noise reduction of 5 dBA. Another common location for a noise barrier was along the right-of-way line. This location was most efficient along ramps near interchanges, where the noise sources were very spread-out and the mainline was elevated.
Where barriers are to be located on both sides of the highway, they must be constructed so as to minimize the effects of multiple reflections between the two walls. Multiple reflections due to a second barrier on the opposite side of the roadway can reduce the effectiveness of a single barrier by several decibels. These negative effects can be reduced by the use of sound-absorbing materials on the faces of the barriers, or by sloping the barriers back away from the road at an angle of 10 or 15 degrees from vertical.

The noise barriers summarized in Table 4-26 are recommended for further consideration during final design. Formal decisions on all noise barriers will be made upon completion of a detailed barrier analysis, the project design, and a public involvement process. Noise barriers that exceed VDOT's cost-effectiveness criteria will receive further consideration during final design only if third party funding becomes available.

With Candidate Build Alternative 9, one barrier was found to be not feasible along the northbound lanes of I-664 in Newport News. A barrier could not be designed to provide the minimum 5 dBA noise reduction for homes along 39th Street between Chestnut and Roanoke.

### 3. Existing Noise Barriers

There are six existing noise barriers along major interstates on the Peninsula that would be removed due to the widening of the highway with each of the Alternatives. VDOT policy is to replace any barriers that are removed because of widening projects. To calculate the cost-effectiveness for replacement barriers, the cost of the existing barrier was subtracted from the cost of the replacement barrier. Then, this net cost was used in the equation for cost-effectiveness [all costs are in 1996 dollars and calculated based on a unit cost of $172 per square meter ($16 per square foot)].

### G. GROUND-BORNE VIBRATION ABATEMENT MEASURES

Because no impact due to ground-borne vibration was identified during the impact assessment, vibration abatement measures are not necessary for the alternatives that include an LRT option.

Vibration mitigation measures may be considered should future modifications of the alternatives result in placing the LRT tracks closer to the right-of-way line. Such measures include speed reductions and good maintenance. Vibration levels decrease with decreasing speed; halving of train speed, where service schedules allow, will reduce vibration levels by about 6 VdB. This can be a particularly low-
cost method of controlling vibration levels. In addition, effective maintenance practices are essential for controlling ground-borne vibration, since a poorly-maintained vehicle may generate vibration levels up to 20 VdB higher compared to a new or well-maintained vehicle. Regular maintenance practices including wheel truing, rail grinding, and monitoring of wheel-flats will help prevent an increase in wayside vibration as the system ages.

IX. ECOSYSTEMS

A. THREATENED, AND ENDANGERED WILDLIFE

1. No-Build Alternative

The No-Build Alternative is defined as the 2018 regional transportation plan. Projects included in the plan may impact threatened and endangered species. As each is developed, appropriate coordination with USFWS, NMFS, and state agencies will occur.

2. Candidate Build Alternatives

The possible presence of threatened and endangered species within each of the Candidate Build Alternatives is discussed below.

Sea Turtles

There is the potential for the juvenile Loggerhead Sea Turtle and Kemp’s Ridley Sea Turtle to occur in the waters of Hampton Roads. Each of the Candidate Build Alternatives will cross Hampton Roads and will involve the construction of a new bridge tunnel. Potential impacts to the sea turtles could include loss of individuals during construction and dredging operations. Indirect impacts to sea turtles resulting from the proposed dredging will be minimal and short-lived. Although potential sea turtle foraging ground may be temporarily disturbed by dredging, the impacted areas represent a tiny fraction of the food resources available to the sea turtles and will be quickly replaced by benthic communities of similar composition (Dauer, 1985). Long-term impacts to sea turtles are not expected because a new crossing of Hampton Roads will not be a physical barrier to the movement of sea turtles into or out of Hampton Roads.

During construction of the I-664 Monitor Merrimac Memorial Bridge Tunnel, a hopper dredge mined sand fill for tunnel island and inner harbor construction from the eastern reach of Thimble Shoal channel in lower Chesapeake Bay, and no sea turtles were taken. Dredging operations at the
Chesapeake Bay borrow site were conducted from February 26 until March 28, thus avoiding the warm-water migration period of sea turtles (Alden et al., 1992). Juvenile sea turtles are present in the Chesapeake Bay and its tributaries from May through November.

Time of year restrictions on dredging (May – November) will be used for this project to avoid impacts to these species. Pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended, a Biological Assessment for the sea turtles was sent to the NMFS (Appendix B). In a letter dated October 3, 2000 (see Chapter 8, Attachment VI Agency Letters), the NMFS writes “Based upon the location of this project, the proposed time of year restrictions for hopper dredging, and the distribution of listed species in the project area, the proposed Hampton Roads Crossing Study is not likely to adversely affect endangered or threatened sea turtles.” No further consultation pursuant to Section 7 of the Endangered Species Act of 1973, as amended, is required.”

Piping Plover
Coordination with the USFWS revealed that the Piping Plover, a federally listed threatened species, may occur within the vicinity of Candidate Build Alternatives 2 and 9. Piping Plovers nest on Craney Island from mid-March to late July. After July, the Piping Plovers migrate south. Piping plovers nest on coastal beaches, other sandy areas, and areas where suitable dredge spoil has been deposited (Cross, 1991). Piping plovers were first noted on Craney Island in 1989 and have been observed there for 10 of the 24 years of observation (Beck, personal communication, 1999). Observations of breeding pairs in 1994 and 1995 found that nests were placed mostly on the island’s western side (5 nests) with one nest on the northern shore and one on the eastern side of the island on the eastern side of the center cell (U.S. FWS, field notes). The maximum number of breeding pairs of piping plovers observed since 1989 was five (5) pairs in 1994 (Hester, personal communication, 2000). According to Hecht (personal communication, 2000), no piping plovers were seen on Craney Island in 1998 or 1999 and none have been observed so far this year (Held, 2000 personal communication). These findings appear to be consistent with the observations reported by Cairns and McLaren (1980) that piping plovers are uncommon breeders on the west side of the mouth of the Chesapeake Bay.

The Preferred Alternative, Candidate Build Alternative 9, will not effect Craney Island’s current land use. Craney Island is owned by the U.S. Army Corps of Engineers (COE) as a dredge disposal site. There are no current plans by the COE to change that use. There is a COE study currently underway to examine the feasibility of expanding Craney Island to the east to provide a fourth cell for dredged material. The Virginia Port Authority has expressed an interest in possibly locating a marine terminal.
on the fourth cell. This project is independent of the proposed third crossing. Because Candidate Build Alternative 9 will not induce a land use change of Craney Island, it will not lead to commercial, recreational or residential development that would effect piping plovers use of the island. It would also not increase the use of Craney Island for recreational or other activities.

Candidate Build Alternative 9 would cross to the north of Craney Island’s northern shore and would consist of a new 4-lane highway facility plus two additional multi-modal use lanes. This facility will be approximately parallel with the northern shore of Craney Island approximately 400 meters (1300 feet) from the mean high tide boundary on the island. It will be elevated on structure approximately 5.25 meters (17.5 feet) above mean high tide on piers spaced 38 to 46 meters (125 to 150 feet) apart. It is not expected that any use other than possible deposition of dredged material will be made of Craney Island during construction of this segment of the alternative. No staging or barging areas will be required on Craney Island during construction.

A 4-lane connector road will tie-into the third crossing mainline with an interchange just off Craney Island’s northeast corner. That connector then proceeds to the south on structure along Craney Island’s eastern shore before intersecting with VA 164. This interchange and the connector are on pile supported bridge structure. The connector consists of two parallel bridge structures 15.4 meters (50.5 feet) wide that are approximately 10 meters (33 feet) apart for a total footprint of 40.8 meters (134 feet). Starting at the northeast corner, the centerline of the footprint follows the eastern shoreline of Craney Island until it comes to a point approximately 700 meters (2300 feet) north of Craney Island's southeast corner. From this point the connector curves slightly to the west as it crosses over Craney Island Creek. It then continues south to VA 164. There is 300-meter (984-foot) section (approximately 12,240 square meters) of the connector at the southeast corner that is on the land of Craney Island proper. However, this section bisects the perimeter road around Craney Island and may require a bridge structure. This will be investigated in later stages of the project.

Traffic studies conducted for this project predict that the average daily traffic volume on the new crossing that runs north of Craney Island will be 75,000 in the year 2018. The projected 2018 average daily traffic volume on the segment that runs along the eastern shore of Craney Island to VA 164 is 39,000. While disturbance has been identified as a significant threat to breeding populations of the piping plovers, the studies that have focused on disturbance have generally dealt with direct disturbance from humans on foot or motor vehicles directly approaching piping plovers nests.
As currently proposed, the proposed facility will pass in front of Craney Island and along its eastern shore line. Piping plovers have generally nested along the western edge of Craney Island or inland on the island; observations of nesting pairs have only identified one piping plover nest on the northern shore. Piping plovers nesting on the western edge of the island and inland on the island would not be within the viewshed of the project. Lighting on the proposed facility will be directed onto the facility. Fugitive light will be limited, as is currently the case on the Monitor-Merrimac Bridge Tunnel and the Hampton Roads Bridge Tunnel, to a small footprint near the facility. Because of the distance between the new facility and the areas on Craney Island (western and northern shores) historically utilized by piping plovers, fugitive light from the facility light will not illuminate historically preferred piping plover habitat.

While there have been no studies reported on the effects of "distant" traffic passing “in front of” piping plovers nests, two studies have suggested that piping plovers may habituate to the presence of continuous human presence as long as that presence does not directly interfere with nesting pair or interdict and disturb feeding areas. Cairns and McLaren (1980) suggested that: "probably mere presence of people, within limits, does not affect reproductive success. Actual destruction of nests and young is more serious". Patterson et al’s (1991) findings seemed to support Cairns and McLaren. They conclude in part that: "Because piping plovers typically nest far above high tide line and appear capable of habituating to some levels of recreational activity. Restricting recreational use to narrow zones immediately adjacent to the high energy beach might reduce indirect recreational disturbance to plovers nesting on beaches with a wide berm".

The proposed project’s mainline will be on structure 400 meters (1300 feet) from the Craney island’s northern shore and on structure along the island’s eastern shore line. Because of the distance between the proposed facility and the area’s on the island historically utilized by piping plovers (see above), and the reported habituation ability of the piping plover, it seems likely that this distance will ensure no disturbance of piping plovers that may be on Craney Island.

Mammalian and avian nest predation opportunities will not be substantially increased as a result of the new facility. According to Beck (personal communication, 1999) potential nest predators on the island include the red fox and raccoon. Avian predation from gulls may be increased slightly as the result of additional perching sites afforded by the new facility and its appurtenances (e.g., light fixtures). However, a relatively large colony of least terns nest on the island which may serve to attract avian predation away from a few, at least historically, difficult to find piping plover nests.
In conclusion, the Candidate Build Alternative 9, the Preferred Alternative will not adversely effect the piping plover because it:

1. will not directly use piping plover habitat or induce land use changes on Craney Island that would destroy piping plovers or their habitat;
2. will not serve as a substantial attractor to predators that might effect piping plover breeding success and;
3. will not interdict piping plover access to the island or;
4. will not induce additional recreational use, foot or motorized traffic on the island

Pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended, a preliminary Biological Assessment for the Piping Plover was sent to the USFWS. USFWS comments on the preliminary Biological Assessment have been addressed and are included in the Biological Assessment contained in Appendix C of this document. Comments received to date from the USFWS are included in Chapter 8, Attachment VI Agency Letters and in Appendix C, Attachment A. Continued coordination with the USFWS will occur as the project moves into the final design stage.

Dismal Swamp Shrew
The Dismal Swamp Shrew, a stated listed species, could be affected by Candidate Build Alternative 9 in the vicinity of the Joliff Road/Bowers Hill area. Construction in this area will occur only within the current right-of-way limits of I-664. Based on the habitat requirements of the Dismal Swamp Shrew as discussed in its Draft Recovery Plan, the current right-of-way for I-664 does not provide habitat for this species. Therefore, Candidate Build Alternative 9, as proposed, will not affect the Dismal Swamp Shrew.

Peregrine Falcon
Peregrine Falcons, a state listed species, nest on bridges and other elevated structures throughout Hampton Roads. In a letter dated July 22, 1998, the USFWS stated, “Based on our review of the alternatives currently under consideration, it does not appear that this species will be impacted by the project.”

Canebrake Rattlesnake
Coordination with the VDGIF revealed that the Canebrake Rattlesnake has been documented in the Bowers Hill Quadrangle in Chesapeake. The Canebrake Rattlesnake occupies hardwood and mixed hardwood-pine forests, cane fields, and swamp margins. The project footprint in this area remains
within the existing I-664 right-of-way and will not encroach upon prime rattlesnake habitat. Although there are small areas of hardwood, mixed hardwood-pine forests, and wetlands located along the outer edge of the interstate right-of-way, any canebrakes found in these areas would be transient. In addition, the majority of wetland areas within the right-of-way in this area are bridged. Therefore, no adverse impacts to Canebrake Rattlesnakes are expected.

**Marine Mammals**

Atlantic Bottlenose Dolphins are observed in Virginia’s waters and in Hampton Roads from May through October, with sporadic sightings in April, November, December, and other winter months (VMSM, 1996). However, these species are highly mobile and intelligent animals and are expected to avoid construction zones (USDOT, 1993). Therefore, no adverse impacts to Atlantic Bottlenose Dolphins are expected.

Harbor Porpoises have been documented in Virginia’s coastal waters from January through March and have been found stranded along the coast from March through May. Harbor porpoises are rarely sighted in the Hampton Roads harbor because of their shy behavior around boats and tendency to travel in small groups (VMSM, 1996). In addition, this marine mammal species is highly mobile, and impacts due to the construction of a third crossing are not anticipated.

**B. WILDLIFE AND WATERFOWL REFUGES**

No wildlife or waterfowl refuges would be impacted by the proposed project.

**X. WATER QUALITY**

The No-Build is defined as the 2018 regional transportation plan. Projects included in this plan may impact surface water resources.

**A. WATER QUALITY FIELD SAMPLING**

1. **Hampton Roads**

   a. **Methodology**

   Surface water and sediment samples were obtained in the James River estuary in the Hampton Roads area to identify and assess possible impacts to, and mitigation for, surface water resources. The sampling stations corresponded to the likely locations of the tunnel, tunnel islands, and bridge
structures.

Environmental surface water samples were collected from five locations, with two samples taken from each location. One sample was taken from approximately one meter under the surface of the water, while the second was collected from approximately one meter above the sediment-water interface. Specific conductivity, pH, salinity, dissolved oxygen, turbidity, and temperature of the surface water were measured at each sampling location immediately following sample collection. Two surface water sampling locations were located along Candidate Build Alternative 1, and three surface water sampling locations were located along Candidate Build Alternatives 2 and 9.

Sediment samples were collected from a total of 82 locations. Environmental samples were taken from 30 of these locations, while the remaining 52 locations were analyzed for grain size. A description, including color, grain size, odor, presence of oil, and presence of life was provided for all sediment samples. Water quality parameters, including pH, specific conductivity, salinity, dissolved oxygen, turbidity, and temperature were also determined at each of the environmental sediment sampling locations. Environmental samples were collected with a stainless steel Smith/Macintyre benthic Grab Sampler from a depth of 0 to 12 inches. Grain size samples were collected with an aluminum Reisner clam shell grab from a depth of 0 to 6 inches.

The surface water and sediment samples were sent to a laboratory for analysis. The samples were prepared and handled in accordance with the Field Sampling Procedures and USEPA Region III Standard Operating Procedures. The surface water samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides and polychlorinated biphenyls (PCBs), priority pollutant (PP) metals, fecal coliforms, and total suspended solids (TSS). Environmental sediment samples were analyzed for VOCs, SVOCs, pesticides/PCBs, PP metals, tributyl tin, grain size, and total organic carbon (TOC). In addition, selected sediment samples were analyzed for grain size. A summary of the sample numbers and parameters analyzed are provided in the Natural Resources Technical Appendix. Further information on sampling methodology and a map of the sampling locations is also included in the Natural Resources Technical Appendix.

b. Field Sampling Results

The results of the field sampling effort are summarized in this section. Detailed tables listing the surface water statistics, surface water detections, sediment statistics, and sediment detections for each Candidate Build Alternative are provided in the Natural Resources Technical Appendix. The detected
concentrations were compared to applicable standards and criteria. These include Virginia and EPA water quality standards and criteria and NOAA Screening Quick Reference Table sediment quality benchmarks. It is noted that some of the sediment quality benchmarks have a low effect value and a median effects value. These values refer to Sediment Screening Levels (SSLs), which have been compiled to evaluate the potential for contaminants in sediment to cause adverse biological effects (Long, et.al, 1995; Long and Morgan 1991; and USEPA, 1995 a,b). The lower ten percentile (Effects Range-Low [ER-L]) and the median percentile (Effects Range-Median [ER-M]) of biological effects have been developed for several contaminants. The concentration below the ER-L represents a minimal-effects range (adverse effects would be rarely observed). The concentration above the ER-L but below the ER-M represents a possible-effects range (adverse effects would occasionally occur). Finally, the concentration above the ER-M represents a probable-effects range (adverse effects would probably occur).

In addition, STORET data for six stations located in the Hampton Roads area and having greater than five years of sampling data were compiled and compared to the sampling results. STORET is a computerized data base utility maintained by EPA for the STOrage and RETrieval of chemical, physical, and biological data pertaining to the quality of the waterways within and contiguous to the United States. Five metals including copper, lead, nickel, selenium, and zinc exceeded applicable water quality standards or criteria. Seven metals including arsenic, copper, lead, mercury, nickel, selenium, and zinc were above the low effects value for available applicable sediment quality benchmark. However, all of these metals had detected concentrations that were less than the median effects with the exception of zinc.

**Candidate Build Alternative 1**

Eight metals were detected in the two surface water sampling stations including arsenic, copper, lead, nickel, selenium, silver, thallium, and zinc. Four metals including copper, lead, nickel, and silver exceeded applicable water quality standards or criteria. Both the surface and bottom samples had exceedances.

Ten metals were detected in the sediments at sampling stations including arsenic, chromium, copper, lead, mercury, nickel, silver, thallium, tributyl tin, and zinc. Zinc was detected the most frequently followed by chromium, mercury, and arsenic. All metals were below the low effects value for available applicable sediment quality benchmark with the exception of arsenic. However, arsenic was less than the median effects value.
Candidate Build Alternative 2

Eight metals were detected in the three surface water stations including arsenic, copper, lead, nickel, selenium, silver, thallium, and zinc. Five metals including copper, lead, nickel, selenium, and silver exceeded applicable water quality standards or criteria. Both the surface and bottom samples had exceedances. Fecal coliform were detected but did not exceed water quality standards.

Twelve metals were detected in the sediments at stations including arsenic, beryllium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, tributyl tin, and zinc. Zinc was detected the most frequently followed by arsenic, chromium, copper, and lead. All metals were below the low effects value for available applicable sediment quality benchmark with the exception of arsenic, mercury, silver, and zinc. However, all were less then the median effects value. Seven SVOCs were detected in the sediments including benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (k) fluoranthene, chrysene, fluoranthene, and pyrene. All the SVOCs were detected at one station (C2 BLS 19), and all were above the median effects value.

Candidate Build Alternative 9

Eight metals were detected in the three surface water stations located along Candidate Build Alternative 9 including arsenic, copper, lead, nickel, selenium, silver, thallium, and zinc. Four metals including lead, nickel, selenium, and silver exceeded applicable water quality standards or criteria. Both the surface and bottom samples had exceedances. Fecal coliform were detected but did not exceed water quality standards.

Twelve metals were detected in the sediments at stations located along Candidate Build Alternative 9 including arsenic, beryllium, chromium, copper, lead, mercury, nickel, selenium, thallium, tributyl tin, and zinc. Arsenic, chromium, copper, lead, nickel, thallium, and zinc were detected the most frequently at 19 of 20 stations sampled. Eight SVOCs were detected in the sediments including benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (k) fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene. With the exception of phenanthrene, all the SVOCs were detected at one station (C9 BLS 19). Phenanthrene was detected at one station (C9 BLS 01). In addition, heptachlor was detected once at station C9 BLS 08. All metals were below the low effects value for available applicable sediment quality benchmark with the exception of arsenic, silver, and zinc. However, these three metals had detected concentrations that were less then the median effects value. Heptachlor was greater than the sediment quality benchmark. All the SVOCs were above the median effects value.
c. **I-664 Water Quality Monitoring Program**

A three year water quality monitoring program was conducted by the Applied Marine Research Laboratory (AMRL) of Old Dominion University during construction of the I-664 Monitor Merrimac Memorial Bridge Tunnel, which was completed in 1992. A total of 14 separate monitoring projects were conducted during the environmental program associated with the dredging and filling activities. Overall, the monitoring project concluded that “the frequency of violations of water quality control limits was remarkably low for all dredging and filling projects. No two parameters were observed to be out-of-range at the same time, no patterns could be related to proximity to dredging and filling operations, and no ecologically significant effects on water quality were indicated” (AMRL, 1992). It would be expected that construction of any of the Candidate Build Alternatives within the Hampton Roads would follow the same pattern.

The monitoring program measured the following water quality parameters: Total Suspended Solids (TSS), Dissolved Oxygen (DO), pH, temperature, heavy metals (arsenic, cadmium, chromium, mercury, manganese, nickel and lead), nutrients (orthophosphate, total Kjeldahl nitrogen, ammonia, nitrate + nitrate, and total organic carbon), and organic “priority pollutants” (volatile organics, chlorinated hydrocarbons, base/neutral/acid extractable compounds). The parameters were measured every two hours during daylight hours at 1 meter below the surface, mid-depth, and 1 m above the bottom at a control site located beyond the effects of construction activities, and at two test stations located 200 meters and 500 meters from the construction operation.

Low frequency of violations were observed relative to water quality control limits. In addition, the majority of violations were not directly related to the dredging and filling activities. These included observations of high pH and low dissolved oxygen conditions that were observed throughout the region during certain critical seasons. In general, the following results were noted for some of the parameters that were monitored:

- Total suspended solids violations were associated with atypical events and were transient.
- Dissolved oxygen violations occurred during the summer months when low levels were observed throughout the Hampton Roads Harbor
- Concentrations of organic and metal contaminants were negligible and no patterns could be related to proximity to dredging and filling activities.
- No ecologically significant effects on water quality were noted.
Alden (1992) provided several recommendations for future monitoring programs. Of note is the recommendation for toxicity screens in areas of high-contaminated sediments. The dredging activities located in the area of the Elizabeth River would qualify for the toxicity screens recommended by Alden (1992). Any indications of cause and effect relationships between the toxicity screens and the dredging activity would indicate a need for corrective actions and mitigation.

2. Streams
Physiochemical water quality sampling was conducted on streams potentially impacted by each Candidate Build Alternative. The physiochemical parameters conducted on each stream include sample depth, temperature, pH, dissolved oxygen, conductivity, turbidity and salinity. A total of 34 sampling locations received water quality sampling events and/or observations notations. Further information on sampling methodology can be found in the Natural Resources Technical Appendix.

Surface water quality parameters were conducted at all sites that exhibited standing water. Some locations, due to extremely dry weather conditions, did not contain standing water to sample. Table 4-27 shows the water quality results per location. It should be noted that many locations may simply be drainage points created by the existing I-664 roadway. However, all drainage points that contained or appeared to accommodate water were sampled and noted.

B. WATERBODY CROSSINGS
Table 4-28 lists the waterbodies crossed by each of the Candidate Build Alternatives, the length of the crossing, and the type of crossing proposed (i.e. bridge or culvert). Because each of the Candidate Build Alternatives generally involves widening an existing transportation facility, the expansion would cross the streams in the same manner as the existing facility. While often more expensive, crossing a stream with a bridge, as opposed to a culvert (box, pipe, or bottomless pipe arch), minimizes permanent disturbance to the natural stream channel, reduces impacts to stream hydraulics, minimizes loss of aquatic habitat, and eliminates obstruction to aquatic organism movement within the stream. The use of a bridge also minimizes impacts on riparian vegetation and may provide movement corridors along streams for terrestrial wildlife.

During construction, an increase in turbidity levels could occur at any water crossing due to erosion and sedimentation. This could temporarily reduce water quality and potentially impact aquatic
### TABLE 4-27
STREAM WATER QUALITY FIELD MEASUREMENTS

<table>
<thead>
<tr>
<th>Water Body</th>
<th>CBA</th>
<th>Station</th>
<th>Temperature (°C)</th>
<th>pH (s.u.)</th>
<th>Dissolved Oxygen (mg/l)</th>
<th>Conductivity (micromhos/cm)</th>
<th>Turbidity (NTU)</th>
<th>Salinity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mason's Creek 1 and 2</td>
<td>C-1-SW01</td>
<td>14.70</td>
<td>8.07</td>
<td>9.68</td>
<td>37.50</td>
<td>77.00</td>
<td>2.36</td>
<td></td>
</tr>
<tr>
<td>Oasts Creek 1 and 2</td>
<td>C-1-SW02</td>
<td>15.80</td>
<td>8.33</td>
<td>9.53</td>
<td>33.20</td>
<td>68.00</td>
<td>2.07</td>
<td></td>
</tr>
<tr>
<td>John's Creek 1 and 2</td>
<td>C-1-SW03</td>
<td>15.10</td>
<td>8.54</td>
<td>9.52</td>
<td>44.10</td>
<td>23.00</td>
<td>2.81</td>
<td></td>
</tr>
<tr>
<td>Unnamed tributary of Hampton River 1 and 2</td>
<td>C-1-SW04</td>
<td>14.60</td>
<td>9.43</td>
<td>8.44</td>
<td>3.52</td>
<td>190.00</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>Hampton River 1 and 2</td>
<td>C-1-SW05</td>
<td>14.90</td>
<td>8.03</td>
<td>8.44</td>
<td>43.00</td>
<td>112.00</td>
<td>2.75</td>
<td></td>
</tr>
<tr>
<td>Bright's Creek 1 and 2</td>
<td>C-1-SW06</td>
<td>14.30</td>
<td>7.31</td>
<td>4.56</td>
<td>32.40</td>
<td>62.00</td>
<td>2.09</td>
<td></td>
</tr>
<tr>
<td>New Market Creek at Hampton Coliseum 1 and 2</td>
<td>C-1-SW07</td>
<td>14.40</td>
<td>8.01</td>
<td>12.07</td>
<td>27.90</td>
<td>39.00</td>
<td>1.71</td>
<td></td>
</tr>
<tr>
<td>Sewell’s Golf Course Pond</td>
<td>C-564-01</td>
<td>15.10</td>
<td>6.21</td>
<td>5.23</td>
<td>0.22</td>
<td>19.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Unnamed Creek near Camp Allen 2 and 9</td>
<td>C-564-02</td>
<td>14.70</td>
<td>6.78</td>
<td>5.44</td>
<td>17.00</td>
<td>16.00</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td>Retention Pond 2 and 9</td>
<td>C-564-03</td>
<td>17.10</td>
<td>7.27</td>
<td>1.65</td>
<td>11.20</td>
<td>156.00</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>Unnamed Creek 2 and 9</td>
<td>C-564-04</td>
<td>17.30</td>
<td>7.35</td>
<td>6.92</td>
<td>18.30</td>
<td>163.00</td>
<td>1.08</td>
<td></td>
</tr>
<tr>
<td>Newport News Creek 9</td>
<td>C-9-SW01</td>
<td>13.30</td>
<td>7.77</td>
<td>7.33</td>
<td>42.20</td>
<td>10.00</td>
<td>2.68</td>
<td></td>
</tr>
<tr>
<td>Streeter Creek Trib NW 9</td>
<td>C-9-SW02</td>
<td>7.80</td>
<td>6.76</td>
<td>5.80</td>
<td>0.53</td>
<td>762.00</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Knotts Creek Trib 2 9</td>
<td>C-9-SW05</td>
<td>10.10</td>
<td>7.35</td>
<td>9.00</td>
<td>1.31</td>
<td>543.00</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Knotts Creek Trib 3 9</td>
<td>C-9-SW06</td>
<td>12.70</td>
<td>7.18</td>
<td>7.36</td>
<td>1.42</td>
<td>100.00</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Knotts Creek Trib 4 9</td>
<td>C-9-SW07</td>
<td>11.40</td>
<td>7.20</td>
<td>6.71</td>
<td>0.35</td>
<td>*</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Bailey Creek Trib 3 9</td>
<td>C-9-SW16</td>
<td>17.00</td>
<td>6.57</td>
<td>11.11</td>
<td>20.90</td>
<td>312.00</td>
<td>1.24</td>
<td></td>
</tr>
<tr>
<td>Goose Creek Trib 3 9</td>
<td>C-9-SW19</td>
<td>14.50</td>
<td>6.73</td>
<td>10.90</td>
<td>27.30</td>
<td>100.00</td>
<td>1.66</td>
<td></td>
</tr>
<tr>
<td>Craney Island Creek 2 and 9</td>
<td>C-9-SW20</td>
<td>14.40</td>
<td>7.56</td>
<td>9.70</td>
<td>45.90</td>
<td>100.00</td>
<td>2.94</td>
<td></td>
</tr>
<tr>
<td>Goose Creek Trib 5 9</td>
<td>C-9-SW21</td>
<td>15.50</td>
<td>6.95</td>
<td>3.71</td>
<td>4.76</td>
<td>100.00</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>Goose Creek Trib 6 9</td>
<td>C-9-SW22</td>
<td>13.70</td>
<td>6.31</td>
<td>6.72</td>
<td>11.20</td>
<td>100.00</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>Lake Kingman 2 and 9</td>
<td>C-9-SW23</td>
<td>15.90</td>
<td>7.68</td>
<td>8.65</td>
<td>45.90</td>
<td>100.00</td>
<td>2.93</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Some streams were unable to be sampled due to insufficient water at sampling location due to unusual dry weather. These streams include: Knotts Creek Tributaries 1 and 5; Drum Point Creek Tributaries 1, 2, 4, 5, and 6; Bailey Creek Tributaries 1 and 2; Goose Creek Tributaries 1 and 2; and Streeter Creek Tributary SW

* - Turbidity meter reading questionable.
### TABLE 4-28

**WATERBODIES CROSSED**

<table>
<thead>
<tr>
<th>CBA[^1]</th>
<th>Water Body</th>
<th>Estimated Length of Crossing (meters)</th>
<th>Type of Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hampton Roads/mouth of Elizabeth River</td>
<td>5,750</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>2</td>
<td>Hampton Roads/mouth of Elizabeth River</td>
<td>9,300</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>1, 2</td>
<td>Willoughby Bay</td>
<td>2,450</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>1, 2</td>
<td>Mason's Creek</td>
<td>230</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>1, 2</td>
<td>Oasts Creek</td>
<td>40</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>1, 2</td>
<td>John's Creek</td>
<td>105</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>1, 2</td>
<td>Unnamed tributary of Hampton River</td>
<td>55</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>1, 2</td>
<td>Hampton River</td>
<td>340</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>1, 2</td>
<td>Bright's Creek</td>
<td>170</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>1, 2</td>
<td>New Market Creek near Hampton Coliseum</td>
<td>100</td>
<td>Culvert</td>
</tr>
<tr>
<td>2, 9</td>
<td>Unnamed Creek near Camp Allen</td>
<td>15</td>
<td>Culvert</td>
</tr>
<tr>
<td>2, 9</td>
<td>Unnamed Creek along railroad tracks</td>
<td>700</td>
<td>Culvert</td>
</tr>
<tr>
<td>2, 9</td>
<td>Craney Island Creek</td>
<td>25</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>9</td>
<td>Hampton Roads/mouth of Elizabeth River</td>
<td>14,750</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>9</td>
<td>Streeter Creek Tributary SW</td>
<td>110</td>
<td>Culvert</td>
</tr>
<tr>
<td>9</td>
<td>Knotts Creek Tributary 2</td>
<td>2</td>
<td>Culvert</td>
</tr>
<tr>
<td>9</td>
<td>Knotts Creek Tributary 3</td>
<td>610</td>
<td>Culvert</td>
</tr>
<tr>
<td>9</td>
<td>Knotts Creek Tributary 4</td>
<td>80</td>
<td>Culvert</td>
</tr>
<tr>
<td>9</td>
<td>Bailey Creek Tributary 1</td>
<td>25</td>
<td>Culvert</td>
</tr>
<tr>
<td>9</td>
<td>Bailey Creek Tributary 3</td>
<td>60</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>9</td>
<td>Goose Creek Tributary 3</td>
<td>100</td>
<td>Bridge-Tunnel</td>
</tr>
<tr>
<td>9</td>
<td>Goose Creek Tributary 5</td>
<td>110</td>
<td>Culvert</td>
</tr>
<tr>
<td></td>
<td><strong>Candidate Build Alternative 1 – Bridge-Tunnel</strong></td>
<td><strong>5,750</strong></td>
<td><strong>Bridge</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>3,285</strong></td>
<td><strong>Culvert</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>205</strong></td>
<td><strong>Culvert</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Candidate Build Alternative 2 – Bridge-Tunnel</strong></td>
<td><strong>9,300</strong></td>
<td><strong>Bridge</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>3,310</strong></td>
<td><strong>Culvert</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>920</strong></td>
<td><strong>Culvert</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Candidate Build Alternative 9 – Bridge-Tunnel</strong></td>
<td><strong>14,750</strong></td>
<td><strong>Bridge</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>185</strong></td>
<td><strong>Culvert</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>1,650</strong></td>
<td><strong>Culvert</strong></td>
</tr>
</tbody>
</table>

[^1]: The No-Build is defined as the 2018 regional transportation plan. Projects included in the plan will cross waterbodies.
species. Implementation of strict erosion control measures would minimize water quality impacts due to sedimentation and turbidity during construction.

Accumulation of materials on highway surfaces, medians, and adjoining rights-of-way occurs as a result of highway use, maintenance, natural contributions, and air pollution fallout. Stormwater runoff from highways can wash this material into streams and lakes. Research indicates that highway stormwater runoff causes few impacts for highways with less than 30,000 average daily traffic (ADT) (Dupuis, et al., 1984). Impacts from highways with more than 30,000 ADT are site specific and depend on the highway and receiving water characteristics. Mitigation measures designed to control storms producing less than one inch of rainfall will control discharges from about 90 percent of the storms each year (Maestri, et al., 1989). Implementation of stormwater retention basins, as regulated by Virginia state regulations, will occur. These basins will minimize water quality impacts due to stormwater runoff.

Due to the length of the structure, the runoff from the new bridge tunnel facility will be handled the same as the existing I-664 Monitor Merrimac Memorial Bridge Tunnel and I-64 Hampton Roads Bridge Tunnel, which use a scupper system that drains the water directly into Hampton Roads. Any potential spills from tanker truck accidents will be handled using established hazardous material spill guidelines. The practicability of storm water systems for other waterbodies bridged by Alternative 9 will be evaluated during final design.

C. DREDGING

1. Quantity of Estimates
An estimate of dredging and fill quantities was developed for each of the Candidate Build Alternatives (Table 4-29). The estimated quantities were comprised of dredging, common backfill, locking stone, and armor stone for the tunnels and excavation, common backfill, armor stone, and Type C stone for the islands. Quantity estimates were developed for both the steel tube tunnel and the concrete tube tunnel (see Figure 2-6, Chapter 2). Tunnel estimates show major differences for dredging and backfill estimates for the steel and concrete tunnels due to their structural geometries. Island quantities were assumed to be the same for both the steel and concrete tunnels. Top of island elevations were assumed to be at the highest roadway grade within each island. Tunnel quantities include dredging from the edge of the island to the edge of the opposite island, and locking stone along the entire length of the tunnels. Island and tunnel cross sections were established every 100 meters.
### TABLE 4-29
**ESTIMATE OF DREDGING AND FILL QUANTITIES**

<table>
<thead>
<tr>
<th>CBA</th>
<th>Location</th>
<th>Tunnels</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Excavation</td>
<td>Common Backfill</td>
<td>Armor Rock</td>
<td>Locking Stone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dredging</td>
<td>Backfill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Hampton Roads</td>
<td>2,078,830</td>
<td>257,165</td>
<td>115,310</td>
<td>72,358</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Lane Concrete</td>
<td>2,078,830</td>
<td>257,165</td>
<td>115,310</td>
<td>72,358</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Lane Steel</td>
<td>2,860,704</td>
<td>438,832</td>
<td>139,225</td>
<td>123,494</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Hampton Roads</td>
<td>2,078,830</td>
<td>257,165</td>
<td>115,310</td>
<td>72,358</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Lane Concrete</td>
<td>2,078,830</td>
<td>257,165</td>
<td>115,310</td>
<td>72,358</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Lane Steel</td>
<td>2,860,704</td>
<td>438,832</td>
<td>139,225</td>
<td>123,494</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elizabeth River</td>
<td>1,459,442</td>
<td>190,890</td>
<td>74,061</td>
<td>55,802</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Lane Concrete</td>
<td>1,459,442</td>
<td>190,890</td>
<td>74,061</td>
<td>55,802</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Lane Steel</td>
<td>1,784,798</td>
<td>320,244</td>
<td>90,147</td>
<td>96,284</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Hampton Roads</td>
<td>876,062</td>
<td>191,783</td>
<td>85,994</td>
<td>53,962</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Lane Concrete</td>
<td>876,062</td>
<td>191,783</td>
<td>85,994</td>
<td>53,962</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Lane Steel</td>
<td>1,188,710</td>
<td>327,265</td>
<td>103,829</td>
<td>92,098</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elizabeth River</td>
<td>1,717,913</td>
<td>198,322</td>
<td>88,925</td>
<td>55,802</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Lane Concrete</td>
<td>1,717,913</td>
<td>198,322</td>
<td>88,925</td>
<td>55,802</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Lane Steel</td>
<td>2,214,059</td>
<td>342,140</td>
<td>108,548</td>
<td>96,284</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7,200</td>
<td>264,100</td>
<td>203,800</td>
<td>280,200</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CBA</th>
<th>Location</th>
<th>Islands</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Excavation</td>
<td>Fill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Common Backfill</td>
<td>Armor Rock</td>
<td>Type C Stone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Hampton Roads</td>
<td>2,000</td>
<td>173,200</td>
<td>115,500</td>
<td>160,700</td>
<td></td>
</tr>
<tr>
<td></td>
<td>North Island</td>
<td>5,200</td>
<td>90,900</td>
<td>88,300</td>
<td>119,500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>South Island</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7,200</td>
<td>264,100</td>
<td>203,800</td>
<td>280,200</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Hampton Roads</td>
<td>2,000</td>
<td>173,200</td>
<td>115,500</td>
<td>160,700</td>
<td></td>
</tr>
<tr>
<td></td>
<td>North Island</td>
<td>5,200</td>
<td>90,900</td>
<td>88,300</td>
<td>119,500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>South Island</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>14,900</td>
<td>542,800</td>
<td>351,000</td>
<td>467,400</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Hampton Roads</td>
<td>0</td>
<td>264,200</td>
<td>91,900</td>
<td>298,800</td>
<td></td>
</tr>
<tr>
<td></td>
<td>North Island</td>
<td>0</td>
<td>302,700</td>
<td>96,100</td>
<td>296,400</td>
<td></td>
</tr>
<tr>
<td></td>
<td>South Island</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7,700</td>
<td>845,600</td>
<td>335,200</td>
<td>782,400</td>
<td></td>
</tr>
</tbody>
</table>

1. All quantities in cubic meters
2. The No-Build is defined as the 2018 regional transportation plan. Projects included do not include a crossing of Hampton Roads.
As shown in Table 4-29, the concrete tunnel shows about a 25 percent reduction in dredging, a 42 percent reduction in common backfill, an 18 percent reduction in armor rock, and a 42 percent reduction in locking stone when compared to the steel tunnel quantities. This reduction can be contributed to the differences in the structural geometries of the two sections.

Candidate Build Alternative 1 requires the least amount of dredging and fill material to construct because it will only consist of one tunnel. Candidate Build Alternative 2 requires about 32 percent less dredging than Candidate Build Alternative 9, but requires about 30 percent more island fill than Candidate Build Alternative 9.

2. Effects of Dredging

The potential impacts of dredging to the environment include: the generation of suspended solids/turbidity and the resultant degradation of surface water quality and sediment quality; elimination of benthic populations within the dredging zone; and, deposition of dredge-induced suspended sediment on benthic populations downstream of the dredging zone.

During the dredging period, the dredging activities will result in resuspension of sediments and an increase in turbidity with a decrease in photic zone, resuspension of contaminants, and release of nutrients that increase fertilization of the waters and increase biological oxygen demand and subsequent reduction of dissolved oxygen. The resuspension of adsorbed contaminants on the particulates and release (desorbed) of contaminants to the water column will be a function of the total area of disturbed sediment and the characteristics of the sediment (sediment quality) in the areas of disturbance. In addition, the contaminants released and the amounts released are affected by physical characteristics of the sediments such as particle size distribution, total organic carbon, and mineral composition. It is noted that not all releases of nutrients result in a potential impact. Johnston (1981) reports that releases of nitrogen and total phosphate produced conditions that increased the growth of oysters in nutrient-rich waters.

The most notable impact of dredging activities on water quality is the increase in turbidity (Brannon et al, 1989). The amount of turbidity associated with a dredging operation is a function of dredge type, dredging operation, and sediment characteristics. Turbidity in the area of the dredging operation can exceed the background levels by two to four orders of magnitude. However, Nicols et al (1990) found that the levels are of short duration, less than three minutes at a fixed point. The turbidity associated with the dredging operations will last only as long as the dredging. In addition, even during the
dredging operations, the turbidity increases are limited in areal extent. Finally, most dredging operations are conducted in waters that are naturally turbid and usually increased turbidity from dredging operations exceeds background levels for only a short distance downstream.

The release of contaminants in the deposited sediments and subsequent exposure to aquatic life is limited to diffusion of soluble contaminants in the sediment interstitial water and then into the overlying water, resuspension of bottom sediments, and desorption of contaminants from resuspended sediments. The release of contaminants into the overlying water from suspended or resuspended sediment is a greater source of contaminant release than diffusion of contaminants from bed sediments into the overlying water (Brannon et al, 1989). Diffusion of contaminants from sediments requires that the contaminant desorb from the sediment into the pore water, then slowly diffuse through the pore spaces into the overlying water. In contrast, contaminants from resuspended sediments or suspended sediments can move directly into the overlying water without the diffusion through pore spaces. Therefore, in areas of appreciable sediment resuspension, the rate of contaminant movement into the overlying water via release from suspended sediment would be expected to be much higher than that originating from a deposited sediment via diffusion. The greater release potential is a result of the great increase in surface area available for desorption of contaminants during suspension, compared with the limited surface area of a compacted bottom sediment.

The geochemical form of the contaminant in the sediment will to a great extent determine its bioavailability to aquatic organisms (Brannon et al, 1989). The presence of the contaminant in the sediment does not directly correspond to an adverse impact on aquatic life. Metals and organics found in sediment interstitial waters or adsorbed to metals associated with sediments are the most mobile and potentially available contaminants in contaminated sediments.

Bottom sediment distribution were plotted by Nichols et al. (1991). Coarser sandy bottom sediments are located in the channel and northern flank in Hampton Flats and finer muddy bottom sediments in the southern flank near Carney Island. Using this information, Candidate Build Alternative 1 sediments consists mainly of coarser sandy sediments in the dredging zone with a relative lower level of suspended sediments resulting from the dredging activity. Candidate Build Alternative 2 includes the coarser sandy sediments of Candidate Build Alternative 1 in the channel and the finer muddy bottom sediments in the mouth of the Elizabeth River. The lowel level of suspended sediments of the channel dredging would be supplemented by the higher level of suspended sediments generated by the dredging activity across the Elizabeth River. Candidate Build Alternative 9 includes medium silts to
finer silts in the area of the islands and tunnels in the James River and finer muddy bottom sediments in the mouth of the Elizabeth River. Therefore, the level of suspended sediments generated in the James River area of this alternative would be expected to be greater than Candidate Build Alternatives 1 and 2 and would be supplemented by the higher level of suspended sediments generated by dredging across the Elizabeth River main channel.

Dredging Equipment and Methods
Havis (1988) examined three conventional dredges: hydraulic pipeline cutterhead, hydraulic hopper dragarm, and mechanical clamshell. The study found that the cutterhead dredge, with proper design, proper cutter for given sediment, and correct rotational speed of cutter verses hydraulic suction, can reduce sediment resuspension while maintaining efficient production. In applications where a cutterhead dredge is not practical (i.e. work in seas over three feet where hopper dredges are preferred or around docks and other harbor installations where a clamshell dredge would be preferred), sediment resuspension from clamshell and hopper dredging can be controlled through control of the dredging operations. Accordingly, limiting overflow from hopper dragarm dredging showed significant benefits by reducing water column total suspended sediment levels to near background compared to water quality conditions during hopper overflow. Johnson and Pachure (1999) showed that the maximum values of the turbidity generation units (TGUs) for cutterhead, hopper (without overflow), and clamshell dredges were about 45, 25, and 90 kg/cu meters, respectively. The TGUs observed are dependent on sediment type with the highest levels from silty sand and silty clay.

Selection of dredging equipment and method used to perform the dredging will depend on the following factors:

- Physical characteristics of material to be dredged
- Quantities of material to be dredged
- Dredging depth
- Distance to disposal area
- Physical environment of the dredging and disposal areas
- Contamination level of sediments
- Method of disposal

Final selection of dredging equipment and methods used for dredging will occur during the final design stage.
Disposal of Dredged Material

Material dredged for construction of a new crossing may likely be disposed of on the Craney Island Dredged Disposal Management Area. Craney Island is authorized to handle all types of navigation dredged material including material suitable and unsuitable for open ocean disposal. Clean sand material will be used to provide the needed cover over the tunnel tubes. Upland sites will be investigated for borrow material prior to construction. These could include undeveloped property in the study area, future construction sites with extra fill material, or commercial suppliers of borrow material. The Thimble Shoal Channel could be another potential resource for fill material for the tunnel(s) and islands. The Thimble Shoal Channel historically has been dredged to maintain navigation.

D. HYDRODYNAMIC AND SEDIMENTATION MODELING

A three-dimensional hydrodynamic and sedimentation model, HYSED-3D, was used by the Virginia Institute of Marine Science to simulate the tide, current, and salinity fields of the James River in Virginia. In addition to these physical properties, the model also was used to simulate sedimentation in the lower James River as part of a study to assess the environmental effects of bridge-tunnel construction in a planned crossing of Hampton Roads. The design infrastructure for three separate highway crossings, designated as Candidate Build Alternatives 1, 2, and 9, was tested using a fine-scale computational grid representing the existing waterways of the lower James River and the Elizabeth River, a tributary basin located just inside the entrance to the James River. The model was required to simulate the full range of hydrodynamic and hydrologic conditions expected for the prototype system, including tides of maximum and minimum range as well as extremes in freshwater inflow expected for the headwaters of the James River. In each test, model-simulated properties were compared between the existing highway crossing structure (Base Case) and that of Candidate Build Alternative 1, 2, or 9 (simulation comparisons). The results were analyzed to determine the response to the design structures added to the Base Case under the test conditions specified. The results are discussed below for each Candidate Build Alternative. Further information on the hydrodynamic and sedimentation modeling methodology and results can be found in the Hampton Roads Crossing Study Three Dimensional Hydrodynamic –Sedimentation Modeling Study (VIMS, 1999) to this FEIS.

1. Tidal Heights

No discernible change in simulated tidal heights was noted at any of the nine tide stations selected for comparison of the Base Case with Candidate Build Alternatives 1, 2, and 9. None of the comparisons
evidenced any structure-induced change in tidal height related to variations in tidal range or river inflow. Changes in the times and heights of high and low water were consistently less than the expected accuracy limits of the model (5–10 minutes and 3-4 cm, respectively).

2. Tidal Currents

Changes in tidal current time histories were apparent at four of the seven current stations selected for comparisons in Hampton Roads. Station C1 at the entrance to the James River evidenced a slight difference in simulated currents for the Base Case and Candidate Build Alternatives 1 and 2 for most combinations of tidal range and river inflow. This change was manifested only in the form of the surface current curve with no discernible difference in either the time or speed of the flood and ebb current maxima.

Station C2 at the entrance to the Elizabeth River demonstrated a more noticeable change in the surface current time histories for Candidate Build Alternatives 2 and 9 during all nine combinations of tidal range and river inflow. In addition to changes in curve form (sharper peaks), there are small differences in the strength of the current maxima (stronger flood and weaker ebb) that is suggestive of a residual current when the duration of flood and ebb are approximately equal. Bottom currents at station C2 were weaker and more variable than surface current; although they suggest a change for Candidate Build Alternatives 2 and 9, they are more difficult to characterize in terms of a consistent and recognizable pattern of change.

Surface currents at stations C3 (Newport News Channel) and C5 (Newport News Point) show distinct changes in current maxima when comparing Candidate Build Alternative 9 to the Base Case. Bottom currents appear unaffected at either station. Under the mean tidal range and mean river inflow conditions, it is apparent that the surface current at station C3 possesses an ebb residual that is strengthened by Candidate Build Alternative 9 while the current range (gross difference in current extremes) remains constant. At station C5 near the Newport News tunnel islands required for Candidate Build Alternative 9, the current range at mean tide (120 cm/s) decreases by approximately 12 cm/s (10%) while the ebb current residual again increases by a slight amount. These observations suggest a change in the direction of the surface current or a current divergence at station C5 that would produce a reduction in current range in the direction aligned with the channel axis. Changes at station C3 consist of a change in the residual current only.
Spatial change in instantaneous surface and bottom currents is quite small and limited to a few highly local changes in current speed and/or direction (e.g., in the vicinity of the bridge tunnels for Candidate Build Alternative 9). The only organized change in flow patterns noted was limited to a small, eddy-like feature appearing in the surface current near the Newport News Channel in response to Candidate Build Alternative 9. This feature was apparent only during maximum flood and apogean-neap tide. It is not unusual to see organized fields of motion (eddies) developing in the residual current over Hampton Flats during times of maximum stratification.

3. Tidal Prism, Residual Current

Determination of the tidal prism (volume of flood or ebb flow entering an enclosed region) was deemed important for the Elizabeth River, a tidal basin with only a single seaward entrance and no measurable freshwater inflow. A reduction in tidal prism is normally associated with a reduction in the flushing ability of a tidal basin. Simulation comparisons of the flow through Transect 1 at the entrance of the Elizabeth River showed no evidence of a reduction in tidal prism for the Elizabeth River under the conditions tested for Candidate Build Alternatives 2 and 9.

The observation of a change in the current history at station C2 underscored the necessity of examining the residual current and its possible influence on circulation within the entrance and perhaps other parts of the Elizabeth River. Residual currents associated with horizontal eddy systems have the potential to lower flushing rates and impede particle movement by a convergence or “trapping” effect (Hood et al., 1999). For this reason the model-simulated residual currents were examined in plan and profile view and the residual water volumes passing through Transect 1 at the Elizabeth River entrance were calculated. The model results indicated that eddy motion decreases and residual water volumes passing through the transect are reduced as a result of Candidate Build Alternatives 2 and 9. This happens primarily during apogean-neap tides when eddy development is most pronounced. This finding suggests that residual circulation may be affected, at least within the Elizabeth River entrance region. Model grid resolution presently is not adequate to provide definitive answers on circulation throughout the interior region. In addition to further modeling studies specific to the Elizabeth River, detailed measurements of the actual residual current in the field are needed to verify the simulation results.

4. Salinity

Little change is expected in the salinity field at depth. Simulated salinity profiles along Transect 3,
which is located along the axis of the main channel of the river, suggest little or no longitudinal change in the limit of salt intrusion in the James river as a result of Candidate Build Alternative 1.

Changes in salinity observed through the test simulations conducted in this study were primarily limited to regions with measurable salinity stratification and enhanced vertical mixing as occurs in the vicinity of bridge pilings such as those specified for Candidate Build Alternatives 2 and 9. As expected, surface salinity increased and bottom salinity decreased in these regions as a result of turbulence-induced mixing. The mixing is most intense during perigean-spring tides and least intense during apogean-neap tides. No changes in salinity were observed through the test simulations conducted in this study for Candidate Build Alternative 1.

Near Newport News Point, surface water from upstream areas of the James River generally encounters saltier water entering from Chesapeake Bay and may override it in frontal systems. Some variation in the position of the frontal interface and the distribution of low salinity surface water is predicted as a result of Candidate Build Alternative 9. Little change is expected, however, in the salinity field at depth. Simulated salinity profiles along Transect 3, which is located along the axis of the main channel of the river, suggest little or no longitudinal change in the limit of salt intrusion in the James river as a result of any of the Candidate Build Alternatives tested. Of course the longitudinal salinity distribution undergoes considerable change after a change in any of the three river inflow conditions, and this affect greatly outweighs that of any other condition tested.

5. Sedimentation

A previous investigation on the effects of I-664 construction relative to sedimentation in the Lower James predicted only minor changes except for a possible reduction in shoaling within the Newport News Channel (Heltzel, 1988). The present investigation has little to add in terms of expected changes in sedimentation, or sedimentation potential, as a result of any of the alternatives examined. In response to Candidate Build Alternative 1, a minor increase in sedimentation potential was noted near shore at the northeast end of Hampton Flats. For Candidate Build Alternatives 2 and 9, a decrease in sedimentation potential is indicated in the vicinity of bridge structures north of Craney Island due to increased bottom turbulence. The HYSED-3D model generally predicts that areas of high sedimentation potential are located predominately along the south shore of the James with very little sedimentation potential along the north shore. This result is consistent with the observed grain size characteristics of bottom sediments (Nichols et al., 1991) which are consistently finer grained along the south shore and within the Elizabeth River entrance.
Simulated release of tagged or traceable sediment particles with characteristic grain sizes and settling velocities indicate that only medium silt (15.6 – 31.3 \( \mu \)m) and finer grained sediment has the capability of reaching the lower James from known source regions upstream under mean freshwater inflow conditions. However, considerably more of this sediment and some coarser-grained material as well can be expected to reach the lower James during the tested condition of high river inflow. The change that occurs between extremes in the inflow condition strongly outweighs the change due to structures added for any of the Candidate Build Alternatives.

E. PUBLIC WATER SUPPLY

1. Surface Water
There would be no direct public water supply impacts associated with any of the Candidate Build Alternatives.

2. Groundwater
There are no groundwater aquifers used for public drinking water supplies that would be affected by any of the Candidate Build Alternatives.

F. MITIGATION
The following mitigation measures could be implemented to prevent or minimize water quality impacts of constructing a new transportation facility:

- Erosion and sediment control measures will be conducted as specified in VDOT’s Erosion and Sediment Control Handbook;
- A water quality monitoring program similar to the one used for the construction of the I-664 Monitor Merrimac Memorial Bridge Tunnel will be implemented to allow real-time corrective actions to be implemented if changes in water quality are detected;
- Pre-construction sediment quality assessments will be conducted to determine where dredged material should be properly disposed and to ensure that dredging will not increase the concentration of contaminants
- Dredge operation criteria (e.g. propeller speed, movement of draghead and/or cutterhead, no overflow of hopper in contaminated sediment areas) will be developed and implemented to minimize resuspension of sediments. The dredging operation criteria would be linked to the water quality monitoring program criteria (i.e. when exceedences are observed, more restrictive resuspension control measures will be implemented)
In conjunction with the dredging management and water quality monitoring programs, silt curtains and other turbidity control measures will be implemented to minimize resuspension of sediments.

XI. AQUATIC RESOURCES

A. FISH

In the freshwater systems in the study area, there are no fish species particularly sensitive to temporary impacts due to noise or turbidity caused by construction activity. Therefore, construction should not affect populations of freshwater fish species. In addition, construction in the larger estuarine systems would be spread out over two to three years and would impact only a small percentage of the waterbody at any one time. Therefore, construction would not affect the migratory patterns of anadromous or marine fish species.

The hydrodynamic and sedimentation model results predicted that the spatial change in instantaneous surface and bottom currents is quite small and limited to a few highly local changes in current speed and/or direction (i.e. Candidate Build Alternative 9 bridge tunnels). In addition, the only organized change in flow patterns noted was a small, eddy like feature appearing in the surface current near Newport News channel. It is not unusual to see organized fields of motion (eddies) developing in residual currents over Hampton Flats during times of maximum stratification.

In addition to the predicted small spatial changes in instantaneous surface and bottom currents, the hydrodynamic model predicted no longitudinal change in the limit of salt intrusion in the James River. The model did show that in the vicinity of the bridge pilings for Candidate Build Alternatives 2 and 9 surface salinity increased and bottom salinity decreased as a result of turbulent-induced mixing as expected with most intense mixing occurring during spring tides and least occurring during neap tides.

In addition, some variation of the position of the salt water front interface in the James River (near Newport News Point) and the distribution of the low salinity surface water was predicted; however, no changes in the salinity field with depth were observed. Although the model did predict some variation of the position of the salt water front interface, this slight change in the longitudinal extent of salt intrusion is also largely dependent upon the seasonal flux of freshwater entering Hampton Flats from the James River, Elizabeth River, and Nansemond River. In essence, the longitudinal variation of the position of the salt water front interface is a natural occurrence within this large estuarine system and thus freshwater, marine, and anadromous fish species will not be negatively impacted by the
B  SUBMERGED AQUATIC VEGETATION (SAV)

There are no SAV beds located within the actual footprint of the Candidate Build Alternatives (see Figure 3-9 in Chapter 3). During the construction phase and especially during the dredging and filling activities, local and temporary siltation and turbidity may reduce the photic zone in areas of SAVs. However, based on the information obtained during the I-664 monitoring program, the impacts will be near field and will be minimized by the constant mixing of water through wind and tidal action. In addition, the presence of SAVs is limited to the northern portions of the Hampton Roads estuary. Bottom sediment distribution were plotted by Nichols et al. (1991) and the northern portions of the estuary had coarser sandy bottom sediments, which are less conducive to generating turbidity impacts during the dredging process. Monitoring of near-field and far-field turbidity during the construction phase is recommended to identify activities that require additional mitigation such as silt screens and cessation of activities.

The sedimentation model results predicted only minor changes in sedimentation patterns and rates within Hampton Flats. Increased sedimentation potential was predicted to occur along the south shore of the James River with little increased sedimentation potential on the north shore. Submerged aquatic vegetation (SAV) beds are limited to the northern portions of the Hampton Flats (Figure 3-9 DEIS) which are outside of the predicted areas of increased sedimentation potential; therefore, there is no evidence that there will be a biological impact on SAVs within this estuary.

To further minimize any disturbances during construction due to an increase in turbidity levels strict erosion control measures will be employed to minimize water quality impacts due to sedimentation and turbidity during construction.

C.  BENTHOS

Shen et al. (1999) conducted a series of model experiments, using the Hydrodynamic Eutrophication Model (HEM-3D), to simulate the observed frontal development and eddy evolution in the lower James River near Newport News Point. Generally, frontal development in this area provides a linkage between shoal surface water and channel bottom water, producing a strong net upriver bottom transport (Kuo et al., 1990). The results of the Shen et al. (1999) study indicate that circulation, in combination with the frontal evolution developed near Newport News Point, plays a significant role in
larval transport (Byrne et al., 1987). These results show that eddy-induced horizontal circulation and vertical transport associated with the frontal system are important mechanisms which promote the retention of larval organisms in the James River.

The Hydrodynamic & Sedimentation Modeling results determined that the spatial change in instantaneous surface and bottom currents is quite small and limited to a few highly local changes in current speed and/or direction. The only organized change in flow patterns noted was a small, eddy-like feature appearing in the surface current near Newport News channel. It is not unusual to see organized fields of motion (eddies) developing in residual currents over Hampton Flats during times of maximum stratification which is in agreement with Shen et al. (1999). Based on the model findings and additional research presented, there is no evidence that the construction of structures associated with any of the Candidate Build Alternatives will disrupt existing larval dispersion patterns within Hampton Flats.

Proposed dredging and fill activity would have both temporary and permanent impacts to the existing benthic populations within the designated dredge areas. However, the benthic macroinvertebrate community present, which includes both opportunistic and equilibrium species, is expected to promote recolonization by opportunistic species. Table 4-30 gives the estimated areal extent of benthic habitat removed in hectares during the dredging and filling activities for each of the alternatives. Note that approximately nine percent more habitat is lost in construction of the steel tunnel versus the concrete tunnel.

Impacts would be temporary at locations of tunnel construction because sediments settle after construction and the tunnel areas will once again regain natural habitat for benthic species. Research conducted in the Chesapeake Bay region shows that displaced benthic populations recolonize and reestablish within a few months to a year and a half (Nichols et. al., 1990). Recolonization would be expected to follow a similar pattern in the Hampton Roads following construction. Table 4-30 assumes a similar density of benthic population within each of the alternatives, and it also assumes a similar quality of habitat. Benthic populations living in areas within the Elizabeth River corridor would be expected to have a lower quality of habitat and lower density of benthic population due to the presence of higher levels of contaminants in the sediments. However, after filling activities for the tunnel(s), a higher quality of habitat would be available for recolonization by opportunistic species present within the Hampton Roads estuary system.
## TABLE 4-30

**BENTHIC HABITAT IMPACT AND CREATION**

<table>
<thead>
<tr>
<th>CBA²</th>
<th>Island and Tunnel Location</th>
<th>Benthic Habitat Impacted</th>
<th>Habitat Created by Armor Stone³,⁴</th>
<th>Net Habitat Impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Hectares</td>
<td>Acres</td>
<td>Hectares</td>
</tr>
<tr>
<td>CBA 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete Tunnel</td>
<td>Hampton Roads Islands</td>
<td>12</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Hampton Roads Tunnel</td>
<td>17</td>
<td>42</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>72</strong></td>
<td><strong>30</strong></td>
</tr>
<tr>
<td>Steel Tunnel</td>
<td>Hampton Roads Islands</td>
<td>12</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Hampton Roads Tunnel</td>
<td>20</td>
<td>49</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>32</strong></td>
<td><strong>79</strong></td>
<td><strong>34</strong></td>
</tr>
<tr>
<td>CBA 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete Tunnel</td>
<td>Hampton Roads Islands</td>
<td>12</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Hampton Roads Tunnel</td>
<td>17</td>
<td>42</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Elizabeth River Island</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Elizabeth River Tunnel</td>
<td>15</td>
<td>37</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>124</strong></td>
<td><strong>49</strong></td>
</tr>
<tr>
<td>Steel Tunnel</td>
<td>Hampton Roads Islands</td>
<td>12</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Hampton Roads Tunnel</td>
<td>20</td>
<td>49</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Elizabeth River Island</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Elizabeth River Tunnel</td>
<td>17</td>
<td>42</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>136</strong></td>
<td><strong>56</strong></td>
</tr>
<tr>
<td>CBA 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete Tunnel</td>
<td>Hampton Roads Islands</td>
<td>14</td>
<td>35</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Hampton Roads Tunnel</td>
<td>9</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Elizabeth River Island</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Elizabeth River Tunnel</td>
<td>18</td>
<td>44</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>47</strong></td>
<td><strong>116</strong></td>
<td><strong>44</strong></td>
</tr>
<tr>
<td>Steel Tunnel</td>
<td>Hampton Roads Islands</td>
<td>14</td>
<td>35</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Hampton Roads Tunnel</td>
<td>11</td>
<td>27</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Elizabeth River Island</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Elizabeth River Tunnel</td>
<td>20</td>
<td>49</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
<td><strong>126</strong></td>
<td><strong>49</strong></td>
</tr>
</tbody>
</table>

1. Habitat impact and creation estimates are rounded to the nearest hectare/acre
2. The No-Build is defined as the 2018 regional transportation plan. Projects included in the plan do not include a crossing of Hampton Roads.
3. All armor stone quantities represent surface areas of armor stone below water level (elev. = 0)
4. Tunnel estimates include armor stone as well as reestablished substrate
Material placement for the construction of portal islands will result in permanent impacts to benthic organisms, through burial and mortality. However, this adverse impact would be at least partially compensated for by creation of new hard substrate benthic and epifaunal habitat. By adding a complex vertical dimension to a uniformly horizontal environment, additional habitat will be created allowing for species diversity as that associated with the artificial islands of the Monitor Merrimac Memorial Bridge Tunnel and the Chesapeake Bay Bridge Tunnel. Table 4-30 provides the estimated areal extent of new habitat created by the island and tunnel armor stone. In addition to the tunnel armor stone, the estimate for habitat area created by the tunnels includes the sediments which will settle after construction and reestablish as natural habitat for benthic species.

Several assumptions were incorporated in order to approximate armor stone surface area. Armor stone was classified as a Type III dry riprap with the gradation shown in VDOT’s Road and Bridge Specifications. A unit weight of 165 pound/cubic foot was assumed for riprap which corresponds with Soil Conservation Service guidelines. The armor stone size ranged from 0.48 to 0.71 meters (1.57 to 2.33 feet) by using the Isbash Curve. A detail was developed for VDOT Type III riprap using regular diameter stone for a typical 10 meter horizontal tunnel section. A revised length of approximately 12.95 meters (42.48 feet) for armor stone was calculated by measuring the surface circumference of the exposed stone surfaces, which results in a 29.5 percent increase in length. Because actual stone used for the proposed tunnels and islands will be irregular shaped to provide an interlocking action between stones, the actual surface area will be larger than the assumed surface area of the regular diameter stones assumed in the calculation. Therefore, a general linear increase of 30 percent was assumed to develop surface area estimates for the three Candidate Build Alternatives. In addition, the vertical height of submerged armor stone on the islands was adjusted for correct slope length.

Thimble Shoal Channel is proposed as a potential resource for fill material for the Hampton Roads tunnels and islands. Rule (1986) investigated the environmental consequences of dredging the eastern portion of Thimble Shoal Channel. The main environmental concern associated with the dredging was elimination of benthic populations and loss of benthic habitat within the dredge zone. The benthic community found in the channel area include opportunistic species as well as equilibrium species. The recovery rate of benthic populations in dredge zones can occur rapidly (one to two months) when species having rapid colonization rates, as are present within the Thimble Shoal Channel area. In addition, the species present have a broad sediment preference. The Thimble Shoal Channel receives relatively strong tidal currents and is well flushed (Rule, 1986) and maintain a static hydrological condition. These conditions are not expected to change due to use of the channel as a borrow source.
area. Therefore, the potential impacts of elimination of benthic populations within the dredge zone is negligible and the changes in hydrological conditions are minimal.

1. **Hardshell Clam**

Shellfish loss would be most evident for the hardshell clam. Table 4-31 presents the estimated number of clams that would be lost for each Candidate Build Alternative based on the range of clam densities found within the alternative corridors and the difference in concrete tube tunnel construction versus steel tube tunnel construction. Note that approximately nine percent more clams are lost in construction of the steel tube tunnel versus the concrete tube tunnel.

**TABLE 4-31**

<table>
<thead>
<tr>
<th>Candidate Build Alternative</th>
<th>Concrete Tube Tunnel</th>
<th>Steel Tube Tunnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>717,000 – 1,076,000</td>
<td>785,000 – 1,178,000</td>
</tr>
<tr>
<td>2</td>
<td>717,000 – 1,103,000</td>
<td>785,000 – 1,206,000</td>
</tr>
<tr>
<td>9</td>
<td>137,000 – 435,000</td>
<td>148,000 – 473,000</td>
</tr>
</tbody>
</table>

The total clams eliminated as a potential resource is only a fraction of the total clams available for commercial fishing in the Hampton Roads estuary. The worst-case numbers in Table 4-31 represent approximately one percent of the known densities mapped by VMRC (see Figure 3-10 in Chapter 3). In addition, clam populations will likely become reestablished following construction. Two clam broodstock management areas (the James River and Middle Ground Light Broodstock Management Areas) are in close proximity to the project area. During the construction phase and especially during the dredging and filling activities, local and temporary siltation and turbidity may impact these areas. However, based on the information obtained during the I-664 monitoring program, the impacts will be near field and will be minimized by the constant mixing of water through wind and tidal action. Monitoring of near-field and far-field turbidity during the construction phase is recommended to identify activities that require additional mitigation such as silt screens and cessation of activities.

Candidate Build Alternative 9 will cross a portion of the Newport News Shellfish Management Area, a public clamming ground. The patent tong season for this area runs from December 1 through March 15. Clammers will be given prior notice to any planned dredging in order to permit them to work the area first.
2. Blue Crab

The blue crab (Callinectes sapidus) uses a variety of habitats throughout the year within the Hampton Roads. There would be no direct impacts to blue crabs associated with the No-Build. Blue crab spawning and early development will not be affected by any of the Candidate Build Alternatives because these activities take place outside of the Hampton Roads. Dredging for the bridges and tunnels would have little affect on blue crab during the summer when crabs are moving through the Hampton Roads because blue crabs are a mobile species. During winter, dredging could have an impact on the small number of male blue crabs that use the bottom areas in the Hampton Roads for hibernation. Turbidity associated with dredging is unlikely to affect blue crabs because they encounter natural turbidity throughout the Hampton Roads. The area off of Craney Island and the mouth of the Elizabeth River is a blue crab pot and peeler pot location in the spring and summer months, and any dredging during that time will result in the displacement of watermen’s pots (VMRC, 1999).

D. OTHER FLORA AND FAUNA

Temporary local short-term impacts to phytoplankton, macro-algae, and zooplankton in the immediate vicinity of the Candidate Build Alternatives may occur due to increases in turbidity. However, these impacts will not have an adverse effect on the overall function of the ecosystem (Herbich, 1992). Submerged portions of the portal islands and bridge pilings would provide attachment sites for macro-algae, which could be expected to colonize these structures.

E. MITIGATION

Oyster reef establishment or restoration could serve as mitigation for the bottom habitat impacts associated with the construction of a new crossing of Hampton Roads. Coordination with the appropriate agencies to determine mitigation measures will occur. Mitigation for hard shell clams could include reseeding the area. Specifics on the quantity, size, and placement of seed clams will be determined through consultation with the appropriate agencies. In addition, local clammers will be given sufficient opportunity to harvest the project area prior to commencement of construction. The mitigation measures listed in the Water Quality section could also be implemented to avoid or reduce impacts to aquatic resources.

XII. FLOODPLAINS

The protection of floodplains and floodways is required by Executive Order 11988 (Floodplain Management) and is implemented through 23 CFR 650 (Location and Hydraulic Design of
Encroachments on Floodplains). The intent of these regulations is to avoid or minimize highway encroachments within the 100-year (base) floodplains, where practicable, and to avoid supporting land use development which is incompatible with floodplain values. The 100-year floodplain refers to an area adjacent to a body of water that is capable of storing or conveying flood waters during a 100-year frequency storm event.

Designated 100-year floodplains were identified based on FEMA Flood Insurance Rate Maps of Hampton, Newport News, Chesapeake, Suffolk, Portsmouth, and Norfolk. The No-Build is defined as the Hampton Roads 2018 regional transportation plan. Projects included in the plan may impact floodplains. Each of the Candidate Build Alternatives will cross 100-year floodplain areas as identified in the Flood Insurance Rate Maps.

Construction of a Candidate Build Alternative will increase the amount of impervious surface areas within the study area, thereby increasing stormwater runoff. However, the amount of impervious surface area (roadway surface) will be very small in relation to the overall drainage areas. Increases in backwater surface elevation and velocities at floodplain encroachments will be minimal. Any impacts to natural and beneficial floodplain values associated with the project will be negligible.

During the final design phase of the Preferred Alternative, a detailed Location Hydraulic Study will be performed in accordance with 23 CFR 650. The study will determine if the 100-year base flood elevations will increase due to the construction of the new facility within the floodplain. The detailed hydraulic analysis will demonstrate that adequate measures will have been taken to ensure that any floodplain encroachments will not increase the risk of flooding to adjacent properties and comply with all federal, state, and local floodplain regulations (44 CFR Part 60.3, Floodplain management criteria for flood prone areas, and Part 65.12, Revision of flood insurance rate maps to reflect base flood elevations caused by proposed encroachments).

XIII. WETLANDS

A. METHODOLOGY

Wetlands are defined in 33 CFR Part 328 as “…those areas that are inundated or saturated by surface or ground water 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.” Wetlands were identified using the guidance of the 1987 Corps of Engineers Wetland Delineation
Manual. Field investigations were conducted to identify and map all wetlands within the Candidate Build Alternatives. The wetland boundaries were classified in accordance with the USFWS’s *Classification of Wetlands and Deepwater Habitats of the United States.*

For each wetland identified, a wetland delineation data form was completed. Functional assessments were conducted for all wetlands identified. Secondary sources of information were used to provide background information on wetlands in the study area. These sources include USGS 7.5-minute topographic quadrangles, National Wetland Inventory maps, aerial photography, and county soil surveys. Coordination with the Corps of Engineers was conducted.

To minimize impacts to wetlands, each of the Candidate Build Alternatives incorporates existing interstate facilities. Candidate Build Alternatives 1 and 2 incorporate the existing I-64 right-of-way in Norfolk and Hampton. Candidate Build Alternative 9 incorporates the existing I-664 right-of-way in Hampton, Newport News, Suffolk, and Chesapeake. In Norfolk, Candidate Build Alternatives 2 and 9 incorporate the existing I-564 right-of-way and an existing railroad corridor.

The connection to VA 164 in Portsmouth, which is included in Candidate Build Alternatives 2 and 9, would be located on a new alignment. Some redesign of the conceptual engineering for this connection was conducted in the DEIS stage to avoid wetland impacts. For example, the Candidate Build Alternatives originally connected to VA 164 near Coast Guard Boulevard. However, after conducting the wetland fieldwork, it was determined that 8.3 hectares (20.4 acres) of wetlands were impacted in this area. Thus, another connection further to the east on VA 164 was selected, reducing the wetland impacts in this area by 6.8 hectares (17 acres). Additional redesign of the VA 164 connection for the FEIS has further reduced these impacts (see discussion in impacts section).

### B. FUNCTIONS AND VALUES ASSESSMENT

Wetlands provide a wide range of functions that are considered a valuable resource to society. Wetland functions are the physical, chemical, and biological attributes of a wetland. The values of a wetland are its processes or attributes that are considered valuable to society.

An analysis was performed to determine the effects on the functions and values of the wetlands potentially being impacted by the proposed project. The following functions and values were evaluated for each of the freshwater wetlands: ground water recharge/discharge, floodflow alteration, sediment stabilization, sediment/toxicant/nutrient retention, production export, wildlife
diversity/abundance, aquatic diversity/abundance, and recreation and uniqueness/heritage. The Estuarine wetlands were not evaluated for ground water recharge/discharge and floodflow alteration, due to differences in the hydrological functions they provide.

Ratings assigned to the wetlands functions and values are based on the concepts from Wetland Evaluation Technique (WET 2.0) model (Adamus et. al., 1987). WET 2.0 assigns a qualitative probability rating to each modeled function and value based on the characteristics of the physical, chemical, and biological attributes of wetlands and its surroundings, i.e. landscape positioning and regional importance. These characteristics directly or indirectly measure these processes or attributes of a wetland. The estimate of likelihood is given in three qualitative probability levels: high, moderate, or low. Field indicators of functional capacity were the basis for assessing the wetland functions and values using best professional judgement. The results, based on the wetlands capacity to provide that function, are shown in Table 4-32.

Field data sheets were developed prior to field reconnaissance to provide a more consistent and justifiable assessment. For each function, three to four characteristics contributing to the ability of the wetland to provide that function were identified from the WET 2.0 model. For each characteristic, factors that would provide high, moderate and low levels of the corresponding function were identified. Best professional judgement was used to ascertain the overall likelihood for a wetland to perform that particular function. Table 4-33 identifies the determining factors necessary to achieve a high likelihood for each function assessed.

In conclusion, a brief description of the results for the functions and values evaluated are listed below. Because probability ratings assigned by WET 2.0 do not measure magnitude, this evaluation was not used to estimate an overall probability rating for each assessed wetland, nor provide a statistical basis to quantify wetland functions and values. The overall quality rating for each wetland was assessed to be the magnitude at which individual wetland functions and values may perform with respect to the functions and values defined in the WET 2.0 model.

a. Palustrine Wetlands

♦ Ground Water Recharge/Discharge - There were no wetlands rated high due to a lack of springs and seeps. The wetlands were rated low because they were isolated or did not exhibit signs of groundwater recharge. Wetland 9-3 was given a moderate rating because of its location within a floodplain.
### TABLE 4-32
FUNCTIONS AND VALUES ASSESSMENT

<table>
<thead>
<tr>
<th>Wetland ID</th>
<th>Classification*</th>
<th>Impact (Encroach = Direct; Bridge = Indirect)</th>
<th>Ground Water Recharge/Discharge</th>
<th>Floodflow Alteration</th>
<th>Sediment Stabilization</th>
<th>Sediment/Toxicant/Nutrient Retention</th>
<th>Production Export</th>
<th>Wildlife Diversity/Abundance</th>
<th>Aquatic Diversity/Abundance</th>
<th>Recreation and Uniqueness/Heritage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candidate Build Alternatives 1 and 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-1</td>
<td>E2EM1P</td>
<td>Bridge</td>
<td>--</td>
<td>--</td>
<td>High</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
</tr>
<tr>
<td>2-1</td>
<td>PEM1E</td>
<td>Bridge</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Mod.</td>
<td>Low</td>
<td>Low</td>
<td>Mod.</td>
<td>Low</td>
</tr>
<tr>
<td>2-3</td>
<td>E2EM1N</td>
<td>Encroach</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
</tr>
<tr>
<td>2-4</td>
<td>E2EM</td>
<td>Bridge</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
</tr>
<tr>
<td>2-7</td>
<td>E2EM</td>
<td>Bridge</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
</tr>
<tr>
<td>3-1</td>
<td>E2EM</td>
<td>Bridge</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
</tr>
<tr>
<td>3-2</td>
<td>E2EM1N</td>
<td>Encroach</td>
<td>--</td>
<td>--</td>
<td>High</td>
<td>High</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>High</td>
</tr>
<tr>
<td>4-1</td>
<td>E2EM1P</td>
<td>Bridge</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>4-3</td>
<td>E2EM1P</td>
<td>8/10 Bridged</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>4-4</td>
<td>E2EM</td>
<td>Bridge</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>4-5</td>
<td>E2EM</td>
<td>Bridge</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>4-6</td>
<td>E2EM</td>
<td>Bridge</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Candidate Build Alternatives 2 and 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-1</td>
<td>PEM1A</td>
<td>Encroach</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>5-4</td>
<td>E2EM1N</td>
<td>Encroach</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>5-5</td>
<td>E2EM1N</td>
<td>Encroach</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>5-6</td>
<td>E2EM1N</td>
<td>Encroach</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>5-7</td>
<td>E2EM1P</td>
<td>Encroach</td>
<td>--</td>
<td>--</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>5-8</td>
<td>E2SB2K/Nx</td>
<td>Encroach</td>
<td>--</td>
<td>--</td>
<td>Low</td>
<td>Low</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Classification -
E2EM1P = Estuarine intertidal irregularly flooded persistent emergent wetland  
PEM1E = Palustrine seasonally saturated persistent emergent wetland  
2EM1N = Estuarine intertidal regularly flooded persistent emergent wetland  
PSS1A = Palustrine temporarily flooded broad leaved deciduous scrub-shrub wetland  
PFO1A = Palustrine temporarily flooded broad leaved deciduous forested wetland  
PFO1/4E = Palustrine seasonally saturated broad leaved deciduous/needle leaved evergreen forested wetland  
PSS1/5A = Palustrine temporarily flooded broad leaved deciduous/dead scrub-shrub wetland  
E2RB2K/Nx = Estuarine intertidal regularly flooded artificial (excavated) rock bottom canal wetland

*Note: Wetlands 7-2 (PFO), 7-3 (PFO), 7-6 (PFO), and 7-7 (E2EM) were previously delineated and approved by the Corps. Additional data were not collected.
### TABLE 4-32 (Continued)

**FUNCTIONS AND VALUES ASSESSMENT**

<table>
<thead>
<tr>
<th>Wetland ID</th>
<th>Classification*</th>
<th>Impact (Encroach = Direct; Bridge = Indirect)</th>
<th>Ground Water Recharge/ Discharge</th>
<th>Floodflow Alteration</th>
<th>Sediment Stabilization</th>
<th>Sediment/ Toxicant/ Nutrient Retention</th>
<th>Production Export</th>
<th>Wildlife Diversity/ Abundance</th>
<th>Aquatic Diversity/ Abundance</th>
<th>Recreation and Uniqueness/ Heritage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-9 PEM1E</td>
<td>Encroach Low Low Mod. Mod. Mod. Low Low Low</td>
<td><strong>Candidate Build Alternative 9</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-2 PEM1A</td>
<td>Bridge Low Low Mod. Mod. Mod. Low Low Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-4 E2EM1N</td>
<td>Bridge -- -- High High High Mod. Mod. Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-5 E2EM1N</td>
<td>Bridge -- -- Mod. High High High Mod. Mod. Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-13 PEM2C</td>
<td>Encroach Low Low Low Low Low High/Mod. High/Mod. Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-2 PEM2E</td>
<td>Encroach Low Low Low Low Mod. Low Low Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-4 PSS1A</td>
<td>Encroach Low Mod. Mod. Mod. Low Mod. Low Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-5 PFO1A</td>
<td>Encroach Low Low Mod. Mod. Low Mod. Low Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-6 PFO1A/PEM1E</td>
<td>Encroach Low Low Mod. Mod. Low Mod. Low Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-7 PSS1A</td>
<td>Encroach Low Mod. High Mod. Mod. Low Low Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-8 PSS1A</td>
<td>Encroach Low Mod. Mod. Mod. Mod. Low Low Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-3 PFO1A</td>
<td>Encroach Mod. High High High Mod. High High Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-5 PFO1A</td>
<td>Encroach Low Low Mod. Mod. Mod. Low Low Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-6 PFO1A</td>
<td>Encroach Low Low Mod. Mod. Mod. Low Low Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-8 PFO1A</td>
<td>Encroach Mod. Mod. Mod. Mod. Mod. Low Mod. Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-1 E2EM</td>
<td>Bridge -- -- High Mod. High Mod. Mod. Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-1 E2EM1N</td>
<td>Bridge -- -- High Mod. High Mod. Mod. Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Classification -

E2EM1P = Estuarine intertidal irregularly flooded persistent emergent wetland  
PEM1E = Palustrine seasonally saturated persistent emergent wetland  
2EM1N = Estuarine intertidal regularly flooded persistent emergent wetland  
PSS1A = Palustrine temporarily flooded broad leaved deciduous scrub-shrub wetland  
PFO1A = Palustrine temporarily flooded broad leaved deciduous forested wetland  
PFO1/4E = Palustrine seasonally saturated broad leaved deciduous/needle leaved evergreen forested wetland  
PSS1/5A = Palustrine temporarily flooded broad leaved deciduous/dead scrub-shrub wetland  
E2RB2K/Ns = Estuarine intertidal regularly flooded artificial (excavated) rock bottom canal wetland

*Note: Wetlands 7-2 (PFO), 7-3 (PFO), 7-6 (PFO), and 7-7 (E2EM, PSS) were previously delineated and approved by the Corps. Additional data were not collected.
## TABLE 4-33
DETERMINING FACTORS TO ACHIEVE A HIGH RATING

<table>
<thead>
<tr>
<th>Freshwater Wetlands</th>
<th>Tidal Wetlands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Groundwater Discharge/Recharge</strong></td>
<td>Sediment Stabilization – Shoreline Anchoring</td>
</tr>
<tr>
<td>Seeps and springs abundant; Located with a floodplain; Water permanence; Suitable substrate for infiltration; Amount of wetland edge; Persistent vegetation</td>
<td>Gradual bank slope; Heavy persistent vegetation; No signs of erosion; Lack of fetch and boat wake</td>
</tr>
<tr>
<td><strong>Floodflow Alteration - Flood Storage</strong></td>
<td>Sediment/Toxicant/Nutrient Retention</td>
</tr>
<tr>
<td>Broad floodplain storage, abandon channels, and/or depressions; Frequently flooded; Shallow channel; evidence of overbank flooding; Heavy woody vegetation</td>
<td>Heavy persistent vegetation (woody and herb); Located near source of sediment and toxicants; No sign of erosion or pollution; Size of wetland in relations to water volume; Long detention time; Sheet Flow (vs Channel flow); Shallow water depth (&lt;2 feet)</td>
</tr>
<tr>
<td><strong>Sediment Stabilization</strong></td>
<td>Production Export – Food Chain Support</td>
</tr>
<tr>
<td>Heavy persistent vegetation; Slow water velocities; No signs of erosion; Lack of fetch</td>
<td>Dense submergent vegetation; Long detention time; Detritous export unrestricted</td>
</tr>
<tr>
<td><strong>Sediment/Toxicant/Nutrient Retention</strong></td>
<td>Wildlife Diversity And Abundance</td>
</tr>
<tr>
<td>Heavy persistent vegetation (woody and herb); Located near source of sediment and toxicants; No sign of erosion or pollution; Size of wetland in relations to water volume; Long detention time; Sheet flow (vs Channel flow) Shallow water depth (&lt;2 feet)</td>
<td>Visual observations of wildlife; Adjacent to tidal flats, channels, and forests; Saltgrass and/or Saltbush communities present; Invasive and nuisance species not present</td>
</tr>
<tr>
<td><strong>Production Export – Food Chain Support</strong></td>
<td>Aquatic Diversity and Abundance</td>
</tr>
<tr>
<td>Dense submergent vegetation; Long hydroperiod; High primary productivity; Detritous export unrestricted</td>
<td>Visual observations of aquatic life; Tidal creeks, channels, and depressions present; High plant diversity and interspersion; No signs of disturbance or pollution</td>
</tr>
<tr>
<td><strong>Wildlife Diversity And Abundance</strong></td>
<td>Recreation and Uniqueness/Heritage</td>
</tr>
<tr>
<td>Visual observations of wildlife; High plant diversity and interspersion; Multiple strata; Low human disturbance; Surrounding landscape forested</td>
<td>Ecological rare wetland type for region; Public or private conservation area; Research or educational facility; Public park (trails, boardwalks, etc.); Hunting and/or fishing opportunities available</td>
</tr>
<tr>
<td><strong>Aquatic Diversity and Abundance</strong></td>
<td></td>
</tr>
<tr>
<td>Visual observations of aquatic life; Permanent open water (fish habitat) Seasonal ponding (amphibian habitat) High plant diversity and interspersion Low human disturbance; No sign of pollution Landscape undeveloped</td>
<td></td>
</tr>
<tr>
<td><strong>Recreation and Uniqueness/Heritage</strong></td>
<td></td>
</tr>
<tr>
<td>Ecological rare wetland type for region; Public or private conservation area; Research or educational facility; Public park (trails, boardwalks, etc.); Hunting and/or fishing opportunities</td>
<td></td>
</tr>
</tbody>
</table>
♦ **Floodflow Alternation/Flood Storage** - High ratings were assigned to the wetlands on defined floodplains adjacent to streams with dense vegetation. Wetland 8-4, located at the headwaters, was rated moderate due to reduced flood volumes and durations. Small isolated wetlands were rated low.

♦ **Sediment Stabilization** - High Ratings were given to wetlands with dense vegetation subjected to moderate surface flooding. Moderate ratings were given to wetlands with limited flooding and short retention times. A low rating for isolated, non-persistent or denuded wetlands, including small depressional wetlands or ponds not subjected to provide stabilization.

♦ **Sediment/Toxicant/Nutrient Retention** – Wetlands with high ratings was assigned to those wetlands with dense vegetation subjected to surface flooding, particularly if retention was enhanced by constricted outlet. Moderate ratings were due to the wetland location in the watershed and limited flooding and short retention times. Rated low for isolated, non-persistent or denuded wetlands.

♦ **Production Export/Food Chain Support** – One wetland was rated high due to dense herbaceous vegetation with unrestricted outlet to the stream. Moderate ratings were given to wetlands primarily due to sparse emergent vegetation. Isolated wetlands dominated by woody vegetation with no outlet were rated low.

♦ **Wildlife Diversity/Abundance** - Large wetland systems located adjacent to undeveloped land or other wetlands received a high rating. Sparsely vegetated wetlands, bordered by unfavorable habitat types were rated moderate. Low ratings were given to wetlands invaded by common reed, sprayed with herbicides, and surrounded by developed land.

♦ **Aquatic Diversity/Abundance** - High ratings given to wetlands with a permanent source of open water and/or visual observations of aquatic life. Wetland 2-1, processes permanent open water but due to its uniform water depth and location next to an existing highway corridor, was assigned a moderate likelihood. Most wetlands were rated low due to a lack of open water, pollution, and invasion by common reed and habitat degradation due to their proximity to developed land.

♦ **Recreation and Uniqueness/Heritage** - All of the wetlands were rated low because none of the wetlands were an ecologically rare wetland type, conservation areas or other special areas. They were located on highway right-of-way or other areas with restricted access, and not developed as a public recreational area.

b. **Estuarine Tidal Wetlands**

♦ **Sediment Stabilization/Shoreline Anchoring** - Regularly flooded saltmarshes along tidal creeks were rated high. Moderate where common reed dominated and/or flooding is irregular. Wetlands 5-8 and 6-1 received the only low ratings due to its vertical concrete walls and steep eroded banks, respectively.

♦ **Sediment/Toxicant/Nutrient Retention** - High ratings given to regularly flooded saltmarshes and moderate ratings for irregularly flooded marshes or those dominated by common reed. A low rating was assigned to Wetland 5-8 due to this manmade canal being constructed of concrete.

♦ **Production Export/Food Chain Support** – High ratings were assigned to most of the regularly flooded saltmarshes with unrestricted connections to tidal creeks. Rated moderate when a culvert
or other constriction reduced export of organic material or when the wetland was dominated by common reed. None of the tidal wetlands received a low probability rating.

♦ **Wildlife Diversity/Abundance** - Regularly flooded tidal wetlands are typically rated high. However, due to pollution and habitat degradation due to urban or other built up land use, these wetlands received only moderate ratings. The irregularly flooded wetlands that have been invaded by common reed were rated low.

♦ **Aquatic Diversity/Abundance** - Irregularly flooded wetlands were rated low because of a lack of permanent water. The regularly flooded wetlands provide aquatic habitat, but were rated only moderate due to pollution and habitat degradation due to invasive species and being located in an urban setting.

♦ **Recreation and Uniqueness/Heritage** - All of the tidal wetlands were rated low except for Wetland 3-2 which is a publicly owned educational and habitat restoration site. None of the wetlands were an ecologically rare wetland type for the region.

**C. WETLAND IMPACTS**

1. **No-Build Alternative**

   The No-Build is defined as the Hampton Roads 2018 regional transportation plan. Projects included in the plan may impact wetlands.

2. **Candidate Build Alternatives**

   Table 4-34 provides a summary of total wetland impacts, and Table 4-35 lists impacts by individual wetland. The location of wetlands within each of the Candidate Build are shown in Figures 4-15 through 4-26. Placement of fill in a wetland is considered an encroachment and is considered a permanent wetland impact. Construction of a bridge over a wetland would generally avoid permanent impacts to wetlands although there could be minimal permanent impacts and also some temporary impacts during construction. The location of the piers will be determined during final design. Shading could occur as an indirect effect of bridging.

Indirect impacts to wetlands may result from road construction or long-term roadway operation. These indirect impacts can affect wetlands by changing the vegetation community, erosion and sediment deposition, or altering water regimes and water quality. However, new highway construction in Virginia must include stormwater management systems. Such systems would prevent sediment and pollutants from reaching wetlands by improving the water quality of runoff from most storms during the year (2-year storm events or less).
### TABLE 4-34
**SUMMARY OF WETLAND IMPACTS**

<table>
<thead>
<tr>
<th>Wetland Type</th>
<th>CBA 1</th>
<th>CBA 2</th>
<th>CBA 9</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct (Encroach)</td>
<td>Indirect (Bridged)</td>
<td>Direct (Encroach)</td>
</tr>
<tr>
<td>E2EM</td>
<td>0.36</td>
<td>0.59</td>
<td>1.69</td>
</tr>
<tr>
<td>Hectares</td>
<td>0.90</td>
<td>1.46</td>
<td>4.17</td>
</tr>
<tr>
<td>PEM</td>
<td>0.31</td>
<td>0.60</td>
<td>0.43</td>
</tr>
<tr>
<td>Hectares</td>
<td>0.76</td>
<td>1.49</td>
<td>1.06</td>
</tr>
<tr>
<td>PFO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hectares</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acres</td>
<td>1.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSS</td>
<td>0.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hectares</td>
<td>0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acres</td>
<td>0.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compensation Site</td>
<td>0.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hectares</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acres</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0.56</td>
<td>0.90</td>
<td>3.38</td>
</tr>
<tr>
<td>Hectares</td>
<td>1.40</td>
<td>2.22</td>
<td>8.40</td>
</tr>
<tr>
<td>Acres</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. The No-Build is defined as the 2018 regional transportation plan. Projects included in the plan may impact wetlands.

### TABLE 4-35
**WETLAND INVENTORY**

<table>
<thead>
<tr>
<th>CBA</th>
<th>WETLAND TYPE</th>
<th>ID Number</th>
<th>Type of Impact</th>
<th>Area Impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>E2EM</td>
<td>1-1</td>
<td>Direct (Encroach)</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-3</td>
<td>Direct (Encroach)</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-4</td>
<td>Indirect (Bridged)</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-7</td>
<td>Indirect (Bridged)</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-1</td>
<td>Indirect (Bridged)</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-2</td>
<td>Direct (Encroach)</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-1</td>
<td>Indirect (Bridged)</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-3</td>
<td>8/10 Bridged; 2/10 Encroach</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-4</td>
<td>Indirect (Bridged)</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-5</td>
<td>Indirect (Bridged)</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-6</td>
<td>Indirect (Bridged)</td>
<td>0.03</td>
</tr>
</tbody>
</table>
### TABLE 4-35
**WETLAND INVENTORY (Continued)**

<table>
<thead>
<tr>
<th>CBA</th>
<th>WETLAND TYPE</th>
<th>ID Number</th>
<th>Type of Impact</th>
<th>Area Impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hectares</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Acres</td>
</tr>
<tr>
<td>2 and 9</td>
<td>E2EM</td>
<td>5-4*</td>
<td>Direct (Encroach)</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-5*</td>
<td>Direct (Encroach)</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-6*</td>
<td>Direct (Encroach)</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-7</td>
<td>Direct (Encroach)</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6-4</td>
<td>Indirect (Bridged)</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6-5</td>
<td>Indirect (Bridged)</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7-7</td>
<td>Indirect (Bridged)</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.21</td>
</tr>
<tr>
<td>9</td>
<td>E2EM</td>
<td>1-1</td>
<td>Indirect (Bridged)</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-1</td>
<td>Indirect (Bridged)</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11-1</td>
<td>Indirect (Bridged)</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.21</td>
</tr>
<tr>
<td>1 and 2</td>
<td>PEM</td>
<td>2-1</td>
<td>Indirect (Bridged)</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-2</td>
<td>Indirect (Bridged)</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.20</td>
</tr>
<tr>
<td>2 and 9</td>
<td>PEM</td>
<td>5-1</td>
<td>Direct (Encroach)</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-9</td>
<td>Direct (Encroach)</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6-2</td>
<td>Indirect (Bridged)</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7-13</td>
<td>Direct (Encroach)</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td>9</td>
<td>PEM</td>
<td>8-2</td>
<td>Direct (Encroach)</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8-6</td>
<td>Direct (Encroach)</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.17</td>
</tr>
<tr>
<td>1 and 2</td>
<td>Compensation Site</td>
<td>2-5</td>
<td>Direct (Encroach)</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.50</td>
</tr>
<tr>
<td>2 and 9</td>
<td>PFO</td>
<td>7-2</td>
<td>Direct (Encroach)</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7-3</td>
<td>Direct (Encroach)</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7-6</td>
<td>Direct (Encroach)</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.60</td>
</tr>
<tr>
<td>9</td>
<td>PFO</td>
<td>8-5</td>
<td>Direct (Encroach)</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.74</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8-6</td>
<td>Direct (Encroach)</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9-3</td>
<td>Direct (Encroach)</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9-5</td>
<td>Direct (Encroach)</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9-6</td>
<td>Direct (Encroach)</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9-8</td>
<td>Direct (Encroach)</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.03</td>
</tr>
<tr>
<td>2 and 9</td>
<td>PSS</td>
<td>7-7</td>
<td>Indirect (Bridged)</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.40</td>
</tr>
<tr>
<td>9</td>
<td>PSS</td>
<td>8-4</td>
<td>Direct (Encroach)</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8-7</td>
<td>Direct (Encroach)</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8-8</td>
<td>Direct (Encroach)</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.14</td>
</tr>
<tr>
<td>2 and 9</td>
<td>E2RB</td>
<td>5-8*</td>
<td>Direct (Encroach)</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.39</td>
</tr>
</tbody>
</table>

* These wetlands will be included in the permit for the I-564 Intermodal connector project (see Chapter II).
FIGURE 4-15
INDEX MAP FOR FIGURES 4-16 THROUGH 4-26
A comparison of wetland encroachments among the three alternatives carried forward in the DEIS revealed that each of the three corridors contained wetlands. Because CBA 9 was determined (see Chapter II) to be the only alternative that fully met the project’s purpose and need, it is considered to be the only practicable alternative. The question then was what appropriate and practicable measures could be developed to minimize encroachments (e.g., design features, location of the alignment within the 1000’ wide preferred corridor). Development of such measures is consistent with 1990 EPA and Department of the Army’s MOA. Measures to avoid or minimize encroachment were analyzed as part of the FEIS process. The results of those efforts are detailed in Table 4-36 for each of Candidate Build Alternative 9’s segments and in the proposed project sequence of construction. An example of an avoidance measure was a slight alignment shift to the east in the VA 164 connection in Portsmouth. As a result of this and other avoidance and minimization efforts, direct wetland encroachment was reduced from the 18 acres reported in the DEIS to 11.3 acres. Additional avoidance and minimization measures will be considered during final design activities. It should also be noted that of the 11.3 acres directly impacted by Candidate Build Alternative 9, 3.4 acres will be included in the permit for the I-564 Intermodal connector project (see Chapter II).

The wetland encroachment acreage from Candidate Build Alternative 9 will not significantly degrade or lead to the further degradation of waterbodies in the project area. Wetland encroachments are generally limited to small wetlands with limited functions. Of the 11.3 acres of wetland encroachment (3.4 of which will be permitted for the I-564 Intermodal Connector project), many are encroachments on small (<0.6 acre), relatively low functioning, isolated wetlands. Large wetland systems present in the project area were avoided or the alignment was located to minimize encroachments. For example, wetland 9-6 is a large diverse PFO. While there is some unavoidable encroachment (0.38 acres), the encroachment was limited to the edge currently within VDOT I-664 right-of-way as opposed to deep within the system.

D. MITIGATION
Candidate Build Alternative 9, the Preferred Alternative, will be further developed in the design stage to avoid wetland encroachments and to minimize the potential harm to wetlands, as much as practicable. Avoidance and minimization measures could include minor alignment changes or use of a bridge rather than a culvert or placement of fill. Even after all impact avoidance and minimization measures are taken, impacts to wetlands which can not be practicably avoided will remain.
**TABLE 4-36**  
**AVOIDANCE AND MINIMIZATION TABLE BY SEGMENT**  
AND  
**PROPOSED SEGMENT CONSTRUCTION SEQUENCE**

Segment 1 – MMBT to Hampton Blvd/I-564

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/Value Analysis</th>
<th>Avoidance - Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-1</td>
<td>0.07</td>
<td>0.07</td>
<td>100%</td>
<td>Uniformly low</td>
<td>Lies under mainline approximately 200’ east of Elizabeth River tunnel entrance. Avoidance not possible due to geometric requirements of tunnel entrance</td>
<td>No minimization measures practicable for this “marginal” wetland</td>
</tr>
<tr>
<td>5-7</td>
<td>0.27</td>
<td>1.7</td>
<td>16%</td>
<td>Moderate to Low</td>
<td>Lies under exit ramp from mainline to “B” Avenue. Shift to east would encroach on large wetland S-3. Bridging not practicable for this small low functioning wetland on Navy base.</td>
<td>No minimization possible without compromising required design configuration of exit ramp.</td>
</tr>
<tr>
<td>5-9</td>
<td>1.41</td>
<td>1.41</td>
<td>100%</td>
<td>Low</td>
<td>Lies within proposed access ramps from mainline to Naval Stations “B” Avenue, a major dock route. Shifting ramps to west would encroach on athletic fields and other Navy facilities. Shifting to east would cause encroachment on Wetland 5-3 Bridging would require unacceptable grades on approach to mainline and “B” Avenue</td>
<td>“Tightening” curves of access ramps would not meet modern design standards</td>
</tr>
</tbody>
</table>
## Segment 1 – MMBT to Hampton Blvd/I-564 (Continued)

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/Value Analysis</th>
<th>Avoidance- Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-4</td>
<td>2.22</td>
<td>2.3</td>
<td>97%</td>
<td>Moderate to Low</td>
<td>Lies within proposed I-564 Intermodal Connector and impacts will be permitted for that project.</td>
<td></td>
</tr>
<tr>
<td>5-5</td>
<td>0.33</td>
<td>7.9</td>
<td>4%</td>
<td>Moderate to Low</td>
<td>Lies within proposed I-564 Intermodal Connector and impacts will be permitted for that project.</td>
<td></td>
</tr>
<tr>
<td>5-6</td>
<td>0.45</td>
<td>1.8</td>
<td>25%</td>
<td>Moderate to Low</td>
<td>Lies within proposed I-564 Intermodal Connector and impacts will be permitted for that project.</td>
<td></td>
</tr>
<tr>
<td>5-8</td>
<td>0.39</td>
<td>3</td>
<td>13%</td>
<td>Moderate to Low</td>
<td>Lies within proposed I-564 Intermodal Connector and impacts will be permitted for that project.</td>
<td></td>
</tr>
</tbody>
</table>

## Segment 2 – MMBT to Newport News

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/Value Analysis</th>
<th>Avoidance- Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>NONE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Segment 3 – VA 164 Connector

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/Value Analysis</th>
<th>Avoidance- Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-2</td>
<td>0.25</td>
<td>1.6</td>
<td>15%</td>
<td>Low</td>
<td>Encroachment due to fill slope. Avoidance not possible because of necessity of maintaining acceptable mainline curve on north</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>7-3</td>
<td>1</td>
<td>1.50</td>
<td>75%</td>
<td>Low</td>
<td>Shifting either east or west would shift into larger wetland systems.</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>7-6</td>
<td>0.60</td>
<td>87.5</td>
<td>0.6%</td>
<td>Moderate</td>
<td>Encroachment due to fill slope. Avoidance not possible because of necessity of maintaining acceptable mainline curve on north</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>7-13</td>
<td>.01</td>
<td>2.6</td>
<td>0.3%</td>
<td>Low</td>
<td>Encroachment due to fill slope. Avoidance not possible</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
</tbody>
</table>

### Segment 4 – Widen and Improve I-664 in Newport News

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/Value Analysis</th>
<th>Avoidance- Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland #</td>
<td>Encroachment (acres)</td>
<td>Total Wetland Size (ac)</td>
<td>% Encroach</td>
<td>Function/Value Analysis</td>
<td>Avoidance- Line Shift</td>
<td>Minimization Measures</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------</td>
<td>------------------------</td>
<td>------------</td>
<td>------------------------</td>
<td>----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>8-2</td>
<td>0.25</td>
<td>0.25</td>
<td>100%</td>
<td>Low</td>
<td>Located within new access ramp from S.R. 136 (College Dr.) onto mainline. Final design may be able to avoid encroachment</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>8-8</td>
<td>0.14</td>
<td>0.14</td>
<td>100%</td>
<td>Low</td>
<td>Located within new access ramp from S.R. 136 (College Dr.) onto mainline. Final design may be able to avoid encroachment</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>8-4</td>
<td>0.13</td>
<td>0.24</td>
<td>25%</td>
<td>Low</td>
<td>Located within new access ramp from S.R. 136 (College Dr.) onto mainline. Final design may be able to avoid encroachment</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>8-6</td>
<td>1.20</td>
<td>9.5</td>
<td>13%</td>
<td>Low</td>
<td>Linear encroachment approx 20’ wide to accommodate additional lane on southbound I-664. No avoidance possible</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>8-5</td>
<td>1.74</td>
<td>9.37</td>
<td>18%</td>
<td>Low</td>
<td>Linear encroachment of approx 20’ wide to accommodate additional lane on northbound I-664. No avoidance possible</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>9-5</td>
<td>0.37</td>
<td>9.6</td>
<td>4%</td>
<td>Low</td>
<td>Narrow linear encroachment approx. 20’ wide to accommodate additional lanes on southbound mainline. No avoidance possible</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>Wetland #</td>
<td>Encroachment (acres)</td>
<td>Total Wetland Size (ac)</td>
<td>% Encroach</td>
<td>Function/Value Analysis</td>
<td>Avoidance - Line Shift</td>
<td>Minimization Measures</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------</td>
<td>------------------------</td>
<td>------------</td>
<td>-------------------------</td>
<td>------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>8-7</td>
<td>0.04</td>
<td>0.04</td>
<td>100%</td>
<td>Moderate to Low</td>
<td>Located within new access ramp from S.R. 136 (College Dr.) onto mainline. Final design may be able to avoid encroachment</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>9-6</td>
<td>0.38</td>
<td>50+</td>
<td>&gt;1%</td>
<td>Low</td>
<td>Narrow linear encroachment approx. 20' wide to accommodate additional lanes on northbound mainline. No avoidance possible.</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>9-3</td>
<td>0.01</td>
<td>0.26</td>
<td>3%</td>
<td>Low</td>
<td>Fill slope and ramp from northbound mainline to S.R. 259 (Pughesville Rd). Design requirements preclude avoidance</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>9-8</td>
<td>0.03</td>
<td>6.25</td>
<td>0.48%</td>
<td>Moderate to Low</td>
<td>Narrow linear encroachment approx. 20' wide to accommodate additional lanes on northbound mainline. No avoidance possible</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
</tbody>
</table>
Compensatory mitigation is the process used by federal and state agencies for determining whether development on wetlands is justifiable and, if so, under what conditions. After the need for the project has been established, the decision making process is hierarchical and each level of criteria must be met prior to proceeding to the next step. Priority in this step-wise process is given to avoiding wetland impacts completely. If it is established that there is an unavoidable need to impact wetlands then, the process attempts to minimize the extent of the impact and sets up requirements to compensate for wetland losses. Restoration of a historic wetland area that has been converted to non-wetland is typically considered the most promising approach, e.g., a wetland that has been converted to non-wetland by artificial drainage to allow for farming activities. Other forms of compensatory mitigation includes creating wetlands from uplands, enhancement of disturbed wetlands, the purchase credits in a mitigation bank, and preservation of ecologically unique, rare, or valuable wetlands.

Typical compensatory ratios for wetland losses are:

- 1 acre for each acre of emergent wetland impacted
- 1 ½ acres for each acre of palustrine shrub-scrub wetland impacted
- 2 acres for each acre of palustrine wetland impacted

The replacement wetland should be of the same type of wetland and include the minimum area to provide the same functions and values which will be lost as a result of the action (in-kind compensation). In-kind compensation “reflect hydrological, structural, and functional equivalency of the lost wetland community” (EPA 1994). If the reestablishment of a wetland system functions cannot be met or exceeded, the replacement ratio requirements will be greater. Ideally, the replacement site should be located immediately adjacent to the wetland impacted (on-site compensation). If this is not practicable or feasible, then the replacement area should be located along or adjacent to the watercourse which is part of the wetland system being impacted. The least preferred on-site replacement area would be located within the same watershed where the impacts occur. Under extreme circumstances only can a wetland replacement site be located in a watershed other than where the loss has occurred.

Data was collected during the preliminary design phase to determine the existing conditions of the wetlands that could be impacted by the Candidate Build Alternatives. A functional assessment was made for each wetland, according to the WET 2.0 methodology. Wetland data forms were completed containing detailed information concerning the vegetative community(s), hydrologic conditions, and soils. This data is necessary to determine the goals to be met for an approved mitigation plan. The mitigation plan will be developed in consultation with the resource and regulatory agencies. Actual wetland impacts will be determined during the final design phase of the project. In-kind replacement
of significant functions and values will be replaced in compliance with state and federal guidelines.

**Potential Wetland Compensation Site**

Based on preliminary observations, a Prior Converted (PC) wetland area as designated by the USDA’s Natural Resources Conservation Service (NRCS), has been selected as the replacement site (Figure 4-27). The site has been historically drained, enabling the land to be used for agricultural purposes. Draining has removed one, two or all three parameters required to be considered a wetland under jurisdiction of the U. S. Corps of Engineers. It is proposed to revert this non-wetland site, back to a functioning wetland. No detailed planning or engineering has been conducted to confirm that the site could actually be used for wetland compensation. Detailed planning and coordination with resource and regulatory agencies would also be required to develop this site further.

The proposed compensation site encompasses more than 150 acres, of which approximately 100 acres are defined by the NRCS as PC wetland. In addition to being an historic wetland area, the property contains more than 100 acres of existing wetland, including estuarine and palustrine systems. Preservation of these existing wetlands from future impacts could be another form of compensatory mitigation. This site provides on-site and in-kind wetland compensation. Other potential on-site areas identified were in urban or forested land use, or lacked sufficient hydrology.

There are many benefits in utilizing this site as a wetland mitigation site. Some of the advantages include: wetland restoration contiguous with in-kind wetlands being impacted; preservation mitigation attainable; minimal grading requirements; hydrologic conditions favorable; surrounding land use compatible; and the property is currently available for purchase.

Action will be taken to achieve the hydrologic conditions present prior to agricultural draining, allowing the water table to rise back to its natural levels. Local and native plant species shall be used as replacement vegetation. Mitigation construction will take place at the time of highway construction to avoid any temporal loss of wetland functions and values. Additional mitigation measures, such as an erosion and sediment control plan, will be implemented to avoid impacts to existing wetland areas. A maintenance and monitoring plan shall be included to assure the success and proper documentation of the mitigation project.
FIGURE 4-27
POTENTIAL WETLAND COMPENSATION SITE
This proposed site meets the wetland mitigation criteria set forth in this section. A final mitigation design plan will be prepared based on the above criteria and the goals defined for such a plan.

**E. PROPOSED PROJECT AND PERMIT SEQUENCING**

As discussed previously, this project will be designed and built in segments. This approach can be adopted because each of the proposed segments of Candidate Build Alternative 9, the Preferred Alternative, has logical termini and independent utility and each segment independently contributes to serving the project’s primary purpose and underlying needs. Because each of the segments will require years of engineering design and construction, and because each may require sequential identification of separate or non-traditional funding sources, it is proposed that Section 404 permits be issued as each segment enters the final design process.

Sequential design and construction of large complicated projects is consistent with FHWA regulations and guidance (23 CFR 771.111 (f)(1) and Development of Logical Project Termini). It is also consistent with the Corp of Engineers’ general policy of only permitting highway construction projects that have independent utility and logical termini and represent single and complete projects.

**XIV. ENERGY**

**A. ENERGY ANALYSIS**

The energy analysis is basically a comparison of the energy requirements of the daily energy consumption for the No-Build Alternative and the Candidate Build Alternatives. Three categories of energy consumption were analyzed; construction, maintenance and operational. Total energy consumption is also provided for a comparison of the No-Build Alternative and Candidate Build Alternatives.

Construction-related energy consumption is based on the construction cost of the Candidate Build Alternatives. This methodology was developed for the FHWA by the California Transportation (CALTRANS) Laboratory, Energy and Transportation Systems, July, 1983. It determines the total amount of joules (metric equivalent of British Thermal Units, or BTUs) required for the production and placement of materials (asphalt, structures, cut, fill, etc.) based on the project's construction cost. Approximately 131,850,000 joules (125,000 BTU's) equals 3.785 liters (1 US gallon) of fuel.

Maintenance and operational energy consumption was calculated using the manual Energy Requirements for Transportation Systems, United States Department of Transportation (USDOT),
Federal Highway Administration (FHWA), Office of Environmental Policy (OEP), June, 1980. Maintenance energy for the alternatives is based on an annual consumption factor of 1,265.76 x 108 joules (1.20 x 108 BTU) per 1.7 lane kilometer (per lane mile).

Operational energy consumption is influenced by vehicle size, vehicle weight, traffic conditions, engine size, vehicle accessories, roadway design and driving mode. Vehicle Miles Traveled (VMTs) were developed for the alternatives for the proposed opening year 2005 and the design year 2018. This data was combined with vehicle fuel consumption tables to develop total vehicle consumption totals for the alternatives. The 2018 Build and No-Build operating energy calculations are included in the Air Quality and Energy Technical Appendix to this FEIS.

Total energy requirements are the sum of the energy required for construction, maintenance and operation of the systems.

B. EXISTING ENVIRONMENT

There are no construction energy consumption calculations for the existing year. For the maintenance energy consumption, there are 9,190 lane kilometers (5,712 lane miles) in the project study area. This resulted in a consumption total of approximately 7,229 x 1011 joules of energy (6.854 BTU’s x 1011) on an average annual basis. For the operational energy, the annual consumption for the existing year 1995 is 911.659 million liters of fuel (240.835 million gallons).

C. IMPACTS

Table 4-37 shows the construction cost and predicted energy consumed for the No-Build Alternative and each of the Candidate Build Alternatives. Table 4-38 shows the amount of predicted maintenance energy, and Table 4-39 shows the predicted operational energy. Table 4-40 summarizes these tables into a total energy requirement figure for the No-Build Alternative and each of the Candidate Build Alternatives.

The No-Build Alternative is predicted to consume the least amount of total energy due to the lack of additional construction energy consumption associated with each of the Candidate Build Alternatives. However, since the predicted operational energy for each of the 2018 Candidate Build Alternatives is less than the 2018 No-Build Alternative, the construction energy consumption may be recouped by the predicted operational energy savings. These savings are discussed in the mitigation section.
### TABLE 4-37

**CONSTRUCTION ENERGY CONSUMPTION**

<table>
<thead>
<tr>
<th>Year</th>
<th>Preliminary Planning Cost Estimate (in billions)</th>
<th>Total Construction Energy Consumption (BTU's x 10^11)</th>
<th>Annual Construction Energy Consumption (BTU's x 10^11)</th>
<th>Annual Construction Energy Consumption (Joules x 10^11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Year</td>
<td>n/a</td>
<td>N/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>2018 No Build</td>
<td>n/a</td>
<td>N/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>2018 CBA 1</td>
<td>1.3</td>
<td>162.019</td>
<td>8.100</td>
<td>8,543</td>
</tr>
<tr>
<td>2018 CBA 2</td>
<td>1.9</td>
<td>236.797</td>
<td>11.840</td>
<td>12,488</td>
</tr>
<tr>
<td>2018 CBA 9</td>
<td>2.4</td>
<td>299.112</td>
<td>14.956</td>
<td>15,775</td>
</tr>
</tbody>
</table>

### TABLE 4-38

**MAINTENANCE ENERGY CONSUMPTION**

<table>
<thead>
<tr>
<th>Year</th>
<th>Lane Miles</th>
<th>Lane Kilometers</th>
<th>Annual Energy Consumption (BTU's x 10^11)</th>
<th>Annual Energy Consumption (Joules x 10^11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Year 1995</td>
<td>5,712</td>
<td>9,190</td>
<td>6.854</td>
<td>7,229</td>
</tr>
<tr>
<td>2018 No Build</td>
<td>6,966</td>
<td>11,208</td>
<td>8.356</td>
<td>8,812</td>
</tr>
<tr>
<td>2018 CBA 1</td>
<td>7,039</td>
<td>11,328</td>
<td>8.447</td>
<td>8,909</td>
</tr>
<tr>
<td>2018 CBA 2</td>
<td>7,087</td>
<td>11,403</td>
<td>8.504</td>
<td>8,969</td>
</tr>
<tr>
<td>2018 CBA 9</td>
<td>7,116</td>
<td>11,450</td>
<td>8.539</td>
<td>9,006</td>
</tr>
</tbody>
</table>
### TABLE 4-39

**DIRECT OPERATING ENERGY CONSUMPTION**

<table>
<thead>
<tr>
<th>Year</th>
<th>Daily VMT (VKT)</th>
<th>Daily Consumption in gallons (liters)</th>
<th>Average Fuel Consumption in mpg (kpl)</th>
<th>Total Energy Consumption 2005 - 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Year</td>
<td>1995</td>
<td>22,419,746 (36,081,156)</td>
<td>659,822 (2,497,698)</td>
<td>33.98 (14.45)</td>
</tr>
<tr>
<td></td>
<td>No - Build</td>
<td>2005</td>
<td>27,362,560 (44,035,860)</td>
<td>825,993 (3,126,724)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2018</td>
<td>33,448,806 (53,830,742)</td>
<td>1,014,487 (3,840,251)</td>
</tr>
<tr>
<td></td>
<td>CBA 1</td>
<td>2005</td>
<td>26,889,957 (43,275,278)</td>
<td>804,685 (3,046,064)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2018</td>
<td>32,871,083 (52,900,985)</td>
<td>988,317 (3,741,187)</td>
</tr>
<tr>
<td></td>
<td>CBA 2</td>
<td>2005</td>
<td>27,168,081 (43,722,876)</td>
<td>813,115 (3,077,975)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2018</td>
<td>32,871,893 (52,902,288)</td>
<td>988,342 (3,741,282)</td>
</tr>
<tr>
<td></td>
<td>CBA 9</td>
<td>2005</td>
<td>27,333,955 (43,989,824)</td>
<td>787,597 (2,981,379)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2018</td>
<td>33,589,605 (54,057,336)</td>
<td>1,011,490 (3,828,906)</td>
</tr>
</tbody>
</table>

### TABLE 4-40

**TOTAL ANNUAL ENERGY CONSUMPTION**

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Construction Energy</th>
<th>Annual Maintenance Energy</th>
<th>Annual Operational Energy</th>
<th>Annual Total Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>n/a</td>
<td>8.4 (8,812)</td>
<td>539.5 (569,202)</td>
<td>547.9 (578,004)</td>
</tr>
<tr>
<td>No-Build</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>8.1 (8,543)</td>
<td>8.4 (8,909)</td>
<td>531.7 (560,973)</td>
<td>548.2 (578,425)</td>
</tr>
<tr>
<td>CBA 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>11.8 (12,488)</td>
<td>8.5 (8,969)</td>
<td>534.2 (563,611)</td>
<td>554.5 (585,068)</td>
</tr>
<tr>
<td>CBA 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>15.0 (15,775)</td>
<td>8.5 (9,006)</td>
<td>533.5 (562,872)</td>
<td>557.0 (587,653)</td>
</tr>
<tr>
<td>CBA 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hampton Roads Crossing Study FEIS
D. MITIGATION
Mitigation measures for energy consumption are not normally employed, primarily due to the avoidance of environmentally sensitive areas, single family residences and basic engineering laws. However, recovery of the construction and additional maintenance energy may be calculated by predicting operational energy consumption benefits as a result of the proposed project.

The predicted annual operational energy for each of the proposed Candidate Build Alternatives is less than the predicted No-Build Alternative. Therefore, the energy expended by the construction and maintenance of the proposed Candidate Build Alternatives may be recouped at some time in the future. Based on the operational energy usage predicted, the energy recapture time for each Candidate Build Alternative is as follows:

<table>
<thead>
<tr>
<th>Candidate Build Alternative</th>
<th>Energy Recapture Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6.7 years</td>
</tr>
<tr>
<td>2</td>
<td>9.9 years</td>
</tr>
<tr>
<td>9</td>
<td>20+ years</td>
</tr>
</tbody>
</table>

Candidate Build Alternative 1 is predicted to have the fastest construction and maintenance energy recovery time period, and Candidate Build Alternative 9 requires the greatest amount of time. Candidate Build Alternatives 1 and 2 will recover their predicted construction and maintenance energy consumption because of improved operating conditions over their 20-year lifespan. Candidate Build Alternative 9 will take longer than its 20-year lifespan to recover the amount of construction energy.

XV. HAZARDOUS WASTE SITES

A. METHODOLOGY
The EPA and the Virginia DEQ regulate businesses and individuals that handle hazardous materials and wastes. Both agencies maintain lists of the different types of regulated sites or facilities (e.g. hazardous waste generators and Superfund sites). These lists are available from the agencies themselves and from companies that provide all the lists as a service. Sites within the study area were identified using information obtained from the Environmental Data Resources (EDR) and the Virginia DEQ.

The EDR report provided a list of sites identified in the records searched, maps showing the location
of these sites in relation to the subject area, and detailed site reports of National Priority List (NPL) sites within the search radius. EDR contacts the appropriate government agencies on a regular basis to maintain the currency of each database in their system. Twenty-four databases were searched by EDR that cover all currently available information. A list of these databases is found in the Social and Economic Technical Appendix to this FEIS: A field survey was conducted to determine and/or verify the locations of potential hazardous waste sites that may be affected by the proposed Candidate Build Alternatives.

B. IMPACTS

The number and types of potential hazardous material and hazardous waste sites within each proposed corridor are identified in Figure 4-28 and Table 4-41. As shown in Figure 4-28, there are 30 properties within the Candidate Build Alternatives that may contain potential hazardous material. Some properties were listed on multiple databases and are listed in the table for each database. Field sites in Figure 4-28 and Table 4-41 were not identified by the EDR data search, but were located during the field survey as potential hazardous material and hazardous waste sites due to the nature of the business and/or the age of the building. A listing of potential hazardous material and hazardous waste sites within each Candidate Build Alternative is included in the Social and Economic Technical Appendix.

An addition to the list printed in the DEIS is the Former Nansemond Ordnance Depot, which was placed on the National Priority List in 1999. The Former Nansemond Ordnance Depot site is located in Suffolk at the mouth of the Nansemond River and covers approximately 975 acres. Part of the property is owned by Virginia Electric Power Company, General Electric, the Hampton Roads Sanitation District, and VDOT, and the remaining 580 acres is currently owned by the State Board of Community Colleges and is the location of a Tidewater Community College Campus.

General Electric is leasing out their building to various companies for storage. The Virginia Electric Power Company property is being developed by Dominion Lands, Inc. This property will be leased or sold and is zoned for commercial development. VDOT has constructed Interstate 664 through the eastern portion of the former depot. Hampton Roads Sanitation District has a small part of their wastewater treatment facility on the depot.
**TABLE 4-41**

**POTENTIAL HAZARDOUS MATERIAL/WASTE SITES**

<table>
<thead>
<tr>
<th>Database ²</th>
<th>CBA 1</th>
<th>CBA 2</th>
<th>CBA 9</th>
</tr>
</thead>
<tbody>
<tr>
<td># UST Sites</td>
<td>2</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td># LUST Sites</td>
<td>3</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td># RCRA-SQG Sites</td>
<td>3</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td># RCRA-LQG Sites</td>
<td>1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td># FINDS Sites</td>
<td>4</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td># MLTS Sites</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td># TRIS Sites</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td># AST Sites</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td># CEDS Sites</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td># CERC-NFRAP Sites</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td># SWF/LF Sites</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td># NPL Sites</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td># Field Sites</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

1. The No-Build is defined as the 2018 regional transportation plan. Projects included in the plan may impact hazardous material and hazardous waste sites.

2. Database: UST = Underground Storage Tank; LUST = Leaking Underground Storage Tank; RCRA-SQG and LQG = Resources Conservation and Recovery System - Small Quantity Generators, Large Quantity Generators; FINDS = Facility Index System; MLTS = Materials Licensing Tracking System; TRIS = Toxic Release Inventory System; AST = Aboveground Storage Tank; CEDS = VA Water Protection Permits, VA Pollution Discharge System, and VA Pollution Abatement permits; CERC-NFRAP = No Further Remedial Action Planned; SWF/LF = Solid Waste Facilities/Landfill Sites.
FIGURE 4-28
POTENTIAL HAZARDOUS MATERIALS/WASTE SITES
The entire original parcel (with the exception of approximately 30 acres south of the existing General Electric facility) was placed on the National Priority List in 1999. The Environmental Protection Agency believes that a number of sites on the property could pose risk to human health and/or the environment. Risk could be encountered from chemical contamination, primarily metals and explosive compounds, or from unexploded ordnance.

Depicted modifications to the existing I-664 alignment for Candidate Build Alternative 9, the Preferred Alternative, on the FNOD property have an extremely low probability of exposing personnel to increased human health risk. However, the possibility to encounter hazardous chemicals or unexploded ordnance does exist.

It should also be noted that during the underwater archaeological fieldwork, divers found one stack of cylindrical objects on some type of pallet. Working in the zero-visibility conditions at the target site, divers assumed that the objects, which were tapered at one end, are ordnance. This site would need to be investigated further before construction could begin.

C. MITIGATION
Avoiding hazardous waste sites will be a priority during the final design stage. A site assessment will be carried out to the degree necessary to determine the levels of contamination and, if necessary, to evaluate the options to remediate, along with the associated costs. Resolution of any problems associated with contamination will be coordinated with the appropriate regulatory agencies and, prior to right-of-way acquisition, appropriate action will be taken.

The Norfolk District Corps of Engineers is creating an Institutional Control Plan to address potential site risks at the Former Nansemond Ordnance Depot. Coordination with knowledgeable Norfolk District personnel will protect workers and minimize or eliminate construction delays. Prior to performing any work on the FNOD property the executive office (CENAO-EX) of Norfolk District should be contacted for the names and contact information of knowledgeable personnel.

XVI. FARMLANDS
The Farmland Protection Policy Act (FPPA) of 1984 requires a farmland impact evaluation for applicable, federally funded projects. Coordination with the United States Department of Agriculture-Natural Resource Conservation Service (NRCS) is required through completion of a Farmland
Conversion Impact Rating Form (Form AD-1006) for each city through which a Candidate Build Alternative passes.

The purpose of the FPPA is “to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses ...” Should the NRCS determine that the proposed action would adversely affect farmland soils, the agency funding the proposed action is required to consider alternatives to lessen the impacts.

The Farmland Conversion Impact Rating Form is a tool used by the NRCS to evaluate the impact to soils the NRCS has designated as either prime, unique, state-wide, or locally important. In accordance with the FPPA, the NRCS criteria for determining prime, unique, state-wide, and locally important farmlands are based on soil type and slope, regardless of whether or not the land in question is currently used for agricultural purposes. Within each state, the NRCS District Conservationists are responsible for determining which soils are classified as such, and are therefore afforded protection under the FPPA.

Coordination with the Chesapeake, Suffolk, and Williamsburg, Virginia NRCS district offices has been initiated in order to complete the required Farmland Conservation Impact Rating Forms (Form AD-1006). Form AD-1006 was completed for each city by the District Conservationists. The farmlands assessment began with identifying the soil types from the soil surveys which were classified by the NRCS as prime farmlands. The number of hectares (acres) of prime farmland soils within each Candidate Build Alternative was determined through the use of a Geographic Information System (GIS). This information was given to the District Conservationist. The site assessment points calculated in Form AD-1006 for each city are presented in Table 4-42.

The FPPA states that if the site assessment points for any project alternative total a score of less than 160 points (from the Form AD 1006), then the site is to be given a minimal level of consideration for protection. Because each of the Candidate Build Alternatives have site assessment points of less than 160 for each city, mitigation is not required. Form AD 1006 for each city appears in the Social and Economic Technical Appendix to this FEIS.
## TABLE 4-42

### FARMLAND SOILS BY CANDIDATE BUILD ALTERNATIVE

<table>
<thead>
<tr>
<th>Candidate Build Alternative</th>
<th>City</th>
<th>Prime Farmland Soils</th>
<th>NRCS Site Assessment Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Hectares</td>
<td>Acres</td>
</tr>
<tr>
<td>CBA 1</td>
<td>Hampton</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Norfolk</td>
<td>0.9</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>0.9</td>
<td>2.3</td>
</tr>
<tr>
<td>CBA 2</td>
<td>Hampton</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Norfolk</td>
<td>0.9</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>Portsmouth</td>
<td>5.2</td>
<td>12.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6.1</td>
<td>15.2</td>
</tr>
<tr>
<td>CBA 9</td>
<td>Hampton</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Newport News</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Suffolk</td>
<td>24</td>
<td>59.3</td>
</tr>
<tr>
<td></td>
<td>Chesapeake</td>
<td>18</td>
<td>44.4</td>
</tr>
<tr>
<td></td>
<td>Norfolk</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Portsmouth</td>
<td>5.2</td>
<td>12.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>47.2</td>
<td>116.6</td>
</tr>
</tbody>
</table>

1. The No-Build is defined as the 2018 regional transportation plan. Projects included in the plan may impact prime farmland soils.

### XVII. PUBLIC PARKLANDS

The No-Build Alternative is defined as the Hampton Roads 2018 regional transportation plan. Projects included in the plan may impact public parklands. While there are some public parks and recreational areas adjacent to the Candidate Build Alternatives, appropriate engineering and construction techniques will be employed to avoid any use of these properties.

### XVIII. HISTORIC AND ARCHAEOLOGICAL RESOURCES

#### A. ARCHITECTURAL RESOURCES

Of the 105 50-years or older architectural resources identified within the Area of Potential Effect (APE) of the three Candidate Build Alternatives, 103 neither possess significant historical associations nor embody distinctive architectural styles or significant construction techniques. These 103 resources, therefore, do not appear to meet National Register criteria for listing under Criterion A, B,
or C. Fieldwork and research identified two previously-recorded resources within the APEs of Candidate Build Alternatives 1 and 2: the Hampton Institute, which is listed on the National Register of Historic Places and the Pasture Point Historic District, which has been determined eligible for listing on the National Register.

Hampton Institute
The Hampton Institute became one of the nation’s preeminent educational institutions for African-Americans during the late nineteenth and early twentieth century. The institution was originally established to provide freed slaves with educational and technical skills to ease their transition into American society as self-supporting citizens; by the 1930s the institution had received college accreditation. The college is now named “Hampton University”.

The National Register of Historic Places boundary for the Hampton Institute encompasses an 81.34-hectare (201-acre) parcel bordered by the Hampton River on the west and I-64 on the east. The Hampton Institute was also listed as a National Historic Landmark (NHL) in the 1970s, and the Hampton Institute Register property includes all of the smaller 6.07-hectare (15-acre) NHL property. The NHL property does not fall within the APE for the proposed project and will not be impacted.

Conceptual engineering plans for Candidate Build Alternatives 1 and 2 indicate that additional right-of-way ranging between 25 meters (82 feet) and 50 meters (164 feet) will be acquired along the northeastern boundary of the National Register property. The additional right-of-way totals approximately four hectares (10 acres) of land or 4.9 percent of the National Register property.

A copy of a USGS map dated 1965 appended to the Hampton Institute’s National Register nomination form shows that the northeastern portion of the National Register property was almost devoid of any buildings or structures at that time. Since that date the area has undergone intensive development by the Institute, including an expansive athletic complex south of Tyler Street and dormitories and residential housing north of Tyler Street. This modern construction has created a visual and physical barrier between surviving contributing resources of the National Register property and the proposed project. The Emancipation Oak, a discontiguous element of the NHL property and a contributing element to the National Register property, stands approximately 25 meters (80 feet) southwest of the required right-of-way and will not be directly or indirectly impacted by the proposed undertaking. No other contributing resources will be directly or indirectly impacted by the proposed project.
Pasture Point Historic District

The Pasture Point Historic District has been determined eligible for listing on the National Register. A cohesive residential district, the Pasture Point neighborhood consists of approximately 150 contributing resources built primarily between 1885 and 1940 in the city of Hampton. Bounded by Interstate 64 right-of-way to the north, the Hampton River to the east, and Syms and Lincoln Streets to the south, the neighborhood lies north of the city’s business district. VDHR documents indicate that the western boundary of the historic district has not yet been established. Platted in 1885 by the Old Dominion Land Company with a grid pattern of streets laid perpendicular to Pembroke Avenue, a four-lane divided boulevard extending from east to west and bisecting the neighborhood, the area quickly developed as a streetcar suburb of Hampton. Large two-story frame dwellings, many featuring nationally popular picturesque architectural styles including Queen Anne and Colonial Revival, were erected along Pembroke Avenue. Smaller dwellings predominated on streets extending north and south off Pembroke Avenue.

A 1997 IPS form documenting the neighborhood (Mattson, Alexander & Associates) recommended Pasture Point as potentially eligible for the National Register under Criterion A for its associations with community planning and development, and under Criterion C for its embodiment of late nineteenth and early twentieth century architectural styles. In 1998, VDHR and VDOT determined the Pasture Point Historic District eligible for the National Register. Fieldwork undertaken for this project indicated that the district retains the characteristics outlined in the 1997 IPS form. Based upon available information and the district’s current condition, Pasture Point’s continued National Register eligibility under Criterion A and C is recommended. It is also recommended that Eaton Street form the western boundary of the district. This boundary would enclose the late nineteenth and early twentieth century buildings retaining good integrity that most strongly contribute to the district’s period of significance.

Based on conceptual engineering plans for Candidate Build Alternatives 1 and 2 in the Pasture Point area, a sliver of land ranging roughly between 25 meters (80 feet) to 35 meters (115 feet) will be required between Eaton Street and the Hampton River for additional right-of-way along the southern side of the current Interstate 64 alignment within the boundaries of the Pasture Point Historic District. Three resources, all non-contributing modern elements to the district because they do not meet the National Register’s 50-year old threshold, may be directly impacted by the proposed acquisition. The acquisition of the new right-of-way and the roadway’s construction will not introduce any new elements into the district that would diminish the characteristics that qualify it for inclusion on the
National Register.

B. TERRESTRIAL ARCHAEOLOGICAL RESOURCES

1. Candidate Build Alternative 1
Based on the results of the intensive cultural resource survey, the construction of proposed CBA 1 may impact two possibly significant archaeological sites (Sites 44HT89 and 44HT90). The sites are recommended for archaeological testing to evaluate their eligibility for the National Register.

If, based on the results of the archaeological testing, either site is determined *not* to be eligible for the National Register by VDOT and the Virginia Division of Historic Preservation, then no further work is needed. However, if either site is determined to be eligible for the National Register, and if the affected resource will be partially or completely impacted by proposed construction, then an analysis of mitigative alternatives will have to be conducted (see below).

2. Candidate Build Alternative 2
Based on the results of the intensive cultural resource survey, the construction of proposed CBA 2 may impact two possibly significant archaeological sites (Sites 44HT89 and 44HT90). The sites are recommended for archaeological testing to evaluate their eligibility for the National Register.

If, based on the results of the archaeological testing, either site is determined *not* to be eligible for the National Register by VDOT and the Virginia Division of Historic Preservation, then no further work is needed. However, if either site is determined to be eligible for the National Register, and if the affected resource will be partially or completely impacted by proposed construction, then an analysis of mitigative alternatives will have to be conducted (see below).

3. Candidate Build Alternative 9
Based on the results of the intensive cultural resource survey, one possibly significant archaeological site (Site 44CS244) and one previously recorded cemetery (Site 44CS93 – Old New Hope Cemetery) lie adjacent to Candidate Build Alternative 9. Based on current conceptual engineering design, these sites will be avoided and impacts will not occur.
4. **Mitigative Alternatives**

Mitigative measures may include:

- Avoiding impact(s) altogether by not taking a certain action in whole or part;
- Minimizing impact(s) by limiting the degree of magnitude of the action and its implementation;
- Recovering and/or recording the resource through detailed investigation, if impacts are unavoidable.

**C. UNDERWATER CULTURAL RESOURCES**

The first phase of the underwater survey of the Candidate Build Alternatives was conducted by magnetic and acoustic remote sensing from an 8-meter-long (26 foot) vessel suitable for open- and shoal-water environments. The goal of the survey was to identify remote sensing targets that generated signatures suggestive of submerged cultural resources. Background research conducted as part of this project indicated that Hampton Roads has been the site of numerous historically significant maritime activities. An analysis of the remote sensing data identified 78 magnetic and/or acoustic targets in the three Candidate Build Alternatives. Of the 78 targets, 30 possess signatures indicative of submerged cultural resources and are classified as potentially significant targets. Thirteen were located in Candidate Build Alternative 1, 15 were found in Candidate Build Alternative 2, and 17 were located in Candidate Build Alternative 9. Many of the other 48 targets were identified with sonar as pipe or cable.

Additional investigations, or ground-truthing, was required to identify the materials generating the remote sensing signatures and to determine the National Register eligibility of the 17 potentially significant submerged sites located in Candidate Build Alternative 9, the Preferred Alternative. Detailed information on the methodology used for the remote sensing fieldwork and diving operations is included in the *Hampton Roads Crossing Study Cultural Resources Survey*, a Technical Appendix to this document (bound separately).

Modern debris was found at many of the target locations, and none of the 17 targets investigated were considered to be potentially historically significant. More information on the findings of the remote sensing fieldwork and diving operations is included in the *Cultural Resources Survey*.
XIX. PERMITS

Federal and state laws and regulations require that various environmental permits or approvals be acquired prior to the start of project-related construction activities. The following permits or compliances would be required:

- Compliance with Executive Order 11990 (protection of wetlands) and Section 404 permits (Clean Water Act) from the U.S. Army Corps of Engineers
- Section 10 permit (Rivers and Harbors Act) from the U.S. Army Corps of Engineers
- Virginia Water Protection Permit from the Commonwealth of Virginia, DEQ
- Subaqueous Bed Permit (Virginia Water Law) from the Virginia Marine Resources Commission
- Coast Guard permit
- Compliance with the Endangered Species Act (ESA)
- Compliance with Section 106 of the Natural Historic Preservation Act
- Compliance with Section 4(f) of the 1966 Department of Transportation Act
- Compliance with Executive Order 12898 on Environmental Justice

Approvals of various types also may be required for highway projects. A consistency determination related to the Coastal Zone Management Act would be required because the project is located in the coastal zone. A floodplain finding in compliance with Executive Order 11988, Floodplain Management would be required. Approvals under Virginia’s Chesapeake Bay Protection Act are not required because public roads are exempt from the requirement of that Act provided the project complies with the requirements of the erosion and sediment control standards and the stormwater management standards. The project will be constructed in accordance with the Erosion and Sediment Control Law and Stormwater Management Act.

As discussed previously, this project will be designed and built in segments. This approach can be adopted because each of the proposed segments of Candidate Build Alternative 9, the Preferred Alternative, has logical termini and independent utility and each segment independently contributes to serving the project’s primary purpose and underlying needs. Because each of the segments will require years of engineering design and construction, and because each may require sequential identification of separate or non-traditional funding sources, it is proposed that Section 404 permits be issued as each segment enters the final design process.
Sequential design and construction of large complicated projects is consistent with FHWA regulations and guidance (23 CFR 771.111 (f)(1) and Development of Logical Project Termini). It is also consistent with the Corp of Engineers’ general policy of only permitting highway construction projects that have independent utility and logical termini and represent single and complete projects.

XX. SECONDARY AND CUMULATIVE IMPACTS

A. METHODOLOGY
Secondary impacts are defined as those “caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable” (40 CFR 1508.8). This kind of impact is typically considered to be an effect indirectly caused or induced by construction of the proposed project. Cumulative impacts are defined as those impacts that “result from the incremental consequences of an action when added to other past and reasonably foreseeable future plans” (40 CFR 1508.7). Foreseeable actions are generally defined as those for which plans exist. The past and future actions considered may be either federally or privately sponsored.

In the study area, there are several major projects in the planning stages that could potentially affect development and have additional environmental impacts. These projects include the potential eastward expansion of Craney Island and the fourth marine terminal, which may be constructed on the potential new fourth cell of Craney Island, and the light rail facilities being studied on the Southside and Peninsula. However, all of these projects are in the preliminary planning stages and there are no definite locations or decisions as to whether these facilities will be constructed. Thus, their impacts are not yet reasonably foreseeable and are not included in this analysis.

B. SOCIOECONOMIC IMPACTS
All communities within the study area have developed and adopted comprehensive and zoning plans or are in the process of updating and amending their comprehensive plans. Induced development pressures are regulated by these communities under their zoning and land use plans. The planned development within the study area will occur without a new third crossing of Hampton Roads. The Hampton Roads Crossing Study is a response to solving an existing and readily foreseeable problem: increasing traffic volumes and congestion at the Hampton Roads Bridge Tunnel.
The design of each of the Candidate Build Alternatives does not promote development, because each of the Candidate Build Alternatives will be interstate facilities, and a majority of the Candidate Build Alternatives incorporate existing interstate systems. Candidate Build Alternatives 1 and 2 incorporate the existing I-64 right-of-way in Norfolk and Hampton. Candidate Build Alternative 9 incorporates the existing I-664 right-of-way in Hampton, Newport News, Suffolk, and Chesapeake. No new interchanges are proposed in these areas. In Norfolk, Candidate Build Alternatives 2 and 9 incorporate the existing I-564 right-of-way and an existing railroad corridor. This segment will provide new access to Hampton Boulevard, a heavily developed area of Norfolk.

The connection to VA 164 in Portsmouth, which is included in Candidate Build Alternatives 2 and 9, will be located on a new alignment. The only interchange supplied for this segment of Candidate Build Alternatives 2 and 9 is the interchange located at the connection’s termini with VA 164, an existing limited access expressway.

All communities within the study area have developed and adopted comprehensive and zoning plans, or are in the process of updating and amending their comprehensive plans. As discussed in Chapter 3 above, three of the Southside cities in the study area (Chesapeake, Virginia Beach and Suffolk) have experienced rapid development since 1980. Because of this rapid development, services have been stressed. Each of these cities has responded by incorporating concepts in their comprehensive and zoning plans to either restrict or control growth. Therefore, development, and any induced (secondary) development pressures from new facilities like the Hampton Roads Crossing, will be regulated by these communities under their zoning and land use plans.

Developable land in the vicinity of the alternatives has been either fully developed or is planned for development. The I-64 corridor through Hampton and Norfolk and the I-664 corridor through Hampton and Newport News are already heavily developed. In addition to the development that currently occurs, there are a number of proposed, planned, and approved development plans along the I-664 corridor in the cities of Suffolk and Chesapeake on the Southside (Chesapeake’s Western Branch Area Plan, 1995, Suffolk Zoning Map, 1998). This planned development will be realized without an expansion of I-664 in this area, which is proposed in Candidate Build Alternative 9. In the city of Portsmouth, the undeveloped area traversed by the VA 164 connection south of Craney Island and the U.S. Coast Guard Center is zoned for heavy manufacturing (Portsmouth Zoning Map, 1997). Because of the existence of VA 164, the Western Freeway, any planned development in this area will also be realized without the VA 164 connection, proposed in Candidate Build Alternatives 2 and 9.
Potential development within the study area (e.g., a forth port at Craney Island, residential subdivisions, other transportation improvements, and those others discussed in previous chapters) will likely occur with or without a new crossing of the Hampton Roads. For example, the Virginia Port Authority is formally on record as stating that a new port would be developed on an expansion of Craney island, regardless of whether or not any or all segments of the Third Crossing are constructed.

A new crossing may affect the rate of cumulative development and associated impacts. That is, congestion relief brought about by the new facility may make travel of all kinds more desirable, because travel may be more efficient and less stressful. Because of this new efficiency, businesses and residents may explore available or new development opportunities.

A new crossing may also lead to increases in the development of brownfield sites and redevelopment projects, as some cities seek to fill in urban cores, or turn around declining tax bases.

C. NATURAL RESOURCE IMPACTS

Secondary impacts to natural resources (e.g., wetlands, water quality) are discussed in the appropriate sections above. Cumulative impacts resulting from other past and reasonably foreseeable future plans may affect water quality, wildlife habitat and other natural (e.g., wetlands) and physical resources (e.g., air quality, groundwater quantity).

The study area began its present day development trends as far back as the early 17th century. Since that time the Chesapeake Bay, the Hampton Roads and the watercourses associated with these large waterbodies (e.g., James and Elizabeth Rivers) and associated wetlands and uplands have been developed to support maritime and defense needs, as well as the people supporting those industries. Stringent environmental regulations guiding this development have only been in effect since the early 1970’s. Since inception of these regulations, the study area has experienced decreased rates of wetland loss, increased water quality and improved air quality. Examples of this overall environmental improvement, even with the rapid development of the area between 1980 and present day, include the return of a striped bass fishery, re-growth of submerged aquatic vegetation beds in the Hampton Roads and recovery of pelican populations from approximately 100 birds in 1970 to many hundreds of birds today.
With the implementation of the planned developments cited in the socio-economic discussion above, additional impacts to upland wildlife habitat can be expected. Implementation of the proposed project, as discussed above, may accelerate this habitat loss by accelerating the rate of planned development. However, enforcement of environmental regulations (e.g., Section 404 of Clean Water Act, stormwater management) can minimize the impacts of these activities to natural and physical resources.

Specifically, the cumulative loss of wildlife habitat has been recognized in the region. Activities and discussions are underway within many municipalities to protect and preserve high quality wildlife habitat, such as the Dismal Swamp and wetlands and uplands surrounding Stumpy Lake.

**XXI. CONSTRUCTION IMPACTS**

Construction activities for any of the Candidate Build Alternatives will affect the residents of the immediate area and those traveling in the vicinity. These impacts could include: the temporary degradation of air, noise, and water quality; the temporary impedance to the maintenance and control of traffic; additional safety concerns as a result of changes in traffic flow patterns; the stockpiling and disposal of construction materials; the use and mitigation of borrow areas; and the possibility of limited construction access channels.

**A. AIR QUALITY**

Construction activities can have a short-term impact on local air quality during periods of site preparation, with particulate matter, also known as fugitive dust, having the greatest impact. This impact will occur in association with excavation and earth moving, cement, asphalt, aggregate handling, heavy equipment operation, use of haul roads and wind erosion of exposed areas and material storage piles. The effect of fugitive dust will be temporary and will vary in scale depending on local weather conditions, the degree of construction activity and the nature of the construction activity.

The Contractor will comply with the provisions of Section 107.01 *(LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC, Laws to Be Observed)* and especially with the State Air Pollution Control Law and Rules of the State Air Pollution Control Board, including notifications.
required therein.

Any burning will be done in accordance with applicable local laws and ordinances. Any burning will be performed under the constant surveillance of competent watch persons. The Contractor would not burn rubber tires, asphalitic materials, used crankcase oil, or similar materials which produce dense smoke, either to dispose of such materials or as an ignitor or promoter in the burning of other materials. Care would be exercised so that the burning of materials does not destroy or damage public or private property, or cause excessive air pollution.

B. NOISE

An increase in project area noise levels will occur during the construction of the proposed improvements. Construction-related noise differs from that generated by normal traffic due to differences in the spectral and temporal characteristics of the noise. The degree of noise impact during construction will be a function of the number and types of equipment being used, and the distances between the construction equipment and the noise-sensitive areas.

Generally, construction operations will occur during normal working hours on weekdays. Therefore, noise impact experienced by local residents as a result of construction activities should not occur during sleeping hours.

A number of measures can be utilized in order to minimize noise resulting from construction operations. Such measures include, but are not limited to, the following:

- Equip any internal combustion engine used for any purpose on or related to the job with a properly operating muffler.
- Conduct truck loading, unloading and hauling so that noise is kept to a minimum.
- Route construction equipment and vehicles in areas that will cause the least disturbance to nearby receptors where possible.
- Place continuously operated diesel-powered equipment, such as compressors and generators, in areas as far as possible from or shielded from noise-sensitive locations.
- Wherever possible, noise barriers to be constructed as part of the project will be constructed as soon as possible to allow the barriers to protect noise-sensitive areas from construction noise.
The Virginia Department of Transportation (VDOT) has developed a specification concerning construction noise that is applicable to this project. In summary, the specification requires the Contractor to limit construction noise levels to 80 decibels in noise-sensitive areas adjacent to the project area. Further, VDOT may monitor construction noise and require noise abatement where exterior noise levels from construction operations exceed 80 decibels. Also, VDOT may prohibit or restrict work that produces objectionable noise between 10 P.M. and 6 A.M. Construction equipment cannot be altered such that noise levels will be greater than that of the original equipment. These provisions are contained in Section 107.14(b) 3 Noise and are reproduced below:

- "The Contractor's operations shall be performed so that exterior noise levels measured during a noise-sensitive activity shall be not more than 80 decibels. Noise sensitive activity is any activity for which lowered noise levels are essential if the activity is to serve its intended purpose. Such activities include, but are not limited to, those associated with residences, hospitals, nursing homes, churches, schools, libraries, parks, and recreational areas."
- "The Department may monitor construction-related noise. If construction noise levels exceed 80 decibels, the Contractor shall take corrective action before proceeding with operations. The Contractor shall be responsible for costs associated with the abatement of construction noise and the delay of operations attributable to noncompliance with these requirements."
- "The Department may prohibit or restrict to certain portions of the project any work that produces objectionable noise between 10 P.M. and 6 A.M. If other hours are established by local ordinance, the local ordinance shall govern."
- "Equipment shall in no way be altered so as to result in noise levels that are greater than those produced by the original equipment."
- "When feasible, the Contractor shall establish haul routes that direct his vehicles away from developed areas and ensure that noise from hauling operations is kept to a minimum."
- "These requirements are not applicable if the noise produced by sources other than the Contractor's operation at the point of reception is greater than the noise from the Contractor's operation at the same point."

C. WATER QUALITY
Effects to water quality resulting from erosion and sedimentation, as well as from pollutants such as chemicals, fuels, lubricants, bitumins, raw sewage, and other harmful waste, will be strictly controlled in accordance with Sections 107 and 303 of VDOT’s Specifications. The Contractor will exercise
every reasonable precaution necessary during construction to prevent pollution of rivers, streams, or impoundments. All construction discharge will be adequately filtered prior to discharge into waters and will meet the State requirements. During spawning seasons, discharges and construction activities in spawning areas will be restricted so as not to disturb or inhibit aquatic species. In the event the Contractor dumps, discharges, or spills any contaminant which may affect water quality, he/she will immediately notify all appropriate local, state, and federal agencies and will take immediate action to contain and remove the contaminant.

D. MAINTENANCE AND CONTROL OF TRAFFIC
Maintenance of the current flow of traffic on the existing roadway network will be planned and scheduled to minimize adverse impacts to the traveling public. Within construction areas, traffic control measures using standard practices will be used, as outlined in Virginia’s *Work Area Protection Manual*. In addition to using these standards, news releases of construction activities and schedules will be made available to the public.

E. HEALTH AND SAFETY
During the course of construction, the Contractor will comply with all federal, state, and local laws governing safety, health, and sanitation. All reasonable safety considerations and safeguards necessary to protect the life and health of employees on the job, the safety of the public, and the protection of property in connection with roadway construction will be taken.

F. POLLUTION CONTROL
Project construction will consist of roadways and bridges requiring excavation of unsuitable materials, placement of embankments, and the use of materials such as aggregates, bituminous, and portland cement concrete. The stockpiling and disposal of the construction and excavation materials may be visually displeasing to some of the residents along the corridor. However, this will be a temporary condition and should pose no permanent problems with the use of the required temporary erosion control features. The Contractor will be responsible for his/her methods of placing the necessary features of pollution control on haul roads, borrow and other materials pits, areas used for the disposal of waste materials, and other potential pollutants (e.g. fuels) associated with the construction of the project. Temporary erosion control features will consist of berms, dikes, temporary seeding, sediment traps, fiber mats, silt fences, slope drains, mulches, crushed stone, and others, as specified in VDOT’s *Specifications*. 
Existing conditions that could pose problems to the constructability of the project, such as large cuts and fills, rockfall areas, stream crossings, etc., will be handled individually during final design. The final alignment will be placed in the most practical location to avoid construction problem areas and sensitive natural resource areas. In-depth geotechnical research, reconnaissance, and core borings will be used to make sound engineering judgements to solve difficult construction problems as they arise.

**XXII. RELATIONSHIP OF LOCAL SHORT-TERM USES VS. LONG-TERM PRODUCTIVITY**

The construction phase of the project will cause limited adverse effects on the environment which have been deemed to be short-term. Adverse effects have been evaluated and mitigation (i.e. avoidance or minimization) measures identified. In addition, careful attention will be given to the problems identified during design. Proposed mitigation measures, some temporary and some permanent, will minimize adverse short-term effects and avoid any substantial long-term damage.

The proposed project will be classified as a long-term productive facility. This project, with its desirable design characteristics, will provide for safe and efficient vehicle operation for future, as well as present, traffic volumes. The benefits, such as reduced operating costs, reduced travel time, reduced traffic accidents, and general economic enhancement of the area offered by the long-term productivity of this project, should more than offset the short-term inconvenience and adverse effects on the human environment.

**XXIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES**

Land used in the construction of the proposed facility is considered an irreversible commitment during the period that the land is used for a highway facility. However, if a greater need arises for use of the land, or if the highway facility is no longer needed, the land can be converted to another use. At present, there is no reason to believe such a conversion will be necessary or desirable.

Considerable amounts of fossil fuels, labor, and highway construction materials such as cement, aggregate, and bituminous material will be expended. In addition, large amounts of labor and natural resources will be used in the fabrication and preparation of construction materials. These materials are
not generally retrievable. They are not in short supply, and their use will not have an adverse effect upon continued availability of these resources. Any construction will also require a substantial one-time expenditure of state, federal, or private funds which are not retrievable. The commitment of these resources is based on the concept that residents in the immediate area, region, state, and nation will benefit by the improved quality of the transportation system. These benefits will consist of improved accessibility and safety, savings in time, fuel savings, and a greater availability of quality services, which are anticipated to outweigh the commitment of these resources.
CHAPTER 5
SECTION 4(F) EVALUATION

Section 4(f) of the 1966 Department of Transportation Act is applicable only to agencies within the US Department of Transportation and applies to publicly owned parks, recreation areas, and wildlife and waterfowl refuges, as well as cultural resources listed or eligible for listing on the National Register of Historic Places (NRHP). When a project uses land protected by Section 4(f), a Section 4(f) evaluation must be prepared. The evaluation applies the test for prudence and feasibility versus avoidance and measures to minimize harm in use situations.

In accordance with FHWA’s Section 4(f) Policy Paper (1989), descriptions of the proposed action, the purpose of and need for the action, and the proposed alternatives have been prepared. This information is contained within Chapters 1 and 2 of this FEIS.

While there are some public parks and recreational areas adjacent to the Candidate Build Alternatives, appropriate engineering and construction techniques will be employed to avoid any use of these properties. No wildlife or waterfowl refuges would be impacted by the proposed project.

None of the Candidate Build Alternatives would require the demolition of a building that is 1) considered eligible for, 2) eligible for, or 3) listed in the National Register of Historic Places. However, Candidate Build Alternatives 1 and 2 traverse property of the Hampton Institute, which is listed on the National Register of Historic Places, and the Pasture Point Historic District, which has been determined eligible for listing on the National Register. Candidate Build Alternative 9, the Preferred Alternative, will not require the direct or constructive use of any Section 4(f) resources.

I. HAMPTON INSTITUTE

The National Register of Historic Places boundary for the Hampton Institute encompasses an 81.34-hectare (201-acre) parcel bordered by the Hampton River on the west and I-64 on the east. The Hampton Institute was also listed as a National Historic Landmark (NHL) in the 1970s, and the Hampton Institute Register property includes all of the smaller 6.07-hectare (15-acre) NHL property. The NHL property does not fall within the APE for the proposed project and will not be impacted.

Conceptual engineering plans for Candidate Build Alternatives 1 and 2 indicate that additional right-
of-way ranging between 25 meters (82 feet) and 50 meters (164 feet) will be acquired along the northeastern boundary of the National Register property. The additional right-of-way totals approximately four hectares (10 acres) of land or 4.9 percent of the National Register property.

A copy of a USGS map dated 1965 appended to the Hampton Institute’s National Register nomination form shows that the northeastern portion of the National Register property was almost devoid of any buildings or structures at that time. Since that date the area has undergone intensive development by the Institute, including an expansive athletic complex south of Tyler Street and dormitories and residential housing north of Tyler Street. This modern construction has created a visual and physical barrier between surviving contributing resources of the National Register property and the proposed project. The Emancipation Oak, a discontiguous element of the NHL property and a contributing element to the National Register property, stands approximately 25 meters (80 feet) southwest of the required right-of-way and will not be directly or indirectly impacted by the proposed undertaking. No other contributing resources will be directly or indirectly impacted by the proposed project.

II. PASTURE POINT HISTORIC DISTRICT

The Pasture Point Historic District has been determined eligible for listing on the National Register. A cohesive residential district, the Pasture Point neighborhood consists of approximately 150 contributing resources built primarily between 1885 and 1940 in the city of Hampton. Bounded by Interstate 64 right-of-way to the north, the Hampton River to the east, and Syms and Lincoln Streets to the south, the neighborhood lies north of the city’s business district. VDHR documents indicate that the western boundary of the historic district has not yet been established. Platted in 1885 by the Old Dominion Land Company with a grid pattern of streets laid perpendicular to Pembroke Avenue, a four-lane divided boulevard extending from east to west and bisecting the neighborhood, the area quickly developed as a streetcar suburb of Hampton. Large two-story frame dwellings, many featuring nationally popular picturesque architectural styles including Queen Anne and Colonial Revival, were erected along Pembroke Avenue. Smaller dwellings predominated on streets extending north and south off Pembroke Avenue.

A 1997 IPS form documenting the neighborhood (Mattson, Alexander & Associates) recommended Pasture Point as potentially eligible for the National Register under Criterion A for its associations with community planning and development, and under Criterion C for its embodiment of late nineteenth and early twentieth century architectural styles. In 1998, VDHR and VDOT determined the
Pasture Point Historic District eligible for the National Register. Fieldwork undertaken for this project indicated that the district retains the characteristics outlined in the 1997 IPS form. Based upon available information and the district’s current condition, Pasture Point’s continued National Register eligibility under Criterion A and C is recommended. It is also recommended that Eaton Street form the western boundary of the district. This boundary would enclose the late nineteenth and early twentieth century buildings retaining good integrity that most strongly contribute to the district’s period of significance.

Based on conceptual engineering plans for Candidate Build Alternatives 1 and 2 in the Pasture Point area, a sliver of land ranging roughly between 25 meters (80 feet) to 35 meters (115 feet) will be required between Eaton Street and the Hampton River for additional right-of-way along the southern side of the current Interstate 64 alignment within the boundaries of the Pasture Point Historic District. Three resources, all non-contributing modern elements to the district because they do not meet the National Register’s 50-year old threshold, may be directly impacted by the proposed acquisition. The acquisition of the new right-of-way and the roadway’s construction will not introduce any new elements into the district that would diminish the characteristics that qualify it for inclusion on the National Register.
THIS PAGE INTENTIONALLY LEFT BLANK
CHAPTER 6
LIST OF PREPARERS

This document was prepared by the US Department of Transportation, Federal Highway Administration, and the Virginia Department of Transportation, with assistance from Michael Baker Jr., Inc., consulting engineers and planners. Additional assistance was supplied by Fitzgerald & Halliday, Inc., Harris, Miller, Miller, and Hanson, Inc., Louis Berger and Associates, Inc., Virginia Institute of Marine Science, Virginia Department of Rail and Public Transportation, and the Hampton Roads Planning District Commission.

<table>
<thead>
<tr>
<th>NAME</th>
<th>EDUCATION AND EXPERIENCE</th>
<th>PRIMARY RESPONSIBILITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FEDERAL HIGHWAY ADMINISTRATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bruce Turner</td>
<td>B.S. Biology. Certificate Public Service Archaeology. 23 years experience reviewing environmental documents</td>
<td>Document review, transportation planning</td>
</tr>
<tr>
<td><strong>VIRGINIA DEPARTMENT OF TRANSPORTATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jeffrey C. Cutright</td>
<td>Civil Engineering coursework. 12 years experience in transportation engineering, 3 years experience in transportation construction</td>
<td>Engineering Project Manager, document review</td>
</tr>
<tr>
<td>Kenneth E. Wilkinson</td>
<td>B.S. Biology. 24 years experience in preparing and managing environmental documents</td>
<td>Environmental Project Manager, document review</td>
</tr>
<tr>
<td>Gerald W. Sears</td>
<td>36 years experience in transportation planning</td>
<td>Transportation planning</td>
</tr>
<tr>
<td>Horace Welch</td>
<td>A.S. Civil Engineering. 32 years experience in transportation planning</td>
<td>Transportation planning</td>
</tr>
<tr>
<td><strong>VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>William Labaugh, III</td>
<td>B.S. Civil Engineering. M.S. Civil Engineering. 24 years experience in public transportation planning</td>
<td>Review of rail and public transportation issues</td>
</tr>
<tr>
<td>Hampton Roads Crossing Study FEIS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HAMPTON ROADS PLANNING DISTRICT COMMISSION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwight L. Farmer, P.E.</td>
<td>B.S. Civil Engineering, M.S. Civil Engineering. 25 years experience in transportation planning and engineering</td>
<td>Transportation planning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MICHAEL BAKER JR., INC.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Philip Shucet</td>
</tr>
<tr>
<td>Williard C. McCartney</td>
</tr>
<tr>
<td>Robert Morgan</td>
</tr>
<tr>
<td>Tom Biksey</td>
</tr>
<tr>
<td>Jonathon Lohman</td>
</tr>
<tr>
<td>Victor J. Siaurusaitis</td>
</tr>
<tr>
<td>Joe Blickenderfer</td>
</tr>
<tr>
<td>George Brandt</td>
</tr>
<tr>
<td>Billy K. Buck, E.I.T.</td>
</tr>
<tr>
<td>Mariellen J. Calabro, R.E.M., C.E.I.</td>
</tr>
<tr>
<td>Name</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>Ellen Crainer</td>
</tr>
<tr>
<td>Larry A. Diday, P.E., P.L.S.</td>
</tr>
<tr>
<td>Andy P. Kuchta</td>
</tr>
<tr>
<td>Peter Monday</td>
</tr>
<tr>
<td>Philip D. Quillin, E.I.T.</td>
</tr>
<tr>
<td>Kevin Schroeder</td>
</tr>
<tr>
<td>Robert C. Siegfried, II</td>
</tr>
<tr>
<td>Margaret Smith</td>
</tr>
<tr>
<td>Peter O. Tacelli</td>
</tr>
<tr>
<td>John L. Watts, E.I.T.</td>
</tr>
<tr>
<td>David M. Williams, P.E.</td>
</tr>
<tr>
<td>Wendy Zelencik</td>
</tr>
</tbody>
</table>
**FITZGERALD AND HALLIDAY INC.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Education and Experience</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laura Shucet</td>
<td>B.S. Environmental Studies. 5 years experience in transportation planning, environmental studies, and documentation</td>
<td>Assistant Project Manager: DEIS and FEIS author and manager of technical tasks.</td>
</tr>
</tbody>
</table>

**HARRIS MILLER MILLER AND HANSON, INC.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Education and Experience</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christopher W. Menge</td>
<td>B.S. Physics. 27 years experience in transportation noise assessments</td>
<td>Manager of highway noise analysis tasks</td>
</tr>
<tr>
<td>Christopher J. Bajdek</td>
<td>B.S. Mechanical Engineering. 9 years experience in transportation noise assessments</td>
<td>Deputy manager of highway noise analysis tasks</td>
</tr>
<tr>
<td>Hugh J. Saurenman, P.E.</td>
<td>Ph.D. Mechanical Engineering. 28 years experience in transit noise and vibration assessments</td>
<td>Supervisor of transit noise/vibration analysis tasks</td>
</tr>
</tbody>
</table>

**LOUIS BERGER AND ASSOCIATES, INC.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Education and Experience</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kay Simpson</td>
<td>Ph.D. Anthropologyy M.A. B.A. 23 years experience as a cultural resources manager and senior archaeologist</td>
<td>Manager of Cultural Resources task</td>
</tr>
<tr>
<td>Stuart Paul Dixon</td>
<td>M.A. B.A. 12 years experience as an architectural historian</td>
<td>Manager of architectural survey, document preparation</td>
</tr>
<tr>
<td>Timothy R. Sara</td>
<td>M.A. B.A. 14 years experience as an archaeologist</td>
<td>Manager of archaeological survey, document preparation</td>
</tr>
</tbody>
</table>

**DOLAN RESEARCH, INC.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Education and Experience</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>J. Lee Cox, Jr.</td>
<td>M.A. Maritime History/Underwater Archaeology B.A. 14 years experience as a maritime archaeologist</td>
<td>Underwater archaeology survey, document preparation</td>
</tr>
</tbody>
</table>

**VIRGINIA INSTITUTE OF MARINE SCIENCE**

<table>
<thead>
<tr>
<th>Name</th>
<th>Education and Experience</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Boon</td>
<td>Ph.D. Marine Science M.S. Marine Science B.A. Geology. 36 years experience in marine science and oceanography; professor</td>
<td>Manager of hydrodynamic and sediment modeling task, document preparation</td>
</tr>
<tr>
<td>Sung-Chan Kim</td>
<td>Ph.D. Marine Science M.S. Oceanography B.S. Oceanography. 9 years</td>
<td>Hydrodynamic and sediment modeling task</td>
</tr>
<tr>
<td>Name</td>
<td>Education</td>
<td>Experience</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Harry V. Wang</td>
<td>Ph.D. Geophysical Fluid Dynamics</td>
<td>15 years experience as a water resource engineer, research physical scientist, and assistant professor</td>
</tr>
<tr>
<td></td>
<td>B.S. Atmospheric Sciences</td>
<td></td>
</tr>
<tr>
<td>Albert Yi-shuong Kuo</td>
<td>Ph.D. Fluid Mechanics</td>
<td>29 years experience as a professor</td>
</tr>
<tr>
<td></td>
<td>M.S. Mechanics and Hydraulics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.S. Agricultural Engineering</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 7
LIST OF FEIS RECIPIENTS

Copies of the Final Environmental Impact Statement will be distributed to the following agencies, organizations, and individuals:

FEDERAL AGENCIES
Advisory Council on Historic Preservation- Eastern Office
Federal Transit Administration
U.S. Coast Guard – Fifth District (OAN)
U.S. Corps of Engineers – Norfolk District
U.S. Department of Agriculture - Natural Resources Conservation Service
U.S. Department of Interior - Fish and Wildlife Service
U.S. Department of Interior – Office of Environmental Policy and Compliance
U.S. Environmental Protection Agency
U.S. Navy – Naval Base Norfolk

STATE AGENCIES
Chesapeake Bay Local Assistance Department
Virginia Department of Agriculture and Consumer Services
Virginia Department of Conservation and Recreation
Virginia Department of Environmental Quality – Air Division
Virginia Department of Environmental Quality – Waste Division/Office of Technical Assistance
Virginia Department of Environmental Quality – Water Division
Virginia Department of Game and Inland Fisheries
Virginia Department of Health – Office of Water Programs
Virginia Department of Historic Resources
Virginia Department of Mines, Minerals, and Energy
Virginia Department of Rail and Public Transportation
Virginia State Forester
Virginia Institute of Marine Science
Virginia Marine Resources Commission
Virginia Outdoors Foundation
Virginia Port Authority

LOCAL AGENCIES AND GOVERNMENTS
City of Chesapeake – City Manager
City of Chesapeake – Economic Development Director
City of Chesapeake – Director of Parks and Recreation
City of Chesapeake – Director of Planning
City of Chesapeake - Superintendent of Schools
City of Hampton - City Manager
City of Hampton – Director of Economic Development
City of Hampton - Director of Parks and Recreation
City of Hampton – Director of Planning
City of Hampton – Environmental Health Manager
City of Hampton – Superintendent of Schools
City of Newport News – Chairman of the Economic Development Authority
City of Newport News - City Manager
City of Newport News - Director of Parks and Recreation
City of Newport News – Environmental Health Manager
City of Newport News – Planning and Development
City of Newport News – Superintendent of Schools
City of Norfolk – Department of Planning
City of Norfolk – Director of Economic Development
City of Norfolk - Director of Parks and Recreation
City of Norfolk – Superintendent of Schools
City of Poquoson – City Manager
City of Portsmouth – City Manager
City of Portsmouth – Department of Environmental Health
City of Portsmouth – Director of Economic Development
City of Portsmouth - Director of Parks and Recreation
City of Portsmouth – Director of Planning
City of Portsmouth – Superintendent of Schools
City of Suffolk – City Manager
City of Suffolk – Director of Parks and Recreation
City of Suffolk – Economic Development Director
City of Suffolk – Environmental Health Supervisor
City of Suffolk – Planning Director
City of Suffolk – Superintendent of Schools
City of Virginia Beach – City Manager
Hampton Roads Planning District Commission
Isle of Wight County Administrator
Peninsula Transportation District Commission
Tidewater Transportation District Commission
York County Administrator
CHAPTER 8
COMMENTS AND COORDINATION

I. INTRODUCTION
This chapter describes the scoping, coordination, and public involvement program for the Hampton Roads Crossing Study. Agency and public coordination began with the Hampton Roads Crossing Study Major Investment Study (MIS) (VDOT, 1997) and is concluding in this FEIS.

II. MAJOR INVESTMENT STUDY
The MIS was conducted in accordance with the Joint Statewide Metropolitan Planning Regulations (23 CFR 450). Decision points in the Hampton Roads Crossing Study MIS process included:

* **Establish Purpose and Need:** Purpose and Need for the project was approved in late 1994 (Hampton Roads Crossing Study Final Purpose and Need Statement and Technical Appendix).

* **Develop Initial Solutions:** A preliminary list of 45 possible solutions was developed during 1995. This list was reduced based on criteria established by the Purpose and Need document and the Coordinating Committee.

* **Develop Transportation Corridors:** Further refinement and combinations of the original solutions resulted in the development of 11 individual Transportation Corridors in early 1996.

* **MPO Selection of Locally Preferred Alternative:** On July 16, 1997, the Hampton Roads Metropolitan Planning Organization (MPO) recommended Transportation Corridor 9 as the Locally Preferred Corridor based on the MIS findings and citizen input from the MIS public hearings. The MPO also endorsed continuing to improve and study the CSX corridor for a transit component.

* **CTB Endorsement of Locally Preferred Alternative:** On September 18, 1997 the Commonwealth Transportation Board (CTB) passed a resolution which expressed its good faith intent to facilitate and develop the Hampton Roads Transportation Crossing identified as Transportation Corridor 9, which consists of a facility that includes a Bridge/Tunnel from I-564 in Norfolk to I-664 in Newport News with a connection from this new facility to the
Western Freeway (Route 164), in Portsmouth and with the CSX Transportation Corridor on the Peninsula for the transit component as adopted by the MPO.

Coordination in the MIS phase of the project included the Hampton Roads Crossing Study Coordinating Committee, regulatory resource agencies, and public involvement. MIS development meetings are listed in Table 8-1.

A. COORDINATING COMMITTEE
To help guide development of the study, the Hampton Roads Crossing Study Coordinating Committee was formed by VDOT in 1993. With one exception, the Coordinating Committee met at least quarterly through the MIS phase of the project. The Coordinating Committee included: FHWA; Federal Transit Administration (FTA); VDOT; Virginia Department of Rail and Public Transportation (VDRPT); representatives of the Hampton Roads Metropolitan Planning Organization; local public officials; and environmental agency representatives. The Coordinating Committee also included representatives from transit commissions, rail providers, port operators, and the military. Project development meetings were held with the Coordinating Committee to review the study progress and make recommendations concerning project direction, study techniques, and public meeting locations, schedules, and materials.

B. RESOURCE AGENCIES
In addition to the regulatory resource agencies included on the Hampton Roads Crossing Study Coordinating Committee, the project was introduced at VDOT’s Interagency Coordination Meeting on December 7, 1993. Additional resource agency coordination meetings have been held as part of the ongoing agency coordination process (Table 8-1).

C. PUBLIC INVOLVEMENT
All segments of the public have had the opportunity to be involved since the beginning of the project. Outreach efforts included public information meetings, newsletters, a telephone hotline number, and an Internet home page site. To date, three sets of public meetings and one set of MIS public hearings have been held for the project (Table 8-1). For each set of public meetings and public hearings, one was held on the Southside and one on the Peninsula. These meetings were advertised by placards placed in public buses, local newspaper advertisements, as well as on local television and radio
TABLE 8-1

MIS DEVELOPMENT MEETINGS

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>March, 1993</td>
<td>Coordinating Committee holds organizational meeting</td>
</tr>
<tr>
<td>August, 1993</td>
<td>Coordinating Committee meets to review technical approach of project and finalize project contract</td>
</tr>
<tr>
<td>December, 1993</td>
<td>Introductory presentation at VDOT’s monthly Interagency Coordination Meeting (IACM)</td>
</tr>
<tr>
<td>January, 1994</td>
<td>Coordinating Committee meets to discuss development of the Purpose and Need document and the transportation model</td>
</tr>
<tr>
<td>February, 1994</td>
<td>Update at IACM</td>
</tr>
<tr>
<td>May, 1994</td>
<td>Coordinating Committee meets to discuss public involvement program, Purpose and Need document, and household survey</td>
</tr>
<tr>
<td>July, 1994</td>
<td>Coordinating Committee meets to discuss Purpose and Need document and review public meeting materials</td>
</tr>
<tr>
<td>August, 1994</td>
<td>First set of public meetings</td>
</tr>
<tr>
<td>February, 1995</td>
<td>Coordinating Committee meets for a project update and to review materials being presented at March public meetings</td>
</tr>
<tr>
<td>March, 1995</td>
<td>Second set of public meetings</td>
</tr>
<tr>
<td>May, 1995</td>
<td>Coordinating Committee meets to discuss preliminary list of solutions and trip diversion report</td>
</tr>
<tr>
<td>August, 1995</td>
<td>Update at IACM</td>
</tr>
<tr>
<td>September, 1995</td>
<td>Coordinating Committee meets to review Draft Level I Analysis; agree on solutions to be carried forward for detailed study</td>
</tr>
<tr>
<td>September, 1995</td>
<td>Third set of public meetings</td>
</tr>
<tr>
<td>October, 1995</td>
<td>Update at IACM; Solutions carried forward for detailed study shown</td>
</tr>
<tr>
<td>March, 1996</td>
<td>Update at IACM</td>
</tr>
<tr>
<td>July, 1996</td>
<td>Coordinating Committee meets to discuss solutions being carried forward into MIS</td>
</tr>
<tr>
<td>August, 1996</td>
<td>Coordinating Committee meets to discuss recommendation to eliminate certain solutions</td>
</tr>
<tr>
<td>March, 1997</td>
<td>Coordinating Committee meets to discuss study process</td>
</tr>
<tr>
<td>April, 1997</td>
<td>Meetings held with HRPDC Technical Committee and MPO to discuss MIS Transportation Issues</td>
</tr>
<tr>
<td>May, 1997</td>
<td>Meetings held with HRPDC Technical Committee and MPO to discuss MIS Social and Environmental Information</td>
</tr>
<tr>
<td>May, 1997</td>
<td>Set of MIS public hearings held.</td>
</tr>
<tr>
<td>June, 1997</td>
<td>Meetings held with HRPDC Technical Committee and MPO to discuss MIS Financial Analysis and Public Hearing Feedback</td>
</tr>
<tr>
<td>July, 1997</td>
<td>Coordinating Committee meets; recommends that Transportation Corridor 9 be selected as the Locally Preferred Alternative</td>
</tr>
<tr>
<td>July, 1997</td>
<td>Meetings held with HRPDC Technical Committee and MPO; Transportation Corridor 9 selected as Locally Preferred Alternative</td>
</tr>
<tr>
<td>August, 1997</td>
<td>Presentation on study results given at Commonwealth Transportation Board (CTB) workshop</td>
</tr>
<tr>
<td>September, 1997</td>
<td>CTB endorses Transportation Corridor 9 as Locally Preferred Alt.</td>
</tr>
</tbody>
</table>
stations. A special effort was made to hold all meetings at locations accessible by public transit and persons with disabilities.

Approximately 3,300 newsletters were published before each set of public meetings/hearings and copies were distributed throughout Hampton Roads. The newsletters provide up to date information regarding the project as well as notices about upcoming public meetings. Special distribution efforts were made to assure that the newsletters reached civic groups, minority and low-income groups, senior citizens, and citizens who rely on public transportation. The newsletters were delivered to 92 special distribution points including local community centers, churches, public libraries, social service centers, public housing centers, and senior centers. A telephone survey of local social service agencies helped to identify churches with outreach programs. These churches were used as newsletter drop off points.

1. **Summary of MIS Public Meetings and Hearings**

   **a. First Set of Public Meetings (August 10 and 11, 1994; 2:00 PM to 8:00 PM)**
   The August 10th meeting was held at the Airport Hilton in Norfolk, 1500 North Military Highway. This meeting was attended by 56 people. The meeting on the August 11th was held at the Holiday Inn in Hampton, 1815 West Mercury Boulevard. This meeting was attended by 52 people. Citizens attending the meetings viewed a video containing information about the study and had the opportunity to talk with study representatives. They were also given handouts listing general findings of the study to date and given the chance to write down comments on a comment sheet.

   **b. Second Set of Public Meetings (March 8 and 9, 1995; 4:00 PM to 8:00 PM)**
   The March 8th meeting was held in the Webb Center (Newport News/Hampton Room) at Old Dominion University in Norfolk, 5115 Hampton Boulevard. This meeting was attended by 31 people. The meeting on the ninth was held at the PenTran Downtown Hampton Transportation Center, corner of King Street and Pembroke Avenue. This meeting was attended by 18 people. Citizens attending the meetings viewed boards showing generic solutions to the region’s transportation problems and were given the opportunity to react to these solutions by speaking with representatives from the study team and/or writing down comments on a supplied comment sheet. They were also given handouts citing the study’s progress to date.
c. Third Set of Public Meetings (September 20 and 21, 1995; 4:00 PM to 8:00 PM)
The September 20th meeting was held at Northside Middle School in Norfolk, 8720 Granby Street. This meeting was attended by 36 people. The meeting on September 21st was held at PenTran in Hampton, 3400 Victoria Boulevard. This meeting was attended by 26 people. At the meetings, an initial list of solutions to reduce congestion at the Hampton Roads Bridge Tunnel was presented to the public for input. The initial list of solutions is included in the third newsletter provided in this Technical Appendix. Comment sheets were provided at the meetings and study representatives were available for comments and questions.

d. MIS Public Hearings (May 21 and 22, 1997: 4:00 PM to 7:00 PM)
The meeting on May 21st was held at Northside Middle School in Norfolk, 8720 Granby Street. There were a total of 106 attendees. The meeting on May 22nd was held at Warwick High School in Newport News, 51 Copeland Lane. There were a total of 47 attendees. A summary of the comments received at these meetings is provided in Attachment I of this chapter.

2. Project Newsletters
Copies of each of the project newsletters are provided in Attachment II of this chapter.

III. ENVIRONMENTAL IMPACT STATEMENT
Coordination and scoping was conducted with federal, state, and local agencies throughout the Hampton Roads Crossing Study, in accordance with the National Environmental Policy Act (NEPA) guidance (40 CFR 1501.7).

A. SCOPING MEETINGS
A notice of intent was reissued in the Federal Register on June 1, 1998 officially announcing the project (FR vol. 63, no. 104). The notice of intent invited comments, suggestions, and questions from all interested parties. A formal Scoping Meeting was held on May 28, 1998 at the Hampton Roads Planning District Commission building in Chesapeake, Virginia. Representatives from federal, state, and local agencies, as well as consultants working on the project, were in attendance. The purpose of the Scoping Meeting included the following:

- To initiate preparation of the DEIS
- To invite participation of the resource agencies
• To summarize the project history
• To identify significant issues within the framework of the DEIS
• To develop consensus on appropriate level of analysis for the DEIS

Minutes from the meeting are included in Attachment III of this chapter. Comments were received from many of the agencies following the scoping meeting. Copies of these letters are included in Attachment VI of this chapter.

In addition to the formal scoping meeting described above, additional meetings were held with individual state, federal, and local agencies to obtain and share technical information and to further discuss technical aspects of the study. These meetings are documented in Table 8-2.

B. PUBLIC INVOLVEMENT

1. DEIS/Location Public Hearings
The Hampton Roads Crossing Study Draft Environmental Impact Statement (DEIS)/Location Public Hearings were held on January 24, March 1 and March 2, 2000 from 4:00 to 7:00 PM (Hearings previously scheduled for January 26 and 27, 2000 were cancelled due to inclement weather and rescheduled for the March dates). The DEIS was made available for public review prior to the public hearings. At the public hearings, citizens had the opportunity to ask questions concerning the project and make official statements for the project record. A total of 135 citizens attended the public hearings. A summary of the attendance and comments received at the public hearings is provided in Attachment IV of this chapter.

2. DEIS Comments and Responses
Comments on the DEIS were received from resource agencies, local municipalities, local agencies, and the public. As is consistent with CEQ guidelines (40 CFR 1503.4), substantive comments were responded to in one of three ways: (1) correct or revise text in the FEIS; (2) explain why the comment(s) did not warrant further agency response; and (3) supplement, improve, or modify analyses presented in the FEIS. The comments and responses to comments are presented in Attachment V of this chapter. Copies of agency letters are included in Attachment VI of this chapter.
## TABLE 8-2

**FEDERAL, STATE, AND LOCAL AGENCY MEETINGS**

<table>
<thead>
<tr>
<th>Date</th>
<th>Agencies Invited</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4/98</td>
<td>VIMS, VMRC, US Corps</td>
<td>Project History/Environmental Issues</td>
</tr>
<tr>
<td>3/11/98</td>
<td>VIMS, HRPDC</td>
<td>Economic Impacts</td>
</tr>
<tr>
<td>3/18/98</td>
<td>VIMS, VA Port Authority</td>
<td>Economic Impacts</td>
</tr>
<tr>
<td>3/25/98</td>
<td>VIMS</td>
<td>Water Quality/Aquatic Resources</td>
</tr>
<tr>
<td>5/28/98</td>
<td>US Corps</td>
<td>Craney Island Expansion Study</td>
</tr>
<tr>
<td>7/15/98</td>
<td>US Corps</td>
<td>Craney Island Expansion Study/Permits</td>
</tr>
<tr>
<td>9/19/00</td>
<td>IACM</td>
<td>Distribute Preliminary FEIS</td>
</tr>
</tbody>
</table>
ATTACHMENT I

SUMMARY OF MIS PUBLIC HEARING COMMENTS
MIS Public Hearings (May 21 and 22, 1997: 4:00 PM to 7:00 PM)
The meeting on May 21st was held at Northside Middle School in Norfolk, 8720 Granby Street. There were a total of 106 attendees. The meeting on May 22nd was held at Warwick High School in Newport News, 51 Copeland Lane. There were a total of 47 attendees.

The following is a summary of the comments received at these meetings. The complete public hearing transcripts are available from the Virginia Department of Transportation.

Total number of recorded statements, comment sheets, and correspondence received: 157
   May 21st meeting: 10 recorded statements; 119 comments sheets and correspondence
   May 22nd meeting: 6 recorded statements; 22 comments sheets and correspondence

Many people indicated a preference for one or more Transportation Corridor. The following is a breakdown of the indicated preferences:

<table>
<thead>
<tr>
<th>Number of people</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation Corridor 1</td>
</tr>
<tr>
<td>Transportation Corridor 2</td>
</tr>
<tr>
<td>Transportation Corridor 3</td>
</tr>
<tr>
<td>Transportation Corridor 4</td>
</tr>
<tr>
<td>Transportation Corridor 5</td>
</tr>
<tr>
<td>Transportation Corridor 6</td>
</tr>
<tr>
<td>Transportation Corridor 7</td>
</tr>
<tr>
<td>Transportation Corridor 8</td>
</tr>
<tr>
<td>Transportation Corridor 9</td>
</tr>
<tr>
<td>Transportation Corridor 10</td>
</tr>
<tr>
<td>Transportation Corridor 11</td>
</tr>
</tbody>
</table>

- Other (ideas listed below)
  1. Ferry Systems primarily for bicycles, walkers, and tourists in unison with the transportation systems in the Hampton Roads cities with landings in the heart of their downtown areas; including Virginia Beach with a convenient route to Suffolk and Williamsburg.
  2. Build one dual lane roadway and tunnel parallel to the Hampton Roads Bridge Tunnel and one dual lane roadway and tunnel parallel to the Monitor Merrimac Memorial Bridge Tunnel. Connect the Western Freeway to Hampton Blvd. at 26th and 27th streets in Norfolk.
  3. Use 38th Street in Norfolk from Hampton Blvd. west. At Parker Avenue angle off to right and run across city property with a tunnel to Western Freeway.
  4. A third crossing located halfway between the existing crossings and that is independent of the existing crossings.
  5. Dedicated signage that directs beach traffic to follow I-664. 530 AM radio station directs traffic to I-664 at all times and not just during congestion. Signage and radio cut in indicating that 55 mph speed limit must be maintained. Vehicles that don't obey will be warned, then ticketed. Slow moving vehicles may only use HRBT during “off hours”.
  6. Hovercraft from Hampton to Willoughby Spit and/or Waterside
  7. Corridor 11 without the connection between Craney Island and I-664 because a connection such as
this would block the development of port facilities on the western side of Craney Island.

8. Remove the combustion engine from the interstates and replace with a rubber to rail and rail to rubber system.

9. Construct a tunnel crossing from Hampton Blvd./Terminal Blvd. interchange to Craney Island and then connect to VA 164

10. An I-64 spur running along the edge of Fort Eustis connecting to a bridge or tunnel going across the James River which will connect to a new interstate paralleling Highway 10. The new interstate will connect I-295 near Hopewell or Petersburg with I-664/64 west of Portsmouth.

11. Construct a crossing from International Terminal Blvd. to Craney Island, then extend along Cedar Lane to connect to VA 164. In addition, a connection to the MMBBT along the northernmost tip of Craney Island should be constructed.

12. Instead of destroying habitat and displacing people, the Hampton Roads region needs to concentrate its efforts on producing an excellent public transit system to relieve traffic congestion.

13. A passenger rail crossing with the following two possible routes. Route 1. Originating at the Amtrak station in Newport News, then parallel to the Monitor Merrimac, Interstate 664 and Route 13 to the area of Greenbrier Office and Industrial Park. Busses from that point could provide passage to all areas of south side Hampton Roads. Route 2. Originate the same as Route 1, but separates from Route 13 near Deep Lake, swing south of Deep Creek and proceed east remaining south of heavily populated areas. The end of the line would be Virginia Beach.

14. A modified option 2, from I-564 in Norfolk connect Craney Island, interchanges at I-664 Monitor-Merrimac Bridge, Route 17 James River Bridge, continuing to a leg connecting near Rushmere another leg connecting Fort Eustis-Denby area.

A few people did not support any of the options. One stated that she lived in the area that would be affected in Corridors 2, 3, 5, 6, 8, 9, 10, and 11.

In addition, several people did not specifically select a Transportation Corridor, but supported the following locations for a new third crossing:

- 5 people supported a new crossing that would connect the existing ports, the planned port facility at Craney Island, and Naval Base Norfolk.
- 1 person supported the building of a new bridge-tunnel east of the existing Monitor-Merrimac, curving around Craney Island in Portsmouth and ending near NIT.
- 1 person selected Transportation Corridor 9 with a provision that rail should go up the CSX in addition to improving the highway along I-664.
- 1 person supported either a new crossing which best supports the local ports or the one that doubles-up the Hampton Roads Bridge Tunnel.
- 1 person supported an additional crossing but requested that the connection to Craney Island be made with a bridge and not a causeway, or any other protrusion from Craney Island because a causeway (or protrusion) would further impede the circulation and natural flushing of the harbor. (Included with this comment sheet is data and copies of reports on Craney Island and the Elizabeth River)
- 1 person stated that any project has to connect I-564, Craney Island, and I-664.
People were also given the opportunity to express their views on a number of revenue sources. Their responses and ideas are listed below:

<table>
<thead>
<tr>
<th>Number of People Who Support</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tolls</td>
<td>87</td>
</tr>
<tr>
<td>Gas Tax</td>
<td>66</td>
</tr>
<tr>
<td>Dedicated Sales Tax</td>
<td>31</td>
</tr>
<tr>
<td>Residential Property Assessment</td>
<td>2</td>
</tr>
<tr>
<td>Commercial Property Assessment</td>
<td>11</td>
</tr>
<tr>
<td>None of the Above</td>
<td>6</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>(ideas are listed below)</td>
<td></td>
</tr>
<tr>
<td>Lottery</td>
<td>3</td>
</tr>
<tr>
<td>Various port taxes (see sheets):</td>
<td>8</td>
</tr>
<tr>
<td>Virginia Port Authority and Navy</td>
<td>1</td>
</tr>
<tr>
<td>Federal and state funds</td>
<td>2</td>
</tr>
<tr>
<td>Highway trust fund</td>
<td>1</td>
</tr>
<tr>
<td>Solicit funds from big businesses</td>
<td>1</td>
</tr>
<tr>
<td>Commercial user tax</td>
<td>1</td>
</tr>
<tr>
<td>Toll trucks</td>
<td>2</td>
</tr>
<tr>
<td>Tourist Tax</td>
<td>3</td>
</tr>
<tr>
<td>Golf green tax</td>
<td>1</td>
</tr>
<tr>
<td>Dedicate center tube to heavy rail and get some funding from CSX, NS, and Amtrak</td>
<td>1</td>
</tr>
<tr>
<td>Reduce retirement for elected officials</td>
<td>1</td>
</tr>
<tr>
<td>Revenue Bonds</td>
<td>1</td>
</tr>
<tr>
<td>Sales tax on motor vehicles</td>
<td>1</td>
</tr>
</tbody>
</table>

For the most part, people felt that issues were being adequately addressed. Issues that some felt needed to be addressed in further detail include:

- Wildlife in Lochaven
- Construction of the railroad underpass at Greenbrier Avenue and Hampton Blvd.
- Navy’s access to water
- Safety Issue: Corridor 1 could cause problems with fire and rescue service to Willoughby Spit during any type of traffic problem times.
- More advance information about the public meetings should be provided
- Provide more information on other plans (e.g. light rail)
- Crany Island is an informal bird sanctuary (A list of bird species was provided)
- Noise Walls: Corridor 1 at I-64 requires a noise wall. Vibration effects are cumulative and physically damaging to residential structures and to the wildlife of Little Bay.
- Impact on Midtown Tunnel
- Impact on I-64 in Hampton and Norfolk
- Hampton Blvd. is a large safety issue
- Overdredging of the bay
- Movement of containers into NIT
Additional comments were provided on several comment sheets. A summary of these issues are listed below. Please refer to comment sheets for more detailed discussion.

- The No-Build is unacceptable
- More warning signs are needed along I-64 to warn of congestion.
- There is a need to meet with civic associations to get input and to maximize support for the project.
- Mass transit in the third crossing is a must.
- First priority should go to the construction of the I-564/I-64 connector and the Craney Island extension.
- Pedestrian and bicycle usage should be included in the crossing.
- Consider rail only in the CSX corridor, not highway.
- Construction should be phased
- Heavy truck traffic should be restricted on Hampton Blvd.
- Opposed to another tunnel at HRBT
- A passenger rail system needs to be constructed between the Peninsula and the Southside
- A few people opposed construction of a second Midtown Tunnel, and one person felt there was a need for a second Midtown Tunnel in addition to one of the new crossings from I-564 to I-664. Several people felt that a new crossing with the Craney Island extension could delay the need for a second Midtown Tunnel.
- Dedicated space should be provided in the tubes and on the bridges for utilities (water, sewer, power, communications).
- New tunnel system must include accommodation for a rail spur.
- Any new crossing should include the Craney Island extension.
- Endorsement of a third crossing should include a concurrent commitment to improve Rt. 460 from I-264/I-664 to I-295.
- Crossing needs to be built now/Need to speed up starting date.
- The crossing from Norfolk to Craney Island could be a high level bridge.
- Corridor 11 offers an opportunity to expand public transit services
- Consider a 4 tube tunnel. One for traffic each way, one for the train, and the fourth tube being for HOV or for truck traffic.
- Noise walls are needed on I-64 in Commodore Park of Norfolk
Hampton Roads transportation officials have watched traffic increase steadily between Newport News, known for its shipyards, and the nation's largest U.S. Navy Facility at Norfolk. Throw in Virginia Beach, which draws millions of tourists a year, and you have a recipe for miles of snarled traffic.

The chief transportation bottleneck is the I-64 Hampton Roads Bridge Tunnel. Built in 1957, it is the primary route between Southside Hampton Roads and the Peninsula. Expanded from two to four lanes in 1976, its increased capacity was almost immediately overtaken. Since the opening of the parallel bridge-tunnel and removal of its $1.25 toll, there has been more movement back and forth among the 1.5 million people who live in the area. Traffic flow now is 27.1 million vehicles a year with travelers experiencing the worst backups on weekends during the summer months.

It's a classic transportation problem: Moving large numbers of people and goods between two pieces of land, separated by water. While the problem may be an old one, the Virginia Department of Transportation (VDOT) is using a decidedly modern approach to solve it in the Hampton Roads area.

To determine how to improve the situation, VDOT has opted to start the Hampton Roads Crossing Study at "ground zero". By exploring the broader framework of how people move between Southside Hampton Roads and the Peninsula, this innovative approach will be the first transportation study to unify the whole

"Crossings", the Hampton Roads Crossing Study Newsletter, is published periodically by the Virginia Department of Transportation. The newsletter is designed to inform citizens within the study area of study progress and conclusions.
area as a transportation region. Unlike traditional transportation engineering studies that start with solutions rather than focusing on the larger needs or problems in a region, possible solutions will not even be discussed until 1995.

The VDOT Crossing Study is visionary in its focus on interaction between congested highways, poor rail service and limited bus service through the Hampton Roads Bridge Tunnel. Buses will begin to carry passengers next month.

The seemingly obvious solution of simply building another tunnel may not be the best one. VDOT knows that it is crucial that other available forms of transportation and congestion management be explored.

Also to be incorporated in the study are an environmental inventory of the area and a major investment study which could also offer long-term rewards for the region.

The cornerstone of the Crossing Study will be extensive public involvement in the decision making process. Gallup has surveyed residents to determine their transportation movements. A series of public meetings and other innovative means are being planned to gather public opinion.

In addition, a 30-member coordinating committee of local public officials, representatives from the Metropolitan Planning Organization, the armed forces, public transit, and transportation planning and environmental professionals will provide guidance.

The Hampton Roads Crossing Study is being funded with $5.9 million from the Innovative Project Program of the federal government's Intermodal Surface Transportation Efficiency Act of 1991. Michael Baker Corporation's Transportation Planning Department will be assisting VDOT in conducting the three year study, examining intermodal solutions to the area's traffic problems, and making intermodal changes to alleviate the congestion in the Hampton Roads Bridge Tunnel.
Before VDOT can put together a plan of action for improvements, a broad range of transportation issues in Hampton Roads need to be clearly defined. Although many of these problems may seem obvious if you live here, laying them out in a clear fashion requires some research and analysis. That's why VDOT has been working since January on the Purpose and Need document.

The Purpose and Need document will include the results of an evaluation of a broad range of transportation issues. It will look beyond traditional "highway" travel, to examine all transportation modes, including public transit, rail, and aviation. In addition to the movement of people, goods movement into and out of the region will also be examined.

Everyone knows that a strong economy is tied to an efficient transportation system. In order to completely evaluate the issues, the Purpose and Need document will also consider current key economic indicators for the region. By looking at both transportation and economic issues now, a better range of potential solutions can be proposed later.

When it comes to proposing solutions, another important factor has to be weighed. What about money? Just how much money is going to be available for transportation improvements? Where is it coming from? How do we ensure it is spent wisely? These questions have always been important, although requirements to consider them have not been very formal.

That changed in October of 1993. The federal government has issued regulations requiring the preparation of a Major Investment Study, called an MIS, for transportation projects in metropolitan areas like Hampton Roads. After problems are defined and the need for improvements is established, the MIS for the Hampton Roads Crossing Study will evaluate the cost effectiveness of various alternative investments such as mass transit, HOV lanes, light rail, and highway development. These options will be evaluated based on such factors as mobility improvements; social, economic and environmental effects; safety; operating efficiencies; land use and economic development; financing; and energy consumption.

We know the public has a great deal to say about purpose and need, as well as major investment options. That's why the first public meeting for this project is going to focus solely on giving you a chance to tell VDOT what you think are the transportation problems in Hampton Roads. While you are at it, you can also say what's on your mind about investing for the future.
VDOT WANTS TO HEAR FROM YOU!!!

Hampton Roads Crossing Study Public Information Meeting

- August 10, 1994: 2-6 PM; Airport Hilton, 1500 N. Military Hwy, Norfolk
- August 11, 1994: 2-6 PM; Holiday Inn Hampton, 1815 W. Mercury Blvd.

VDOT has scheduled the first public information meetings for the Hampton Roads Crossing Study. Meetings are being held on both the Peninsula and the Southside to give as many people as possible a chance to participate. Both locations are accessible by Pentran or TRT. For route information call Pentran at 723-3344 or TRT at 640-6300. These meetings will give you a chance to tell VDOT what you think about transportation problems in Hampton Roads. And, if you have ideas on how to solve them, VDOT wants to hear that too.

Thanks to those of you who have participated in our study so far. Public input is a valuable part of the Hampton Roads Crossing Study. We want to hear from you!

If you didn't get a chance to participate in the Gallup household survey, don't worry. You will have more opportunities to participate.

Plan to attend future meetings as more information becomes available.

And remember, you can always call the Hampton Roads Crossing Study Hotline:

1-800-276-HRCS
24 hours a day!

Project Study Team

Virginia Department of Transportation
Hampton Roads Crossing Study Coordinating Committee
Michael Baker Jr., Inc.
Maguire Associates, Inc.
COMSIS
Fitzgerald & Halliday, Inc.
Louis Berger & Associates, Inc.
Mott MacDonald
Harris, Miller, Miller & Hanson
E. L. Hamm & Associates, Inc.

Hampton Roads Crossing Study
Virginia Department of Transportation
c/o Michael Baker Jr., Inc.
770 Lynnhaven Parkway, Suite 120
Virginia Beach, VA 23452

BULK RATE
POSTAGE & FEES
PAID
PERMIT NO. 2095
On Track for '95

Purpose and Need Document Approval

The Purpose and Need Document for the Hampton Roads Crossing Study was approved on October 21, 1994, two months ahead of schedule. This analysis provides facts to back up what most of you already know -- getting around Hampton Roads can be difficult. Inside you will find a fact sheet that provides a summary of issues.

Public transit, rail, highways, waterways, and bicycle and pedestrian facilities were examined in order to thoroughly investigate possible transportation problems in Hampton Roads. Key economic factors considered included accessibility between the Southside and the Peninsula, population and employment, military facilities, tourism, and port and shipbuilding facilities.

Early completion of the Purpose and Need Document has allowed the study team to get an early jump on the next phase of work. In this phase, we will consider solutions to meet the variety of defined needs. Evaluating the potential effects of solution alternatives will take place throughout 1995.

The public deserves thanks for helping out in 1994. Much of the credit for an early finish goes to you. THANKS!

Purpose and Need Document Findings

The Purpose and Need Document contains many findings. Some highlights include:

❖ 76% of all commuters in the region drive alone.
❖ Only 2% of all commuters in the region use public transit.
❖ The ports in Hampton Roads handle more cargo than any other on the East Coast.
❖ Traffic on I-64 is expected to increase 95% by the year 2015. This is 4 times faster than the population is expected to increase.
❖ Nearly 60% of I-64 experiences severe congestion. By 2015 that goes to 100%.
Environmental Mapping:
An Important Part of Alternatives Development

New development of any kind should avoid sensitive environmental areas, to the extent practical. It's not only the law; it's the right thing to do. That's why the Virginia Department of Transportation (VDOT) will map known locations of environmental concern on the Southside and Peninsula as a part of the alternative development phase. By considering the environment now, work can be better focused on those alternatives that have the best chance of actually being implemented.

Mapping the sensitive environmental areas in Hampton Roads will not be restricted to only the natural environment (e.g. wetlands, rare species, etc.) The study team will also map important features such as schools, cemeteries, hazardous waste areas, and prehistoric and historic sites that might be affected by potential alternatives. While the focus for developing alternatives will concentrate on the future, VDOT will not ignore the present or the past in developing alternatives.

The mapping effort and alternative development work will be coordinated with the environmental resource agencies having jurisdiction over permit requirements. Everyone comes out a winner when environmental considerations are made an integral part of the alternatives development process.

At public meetings to be held later this year, you will have a chance to inspect these maps, and see how they are being used.

Hampton Roads Crossing Study Timeline

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Public Meetings: Aug '94, Mar '95, Aug '95, Dec '95, May '96, Nov '96
- MIS* and Alternative Analysis
- Environmental Analysis
- Project HOTLINE - 1-800-276-HRCS

* Major Investment Study

CROSSINGS
SELECTED RESULTS FROM A HOME INTERVIEW SURVEY

Did you know...

- That only 23% of all weekday trips taken in the Hampton Roads area are between home and work?
- That 47% of all weekday trips taken in the area are between home and locations other than work?
- That 30% of all weekday trips taken in the area do not begin or end at home?

**Trips per household by household size**

- **Persons per household**: 1, 2, 3, 4+, Trips per household: 0, 2, 4, 6, 8, 10, 12

**Trips per household by auto availability**

- **Autos per household**: 0, 1, 2, 3+, Trips per household: 0, 2, 4, 6, 8, 10, 12

**Trip Characteristics**

**Time of Day**

- **Hour of Trip Origin**: AM, PM, Trips: 0, 250, 500, 750, 1000

**Trips per household by Peninsula/Southside**

- **Peninsula, Southside**: Trips per household: 0, 2, 4, 6, 8, 10, 12

**Legend**

- **Home-Based Work**: A trip that goes between home and work
- **Home-Based Other**: A trip that begins or ends at home but does not involve work
- **Non-Home-Based**: A trip that neither starts nor ends at home

CROSSINGS
SECOND PUBLIC MEETING SCHEDULE!!!

March 8, 1995, 4:00-8:00 PM
Old Dominion University
5115 Hampton Boulevard
Webb Center-Newport News/ Hampton Room
Norfolk, VA

March 9, 1995, 4:00-8:00 PM
PenTran - Downtown Hampton
Transportation Center
Corner of King Street and Pembroke Avenue.
Hampton, VA

VDOT invites you to participate in the second series of public meetings for the Hampton Roads Crossing Study. In August 1994, you helped us identify some of the problems occurring at the I-64 Hampton Roads Bridge Tunnel. At the March 8th and 9th public meetings you can help us start the process of identifying solutions.

These alternative solutions may include a combination of:
- Highways
- Light Rail Transit
- Busways
- Upgrading of Existing Roads
- Water Transportation
- Heavy Rail
- ...any other suggestions you may have.

Your input at these meetings will help us to develop cost-effective solutions to reduce congestion at the Hampton Roads Bridge Tunnel and support the movement of goods and people within the region.

Thanks to those of you who attended the first public meetings for the study. Your input is an important part of the Hampton Roads Crossing Study. And remember, you can always call the Hampton Roads Crossing Study Hotline.

1-800-276-HRCS
24 hours a day!

---

NEED MORE INFO ON PUBLIC MEETINGS?

NEED MORE COPIES OF CROSSINGS?

JUST CALL THE HOTLINE NUMBER...

Hampton Roads Crossing Study
Virginia Department of Transportation
c/o Michael Bakor, Jr., Inc.
770 Lynnhaven Parkway, Suite 120
Virginia Beach, VA 23452

- Address Correction Requested -
Transportation Facts *

Highways

- 57% of I-64 currently operates at the poorest level of service; by 2015 this will be 100%
- Traffic on I-64 is expected to increase 95% by 2015. This is 4 times faster than the population is expected to increase.
- Volumes on U. S. 17 are expected to increase 117% by 2015
- Volumes on 34% of the proposed National Highway System in the study area are expected to increase over 100% by 2015

Public Transit

- Only 2% of all commuters in the region use public transit
- TRT ridership decreased 43% from 1980 - 1993
- PenTran ridership increased 17% from 1980 - 1993

Single Occupancy Vehicles and Alternatives

- 76% of all commuters in the region drive alone
- 15% of all commuters in the region carpool
- Currently, there are 16.2 miles (27 Km) of High Occupancy Vehicle lanes on the Southside
- Currently, there are no HOV facilities on the Peninsula

Rail

- Yearly, rail moves over 27 million metric tons of general freight on both the Peninsula and the Southside
- In addition to general freight, 26 million metric tons of coal were moved in the study area in 1993
- Amtrak ridership increased 29% from 1989 - 1991
- Amtrak does not directly access the Southside
- There are no light rail facilities in the study area

*Compiled from the Purpose and Need Document of the Hampton Roads Crossing Study
Aviation

- From 1980-1990 passenger enplanements increased 41% at the Norfolk International Airport and increased 45% at the Newport News/Williamsburg International Airport
- From 1991-1992 cargo increased 24% at the Norfolk International Airport and decreased 20% at the Newport News/Williamsburg International Airport
- Neither rail nor transit serves either airport

Waterways and Port Facilities

- General cargo tonnage increased 188% from 1983-1992
- Truck traffic into the ports is expected to increase by at least 100% by 2010
- Hampton Roads handles more cargo than any other port on the East Coast

Bicycle and Pedestrian Facilities

- There are approximately 101 miles (169 Km) of bikeways in the study area
- Bicycle facilities are mainly used for recreational travel in the study area
- There are no bicycle or pedestrian linkages between the Southside and Peninsula

Environmental Factors

- The region is currently in non-attainment for ozone
- Non-point sources, such as highways, are contributors to water pollution primarily through water runoff containing petroleum products
- In order to meet requirements of the Clean Air Act, the region must implement transportation solutions that help to reduce emissions and overall vehicle miles of travel

Emergency Services

- Within the last century, there have been three severe hurricanes in the region
- While an average of two hurricanes a year come close enough to affect Virginia, Hampton Roads has not experienced a direct hit in over two decades
- There is a need to evacuate the "at risk" population in the event of an emergency

*Compiled from the Purpose and Need Document of the Hampton Roads Crossing Study*
Inside this edition of Crossings you will find an initial list of solutions to reduce congestion at the Hampton Roads Bridge Tunnel. These potential solutions were derived from suggestions made by the public, TRT, PenTran, port and freight operators, the military, and government officials. Each suggestion was analyzed to determine if it would:

- Reduce peak hour volumes at the Hampton Roads Bridge Tunnel by 10% or more
- Address existing and future Origin and Destination patterns between the Southside and Peninsula
- Provide a direct connection to the major ports or serve as a major freight corridor
- Connect to an existing expressway

Maps showing the solutions are presented on the inside pages. The solutions include constructing a new transportation facility, upgrading US 460 corridor from Suffolk to Petersburg, and implementing congestion management strategies. Any of the crossing solutions could be designed to combine various kinds of transportation including:

- Multi-lane Highway (SOV and/or HOV lanes)
- Light Rail Transit
- Heavy Rail (Amtrak, commuter, or rapid rail)
- Freight Rail
- Busway
- Dedicated Fixed Guideway Transit
- Dedicated Corridor for Trucks
- Bicycle/Pedestrian

Transit combinations will be studied more thoroughly during the next level of analysis when the study team analyzes things like future housing and employment concentrations. The cost-effectiveness of each potential solution will be evaluated in the final analysis along with such factors as mobility improvements; social, economic, and environmental impacts; safety; operating efficiencies; land use; financing options; and energy consumption.

Turn the page, take a look, and let us know what you think...
SOLUTIONS PROPOSED TO PROCEED TO THE NEXT LEVEL OF ANALYSIS*

Construct a New Transportation Crossing

1. Parallel to the Hampton Roads Bridge Tunnel.
- May reduce peak hour volumes at the Hampton Roads Bridge Tunnel by 15-20%
- Addresses Southside/Peninsula Origin and Destination patterns
- I-64 serves as a major freight corridor
- Connects to I-64

2. From I-564 across the Naval Base railroad right-of-way to I-664 in Newport News. An optional extension to VA 164 can be included.
- May reduce peak hour volumes at the Hampton Roads Bridge Tunnel by 15-20%
- Addresses Southside/Peninsula Origin and Destination patterns
- Connects Norfolk International Terminal, Portsmouth Marine Terminal, and Newport News Marine Terminal
- Connects to I-564, VA 164, and I-664

3. Parallel to the Monitor Merrimac Memorial Bridge Tunnel.
- May reduce peak hour volumes at the Hampton Roads Bridge Tunnel by 5-10%
- Addresses Southside/Peninsula Origin and Destination patterns
- I-664 serves as a major freight corridor
- Connects to I-664

*Lines represent concepts only and do not represent precise locations.
Optional Extension to Crossing Solutions

1. Along the CSX right-of-way in Newport News to I-64 near Williamsburg.
   - May reduce peak hour volumes at the Hampton Roads Bridge Tunnel by 15-20%
   - Addresses Southside/Peninsula Origin and Destination patterns
   - Will continue to serve as a major freight corridor
   - Connects to I-664 and I-64

Upgrade Existing Roadway

1. Upgrade US 460 corridor from Suffolk to I-295 in Petersburg.
   - May reduce peak hour volumes at the Hampton Roads Bridge Tunnel by 5-10%
   - Does not address Southside/Peninsula Origin and Destination patterns, but does address movement into and out of the region
   - US 460 serves as a major freight corridor
   - Connects to I-64, I-664, I-264 and I-295

Congestion Management Strategies

Congestion management strategies are relatively low cost solutions which could reduce congestion at the Hampton Roads Bridge Tunnel by anywhere from 5 to 20% depending on the strategy implemented. They have the potential of being implemented on all existing expressways, and some may increase the efficiency of freight movement in the Hampton Roads region. The various strategies include:

1. Implement Transportation Demand Management Strategies
   - Alternative Work Schedules
   - Ridesharing Programs
   - Parking Management
   - Telecommuting

2. Implement Transportation System Management Strategies
   - Pre-trip Travel Information
   - En-route Travel Information
   - Incident Management
   - Public Transportation Management
   - Commercial Fleet Management

3. Implement Congestion Pricing
   - User fees dependent on the level of congestion
   - HOV's may receive a discount or a free trip

4. Provide Additional Bus Service. Could include combinations of the following:
   - Increase service for the Crossroads bus route. Provide additional Park & Ride lots.
   - Express bus service connecting Williamsburg, downtown Hampton, Norfolk Naval Base, downtown Norfolk, and the Oceanfront. Provide additional Park & Ride lots.
   - Provide demand responsive transit between the Peninsula and the Southside.
THIRD PUBLIC MEETING SCHEDULE!!!

<table>
<thead>
<tr>
<th>September 20, 1995, 4:00-8:00 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northside Middle School</td>
</tr>
<tr>
<td>8720 Granby Street</td>
</tr>
<tr>
<td>Norfolk, VA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>September 21, 1995, 4:00-8:00 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PenTran</td>
</tr>
<tr>
<td>3400 Victoria Boulevard</td>
</tr>
<tr>
<td>Hampton, VA</td>
</tr>
</tbody>
</table>

Your chance to really get involved in picking solutions!

VDOT invites you to participate in the third series of public meetings for the Hampton Roads Crossing Study. In March, 1995, you helped us start the process of identifying solutions to reduce congestion at the I-64 Hampton Roads Bridge Tunnel. At the September public meetings we want your input on the solutions that have been proposed to proceed to the next step.

Both public meeting locations are accessible by PenTran or TRT. For route information, call PenTran at 723-3344 or TRT at 640-6300. If you require special assistance at the meetings please call the hotline number so we can accommodate your needs.

Thanks to those of you who attended the second public meetings for the study. Your input is an important part of the Hampton Roads Crossing Study. And remember, you can always call the Hampton Roads Crossing Study Hotline.

1-800-276-HRCS
24 hours a day!

Need more info on Public Meetings?
Need more copies of CROSSINGS?
Just call the Hotline Number...

Hampton Roads Crossing Study
Virginia Department of Transportation
c/o Michael Baker, Jr., Inc.
770 Lynnhaven Parkway, Suite 120
Virginia Beach, VA 23452
The Hampton Roads Crossing Study is investigating solutions for improving mobility across Hampton Roads. If no improvements are made by the year 2015, the number of incidents causing delays of 15 minutes or longer at the Hampton Roads Bridge Tunnel could reach 21 a day or nearly one every hour. Eleven Transportation Corridors are being evaluated in a Major Investment Study (MIS). A MIS is a relatively new planning tool within the metropolitan transportation planning process. The MIS evaluates:

- Transportation Issues
- Conceptual engineering issues
- Environmental issues
- Social issues
- Financial requirements

A map depicting the eleven Transportation Corridors is provided on the next page. Some important features of the Transportation Corridors are:

- Corridor 1 provides a new crossing parallel to the existing I-64 Hampton Roads Bridge Tunnel.

- Corridors 2, 3, 5, 6, 8, 9, 10, and 11 each provide a new crossing from Newport News to Norfolk, and each provide a direct connection from the Peninsula to Norfolk International Terminals and Naval Base Norfolk. Each of these corridors improves access between Norfolk and Newport News Marine Terminal and Newport News Shipbuilding and Drydock Company.

- Corridors 4 and 7 each provide a crossing parallel to the existing I-664 Monitor Merrimac Memorial Bridge Tunnel.

- Corridors 8, 9, 10, and 11 each provide a new interchange located south of the existing I-664 Monitor Merrimac Memorial Bridge Tunnel, and each provide a new crossing from Southside I-664 to Norfolk International Terminals and Naval Base Norfolk.

- Corridors 3, 6, 9, and 11 each provide a new connection across Crancey Island to VA 164 in Portsmouth, and each provide a new direct connection from VA 164 to Norfolk International Terminals and Naval Base Norfolk. Each of these corridors improves access between Naval Base Norfolk and the Naval Hospital, Naval Shipyard, and Naval Supply Center located in Portsmouth.

- Corridors 5, 6, 7, 10, and 11 each provide a new transportation facility along the CSX railroad corridor from downtown Newport News to I-64 near Bland Boulevard

Each of the Transportation Corridors includes a three tube tunnel crossing. Two tubes can carry automobile traffic. The third tube could be used for multimodal purposes. These purposes could include reversible HOV lanes, an exclusive busway, exclusive truck lanes, or a passenger rail system.
CORRIDOR 1
CORRIDOR 2
CORRIDOR 3
CORRIDOR 4
CORRIDOR 5
CORRIDOR 6
CORRIDOR 7
CORRIDOR 8
CORRIDOR 9
CORRIDOR 10
CORRIDOR 11
TRANSPORTATION CORRIDORS
### GENERAL TRANSPORTATION INFORMATION

**COMPARISON OF NO-BUILD AND 11 TRANSPORTATION CORRIDORS**

<table>
<thead>
<tr>
<th>Total Trips Between Peninsula and Southside</th>
<th>240,000</th>
<th>240,000</th>
<th>252,000</th>
<th>250,000</th>
<th>246,000</th>
<th>254,000</th>
<th>253,000</th>
<th>246,000</th>
<th>274,000</th>
<th>270,000</th>
<th>279,000</th>
<th>281,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADT Volume at HRBT</td>
<td>111,000</td>
<td>143,000</td>
<td>84,000</td>
<td>85,000</td>
<td>95,000</td>
<td>78,000</td>
<td>84,000</td>
<td>97,000</td>
<td>84,000</td>
<td>82,000</td>
<td>82,000</td>
<td>82,000</td>
</tr>
<tr>
<td>Per Lane Volumes at HRBT</td>
<td>27,750</td>
<td>17,875</td>
<td>21,000</td>
<td>21,250</td>
<td>24,500</td>
<td>19,500</td>
<td>21,000</td>
<td>24,250</td>
<td>21,000</td>
<td>20,500</td>
<td>20,500</td>
<td>20,500</td>
</tr>
<tr>
<td>(% Decrease from No-Build)</td>
<td>(-36%)</td>
<td>(-24%)</td>
<td>(-23%)</td>
<td>(-12%)</td>
<td>(-30%)</td>
<td>(-24%)</td>
<td>(-13%)</td>
<td>(-24%)</td>
<td>(-26%)</td>
<td>(-26%)</td>
<td>(-26%)</td>
<td>(-26%)</td>
</tr>
<tr>
<td>Peak Hour V/C at HRBT</td>
<td>1.63</td>
<td>1.00</td>
<td>1.24</td>
<td>1.25</td>
<td>1.44</td>
<td>1.15</td>
<td>1.23</td>
<td>1.43</td>
<td>1.23</td>
<td>1.21</td>
<td>1.21</td>
<td>1.21</td>
</tr>
<tr>
<td>Planning Cost Estimate for Construction (in billions$)</td>
<td>$1.5</td>
<td>$1.8</td>
<td>$2.1</td>
<td>$1.6</td>
<td>$2.6</td>
<td>$2.8</td>
<td>$2.2</td>
<td>$2.2</td>
<td>$2.4</td>
<td>$3.2</td>
<td>$3.3</td>
<td></td>
</tr>
</tbody>
</table>

1. The No-Build is defined as the Hampton Roads 2015 Regional Transportation Plan, which is funded for 3.5 billion dollars.
2. Transportation Corridor Costs are in addition to the 2015 Regional Transportation Plan.
3. HRBT = Hampton Roads Bridge Tunnel

---

### Financing Options

An important part of the MIS process is determining how a project can be funded. The MIS is focusing on potential funding sources which could be used in a variety of combinations to construct feasible financing packages. These funding sources include capital infusions and revenue streams. Capital infusions refer to lump-sum up-front investments to capitalize the project. The most common source of such investments in transportation infrastructure are grants through the Virginia Department of Transportation (VDOT).

Another potential source of capital infusions are agencies with an interest in transportation access to the region, both at the federal and state level. Revenue streams are funds which enter the project over time, either continually or on an annual basis. These include user fees, beneficiary charges, and streams of government revenue. When a Preferred Corridor is selected, additional detailed financial studies will be conducted to assemble an appropriate financing package.

---

### The Next Step: Selection of a Locally Preferred Corridor

As this stage of the planning process comes to a close, we need you to help us select a Locally Preferred Corridor. Transportation, social, and environmental information will be presented at the public hearings. This information will help you to make a decision on your preferred corridor. Your input will then be given to the Hampton Roads Metropolitan Planning Organization (MPO) to aid them in making their decision on a Locally Preferred Corridor. The schedule below shows when these elected officials will be making their decision. After a Locally Preferred Corridor has been selected by the MPO and endorsed by the Commonwealth Transportation Board (CTB), additional and more detailed studies for alignments within the selected corridor will be conducted. These alignments will be the subject of an Environmental Impact Statement prepared in accordance with the National Environmental Policy Act (NEPA).

**Project Schedule:**
- **Metropolitan Planning Organization (MPO) Meeting** .................................. June 18, 1997
  - Review public input from the MIS Public Hearings
- **Commonwealth Transportation Board (CTB)** .................................. September, 1997
  - Decision on Endorsement of Locally Preferred Alternative
- **Decision on Locally Preferred Corridor** .................................. July 16, 1997
  - Decision on Locally Preferred Corridor

---

*This content is extracted from the document and formatted for better readability.*
### MIS Public Hearing Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday, May 21, 1997</td>
<td>Anytime between 4:00 and 7:00 PM</td>
<td>Northside Middle School</td>
<td>Norfolk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8720 Granby Street</td>
<td></td>
</tr>
<tr>
<td>Thursday, May 22, 1997</td>
<td>Anytime between 4:00 and 7:00 PM</td>
<td>Warwick High School</td>
<td>Newport News</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51 Copeland Lane</td>
<td></td>
</tr>
</tbody>
</table>

**PLEASE PLAN TO ATTEND THESE IMPORTANT MIS PUBLIC HEARINGS.**
**THIS IS YOUR CHANCE TO MAKE A DIFFERENCE!!!**

VDOT wants you to participate in the Hampton Roads Crossing Study MIS Public Hearings. The public hearings will provide you an opportunity, in an open forum, to review and discuss important information with the study team. Oral comments will be taken at the hearings. Written comments relative to the proposed project may also be submitted at the public hearing or to the Department at any time within 10 days after the hearing. If you require special assistance to attend and participate in this hearing, please call the Norfolk Resident Engineer at 1-888-723-8401 (toll free).
ATTACHMENT III

SCOPING MEETING MINUTES
Summary Minutes
Scoping Meeting for Draft Environmental Impact Statement
Project No. 0064-114-F12, PE-102
Hampton Roads Crossing Study

Date of Meeting
May 28, 1998

Time
1:00 PM

Location
Hampton Roads Planning District Commission
The Regional Building
723 Woodlake Drive
Chesapeake, VA 23320

The Meeting was attended by:

Tom Barnard  VA Institute of Marine Science
Noelle Brown  Pentran/TRT
Dale Castellow  City of Virginia Beach
Denis Cournoyer  TRT Engineering
Robert P. Creecy  City of Portsmouth
Jeff Cutright  VDOT
Erin K. Dunn  VDOT Public Relations
Dwight Farmer  HRPDC
Paul E. Fisher  Suffolk Planning
Laura Grignano  VA Marine Resources Commission
Richard Hartman  City of Portsmouth
Donna Huang  VA DEQ – Air Division
Ray Kirby  Navy
Peter Kube  Army Corps of Engineers – Regulatory Division
William C. LaBaugh III  VDRPT
Tom McCarthy  Army Corps of Engineers – Planning Division
Pete Monday  Baker
Terry O’Neill  City of Hampton
Jeff Raliski  City of Norfolk
Camelia Ravanbakht  HRPDC
Tommy Richardson  Economic Development, City of Portsmouth
Charlie Rinehart  Louis Berger
Bob Siegfried  Baker
Kay Simpson  Louis Berger
Philip Shucet  Baker
Laura Shucet  Fitzgerald & Halliday, Inc.
Tom Slaughter  City of Newport News
Bruce Turner  FHWA
Gary Waldo  City of Chesapeake
Horace Welsh  VDOT
Jayne Whitney  TRT
Ken Wilkinson  VDOT
Mollie Wolcott  VA Port Authority
Ken Wilkinson - VDOT

- Ken opened the meeting by greeting and thanking everyone for attending the meeting. He pointed out that this meeting is the kick-off for NEPA’s formal scoping process. The study is a cooperative effort with FHWA as the lead agency.

Philip Shucet – Baker Environmental

- Philip went over the background of the project. A Purpose and Need document was published in November of 1994, and a Major Investment Study (MIS) was published in October of 1997. The MIS studied 11 Transportation Corridors and the No-Build. The MPO selected Transportation Corridor 9 as the Locally Preferred Alternative in July of 1997, and the Commonwealth Transportation Board endorsed their selection in September of 1997.

- Philip then went over the alternatives which will be studied in the DEIS. He explained that the MIS is not a NEPA document, and the EIS must meet a test of legal sufficiency for alternatives analysis. EIS alternatives will include the No-Build Alternative, Candidate Build Alternative (CBA) 1, and CBA 9. CBA 1 will provide a new transportation crossing parallel to the existing I-64 Hampton Roads Bridge Tunnel and will improve I-64 on the Southside to the I-564 interchange and on the Peninsula to the I-664 interchange. CBA 9 will provide a new transportation crossing parallel to the existing I-664 Monitor Merrimac Memorial Bridge Tunnel. It includes a new interchange near the south approach structure of the Monitor Merrimac Memorial Bridge Tunnel connecting to a new roadway and bridge-tunnel extending from I-664 to I-564 in Norfolk. The existing and the new-bridge tunnel would work in conjunction with each other; one would carry traffic from the Peninsula to the Southside, and the other would carry traffic from the Southside to the Peninsula. CBA 9 also includes a connection to VA 164 in Portsmouth, and it would improve I-664 on the Southside and the Peninsula.

- Preliminary engineering in the DEIS will be developed to a level of detail which will allow for equal evaluation of environmental impacts. Both of the CBAs include a three-tube tunnel crossing. Two of the tubes will be used to carry conventional traffic, and the third tube could be used to carry HOV, buses, trucks, and/or passenger rail. To accommodate the multi-modal component of the project, Philip pointed out that additional engineering analysis needs to be conducted to determine the typical section for carrying SOV/HOV along I-64 or I-664 on the Peninsula, while connecting the multi-modal option with the proposed CSX corridor. Additional engineering also needs to be conducted to determine the typical section for carrying SOV/HOV along I-64 on the Southside while connecting the multi-modal option with the proposed LRT corridor.

- Philip then went over some issues that have been identified as important in the development of the DEIS. These issues include the following:

  - **Displacements:** In the MIS, Transportation Corridors 1 and 9 had substantially fewer potential displacements than the majority of the other Transportation Corridors which ranged from 900 to 1500 residential unit displacements. The social inventory for Transportation Corridor 1 included 180 residential units, 21 business units, and 7 community facilities. The social inventory for Transportation Corridor 9 included 125 residential units, 43 business units, and 5 community facilities. As engineering is refined in the DEIS, these impacts will most likely be reduced.

  - **Environmental Justice:** Information on possible Environmental Justice issues will be obtained from low-income and minority populated areas. Using FHWA methodologies, it
will be determined if the project disproportionately impacts low-income or minority populations.

- **Air Quality**: In the MIS analysis, the predicted VOC and NOx levels for design year 2015 Transportation Corridors 1 and 9 were less than the 1990 base year level and predicted design year No-Build level. In the DEIS, a microscale and mesoscale analysis will be conducted in accordance with the Clean Air Act Amendments of 1990.

- **Threatened and Endangered Species**: The Kemp’s Ridley Sea Turtle, Loggerhead Sea Turtle, and the Atlantic Green Sea Turtle have been documented in Hampton Roads. One field survey is proposed in coordination with the appropriate agencies for the three sea turtles. The Piping Plover has been documented on Craney Island. One field survey is proposed in coordination with the appropriate agencies. The Canebrake Rattlesnake has been documented in the vicinity of CBA 9 in Suffolk. An analysis of potential impacts will be conducted. The Atlantic Bottlenose Dolphin and the Harbor Porpoise have been documented in Hampton Roads. An analysis of potential impacts will be conducted in accordance with the Marine Mammal Protection Act.

- **Water Quality Sampling**: For each stream encroachment, sampling will include pH, dissolved oxygen, turbidity, and salinity. As appropriate and in addition to the previously listed criteria, sampling in Hampton Roads and the mouth of the Elizabeth River will include fecal coliform, organics, heavy metals, and inorganics. Macro invertebrate indicator species information will be collected from existing literature or the field.

- **Sediment Quality Assessment**: In Hampton Roads and the mouth of the Elizabeth River, a sediment quality assessment will be conducted to determine the concentration of organic and metal contaminants within the top foot of the bottom sediments. The assessment will supplement the existing database.

- **Modeling of New Bridge Tunnels**: Computer modeling will be conducted to assess circulation impacts and sediment transport impacts. Emphasis will be placed on the eddy front system off of Newport News and the Middle Ground clam sanctuary.

- **Aquatic Resources**: Impacts to aquatic resources will be identified and assessed. Emphasis will be placed on shellfish and submerged aquatic vegetation.

- **Wetlands**: Wetland delineations will be conducted in accordance with the 1987 Corps of Engineers manual and will be recorded using a GPS unit. Potential impacts to function and values of wetland systems will be identified using best professional judgement. All measures to avoid and minimize wetland impacts will be documented, and mitigation measures will be identified where appropriate.

- **Cultural Resources**: A terrestrial archaeological identification survey and a determination of eligibility and criteria of effects on historic sites will be conducted. A remote sensing survey will be conducted to determine the presence of submerged cultural resources.

- **Potential Section 4(f) Resources**: In MIS, all public parks and recreation areas were identified and measures were taken to avoid these areas. There are no wildlife or waterfowl refuges in the vicinity of the CBAs. For DEIS, an impact analysis will be conducted within the ROW to determine the use of any Section 4(f) properties (historic sites, public parks, and public recreation areas).
• Craney Island: There are many engineering issues associated with Craney Island. The Corps has expressed concerns about CBA 9 limiting the dredged material placement on Craney Island. There are also studies ongoing which are looking at expanding Craney Island to the east and potentially being the location of a new marine terminal. Philip stated that the project team had met with the Corps earlier in the day, and continued coordination with the Corps will be conducted.

• Additional topics which will be included in the DEIS include: land use; socio-economics, visual and aesthetics; noise and vibration; groundwater; floodplains; energy; coastal barriers and coastal zones; hazardous waste sites; and farmlands.

• Philip noted that over 75 invitation letters had been sent out for the scoping meeting. Letters were sent to federal, state, regional and local agencies.

• The anticipated schedule is as follows:
  
<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signed DEIS</td>
<td>Summer, 1999</td>
</tr>
<tr>
<td>Public Hearings</td>
<td>Summer, 1999</td>
</tr>
<tr>
<td>Signed FEIS</td>
<td>Fall, 1999</td>
</tr>
<tr>
<td>Record of Decision</td>
<td>Winter, 1999-2000</td>
</tr>
</tbody>
</table>

**Questions and Comments**

**Dona Huang** – DEQ Air Division

• Will the DEIS use the revised 2018 traffic projections?

  • Philip responded that the traffic projections will be updated.

**Terry O’Neill** – City of Hampton

• Can pieces of other alternatives be taken and pieced together? Specifically, can the I-164 connection be added to CBA 1?

  • Philip stated that the DEIS can study that addition to CBA 1.

**Richard Hartman** – City of Portsmouth

• Because the MIS studied 275-foot corridors for potential social impacts, does this mean that alignments have already been determined?

  • Philip responded by stating that corridors were selected in the MIS for comparison purposes. In the EIS, shifts in the corridors and alignments within the corridors can be considered.

**Richard Hartman** – City of Portsmouth

• How can the city of Portsmouth give input on where they want the VA 164 connector to be located?

  • Philip stated that the project team will be looking at up to five different locations for the VA 164 connector. It will take some time before this information is developed. Once it is developed, a meeting with the City of Portsmouth can be scheduled.
Jeff Raliski – City of Norfolk
- I heard that the governor has put in money for the I-564 connector and want to know how this would affect the Hampton Roads Crossing Study (HRCS)?
  - Ken Wilkinson stated that the Secretary of Transportation met with the commissioner and thought that the I-564 connector from I-564 to around Hampton Boulevard would be a good intermodal connection. There is talk about doing the connector as a separate project. If it moves forward, HRCS would still have to look at a range of alternatives with logical termini.

Bruce Turner – FHWA
- The I-564 connector would have to serve as a separate project with independent purpose and need. HRCS would still have the same termini.

Peter Kube – Army Corps of Engineers
- Is the EIS going to recommend what type of modes will go in the modal tube?
  - That option will be left open and the EIS will cover range of impacts of modal options. Heavy freight rail and high-speed rail are not being considered for the modal tube based on today’s technology.

Bill Labaugh – VDRPT
- The restriction on heavy freight rail has to do with the length of the train and the number of engines that would have to be used for the grades being considered. Basically, it is an economic restriction. High-speed rail could use the crossing, but due to its termini on the Southside it would not be traveling at high speeds when it crossed Hampton Roads.

Dona Huang – DEQ Air Division
- The EIS will have to demonstrate conformity. How will the study account for the modal tube?
  - Philip stated that in the MIS the air quality analysis was ran as all SOV, which is the worst case scenario.

Peter Kube – Army Corps of Engineers
- The information in the EIS needs to be sufficient for the 404(b) guidelines.
  - Ken Wilkinson responded that we want a location approval at the end of the EIS. Then we will move on with segment design and obtaining permits for each segment.

Ken Wilkinson – VDOT
- Ken closed the meeting by restating that the project team would appreciate input on the study. His address is 1401 East Broad Street, Richmond, VA  23219, and his phone number is 804-371-6758.
ATTACHMENT IV

SUMMARY OF DEIS/LOCATION

PUBLIC HEARINGS
Hampton Roads Crossing Study
Draft Environmental Impact Statement/Location Public Hearings

The Hampton Roads Crossing Study Draft Environmental Impact Statement (DEIS)/Location Public Hearings were held on January 24, March 1 and March 2, 2000 from 4:00 to 7:00 PM (Hearings previously scheduled for January 26 and 27, 2000 were cancelled due to inclement weather and rescheduled for the March dates.) The following presents a total summary, along with individual summaries for each separate public hearing, of the attendance and comments received. The complete public hearing transcripts are available from the Virginia Department of Transportation.

Total number of attendees: 135 people
Total number of comment sheets received from public: 96

Preferred Alternative

<table>
<thead>
<tr>
<th>Alternative</th>
<th># of People Favoring a Particular Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Build Alternative</td>
<td>8</td>
</tr>
<tr>
<td>Candidate Build Alternative 1</td>
<td>3</td>
</tr>
<tr>
<td>Candidate Build Alternative 2</td>
<td>5</td>
</tr>
<tr>
<td>Candidate Build Alternative 9</td>
<td>69</td>
</tr>
<tr>
<td>Both Candidate Build Alternative 1 and 9</td>
<td>1</td>
</tr>
<tr>
<td>Either Candidate Build Alternative 2 or 9</td>
<td>3</td>
</tr>
<tr>
<td>Other (see explanation below)</td>
<td>7</td>
</tr>
</tbody>
</table>

Comments from local municipalities

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Preferred Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Chesapeake</td>
<td>CBA 9</td>
</tr>
<tr>
<td>City of Hampton</td>
<td>New Alternative (see 1/24/00 hearing notes)</td>
</tr>
<tr>
<td>City of Newport News</td>
<td>CBA 9</td>
</tr>
<tr>
<td>City of Norfolk</td>
<td>CBA 9</td>
</tr>
<tr>
<td>City of Portsmouth</td>
<td>CBA 9</td>
</tr>
<tr>
<td>City of Suffolk</td>
<td>CBA 9</td>
</tr>
<tr>
<td>City of Virginia Beach</td>
<td>CBA 9</td>
</tr>
<tr>
<td>County of Isle of Wight</td>
<td>CBA 9</td>
</tr>
</tbody>
</table>

January 24, 2000
Heritage High School
5800 Marshall Avenue
City of Newport News

Of the 27 comment sheets received from the public, the following is a breakdown of which alternative was preferred by the commentor:

<table>
<thead>
<tr>
<th>Alternative</th>
<th># of People Favoring a Particular Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Build Alternative</td>
<td>3</td>
</tr>
<tr>
<td>Candidate Build Alternative 1</td>
<td>2</td>
</tr>
<tr>
<td>Candidate Build Alternative 2</td>
<td>2</td>
</tr>
<tr>
<td>Candidate Build Alternative 9</td>
<td>17</td>
</tr>
<tr>
<td>Both Candidate Build Alternative 1 and 9</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

1. Increase I-64 from four lanes to six lanes from I-64 to and including I-564 – or from six lanes to eight lanes. Increase I-664 from six lanes to eight lanes. Add feeder to Craney Island and
connect to I-564. (Note: This person originally submitted a comment sheet favoring CBA 9, but changed his mind. His other comment sheet has not been included in this summary)

2. Instead of spending billions of dollars on a new roadway or light rail system, provide efficient bus service. Make a more concerted effort to provide bus riders with plans that provide the basic elements of what is desired in order to replace the convenience of the personal automobile.

3. Build Tunnel 1, 60 foot for 50 foot channel now required by port. Then lower HRBT on stands to 60 foot. Add leg for new port on Craney Island as needed.

Note:
1. One person who selected Alternative 9 as the best option also wrote that he had serious concerns, that for the money, it is not a long term solution
2. One person who selected Alternative 1 wrote that they would prefer rail through the tunnel now and do not widen roads too much, 6 lanes only. Finish roads currently under construction first.

Comments from Local Municipalities
In addition to the 27 comment sheets received from citizens, the cities of Hampton and Newport News submitted letters to VDOT.

City of Hampton - supports a third crossing of Hampton Roads but is not convinced that any of the options being considered represent the best long-term investment of transportation dollars. The city passed a Resolution requesting that a fourth “build” alternative be investigated which includes the following components:
• Adding a third vehicle lane in each direction to the Hampton Roads Bridge Tunnel
• Placing the third “multi-modal” tube adjacent to the Hampton Roads Bridge Tunnel
• Include the port access improvements included in both CBA 2 and CBA 9
• Adding a third vehicle lane in each direction to the Monitor Merrimac Tunnel.

City of Newport News - continues to support Candidate Build Alternative 9.

Additional Public Comments
Additional comments were provided on several comment sheets. Please refer to transcript for more detailed discussions.

• Have a toll on CBA 9 or raise the gas tax and dedicate the tax strictly for CBA 9
• HOV lanes and bus transportation will not reduce the traffic problems. A rail system must be built from Williamsburg or Richmond to Virginia Beach with stations near where people live and work.
• The route from downtown Norfolk and Portsmouth to the current I-664 and Monitor Merrimac Memorial Bridge Tunnel is very poorly marked. It should be improved.
• Hampton Roads citizens should be given the opportunity to vote on a local tax increase to facilitate the cost of the project.
• Roadway signs for public hearings should be larger to enable drivers to see better.
• Build tunnels wide enough that they will not be affected by overheight trucks and build travel lanes wider to accommodate wide loads
• The ports need a deep draft of at least 55 feet top shelf.
• More and larger roads just expand a traffic problem as the availability to drive just entices the demand. City planners should focus on means that will no necessitate commuting from area to area.
March 1, 2000

Sewell’s Point Elementary School
7928 Hampton Boulevard
City of Norfolk

Number of Attendees
47

Of the 50 comment sheets received from the public, the following is a breakdown of which alternative was preferred by the commentor:

<table>
<thead>
<tr>
<th>Alternative</th>
<th># of People Favoring a Particular Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Build Alternative</td>
<td>3</td>
</tr>
<tr>
<td>Candidate Build Alternative 1</td>
<td>1</td>
</tr>
<tr>
<td>Candidate Build Alternative 2</td>
<td>1</td>
</tr>
<tr>
<td>Candidate Build Alternative 9</td>
<td>38</td>
</tr>
<tr>
<td>Either Candidate Build Alternative 2 or 9</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>1. Interstate paralleling US 460</td>
<td></td>
</tr>
<tr>
<td>2. Build a people friendly suspension bridge at the HRBT and use the existing tunnels for people rail transportation. The “Gate of Destiny Bridge” will have a total of 14 lanes: 10 lanes for traffic, 2 bike lanes, 2 pedestrian lanes, bus lanes on outermost lanes, and HOV lanes on innermost lanes.</td>
<td></td>
</tr>
<tr>
<td>3. Combination of third crossing by highway, high speed rail, and fast ferries. Population growth and resulting demand could be much more than predicted so that additional forms of transportation may be necessary, in addition to the Third Crossing. There is room for both the Third Crossing and fast ferries after the Third Crossing is built. Fast ferries could also be used while the Third Crossing is being built. And fast ferries can be used to run up the Bay from Hampton Roads to Baltimore and Washington.</td>
<td></td>
</tr>
</tbody>
</table>

Comment from the City of Norfolk
In addition to the 50 comment sheets received from the public, a comment letter was received from the City of Norfolk. The City of Norfolk continues to strongly endorse the selection of CBA 9 as the recommended option for the needed new crossing of Hampton Roads.

Additional Public Comments
- The VA 164 connection is desirable, however, the Lawson Company is concerned about the impact this corridor will have on proposed development of the Cox Property as well as future access to both the freeways and local streets adjacent to the Property. Minimizing the potential “take” of the land for the roadway and interchange, and coordination of the road corridor with land use and access issues are of paramount concern to the Owners and potential purchaser.
- An increase in the gas tax in “Hampton Roads” is an obvious way to pay for this project. However, it would not be fair to add the tax to gas stations located in Isle of Wight County.
- Homeowners should have been notified of the project.
- No matter what is done on this project, another midtown tunnel is required.
- Do not add the Craney Island Terminal without extensive environmental research.
- The area needs 1) a true international airport; 2) better road access in and out of the region; 3) possible better train transport to Washington D.C., Richmond, and Raleigh; and 4) better boat/ferry/hovercraft options.
- Would support a temporary toll on all crossings.
- Improving passenger rail (Amtrak perhaps supplemented with VRE trains service WAS-RIC-Newport News) and bus service thru the I-64 corridor could reduce the need to widen I-64 to no more than 6 lanes.
• Continue CBA 9 thru to James River Bridge to above Smithfield on the south and above Jamestown on the North. This will ease traffic thru Hampton-Newport News-Portsmouth-Norfolk.
• Gas taxes are a fair way to pay for project
• No tolls
• Encourage NIT to close Terminal Boulevard entrance to truck traffic
• HRT or Light Rail should be considered
• The tunnel should have more lanes than are leading into it to solve the problem of drivers slowing down
• The DEIS does not include some information on new development. The DEIS does not mention the recent decision of the Commonwealth of Virginia to participate in the Southeast High Speed Rail Corridor, and it does not mention fast ferries. There is enough demand to cross Hampton Roads that there is room for both the Hampton Roads Third Crossing and fast ferries.
• Oppose the construction of the second tunnel to the Midtown Tunnel

March 2, 2000

Churchland Academy Elementary School
4061 River Shore Road
City of Portsmouth

Of the 19 comments received from the public, the following is a breakdown of which alternative was preferred by the commentor:

<table>
<thead>
<tr>
<th>Alternative</th>
<th># of People Favoring a Particular Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Build Alternative</td>
<td>2</td>
</tr>
<tr>
<td>Candidate Build Alternative 1</td>
<td>0</td>
</tr>
<tr>
<td>Candidate Build Alternative 2</td>
<td>2</td>
</tr>
<tr>
<td>Candidate Build Alternative 9</td>
<td>14</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

1. Combination of Alternatives 2 and 9. Build CBA 2 in its entirety, add bridge only tie to existing 664 bridge. Consider traffic size/time restrictions if necessary on Hampton Roads Bridge Tunnel. Sequentially 1) Build third crossing and connect to I-64; 2) build bridge to 664; and 3) if needed, parallel HRBT crossing.

Three people indicated that CBA 2 was their second choice after CBA 9.

Comments from Local Municipalities
In addition to the 19 comment sheets received from the public, comment letters were received from the following municipalities:

City of Chesapeake – Continues to support CBA 9 as the Preferred Alternative. City Council believes that building the facility as a phased project, with the first phase being the I-564 East and West Connector to I-664, along with widening I-664 to six lanes from the Connector to Bower’s Hill. Chesapeake’s resolution further states its support for the upgrade of Route 460 to freeway status.

City of Portsmouth – Supports CBA 9

City of Suffolk – Supports CBA 9 as the preferred Third Crossing of Hampton Roads. Suffolk’s resolution further states its support for the upgrade of Route 460 to freeway status as one of the Seven Regional High Priority Transportation Projects.
City of Suffolk, Industrial Development Authority – Endorses CBA 9

City of Virginia Beach – Endorses CBA 9 as its preferred alternative.

County of Isle of Wight – Continues to support CBA 9

Additional Public Comments

- The ports/terminal/military base are number one benefactors of project. Investigate % of project for these people to pay. I am opposed to tax increase or toll project.
- There is a much greater need for light rail type facilities all over Hampton Roads
- Haul more freight to docks by train
- Will support CBA 9 if it does not involve tolls on the downtown and midtown tunnels; if tolls on the James River crossings were “congestion” priced; if carpool discounts were part of the package; and if trucks and trailers were segregated in dedicated lanes
- The entrance to the tunnel in Pinners Point. Access, I hope will be better.
- Support CBA 9 but do not want tolls
- Concerned about the height of the roadway as related to storm surges. In a category 3 or 4 hurricane, storm surges to 15 feet or more are possible
- Port traffic should be banned from Hampton Boulevard from 5:00 AM to midnight daily
- There should be more message boards warning of delays in the Armistead Avenue/Hampton River Bridge area
- Is there any interest from the CSX and/or NS in having the third tube carry heavy rail traffic? If so, would they be interested in contributing financially?
- Plan to oppose the Craney Island eastward expansion. Recommend that this section of CBA 2 be relocated westward.
ATTACHMENT V

AGENCY AND PUBLIC COMMENTS ON DEIS AND RESPONSES TO COMMENTS
## List of DEIS Commentors

<table>
<thead>
<tr>
<th>Name</th>
<th>Agency</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnard, Thomas</td>
<td>Virginia Institute of Marine Science</td>
<td>1</td>
</tr>
<tr>
<td>Bray, J. Robert</td>
<td>Virginia Port Authority</td>
<td>3</td>
</tr>
<tr>
<td>Fernald, Raymond T.</td>
<td>Virginia Dept. of Game and Inland Fisheries</td>
<td>3</td>
</tr>
<tr>
<td>Harold, Catherine M. / David Kovacs</td>
<td>Chesapeake Bay Local Assistance Dept.</td>
<td>4</td>
</tr>
<tr>
<td>Hume, J. Robert</td>
<td>U.S. Army Corps of Engineers</td>
<td>5</td>
</tr>
<tr>
<td>Jones, Derral</td>
<td>Virginia Dept. of Conservation and Recreation</td>
<td>7</td>
</tr>
<tr>
<td>Simon, John A.</td>
<td>Hampton Roads Maritime Association</td>
<td>7</td>
</tr>
<tr>
<td>Slenkamp, Thomas</td>
<td>U.S. Environmental Protection Agency</td>
<td>7</td>
</tr>
<tr>
<td>Taylor, Willie R.</td>
<td>U.S. Dept. of the Interior</td>
<td>14</td>
</tr>
<tr>
<td>Townes, Michael S.</td>
<td>Hampton Roads Transit</td>
<td>16</td>
</tr>
<tr>
<td>Wright, Neal T.</td>
<td>Virginia Port Authority</td>
<td>16</td>
</tr>
<tr>
<td>Bradshaw, Phillip</td>
<td>County of Isle of Wight</td>
<td>18</td>
</tr>
<tr>
<td>Dixon, Mary Lynn</td>
<td>City of Suffolk</td>
<td>18</td>
</tr>
<tr>
<td>Holley, James W.</td>
<td>City of Portsmouth</td>
<td>18</td>
</tr>
<tr>
<td>O'Grady, Thomas</td>
<td>City of Suffolk</td>
<td>18</td>
</tr>
<tr>
<td>Pazour, John L.</td>
<td>City of Chesapeake</td>
<td>19</td>
</tr>
<tr>
<td>Simpson, John O.</td>
<td>City of Norfolk</td>
<td>19</td>
</tr>
<tr>
<td>Spencer, Joseph H.</td>
<td>City of Hampton</td>
<td>19</td>
</tr>
<tr>
<td>Spore, James K.</td>
<td>City of Virginia Beach</td>
<td>21</td>
</tr>
<tr>
<td>Whitley, Fred</td>
<td>City of Hampton</td>
<td>22</td>
</tr>
<tr>
<td>Williams, Regina</td>
<td>City of Norfolk</td>
<td>22</td>
</tr>
<tr>
<td>Adkins, James W. and Frederick W. Ellis</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Alcott, Robert G.</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Arnt, Richard L.</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Baird, Edward R.</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Baisley, George E.</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Beasley, Earl M.</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Conlon, David</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>Edberg, Gary</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>Flayhart, Donald H.</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>Geduldig – Yatrofsky, Mark A.</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>Girard, Remy G.</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>Giles, Edmond</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Hall, J.B.</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Hendrix, Andrew H.</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Klinefelter, John W.</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Molzhon, Fred</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>Murrell, Janie and George Randell</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>Procynson, John</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>Smith, Albert H.</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Stumm, Robert E.</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Thomas, Julian J.</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Trundle, Robert D.</td>
<td></td>
<td>31</td>
</tr>
</tbody>
</table>
DEIS - Agency Comments and Responses

Commentor: Barnard, Thomas A., Jr., Marine Scientist
Agency – Virginia Institute of Marine Science
Date – February 4, 2000

**Issue: Hydrodynamic Modeling of Hampton Roads and Elizabeth River**

**Comment:** Results of the studies accomplished to date indicate that there are significant residual currents within the Elizabeth River mouth and these may influence flushing. Additional model investigations using a finer grid model are needed to resolve the questions lingering from the larger grid Elizabeth River model.

**Response:** Final design details have not been completed for the selected alternative. Use of a finer grid model at the current level of engineering detail could well lead to incorrect results and conclusions drawn from those results. A finer grid model will be employed as design is authorized and appropriate design details are available.

**Comment:** There may be cumulative impacts and/or synergistic effects to Elizabeth River circulation and therefore water quality as a result of the related expansion of Craney Island, and eventual development of an additional port facility. Since both alternatives 2 and 9 appear designed to address access for future port development, and were selected as preferred alternatives because they have this characteristic, it would appear necessary in our view also to examine the effects of the eastward expansion of Craney Island on circulation in the Elizabeth River. This would also afford the opportunity to use a finer grid model to address the model shortcomings described in the previous paragraph.

**Response:** The Craney Island expansion is a possible project currently under study by the Corps of Engineers. Currently the project is in the planning/DEIS stage. No commitment by any party has been made to this expansion and as explained in the DEIS p. 232 there are “no definite decisions as to whether [this facility] will be constructed.” Thus, the Craney Island expansion is not foreseeable. Details concerning the design of the facility are not available. The results of using a finer grid model without “finer” engineering plans for either the preferred alternative or the proposed expansion could well produce inaccurate data and conclusions. A finer grid model study will be undertaken by appropriate agencies when, and if, engineering details become available.

**Issue: Submerged Aquatic Vegetation (SAV)**

**Comment:** Even though water quality on the shoals might be affected only minimally, TSS loads of over 15 mg/l are above the habitat suitability requirements for both *Zostera marina* and *Ruppia maritima*. SAV can withstand short periods of elevated turbidity such as would occur during a storm event, but turbidity increases on the order of weeks or months can significantly affect SAV abundance. The proposed monitoring design should take this into account and address turbidity on the shoals, should it be shown to be a result of the project dredging or construction activities.
Response: The scope of the monitoring program committed to in the DEIS (page 198) will be developed in concert with appropriate agencies prior to any construction of the 3rd crossing.

Issue: Dredging and Water Quality

Comment: It appears that Alternative 9 carries the greatest potential for the degradation of water quality due to dredging. Tunnel dredging and the filling of the Craney Island 4th cell present the potential for remobilization of sediment-associated contaminants. High concentrations of contaminants have been reported for Elizabeth River sediments and dredging and backfilling may oxygenate anaerobic sediments, changing their geochemistry and mobilizing pollutants previously adsorbed on sediment particles.

Response: The re-suspension and dispersion of sediments during dredging operations is a well-known and well-documented phenomenon. The DEIS identified this activity and the potential for associated re-suspension and dispersion of pollutants that may be part of or bound to dredged sediment material. The amount of re-suspension that occurs during a dredging operation is a function of the dredge apparatus and operator procedures in combination with on-site conditions (Havis, 1988 – already listed in DEIS; also Boston Harbor Navigation Improvement Project Final EIS/Report by the New England Division, USACE in association with Massachusetts Port Authority, Local Project Sponsor, Waltham MA, 1997). The extent of a re-suspended sediment plume is a result of a complex function of tidal cycle and induced tidal velocities, local currents, wind speed and direction, wave action, water depth, and sediment type (cohesive or non-cohesive), particle shape, and diameter (represented as the sediment grain size distribution).

Dredging equipment operations procedures have a significant effect on the amount and extent of a re-suspended sediment plume. Dredging operation variables, for example, ladder speed, swing arm speed, and clamshell hoist speed can add to rather than minimize the amount of sediment that is re-suspended. Monitoring current velocity and wind and wave conditions and establishing dredging operations procedures that minimize operations or avoid dredging in very adverse conditions can significantly minimize sediment plume impacts on environmentally sensitive adjacent areas.

For the permit stage of the project, a finer grid model specific to the Elizabeth River will be employed as design is authorized. Further modeling using a smaller grid size should be able to provide more information on the impacts to sediment-associated contaminants in the Elizabeth River. In addition, as stated on page 198 of the DEIS, a water quality monitoring program similar to the one used for the construction of the I-664 Monitor Merrimac Memorial Bridge Tunnel will be implemented to allow real-time corrective actions to be implemented if changes in water quality are detected. Pre-construction sediment quality assessments will be conducted. Dredging operation criteria would be linked to the water quality monitoring program (i.e. when exceedences are observed, more restrictive resuspension control measures will be implemented) to minimize resuspension of sediments. In conjunction with the dredging management and water quality monitoring programs, silt curtains and other turbidity control measures will be implemented to minimize resuspension of sediments.
Comment: Polycyclic aromatic hydrocarbons (PAH) have also been shown to be highly elevated in the Elizabeth River. The potential for tributyl tin (TBT) accumulation in the sediments is present. It is not clear from the DEIS that these and priority pollutant heavy metals will be evaluated prior to dredging.

Response: VDOT and FHWA regulations and guidance require in depth testing and mitigation design for hazardous waste contamination prior to any construction. Such testing and any required remediation plans will be completed prior to the commencement of any dredging activities.

Commentor: Bray, J. Robert, Executive Director
Agency – Virginia Port Authority
March 10, 2000

Issue: Recommended Alternative

Comment: In July 1997, the Board of Commissioners of the Virginia Port Authority adopted Resolution 97-10 which identified Corridor 9 as the Port Authority’s preferred alternative for the location of the Third Crossing. The Port Authority continues to support this alternative.

Response: Comment noted

Commentor: Fernald, Raymond T., Environmental Services Section
Agency – Virginia Department of Game and Inland Fisheries
Date – February 7, 2000

Issue: Fishery Data

Comment: Recommend that the FEIS state that striped bass (Morone saxatilis) occur year-round at the project site, not just in March and April as stated in the DEIS.

Response: Included on page 96 of the FEIS

Comment: The DEIS states that dredging will not adversely impact migrating anadromous fish because the dredge operation will only affect a small percentage of the channel at any given time. However, if the dredging is occurring within the channel area, which is the preferred migratory pathway, we recommend an instream work time-of-year restriction (TOYR) from 15 February – 30 June. We are currently working with the Corps to evaluate our TOYR, which may lead to migratory studies of anadromous fish in the James River in the near future.

Response: The results of the study cited will be utilized when construction planning proceeds for the 3rd crossing. VDOT will utilize the results of that study, along with additional coordination with VDGIF and the Corps to develop plans for mitigation of impacts to migrating anadromous fish.
Commentors: Harold, Catherine M., Environmental Engineer and David Kovacs, Community Liaison
Agency – Chesapeake Bay Local Assistance Department
Date – February 10, 2000

Issue: Chesapeake Bay Preservation Areas and Resource Protection Areas

**Comment:** The DEIS does not address impacts to Chesapeake Bay Preservation Areas. The Chesapeake Bay Preservation Area Designation and Management Regulations exempts public roads providing the project is constructed in accordance with the Erosion and Sediment Control Law and the Stormwater Management Act. Further conditions of the public road exemption require optimization of a proposed roadway’s alignment and design so as to prevent or otherwise minimize 1) encroachment into Resource Protection Areas (RPAs) and 2) adverse effects on water quality. Candidate Build Alternative 9 will have the greatest direct impacts on RPAs and substantially greater impact to wetlands than the other build alternatives.

**Response:** The project will be constructed in accordance with the Erosion and Sediment Control Law and Stormwater Management Act. In addition, the DEIS and FEIS describe the proper mitigation measures to be implemented to prevent or minimize water quality impacts due to constructing the transportation facility. Measures to avoid or minimize wetland encroachment were analyzed as part of the FEIS process for the preferred alternative. The results of those avoidance and minimization efforts are detailed in Table 4-36 of the FEIS for each of the project’s segments and in the proposed project sequence of construction. As the result of those efforts, direct wetland encroachment was reduced from the 18 acres reported in the DEIS to a little over 11 acres. Additional avoidance and minimization measures will be considered during final design.

**Comment:** It is difficult to ascertain from the mapping provided whether or not the nontidal wetlands impacted by the candidate build alternatives are RPA features.

**Response:** More detailed wetland mapping is provided on pages 224 through 235 of the FEIS.

**Comment:** Rather than evaluating which alternative would cause the least environmental damage, the criteria used to evaluate this stated project need emphasizes “the relative ease of implementing the alternatives”. Regardless, Candidate Build Alternative 1 appears to cause the least impact to natural resources and would probably cause the least difficulty in terms of regulatory approval.

**Response:** Results of the DEIS study as well as public and resource agency comments were presented to the Virginia Commonwealth Transportation Board (CTB). On July 20, 2000, the CTB voted to identify Candidate Build Alternative 9 as the approved location based on Alternative 9’s abilities to best meet the primary project purpose and its underlying needs. In fact, Candidate Build Alternative 9 is the only alternative that addresses all aspects of purpose and need (see Table S-2). Candidate Build Alternative 9 also does the best job of improving total mobility between the Southside and the Peninsula (see Table S-2). Candidate Build Alternative 9 can also be
constructed in usable segments with each segment: 1) contributing to project purpose and need and; 2) having logical termini and independent utility.

Candidate Build Alternative 9 requires fewer estimated residential relocations than either of the other two alternatives. Candidate Build Alternative 9 would require the relocation of 38 residential units, potentially impacting 101 people. Candidate Build Alternatives 1 and 2 would each require the relocation of 128 residential units, with both alternatives potentially impacting 368 people. Although minor, Candidate Build Alternative 9 is also the alternative that has the least disproportionate impact on minority populations as required by E.O. 12898 (Environmental Justice). Candidate Build Alternatives 1 and 2 relocate 42 residential units occupied by minorities and 16 residential units occupied by persons of low income. Candidate Build Alternative 9 relocates 36 minority residential units and 12 low income units.

Commentor: Hume, J. Robert, Chief, Western Virginia Regulatory Section
Agency – U.S. Army Corps of Engineers
Date – April 14, 2000

Issue: Hydrodynamic Model/Water Quality

Comment: Hydrodynamic models suggest that Alternatives 2 and 9 may decrease residual water volumes passing through the mouth of the Elizabeth River. However, model grid resolution presently is not adequate to provide definitive answers on residual circulation. Nevertheless, as a screening tool, the model adequately compares the relative impacts of the alternatives for NEPA purposes. Further modeling studies using a smaller model grid size specific to the Elizabeth River may be required in support of a future permit application for a specific project. In addition, detailed measurements of the actual residual current in the field will be needed to verify model results.

Response: A finer grid model will be employed as design is authorized.

Comment: Questions regarding the effect of alternatives 2 and 9 on the Craney Island Rehandling Basin and the behavior of the dredged material deposited there remain unanswered.

Response: Further modeling using a smaller model grid size specific to the Elizabeth River along with more detailed final design engineering should be able to answer any questions remaining regarding the effect of the selected alternative on the Craney Island Rehandling Basin.

Comment: The biological effects that may result due to the changes in the physical parameters (current, salinity, flushing, sedimentation, etc.) predicted by the model should be evaluated in the FEIS. For instance, what biological impact would a change in physical hydrodynamic parameters have on:

- The eddy circulation at the Hampton Flats thought to be responsible for shellfish larvae trapping
- The plunging front (tidal intrusion) off Newport News Point thought to be responsible for oyster/crab larvae recruitment to the James River estuary
• The eddies in the Elizabeth River mouth (and elsewhere?) which may influence tidal flushing, sediment transport, and biological recruitment
• The bottom shear stress in the lower James and Elizabeth River

**Response:** Further information on biological effects is included on pages 206 through 208 of the FEIS.

**Comment:** Questions remain regarding the model’s accuracy to predict cumulative hydrodynamic and sedimentation impacts without the inclusion of the proposed fourth Craney Island cell and the proposed dredging of the 50’ inbound channel. The cumulative impacts of the Expansion, the deepening, and any preferred alternative may have to be addressed during the permit process. However, the modeling effort to date may be used to evaluate the cumulative impacts of the various projects as a relative screening tool.

**Response:** When additional engineering for this project and the Craney Island expansion project are completed, cumulative impacts can be addressed during the permit process for the new crossing.

**Comment:** For channel deepening projects and placement island construction in the upper Chesapeake Bay, greater impacts are computed during episodic events resulting from meteorological forcings where large set ups and set downs occur. The COE believe that questions remain whether larger impacts might be computed if meteorological forcing had been accounted for in the downstream water surface boundary condition.

**Response:** The water setup (or set down) in the bay may affect the surface elevation and salt intrusion in the James River. However, the impact on salt intrusion will have little practical significance, since the meteorological events have a time scale of three to five days only. The high water due to surface elevation setup may impact beach erosion by wave action. This would require a detailed investigation of storm-generated waves, and a separate study would be needed using a wave model to model these rare but substantial events.

**Comment:** The turbidity maximum is a prominent feature in the James River. It would be more helpful if the total volume of water above I-664 with a salinity less than some value (or values) of the location of the 1.0 ppt bottom salinity (representative of the location of the turbidity maximum) had been computed and compared for the various cases. This would give more insight into cumulative impacts.

**Response:** The 1 ppt isohaline is a useful guide to the location of the main turbidity gradient in the James River, but it is by no means the only factor. As VIMS noted in an earlier response to the COE, VIMS does not think significant changes in salinity up river over a brief time span (three to five days) is likely to occur due solely to the presence of a new bridge tunnel structure in Hampton Roads.

**Issue:** Section 404 (b)(1) Alternatives Analysis

**Comment:** We recommend the FEIS contain an alternative analysis, under Section 404 (b)(1) that addresses avoidance, minimization, and compensation of wetland impacts by answering the following questions:
a. Is there a practicable alternative that avoids discharges of fill in wetlands and other waters?
b. Does the proposed action include all appropriate and practicable steps to minimize adverse impacts to wetlands and waters through project modification and permit conditions?
c. Does the proposed action include appropriate and practicable compensating mitigation requirements for all remaining and unavoidable adverse impacts to wetlands after minimization?

This analysis will help us identify the least environmentally damaging practicable alternative required by Section 404 review.

Response: An alternative analysis under Section 404 (b) (l) is included as Appendix A to the FEIS. Reference to the alternatives analysis is included in the wetland impact section of the FEIS.

Commentor: Jones, Derral  Planning Bureau Manager
Agency – Virginia Department of Conservation and Recreation
Date – February 2, 2000

Issue: Review of Document

Comment: DCR has reviewed the DEIS and has no additional comments to offer at this time

Response: Comment noted

Commentor: Rader, Eugene K., Geologist Supervisor
Agency – Virginia Department of Mines, Minerals, and Energy
Date – December 17, 1999

Issue: Geotechnical evaluation

Comment: Many of the geologic units in the Hampton Roads area are over consolidated. Suggest that a thorough geotechnical evaluation be obtained for all potential road alignments prior to alignment selection or contract bidding to avoid construction problems and cost overruns

Response: Thorough geotechnical investigations are a component of final design activities and will be undertaken prior to any contract bidding.

Commentor: Simon, John A., Hampton Roads Port Ombudsman
Agency – Hampton Roads Maritime Association
Date – March 9, 2000

Issue: Recommended Alternative
Comment: The Hampton Roads Maritime Association supports Alternative 9 as the most effective location for the third crossing of Hampton Roads

Response: Comment Noted.

Commentor: Slenkamp, Thomas, Acting Director, Office of Environmental Programs
Agency – U.S. Environmental Protection Agency
Date – March 15, 2000

Issue: Summary Table

Comment: Add to Table S-3, the information recommended for the Environmental Justice Section. This includes the number of minority and low income houses taken, the number effected by noise and the number of homes left adjacent to the ROW.

Response: Without a door-to-door survey, which at this stage would not be appropriate, the number of minority and low income houses cannot be obtained. Therefore, it was assumed that the number of minority and low income homes in the census tract were homogeneously distributed and an estimate of the number of homes taken and those effected by noise was computed using the percent minority and low income in each census tract. This information is included in Table S-3 of the FEIS.

Because the alternatives, for the most part, widen existing interstate facilities, any residences that will be adjacent to the widened interstate ROW are already adjacent to an existing interstate ROW. In fact the number of residences left adjacent to the ROW after construction will most likely be less than the number before construction due to the subtraction of the residences that will be taken and will no longer be counted as adjacent to the interstate ROW. The connection to VA 164 in Portsmouth will be on new alignment. The residences adjacent to the interchange with VA 164 are already adjacent to an existing limited access expressway. There are no homes located along the portion on new alignment north of VA 164. The section in Norfolk that parallels the railroad ROW to the west of I-564 does not abut any residences.

Comment: Include in Table S-3 a wetland function assessment comparison for each alternative.

Response: A wetland function assessment is included in Table S-3 of the FEIS.

Issue: Figure 3-1

Comment: Explain why 1994 data is used in Figure 3-1 and not 1997 data as shown in Table 3-1.

Response: Figure 3-1 and the 1994 data that is illustrated in it was taken from the Hampton Roads Crossing Study MIS. In the MIS, the study area and area of analysis was broader and 1994 data was used. The 1997 data in Table 3-1 is more specific to the alternatives evaluated in the EIS. In addition, more traffic data was collected for the crossings of Hampton Roads then for the surrounding region, which is depicted in Figure 3-1. Thus, the data obtained for the crossings is more current than for the other facilities in the region.
Issue:  Land Use

Comment: The role of land use on future transportation demand should be more thoroughly explained in Chapter 3. For example, an assessment of the balance of current and future jobs to households on both sides of the harbor should be provided. Explain the role, if any, the balance of jobs as compared to households on both sides of the harbor have on the projected 53% increase in traffic at the Hampton Roads Bridge Tunnel.

Response: All project traffic numbers were produced using a new regional traffic model which was developed using local land use projections provided by the Hampton Roads Planning District Commission (Hampton Roads 2015 Economic Forecast, August 1994). Through a collaborative process, the HRPDC coordinates with each local jurisdiction to assess and estimate future socioeconomic data. This collaborative process results in the HRPDC providing zonal level socioeconomic data for planning purposes like the Hampton Roads Crossing Study traffic model. Therefore, land use was clearly taken into account for this study. Regional socioeconomic data was the driving force for all trip projections made by the travel demand forecasting model.

In addition, three surveys were conducted to determine the characteristics of trips made within the region. A Home Interview Survey was conducted to determine the trip purposes of travelers within the region; an Origin and Destination Survey was conducted to determine the beginning and end points of trips that start within the region and end outside the region; and a Visitor Survey was conducted to determine the trip characteristics of visitors to the region. More information on the development of the transportation model, the completed surveys, and other detailed technical information is included in the Compendium of Technical Traffic Information (VDOT, July 1996) which is incorporated by reference into the DEIS and FEIS. In addition, a more thorough explanation of the development of the traffic model has been included on page 113 of the FEIS.

Issue:  Traffic, Transit, and Safety

Comment: In Table 4-4, clarify if the travel time savings are for the year 2018 or some other year

Response: Travel time savings in Table 4-4 are for the year 2015.

Issue:  Environmental Justice

Comment: Table 4-13 should also include data on the number of minority and low income homes effected by noise and the number of homes remaining adjacent to the ROW.

Response: As noted above, without a door-to-door survey, the number of minority and low income houses cannot be obtained. Therefore, it was assumed that the number of minority and low income homes in the census tract were homogeneously distributed and an estimate of the number of homes effected by noise was computed using the percent minority and low income in each census tract. This information is included on pages 136 through 140 of the FEIS. Please see response included above under the issue “Summary Table” which discusses residences adjacent to the interstate ROW.
Comment: The results of the community outreach efforts should be summarized here including any comments received from local leaders or citizen group representatives regarding the project alternatives and mitigation

Response: Community outreach is discussed on pages 134 through 135 of Chapter 4 and is also discussed in Chapter 8 of the FEIS

Issue: Economic Impacts

Comment: Explain the sentence on page 137 regarding the tunnel users bidding of the right to use the tunnel. EPA is unaware of anywhere where drivers bid for the right to travel on public roads outside of parks or wilderness areas.

Response: The use of quotation marks around the term bid in the DEIS means that the term should not be taken literally. However, to avoid confusion, the sentence has been deleted from the FEIS.

Issue: Ecosystems

Comment: To minimize potential impacts to sea turtles and the piping plover, EPA recommends close consultation with the National Marine Fisheries Service, the Fish and Wildlife Service, and the appropriate state agencies during design and construction of a selected alternative.

Response: Such consultation shall occur

Issue: Water Quality

Comment: EPA recommends a construction water quality program be implemented like that which was done for the I-664 construction project.

Response: As stated in the DEIS (page 198), a water quality monitoring program similar to the one used for the construction of the I-664 Monitor Merrimac Memorial Bridge Tunnel will be implemented to allow real-time corrective actions to be implemented if changes in water quality are detected. Dredging operation criteria will be linked to the water quality monitoring program (i.e. when exceedences are observed, more restrictive resuspension control measures will be implemented). In conjunction with the dredging management and water quality monitoring programs, silt curtains and other turbidity control measures will be implemented.

Comment: Discuss how the runoff from the bridges/causeways will be handled. This is not specifically addressed in the DEIS. The DEIS does not address the potential for spills resulting from tanker truck accidents. EPA recommends VDOT evaluate storm water systems that divert the runoff from the bridge structure to detention or holding basins.

Response: Due to the length of the structure, the runoff from the new bridge tunnel facility will be handled the same as the existing I-664 Monitor Merrimac Memorial Bridge Tunnel and I-64 Hampton Roads Bridge Tunnel, which use a scupper system that drains the water directly into Hampton Roads. Any potential spills from tanker truck accidents will be handled using established hazardous material spill guidelines. The
practicability of storm water systems for other waterbodies bridged by Alternative 9 will be evaluated during final design.

**Issue: Dredging**

**Comment:** EPA recommends the use of hydraulic dredging with direct deposit into Craney Island.

**Response:** As the project nears construction, various dredging methods, including the use of hydraulic dredging with direct deposit into Craney Island will be explored.

**Comment:** EPA is opposed to the stockpiling and reuse of dredged material. This is particularly true in regard to the Elizabeth River area and other areas with contaminated sediments. Once the material is dredged it is considered a new pollutant source and must be handled accordingly.

**Response:** Comment noted

**Comment:** EPA recommends staging of the dredging activities to comply with the time-of-year restrictions for anadromous fisheries recommended by the National Marine Fisheries Service. While the time of year restrictions are in place, other construction activities can be performed.

**Response:** The results of the VDGIF and the COE study on migratory patterns of andromous fish in the Hampton Roads cited above will be utilized when construction planning proceeds for the 3rd crossing. VDOT will utilize the results of that study, along with additional coordination with VDGIF, the COE, and the National Marine Fisheries Service to develop plans for mitigation of impacts to migrating anadromous fish.

**Issue: Aquatic Resources**

**Comment:** Explain why Alternative 2 has more benthic impacts than Alternative 9 which is much longer over open water.

**Response:** Although Candidate Build Alternative 9 is longer over open water, the table of benthic impacts in the DEIS (Table 4-28) only estimates impacts for the tunnels and islands and not the entire bridge structure. The tunnels and islands will cause more impacts to benthic species than the pilings from the bridge structure because of the area impacted. The location of the pilings for the bridge structure will be determined during final design and impacts will be addressed during the permit process.

**Issue: Wetlands**

**Comment:** Part of Table 4-30 is missing (data for wetlands 1-1 thru 8-3) and there are no column headings on the table to indicate which function is shown.

**Response:** The printing error has been corrected. See page 216 of the FEIS.

**Comment:** Each of the Alternatives should be compared by functional assessments. For example, by wetland function, indicate how many low, medium, and high value wetlands are
impacted by each alternative. Alternative 9 impacts the greatest amount of wetlands, however, there is no way to compare the functional importance of this.

**Response:** A comparison of each alternative by functional assessment is included on page 216 of the FEIS.

**Comment:** Many of Alternative 9’s wetland impacts occur south of Rt. 164. Please explain why this section of alternative 9 is integral to the function of the alternative and why it can not be eliminated to reduce wetland impacts.

**Response:** Measures to avoid or minimize wetland encroachment were analyzed as part of the FEIS process. As the result of those efforts, direct wetland encroachment has been reduced from the 18.3 acres reported in the DEIS to 11.3 acres (3.4 of which will be permitted for the I-564 Intermodal Connector project). Of the 11.3 acres of wetland encroachment, 0.79 acres, located within the I-664 right-of-way south of Rt. 164, will be impacted by Alternative 9. An additional 0.36 acres of wetlands will be bridged.

Of the five segments of Alternative 9, this segment will be constructed last. It is included as part of the alternative because of the traffic numbers projected on I-664 in the year 2018.

**Issue: Farmlands**

**Comment:** Alternative 9 impacts the greatest area of prime farmland soils. How much of this acreage is located on the section south of Rt. 164?

**Response:** Of the 116.6 acres of prime farmland soils impacted by Alternative 9, approximately 65 acres are located in the existing I-664 right-of-way south of Rt. 164 in the cities of Chesapeake and Suffolk. The NRCS site assessment rating for impacts in the city of Chesapeake is 40 and the rating for the city of Suffolk is 34. Because Candidate Build Alternative 9 has site assessment points of less than 160 for each city, mitigation is not needed.

**Issue: Secondary and Cumulative Impacts**

**Comment:** EPA does not believe that, as indicated in the response to our initial comments, that because elements of the secondary and cumulative impacts section can be found elsewhere in the document there is no need to include them here. In fact, summarizing the impacts and benefits data from each alternative in this section will allow impacts to be discussed in the context of Secondary and Cumulative effects.

**Response:** Comment noted.

**Comment:** EPA does not agree that cumulative effects will not occur. This project will result in additional dredging, island creation, new lane miles, new impervious surface, and new visual impacts, just to name a few, in the Hampton Roads harbor area. When these effects are added to the past effects of just the existing bridge tunnels, for example, measurable accumulated effects can be documented.
**Response:** Past activities in the Hampton Roads area have had a significant effect on the natural resources in the area. Continued growth in the area both by military and private activities over the last two centuries has dramatically changed the character of the natural and social environment. New changes will also occur, including this project, but because of the uncertainties such as the continued military presence in the region, the overall economy of the region and nation, and funding sources for the projects, even semi-accurate predictions of new development (both public and private) are not possible. Therefore, projections of cumulative impacts to the region are equally impossible. On the positive side of cumulative impacts the regulatory environment, particularly as it relates to air and water quality, has significantly changed over the last thirty years (e.g. Clean Air Act, Clean Water Act). That regulatory change has been at least particularly responsible for the reappearance of submerged aquatic vegetation in Hampton Roads and the increase of populations of seagoing bird species (e.g. pelicans, herons, bald eagles), just to name a few positive impacts. One can assume that this regulatory trend to improve the natural environment will continue, but, like the economy and regulatory environmental change throughout time, it is not possible to project what those positive cumulative impacts would be.

**Comment:** The cumulative effect on air quality of the general increase in shipping traffic expected due to expanded port operations and the new marine terminal should be factored.

**Response:** Shipping is considered an off road emission source. In the context of mobile source emissions, off road emission sources, such as increased shipping, are part of the context of a State Implementation Plan but are not part of the conformity analysis that revolves around an EIS like the Hampton Roads Crossing Study EIS.

**Comment:** EPA disagrees, as stated in the DEIS, that because future projects are in the preliminary planning phase that they are not reasonably foreseeable and their impacts can not be estimated. For example, the Craney Island expansion is planned for the eastern side only and there are conceptual designs and sizes being considered. This project has considerable congressional support and is reasonably likely to be built. The Norfolk Virginia Beach Light Rail project identified by VDOT has a published DEIS with extensive information regarding impacts. The Constrained Long Range Plan identifies specific planned roadway improvements for which impacts can be estimated. The environmental consequences data for each alternative should be added to the impacts for these reasonably foreseeable actions. For example, the benthic impacts of the Craney Island expansion and Hampton Roads Harbor maintenance should be added to the benthic impacts of the alternative. This will give a picture of the cumulative effect of these projects on benthic habitat, and it will show the relative impact of this proposal with those others and to the cumulative total impact.

**Response:** The Craney Island expansion is currently in the early planning stage. No commitment has been made to this expansion and as explained in the DEIS page 232, there are no definite decisions as to whether this facility will be constructed. Modeling of impacts to the Elizabeth River will not be complete until late 2001, and it will not be known until then whether the impacts of expanding into the Elizabeth River will be environmentally acceptable. In addition, without “finer” engineering plans for either the third crossing or the proposed expansion, using a finer grid model could well
produce inaccurate data and conclusions. A better approach, as suggested by the Corps, may be to address the cumulative impacts of the Craney Island expansion (if it is still a viable project) during the permit process. At that time, further modeling studies using a smaller model grid size specific to the Elizabeth River could be undertaken by appropriate agencies using "finer" engineering detail for the third crossing and the expansion.

The Norfolk to Virginia Beach Light Rail project is no longer being considered because the City of Virginia Beach withdrew its support for the project in November of 1999. Other options such as a Norfolk only light rail system, a Norfolk to Chesapeake system, or a Norfolk to Portsmouth system are being considered but no definite decisions have been made.

Comment: Other metrics of cumulative impacts should be included such as total VMT, new lane miles, and area of impervious surface from this project and all the projects contained in the Constrained Long Range Plan. More ambitious would be to estimate the cumulative effect of the county comprehensive plans on lane miles, impervious surface, VMT, and impacts to prime farmlands and wetlands. Gathering this data would allow a comparison of these alternatives to the cumulative effects of future and reasonably foreseeable development.

Response: Total VMT for this project and all the projects contained in the Constrained Long Range Plan are included in Table 4-3 of the FEIS.

Comment: One example of a secondary effect is the land use effect of additional highway capacity. For example, the construction of Alternative 9 will increase highway capacity in western Chesapeake and eastern Suffolk. From this one fact several things can be discussed. Is this additional capacity more or less than that will be generated from the existing county comprehensive plans? If it is then it can be stated that a secondary effect of this alternative will be to put pressure on additional growth in those areas. If it is less than the demand created by the existing county comprehensive plans this may not be the case. In addition, the increased capacity will mean increased VMT and increased loading of air pollutants. These are both examples of secondary effects which can be estimated from existing data, indeed the very data used to develop the purpose and need and data used in region wide conformity analysis.

Response: As stated earlier, the projected traffic volumes for the Hampton Roads Crossing Study came from the regional traffic model, which includes information from each of the local jurisdictions’ comprehensive plans. In fact, the local comprehensive plans are building blocks to the socioeconomic report generated by the HRPDC, which was referenced earlier under “Land Use”. Total VMT for this project and all the projects contained in the Constrained Long Range Plan are included in Table 4-3 of the FEIS.

**Issue: Section 4(f) Evaluation**

**Comment:** Concur that there is no prudent and feasible alternative to the proposed project.

**Response:** Comment noted

**Comment:** Do not believe that all possible planning has been done to minimize harm to the Hampton Institute and the Pasture Point Historic District. Therefore, we recommend continued cooperation and coordination with the State Historic Preservation Officer in order to prepare a Memorandum of Agreement (MOA) which should include measures to avoid and/or minimize harm to the Hampton Institute and the Pasture Point Historic District, in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. A signed copy of the MOA should be included in the Final Section 4(f) Evaluation.

**Response:** The selected alternative, CBA 9, avoids both the Hampton Institute and the Pasture Point Historic District thus no MOA is required

**Issue: Endangered Species Act**

**Comment:** A biological assessment pursuant to Section 7(c) for the piping plover (*Charadrius melodus*) should be included in the FEIS

**Response:** A Biological Assessment has been completed and is included as Appendix C of the FEIS.

**Comment:** The FWS notes that the Dismal Swamp southeastern shrew will likely be delisted as a federally threatened species before March of 2000. The FWS does not recommend preparation of a biological assessment for this species.

**Response:** Comment noted and text in FEIS has been changed to reflect this.

**Comment:** The peregrine falcon (*Falco peregrinus*) was delisted on August 25, 1999 and is no longer protected by the ESA.

**Response:** Comment noted and text in FEIS has been changed to reflect this.

**Issue: Fish and Wildlife Coordination**

**Comment:** A more complete discussion of wetland impacts should be included in the FEIS including figures showing the location of anticipated wetland impacts for each alternative.

**Response:** A more complete discussion of wetland impacts is included in the FEIS. In addition, the figures have been changed to more clearly show the location of anticipated
wetland impacts and a Section 404 (b)(1) alternatives analysis is included as Appendix A to the FEIS.

Comment: The FEIS should include a table of wetland impacts, their classifications and acreage, for each alternative.

Response: Table 4-35 of the FEIS includes this information.

Comment: Based on its substantial avoidance of impacts to aquatic resources, the FWS recommends the use of concrete tubes for tunnel construction.

Response: Consideration will continue to be developed of concrete tubes. As noted in the DEIS (page 38) the use of concrete tubes design is not typical in the United States. Additional information concerning the use of such structures will be developed.

Comment: The FWS strongly supports the creation of oyster reefs as compensation for marine impacts. The FWS recommends that VDOT work closely with the Virginia Marine Resources Commission and Virginia Institute of Marine Science to formulate an oyster reef plan as compensation for subtidal impacts associated with this project. The FWS would be glad to assist with such an effort.

Response: Comment noted. Oyster reef creation will be evaluated as part of the mitigation plan for this project.

Commentor: Townes, Michael S., Executive Director
Agency – Hampton Roads Transit
Date – March 15, 2000

Issue: Recommended Alternative

Comment: The Transportation District Commission of Hampton Roads supports Candidate Build Alternative 9 as meeting the project’s goals as stated in the purpose and need document as well as providing for improved mobility throughout Hampton Roads.

Response: Comment noted.

Issue: Multimodal Tube

Comment: The multimodal tube is a critical element of the Build Alternative and should be an integral part of any Phase I construction of the project. Although there is the opportunity for a phased approach of bus and light rail service, attention should be taken in the project design to assure proper tunnel clearance to accommodate a double track rail system with overhead power distribution. In addition, special safety requirements for transit systems such as National Fire Protection Association 130 need to be included. Also, the design must consider how a train would enter and exit a tunnel section to be consistent with vehicular separation requirements and connectivity with existing and planned highway and rail systems.
Response: Operational and safety requirements for the multimodal tube will be evaluated further in the final design phase of the project.

Commentor: Wright, Neal T., P.E. Chief Engineer
Agency – Virginia Port Authority
Date – February 22, 2000

Issue: Information on the Ports

Comment: The base map used for various figures should depict the general location of NNMT and PMT.

Response: The base map has been revised to reflect those locations.

Comment: Provided updated figures for Tables 1-1, 3-5, and 3-6

Response: Figures and Tables have been revised

Comment: On page 137, Section 1, Port of Virginia, a clarification should define the State of Virginia’s general cargo facilities (NIT, NNMT, PMT) as part of the Port. The Port also includes numerous private cargo facilities (coal grain, etc.) that will also benefit from the third crossing. The definition of the Port as a whole, in addition to the State’s facilities may be appropriate in Chapter 1.

Response: Definition has been inserted on page 54 and 141 of the FEIS
Local Municipalities - Comments and Responses

Commentor: Bradshaw, Phillip A., Chairman, Board of Supervisors
Municipality – County of Isle of Wight

Issue: Recommended Alternative

Comment: The Isle of Wight County Board of Supervisors continues to support Candidate Build Alternative 9.

Response: Comment Noted

Commentor: Dixon, Mary Lynn, Deputy City Clerk
Municipality – City of Suffolk

Issue: Recommended Alternative

Comment: Suffolk City Council continues to support Candidate Build Alternative 9 as the preferred Third Crossing of Hampton Roads. The City of Suffolk also continues to support the upgrade of Route 460 to Freeway Status as one of the Regional High Priority Transportation Projects.

Response: Comment Noted

Commentor: Holley, James W., III, Mayor
Municipality – City of Portsmouth

Issue: Recommended Alternative

Comment: The city reaffirms its support for Candidate Build Alternative 9. As the project proceeds, the city will want to be closely involved in the process by which the final route will be selected, since there are important transportation issues that must be addressed. The City acknowledges that the location presented at the public hearing shows that the Virginia Department of Transportation has made every effort to minimize the impacts on developable land in Portsmouth.

Response: Comment noted. Continued coordination with the city will occur.

Commentor: O’Grady, Thomas A., Director, Department of Economic Development and Executive Director, Industrial Development Authority
Municipality - City of Suffolk

Issue: Recommended Alternative

Comment: The Suffolk Industrial Development has passed a resolution endorsing Candidate Build Alternative 9 as the preferred Third Crossing of Hampton Roads.
Commentor: Pazour, John L., City Manager  
Municipality – City of Chesapeake

Issue: Recommend Alternative

Comment: The City of Chesapeake continues to support Candidate Build Alternative 9 as the preferred alternative. City Council believes that building this high cost facility as a phased project, with the first phase being the I-564 East and West Connector to I-664, along with the widening of I-664 to six lanes from the Connector to Bower’s Hill, would be most effective. Chesapeake also supports the upgrade of Route 460 to freeway status.

Response: Comment noted

Commentor: Simpson, John O., Superintendent of Schools  
Municipality - City of Norfolk

Issue: Review of DEIS

Comment: The DEIS has been reviewed, and we wish to make no comment regarding the study.

Response: Comment noted

Commentor: Spencer, Joseph H., II, Mayor  
Municipality – City of Hampton

Issue: Alternatives Considered

Comment: While we support the project, we are not convinced that any one of the options being considered represent the best long-term investment of our transportation dollars. If Candidate Build Alternative 9 is selected, traffic congestion on the Hampton Roads Bridge Tunnel will remain essentially unchanged from what the public experiences today. Spending $2.7 billion only to have the public still experience significant and frequent delays at the Hampton Roads Bridge Tunnel seems to be a questionable investment decision.

Response: Comment noted. The Major Investment Study, approved in 1997, concluded with the selection of CBA 9 as the best financial investment to best meet the purpose and needs of the project. CBA 9 was unanimously adopted by the MPO.

Comment: We question the wisdom of locating the multi-modal tube alongside CBA 9. The Monitor Merrimac Tunnel corridor is not the most densely populated corridor in our region. Transit appears to have the most opportunity for success in our most urban
corridor, which stretches from the southern Peninsula around to Norfolk and ultimately into Portsmouth. The I-64/HRBT corridor seems to be the far better choice as a transit corridor link.

**Response:** The multimodal corridor along CBA 9 would start at the Hampton Coliseum, follow I-664 through downtown Newport News and connect to I-564 near Naval Base Norfolk, the world’s largest Naval Base. Table 4-6 on page 121 of the DEIS lists the 1990 and 2015 per acre household and employment densities by segment for each Candidate Build Alternative. The width of the segment represents a 10-minute walk time distance in each direction from the center line of the Candidate Build Alternative. The segment of CBA 9 in Norfolk along I-564 from Norfolk International Terminals to the I-64 interchange contains the highest density per acre of employment in 1990 and in 2015. The highest expected density per acre of households occurs along I-64 in Norfolk from Hampton Roads to the I-564 interchange. However, the highest density per acre of automobiles also occurs in this segment. Unlike residential and employment densities, lower densities of automobiles are more conducive to transit use. The densities per acre of households along I-664 and I-64 on the Peninsula are very similar.

**Comment:** Without balancing our transportation investments in both existing crossings, we run the risk of encouraging significant disinvestment in the existing urban core regions of our region. CBA 9 will make it far easier to access the western portions of the region with no corresponding access improvements to the eastern portion of our region via I-64. This strategy has the potential to further encourage regional sprawl at the expense of the urban core cities.

**Response:** Candidate Build Alternative 9 connects Newport News and Norfolk, two of the region’s urban core regions. Candidate Build Alternative 9 does widen I-664 in Suffolk and Chesapeake from four lanes to six lanes. However, in addition to the development that currently occurs along I-664 in Suffolk and Chesapeake, there are already a number of propose, planned, and approved development plans along the I-664 corridor (Chesapeake’s Western Branch Area Plan, 1995, Suffolk Zoning Map, 1998). This planned development will be realized without an expansion of I-664 in this area. In the city of Portsmouth, the undeveloped area traversed by the VA 164 connection south of Craney Island and the U.S. Coast Guard Center is zoned for heavy manufacturing (Portsmouth Zoning Map, 1997). Because of the existence of VA 164, the Western Freeway, any planned development in this area will be realized without the VA 164 connection, proposed in Candidate Build Alternatives 2 and 9.

**Comment:** Does CBA 9 help or hinder our regional tourism strategy? Among the first tourism directions you see traveling south on this route is for the Outer Banks and Nags Head, North Carolina. Will this encourage visitors to by-pass Hampton Roads?

**Response:** Visitors traveling to the Hampton Roads area would most likely already have their travel and destination plans, including hotel reservations, in place before traveling to the region. The improved access between the Southside and the Peninsula should be a beneficial impact on the region’s tourism industry.

**Comment:** Investing in capacity improvements at both tunnels seems to be worth consideration when we know that our region will struggle with evacuations during potential emergencies and natural disasters.
**Response:** Comment noted.

**Comment:** The City of Hampton requests that a fourth “build” alternative be investigated which includes the following components: 1) Adding a third vehicle lane in each direction to the Hampton Roads Bridge Tunnel; 2) Placing the third multi-modal tube adjacent to the Hampton Roads Bridge Tunnel; 3) Include the port access improvements included in both CBA 2 and 9; and 4) Adding a third vehicle lane in each direction to the Monitor Merrimac Memorial Bridge Tunnel.

**Response:** The option suggested by the City of Hampton would increase the cost of the project to $3 Billion, exclusive of additional costs for right of way acquisition. The increased cost is attributable to the loss of mobilization and labor cost efficiencies that would be realized by constructing the new harbor tunnel in one location, rather than in two separate locations.

While the suggested option does reduce congestion at the Hampton Roads Bridge Tunnel, both CBAs 1 and 2 do a better job of reducing congestion at the Hampton Roads Bridge Tunnel. CBA 9 does a better job of improving traffic flow on I-664, VA 164, the Downtown Tunnel and the Midtown Tunnel. CBA 9 does just as good of job of reducing congestion on Hampton Boulevard.

Because the option suggested by Hampton costs more than the three CBAs included in the DEIS, without providing any measurable improvements to the overall project, this option does not require any additional consideration.

**Commentor:** Spore, James K., City Manager  
**Municipality – City of Virginia Beach**

**Issue: Recommended Alternative**

**Comment:** The City of Virginia Beach endorses Candidate Build Alternative 9 as its preferred alternative.

**Response:** Comment noted

**Issue: Craney Island and proposed port expansion**

**Comment:** If the proposed port expansion is not feasible, does this alter the criteria used to select a preferred alternative or the outcome of the selection?

**Response** No, the Route 164 connection is viable with or without the 4th marine terminal. In fact, the Route 164 connection was originally suggested due to its ability to reduce traffic volumes and the volume over capacity ratio on Hampton Boulevard and the Midtown Tunnel (DEIS Table 4-2, page 114). The connection also provides new and improved access to Portsmouth Marine Terminal and improves access between Naval Base Norfolk and the Naval installations located in Portsmouth. These points are noted in the document.
Issue: Traffic upstream and downstream of project limits

Comment: Concerned with the impact the additional crossings of Hampton Roads will have upstream and downstream of the project limits. Although I-64 on the Peninsula is slated for improvement, there is some question as to whether the improvements will be sufficient to accommodate the additional demand. On the Southside, there are no plans for improvements and I-64 is currently operating at level of service “F”. Some consideration needs to be given to phasing the project in a way that will provide an opportunity to evaluate these problems and devise solutions prior to construction of the Third Crossing. The City of Virginia Beach recommended the following phases:

1) the leg between I-564 and I-664. This would allow for a simultaneous review of Route 460 and its ability to serve as an alternative corridor connecting Hampton Roads to I-95. This route would avoid the I-64 congestion problems and provide Hampton Roads with an attractive hurricane evacuation route.

2) The segment across Craney Island connecting I-564 to the Western Freeway in Portsmouth.

3) The additional spans and tubes paralleling I-664 (unless severe congestion occurs before there are concrete plans for a Craney Island port expansion, in which case this segment could become Phase II).

Response: One of the advantages of the selected alternative is to allow for project phasing (i.e., construction of usable segments over time). Such phasing, among many things, will allow for strategic regional planning as proposed.

Commentor: Whitley, Fred, P.E., City Engineer
Municipality - City of Hampton

Issue: Historic Resources

Comment: On page 239, Hampton University is referred to in several places as “Hampton Institute”. This name change occurred in 1990s.

Response: The “Hampton Institute” reference is the designation used for this important resource in historic archives. The FEIS has noted the name change on page 258.

Commentor: Williams, Regina V.K., City Manager
Municipality - City of Norfolk

Issue: Recommended Alternative

Comment: The City of Norfolk continues to strongly endorse the selection of Candidate Build Alternative 9 as outlined in the DEIS as the recommended option for the needed new crossing of Hampton Roads.

Response: Comment noted
DEIS Public Hearings - Public Comments and Responses

Commentor: Adkins, James W. and Fredrick W. Ellis
Individuals

Issue: Homeowner Notification

Comment: Homeowners should have been notified of the project.

Response: An extensive public involvement campaign has been conducted since the beginning of this project in late 1993. It has included local newspaper advertisements; news releases on local television and radio; the mailing of 2,000 newsletters to a project mailing list; an internet home page site; and the distribution of over 1,000 newsletters to local community centers, churches, public libraries, social service centers, bus stations, and senior centers.

Commentor: Alcott, Robert G.
Individual

Issue: Alternatives Considered

Comment: In the long term, a new crossing will be needed, but in the near future an interstate paralleling Route 460 needs to be put in place.

Response: Comment noted. See discussion of Route 460 on page 17 of the FEIS.

Commentor: Arnt, Richard L., Jr.
Individual

Issue: Funding of Project

Comment: Have a toll on CBA 9 or raise the gas tax and dedicate the tax strictly for CBA 9

Response: A variety of funding sources will be investigated for this project.

Commentor: Baird, Edward R., Attorney At Law
Individual

Issue: Alternatives Considered

Comment: Recommend a combination of the third crossing by highway, high speed rail, and fast ferries. The EIS could state that there are substantial indications that the population growth and resulting demand could be much more than predicted so that additional forms of transportation may be necessary, in addition to the Third Crossing. There is room for both the Third Crossing and fast ferries after the Third Crossing is built.

23
Fast ferries could also be used while the Third Crossing is being built. And fast ferries can be used to run up the Bay from Hampton Roads to Baltimore and Washington D.C.

**Response:** Population and employment growth figures were obtained from the Hampton Roads Planning District Commission. This regional socioeconomic data was the driving force for all trip projections made by the travel demand forecasting model. Based on latent demand figures projected by the model and the fact that the region hosts a strong tourism industry, it would appear that there will be room for both the Third Crossing and fast ferries after the Third Crossing is built. Private ferries are being developed by the private sector.

**Comment:** The FEIS should not say that the Third Crossing is the final answer for Hampton Roads transportation needs. But, rather, that the Third Crossing is a badly needed answer, among others, to Hampton Roads transportation needs.

**Response:** The Hampton Roads Crossing Study is a response to solving an existing problem: increasing traffic volumes and congestion at the Hampton Roads Bridge Tunnel. The document does not claim to solve all transportation needs in the region.

### Issue: Privatization of Transportation

**Comment:** The privatization of transportation has recently become a hot button issue. The present public highway-only solution in the DEIS, without considering high speed rail and fast ferries, is a good way to get sued for running a monopoly. A combination public highway and private fast ferry project however is not a monopoly.

**Response:** Comment noted

**Comment:** The Virginia Assembly passed the Public-Private Transportation Act of 1995. Why shouldn’t the Hampton Roads Third Crossing be privatized? DEIS did not contain a discussion of the privatization issue.

**Response:** The Public-Private Transportation Act was mentioned in the Hampton Roads Crossing Study Major Investment Study (VDOT, 1997). A variety of funding sources, including public-private partnerships, will be investigated for this project.

### Issue: Fast Ferries

**Comment:** Fast ferries now operate in several ports in the United States including San Francisco, Seattle, Boston, New York, Key West, and recently Hampton Roads. The City of Hampton, through the Hampton Convention and Tourism Department, applied three years in a row for a Congestion Mitigation Air Quality (CMAQ) grant to bring fast ferries into Hampton. The CMAQ grant was finally issued in the amount of $248,000 per year for three years to run a fast ferry between Hampton and Norfolk. The HarborLink fast ferry service, a wholly owned subsidiary of MetroMarine Holdings, Inc., was started on June 24, 1999 between Hampton and Norfolk. Almost twenty thousand riders were carried in the first two full months of operation. MetroMarine has plans to expand the service, hopefully, by this summer.
Response: Information on the HarborLink ferry service is included in the FEIS in Chapter 3, Section B.3: Ferry Service on page 52.

Comment: There are enough interested designers, builders, repairers, operator (Harbor Link) and computer control firms to create a world class fast ferry industry in Virginia. Building fast ferries in Hampton Roads should lead to a substantial economic multiplier effect.

Response: Comment noted.

Comment: Also, not mentioned in the DEIS is the fact that the Jamestown 2007 Celebration will be over long before the Third Crossing is completed. The Jamestown 2007 Celebration will place a short-term demand on transportation that only fast ferries can fill in time.

Response: Comment noted.

Commentor: Baisley, George E.  
Individual

Issue: Alternatives Considered

Comment: Recommended the following alternative for the third crossing. Increase I-64 from four lanes to six lanes from I-664 to and including I-564 (or from six to eight lanes). Increase I-664 from six lanes to eight lanes. Add feeder to Craney Island and connect to I-564.

Response: This alternative does not include the multimodal component of the project. From the beginning of this project it has been recognized that multimodal needs are an important consideration in order to accommodate future growth. Any alternative that is selected will include the multimodal component. If the multimodal lanes are added to the above alternative it will basically be the same as the alternative recommended by the city of Hampton (see page 19 of this comment and response section).

Commentor: Beasley, Earl M.  
Individual

Issue: Alternatives Considered

Comment: Recommended the following alternative combination of Candidate Build Alternatives 2 and 9 for the third crossing. Build Candidate Build Alternative 2 in its entirety, add bridge only tie to existing I-664 bridge. Consider traffic size/time restrictions if necessary on Hampton Roads Bridge Tunnel.

Response: Without making any improvements to the I-664 corridor, total mobility across Hampton Roads will not be improved. Without any improvements to the I-664 Monitor Merrimac Memorial Bridge Tunnel, a connection from I-564 to I-664 will increase congestion in the I-664 corridor. This option does not require any additional consideration.
Issue: Funding of Project

Comment: The ports/terminal/military are number one benefactors of project. Investigate percent of project for these people to pay. I am opposed to tax increase or toll project.

Response: A variety of funding sources will be investigated for this project.

Commentor: Conlon, David
Individual
Date – January 21, 2000

Issue: Funding of Project

Comment: An increase in the gas tax in “Hampton Roads” is an obvious way to pay for this project. However, it would not be fair to add the tax to gas stations in Isle of Wight County.

Response: A variety of funding sources will be investigated for this project.

Commentor: Edberg, Gary
Individual

Issue: Funding of Project

Comment: Would support a temporary toll on all crossings if it would increase the likelyhood of getting federal assistance to build alternative 9

Response: A variety of funding sources will be investigated for this project.

Commentor: Flayhart, Donald H.
Individual

Issue: Alternatives Considered

Comment: Improving passenger rail (Amtrak perhaps supplemented with VRE train service WAS-RIC-Newport News) and bus service through the I-64 corridor could reduce the need to widen I-64 to no more than 6 lanes.

Response: A separate study, the I-64 Major Investment Study, examined the 75-mile corridor that extends from Richmond to Hampton and Newport News. This multi-modal transportation study examined both the I-64 highway corridor and the CSXT railroad corridor. The Richmond and Hampton Roads MPOs selected a Locally Preferred Alternative. This alternative consists of operational, highway, rail, and transit improvements in the I-64 and CSXT corridors.
Commentor: Geduldig – Yatrofsky, Mark A.

Individual

Issue: Funding of Project

Comment: Support CBA 9 if it does not involve tolls on the downtown and midtown tunnels; tolls on the James River crossings were “congestion” priced; carpool discounts are offered; and trucks and trailers are segregated in dedicated lanes.

Response: A variety of funding sources will be investigated for this project.

Commentor: Girard, Remy G., President

Group – Gate of Destiny, Inc.

Issue: Alternatives Considered

Comment: Build a people friendly suspension bridge at the Hampton Roads Bridge Tunnel and use the existing tunnels for passenger rail transportation. The “Gate of Destiny Bridge” could have a total of 14 lanes: 10 lanes for traffic; 2 bike lanes; 2 pedestrian lanes; bus lanes on outermost traffic lanes; and HOV lanes on innermost lanes.

Response: Earlier in the Major Investment Study phase of this project, high level bridges were considered for all of the alternatives crossing Hampton Roads. High level bridges were eliminated from further study in the MIS phase based on the following reasons: 1) A high-level bridge crossing near the Hampton Roads Bridge Tunnel or at the Elizabeth River crossing would conflict with the required clear zone for the Norfolk Naval Air Station; 2) The Navy historically has opposed a high level bridge over channels used by their ships in the Hampton Roads area; and 3) Concern has been expressed by the Hampton Roads Maritime Association that a high level bridge may limit ship size and hinder future access to the ports of Hampton Roads.

Commentor: Giles, Edmund

Individual

Issue: Location of VA 164 connection

Comment: Plan to oppose the expansion of Craney Island and recommend that this section of Candidate Build Alternative 2 (Mr. Giles’ preferred alternative) be relocated westward to accommodate the proposed port facility along the existing eastern shoreline of Craney Island.

Response: The connection to VA 164 is located directly along the existing eastern shoreline and does not cross the existing Craney Island Dredged Disposal Management Area due to concerns about limiting the height of Craney Island and forcing it to close prematurely.
Commentor: Hall, J.B.  
Individual

**Issue: Alternatives Considered**

**Comment:** Build Alternative 9 and continue it through to James River Bridge to above Smithfield and above Jamestown on the North. This will ease traffic through Hampton-Newport News-Norfolk-Portsmouth.

**Response:** Earlier in the MIS phase of this project, a new transportation facility along the CSXT railroad corridor from downtown Newport News to I-64 near Bland Boulevard was examined as an extension to Alternative 9. However, as a full typical section, this extension was eliminated from further detailed study due to the number of potential displacements, cost, operational and safety issues, and impacts to Threatened and Endangered species (see page 29 of FEIS).

Commentor: Hendrix, Andrew H.  
Individual

**Issue: Funding for Project**

**Comment:** Hampton Roads citizens should be given the opportunity to vote on a local tax increase to facilitate the cost of the project.

**Response:** A variety of funding sources will be investigated for this project.

Commentor: Klinefelter, John W.  
Individual

**Issue: Phasing of Project**

**Comment:** Recommend construction of Alternative 9 in two phases: 1) complete all construction except new tunnel parallel to Monitor Merrimac and widening of I-664; and 2) complete remainder. This will ease funding impact and meet intermodal connectivity earlier.

**Response:** One of the advantages of the selected alternative is to allow for project phasing (i.e., construction of usable segments over time). Such phasing, among many things, will allow for strategic regional planning as proposed.
Commentor: Molzhon, Fred  
Individual

Issue: Alternatives Considered

Comment: Instead of spending billions on a new roadway or light rail system, provide efficient bus service. Make a more concerted effort to provide bus riders with plans that provide the basic elements of what is desired in order to replace the convenience of personal automobiles.

Response: Bus service as a stand alone alternative was originally evaluated in the Hampton Roads Crossing Study in the early stage of the project. However, bus service alone will not address the congestion that occurs and is projected to occur at the I-64 Hampton Roads Bridge Tunnel. As a stand-alone alternative, increased bus service was eliminated during the first screening of alternatives because it did not meet the evaluation criteria of reducing projected peak hour volumes at the Hampton Roads Bridge Tunnel by 10 percent or more. The opportunity to improve bus service between the Peninsula and Southside is provided as part of each Candidate Build Alternative through the incorporation of the multi-modal tube for each tunnel crossing of Hampton Roads.

Commentor: Murrell, Janie and George Randell  
Individuals

Issue: Funding of Project

Comment: No tolls

Response: A variety of funding sources will be investigated for this project.

Commentor: Procyson, John  
Individual

Issue: Alternatives Considered

Comment: What options (ferries, incentives to live where you work, etc.) were considered?

Response: Chapter 2: Alternatives Considered of the FEIS discusses the range of alternatives that were considered.

Issue: Accidents

Comment: Accidents cause tie-ups. If I’m in “the new” tunnel and there is an accident, how am I helped?

Response: Page 126 of the FEIS addresses each alternatives’ ability to accommodate diversion during incidents.
Commentor: Smith, Albert H.
Individual

Issue: Funding of Project

Comment: Is there any interest from the CSX and/or NS in having the third tube carry heavy rail traffic? If so, would they be interested in contributing financially? It would seem that the Port Authority might also like to see this capacity.

Response: A variety of funding sources will be investigated for this project. A heavy freight rail crossing was initially evaluated. However, the current state of technology and normal methods of operation for heavy freight rail require grades of one percent or less. Based on the flatter grade, a tunnel for heavy freight rail would extend for over a mile beyond a practicable landing point at Norfolk International Terminal.

Commentor: Stumm, Robert E.
Individual

Issue: Alternatives Considered

Comment: More and larger roads just expand a traffic problem as the availability to drive just entices the demand. Suggest city planners focus on means that will not necessitate commuting from area to area.

Response: Comment noted.

Commentor: Thomas, Julian J.
Individual

Issue: Funding for Project

Comment: Favor a gas tax to raise the necessary funds

Response: A variety of funding sources will be investigated for this project.
Commentor: Trundle, Robert D.
Group – The Lawson Companies

Issue: Property in Portsmouth

Comment: Concerned about a large undeveloped tract of land adjacent to VA 164 and Cedar Lane in Portsmouth. This land is frequently referred to as the “Cox Property”. The Property is currently under contract with a potential purchaser. The connector to VA 164 appears desirable, but we are concerned about the impact this corridor will have on proposed development of the Property as well as future access to both the freeways and local streets adjacent to the Property. Minimizing the potential “take” of the land for the roadway and interchange, and coordination of the road corridor with land use and access issues are of paramount concern to the Owners and potential purchaser.

We support the proposed connector, and Candidate Build Alternative 9. Ongoing consideration of minimizing impacts to our property must be addressed and we request that you keep us advised of future developments regarding this project.

Response: Comment noted. The Lawson Companies’ address has been added to the project mailing list to assure that the company is kept informed of future developments regarding the project.
ATTACHMENT VI

AGENCY LETTERS
Mr. Roberto Fonseca-Martinez  
Federal Highway Administration  
Dale Building, 1504 Santa Rosa Road  
Richmond, VA 23229  

Reference: Hampton Roads Crossing – Preliminary Final EIS  

Dear Mr. Fonseca-Martinez:  

We are in receipt of a copy of a letter dated October 16, 2000, concerning the Third Harbor Crossing Project proposed by the Virginia Department of Transportation (“VDOT”), and the comments offered by the U. S. Fish and Wildlife Service with respect to the possible Eastward Expansion of the Craney Island Dredged Material Management Area (“Craney Island”). We would like to clarify the comments attributed to one of our consultants, Mr. Michael Knot of Moffatt & Nichol Engineers, on behalf of the Virginia Port Authority during a presentation to the members of the Third Harbor Crossing Commission on September 22, 2000.  

The proposed Eastward Expansion of Craney Island is a completely independent project from the proposed Third Harbor Crossing Project by VDOT. The statement of need for the Craney Island project has a threefold purpose; 1) creating a larger island for dredged material disposal for the Corps; 2) creating land for a new marine terminal for VPA; and 3) a facility to serve as a logistical and tactical area supporting the deployment of national defense forces in times of emergency.  

The proposed Eastward Expansion of Craney Island is currently the subject of a Feasibility Study and EIS being conducted by the Norfolk District US Army Corps of Engineers. The study is jointly sponsored by the Corps and the Commonwealth of Virginia (represented by the Virginia Port Authority). The study was initiated in April 1999 and is scheduled for completion in 2002.
The proposed Eastward Expansion of Crancy Island is independent of the Third Harbor Crossing Project, in that the expansion of Craney Island (including the ultimate build-out) would take place regardless of whether VDOT constructed the new crossing in total, or any proposed segment or segments of the recommended Alternative 9. If the Third Harbor Crossing were not built, then sole access to the terminal on Craney Island would occur through a new access road from the Western Freeway (Rte. 164) in Portsmouth.

Again, we appreciate the opportunity to offer our comments and this clarification to FHWA's review of the Hampton Roads Crossing Preliminary Final EIS. Please call if you have any questions, or if we can be of any additional assistance.

Very truly yours,

VIRGINIA PORT AUTHORITY

[Signature]

Robert R. Merhige, III
General Counsel and Deputy Executive Director

Co: Honorable Shirley J. Ybarra
J. Robert Bray
Ken Wilkinson, VDOT
Phillip A. Shucet, Michael Baker Jr.
Mark T. Mansfield, Norfolk District COE
Peter Kube, Norfolk District COE
Michael Knott, P.E., Moffatt & Nichol Engineers
William Hester, US Fish & Wildlife Service
Tracey Harmon, Department of Environmental Quality
Tom Wilcox, Department of Game and Inland Fisheries
Peter Stokely, EPA Region III – VA Field Office
Rodney Schwarm, National Marine Fisheries Service
Bruce Turner, FHWA
Jay Woodward, Virginia Marine Resources Commission
Thomas Barnard, Virginia Institute of Marine Science
October 17, 2000

Mr. Ken Wilkinson
Environmental Planner
Virginia Department of Transportation
1401 East Broad Street
Richmond, VA 23219

RE: Preliminary Final EIS for the Hampton Roads Crossing Study

Dear Ken,

We have reviewed the subject document from a marine environmental perspective, including VDOT's responses to our previous comments, and have no additional comments to make at this time. Our observations regarding the effects of the potential eastward expansion of Craney Island Dredged Material Placement Area may be pertinent with further planning and the passage of time. We hope they will remain part of the evolving document.

We appreciate the opportunity to comment and hope our observations are useful to the conduct of this necessary planning element.

Sincerely,

Thomas A. Barnard, Jr.
Assistant Professor
October 17, 2000

Mr. Ken Wilkinson
Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219-2000

Subject: Preliminary Final Environmental Impact Statement – Hampton Roads Crossing Study, Virginia

Dear Mr. Wilkinson:

The Department of Environmental Quality (DEQ) Virginia Water Protection Permit Program has reviewed the Preliminary Final Environmental Impact Statement (FEIS) for the Hampton Roads Crossing project. The scope of work includes the construction of a new bridge-tunnel crossing of Hampton Roads in southeastern Virginia. The project area includes the Cities of Chesapeake, Hampton, Poquoson, Newport News, Norfolk, Suffolk, and Virginia Beach and Isle of Wight and York Counties, Virginia.

As reported in the FEIS, all Candidate Build Alternatives (CBAs) will impact State waters, including wetlands. In addition, each CBA requires dredging during the construction activities. As noted in the FEIS, alternative locations and alignments which reduce impacts to wetlands and watercourses were considered during the planning process. CBA 9 has been chosen as the only practicable alternative. CBA 9 impacts the largest amount of wetlands and involves a considerable amount of dredging. Minimization efforts have reduced wetland impacts from an initial 18 acres to 11.3 acres. VDOT should further investigate additional avoidance and minimization of direct and indirect impacts to wetlands and streams to the greatest extent possible. As indicated in the FEIS, for the selected alternative unavoidable impacts to wetlands and State waters will require full compensatory mitigation.

The FEIS indicates CBA 9 has twelve proposed stream crossings. Eight of these crossings are planned with culverts. Spilling streams instead of using culverts should be further investigated as a means to minimize impacts to state waters. Where culverts are found to be most practicable, then they should be countersunk at least 6 inches and a natural stream bottom should be maintained. During construction machinery should be kept out of streams and wetlands when possible. Machinery
that must be operated within wetland areas should be maintained on mats in order to prevent tire rutting.

In order to reduce the amount of proposed dredging, we suggest using the concrete tunnel instead of steel since concrete tunnels require less dredging. The amount of dredging required during the site activities should be minimized, and best management practices should be utilized, including time of year constraints. All non-contaminated dredged material should be properly disposed of at an upland site.

Due to the extent of impacts to State waters, this project will require an individual Virginia Water Protection Permit, including coordination of this project with the Virginia Marine Resources Commission, the Army Corps of Engineers and the DEQ through the Joint Permit Application process.

In general, DEQ encourages the use of erosion and sediment control measures, adherence to stormwater management regulations, and careful construction practices to minimize temporary impacts to State waters during site construction activities.

Please note that any impacts due to grading, clearing, or excavating five or more acres of land will require a stormwater permit for construction. The proponent should coordinate storm water permitting issues with the DEQ Regional Office Storm Water Permitting staff at the Tidewater Regional Office at (757) 518-2000.

We appreciate the opportunity to comment on this project. Please contact Wendy Kedzierski at (804) 698-4503 with any questions or comments.

Sincerely,

Ellen Oliinsky, Ph.D.
Water Protection Permit Program Manager

cc: File
October 16, 2000

Mr. Roberto Fonseca-Martinez
Federal Highway Administration
Dale Building, 1504 Santa Rosa Road
Richmond, Virginia 23229

Re: Hampton Roads Crossing -
Preliminary Draft EIS

Dear Mr. Fonseca-Martinez:

The U.S. Fish and Wildlife Service has reviewed the preliminary Environmental Impact Statement for the Hampton Roads Crossing Study that was provided to this office by the Virginia Department of Transportation by a cover letter dated September 19, 2000. The Virginia Department of Transportation, in cooperation with the Federal Highway Administration, is proposing to construct a new bridge-tunnel crossing of Hampton Roads in southeastern Virginia. The study area includes the Cities of Chesapeake, Hampton, Poquoson, Newport News, Norfolk, Suffolk, and Virginia Beach, and the Counties of Isle of Wight and York. Project termini include the I-64 and I-664 interchange in Hampton; the I-64 and I-564 interchange in Norfolk; Virginia Route 164 near Coast Guard Boulevard in Portsmouth; and the I-64, I-264, and I-664 interchange in Chesapeake. This letter constitutes the comments of the Service and the Department of the Interior on the preliminary Draft EIS and is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the National Environmental Policy Act of 1969 (42 USC, subsections 4321-4370a, as amended).

The Service has provided previous comments on this project in our letters dated July 22, 1998, December 8, 1998, April 23, 1999, and August 11, 1999. We also refer you to comments from the U.S. Department of the Interior dated February 7, 2000. Rather than repeating these comments herein, we refer you to these letters.

Endangered Species Act Comments

As you are aware, for actions considered to be a major federal construction activity significantly affecting the quality of the human environment (i.e. one requiring an EIS under the National Environmental Policy Act), Section 7(c) of the Act requires that the agency prepare a biological
assessment to determine the effects of the project on any listed species or proposed species that may occur in the impact area. Since the piping plover (Charadrius melodus), occurs in the vicinity of the proposed project, the Federal Highway Administration must determine whether the project may affect this species.

The Service has reviewed the Biological Assessment dated August 25, 2000 that was provided to this office by VDOT. The BA concludes that, "The third crossing will not adversely affect [sic] the piping plover..." and that the 4-lane connector road will tie into the third crossing with an interchange just off Craney Island's eastern shore. Based on this information and the figures presented in the BA, the Service requests additional information prior to making a recommendation regarding formal Section 7 consultation on this project. We request that the BA be amended to include the following information:

1) Whether the connector road would be located on the existing Craney Island proper,

2) If so, the square footage of the roadway footprint and construction staging area on the island and the exact location,

3) If not, the distance from the connector road to the existing Craney Island shoreline and distances between the shoreline and roadway, every 100 meters, along the entire length of the eastern shore of Craney Island.

The Service recommends that the BA be amended as requested above and that the amended document be included in the final EIS.

In addition to displacement of breeding or foraging habitat, the Service has concerns regarding the potential impacts of this roadway on the piping plover. Such factors as noise and lighting could disturb plover behavior and use of the island. The roadway is also likely to attract gulls and other birds that prey on plovers and their nests. One or more of these factors could effectively eliminate use of Craney Island by plovers.

Fish and Wildlife Coordination Act Comments

In our August 11, 1999 letter, the Service asked for additional information on the eastward expansion of Craney Island. In the preliminary EIS, it is concluded that the eastward expansion of Craney Island is independent of Hampton Roads Crossing. However, we understand that at a recent meeting of the Hampton Roads Third Crossing Bridge-Tunnel Commission (HR 125/2000), Mr. Mike Knott of Moffatt and Nichol Engineers, agent for the Virginia Port
Authority, noted that a total build-out of a port facility on Craney Island would not be built without the third crossing.

We question the conclusion that the port facility is independent of the third crossing. We again recommend that additional information on the eastward expansion be included in the document, as we stated in our August 11, 1999 letter. Our previous recommendations are repeated below.

We understand that an eastward expansion of Craney Island is being considered as a part of the Corridor 9 alternative. If so, the Service recommends that this option be discussed in detail in the DEIS. Discussion topics should include, at a minimum:

- area of fill of subtidal and tidal bottom, and wetlands,
- source of fill,
- timeline for creation of the eastward expansion,
- anticipated impacts of this activity on aquatic resources and hydrodynamics and sedimentation in Hampton Roads.

The document states that oyster reef creation could serve as a form of compensation for the aquatic impacts from the proposed project. As stated in our previous letter, the Service supports this measure and recommends that VDOT begin immediate discussions with the Virginia Marine Resources Commission and Virginia Institute of Marine Science to formulate oyster reef creation plans. The Service would be glad to assist with the development of a plan to create oyster reefs.

Factors related to this project that may affect the piping plover may also negatively impact other migratory birds that use Craney Island. Gulls and other birds that prey on nests and young are likely to be attracted by the new bridge, causing an increase in predatory bird density around the island. Gulls are a major source of predation on colonial nesting birds that breed on Craney Island such as least terns (Sternula antillarum). The Service will provide additional comments on this issue during future coordination.

The Service appreciates your coordination of this document with us. We look forward to reviewing the amended BA and final EIS. If you have questions, please contact William Hester at (804) 693-6694, ext. 134.

Sincerely,
Karen L. Mayne
Supervisor
Virginia Field Office

cc: Mr. Ken Wilkinson
    VDOT Headquarters, Richmond, VA
    Mr. Peter Kube, Norfolk District Corps of Engineers, Norfolk, VA
bcc: CBFO, Annapolis, MD
    (Attn: Bob Zepp)
    Refuge Manager, Great Dismal Swamp NWR
    (Attn: Lloyd Culp)
    VMRC, Newport News, VA
    (Attn: Jay Woodward)
    VIMS, Gloucester Pt., VA
    (Attn: Tom Barnard)
    VDGIF, Richmond, VA
    (Attn: Tom Wilcox)
    DEQ, Richmond, VA
    (Attn: Tracey Harmon)
    NMFS, Oxford, MD
    (Attn: Rod Schwarm)
    EPA, Reston, VA
    (Attn: Pete Stokely)

(filename: HRCPEIS)
(whester: 10-16-00)
October 2, 2000

Mr. Kenneth E. Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, VA 23219-2000

RE: Preliminary Final Impact Statement for the Hampton Roads Crossing Study

Dear Mr. Wilkinson:

Thank you for updating VDEQ’s Division of Air Program Coordination on the status of the Hampton Roads Crossing Study. Please note that the proposed/final Candidate Build Alternative must be shown to conform in a Transportation Conformity Analysis before construction can proceed. Since the project site is located within an ozone nonattainment area, fugitive emissions of volatile organic compounds (VOCs) and oxides of nitrogen (NOx) generated from construction activities should be minimized. The State air pollution regulations that may be applicable to the construction of the project are listed below.

- Fugitive Dust and Emission Control (9 VAC 5-50-60 et seq.)
- Open Burning Restrictions (9 VAC 5-40-5600 et seq.)
- Cut-back Asphalt Usage Restriction (9 VAC 5-40-5490 et seq.)

Please direct all future correspondence regarding this project to James Ponticello at the address listed above, and I can be reached at (804) 698-4405 with any additional questions.

Sincerely,

[Signature]

James Ponticello
Office of Data Analysis

An Agency of the Natural Resources Secretariat
COMMONWEALTH of VIRGINIA

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

6 October 2000

Margaret Long Stephenson
Cultural Resource Planner, Senior
Virginia Department of Transportation
1700 N. Main Street
Suffolk, Virginia 23434

Re: I-64 (Hampton Roads Crossing Study)
0064-114-F12, PE102
Cities of Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, and Suffolk
DHR project no. 93-0238

Dear Ms. Stephenson:

Thank you for requesting our comments on the properties that may be affected by the proposed Hampton Roads Third Crossing project. We have received further survey information on the project from Louis Berger & Associates, Inc. We agree that the following properties are not eligible for listing in the National Register:

- 121-0038, Jefferson Avenue Commercial Corridor, Newport News.

Please contact Lee Tippett at this office if you have questions about our comments. We look forward to working with all parties on this project.

Sincerely,

[Signature]
Cara H. Metz, Director
Division of Resource Services and Review
Mr. Bruce Turner
Federal Highway Administration
409 North Eighth Street, Room 750
Richmond, VA 23240-0249

Dear Mr. Turner:

This correspondence is in regards to the Hampton Roads Crossing Study in the lower James River, Hampton Roads, Virginia, and the potential impacts to federally listed threatened or endangered species and/or designated critical habitat for listed species. While three candidate alternatives are being considered in the same general area, the preferred alternative for this project involves a new crossing parallel to the existing I-664 Monitor Merrimac Memorial Bridge Tunnel, and a new interchange near the south approach structure of the Monitor Merrimac Memorial Bridge Tunnel connecting to a new roadway and bridge tunnel extending from I-664 to I-564 in Norfolk, Virginia.

Tunnel construction consists of a submerged tube where the tube sections will be placed in a dredged trench on the Chesapeake Bay bottom in a position below the future shipping channel. Each tunnel will originate on artificial islands built on either side of the shipping channels. The preferred alternative will require three islands, one on each side of the Newport News Channel and one on the west side of the Norfolk Harbor Channel. The islands will measure approximately 285 feet at the summit. In-water work for this project includes driving 4 ½ feet diameter piles into the riverbed to develop the bridge approaches to the islands, dredging the channel bed to accept the tube tunnels, and laying the tube tunnels on the channel bed. Thimble Shoal Channel is also proposed to be dredged as a potential resource for fill material for the Hampton Roads tunnels and islands. A hopper dredge will be used for this project, but no dredging will be completed from May 1 to November 30.

Several endangered and threatened species occur in the Chesapeake Bay and its rivers, including the loggerhead sea turtle (Caretta caretta), Kemp’s ridley sea turtle (Lepidochelys kempi), leatherback sea turtle ( Dermochelys coriacea), hawksbill sea turtle (Eretmochelys imbricata), green sea turtle (Chelonia mydas), shortnose sturgeon (Acipenser brevisrostrum), and various species of marine mammals. Sea turtles can be found in the project area from May to November, which coincides with water temperatures in excess of 18° C. In particular, Kemp’s ridley and loggerhead sea turtles forage in harbors, bays, and estuarine waters during the summer months. Shortnose sturgeon have also been documented in the Chesapeake Bay. The distribution and movements of shortnose sturgeon in the Chesapeake Bay are poorly understood at this time, in part because this species is often confused with Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus). Therefore, we cannot conclude that shortnose sturgeon will not be present in the project area or that the species will not be vulnerable to project impacts. Further, the seasonal patterns of shortnose sturgeon in the Virginia waters of the Chesapeake Bay cannot be predicted at this time.

As stated in the project description, all dredging will be completed from December 1 to April 30, when turtles are not typically present in the Chesapeake Bay. Therefore, dredging in the Thimble Shoal Channel and in the channel bed located in the lower James River is not likely to adversely affect endangered or threatened sea turtles. While pile driving and placing the tube tunnels in the channel have
the potential to impact sea turtles (e.g., by disrupting feeding behavior or trapping the turtles under the tunnel), it is unlikely that these activities will adversely affect these species due to the location of the project and the efficient swimming capability of sea turtles.

Pile driving has the potential to impact the survival and distribution of shorntose sturgeon, and this species could also become trapped under the tube tunnels during placement. Hopper dredging also has been found to occasionally entrain shorntose sturgeon. However, due to the limited distribution of shorntose sturgeon in the Virginia waters of the Chesapeake Bay and the lack of evidence on shorntose sturgeon in the James River or in the Thimble Shoal Channel, the level of interaction, if any, is expected to be extremely low. As a result, the limited pile driving and hopper dredging is not likely to adversely affect shorntose sturgeon. The National Marine Fisheries Service is interested in working with the Federal Highway Administration and the Army Corps of Engineers to assess the distribution of shorntose sturgeon in Virginia waters of the Chesapeake Bay. These future distribution studies would ensure the adequate protection of endangered shorntose sturgeon.

Endangered marine mammals have the potential to occur in the vicinity of the Thimble Shoal Channel, but interactions with hopper dredges are unlikely. The additional in-water construction activities associated with this project should have no effect on marine mammals.

Based upon the location of this project, the proposed time of year restrictions for hopper dredging, and the distribution of listed species in the project area, the proposed Hampton Roads Crossing Study is not likely to adversely affect endangered or threatened sea turtles or shorntose sturgeon. No further consultation pursuant to Section 7 of the Endangered Species Act of 1973, as amended, is required. Should project plans change or new information become available that changes the basis for this determination, consultation should be reinitiated.

Should you have any questions about these comments, please contact Carrie McDaniel at (978) 281-9388.

Sincerely,

Patricia A. Kurkul
Regional Administrator

cc: Peter Kube, ACOE Norfolk
    Rod Schwarm, F/NER-OXF
    Laura Shucet, Fitzgerald & Halliday
    Ken Wilkinson, VDOT

File Code: 1514-05 (A) DOT General
COMMONWEALTH of VIRGINIA
Department of Historic Resources

2801 Kensington Avenue, Richmond, Virginia 23221

5 June 2000

Margaret Long Stephenson
Cultural Resource Planner, Senior
Virginia Department of Transportation
1700 N. Main Street
Suffolk, Virginia 23434

Re: I-64 (Hampton Roads Crossing Study)
0064-114-F12, PE102
Cities of Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, and Suffolk
DHR project no. 93-0238

Dear Ms. Stephenson:

Thank you for providing the further information on the properties that may be affected by the proposed Hampton Roads Third Crossing project. The documentation was received at this office on May 19, 2000. We agree that the following properties are not eligible for listing in the National Register:

- 122-5050-0009, 101 W. Bay View Boulevard, Norfolk
- 122-5050-0010, 8585 Granby Boulevard, Norfolk
- 122-5050-0011, 8577 Granby Boulevard, Norfolk
- 122-5050-0012, 8594 Executive Avenue, Norfolk
- 122-5050-0013, 8598 Executive Drive, Norfolk
- 122-5050-0014, 135 Bay View Boulevard, Norfolk
- 122-5050-0015, 8590 Executive Drive, Norfolk
- 122-0334, Norfolk & Western Grain Elevator Complex, Hampton Boulevard, Norfolk
- 122-5049, Glenwood Park neighborhood
- 122-5053, 203 West Bay Avenue, Norfolk
- 122-0410-0007, Swimming Pool, Fleet Recreation Park, Norfolk
- 122-0410-0008, Pool, Bathhouse and Heater, Fleet Recreation Park, Norfolk
- 122-5052, Willoughby Terrace neighborhood, Norfolk
- 122-5051, Pamlico neighborhood, Norfolk
- 122-5054, 316 Bradford Avenue, Norfolk
- 122-5055, 320 Bradford Avenue, Norfolk
Ms. Stephenenson  
DHR project no. 93-0238  

- 122-5056, 324 Bradford Avenue, Norfolk  
- 122-5057, 328 Bradford Avenue, Norfolk  
- 122-5058, 332 Bradford Avenue, Norfolk  
- 122-5059, 336 Bradford Avenue, Norfolk  
- 122-5060, 340 Bradford Avenue, Norfolk  
- 122-5061, 400 Bradford Avenue, Norfolk  
- 122-5062, 404 Bradford Avenue, Norfolk  
- 122-5063, 408 Bradford Avenue, Norfolk  
- 122-5064, 412 Bradford Avenue, Norfolk  
- 122-5065, 416 Bradford Avenue, Norfolk  
- 122-5066, 132 Greenbrier Avenue, Norfolk  
- 122-5067, 128 Greenbrier Avenue, Norfolk  
- 122-5068, 120 Greenbrier Avenue, Norfolk  
- 122-5069, 116 Greenbrier Avenue, Norfolk  
- 122-5070, 300 Bradford Avenue, Norfolk  
- 122-5071, 304 Bradford Avenue, Norfolk  
- 122-5072, 308 Bradford Avenue, Norfolk  
- 122-5073, 312 Bradford Avenue, Norfolk  
- 122-5074, 140 Greenbrier Avenue, Norfolk  
- 122-5075, 136 Greenbrier Avenue, Norfolk  
- 122-5076, 101 W. Bay View Boulevard, Norfolk  
- 122-5077, 8585 Granby Boulevard, Norfolk  
- 122-5078, 8577 Granby Boulevard, Norfolk  
- 122-5079, 8594 Executive Avenue, Norfolk  
- 122-5080, 8596 Executive Drive, Norfolk  
- 122-5081, 133 Bay View Boulevard, Norfolk  
- 122-5082, 8590 Executive Drive, Norfolk  
- 122-5050, Commodore Park neighborhood, Norfolk  

Please contact John E. Wells at this office if you have questions about our comments. We look forward to working with all parties on this project.

Sincerely,

[Signature]
Cara H. Metz, Director  
Division of Resource Services and Review

c: Louis Berger & Associates, Inc.  
Portsmouth Regional Preservation Office
April 14, 2000

Western Virginia Regulatory Section
94-4529-14 (Hampton Roads)

Mr. Ken Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219

Dear Mr. Wilkinson:

We have reviewed the draft EIS for the Hampton Roads Crossing Study (HRCS) and have the following comments.

3D MODEL STUDY

Hydrodynamic models suggest that Alternatives 2 and 8 may decrease residual water volumes passing through the mouth of the Elizabeth River. However, model grid resolution presently is not adequate to provide definitive answers on residual circulation inside the Elizabeth River. Nevertheless, as a screening tool, the model adequately compares the relative impacts of the alternatives for NEPA purposes. Further modeling studies using a smaller model grid size specific to the Elizabeth River may be required in support of a future permit application for a specific project. In addition, detailed measurements of the actual residual current in the field will be needed to verify model results. Furthermore, questions regarding the effect of alternatives 2 and 8 on the Craney Island Rehandling Basin and the behavior of the dredged material deposited there remain unanswered.

In addition, the biological effects that may result due to the changes in the physical parameters (currents, salinity, flushing, sedimentation, etc.) predicted by the model should be evaluated in the FEIS. For instance, what biological impact would a change in physical hydrodynamic parameters have on:

a. the eddy circulation at the Hampton Flats thought to be responsible for shellfish larval trapping
b. the plunging front (tidal intrusion) off Newport News Point thought to be responsible for oyster/crab larval recruitment to the James River estuary
c. the eddies in the Elizabeth River mouth (and elsewhere?) which may influence tidal flushing, sediment transport and biological recruitment.
d. the bottom shear stress in the lower James and Elizabeth River
Questions remain regarding the model's accuracy to predict cumulative hydrodynamic and sedimentation impacts without the inclusion of the proposed fourth Crissy Island cell and the proposed dredging of the 50' inbound channel. The cumulative impacts of the Expansion, the deepening and any preferred alternative may have to be addressed during the permit process. However, the modeling effort to date may be used to evaluate the cumulative impacts of the various projects as a relative screening tool.

We have found that for channel deepening projects and placement island construction in the upper Chesaapeake Bay, greater impacts are computed during episodic events resulting from meteorological forcings where large set ups and set downs occur. We believe that questions remain whether larger impacts might be computed if meteorological forcing had been accounted for in the downstream water surface boundary condition.

The turbidity maximum is a prominent feature in the James River. It would be more helpful if the total volume of water above 1 ppt with a salinity less than some value (or values) or the location of the 1.0 ppt bottom salinity (representative of the location of the turbidity maximum) had been computed and compared for the various cases. This would give more insight into cumulative impacts.

The Modeling Study Final Report contains many colored plots showing the results for the base and the alternatives. However, computed impacts are so small it is difficult to see them. It would have been better to show the base along with difference plots between the base and each alternative.

**NEPA**

NEPA provides a broad-based approach to impact balancing. However, NEPA does not contain substantive requirements that compel agencies to choose a particular reasonable alternative as is required by Section 404(b)(1) of The Clean Water Act. Compliance with NEPA requirements may not necessarily translate to compliance with the Section 404(b)(1) guidelines during Section 404 permit review. Therefore, we recommend the FEIS contain an alternative analysis under Section 404(b)(1) that addresses avoidance, minimization, and compensation of wetland impacts by answering the following questions:

a. Is there a practicable alternative that avoids discharges of fill in wetlands and other waters?

b. Does the proposed action include all appropriate and practicable steps to minimize adverse impacts to wetlands and waters through project modification and permit conditions?

c. Does the proposed action include appropriate and practicable compensating mitigation requirements for all remaining unavoidable adverse impacts to wetlands after minimization?

This analysis will help us identify the least environmentally damaging practicable alternative required by Section 404 review.
Thank you for this opportunity to comment. If you have any questions regarding the review of this project, please call Peter Kube at (757) 441-7504.

Sincerely,

[Signature]

Roberto Hume, Ph.D.
Chief, Western Virginia Regulatory Section
Project Number: 94-4529

1. Participant:
   Virginia Department of Transportation
   Federal Highway Administration

Waterway: Hampton Roads

2. Authorized Agent:
   Kevin Schroeder

   Michael Baker Jr., Inc.
   Airport Office Park - Bldg. 3
   420 Reuse Road
   Cranie, PA. 15108

3. Address of Job Site:
   Alternative crossings of Hampton Roads may be parallel to the Monitor Merrimac or Hampton Roads Bridge Tunnel facilities.

4. Project Description:
   The Virginia Department of Transportation, in cooperation with the Federal Highway Administration (FHWA), is proposing to construct a new bridge-tunnel crossing of Hampton Roads in southeastern Virginia.

5. Findings:
   This is regarding your request for verification of a jurisdictional wetlands delineation in the highway right-of-ways (ROW) for the alternative road alignments proposed for the Hampton Roads Crossing Study. The limits of jurisdictional wetlands regulated under Section 10 of the Rivers and Harbors Act (33 U.S.C. 403) and/or Section 404 of the Clean Water Act (33 U.S.C. 1344) are shown on the drawings entitled, "Hampton Roads Crossing Study, Hampton, Virginia, Current Field Identified Wetlands", in 11 sheets dated 7/99, sheets 7 and 8 revised 10/99, submitted to the Corps by Baker Environmental, Inc., Cranie, Pennsylvania. Nontidal, headwater wetlands; and tidal wetlands and tidal wetlands have been identified along the ROWs for the various alternative alignments. This jurisdictional determination is valid for a period of five years from the date of this letter.

   Please note that this is simply a verification of the wetlands delineation for the proposed project. Proposed work which would potentially result in the placement of dredged or fill material into waters or wetlands of the United States would be subject to review by the Corps and any appropriate State and local agencies prior to the start of any such fill activities. The term discharge of dredged material is defined as any addition, including redeposition other than incidental fall back, of dredged material, including excavated material, into waters of the United States which is incidental to any activity, including mechanized landclearing; and in some cases, ditching, channelization, or other excavation (40 CFR Part 232.2(1)(iii) as amended and 33 CFR 323.2(4)(1)(iii) as amended).

6. Corps Contact: Peter Kube at (757) 441-7504.

J. Robert Hume, III
Chief, Western Virginia Regulatory Section
March 15, 2000

Mr. James C. Cleveland  
Suffolk District Administrator  
Virginia Department of Transportation  
1700 North Main Street  
Suffolk, VA 23434-4322  

Re: Hampton Roads Crossing Study - Draft Environmental Impact Statement  

Dear Mr. Cleveland:  

The purpose of this letter is to convey the City of Virginia Beach’s comments on the Draft Environmental Impact Statement (DEIS) for the Third Crossing of Hampton Roads. The comments included below focus on both the technical elements of the DEIS as well as larger policy issues surrounding the proposed Third Crossing.  

The City of Virginia Beach is painfully aware of the congestion problems at the Hampton Roads Bridge Tunnel. Some 2.5 million tourists visit Virginia Beach each year, most of whom arrive via the Hampton Roads Bridge Tunnel. In light of this fact, the City of Virginia Beach continues to support the Third Crossing of Hampton Roads as a vitally important component of the region’s transportation network. The project addresses several important goals and objectives related to mobility and accessibility in Hampton Roads. The DEIS does an excellent job of identifying the issues and arraying the information in a clear and concise way. The information contained in the DEIS makes a compelling case for Candidate Build Alternative (CBA) #9 as the preferred alternative. It is my understanding that this alternative has been already endorsed by the Commonwealth Transportation Board as its preferred alternative.
The City of Virginia Beach also endorses CBA #9 as its preferred alternative. It is our opinion that this alternative more adequately meets the goals and objectives than the other alternatives included in the screening analysis. This alternative clearly reduces congestion at the Hampton Roads Bridge Tunnel by more than the 10% threshold and it has minimal impact on the community in terms of residential, commercial and community displacements. Alternative #9 has fewer than 40 displacements compared to more than 125 for each of the remaining alternatives (#1 and #2). Finally, the preferred alternative impacts only 24 acres of wetlands, which is a slightly higher level of impact than with the other alternatives, but it is a relatively small impact when you consider the scope and location of this project. We are hopeful that an effective mitigation plan will be developed to mitigate and/or compensate for all impacts.

Despite our support for the preferred alternative, several questions remain that we suggest VDOT address in preparation of the Final Environmental Impact Statement. Our questions are as follows:

- Access to Craney Island and the proposed port expansion site is discussed as an important factor for selecting CBA #9. Our understanding is that there is some question as to whether this proposal is even feasible. If this is correct, does this in any way alter the criteria used to select a preferred alternative or the outcome of the selection?

- The report suggests that the preferred alternative will generate a significant increase in the number of crossings between the Peninsula and Southside Hampton Roads (the DEIS calls for an increase of 15 million crossings annually). Our concern has been, and continues to be, the impact these additional crossings will have upstream and downstream of the project limits. Although I-64 on the Peninsula is slated for improvement, there is some question as to whether the proposed improvements will be sufficient to accommodate the additional demand. On the Southside there are no plans for improvements and I-64 is currently operating at level of service "F."

As this project moves forward, some consideration needs to be given to phasing the project in a way that will provide an opportunity to evaluate these problems and devise solutions prior to the construction of the Third Crossing. One suggestion would be to construct Phase I of the Third Crossing, consisting of the leg between I-564 and I-664, before embarking on the construction of the third span and tubes. This would allow for a simultaneous review of Route 460 and its ability to serve as an alternative corridor connecting Hampton Roads to I-95. When combined with the I-564 to I-664 segment, Route 460 becomes a highly attractive route for traffic with origins or destinations at the port or the Norfolk Naval Base. This route would avoid the I-64 congestion problems and provide Hampton Roads with an attractive hurricane evacuation route. This is particularly important in light of our recent experience with Hurricane Floyd when both I-64 and US 460 was closed due to flooding.
The second phase of the project could be the segment across Craney Island connecting I-564 to the Western Freeway in Portsmouth. Future construction of this segment should be linked to the Commonwealth's plans to expand port facilities to Craney Island. The third and final phase should be the additional spans and tubes paralleling I-664 (unless severe congestion was to occur here before there are concrete plans for Craney Island port expansion, in which case this segment could become Phase II).

To conclude, the City of Virginia Beach remains steadfast in its support for the Third Crossing of Hampton Roads. The project serves as a lifeline for the Hampton Roads economy as it improves our accessibility to the rest of the Commonwealth. But as our comments suggest, we also support future improvements to Route 460 as an alternative east/west corridor further connecting Hampton Roads to I-95, the Richmond region, and markets north and south. Consequently, our hope is that a serious effort will be made to advance this project in the Commonwealth's Transportation Improvement Program.

Thank you for the opportunity to participate in the development of this important transportation project and we look forward to working with you in the future as this project continues to move forward.

Sincerely,

James K. Spore
City Manager

c: Honorable Members of Council
March 15, 2000

Mr. J. C. Cleveland
District Administrator
Virginia Department of Transportation
1700 N. Main Street
Suffolk, Virginia 23434-4322

Dear Mr. Cleveland:

Enclosed please find a resolution approved by Chesapeake City Council March 14, 2000, relating to the Draft Environmental Impact Statement for the Hampton Roads Third Crossing Study. The resolution states that the City of Chesapeake continues to support Candidate Build Alternative 9 as the preferred alternative. City Council believes that building this high cost facility as a phased project, with the first phase being the I-564 East and West Connector to I-664, along with the widening of I-664 to six lanes from the Connector to Bower's Hill, would be the most effective approach to the project's development. The resolution further states Chesapeake's support for the upgrade of Route 460 to freeway status. By combining these two projects, Hampton Roads would receive both economic development benefits, as well as an additional viable hurricane evacuation route.

The City appreciates this opportunity to participate in the development of this important transportation improvement and we look forward to working with you in the future as this project moves forward.

Sincerely,

John L. Pazour
City Manager

JLP/MAS:dn

C: City of Chesapeake Legislative Delegation
   Secretary Ybarra and Members of the Commonwealth Transportation Board
   Anne Odell, Assistant City Manager
   Patricia Biegler, Director of Public Works
A RESOLUTION SUPPORTING CANDIDATE BUILD ALTERNATIVE 9 AS THE PREFERRED ALTERNATIVE FOR THE THIRD HAMPTON ROADS CROSSING AND SUPPORTING AN UPGRADED ROUTE 460 TO FREEWAY STATUS

WHEREAS, the Virginia Department of Transportation is currently soliciting comments on the Draft Environmental Impact Statement as part of the Hampton Roads Crossing Study; and,

WHEREAS, Public Hearings were held March 1 and 2, 2000; and,

WHEREAS, on July 8, 1997, City Council, by motion, endorsed Candidate Build Alternative 9; and,

WHEREAS, the Hampton Roads Metropolitan Planning Organization on July 16, 1997, selected Candidate Build Alternative 9 as the Locally Preferred Alternative; and,

WHEREAS, the Hampton Roads Metropolitan Planning Organization on August 18, 1999, endorsed Hampton Roads Candidate Build Alternative 9 and an upgraded Route 460 to Freeway Status as two of the Seven Regional High Priority Transportation projects; and,

WHEREAS, Hampton Roads Crossing Candidate Build Alternative 9 meets every aspect of this project’s purpose and need, and at the same time substantially improves total mobility across Hampton Roads; and,

WHEREAS, Hampton Roads Crossing Candidate Build Alternative 9 also does the best job of reducing traffic volumes on other important roadways in the area; and,

WHEREAS, Hampton Roads Crossing Candidate Build Alternative 9 results in the least environmental impact according to the findings of the Draft Environmental Impact Statement; and,

WHEREAS, even with the completion of Hampton Roads Crossing Candidate Build Alternative 9, there will continue to be the need for a freeway type facility connecting South Hampton Roads directly to Interstate 95 (I-95) and Interstate 85 (I-85) without a harbor crossing.

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Chesapeake Virginia, that the City Council continues to support Hampton Roads Crossing Candidate Build Alternative 9 as the preferred Third Crossing of Hampton Roads as a phased project with I-564 East and West Connector to I-664 along with the widening of I-664 to six lanes from the Connector to Bower’s Hill as the first phase; and,
BE IT FURTHER RESOLVED that the City of Chesapeake continues to support the Upgrade of Route 460 to Freeway status as one of the Seven Regional High Priority Transportation Projects.

ADOPTED by the Council of the City of Chesapeake, Virginia, this 14th day of March 2000.

APPROVED:

[Signature]
Mayor

ATTEST:

[Signature]
Clerk of the Council

TRUE COPY

[Signature]
Deputy City Clerk
Mr. Earl T. Robb
Environmental Administrator
Virginia Department of Transportation
1401 East Broad St.
Richmond, VA 23219

Dear Mr. Robb:

In accordance with the National Environmental Policy Act (NEPA), and Section 309 of the Clean Air Act, the Environmental Protection Agency (EPA) offers the following comments regarding the Draft Environmental Impact Statement (DEIS) for Hampton Roads Crossing Study, signed October 19, 1999.

This project was coordinated with EPA and the other Federal agencies beginning in early 1994. EPA concurred on the purpose and need for this study in October 1994. After this EPA was involved in the screening process that led to the candidate build alternatives in the DEIS.

Notwithstanding the above, a project of this magnitude raises concerns relating to impacts on the aquatic environment and on low income and minority populations. In addition the cumulative and secondary effects of this project were not well documented in the DEIS.

The proposed facility is located a harbor area used by many species of anadromous fish. This facility will require a significant amount of dredging. Our concerns lie with the potential impact on aquatic life, specifically potential impacts to anadromous fish during construction and the long term threat posed by catastrophic spills from major accidents on the over-water portions of the facility. The staging of dredging activity and handling of dredged material and highway runoff will be critical to protect aquatic resources. However at this point it appears these concerns can be mitigated by construction timing, techniques, and location.

The on-the-ground portions will have a disproportionate impact on low income and minority populations. The majority of the relocation impacts and construction and operation impacts will be born by the minority and low income population groups in the Hampton Roads area. This should to be better documented in the DEIS.

The cumulative impacts of this proposal the needs further documentation. The Council on Environmental Quality (CEQ) regulations (CEQ 1987) both define Cumulative Impacts and explicitly state that cumulative impacts must be evaluated along with the direct and indirect effects of each alternative.
The increased highway capacity of this project may lead to secondary impacts throughout the Hampton Roads area. Alternative 9 increases highway capacity in the lowest population density areas of the study area and may increase the pressure on the conversion of farmlands, wetlands and forest land for commercial and residential purposes. This was not sufficiently addressed in the DEIS.

Consequently EPA rates this project with Environmental Concerns (EC) and the document a 2, Insufficient Information. A copy of our rating system is enclosed. Detailed comments on these and other aspects of this DEIS are attached.

Thank you for this opportunity to comment. If you have any questions regarding our comments please call Mr. Peter Stokely of my staff at 703-648-4292.

Sincerely,

[Signature]

Thomas Slenkamp, Acting Director
Office of Environmental Programs

Enclosure
Technical Comments, Hampton Roads Crossing Study
Draft Environmental Impact Statement, October 1999

Summary:

Add to Table S-3 the Information recommended for the Environmental Justice Section.
This includes the number of minority and low income houses taken, the number affected by noise
and the number of homes left adjacent to the ROW.

Include in the summary table a wetland function assessment comparison for each alternative.

Chapter 3

Figure 3-1: Explain why 1994 data used and not 1997 data as shown in Table 3-1.

Land use:

The role of land use on future transportation demand should be more thoroughly explained here.
For example, an assessment of the balance of current and future jobs to households on both sides
of the harbor should be provided. Explain the role, if any, the balance of jobs as compared to
households on both sides of the harbor have on the projected 53% increase in traffic at the
Hampton Roads Tunnel.

Chapter 4

I Traffic, Transit and Safety:

Table 4-4: Please clarify if the travel time savings are for the year 2018 or some other year.

II Social Impacts:

Environmental Justice Groups:

To make this section more informative Table 4-13 should also include data on the number of
minority and low income homes affected by noise and the number of homes remaining adjacent
to the ROW.

In addition the results of the community outreach efforts should be summarized here including
any comments received from local leaders or citizen group representatives regarding the project
alternatives and mitigation.
V. Economic Impacts:

Please explain the sentence on page 137 regarding the tunnel users bidding of the right to use the tunnel. EPA is unaware of anywhere where divers bid for the right to travel on public roads outside of parks or wilderness areas.

VII. Air Quality:

This project is located in an area designated as a maintenance area under the one hour standard for Ozone. The air quality analysis should factor in the cumulative effect of this project with that of the general increase in shipping traffic expected due to expanded port operations and the new marine terminal.

IX. Ecosystems:

To minimize potential impacts to sea turtles and the Piping Plover EPA recommends close consultation with the National Marine Fisheries Service, the Fish and Wildlife Service, and the appropriate state agencies during design and construction of a selected alternative.

X. Water Quality:

EPA recommends a construction water quality program be implemented like that which was done for the I-664 construction project.

Discuss how will the runoff from the bridges/causeways be handled. This is not specifically addressed in this document. The DEIS does not address the potential for spills resulting from tanker truck accidents. EPA recommends VDOT evaluate storm water systems that divert the runoff from the bridge structure to detention or holding basins.

Dredging:

EPA recommends the use of hydraulic dredging with direct deposit into Craney Island.

EPA is opposed to the stockpiling and reuse of the dredged material. This is particularly true in regard to the Elizabeth River area and other areas with contaminated sediments. Once the material is dredged it is considered a new pollutant source and must be handled accordingly.

We recommend staging of the dredging activities to comply with the time of year restrictions for anadromous fisheries recommended by the National Marine Fisheries Service. While the time of year restrictions are in place other construction activities can be performed.
XI. Aquatic Resources

Benthos

Explain why Alternative 2 has more benthic impacts than alternative 9 which is much longer over open water.

Wetlands:

Functions and Values Assessment:

Part of Table 4-30 is missing (data for wetlands 1-1 thru 8-3) and there are no column headings on the table to indicate which function is shown.

Each of the Alternatives should be compared by functional assessment. For example, by wetland function, indicate how many low, medium, and high value wetlands are impacted by each alternative.

Alternative 9 impacts the greatest amount of wetlands, however there is no way to compare the functional importance of this (see comment above). In addition, many of Alternative 9's wetland impacts occur south of Rt 164. Please explain why this section of alternative 9 is integral to the function of the alternative and why it cannot be eliminated to reduce wetland impacts.

XVI. Farmlands:

Alternative 9 impacts the greatest area of prime farmland soils. How much of this acreage is located on the section south of 164?

XX. Secondary and Cumulative Impacts

This section has not been changed to reflect our comments on the pre-draft document. Once again this section is an attempt to avoid a complex issue by saying these types of impacts will not occur. This is simply incorrect. Both secondary and cumulative effects will be realized and with a modest effort these can be quantified or at least discussed.

EPA does not believe that, as indicated in your response to our initial comments, that because elements of this section can be found elsewhere in this document there is no need to include them here. In fact, summarizing the impacts and benefits data from each alternative in this section will allow impacts to be discussed in the context of Secondary and Cumulative effects. VDOT did look at this issue in greater detail for the proposed Southeastern Expressway than it has for most, if not all, other highway proposals. This type of analysis should be used for this project as well. In addition below are additional ideas on ways to address Cumulative and Secondary effects.
Cumulative Effects:
EPA has developed guidance for assessing cumulative effects in a document entitled Consideration of Cumulative Impacts in EPA Review of NEPA Documents.

EPA does not agree with the statement in the DEIS that cumulative effects will not occur. This is simply false. Cumulative effects have occurred and will continue to occur. The concept of cumulative effects takes into account all past, present and reasonably foreseeable future disturbances. Cumulative impacts result in the compounding of the effects of all actions over time. Cumulative effects include all actions, no matter what entity: federal, non-federal or private take these actions. The Council on Environmental Quality (CEQ) regulations (CEQ 1987) both define these terms and explicitly state that cumulative impacts must be evaluated along with the direct and indirect effects of each alternative.

This project will result in additional dredging, island creation, new lane miles, new impervious surface and new visual impacts, just to name a few, in the Hampton Roads harbor area. When these effects are added to the past effects of just the existing bridge tunnels, for example, measurable cumulative effects can be documented.

This project is located in an area designated as a maintenance area under the one hour standard for Ozone. The cumulative effect on air quality of the general increase in shipping traffic expected due to expanded port operations and the new marine terminal should be factored.

We disagree, as stated in the DEIS, that because future projects are in the preliminary planning phase that they are not reasonably foreseeable and their impacts can not be estimated. For example, the Crainey Island expansion is planned for the eastern side only and there are conceptual designs and sizes being considered. This project has considerable congressional support and is likely to be built. The Norfolk-Virginia Beach Light Rail project identified by VDOT has a published DEIS with extensive information regarding impacts. The Constrained Long Range Plan identifies specific planned roadway improvements for which impacts can be estimated.

The environmental consequences data for each alternative should be added to the impacts for these reasonably foreseeable actions. For example, the benthic impacts of the Crainey Island eastward expansion and Hampton Roads Harbor maintenance should be added to the benthic impacts of each alternative. This accomplishes several things. It will give a picture of the cumulative effect of these projects on benthic habitat in the Hampton Roads and it will show the relative impact of this proposal with those others and to the cumulative total impact.

Other metrics of Cumulative Effect should be included such as total VMT, new lane miles and area of impervious surface from this project and the all projects contained in the CLRP. More ambitious would be to estimate the cumulative effect of the county comprehensive plans on lane miles, impervious surface, VMT, and impacts to prime farmland and wetlands. Gathering this
data would allow a comparison of these alternatives to the cumulative effects of future and reasonably foreseeable development.

Secondary Effects:

One example of a secondary effect is the land use effect of additional highway capacity. For example, the construction of Alternative 9 will increase highway capacity in western Chesapeake and eastern Suffolk. From this one fact several things can be discussed. Is this additional capacity more or less than that which will be generated from the existing county comprehensive plans? If it is then it can be stated that a secondary effect of this alternative will be to put pressure on additional growth in those areas. If it is less than the demand created by the existing county comprehensive plans this may not be the case. In addition, the increased capacity will mean increased VMT and increased loading of air pollutants. These are both examples of secondary effects which can be estimated from existing data, indeed from the very data used to develop the purpose and need and data used in region-wide conformity analysis.
March 15, 2000

Mr. J.C. Cleveland  
Suffolk District Administration  
Virginia Department of Transportation  
1700 North Main Street  
Suffolk, Virginia 23434-4322

SUBJECT: Hampton Roads Crossing DEIS

Dear Mr. Cleveland:

Thank you for the opportunity to comment on the Hampton Roads Crossing Draft Environmental Impact Statement. The Transportation District Commission of Hampton Roads supports Candidate Build Alternative 9 as meeting the project's goals as stated in the purpose and need document as well as providing for improved mobility throughout Hampton Roads.

Of particular interest to the Commission is the inclusion of a multimodal tube section to accommodate HOV, bus and passenger rail service. This is a critical element of the Build Alternative and should be an integral part of any Phase I construction of the project. Although there is the opportunity for a phased approach of bus and light rail service, attention should be taken in the project design to assure proper tunnel clearance to accommodate a double track rail system with overhead power distribution. In addition, special safety requirements for transit systems such as National Fire Protection Association (NFPA) 130 need to be included. Also, the design must consider how a train would enter and exit a tunnel section to be consistent with vehicular separation requirements and connectivity with existing and planned highway and rail systems.

Again, thank you for the opportunity to comment. The Commission enthusiastically supports initiatives to bring a more balanced transportation network to the region. We would appreciate inclusion in the working group for the design phase of the project. Please call me if you have questions.

Sincerely,

Michael S. Townes  
Executive Director
Mr. Ken Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219

Dear Mr. Wilkinson:

In recognition of the many related aspects of the Hampton Roads Crossing Study (HRCS) to the Craney Island expansion feasibility study, our staff has been working diligently with that of VDOT to address a number of areas of mutual concern. One of those key areas is an assessment of the cumulative impacts that these projects may have. In that connection, we are currently examining the required outputs to be provided as a result of hydrodynamic modeling of the Elizabeth River system for the Craney Island expansion study. In addition, the District is continuing its coordination with the Virginia Institute of Marine Science (VIMS) and our Engineer Research and Development Center (ERDC) regarding the model results for the HRCS.

We recently met with the ERDC, VIMS, Virginia Port Authority and your Department to discuss the above modeling efforts. To allow us sufficient time after this meeting to provide specific comments on the modeling effort, we request a 3 week time extension, till April 6, 2000, to provide our input on the DEIS. We will then be able to better provide comments on the modeling study, in particular and the DEIS, in general.

Thank you for providing valuable input at our March 9, 2000 technical meeting. We look forward to our continued cooperation during the evaluation of the HRCS. If you have any questions regarding the review of this project, please call Peter Kube at (757) 441-7504.

Sincerely,

[Signature]

J. Robert Hume, III
Chief, Western Virginia Regulatory Section
March 10, 2000

Mr. Jeffrey C. Southard
Assistant Commissioner
Environment, Transportation Planning and Regulatory Affairs
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23218-2000

Re: Comments on Hampton Roads Third Crossing Location

Dear Mr. Southard:

Thank you for the opportunity to comment on the location for the proposed Third Crossing of the Hampton Roads Harbor. The Virginia Port Authority is charged by State law to foster and stimulate the shipment of maritime cargoes through The Port of Virginia and, as such, we are vitally interested in this critically important project.

In July 1997, the Board of Commissioners of the Virginia Port Authority adopted Resolution 97-10 (copy attached) which identified Corridor 9 as the Port Authority’s preferred alternative for the location of the Third Crossing. The Board of Commissioners did this after mature consideration and the Port Authority continues to support this alternative.

Again, thank you for this opportunity and if you have any questions, please contact me at 757-683-8000.

Sincerely,

J. Robert Bray
Executive Director

IRB/djm
Enclosure
RESOLUTION 97-10

RESOLUTION RECOMMENDING THAT THE COMMONWEALTH TRANSPORTATION BOARD ADOPT PROPOSED TRANSPORTATION CORRIDOR 9 AS THE PREFERRED ALTERNATIVE FOR THE THIRD CROSSING OF HAMPTON ROADS.

WHEREAS, it is anticipated that throughput at the Port of Virginia will more than double by the year 2010; and

WHEREAS, the continued success and growth of the Port is dependent upon infrastructure improvements both inside and outside of the VPA owned terminals; and

WHEREAS, in 1992 the Virginia General Assembly directed, through Joint Resolution 132, that the Virginia Department of Transportation (VDOT) investigate methods to relieve congestion at the Hampton Roads Bridge Tunnel; and

WHEREAS, VDOT, in conjunction with local and regional transportation planning entities, as well as with input from concerned citizens, has narrowed the study’s focus to the selection of a preferred alternative from eleven possible new transportation corridors; and

WHEREAS, the Hampton Roads Crossing Study Coordinating Committee, the Hampton Roads Metropolitan Planning Organization, and the City of Norfolk all favor Corridor 9 as the preferred alternative; and

WHEREAS, the Corridor 9 alternative will provide new direct access to (1) Norfolk International Terminals, (2) the potential fourth marine terminal at Craney Island, and (3) the Norfolk Naval Base from the Peninsula and new access from I-664 on the Southside to Norfolk International Terminals and the Norfolk Naval Base.

NOW THEREFORE, BE IT RESOLVED that the Board of Commissioners of the Virginia Port Authority respectfully recommends that the Commonwealth Transportation Board adopt Transportation Corridor 9 as the preferred alternative for the third crossing of Hampton Roads.

PASSED AND ADOPTED this 22nd day of July 1997.

[Signature]
Chairman

Attest:

[Signature]
Debra J. McNulty, Clerk
March 10, 2000

Mr. Jeffrey C. Southard
Assistant Commissioner
Environment, Transportation Planning & Regulatory Affairs
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23218-2000

RE: Comments on Hampton Roads Third Crossing location

Dear Mr. Southard:

Thank you for the opportunity to comment on the location of the proposed Third Crossing of Hampton Roads Harbor. The Hampton Roads Partnership is a public-private organization comprised of the chief elected officials, key business leaders, military commands, college and university presidents, and representatives from the labor and civic communities. Its mission is to provide leadership to focus on those strategic issues that will enhance Hampton Roads' competitive position in the global economy.

The Partnership strongly supports the future development of the Port of Virginia and the efficient surface transportation network necessary to ensure its growth while improving mobility for Hampton Roads commuters. The construction and specific location of the Third Crossing are critical to Hampton Roads and Virginia's economic competitiveness. We would like to reaffirm our support for Alternative 9 as the best location for the Third Crossing, the selection made by the Hampton Roads MPO and later endorsed by the Commonwealth Transportation Board.

According to the MIS completed in 1999 on this project, Alternative 9 did the best job of reducing traffic volumes on some of our major roadways as the Hampton Roads Bridge Tunnel, Hampton Boulevard, Midtown Tunnel and the Downtown Tunnel. This alternative also provides more flexibility in how our region will be able to manage future traffic growth.

Mr. James L. Eason
President & CEO
Thank you for your consideration. If you have questions, please feel free to contact me at (757) 625-4696.

Sincerely,

James L. Eason

James L. Eason
March 9, 2000

Mr. J.C. Cleveland
Suffolk District Administrator
1700 North Main Street
Suffolk, Virginia 23434-4322

Dear Mr. Cleveland:

Attached you will find a resolution adopted by the City Council of the City of Hampton on March 8, 2000 relative to the Hampton Roads Crossing project that is currently receiving public comment on the Draft Environmental Impact Assessment and Location Study. This resolution expresses both support for the proposed project as well as concerns regarding the range of options being considered.

We want to make it very clear that the City of Hampton is a staunch supporter of a third crossing of Hampton Roads. Improving the region’s ability to move people, goods, and services across Hampton Roads as well as enhancing access to our ports are vital to the future of our region as well as the Commonwealth. While we support the project, we are not convinced that any one of the options being considered represent the best long-term investment or our transportation dollars.

Attached you will also find copies of written material that has been presented to the Virginia Department of Transportation which indicates the City of Hampton’s previous attempts to convey our concerns during earlier discussions surrounding this project. Since these concerns have never been addressed to our satisfaction, we feel compelled to submit our views to you in writing for inclusion in the public record.

We hope you will give these concerns due consideration prior to moving forward with the final selection of the corridor location for this very critical project. We pledge to assist you in any way possible to sort through these issues in order to expeditiously move this project forward.

Sincerely,

Joseph H. Spencer II
Mayor

Sincerely,

George E. Wheeler
City Manager
RESOLUTION

WHEREAS: the City Council of the City of Hampton, Virginia has before it this day consideration of the Hampton Roads Crossing Draft Environmental Impact Assessment and Location Study; and

WHEREAS: three "build" alternatives and one "no build" alternative are being considered for the proposed third crossing of Hampton Roads; and

WHEREAS: the City of Hampton recognizes and supports the future need for a third crossing in order to reduce congestion at the Hampton Roads Bridge Tunnel and improve our regional transportation network’s ability to efficiently move people, goods, and services across Hampton Roads; and

WHEREAS: the City of Hampton wholeheartedly supports the need to enhance access to the various components of our world renowned Port of Hampton Roads; and

WHEREAS: despite the City of Hampton’s continual support for a third crossing, we continue to have concerns that no single option considered to date, including the Locally Preferred Alternative (CBA 9), will best meet the future transportation needs of our region; and

WHEREAS: The City of Hampton’s concerns focus on the following issues:

1. If Candidate Build Alternative (CBA) 9 is ultimately selected; traffic congestion on the Hampton Roads Bridge Tunnel will remain essentially unchanged from what the public experiences today. Have we really solved the problem? Spending $2.7 billion only to have the public still experience significant and frequent delays at the Hampton Roads Bridge Tunnel (HRBT) seems to be a questionable investment decision.

2. We have continually questioned the wisdom of locating the “multi-modal tube” alongside CBA 9. The Monitor Merrimac Tunnel corridor is not the most densely populated corridor in our region. If we are only going to make one transit link between the Peninsula and the Southside, it appears to have the most opportunity for success in our most urban corridor, which stretches from the southern Peninsula around to Norfolk and ultimately into Portsmouth. The I-64/HRBT corridor seems to be the far better choice as a transit corridor link.

3. Without balancing our transportation investments in both existing crossings, we run the risk of encouraging significant disinvestment in the existing urban core areas of our region. It is well documented that transportation projects greatly influence where and when new development occurs. A transportation project of this magnitude has the potential to significantly impact investment patterns in the region. The Locally Preferred Alternative (CBA 9) will make it far easier to access the western portions of the Hampton Roads Region with no corresponding access improvements to the eastern portion of our region via I-64 and the
HRBT. This strategy has the potential to further encourage regional sprawl at the expense of the urban core cities.

4. Does the Locally Preferred Alternative (CBA 9) help or hinder our regional tourism strategy? Among the first tourism directions you see traveling south on this route is for the Outer Banks and Nags Head, North Carolina. Will this encourage visitors to by-pass Hampton Roads?

5. We question the wisdom of only increasing capacity at one tunnel crossing when we know that our region will struggle with evacuations during potential emergencies and natural disasters. Investing in capacity improvements at both tunnels seems to be worth consideration.

WHEREAS: the City of Hampton respectfully submits to the Virginia Department of Transportation that the above issues deserve additional consideration before a final corridor location is selected; and

WHEREAS: the City of Hampton further requests that a fourth “build” alternative be investigated which includes the following components:

1. Adding a third vehicle lane in each direction to the Hampton Roads Bridge Tunnel.
2. Placing the “multi-modal” tube adjacent to the Hampton Roads Bridge Tunnel.
3. Include the port access improvements included in both CBA 2 and CBA 9.
4. Adding a third vehicle lane in each direction to the Monitor Merrimac Tunnel.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Hampton supports a third crossing of Hampton Roads but does not support Candidate Build Alternative 9 as the preferred location;

BE IT FURTHER RESOLVED that the City Council of the City of Hampton respectfully requests that the Virginia Department of Transportation further investigate the concerns and suggestions articulated in the above resolution prior to final approval of a corridor location for the proposed third crossing of Hampton Roads.

Adopted at a regular meeting of the City Council of the City of Hampton, Virginia, held March 8, 2000.

[Signatures]
Mayor

Clerk
March 9, 2000

Mr. Charles D. Nottingham
Commissioner
Virginia Department of Transportation
1401 East Broad Street
Richmond, VA 23218-2000

Dear Commissioner Nottingham:

I am writing to reaffirm the Hampton Roads Maritime Association’s choice and support of Alternative #9 as the most effective location for the 3rd crossing of Hampton Roads.

The conduct of commerce between Southside Hampton Roads and the peninsula and points west and north are already significantly delayed because of the increase of congestion at James River and Hampton Roads crossings. Unless construction begins soon on another crossing, all manners of commerce ranging from tourism to the Virginia shores and port business will begin to be negatively impacted.

You may be assured of our continuing support of Alternative #9 for a 3rd crossing and remain available to participate in any discussions of its merits.

Sincerely,

[Signature]

JOHN A. SIMON
Hampton Roads Port Ombudsman

cc: Secretary, Virginia Department of Transportation
March 9, 2000

Mr. Charles D. Nottingham
Commissioner
Department of Transportation
1401 East Broad Street
Richmond, VA 23219-2000

Dear Commissioner Nottingham:

Please accept this letter as a statement by Norfolk Southern Corporation in support of Candidate Build Alternative 9 in the Draft Environmental Impact Statement for the Hampton Roads Crossing Study.

Candidate Build Alternative 9 does the most effective job of connecting all three of the existing port facilities in the Hampton Roads region, as well as planning for the future connection to a fourth marine terminal to be built on Craney Island. From this perspective, CBA 9 would do the most to buttress the economic well-being of the region, which depends on a strong and competitive port. We also believe that this alternative will do the most to relieve local streets from future truck traffic traveling between the various marine terminals.

Thank you for your consideration of our position.

Sincerely,

[Signature]

cc: Mr. Jeffrey C. Southard
March 8, 2000

Ken Wilkinson
Commonwealth of Virginia
Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219-1939

Dear Mr. Wilkinson:

Enclosed is a resolution from the Suffolk Industrial Development Authority endorsing the Hampton Roads Crossing Candidate Build Alternative #9. The members of the Authority have reviewed the information provided by your office and based on this information concluded that this alternative is the best choice. If the Authority or our department can assist you further in supporting Candidate Build Alternative #9, do not hesitate to ask. My card is enclosed for your convenience.

Sincerely,

[Signature]

Thomas A. O'Grady
Director, Department of Economic Development, City of Suffolk and Executive Director, Industrial Development Authority, City of Suffolk

PC: J. C. Cleveland, Suffolk District Administrator
RESOLUTION NUMBER_______

A RESOLUTION SUPPORTING CANDIDATE BUILD ALTERNATIVE 9 AS THE PREFERRED ALTERNATIVE FOR THE THIRD HAMPTON ROADS CROSSING

WHEREAS, the Hampton Roads Metropolitan Planning Organization on July 16, 1997, selected Candidate Build Alternative 9 as the Locally Preferred Alternative; and,

WHEREAS, the Hampton Roads Metropolitan Planning Organization on August 18, 1999, endorsed Hampton Roads Candidate Build Alternative 9 and an upgraded Route 460 to Freeway Status as two of the Seven Regional High Priority Transportation projects; and,

WHEREAS, Hampton Roads Crossing Candidate Build Alternative 9 meets every aspect of this project’s purpose and need, and at the same time substantially improves total mobility across Hampton Roads; and,

WHEREAS, Hampton Roads Crossing Candidate Build Alternative 9 also does the best job of reducing traffic volumes on other important roadways in the area; and,

WHEREAS, Hampton Roads Crossing Candidate Build Alternative 9 results in the least environmental impact according to the findings of the Draft Environmental Impact statement; and,

WHEREAS, even with the completion of Hampton Roads Crossing Candidate Build Alternative 9, there will continue to be the need for a freeway type facility connecting South Hampton Roads directly to Interstate 95 (I-95) and Interstate 85 (without a harbor crossing.

NOW, THEREFORE, BE IT RESOLVED by the Industrial Development Authority of the City of Suffolk, Virginia that the Authority supports Hampton Roads Crossing Candidate Build Alternative 9 as the preferred Third Crossing of Hampton Roads and the Upgrade of Route 460 to Freeway status as one of the Seven Regional High Priority Transportation Projects.

BE IT FURTHER RESOLVED that a copy of this resolution be transmitted the Environmental Administrator of the Virginia Department of Transportation, 1201 East Broad Street Richmond Virginia.

This resolution shall be come effective upon its adoption

READ AND ADOPTED: March 8, 2000

A TRUE COPY: TESTED:

Dennis H. Gotman, Secretary-Treasurer

Approved as to Form:

C. Edward Roettger, Jr.
City Attorney
March 1, 2000

Mr. J. C. Cleveland  
Suffolk District Administrator  
Virginia Department of Transportation  
1700 North Main Street  
Suffolk, Virginia 23434-4322  

Dear Mr. Cleveland:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement and Location Study for the proposed Third Crossing of Hampton Roads. The City of Portsmouth has consistently supported Candidate Build Alternative 9, which was selected by the Metropolitan Planning Organization and subsequently endorsed by the Commonwealth Transportation Board in September 1997.

Now that the Draft Environmental Impact Statement has been completed, it is apparent that Alternative 9 does the best job, by far, of addressing the transportation issues by which the alternatives were measured, while having the least social and environmental impact of any of the build alternatives. For these reasons, the city hereby reaffirms its support for Candidate Build Alternative 9. As this project proceeds, the city will want to be closely involved in the process by which the final route will be selected, since there are important transportation and development issues that must be addressed. We acknowledge that the location presented at the public hearing shows that the Virginia Department of Transportation has made every effort to minimize the impacts on developable land in Portsmouth, and we encourage you to keep this issue in mind as you proceed.

Again, we thank you for this opportunity to express our views, and the city looks forward to working with VDOT on this high priority project.

Sincerely,

Dr. James W. Holley III  
Mayor

JWH/ces  
cc: City Council
COMMONWEALTH of VIRGINIA

Virginia Port Authority
600 World Trade Center
Norfolk, Virginia 23510-1617
Telephone (757) 683-8000
Fax (757) 683-8500

February 22, 2000

Mr. Ken Wilkinson
Environmental Planner
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219-1939

RE: HAMPTON ROADS CROSSING STUDY
DRAFT ENVIRONMENTAL IMPACT STUDY

Dear Mr. Wilkinson:

As requested, the Virginia Port Authority offers the following comments on the aforementioned draft report.

- BASE MAP - The map used for various figures should depict the general location of Newport News Marine Terminal (NNMT) and Portsmouth Marine Terminal (PMT) in addition to Norfolk International Terminals (NIT). Attachment A

- TABLE 1-1; 3-5; and 3-6 - Updated figures attached.

- Page 137 Section 1, Port of Virginia - A clarification should define the State of Virginia’s general cargo facilities (NIT, NNMT, PMT) as part of the Port. The Port also includes numerous private cargo facilities (coal, grain, etc.) that will also benefit from the third crossing. The definition of the Port as a whole, in addition to the State's facilities may be appropriate in Chapter 1.

If you have any questions, please contact me at (757) 683-8000.

Sincerely,

Neal T. Wright, P.E.
Chief Engineer

Attachments
cc: Mr. Robert Merhige, III
    Ms. Mollie Wolcott
Updated Figures: Hampton Roads Crossing Study EIS Draft

Table 1.1:

*Waterways and Port Facilities:*

“General cargo tonnage increased 188% from 1983 to 1992. Between 1992 and 1999, general cargo grew 58.9% to 11.8 million tons.”

Table 3-5:

*Imports and Exports of Atlantic Coast Ports in 1998 In Short Tons (000s):*

<table>
<thead>
<tr>
<th>Port</th>
<th>Exports</th>
<th>Imports</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton Roads</td>
<td>44,182.5</td>
<td>11,551.0</td>
<td>55,733.5</td>
</tr>
<tr>
<td>Baltimore</td>
<td>9,124.4</td>
<td>16,150.0</td>
<td>25,274.4</td>
</tr>
<tr>
<td>Charleston</td>
<td>6,116.5</td>
<td>6,920.0</td>
<td>13,036.5</td>
</tr>
<tr>
<td>New York</td>
<td>6,873.7</td>
<td>54,635.7</td>
<td>61,509.4</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>603.8</td>
<td>36,972.8</td>
<td>37,576.6</td>
</tr>
<tr>
<td>Savannah</td>
<td>6,249.9</td>
<td>8,179.4</td>
<td>14,429.3</td>
</tr>
</tbody>
</table>

Source: Hampton Roads Maritime Association, 2000

Table 3-6:

*Port Related Truck Volume:*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Newport News Marine Terminal</td>
<td>21,000</td>
<td>85,056</td>
<td>126,000</td>
<td>26%</td>
</tr>
<tr>
<td>Norfolk International Terminals</td>
<td>191,000</td>
<td>297,292</td>
<td>522,000</td>
<td>9%</td>
</tr>
<tr>
<td>Portsmouth Marine Terminal</td>
<td>137,000</td>
<td>269,261</td>
<td>322,000</td>
<td>7%</td>
</tr>
</tbody>
</table>

Source: Virginia Port Authority, 2000
have a variety of important implications for the regional economy. Some of the more important of these impacts which will arise from these higher transportation costs are outlined below:

1. **Port of Virginia**

   The operation of the Port generates considerable business for the region and produces a substantial impact upon the Hampton Roads economy each year. Given the important role truck traffic plays in meeting the needs of the Port, and given the importance of the area’s tunnels to truck movements, it can be assumed that the Port of Virginia is dependent in large measure upon the efficient movement of goods across the Hampton Roads harbor. This dependence upon the region’s highway and tunnel system will only increase in future years since the Port Authority projects that its three terminals will add over 576,000 annual truck arrivals between now and the year 2015. In addition, should traffic across the harbor continue to grow without a corresponding increase in the capacity of the highway system to accommodate that increase, it is likely that the pace of growth imbedded in the port’s projections (See Chapter 3: Section IV.B) will be in jeopardy (HRPDC, 1997b).

2. **Tourism Industry**

   Growing congestion at the Hampton Roads Bridge Tunnel threatens to curtail growth in the region’s tourism industry. Because a large segment of visitors travel to the area using I-64, this is especially true for that component of the industry located on the Southside. However, Peninsula attractions are also vulnerable to congestion at the tunnels because many of the visitors (and local residents) come from the Southside on day trips.

   In addition to threatening the industry’s future growth, the current level of tourist activity may also be at risk from growing congestion. In a very real sense, tunnel users “bid” for the right to use the Hampton Roads Bridge Tunnel when they decide whether or not to make a cross harbor trip given the potential for delay at the tunnel. Those motorists who find the benefit of using the tunnel to exceed the cost will cross the harbor. Those who find that the cost exceeds the benefit will choose not to make the trip. The threat to the travel industry is that as the cost of congestion rises, tourists may increasingly decide not to travel through the tunnel when making cost-benefit comparisons because they are discretionary tunnel users while others who have little choice decide to use the tunnel. Over time, this process has the potential to substantially decrease the percent of all tunnel users who are tourist. Should the percent of tunnel users who are tourists decline substantially faster than the percent increase in tunnel traffic, the result would be fewer tourists and less business for travel operations, especially on the Southside. (HRPDC, 1997b)
February 10, 2000

Mr. Ken Wilkinson, Environmental Planner
Virginia Department of Transportation
Environmental Division
1401 East Broad Street
Richmond, Virginia 23219-1939

RE: Hampton Roads crossing Study
CBLAD Project Review No. SSPR-VDOT-01-00

Dear Mr. Wilkinson:

As you requested, we reviewed the Draft Environmental Impact Statement (DEIS) for the Hampton Roads Crossing Study and offer the following comments.

The DEIS does not address impacts to Chesapeake Bay Preservation Areas. The Chesapeake Bay Preservation Area Designation and Management Regulations exempts public roads providing the project is constructed in accordance with the Erosion and Sediment Control Law and the Stormwater Management Act. Further conditions of the public road exemption require optimization of a proposed roadway's alignment and design so as to prevent or otherwise minimize (1) encroachment into Resource Protection Areas (RPAs) and (2) adverse effects on water quality. It appears from the materials presented that Candidate Build Alternative 9 will have the greatest direct impact on RPAs and substantially greater impact to wetlands than the other build alternatives. It is difficult to ascertain from the mapping provided in the DEIS whether or not the nontidal wetlands impacted by the candidate build alternatives are RPA features.

The DEIS states that of equal importance in planning for transportation needs is environmental protection and enhancement. However, rather than evaluating which alternative would cause the least environmental damage, the criteria used to evaluate this stated project need emphasizes "the relative ease of implementing the alternatives". Regardless, Candidate Build Alternative 1 appears to cause the least impact to natural resources and would probably cause the least difficulty in terms of regulatory approval.
We appreciate the opportunity to provide our comments on this proposal. Please do not hesitate to contact us at 1-800-CHESBAY, should you have any questions or comments.

Sincerely,

Catherine M. Harold
Environmental Engineer

David Kovacs
Community Liaison

Cc: Scott Crafton, CBLAD
    H. Shepard Moon, CBLAD
February 4, 2000

Mr. Kenneth E. Wilkinson
Environmental Planner
Virginia Department of Transportation
1401 East Broad Street
Richmond, VA 23219

RE: Draft Environmental Impact Statement For the Hampton Roads Crossing Study (DEIS)

Dear Ken,

We have reviewed the subject document from a marine environmental perspective. This review has included personnel from our Department of Biological Sciences, Center of Coastal Resources Management, Department of Environmental Sciences and Department of Physical Sciences. In general, the DEIS addresses our previously expressed concerns adequately. We would, however, like to make the following specific comments based on our review of the present document.

We have previously expressed our concerns regarding circulation and flushing issues in the Elizabeth River due to the proposed new tunnel and the results of the studies accomplished to date indicate that there are significant residual currents within the Elizabeth River mouth and these may influence flushing. Additional model investigations using a finer grid model are needed to resolve the questions lingering from the larger grid Elizabeth River model.

Related to this is our also previously expressed concern that there may be cumulative impacts and/or synergistic effects to Elizabeth River circulation and therefore water quality as a result of the related expansion of Craney Island, and eventual development of an additional port facility. Since both alternatives 2 and 9 appear designed to address access for future port development, and were selected as preferred alternatives because they have this characteristic, it would appear necessary in our view also to examine the effects of the eastward expansion of Craney Island on circulation in the Elizabeth River. This would also afford the opportunity to use a finer grid model to address the model shortcomings described in the previous paragraph.

We would comment additionally that even though water quality on the shoals might be affected only minimally, TSS loads of over 15 mg/l are above the habitat suitability requirements for both Zostera marina and Ruppia maritima. It should also be noted that at the time of the original Monitor-Merrimac turbidity studies, no SAV colonies existed in the James River, west of Peterson's Yacht Basin as they do now. SAV can withstand short periods of elevated turbidity such as would occur during a storm event, but turbidity increases on the order of weeks or months can significantly affect SAV abundance. The proposed monitoring design should take...
this into account and address turbidity on the shoals, should it be shown to be a result of the project dredging or construction activities.

It appears from the draft that alternative 9 carries the greatest potential for the degradation of water quality due to dredging. Tunnel dredging and the filling of the Craney Island 4th cell present the potential for remobilization of sediment-associated contaminants. High concentrations of contaminants have been reported for Elizabeth River sediments and dredging and backfilling may oxygenate anaerobic sediments, changing their geochemistry and mobilizing pollutants previously adsorbed on sediment particles.

Polycyclic aromatic hydrocarbons (PAH) have also been shown to be highly elevated in the Elizabeth River. Given the level of ship building and ship repair in the river, the potential for tributyl tin (TBT) accumulation in the sediments is present. It is not clear from the DEIS that these and priority pollutant heavy metals will be evaluated prior to dredging.

We appreciate the opportunity to contribute to the environmental review of this proposal and if I may answer any questions with regard to these comments, please do not hesitate to contact me.

Sincerely,

Thomas A. Barnard, Jr.
Marine Scientist

cc:

Tracie West, VMRC
Peter Kube, USACE
Rod Schwarm, NMFS
William Hester, F&WS
Peter Stokeley, EPA
February 3, 2000

Mr. James C. Cleveland
Suffolk District Administrator
1700 North Main Street
Suffolk, Virginia 23434-4322

RE: Hampton Roads Crossing Study

Dear Mr. Cleveland:

The Isle of Wight County Board of Supervisors has followed the Hampton Roads Crossing Study since it's inception in late 1993. While the Board understands that there will be no direct impact on Isle of Wight County, the County recognizes the long-term benefits of establishing an additional crossing between the Peninsula and Southside. Such a crossing could alleviate projected congestion at the existing crossings, including the James River Bridge, while improve access to military sites and existing and future major port facilities.

In light of the significance of this project and the public investment that will be committed to such an improvement, the Isle of Wight County Board of Supervisors continues to support Candidate Build Alternative 9. A motion in support of Alternative 9 was adopted by the Board of Supervisors on February 3, 2000. This alternative offers the greatest solution to existing and potential needs of the future. This support is consistent with the Board's support at the conclusion of the Major Investment Study, and is in keeping with the preference of the Metropolitan Planning Organization and the Commonwealth Transportation Board.

Sincerely,

Phillip A. Bradshaw
Chairman, Board of Supervisors

Cc   W. Douglas Caskey, County Administrator
February 2, 2000

Ken Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219-1939

Re: Hampton Roads Crossing Study, Draft Environmental Impact Statement (EIS), Project: 0064-114, F12, PE-102

Dear Mr. Wilkinson:

Comments are provided herein on the above referenced project.

DIVISION OF NATURAL HERITAGE

The Department of Conservation and Recreation (DCR) has reviewed the Draft EIS and have no additional comments to offer at this time.

Thank you for the opportunity to review and comment on this transportation project.

Sincerely,

Derral Jones
Planning Bureau Manager
January 24, 2000

Mr. James C. Cleveland  
District Administrator  
Virginia Department of Transportation  
1700 North Main Street  
Suffolk, Virginia 23434

Dear Mr. Cleveland:

Enclosed please find a certified copy of a resolution adopted by Suffolk City Council at its meeting held January 19, 2000, supporting Candidate Build Alternative 9 as the preferred alternative for the third Hampton Roads crossing.

Sincerely,

Mary Lynn Dixon  
Deputy City Clerk

Enclosure

pc: Arthur L. Collins, Executive Director/Secretary  
    Hampton Roads Planning District Commission  
    Myles E. Standish, City Manager  
    MacFarland Neblett, Resident Engineer, VDOT  
    George Fly, Chairman, Transportation Safety Commission  
    Eric T. Nielsen, Jr., Director of Public Works  
    Paul E. Fisher, Unified Development Ordinance Coordinator
RESOLUTION NUMBER 14-00

A RESOLUTION SUPPORTING CANDIDATE BUILD ALTERNATIVE 9 AS THE PREFERRED ALTERNATIVE FOR THE THIRD HAMPTON ROADS CROSSING

WHEREAS, the Virginia Department of Transportation will hold Hampton Roads Crossing Study Draft EIS/Location public hearings on January 24, 26 and 27, 2000; and,

WHEREAS, the Hampton Roads Metropolitan Planning Organization on July 16, 1997, selected Candidate Build Alternative 9 as the Locally Preferred Alternative; and,

WHEREAS, the Hampton Roads Metropolitan Planning Organization on August 18, 1999, endorsed Hampton Roads Candidate Build Alternative 9 and an upgraded Route 460 to Freeway Status as two of the Seven Regional High Priority Transportation projects; and,

WHEREAS, Hampton Roads Crossing Candidate Build Alternative 9 meets every aspect of this project’s purpose and need, and at the same time substantially improves total mobility across Hampton Roads; and,

WHEREAS, Hampton Roads Crossing Candidate Build Alternative 9 also does the best job of reducing traffic volumes on other important roadways in the area; and,

WHEREAS, Hampton Roads Crossing Candidate Build Alternative 9 results in the least environmental impact according to the findings of the Draft Environmental Impact Statement; and,

WHEREAS, even with the completion of Hampton Roads Crossing Candidate Build Alternative 9, there will continue to be the need for a freeway type facility connecting South Hampton Roads directly to Interstate 95 (I-95) and Interstate 85 (I-85) without a harbor crossing.

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Suffolk, Virginia, that the City Council continues to support Hampton Roads Crossing Candidate Build Alternative 9 as the preferred Third Crossing of Hampton Roads; and,

BE IT FURTHER RESOLVED that the City of Suffolk continues to support the Upgrade of Route 460 to Freeway Status as one of the Seven Regional High Priority Transportation Projects.

This resolution shall become effective upon its adoption and shall not be published.

READ AND ADOPTED: JANUARY 19, 2000

A TRUE COPY: TESTE: [Signature]
Deputy City Clerk
January 4, 2000

Mr. Ken Wilkinson
Environmental Planner
Commonwealth of Virginia
Department of Transportation
1401 East Broad Street
Richmond VA 23219-1939

Dear Mr. Wilkinson:

I am in receipt of the Draft Environmental Impact Statement for the Hampton Roads Crossing Study. The draft has been reviewed by Norfolk Public Schools personnel, and we wish to make no comment regarding the study.

Thank you for the opportunity to do so.

Sincerely,

John O. Simpson
Superintendent of Schools
Mr. Ken Wilkinson  
Environmental Planner  
Department of Transportation  
1401 East Broad Street  
Richmond, VA 23219-1939

RE: Hampton Roads Crossing Study

Dear Ken:

Many of the geologic units in the Hampton Roads area are over consolidated. The over consolidation, if not known before alignment selection or contract bidding, could result in construction problems and cost overruns.

I strongly suggest that a thorough geotechnical evaluation be obtained for all potential road alignments.

Sincerely,

[Signature]

Eugene K. Rader  
Geologist Supervisor

EKR/kh

Copy: O. Gene Dishner
November 29, 1999

Ken Wilkinson, Environmental Planner
Virginia Department of Transportation
1401 E. Broad Street
Richmond, VA 23219-1939

Re: Hampton Roads Crossing Study

Dear Mr. Wilkinson:

Thank you for the opportunity to review the draft environmental impact statement for the Hampton Roads Crossing Study. Please note that on page 239, Hampton University is referred to in several places as "Hampton Institute". This name change occurred in 1990s.

Thank you for the opportunity to review the document.

Sincerely,

Fred Whitley, P.E.
City Engineer

FW/pg

cc: George E. Wallace, City Engineer
    Terry O'Neill, Director of Planning
Mr. Ken Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, VA 23219-1939

Dear Mr. Wilkinson:

Thank you for your letter of June 15, 1999, and the opportunity to review the preliminary draft EIS for the Hampton Roads Crossing Study.

Although both Candidate Build Alternatives 2 and 9 would construct a new roadway to connect a third crossing of the Elizabeth River with VA 164 in Portsmouth, Alternative 9 would provide greater support for Navy commuters and logistics requirements. Chapter 2, Section II.C.2. (page 28), states that a decision has been made to change the alignment of the roadway from the middle to the east side of Craney Island Management Disposal Facility. This change in alignment is of concern to the Navy as it may have a great impact on the Navy’s Craney Island Fuel Depot. The proposed route appears to bisect Craney Island Fuel Depot, and the city of Portsmouth landfill, and would also cross Craney Island Creek. The routing of the proposed roadway must be determined with great care, and with the close involvement of Navy officials. Routing must consider the continued functionality and long range plans for Navy property along with the associated environmental impacts.

If you have any further questions or comments, my point of contact is Mr. Chris Merrell at 322-3022.

Sincerely,

[Signature]

People Who Care
Mr. Roberto Fonseca-Martinez  
Division Administrator  
Federal Highway Administration  
Post Office Box 10249  
400 North 8th Street, Room 750  
Richmond, Virginia 23229

Dear Mr. Fonseca-Martinez:

This is in response to the request for the Department of the Interior’s comments on the Draft Environmental Impact Statement (DEIS)/Section 4(f) Evaluation for the proposed New Bridge-Tunnel Crossing of Hampton Roads in Southeastern Virginia; Isle of Wight and York Counties, Virginia.

**SECTION 4(F) EVALUATION COMMENTS:**

We concur that there is no prudent and feasible alternative to the proposed project, if project objectives are to be met. However, we do not believe that all possible planning has been done to minimize harm to the Hampton Institute and the Pasture Point Historic District. Therefore, we recommend continued cooperation and coordination with the State Historic Preservation Officer in order to prepare a Memorandum of Agreement (MOA) which should include measures to avoid and/or minimize harm to the Hampton Institute and the Pasture Point Historic District, in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. A signed copy of the MOA should be included in the Final Section 4(f) Evaluation.

**ENDANGERED SPECIES ACT COMMENTS:**

For actions considered to be a major federal construction activity significantly affecting the quality of the human environment (i.e. one requiring an EIS under the National Environmental Policy Act), Section 7(c) of the Act requires that the agency prepare a biological assessment to determine the effects of the project on any listed species or proposed species that may occur in the impact area. Since the piping plover (**Charadrius melodus**) occurs in the vicinity of the proposed project, the
Federal Highway Administration (FHWA) must determine whether the project may affect this species. A biological assessment pursuant to Section 7(c) will therefore be required for this project.

On page 180 of the DEIS, it is stated that the biological assessment will be performed prior to construction. To allow thorough review by the public and timely review by the U.S. Fish and Wildlife Service (FWS), FHWA, and Virginia Department of Transportation (VDOT), the FWS recommends that the biological assessment for this species be included in the final EIS.

The FWS notes that the Dismal Swamp southeastern shrew will likely be delisted as a federally threatened species before March of 2000. Therefore, the FWS does not recommend preparation of a biological assessment for this species. The peregrine falcon (*Falco peregrinus*) was delisted on August 25, 1999 and therefore, is no longer protected under the ESA.

**FISH AND WILDLIFE COORDINATION ACT COMMENTS:**

The FWS recommends that a more complete discussion of wetland impacts be included in the document including figures showing the location of anticipated wetland impacts for each candidate build alternative. The FWS also recommends that the final EIS include a table of wetland impacts, their classification and acreage, for each alternative.

Based on a review of the DEIS, the FWS understands that the use of concrete for tunnel construction, as opposed to steel, would result in a substantial avoidance of impacts to aquatic resources. The FWS therefore recommends the use of concrete tubes for tunnel construction associated with this project.

The FWS is pleased that the applicant is considering the establishment of oyster reefs as compensation for the large-scale disturbance of subtidal bottom and its associated turbidity and other water quality impacts that will result from this project. The FWS strongly supports the creation of oyster reefs as compensation for the impacts of this project on the marine environment of Hampton Roads. The Virginia Marine Resources Commission and other state and Federal agencies are currently involved in an oyster restoration program throughout suitable tidal habitat in Virginia. The FWS recommends that VDOT work closely with the Virginia Marine Resources Commission and Virginia Institute of Marine Science to formulate an oyster reef restoration plan as compensation for subtidal impacts associated with this project. The FWS would be glad to assist with such an effort.
Oysters and their associated reefs provide numerous ecosystem services including habitat creation and water purification. Oysters and their reefs provide three-dimensional habitat for numerous aquatic species of fish, other bivalves, birds, and numerous intertidal invertebrates. Oyster reefs can serve as foraging and perching habitat for many bird species including oystercatchers, other shorebirds, wading birds, waterfowl, and many other bird species. Through water purification, oysters can facilitate the establishment of submerged aquatic vegetation beds. Oysters and their reefs also buffer wave action, thereby ameliorating erosion and improving water clarity.

Matters pertaining to fish and wildlife resources should be directed to Mr. William Hester, U. S. Fish and Wildlife Service, Ecological Services, 6669 Short Lane, Gloucester, Virginia 23061 at (804) 693-6694, ext. 134, if you have questions or would like additional information.

**SUMMARY COMMENTS:**

We will provide you with further comments on the Section 4(f) aspects of this project upon the circulation of the Final Environmental Impact Statement/Section 4(f) Evaluation for public review and comment.

We appreciate the opportunity to provide these comments.

Sincerely,

Willie R. Taylor
Director, Office of Environmental Policy and Compliance

cc:
Mr. Kenneth E. Wilkinson
Environmental Planner
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219
Commonwealth of Virginia

Department of Game and Inland Fisheries

February 7, 2000

Mr. Ken Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219-1939

RE: Virginia Department of Transportation
Hampton Roads Crossing Study
Draft Environmental Impact Study
ESSLOG# 3952

Dear Mr. Wilkinson:

We have reviewed the Draft Environmental Impact Study (DEIS) for the project referenced, and offer the following comments. The Department of Game and Inland Fisheries (VDGIF), under Title 29.1 of the Code of Virginia, is the primary wildlife and freshwater fish management agency in the Commonwealth. We have full law enforcement and regulatory jurisdiction over those resources, inclusive of state or federally endangered or threatened species, but excluding listed insects. We are a consulting agency under the U.S. Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and we provide environmental analysis of projects or permit applications coordinated through the Virginia Department of Environmental Quality, the Virginia Marine Resources Commission, the Virginia Department of Transportation, the U.S. Army Corps of Engineers, the Federal Energy Regulatory Commission, and other state or federal agencies. Our role in these procedures is to determine likely impacts upon fish and wildlife resources and habitats, and to recommend appropriate measures to avoid, reduce, or compensate for those impacts.

The Virginia Department of Transportation proposes to construct a new bridge-tunnel crossing of Hampton Roads in southeastern Virginia. Due to current time restraints within the Environmental Services Section of the Department of Game and Inland Fisheries, we are unable to comment on specific alternatives at this time. However, we were able to review the fishery data and recommend that the Final EIS state that striped bass (Morone saxatilis) occur year-round at the project site, not just in March and April as stated in the DEIS. The DEIS states that dredging will not adversely impact migrating anadromous fish because the dredge operation will only affect a small percentage of the channel at any given time. However, if the dredging is occurring within the channel area, which is the preferred migratory pathway, we recommend an instream work time-of-year restriction (TOYR) from 15 February - 30 June. We are currently working with the U.S. Army Corps of Engineers to evaluate our TOYR, which may lead to migratory studies of anadromous fish in the James River in the near future.

Thank you for the opportunity to comment on this proposed project. Please call me or Tom Wilcox at (804) 367-8999 if we may be of further assistance.

Sincerely,

Raymond T. Fernald, Manager
Environmental Services Section

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD) Equal Opportunity Employment, Programs and Facilities FAX (804) 367-9147
Mr. Bruce Turner
Planning and Environmental Manager
Federal Highway Administration
Dale Building, 1504 Santa Rosa Road
Richmond, Virginia 23229

Re: Hampton Roads Crossing - Preliminary Draft EIS

Dear Mr. Turner:

The U.S. Fish and Wildlife Service has reviewed the preliminary Draft Environmental Impact Statement for the Hampton Roads Crossing Study that was provided to this office by the Virginia Department of Transportation by a cover letter dated June 15, 1999. The Virginia Department of Transportation, in cooperation with the Federal Highway Administration is proposing to construct a new bridge-tunnel crossing of Hampton Roads in southeastern Virginia. The study area includes the Cities of Chesapeake, Hampton, Poquoson, Newport News, Norfolk, Suffolk, and Virginia Beach, and the Counties of Isle of Wight and York. Project termini include the I-64 and I-664 interchange in Hampton; the I-64 and I-564 interchange in Norfolk; Virginia Route 164 near Coast Guard Boulevard in Portsmouth; and the I-64, I-264, and I-664 interchange in Chesapeake. This letter constitutes the comments of the Service and the Department of the Interior on the preliminary Draft EIS and is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the National Environmental Policy Act of 1969 (42 USC, subsections 4321-4370a, as amended).

The Service has provided previous comments on this project in our letters dated July 22, 1998, December 8, 1998, and April 23, 1999. Rather than repeating these comments herein, we refer you to our previous letters.

Endangered Species Act Comments

As you are aware, for actions considered to be a major federal construction activity significantly affecting the quality of the human environment (i.e. one requiring an EIS under the National Environmental Policy Act), Section 7(a) of the Act requires that the agency prepare a biological assessment to determine the effects of the project on any listed species or proposed species that
may occur in the impact area. Since the piping plover (*Charadrius melanops*), Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*), and peregrine falcon (*Falco peregrinus*) occur in the vicinity of the proposed project, the Federal Highway Administration must determine whether the project may affect any of these species. A biological assessment pursuant to Section 7(c) will therefore be required for this project. General recommendations for the preparation of a biological assessment are enclosed. We will be pleased to discuss the consultation process with you.

The Service notes that the Dismal Swamp southeastern shrew will likely be delisted as a federally threatened species, during or before October of 1999 and the final rule to delist the peregrine falcon should be published in late August of 1999. Therefore, we do not recommend preparation of a biological assessment for these species at this time.

**Fish and Wildlife Coordination Act Comments**

The Service has reviewed the document entitled: *Three-Dimensional Hydrodynamic and Sedimentation Modeling - Hampton Roads Crossing Study* that was provided to this office by VDOT via a cover letter dated January 28, 1999. We note that minutes from the January 22, 1999 meeting on this study revealed that according to the model, there is a reduction in the residual flow (non-tidal current) at the mouth of the Elizabeth River as measured along transect 1. Such preliminary findings concern the Service. We understand that additional studies are ongoing to refine the circulation modeling for this project. The Service looks forward to reviewing the study results and we will provide additional comments upon our review.

We understand that an eastward expansion of Craney Island is being considered as a part of the Corridor 9 alternative. If so, the Service recommends that this option be discussed in detail in the DEIS. Discussion topics should include, at a minimum:

- area of fill of subtidal and tidal bottom, and wetlands,
- source of fill,
- timeline for creation of the eastward expansion,
- anticipated impacts of this activity on aquatic resources and hydrodynamics and sedimentation in Hampton Roads.
The Service appreciates your coordination of this document with us. If you have questions, please contact William Hester at (804) 693-6694, ext. 134.

Sincerely,

Karen L. Mayne
Supervisor
Virginia Field Office

Enclosure

cc: Mr. Ken Wilkinson
VDOT Headquarters, Richmond, VA
Mr. Peter Kube, Norfolk District Corps of Engineers, Norfolk, VA
Biological Assessment Guidelines

If a Federal agency determines a project to be a major Federal construction activity significantly affecting the quality of the human environment (i.e., one requiring an environmental impact statement under the National Environmental Policy Act), Section 7(c) of the Endangered Species Act, as amended, requires that the agency prepare a biological assessment to determine the effects of the project on listed and proposed species that may occur in the project impact area. The biological assessment shall be completed before any contract for construction is entered into and before construction is begun. Biological assessments are recommended, but not required, for other Federal actions that may result in significant impacts to threatened or endangered species and their critical habitats, but which do not require the preparation of an EIS. The contents of the biological assessment depend on the nature of the Federal action. In general, the U.S. Fish and Wildlife Service (Service) recommends the following steps be taken:

1. Conduct a scientifically sound on-site inspection of the area affected by the action, which must in most cases include a detailed survey of the area to determine if listed or proposed species are present or occur seasonally and whether suitable habitat exists within the area for either expanding the existing population or potential reintroduction of populations.

2. Interview recognized experts on the species at issue, including those within the Service, State conservation agencies, universities, and others who may have data not yet found in scientific literature.

3. Review literature and other scientific data to determine the species' distribution, habitat needs, and other biological requirements.

4. Analyze the effects of the action on individuals and populations of each species and its habitat, including indirect and cumulative effects of the action.

5. Analyze alternative actions that may provide conservation measures.

6. Conduct any studies necessary to fulfill the requirements of (1) through (5) above.

7. Review any other relevant information.

If the Federal action agency determines that the proposed action may affect any listed species or critical habitat, the agency must request, in writing, formal consultation with the Service pursuant to Section 7(a)(2). If the action agency determines that the action is likely to jeopardize the continued existence of proposed species or result in the destruction or adverse modification of proposed critical habitat, the agency must confer with the Service.

If the determination is "no effect," neither consultation nor conference is necessary, unless requested by the Fish and Wildlife Service. A copy of the biological assessment document should be provided to the Fish and Wildlife Service.
Comments on the Hampton Roads Crossing Pre-Draft Environmental Impact Statement

To more effectively coordinate this project:

1) Please send a copy of HYSED-3D to William Muir, EPA Region 3, 1650 Arch St,
Philadelphia, PA 19103, Mail Code 3ES30

2) Please send EPA copies of the final Draft EIS to same address, attn. Margarete Messiah

3) Please send one copy to Paul Wentworth, EPA Air Division at the same address.

Comments on the pre-draft EIS:

The following comments are provided for your consideration. Additional and/or expanded
comments will be provided after review of the final Draft EIS. These comments are largely
focused in the Environmental Consequences Section. The most notable short comings of this
document lie in the Environmental Justice and Cumulative and Secondary Impacts Sections.

Environmental Consequences:

Traffic Impacts: the percentage of truck traffic (relates to a primary need for this proposal)
should be estimated of each alternative and it’s impact on commuter and tourist traffic discussed.

The effect, if any, this project will have on future navigation needs to be assessed. CBA 9 will
effectively encircle the Hampton Roads navigational area. The effect this will have on small craft
and ocean going vessels needs to be addressed.

Land use (page 121): please add open water impacts into this discussion and discuss the right-of-
way implications of this.

Environmental Justice Section: This section needs a more thoughtful analysis. The document
claims that because all of the alternatives pass through tracts with above average concentrations
of low income and minority populations that none of the alternatives will disproportionately
impact these populations. Based on the census data provided this can not be an accurate
statement.

To determine if this project will disproportionately impact these populations the impacts must be
compared to non-minority and low income populations. Please indicate in the DEIS, for each
social factor; noise, vibration, displacements, economy, etc, how many and what proportion of
the total impacts will be to minority and low income populations and how many and what
proportion of these impacts will be to non-minority and non-low income populations. This is the
type of analysis that is needed to determine these impacts. EPA will gladly provide guidance on
an appropriate level of analysis for the Environmental Justice issues.
Economic Impacts: what empirical studies were performed to support the conclusions related to tourism, job opportunities, cost of living, etc. found in this section. Please outline the methods used and site some examples of this data in the body of the DEIS.

Secondary and Cumulative Impacts: This section also needs more careful consideration. Once again this section is an attempt to avoid a complex issue by saying these types of impacts will not occur. This is simply incorrect. Both secondary and cumulative effects will be realized and with a modest effort these can be quantified or at least discussed.

For example secondary impacts will include the economic benefit of cost to tourism and business that will result from building or not building this project. In addition, there will be secondary and cumulative impacts from the development of Craney Island and other port related expansion. Both of which are cited in this document (pages 136-142) as possible outcomes and ones that this project is intended to support.

Even more glaring is the statement that cumulative effects will not occur. This is simply false. Cumulatively (when added to the existing bridge tunnels, for example) this project will require additional dredging, island creation, new lane miles, new impervious surface and new visual impacts, just to name a few. In addition the introduction of new lanes, new traffic movements, interchanges over open water will increase pollutant loading from storm water runoff and potentially from catastrophic accidents (hazmat). These issues need to be discussed as well.

These may not be critical issues or ones that major decisions will turn on, but they need to be explored in the DEIS. To state they will not occur ignores the reality of the situation. EPA will be happy to provide guidance on this issue so that the DEIS can present a fair and complete picture of the Secondary and Cumulative Impacts.
July 30, 1999

Mr. Ken Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, 23219-1939

Dear Mr. Wilkinson:

The purpose of this letter is to respond to your request for comments on the Draft Environmental Impact Statement (EIS) for the Hampton Roads Crossing Study. Unfortunately, I could not participate in the July 20, 1999 IACM meeting to discuss this document. My comments concerning the air quality analyses and potential impacts of this project are as follows:

- A brief description of a mesoscale analysis of this project is contained in the draft EIS. However, the discussion lacks sufficient details on how this analysis was performed and what data and procedures were used, to perform a meaningful review of the analysis or to provide substantive comments. An “Air Quality and Energy Technical Appendix” is referenced in the EIS but was not provided for review. This Appendix must be provided for review and comment in any subsequent versions of the EIS.

- The air quality impacts section contains what the sponsor cites as evidence that this project will have a net benefit in terms of reducing regional emissions of ozone precursor emissions. Beyond the fact that there are not sufficient supporting documentation for this analysis, it must be understood that regardless of the result of this type of project level analysis, it cannot serve as a substitute for the formal transportation conformity process. Before this project can receive final approval from an air quality standpoint, the selected alternative must be included and analyzed in a transportation conformity analysis which is demonstrated to conform to the applicable State Implementation Plan (SIP) in effect at the time of this analysis.
Mr. Ken Wilkinson
Page 2
July 30, 1999

Thank you for the opportunity to review the draft EIS. Please contact me at (804) 698-4406 if you have any questions concerning these comments.

Sincerely,

[Signature]

Thomas R. Ballou
Office of Air Data Analysis
July 30, 1999

Mr. Ken Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219

Re: Hampton Roads Crossing Study

Dear Mr. Wilkinson:

Comments are provided herein on the above referenced project.

DIVISION OF NATURAL HERITAGE

The Department of Conservation and Recreation (DCR) has reviewed the Hampton Roads Crossing Study, Pre-Environmental Impact Statement (EIS). DCR's Division of Natural Heritage offered comments on Alternatives 1 & 9 by a letter dated December 17, 1998. Those comments have been incorporated in the Pre-EIS. The concerns for Alternative 2 are similar to those for 1 & 9 since they are located in the same area.

The proposed wetland compensation site is located near the south-eastern segment of Alternatives 2 & 9. The compensation site contains prior converted wetlands and existing wetlands. Several basic concerns should be addressed in planning this restoration project. Clearly defined goals and objectives should be established to measure the effectiveness of the restoration project. A target state, based on the environmental history of the site or of similar ecosystems nearby, should be clearly defined for the restoration project. An appropriate reference model, an ecosystem or natural community similar to the desired target, should be identified and used as an aid in determining restoration targets and in measuring success. Performance indicators, such as measurable biological, physical, and chemical attributes, should be directly linked to the objectives and can be drawn from the reference model. A monitoring program must be a component of the restoration project to provide the information necessary for assessing progress or identifying problems. Native species propagated from local sources should be used when revegetating the site.

Any absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. New and updated information is continually added to BCD. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.
DIVISION OF SOIL AND WATER CONSERVATION

The Virginia Department of Transportation is required to adhere to the state erosion and sediment control and stormwater management requirements as contained in their annual specifications, already approved by the Department of Conservation and Recreation, Division of Soil and Water Conservation.

DIVISION OF PLANNING AND RECREATION RESOURCES

A major impact of this study will be the introduction of structures into the waters of Hampton Roads. Hampton Roads is a popular and actively used recreation boating area. The introduction of piers and the attendant roadway between Newport News and Portsmouth increases the potential for boating accidents. The alternatives that place a new crossings near an existing crossing, provide a safer environment for boaters with less visual impact, than the proposal 2,9 which calls for bridging across the front of Craject Island. The development of an elevated highway across Craject Island will not have a positive impact on the development of the Island for industrial, commercial or any other type of land use. The placement of an interchange in the middle of Hampton Roads and an access to Craject Island over water from the elevated highway appear to have potential for accidents and environmental consequences.

Thank you for the opportunity to comment on this project.

Sincerely,

Derral Jones
Planning Bureau Manager

Cc: William Hester, USFWS
    Alice Allen-Grimes, ACOE
REPLY TO
ATTENTION OF:
Western Virginia Regulatory Section
94-4529-14 (Hampton Roads)

July 29, 1999

Mr. Ken Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219

Dear Mr. Wilkinson:

We have reviewed the preliminary draft EIS for the Hampton Roads Crossing Study (HRCS) and have the following comments.

Identifying the purpose and need of a project is one of the most important aspects of project development. The Council on Environmental Quality (CEQ) regulation's require an agency to identify the underlying purpose and need of a project.

The project purpose is a statement of the overall intended objective to be achieved by the proposed project. It has been defined as "to develop intermodal alternatives that can work together to improve accessibility, mobility, and goods movement in the Hampton Roads metropolitan area to help relieve the congestion that occurs at the existing I-64 Hampton Roads Bridge Tunnel" (HRBT).

Although the project purpose talks about the need to develop and analyze intermodal alternatives, and two lanes of each of the candidate build alternatives is reserved for multi-modal options, the DEIS does not evaluate any alternative but road construction. The DEIS does not provide any information on operational alternatives. Congestion Demand Management (CDM) strategies, like congestion pricing and multi-modal options such as enhanced busway alternatives, both which were determined to reduce traffic volumes at the Hampton Roads Bridge Tunnel by 10-20% in the Final Level 1 Analysis of the Hampton Roads Crossing Solutions, are dismissed from detailed review. A thorough review of the three build alternatives can not be made when information on how 1/3 of a facility would best be utilized is not presented. Information on which build alternative with which multi-modal option best reduces congestion at the Hampton Roads Bridge Tunnel is a critical piece of information. The project purpose is to develop and analyze intermodal alternatives. There is no comparative analysis of which operational choices (congestion pricing, busway, etc.) best mesh with the build alternatives to best meet the evaluation criteria set out in the preliminary DEIS. Will Alternative 2 with a busway provide greater benefits than Alternative 9 with a busway? Will Alternative 1 produce greater congestion relief with a busway or congestion pricing in the designated multi-modal lane? We believe this information is necessary for the determination of which alternative provides the greatest benefits. This analysis should be provided in the DEIS.
a. Is there a practicable alternative that avoids discharges of fill in wetlands and other waters?
b. Does the proposed action include all appropriate and practicable steps to minimize adverse impacts to wetlands and waters through project modification and permit conditions?
c. Does the proposed action include appropriate and practicable compensating mitigation requirements for all remaining unavoidable adverse impacts to wetlands after minimization?

This analysis will help us identify the least environmentally damaging practicable alternative required by Section 404 review.

Additional fieldwork will be necessary to verify delineated wetlands and assess the potential mitigation site. Although compensation sequentially comes late in the permit process, it is strongly recommended to anticipate needs and begin planning early. Impacts to clam flats and mudflats should also be considered.

The pre DEIS states that coordination for the Dismal swamp shrew is not necessary because impacts are confined to the existing right-of-way (ROW) limits of I-64 in the Joliff Road/Bowers Hill area. However, just because construction will be limited to the ROW, does not necessarily mean there is no suitable habitat for the Dismal Swamp Shrew. Therefore, the US Fish & Wildlife Service or National Marine Fisheries Service will have to be coordinated with to determine potential effects to endangered and threatened species, including the shrew.

Thank you for this opportunity to comment. If you have any questions regarding the review of this project, please call Peter Kube at (757) 441-7504.

Sincerely,

[Signature]

J. Robert Hume, III
Chief, Western Virginia
Regulatory Section
Alternative 2, which is basically Alternative 1 with a Route 164 connection, was dismissed back in 1996 because an analysis by Michael Baker showed the alternative would have no impact on reducing 2015 No Build Traffic volumes at the Hampton Roads Bridge Tunnel. Therefore, the alternative was not included in the Final Level 1 Analysis of the Hampton Roads Crossing Solutions. Why is this alternative being reconsidered?

Alternatives 2 and 9 both have a Route 164 connection. The DEIS states that these alternatives were selected, in part, because they provide access to the potential 4th marine terminal on the east side of Craney Island. If the 4th marine terminal is not built, would the Route 164 connection still be built? If yes, please provide the specific transportation problems or deficiencies this connection will ameliorate with technical information such as measures of traffic efficiency and demand (origin-destination patterns, modal links, motorist delays, level of service improvements, etc.). Comparing the 2015 % change from No-Build lane volumes, alternatives with and without the Route 164 connector have very similar, if not identical congestion relief. If the connector is not being built for congestion relief, what is its purpose? If the connector would not be built without the 4th terminal, please re-calculate the benefits of Alternative 2 and 9 without the Route 164 connector compared to Alternative 1.

Hydrodynamic models suggest that Alternatives 2 and 9 may decrease residual water volumes passing through the mouth of the Elizabeth River. However, model grid resolution presently is not adequate to provide definitive answers on residual circulation inside the Elizabeth River. Therefore, further modeling studies specific to the Elizabeth River may be required to assess the project’s impact on the Elizabeth River. In addition, detailed measurements of the actual residual current in the field are needed to verify model results. Furthermore, questions regarding the effect of alternatives 2 and 9 on the Craney Island Rehandling Basin and the behavior of the dredged material deposited there remain unanswered.

Questions remain regarding the model’s accuracy to predict cumulative hydrodynamic and sedimentation impacts without the inclusion of the proposed fourth Craney Island cell and the proposed dredging of the 50’ inbound channel element of the Norfolk Harbor and Channels Deepening project. At the July 20th IACM meeting, VDOT stated they did not have the dimensions of the proposed 4th cell to input into additional model studies. One of the products of the Feasibility Study for the 4th cell expansion will be an evaluation of dimensions of a number of potential cell alignments. In the interim, the enclosed concept indicates the dimensions of the largest area the cell might occupy.

NEPA provides a broad-based approach to impact balancing. However, NEPA does not contain substantive requirements that compel agencies to choose a particular reasonable alternative as is required by Section 404 (b)(1) of the Clean Water Act. Compliance with NEPA requirements may not necessarily translate to compliance with the Section 404(b)(1) guidelines during Section 404 permit review. Therefore, we recommend the FEIS contain an alternative analysis under Section 404 (b)(1) that addresses avoidance, minimization, and compensation of wetland impacts by answering the following questions.
COMONWTH of VIRGINIA

Marine Resources Commission
2600 Washington Avenue
P.O. Box 756
Newport News, Virginia 23607-0756

July 26, 1999

Mr. Richard C. Woody, II
Environmental Manager
Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219-1939

Re: Hampton Roads Crossing Study Pre-
Draft Environmental Impact Statement

Dear Mr. Woody:

In response to your request for comments on the above-referenced document, we would like to offer the following:

As I mentioned, the project will be handled as an individual, rather than a general permit, given the scale of proposal and estimated degree of impact to resources under the jurisdiction of the Commission. Heather Wood and Traycie West of our office will likely be the Environmental Engineers reviewing the Joint Permit Application, though I will be available to work with them, given my involvement to date. While more comments may be brought forward during the required public interest review of the JPA, in general we would support the tunnel design with the smaller footprint, represented by the concrete rather than steel tube alternative in the pre-draft EIS. We would require that all dredged material be removed from the waterway with contained upland disposal and that clean sand material be used to provide the needed cover over the tunnel tubes. We will not permit any side casting of dredged material or double-handling of material prior to upland disposal.

We are curious as to why the portion of the roadway proposed to be located approximately 300 feet offshore (north) of the northern end of Craney Island can’t be aligned on the island, along the northern edge, thereby reducing the amount of State-owned subaqueous bottom filled by the piles for the bridge structure. It is our understanding that any expansion of Craney Island (Fourth Cell) would take place to the east into the Elizabeth River, not to the north into Hampton Roads. If the island is to be raised to accommodate future dredge material, how high is it expected to be? Since the current proposal calls for pile-supported decking in this
location, is it possible to raise the deck elevation along this section to allow for the potential additional elevation of the island? Any supporting information you may have which shows this option to be infeasible is welcome.

We will recommend that all impacts to hard shell clam habitat be compensated using seed clams at a minimum ratio of 3 to 1, using the high end estimate of clam density (500 clams per acre) in this area, as shown in Figure 3-10 of the pre-draft EIS. In addition, we will recommend that local clammers be given sufficient opportunity to harvest the project area prior to commencement of any construction, to further reduce any loss of this resource. These recommendations are consistent with previous compensation requirements for permitted projects in this area of Hampton Roads. Specifics on the size of the seed clams to be used, where they are to be placed and when will be supplied at a later date. While we agree that the pilings and tunnel islands and associated armor stone riprap will provide hard substrate for potential oyster settlement, we do not believe that these structures offer mitigation for impacts to clam bottom habitat that is to be disturbed or lost in association with this project. We also support the May-November time-of-year restriction for the dredging of the tunnel areas in order to minimize any potential impacts to sea turtles. I have included a copy of the comments provided by our Fisheries Management Division for your information.

We appreciate the opportunity to provide comments at this stage of the review of this project and will be able to offer more specific comments upon receipt of the final EIS and the required Joint Permit Application. In the meantime, should you have any questions, please don’t hesitate to call me at (757) 247-8032.

Sincerely,

[Signature]

Jay M. Woodward
Environmental Engineer

Enclosure
JMW/an
HM
cc: Jack Travelstead, Chief, Fisheries Management
Jim Wesson, Chief, Conservation and Replenishment
Roy Insley, Head, Plans and Statistics
Tom Barnard, Virginia Institute of Marine Science
Heather Wood
Traycie West
MEMORANDUM:

TO: Jay Woodward
Habitat Management Division

FROM: Roy Insley
Tina Hutcheson
Fisheries Management Division

RE: Hampton Roads Crossing Study

DATE: July 16, 1999

We appreciate being given the opportunity to comment on the Hampton Roads Crossing Study Draft Environmental Impact Statement (DEIS). We do have some concerns over the loss of or impacts to valuable clam and blue crab resources and habitat as a result of the proposed Corridor 9 development and construction.

Hardshell Clams
The Hampton Roads area harbors a large hard clam (Mercenaria mercenaria) population with a good record of clam settlement. Construction of a new tunnel and bridge span raises concerns over impacts to the hydrodynamics of the area, in that it could negatively alter the current flow and speed patterns. Reports from watermen who have worked in the area for years have already reported to us changes in flows since the construction of the Monitor Merrimac Memorial Bridge Tunnel in 1992.

VMRC initiated a successful Hard Clam Broodstock Program in 1995. Coordinating with biological scientists and computer modelers from the Virginia Institute of Marine Science (VIMS) and individuals within the hard clam fishery, VMRC Staff selected protected sites to place large numbers of clams in order to increase reproductive potential. To date, four broodstock sites have been established. Two of these sites, the James River Broodstock Management Area and the Middle Ground Light Broodstock Management Area, are in close proximity to the Crossing Study Area and could be affected by not only flow pattern changes, but by dredging, as well. Research has shown that high silt concentrations, such as levels that could result from dredging activity, are detrimental to both hard clam eggs and larvae.

The DEIS did make mention of the summer clam relay season, but it did not mention the equally important patent tong season for the Newport News Management Area, which runs from...
December 1 through March 15. This area would be directly impacted by the new bridge tunnel. To compensate for loss of a portion of their clamming grounds, clammers should be given prior notice to any planned dredging in order to permit them to work the area first.

**Blue Crabs**

As stated in the DEIS, "Dredging for the bridges and tunnels would have little affect on blue crab during the summer when crabs are moving through the Hampton Roads because blue crabs are a mobile species." However, the area off Craney Island and the mouth of the Elizabeth River is a well-known crab pot and peeler pot location in the spring and summer months, and any dredging or construction work during that time will result in displacement of a significant amount of watermen's pots.

TMH

FM(PS)

cc: Jack Travelstead
United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
P.O. Box 99
8669 Short Lane
Gloucester, Virginia 23061

April 23, 1999

Mr. Roberto Fonseca-Martinez
Planning and Environmental Manager
Federal Highway Administration
Dale Building, 1504 Santa Rosa Road
Richmond, Virginia 23229

Colonel Allan B. Carroll
District Engineer
Norfolk District, Corps of Engineers
Fort Norfolk, 803 Front Street
Norfolk, Virginia 23510-1096

Attn: Bruce Turner, FHWA
Peter Kube, Corps

Re: Hampton Roads Crossing

Gentlemen:

On February 5, 1999, representatives from the U.S. Fish and Wildlife Service, the Norfolk District Corps of Engineers, the Virginia Department of Game and Inland Fisheries, the College of William and Mary, and consultants for the Virginia Department of Transportation performed a site visit of Craney Island, located in the City of Portsmouth, Virginia. The site visit was organized in furtherance of Section 7 consultation regarding the potential impacts of this project on the federally threatened piping plover (Charadrius melodus). The Federal Highway Administration (FHWA) in cooperation with the Virginia Department of Transportation (VDOT), proposes a new crossing of Hampton Roads in southeastern Virginia. The project study area is generally bounded by the interchange of I-64/I-664 on the north, I-64/I-564 on the east, I-264/I-64 on the south, and the I-664 alignment on the west. At least one of the project alternatives would be located on or adjacent to Craney Island. This letter constitutes the comments of the Service and the Department of the Interior on the proposed project and is submitted in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).
Mr. Fonseca-Martinez and Colonel Carroll

Participants at the site visit first reviewed the current status of the piping plover on Craney Island and the proposed location of the roadway. This information was provided by Dr. Ruth Beck of the College of William and Mary, and representatives of VDGIF and the Corps. Attendees next toured Craney Island, specifically, those portions of Craney Island where plovers typically nest. The site visit concluded with a discussion of future Section 7 requirements and potential roadway designs that could minimize impacts to plovers.

We understand that a draft Environmental Impact Statement is currently being produced by VDOT. The Service recommends that this document contain a biological assessment regarding the potential impacts of this project on the piping plover and Dismal Swamp southeastern shrew (Sorex longirostris fisheri).

For actions considered to be a major Federal construction activity significantly affecting the quality of the human environment (i.e. one requiring an EIS under the National Environmental Policy Act), Section 7(c) of the Act requires that the agency prepare a biological assessment to determine the effects of the project on any listed species or proposed species that may occur in the impact area. Since Federally listed species occur in the vicinity of the proposed project, the Federal Highway Administration must determine whether the project may affect any of these species. A biological assessment pursuant to Section 7(c) will therefore be required for this project. General recommendations for the preparation of a biological assessment are enclosed. We will be pleased to discuss the consultation process with you. To assist you with preparation of a biological assessment for piping plovers, the Service has enclosed a document entitled, "Ocean City Water Resources Feasibility Study, Immediate Restoration of Assateague Island - Biological Assessment."

We note that the exact location of any alternative likely to be located near or on Craney Island has not been determined. We therefore recommend that the biological assessment address the impacts of all the likely alternative corridors on the piping plover. This alternatives analysis should include an alternative that would bridge over the open water of Hampton Roads in the vicinity of Craney Island to avoid impacts to the plover.

In fulfillment of our mutual responsibilities under the Endangered Species Act, the Service would like to work with the Corps to produce a comprehensive and long-term management plan for piping plovers on Craney Island. The Service would be happy to work closely with the Corps to complete such a plan. Please contact Mr. William Hester at (804) 693-6694, ext. 134, to discuss this option.
Mr. Forseca-Martinez and Colonel Carroll

The Service appreciates your early coordination of this project with us. If you have questions, please contact Mr. Hester.

Sincerely,

Karen L. Mayne

Karen L. Mayne
Supervisor
Virginia Field Office

Enclosure

cc: Mr. Ken Wilkinson
VDOT Headquarters, Richmond, VA
Biological Assessment Guidelines

If a Federal agency determines a project to be a major Federal construction activity significantly affecting the quality of the human environment (i.e., one requiring an environmental impact statement under the National Environmental Policy Act), Section 7(c) of the Endangered Species Act, as amended, requires that the agency prepare a biological assessment to determine the effects of the project on listed and proposed species that may occur in the project impact area.

The biological assessment shall be completed before any contract for construction is entered into and before construction is begun. Biological assessments are recommended, but not required, for other Federal actions that may result in significant impacts to threatened or endangered species and their critical habitats, but which do not require the preparation of an EIS. The contents of the biological assessment depend on the nature of the Federal action. In general, the U.S. Fish and Wildlife Service (Service) recommends the following steps be taken:

1. Conduct a scientifically sound on-site inspection of the area affected by the action, which must in most cases include a detailed survey of the area to determine if listed or proposed species are present or occur seasonally and whether suitable habitat exists within the area for either expanding the existing population or potential reintroduction of populations.

2. Interview recognized experts on the species at issue, including those within the Service, State conservation agencies, universities, and others who may have data not yet found in scientific literature.

3. Review literature and other scientific data to determine the species' distribution, habitat needs, and other biological requirements.

4. Analyze the effects of the action on individuals and populations of each species and its habitat, including indirect and cumulative effects of the action.

5. Analyze alternative actions that may provide conservation measures.

6. Conduct any studies necessary to fulfill the requirements of (1) through (5) above.

7. Review any other relevant information.

If the Federal action agency determines that the proposed action may affect any listed species or critical habitat, the agency must request, in writing, formal consultation with the Service pursuant to Section 7(a)(2). If the action agency determines that the action is likely to jeopardize the continued existence of proposed species or result in the destruction or adverse modification of proposed critical habitat, the agency must confer with the Service.

If the determination is "no effect," neither consultation nor conference is necessary, unless requested by the Fish and Wildlife Service. A copy of the biological assessment document should be provided to the Fish and Wildlife Service.
December 17, 1998

Ken Wilkinson
Virginia Department of Transportation
Environmental Division
1401 E. Broad Street
Richmond, VA 23219

Re: Hampton Roads Crossing Study

Dear Mr. Wilkinson:

The Department of Conservation and Recreation’s Division of Natural Heritage (DCR) has searched its Biological and Conservation Data System (BCD) for occurrences of natural heritage resources from the area two alternatives outlined in your letter. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

Alternative 1:
According to the information currently in our files, Least Terns (Sterna antillarum, G4/S2/NF/SC) and Black Skimmers (Rynchops niger, G5/S2/NF/NS) have been documented in the vicinity of the Hampton Roads Bridge Tunnel and Willoughby Spit utilizing the area for nesting and foraging.

Least Terns nest on broad, flat, beaches with minimal vegetation and forage in saltwater near the shore (Beck, 1991). Threats to this species include loss of nesting habitat due to development and disturbance of breeding colonies by human activities and high numbers of predators (Beck, 1991). Please note that the Least Tern is currently classified as a special concern species by the Virginia Department of Game and Inland Fisheries (VDGIF).

Black Skimmers occur primarily along coastal waters, including bays, estuaries, lagoons and mudflats, and rivers and lakes in migration and in winter. They nest primarily near coasts on sandy beaches, shell banks, coastal and estuary islands, on wrack and drift of salt marshes, and on dredged material sites. They typically feed on small fish and crustaceans by skimming food from the surface of the water while flying. Black Skimmers roost in flocks of up to the hundreds...
or thousands of birds. In the Eastern United States, major threats include flooding of nests, predation, and human disturbance.

**Alternative 9:**
The Great Egret (*Ardea alba*, G5/S2B, S4N/NF/SC) has been documented in the Pinchurst area. This species is found along freshwater and saltwater marshes, mudflats, dune meadows, river margins, and lake shores. In Virginia, this species prefers relatively open wetlands for foraging. The greatest threat to the Great Egret is the urbanization of available nesting and foraging habitat (Bradshaw, 1991). Please note that the Virginia Department of Game and Inland Fisheries (VDGIF) currently classifies this as a state special concern species.

The Peregrine Falcon (*Falco peregrinus*, G3/S1/LE/LB) has been documented nesting on the bridge over the Western Branch of the Elizabeth River. This species nests on cliffs, bluffs, talus slopes, old tree hollows, and abandoned nests of other birds of prey (Byrd, 1991). Currently, nesting pairs in Virginia use artificial structures such as tall buildings, bridge supports, and towers (Byrd, 1991). The Peregrine Falcon was once extirpated from Virginia, but breeding pairs now occur on the coastal plain. Please note that this species is currently classified as endangered by the United States Fish and Wildlife Service (USFWS) and the Virginia Department of Game and Inland Fisheries (VDGIF).

The Piping Plover (*Charadrius melodus*, G3/S2/LE/LT), Least Tern (*Sertna antillarum*, G4/S2/NF/NS), and Black-necked Stilt (*Himantopus mexicanus*, G5/S1/NF/NS) have been documented at Crancey Island. Piping Plovers inhabit coastal areas, utilizing the flat, sandy beaches of barrier islands for breeding (Cross, 1991). Threats to this species include predation of eggs and young and the development and disturbance of barrier island breeding sites (Cross, 1991). Please note that the Piping Plover is classified as endangered by the United States Fish and Wildlife Service (USFWS) and is listed as threatened by the Virginia Department of Game and Inland Fisheries (VDGIF).

As noted above Least Terns nest on broad, flat, beaches with minimal vegetation and forage in saltwater near the shore (Beck, 1991). Threats to this species include loss of nesting habitat due to development and disturbance of breeding colonies by human activities and high numbers of predators (Beck, 1991). Please note that the Least Tern is currently classified as a special concern species by the Virginia Department of Game and Inland Fisheries (VDGIF).

Black-necked Stilts primarily occur near shallow salt or fresh water bodies with soft muddy bottoms, including grassy marshes, wet savannas, mudflats, shallow ponds, flooded fields, and the borders of salt ponds. They nest along the shallow water of ponds, lakes, swamps, or lagoons and may nest on the ground or in the shallow water on a plant tussock. The Black-necked Stilt feeds on insects, crustaceans, and small fish, as well as the seeds of aquatic plants.

The oak toad (*Bufo quercicus*, G5/S1/NF/SC) has been documented in the general area. This species inhabits southern pine woods where it hides under all manner of objects. Unlike most other toads, the oak toad is active by day. Breeding occurs in shallow pools, ditches, cypress and
flatwoods ponds from April to October, depending on the arrival of warm, heavy rains (Conant, 1991). Please note that this species is currently classified as a state special concern species by the VDGIF.

DCR recommends that the draft environmental impact statement address potential impacts to these species. We also recommend coordination with the USFWS and the VDGIF due to the status of these species.

An absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. New and updated information is continually added to BCD. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

Should you have any questions or concerns, feel free to contact me at 804-371-2708. Thank you for the opportunity to comment on this project.

Sincerely,

Lesa S. Berlinghoff
Project Review Coordinator

cc: Alice Allen-Grimes, ACOE
    William Hester, USFWS
    Ray Formald, VDGIF
    Rebecca Wadja, VDGIF
Literature Cited


Virginia Department of Conservation and Recreation
Definition of Abbreviations Used in Natural Heritage Resource Lists

Natural Heritage Ranks
The following ranks are used by the Virginia Department of Conservation and Recreation to set protection priorities for natural heritage resources. Natural Heritage Resources, or "NHRs," are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The primary criterion for ranking NHRs is the number of populations or occurrences, i.e., the number of known distinct localities. Also of great importance is the number of individuals in existence at each locality or, if a highly mobile organism (e.g., sea turtles, many birds, and butterflies), the total number of individuals. Other considerations may include the quality of the occurrences, the number of protected occurrences, and threats; however, the emphasis remains on the number of populations or occurrences so that ranks will be an index of known biological rarity.

S1 Extremely rare and critically imperiled, with 5 or fewer occurrences or very few remaining individuals in Virginia; or because of some factor(s) making it especially vulnerable to extirpation in Virginia.
S2 Very rare and imperiled, with 6 to 19 occurrences or few remaining individuals in Virginia; or because of some factor(s) making it vulnerable to extirpation in Virginia.
S3 Rare to uncommon in Virginia, with between 20 and 100 occurrences; may have fewer occurrences if found to be common or abundant at some of these locations; may be somewhat vulnerable to extirpation in Virginia.
S4 Common and apparently secure, with more than 100 occurrences; may have fewer occurrences with numerous large populations.
S5 Very common and demonstrably secure in Virginia.
S1H Historically known from Virginia, but not verified for an extended period, usually > 15 years.
SU Status uncertain, often because of low search effort or cryptic nature of the element.
SX Apparently extirpated from Virginia.
S1B Breeding status of an animal within Virginia.
S1N Non-breeding status within the state. Usually applied to winter resident species.

Global ranks are similar, but refer to a species' rarity throughout its total range. Global ranks are denoted with a "G" followed by a character. Note that GA and GN are not used and GX means apparently extinct. A "Q" in a rank indicates that a taxonomic question concerning that species exists. Ranks for subspecies are denoted with a "T". The global and state ranks combined (e.g., G2/S1) give an instant grasp of a species' known rarity. These ranks should not be interpreted as legal designations.

Federal Legal Status
The Division of Natural Heritage uses the standard abbreviations for Federal endangerment developed by the U.S. Fish and Wildlife Service, Division of Endangered Species and Habitat Conservation.

LE - Listed Endangered - threatened with extinction throughout all or a significant portion of its range
LT - Listed Threatened - likely to become endangered in the foreseeable future
PE - Proposed Endangered
PT - Proposed Threatened
E(S/A) - treat as endangered because of similarity of appearance
T(S/A) - treat as threatened because of similarity of appearance
C - Candidate - enough information is available to propose for listing, but listing is "precluded by other pending proposals of higher priority"

State Legal Status
The Division of Natural Heritage uses similar abbreviations for State endangerment

LE - Listed Endangered
LT - Listed Threatened
SC - Special Concern - animals that merit special concern according to VDGIF (not a regulatory category)

For information on the laws pertaining to threatened or endangered species, contact:
U.S. Fish and Wildlife Service for all FEDERALLY listed species
Virginia Department of Agriculture and Consumer Services Plant Protection Bureau for STATE listed plants and insects
Virginia Department of Game and Inland Fisheries for all other STATE listed animals

VDCR:DNH, 12957
December 8, 1998

Mr. Roberto Fonseca-Martinez  
Federal Highway Administration  
1504 Santa Rosa Road  
Richmond, Virginia 23229

Colonel Allan B. Carroll  
District Engineer  
Norfolk District, Corps of Engineers  
Fort Norfolk, 803 Front Street  
Norfolk, Virginia 23510-1096

Attn: Mr. Edward Sundra, FHWA  
Mr. Peter Kube, Corps

Re: Hampton Roads Crossing Study

Dear Colonel Carroll:

The U.S. Fish and Wildlife Service (Service) has reviewed the letter from Mr. Ken Wilkinson of the Virginia Department of Transportation (VDOT), dated November 17, 1998, regarding the Hampton Roads Crossing Study. VDOT requested more detailed information on federally listed species within the vicinity of candidate build alternatives 1 and 9, for preparation of the environmental impact statement for this project. Hampton Roads Crossing is a proposed transportation facility to address traffic congestion in the Hampton Roads area of Virginia. This letter is submitted in accordance with provisions of the Endangered Species Act (37 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

The federally threatened piping plover (Charadrius melodus) and Dismal Swamp southeastern shrew (Sorex longirostris fisheri) are located within the potential impact area of alternative 1 and 9. Piping plovers typically nest on Craney Island; and the exact nest locations vary from year to year. At this point, it appears that formal Section 7 consultation for the plover would be necessary, if alternative 9 were selected as the build alternative.
The Dismal Swamp southeastern shrew is potentially located within the impact area of alternative 1, depending on the exact construction boundaries and potential secondary and indirect impacts of the project. The specific area of concern is in the Jolliff Road/Bowers Hill area. Based on our present understanding of the location of this alternative and the current status of the shrew under the Endangered Species Act, it appears that formal Section 7 consultation for the shrew would be necessary, if alternative 1 were selected as the build alternative. As you are aware, the Dismal Swamp southeastern shrew may be delisted as a federally threatened species in 1999. Until such time however, we should continue consultation.

For actions considered to be a major Federal construction activity significantly affecting the quality of the human environment (i.e. one requiring an EIS under the National Environmental Policy Act), Section 7(c) of the Act requires that the agency prepare a biological assessment to determine the effects of the project on any listed species or proposed species that may occur in the impact area. Since Federally listed species occur in the vicinity of the proposed project, the Federal Highway Administration or U.S. Army Corps of Engineers must determine whether the project may affect any of these species. A biological assessment pursuant to Section 7(c) will therefore be required for this project. General recommendations for the preparation of a biological assessment are enclosed. We will be pleased to discuss the consultation process with you.

The Service appreciates your coordination of this project with us. If you have questions, please contact William Hester at (804) 693-6694, ext. 134.

Sincerely,

Karen L. Mayne
Supervisor
Virginia Field Office

cc: Mr. Ken Wilkinson
VDOT Headquarters, Richmond, VA
Mr. Ken Wilkinson  
Virginia Department of Transportation  
P.O. Box 1070  
Suffolk, VA 23439-1070  

RE: Hampton Roads Crossing Study  

Dear  

This letter is in response to your request for information on listed threatened or endangered plant or insect species in the vicinity of the potential impact areas or the Hampton Roads Crossing Study. To date, Virginia Department of Agriculture and Consumer Services records indicate that no threatened or endangered plant or insect species have been documented in the areas outlined on the map that you provided. The absence of data does not necessarily mean that no listed species occur in the area, but that our files do not currently contain information to document their presence.

The Virginia Department of Agriculture and Consumer Services has jurisdiction over listed plant and insect species only. The Virginia Department of Game and Inland Fisheries has jurisdiction over all other listed threatened or endangered species. Additional information on unique geologic formations, rare or critical habitat, rare and candidate species can be obtained from the Virginia Department of Conservation and Recreation, Division of Natural Heritage.

Thank you for your interest in the endangered or threatened plant and insect species in Virginia. If you have any questions or need any additional information, please contact me.

Sincerely,

[Signature]

John R. Tate  
Endangered Species Coordinator
Western Virginia Regulatory Section
94-4529-14 (Hampton Roads)

Mr. Ken Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219

Dear Mr. Wilkinson:

This is in response to your August 24, 1998 letter regarding the hydrodynamic modeling for the Hampton Roads Crossing Study. The Virginia Department of Transportation (VDOT) has proposed that Dr. John Boone of the Virginia Institute of Marine Science (VIMS) perform hydrodynamic and sedimentation modeling for the project.

We have reviewed the methodology for the hydrodynamic modeling study. Dr. Billy Johnson of the Corps Waterways Experiment Station (WES) has expressed some concern over the size of the model's grid cells relative to the size of the proposed tunnel islands to adequately model the impact of these new islands. Questions also remain regarding the model's accuracy without the inclusion of a fourth Craney Island cell, should it be built. However, recognizing the above, we find the methodology for the hydrodynamic modeling study to be a reasonable approach to model the impacts from the proposed Hampton Roads Crossing Project.

The model for the crossing study may be useful as a baseline model for any additional studies the Corps may undertake for the Craney Island expansion. We look forward to working as a partner with VDOT over the next several years as we each continue our work on these two important projects. If you have any questions, please contact Peter Kubke of my staff at (757) 441-7504.

Sincerely,

J. Robert Hume, III
Chief, Western Virginia Regulatory Section
Mr. Ken Wilkinson  
Virginia Department of Transportation  
1401 East Broad Street  
Richmond, Virginia 23219  

Dear Mr. Wilkinson:

This is in response to your June 25, 1998 letter regarding the Hampton Roads Crossing Study and Craney Island Expansion Study. The meeting between our respective staffs on July 15, 1998 revolved around the 3 issues identified in your letter. The following is a synopsis of that meeting.

1. Peter Kube provided a schematic from an Old Dominion University senior class design project report that provides one view of what a 4th cell might look like, however, a number of factors will determine the physical dimensions. It should be noted that the intent of this reconnaissance study is not to design a 4th cell. The Corps recently met with technical design staff at VDOT and the Virginia Port Authority to determine size requirements for a 4th marine terminal which will assist us in our eastward expansion study efforts.

2. Craney Island exists to serve the Commonwealth of Virginia and Hampton Roads by providing an economical and environmentally acceptable site for the placement of over 3.5 million cubic yards of dredged material per year. This capability is critical to the region’s economy. The VA 164 connection should not limit dredged material placement at the existing Craney Island site.

Alternatives crossing the existing boundaries of Craney Island would effectively limit the height of Craney Island and could force Craney Island to close prematurely. Basic design information, such as how high to build a crossing over Craney Island, cannot be determined at this time since the final height of Craney Island has not been determined. Innovation, changes in levee geometry, and new technology have already doubled Craney Island capacity. It may be impossible to provide a definitive roadway under-clearance elevation within the foreseeable future (the next 30 years). Therefore, we have significant reservations about alternatives that cross existing Craney Island boundaries.

Since the Craney Island Expansion Study is looking at a 4th cell on the east side of Craney Island, we recommend evaluating transportation alternatives that utilize a portion of the proposed 4th cell. Alternatives on the east side of Craney Island should not adversely impact the rehandling basin and its access channels.

We do recognize the need for a transportation connection to the container facility being discussed by the Corps and the Port Authority east of Craney Island. Further environmental and economic analysis will be required during the National Environmental Policy Act (NEPA) evaluation to demonstrate that a VA 164 connection is the answer to that
need. The east side of Craney Island already has access to major transportation corridors, being situated only three miles over existing roads to the Cedar Road interchange on the Western Freeway (164).

3. Project Purpose and Need must be determined as a prelude to the Section 404 alternatives analysis. The Corps provided written concurrence of the project purpose and need statement in October of 1994. The purpose of the project as defined at that time was to develop intermodal alternatives that can work together to improve accessibility, mobility, and goods movement in the Hampton Roads metropolitan area to help relieve the congestion that occurs at the existing I-64 Hampton Roads Bridge Tunnel (HRBT). There seems to have been a certain amount of project purpose creep since 1994 to build a project that seeks to solve all the problems of the region’s transportation network.

Six screening criteria were developed to identify solutions that have the highest probability of reducing congestion at the HRBT. It appears as though some of these screening criteria, (e.g., solution should connect ports/major freight corridors, solution should connect to controlled access freeways), have been elevated to integral elements of the project purpose and need. The Corps is concerned that the added elements not unduly restrict an adequate alternatives analysis. In other words, an alternative does not necessarily have to connect ports and major freight corridors, as an example, to fulfill the project purpose of reducing congestion at the HRBT. If the project purpose has been amended to now include connection of ports and freight corridors, this should be made clear in the EIS.

NEPA provides a broad based approach to impact balancing. However, NEPA does not contain substantive requirements that compel agencies to choose a particular reasonable alternative as is required by Section 404 (b)(1) of the Clean Water Act. Compliance with NEPA requirements may not necessarily translate to compliance with the Section 404(b)(1) guidelines during 404 permit review. Therefore, we recommend that the EIS address the requirements of a Section 404 (b)(1) guidelines analysis. It will then be possible for us to make a permit decision at the time of the Record of Decision.

The DEIS should contain an environmental investigation of the practicable alternatives in order to identify the least environmentally damaging practicable alternative (LEPA). VDOT should complete the field delineation of waters and wetlands and assess wetland functions and values in a narrative fashion. Mapping (+/- 400 scale) should be prepared that shows contours, centerlines, and alignment of the toe of fill in water and wetland crossings. Detailed engineering drawings are not necessary at this stage.

An alternative analysis under Section 404 (b)(1) must address avoidance, minimization, and compensation of wetland impacts by answering the following questions.

a. Is there a practicable alternative which avoids discharges of fill in wetlands and other waters?
b. Does the proposed action include all appropriate and practicable steps to minimize adverse impacts to wetlands through project modification and permit conditions?
c. Does the proposed action include appropriate and practicable compensating mitigation requirements for all remaining unavoidable adverse impacts to wetlands after minimization?
VDOT should prepare an analysis of the effects (including cumulative effects) of the alternatives on wetlands. Measures the applicant has taken to minimize wetland impacts and factors which make other less damaging alternatives not practicable should be included. Compensation schemes for wetland impacts should be described including site analysis, preliminary design drawings, monitoring, reporting and remedial action requirements.

We can issue a Public Notice when the DEIS is released. At the Corps' discretion, one or more of the alternatives may be advertised to solicit public comment. The public may suggest additional alternatives which will need to be analyzed by VDOT. The Corps will consider all relevant public comments to determine the LEDPA. During the public notice stage, we will consider minor shifts in alignments and various construction practices to insure that impacts have been minimized. The Corps will identify the LEDPA, field verify it's wetland delineation, and assess wetland functions and values to be impacted for the final alignment. VDOT may prepare preliminary wetland creation design drawings and specifications with stated goals of functions and values replacement. A permit decision may be made upon completion of the Record of Decision without detailed engineering drawings suitable for construction.

I hope this letter addresses the questions raised in your June 25, 1998 letter. If I have left anything out or as additional issues arise, please contact Peter Kube at (757) 441-7504.

Sincerely,

[Signature]

J. Robert Hume, III
Chief, Western Virginia
Regulatory Section
Mr. Bruce Turner  
Planning and Environmental Manager  
Federal Highway Administration  
Dale Building, 1504 Santa Rosa Road  
Richmond, Virginia 23229  

Attn: Bruce Turner  

Re: Hampton Roads Crossing - Notice of Intent  

Dear Mr. Turner:  

The U.S. Fish and Wildlife Service has reviewed the Notice of Intent to prepare an Environmental Impact Statement (EIS) on the proposed new crossing of Hampton Roads in southeastern Virginia (FR vol. 63, no. 104, June 1, 1998). The Federal Highway Administration (FHWA) in cooperation with the Virginia Department of Transportation (VDOT), will prepare an EIS to determine the impact of a proposed new crossing of Hampton Roads in southeastern Virginia. The EIS will examine construction alternatives in the area generally bounded by the interchange of I-64/I-664 on the north, I-64/I-564 on the east, I-264/I-64 on the south, and the I-664 alignment on the west. This letter constitutes the scoping comments of the Service and the Department of the Interior on the proposed project and is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the National Environmental Policy Act of 1969 (42 USC, subsections 4321-4370a, as amended).

Endangered Species Act Comments  

Based on the information provided to us by VDOT, the following endangered or threatened species could potentially be impacted by this project:

- Piping plover (Charadrius melodus) - Federally listed threatened. This shorebird nests regularly on Craney Island and development on the island will likely disturb breeding plovers and adversely affect reproduction. As project plans are refined, the Service will keep FHWA and VDOT apprised of survey needs and other Section 7 issues. To the maximum extent possible, the Service recommends that FHWA avoid construction on Craney Island.
Mr. Bruce Turner

- Peregrine falcon (*Falco peregrinus*) - Federally listed endangered. Peregrine falcons nest on bridges and other elevated transportation structures throughout Hampton Roads. Based on our review of the alternatives currently under consideration, it does not appear that this species will be impacted by the project. Therefore, it does not appear likely that additional Section 7 consultation will be necessary.

- Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*) - Federally listed threatened. Dismal Swamp southeastern shrews have been found in the immediate vicinity of U.S. Route 13/58/460 and Interstate Highway 64, both east and west of Bowers Hill. Dismal Swamp southeastern shrews have not been found on surveys of the Interstate Highway 664 corridor located north of Bowers Hill. Depending on the extent of construction impacts in this area, surveys and formal Section 7 consultation may be necessary. The Service will provide additional information as project plans are refined.

- Loggerhead sea turtle (*Caretta caretta*) - Federally listed threatened. This turtle occurs in the Hampton Roads area and Chesapeake Bay during the spring and summer. Section 7 consultation for this species in the project area will be administered by the National Marine Fisheries Service at the following address:

  National Marine Fisheries Service  
  904 South Morris Street  
  Oxford, Maryland 21654  
  (410) 226-5771

Other federally threatened or endangered sea turtles may also occur in the project vicinity. Any Endangered Species Act consultation on these species should also be coordinated with NMFS at the above address.

The species listed above, in addition to other species with no federal status, are protected under the Virginia Endangered Species Act. If you have not done so already, you should contact the Virginia Department of Game and Inland Fisheries at the following address, to determine coordination requirements:

Virginia Department of Game and Inland Fisheries  
Environmental Services Section  
P.O. Box 11104  
Richmond, VA 23230  
(804) 367-8999

**Fish and Wildlife Coordination Act Comments**

The Service notes that several initiatives are currently underway to bring about no net loss of wetlands in the United States and to restore the Chesapeake Bay. A more localized initiative is underway to restore the Elizabeth River. Due to the magnitude of this project and its potential to adversely impact natural resources and water quality in Hampton Roads and the Chesapeake
Bay, we encourage FHWA and VDOT to provide project-related funding to restore the former biological integrity of the lower James River and Hampton Roads through pro-active restoration projects as part of the compensation plan. We have provided several suggestions below, of feasible projects that could help accomplish the goals stated above:

- oyster reef establishment/restoration,
- estuarine/palustrine wetland restoration in the James River basin,
- submerged aquatic vegetation restoration and monitoring,
- shoreline erosion control.

The Service would be glad to meet with you to discuss any or all of the above projects.

We are aware that the Hampton Roads Metropolitan Planning Organization selected a preferred alternative that would require, among other things, the widening of I-664 in the Cities of Suffolk and Chesapeake, Virginia. Wetland compensation sites used to compensate for wetland impacts associated with the construction of the existing I-664, and at least one tidal wetland compensation bank, are located on either side of I-664 primarily in the City of Chesapeake just north of Bowers Hill. The invasive wetland species phragmites (*Phragmites australis*) has become established in a number of these sites and in at least two sites, phragmites is now the dominant species. The U.S. Army Corps of Engineers has brought this problem to VDOT’s attention and in the case of the compensation bank, the Corps has informed VDOT that no more credits may be withdrawn from the bank until the phragmites has been successfully removed.

Phragmites is an unwanted, invasive species that is of limited value to fish and wildlife. Under proper conditions, it forms monotypic stands that displace other more valuable wetland plants and greatly reduces habitat diversity. Based on the history of phragmites invasion in this area, we recommend that any wetland compensation associated with this project be properly designed to avoid colonization by phragmites.

The Service has reviewed the letter to VDOT from Mr. Tom Barnard of the Virginia Institute of Marine Science dated June 8, 1998. That letter includes numerous pertinent issues and the Service concurs with VIMS’ recommendations.

As you are aware, the Service typically provides several generic scoping comments on wetland trends, mitigation, compensation and project timing, indirect impacts, and various construction designs. We have enclosed these recommendations.

At the March 1991, Mid-Atlantic Region Highways and Environment Conference, the integration of the NEPA and Section 404 processes was identified as one of the highest priorities of the transportation, regulatory, and resource agencies. This led to the formation of an interagency task force to investigate ways to fully integrate NEPA and Section 404 to ensure the development of an integrated review process. In July of 1992, the document entitled,
"Integrating NEPA/404 for Transportation Projects," was signed by Regional Administrators of the Environmental Protection Agency, Federal Highway Administration, U.S. Army Corps of Engineers, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. You will recall that interagency coordination on this project was initiated under the NEPA/404 process and this process was terminated by VDOT and/or FHWA after agency concurrence on Purpose and Need. The Service again recommends that future project coordination be conducted using the NEPA/404 process.

We note that not all issues of concern to the Service can be anticipated in this very early phase of the project. While we have attempted to list our concerns herein, we acknowledge that new and unforeseen issues may arise during the review process.

The Service appreciates your early coordination of this project with us. If you have questions, please contact William Hester at (804) 693-6694, ext. 134.

Sincerely,

Karen L. Mayne
Supervisor
Virginia Field Office

Enclosure

cc: Mr. Ken Wilkinson
    VDOT Headquarters, Richmond, VA
    Ms. Alice Allen-Grimes, Norfolk District Corps of Engineers
    Norfolk, VA
Enclosure: Generic Service Comments on Wetland Trends, Mitigation, Compensation and Other Project Design Criteria

A primary concern of the Service is the protection of wetlands for the numerous functions and values they provide. Wetlands are some of the most biologically productive ecosystems and they provide habitat for a variety of fish and wildlife species. Wetlands can improve water quality by trapping sediments and absorbing nutrients and pollutants. Forested wetlands preserve water quality by slowing and filtering runoff from uplands, buffering water temperature fluctuations, stabilizing stream banks, and contributing organic matter to the food chain. One-third of our Federally endangered species depend on wetlands for at least a portion of their life history requirements and one-half of our protected migratory birds depend upon or frequent wetlands and associated habitats (U.S. Department of the Interior 1990). Yet wetlands comprise only 5% of the total land area of the contiguous United States (Tiner 1984) and only 4% in Virginia (Tiner 1987). Numerous studies on the status and trends of wetlands indicate that palustrine forested wetlands are declining at a significant rate, with national losses totaling 3.4 million acres from the mid-1970s to the mid-1980s (Dahl and Johnson 1991) and losses within the mid-Atlantic region totaling 70,000 acres between the mid-1950s and late 1970s (Tiner and Finn 1986).

The Service has recently completed a study of wetland trends in the 63,000-square mile watershed draining into Chesapeake Bay. Wetland status and trends were estimated for the time period of 1982 to 1989. An estimated 1.7 million acres of wetlands and 3.5 million acres of deepwater habitat (including the Bay) existed in the watershed in 1989. Almost 90% of the wetlands are palustrine, with forested wetlands being most abundant. An estimated total of 22,000 acres of palustrine wetlands were lost in the Chesapeake Bay watershed during the study period and Virginia experienced the heaviest losses (Tiner et al. 1994). Because of the value of these areas and the national policy of no net loss of wetlands, the Service recommends avoiding wetland impacts.

To preserve wetlands, the Service has formulated a Mitigation Policy to guide our coordination of projects with potential wetland impacts. According to the Service's Mitigation Policy (FR Part III, Vol. 46, No. 15, Jan. 23, 1981, p. 7660) wetland impacts should be avoided or minimized to the maximum extent practicable and should be mitigated in a sequential fashion as listed below:

1. Avoiding the impact altogether by not taking a certain action or parts of an action,

2. Minimizing the impact by limiting the degree or magnitude of the action and its implementation,

3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment,

4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action,

5. Compensating for the impact by replacing or providing substitute resources or environments.
After numbers 1 through 4 above have been completed, if unavoidable wetland losses remain, we generally recommend that emergent wetland losses be compensated by creating similar emergent wetlands from low habitat value upland sites on a 1.5 to 1 areal basis and that unavoidable losses of scrub/shrub and forested wetlands be compensated in-kind on a 2 to 1 areal basis. These general recommendations incorporate more than simple areal replacement because of the inherent risk in wetland creation and the time lag between the loss of existing habitat and the replacement of that habitat value in the created wetland.

The Service makes several generic recommendations for habitat compensation. Sediment and erosion control measures should be implemented to prevent soil movement in the adjacent wetlands and waterways. The local Natural Resources Conservation Service office should be consulted regarding the soil amendments and planting schedule needed to maximize the likelihood of successful soil stabilization. No point source discharge (i.e. stormwater outfalls) should be directed into the restored or created wetlands.

To ensure successful compensation and to provide a basis for compliance monitoring, we recommend that the applicant be required to prepare, and submit for interagency review and concurrence, a detailed compensation plan that addresses the following items:

- a detailed diagram of the compensation area boundaries and elevations;
- a description of the soil conditions to be created or restored, including required pH, organic content, and necessary soil amendments (i.e. pH adjustments, fertilizer);
- a description of the hydrologic conditions to be created or restored, including at least a description of the frequency and duration of soil saturation and/or inundation and the measures to be taken to develop this hydrologic regime;
- a description of the plant communities desired, their proposed locations and means of establishment, the source of propagules, and the timing and density of establishment;
- a detailed schedule describing when the proposed fill, dredging, planting, transplanting, or other actions will occur;
- a post-compensation monitoring plan establishing monitoring methodologies, reporting schedules, and performance standards to be used to evaluate whether the compensation effort restored or replaced the affected wetland functions, including fish and wildlife habitat, flood storage, and water quality maintenance;
- a description of actions to be taken by the applicant if the compensation measures are not successful.

All compensation should be completed prior to or concurrent with project-induced habitat impacts. Compensation plans should include a construction chronology and deadlines for completion of all habitat construction. All compensation plans should be published in the Record of Decision that is required in fulfillment of the obligations for this project under the National Environmental Policy Act.
In accordance with Executive Order 11988 (Protection of Floodplains), floodplain impacts should be mitigated to the maximum extent possible, including compensation for any unavoidable floodplain impacts. We recommend that the applicant mitigate floodplain impacts following the recommendations listed above for wetland mitigation.

The Service requests that the following information be included for each alternative in the EIS:

1. maps showing location and acreage of all habitat types to be impacted including streams, wetlands, and uplands,
2. dominant plant species within each habitat type,
3. maps showing impacts within the 100-year floodplain,
4. stormwater management plans,
5. locations of soil borrow and disposal sites,
6. sequence and timing of project construction,
7. locations of soil borrow and disposal sites.

We request information on the potential indirect impacts to both upland and wetland habitat types predicted to result from each project alternative and the anticipated acreage to be impacted. Examples include land development for industrial facilities, travel corridors, etc., that would be facilitated as a result of this transportation project.
Literature Cited


FACSIMILE

DATE: 7/16/98
TO: KEN WILKINSON
FROM: LESLIE GRAYSON
RE: EASEMENTS IN SUFFOLK & VA. BEACH

THE VA. OUTDOORS FOUNDATION CURRENTLY HOLDS NO OPEN SPACE EASEMENTS IN PORTSMOUTH, HAMPTON, NORFOLK, OR NEWPORT NEWS.

I AM SENDING LOCATION MAPS FOR THE EXISTING EASEMENTS IN SUFFOLK & VA. BEACH (1 IN EACH CITY). LET ME KNOW IF THE MAPS ARE NOT LEGIBLE AND I WILL SEND BY MAIL.

Lesl
Mr. Earl T. Robb  
Environmental Administrator  
Virginia Department of Transportation  
1401 East Broad Street  
Richmond, VA 23219-1939

Dear Mr. Robb:

The proposal to provide a Third Crossing of Hampton Roads, as depicted on the attached sketch, is compatible with long range plans for Naval Base, Norfolk. Issues related to this proposal that require additional study include:

a. Wetlands  
b. Impacts of new traffic patterns and volumes on existing and planned Navy roads and land use.  
c. Impacts on Navy park and recreation areas.  
d. Alignment and depth of any tunnels on adjacent ship berthing, service, anchorage, and transit areas.  
e. Airfield safety criteria.  
f. Explosive safety criteria.  
g. Historic or archeological resources.  
h. Contaminated sites.

Final approval will be based on your formal submission of the proposal, and will involve review by the Secretary of the Navy. Commander, Naval Base, Norfolk point of contact remains Mr. Ray Kirby at (757) 322-2871.

Sincerely,

[Signature]

R. T. Zimmer  
Rear Admiral, U.S. Navy

Enclosure: 1. Hampton Roads Third Crossing Sketch
June 29, 1998

Mr. Ken Wilkinson
Environmental Planner
Commonwealth of Virginia
Department of Transportation
1401 East Broad Street
Richmond, VA 23219-1939

Dear Ken:

Thank you for forwarding to us the minutes of the May 28, 1998 scoping meeting for the Hampton Roads Crossing Study Draft Environmental Impact Statement. Having attended the meeting, I generally concur with the minutes and the general scope of the study outlined at the meeting.

I would like to offer one minor correction and clarification to the minutes. The minutes accurately reflect the fact that I asked whether or not pieces of other alternatives could be taken and pieced together in this phase of the study. I did not specifically identify the addition of I-164 as an addition to CBA 1 although that is an option that the City of Hampton identified via earlier written comments. I believe Phil used this combination as an example. My question was intended to be more general and not necessarily identify a specific combination of various pieces. If we get down the road, in this phase of the study, and find out that it might make some sense do some combination of CBA 1 and CBA 9 that we haven’t previously considered, we want to make sure there is still room for this type of creativity.

Thank you for the opportunity to remained involved in this important project. If you have any questions, please contact me.

Sincerely,

Terry P. O’Neill
Director of Planning

cc. George Wallace, City Manager
Ted Henifin, Director of Public Works

DEPARTMENT OF PLANNING
22 LINCOLN STREET, HAMPTON, VIRGINIA 23669
June 25, 1998

Mr. Kenneth E. Wilkinson
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219

RE: Hampton Roads Crossing Study
DEIS, May 28, 1998 Scoping Meeting

Dear Mr. Wilkinson:

This letter is in response to your request for comments on the proceedings of the May 28, 1998, scoping meeting for the Hampton Roads Crossing Study Draft Environmental Impact Statement (DEIS). In a letter dated to you December 29, 1997, our agency conveyed the extreme importance of the lower James River as a highly productive and utilized marine environment. Specifically this area, commonly referred to as Hampton Roads, is one of the most productive shellfish areas in the Commonwealth. In that correspondence we stated that we would expect extensive circulation studies to be conducted, similar to those undertaken prior to the construction of the present Monitor-Merrimac Bridge Tunnel, in order to evaluate the potential effects the proposed crossing might have on currents and the marine resources in the vicinity.

Based on the information presented at the May 28, 1998, scoping meeting, it appears that the draft Environmental Impact Statement will include computer modeling which will assess the proposed project's impacts on the circulation in the James River and Hampton Roads, with special emphasis on impacts to shellfish larvae settlement as well as sediment transport. In addition to this central issue, the DEIS will address potential project impacts on water quality, including dissolved oxygen turbidity and salinity as well as the resuspension of contaminated sediments in the water column, all important issues that the Commission will consider when reviewing the proposed project. Surveys should also be conducted in order to determine the number of hard clams likely to be potentially impacted by the construction of the project.
The issues chosen to be assessed in the DEIS are fundamental if the Commission is to possess the necessary information as they review the proposed project. Please be advised that, when dealing with a project of this scope and magnitude, new unforeseen issues may arise during the review process. The Commission is aware that the Virginia Institute of Marine Science (VIMS) has conducted a series of seminars to familiarize their scientists with the issues in order to enable them to provide comments throughout the process. Our agency will work closely with VIMS in order to ensure that the Commission has all of the pertinent information necessary to thoroughly evaluate and review the permit application.

Thank you for the opportunity to comment on the scoping meeting. If we may be of further assistance, please do not hesitate to give Ms. Laura Grignano of my staff a call at (757) 247-2009.

Sincerely,

[Signature]

William A. Pruitt

WAP/kr
CO

cc:  VPhillip A. Shucet, Baker Environmental, President
    U.S. Army Corps of Engineers
    Dept. Of Environmental Quality (#6)
    Thomas Barnard, VIMS
Mr. Ken Wilkinson, Environmental Planner  
Virginia Department of Transportation  
1401 East Broad Street  
Richmond, Virginia 23219

Dear Mr. Wilkinson:

This is in response to your letter dated June 3, 1998 which forwarded the minutes from the scoping meeting held on May 28, 1998 for the Hampton Roads Crossing Study Draft Environmental Impact Statement.

The minutes have been reviewed by Linda Gilliam of my staff who will be the project officer for this proposed project. During the drafting of the Draft Environmental Impact Statement (DEIS), the following issues need to be addressed:

a. Commercial waterway users who transit the waterway to be crossed will need to be described in the DEIS by identifying their mast heights, drafts and type of cargo they carry.

b. Recreational waterway users will need to be described by identifying their mast heights, and drafts.

c. An estimated total value of yearly commercial shipping on the waterway affected by the bridge action needs to be included in the DEIS.

d. Adjacent property owners, commercial businesses located along the waterway within the project site should be addressed.

e. When addressing wetland impacts, if acreage due to mitigation efforts has been saved or increased in volume on affected lands, state the amount of acreage saved or increased and the estimated monetary value of the lands affected in the DEIS.

We request to be a cooperating agency for this project and that this be addressed in the DEIS. For questions regarding this matter, please contact Ms. Gilliam at (757) 398-6227.

Sincerely,

ANN B. DEATON  
Chief, Bridge Administration Section  
By direction of the Commander  
Fifth Coast Guard District
June 12, 1998

Mr. Ken Wilkinson
Environmental Planner
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219-1939

RE: HAMPTON ROADS CROSSING STUDY DRAFT EIS MINUTES

Dear Ken:

Thank you for sending me a copy of the minutes from your last meeting concerning the above matter. At this time, we do not have any comments as the new bridge/tunnel will not impact any park property in Chesapeake. The only impact we would see as a result of its approval and construction would be a welcome reduction in traffic congestion.

If further changes to the proposed location could possibly affect any property in Chesapeake, especially near a known park, please contact me or our Park Planner, Susan Bailey, at the number above. Again, thank you for keeping us informed.

Sincerely yours,

Claire R. Askew
Director
JUN 10 1998

Mr. Ken Wilkinson
Environmental Planner
Commonwealth of Virginia
Department of Transportation
1401 East Broad Street
Richmond, VA 23219-1939

REP: Hampton Roads Crossing Study
Draft Environmental Impact Statement
Hampton Roads, Virginia

Dear Mr. Wilkinson:

On June 8, 1998, the Council received a copy of minutes from the scoping meeting for the referenced project along with your request for our comments on issues to be addressed in the study. While we appreciate your notification and request for our comments, it is not the Council’s role, nor do we have the resources to participate regularly in the scoping or EIS process. However, we do wish to call to your attention the requirements of Section 106 of the National Historic Preservation Act and the Council’s implementing regulations (36 CFR Part 800). The Council’s regulations set forth the steps to be taken in order to identify historic properties and assess effects associated with a proposed Federal undertaking, and we strongly recommend that your DEIS be coordinated with the information necessary to initiate and complete the 106 process. Once it is determined that the project may affect historic properties, the Council should be notified and given the opportunity to participate in further consultation to consider means to avoid or minimize those impacts.

We recommend that you initiate coordination with the Virginia State Historic Preservation Officer early in the process and work closely with them to take advantage of their knowledge of cultural resources in the area. Any further request for the Council’s comments regarding this project should be initiated by the sponsoring Federal agency, and accompanied by the requisite supporting documentation specified at 36 CFR § 800.3. Should you have further questions regarding the Section 106 process, please feel free to contact me at (202) 606-8534.

Sincerely,

MaryAnn Naber
Office of Planning and Review
June 10, 1998

Mr. Ken Wilkinson
Environmental Planner
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219-1939


Dear Mr. Wilkinson:

As you requested, we have reviewed the Hampton Roads Crossing - Major Investment Study and evaluated it for compliance with the Chesapeake Bay Preservation Act (CBPA) standards, which our department oversees. At this stage, we have no specific comments relating to the proposed layout or design. As you know, state agency site plans must be developed in accordance with the Chesapeake Bay Preservation Area requirements for the local jurisdiction in which they take place. When more detailed plans are developed, we would be happy to assist you by reviewing these plans for compliance with those local land-use regulations. This letter details some general issues/concerns to consider when developing the construction plans and Environmental Impact Statement.

As part of their CBPA program, coastal Virginia localities have designated certain environmentally sensitive lands as Resource Protection Areas or Resource Management Areas, and adopted local land-use regulations to protect such areas from development and water quality impacts. In general, local ordinances contain an exemption for public roadways within the Resource Protection Areas established by the Chesapeake Bay Preservation Act. However, when designing the site, please take into consideration that this exemption does not extend to structures, parking lots or other non water-dependent uses which are appurtenant to the roadway extension. The site plan, as referenced in the Major Investment Study, should be designed to incorporate Best Management Practices for Water Quality and Stormwater Management which
will mitigate any increase in peak flows and pollutant loads. Calculation methods for determining pollutant loads, buffer equivalency and removal rates should generally follow those of the local jurisdictions. Other performance standards which may affect the design can be found within local ordinances, and resource maps may also be available from the localities to assist in planning the project.

We appreciate the opportunity to comment on the project at this time, and will be happy to assist you in any way we can. Should you have any questions or comments about this matter, please do not hesitate to contact us at 1-800-CHESBAY.

Sincerely,

[Signature]
W. Douglas Burch, Jr.
Environmental Engineer

[Signature]
David J. Kovacs, AICP
Senior Environmental Planner

c: Scott Crafton, CBLAD
Scott Kudlas, CBLAD
June 8, 1998

Mr. Kenneth E. Wilkinson  
Environmental Planner  
Virginia Department of Transportation  
1401 East Broad Street  
Richmond, VA 23219

Dear Ken,

Having participated with us, you are aware that we have gone to some length to familiarize the VIMS staff with the plans which have resulted from the Major Investment Study (MIS) of the envisioned 3rd Crossing of Hampton Roads. Through the sponsoring of a series of five seminars we have attempted to acquaint our interested scientists with the issues and background necessary to propose comments addressing the potential environmental issues, impacts and problems which we see as directly or indirectly related to the proposed construction. We hope you will find our scoping comments of value as you continue the EIS development process.

Probably the major environmental problem to be considered in the process is the effect of any new structures on the circulation in the James and Elizabeth Rivers along with any connecting tidal tributaries. Investigations should include possible structure-induced changes in tidal range, tidal currents, and salinity, along with suspended and bottom sediment deposition patterns.

In the vicinity of Newport News Point the potential exists to affect the “tidal front” which previous VIMS research, Byrne et al. (1987) has demonstrated to be a major mechanism by which shellfish larvae are transported upstream onto the James River seed beds and a natural set is maintained. Project effects on this phenomenon will need to be addressed.

West of the Craney Island Dredged Material Management Area (CIDMMA), the major problem foreseen is the structure-induced hydrodynamic change associated with the major interchange between the proposed I-564 connector and I-664. Even with no island proposed, as is the case at present, model studies should look at effects on the mixing field of the major sewer outfall and diffuser (the discharge from which is expected to increase 3-fold by the time of construction) which extends into the vicinity of the proposed east-west corridor. Only slightly farther to the north of this area is located the newly designated clam sanctuary at Middle Ground shoal, sited primarily as a result of 3-dimensional hydrodynamic model simulations based on present conditions. Changes in sediment deposition and general circulation patterns are of major concern in this area. Additionally, any potential effects of the new pilings being on stratification should
be examined, cumulatively with the existing causeway.

On the east side of the CIDMMA the preferred alternative (Transportation Corridor 9) includes a proposed tunnel running under the Elizabeth River shipping channel. Such a structure may or may not pose significant questions with regard to circulation and flushing characteristics of the Elizabeth River basin. However, legislation introduced in the 1998 session of the General Assembly (SB 56) envisions expanding Craney Island into the Elizabeth River through the addition of an eastern cell extending into the vicinity of the old bulkhead line. The cell would be dedicated to the development of a new marine terminal. There is little question that the 3rd crossing and the marine terminal are closely related proposals, given their respective proximity, the new port’s vehicle access requirements, etc. The two structures could combine to form a major habitat loss/disurbance and a constriction of flow at the critical entrance to the river basin. If both projects materialize as presently proposed, a thorough feasibility study on circulation, sedimentation, contaminant and sediment transport in the modified river is called for in the planning process. The study should also examine the hydrologic changes in the smaller creeks and branches above the proposed constriction. Also of major interest is the effect of the construction on the Craney Island Relhandling Basin and the behavior of the dredged material deposited there, particularly the contaminated fractions.

It is likely that this project is going to require extremely large amounts of sand, depending on final designs, etc. but with the likelihood of two tunnels being involved, along with the additional cell at CIDMMA, cover material and fill may be at a premium. Can existing Craney Island sediments meet this need? Will contamination levels allow its use? What will be the adverse impacts? If other sources are necessary, what will be the impacts of extraction?

A major question involved with all aspects of the construction of this proposal, no matter its final design details, is the potential for the remobilization of sediment-associated contaminants during the dredging and backfilling for the tunnels and the construction and backfilling of the proposed east cell of Craney Island. High concentrations of contaminants have been reported in the Elizabeth River and disposal activities over the years may have concentrated contaminants from other parts of the river in the containment area. The dredging process may oxygenate the anaerobic sediments, changing their geochemistry and mobilizing sorbed pollutants.

Sediments in the affected areas of the river should be characterized with respect to contaminant concentrations, sediment grain size and organic carbon content. Polycyclic aromatic hydrocarbons (PAH) have been shown to be highly elevated in the Elizabeth River and have been implicated in many of the identified adverse biological effects identified. Priority pollutant heavy metals should be evaluated with particular emphasis on copper, zinc and tributyltin (TBT), given the large amount of shipbuilding and repair in the vicinity of the proposed construction.

We also have concerns with regard to dredging/submerged grasses (SAV) interactions in the vicinity of the I-664 and I-64 bridge tunnels. SAV such as eelgrass and widgeon grass have long been virtually nonexistent in the lower James River except for a surviving colony adjacent to Strawberry Banks. The recent discovery of small colonies of these grasses in the vicinity of
Merrimac Shores and west of Peterson's Yacht Basin has shown that they can survive in the lower James and attempts at restoration are underway. Because of the high light requirements of these species, turbidity is an important consideration. We suggest that potential direct SAV loss be examined through comparison of grass distribution with planned dredge and construction areas. Predicted turbidity levels should be studied to determine how water quality may be affected on the shoals, particularly along the north shore area from the I-664 corridor, to and including I-64. The aim should be to assess how these TSS loadings may affect SAV survival. We also recommend that the EIS contain pre- and post-construction monitoring plans to first, identify and second, address SAV losses attributable to the project, if any.

Finally, we are aware of a number of efforts to restore areas of the Elizabeth River, specifically wetlands areas, (The Elizabeth River Project) and to improve water quality in general. The EIS should address these efforts and any positive or negative effects the 3rd Crossing might have in general on specific restoration plans or proposed restoration sites.

Again, we hope you find these comments useful to your scoping process and if any questions or other concerns should arise as a result of this letter, please do not hesitate to contact me.

Sincerely,

Thomas A. Barnard, Jr.
Marine Scientist

xc:
Laura Grignano, VMRC
Peter Kube, Corps
Rod Schwarm, NMFS
William Hester, F&WS
Pete Stokesley, EPA

References:

Mr. Kenneth E. Wilkinson  
Virginia Department of Transportation  
1401 East Broad Street  
Richmond, Virginia 23219

RE: Hampton Roads Crossing Study

Dear Mr. Wilkinson:

This letter follows the December 2, 1997, Richmond VDOT meeting at which the Major Investment Study (MIS) results for the proposed Hampton Roads Crossing Study were presented and discussed. It specifically addresses VDOT’s request to the natural resource agencies for input on critical areas of interest for the Hampton Roads water crossing.

Please be advised that the Marine Resources Commission, pursuant to Chapter 12 of Title 28.2 of the Code of Virginia, is responsible for issuing permits for encroachments in, on, or over State-owned submerged lands throughout the Commonwealth. Before any action is commenced which results in encroachments in, on or over State-owned bottom, a Joint Permit Application must be completed and returned to our agency for processing. Upon receipt of the complete application, copies will then be forwarded to the U.S. Army Corps of Engineers, the local wetland boards and the Virginia Department of Environmental Quality for their independent evaluation. Please be advised that any decision by this agency on the pending permit application will be based on a complete public interest review and evaluation of the potential project impacts on the marine resources of the Commonwealth.

In general, the selected preferred alignment, Corridor 9, crosses the James River in an area highly utilized by both commercial and recreational fisherman. This section of the lower James River is one of the most productive hard clam areas in the Commonwealth and the prevailing circulation patterns play a critical role in the life cycle of the James River Oyster. Extensive circulation studies were undertaken prior to the construction of the present Monitor-Merrimac Memorial Bridge Tunnel. We would expect a similar detailed study to be completed in order to evaluate the potential effects of the proposed third crossing on the marine resources in the vicinity.
Mr. Kenneth E. Wilkinson
December 30, 1997
Page 2

Thank you for the opportunity to comment on this project. Please continue to keep the
Commission abreast of the project's status. If we may be of further assistance, please do not
hesitate to give us a call.

Sincerely,

Laura A. Grignano
Environmental Engineer

LAG/jg
HM
cc: Commissioner William A. Pruitt
     Phillip A. Shucet, Baker Environmental, President
     U.S. Army Corps of Engineers
     Dept. of Environmental Quality
Mr. Philip A. Shucet, Vice-President  
Michael Baker Jr., Inc.  
770 Lynnhaven Parkway, Suite 120  
Virginia Beach, VA 23452

REF: ESS LOG# 5952

Dear Mr. Shucet:

This letter is in response to your October 6, 1995 letter regarding documentation of threatened and endangered species in the vicinity of Hampton Roads Crossing Study Corridors.

Information about fish and wildlife species was generated from our agency’s computerized Fish and Wildlife Information System, which describes animals that are known or may occur in a particular geographic area. Field surveys may be necessary to determine the presence or absence of some of these species on or near the proposed area. Also, additional sensitive animal species may be present, but their presence has not been documented in our information system.

**Prince George and Waverly Quadrangles**

This Department has recommended that the Blackwater Swamp from County Route 635 crossing (Near Disputanta, Prince George County) upstream to US Route 460 Crossing and that Coppahauk Swamp from its confluence with Blackwater River upstream including headwaters, including Harrell’s Pond and its tributaries, be designated as "Outstanding State Resource Waters--Waters Containing Endangered or Threatened Species" (VR 680-21-07.2-C) due to the documented occurrence of the state endangered blackbanded sunfish (*Enneacanthis chaetodon*). On the Prince George Quadrangle, the project corridor comes within a mile of the specified reach and crosses several tributaries to it. On the Waverly Quadrangle, the project corridor crosses the specified reach of Coppahauk Swamp and several of its tributaries. Also on the Waverly Quadrangle, the state special concern little blue heron (*Egretta caerulea caerulea*) has been observed within one mile of project corridor.
Manry Quadrangle

The corridor passes within a mile of an active nesting colony of the federal endangered red-cockaded woodpecker (*Picoides borealis*) and also through potential nesting habitat.

Disputanta North Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor.

Disputanta South Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor.

Ivor Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor.

Raynor Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor.

Windsor Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor.

Chuckatuck Quadrangle

The federally threatened Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*) has been documented within the project corridor. Due to the presence of the federally threatened Dismal Swamp southeastern shrew within the project corridor specific project activities should be coordinated with this Department and the United States Fish and Wildlife Service (USFWS).
ESS LOG# 5952  
Michael Baker, Inc.  
December 20, 1995  
Page 3

**Bowers Hill Quadrangle**

The federally threatened Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*) and the state endangered canebrake rattlesnake (*Crotalus horridus atricaudatus*) have both been documented within and adjacent to the proposed project corridor. The applicant should coordinate with this Department regarding the canebrake rattlesnake and with this Department and the USFWS for the Dismal Swamp southeastern shrew. The state special concern great egret (*Casmerodius albus egretta*) and the state special concern yellow-crowned night-heron (*Nyctanassa violacea violacea*) have been documented in the general area. They may occur within the project corridor if habitat conditions are appropriate.

**Zuni Quadrangle**

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, there is the potential for the occurrence of the state threatened Mabee's salamander (*Ambystoma mabeei*) if habitat conditions are appropriate.

**Norfolk North Quadrangle**

There is a colonial bird rookery within the project corridor. This rookery supports nesting black skimmers (*Rynchops niger*), common terns (*Sterna hirundo*), and gull-billed terns (*Gelochelidon nilotica*). The federal candidate northern diamondback terrapin (*Malaclemys terrapin terrapin*) has been documented within the project corridor. The following state special concern species may occur in the project corridor if habitat conditions are appropriate: great egret (*Casmerodius albus egretta*), yellow-crowned night-heron (*Nyctanassa violacea violacea*), least tern (*Sterna antillarum*), and the common barn-owl (*Tyto alba*).

**Norfolk South Quadrangle**

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, there is the potential for the occurrence of the federal candidate northern diamondback terrapin (*Malaclemys terrapin terrapin*) within the project corridor. The state special concern great egret (*Casmerodius albus egretta*), state special concern Forster's tern (*Sterna forsteri*), and the state special concern yellow-crowned night-heron (*Nyctanassa violacea violacea*) have been documented in the general area. They may occur within the project corridor if habitat conditions are appropriate.
Hampton Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, there is the potential for the occurrence of the federal candidate northern diamondback terrapin (*Malaclemys terrapin terrapin*) within the project corridor. The following state special concern species may occur in the project corridor if habitat conditions are appropriate: yellow-crowned night-heron (*Nyctanassa violacea violacea*), least tern (*Sterna antillarum*), and the Caspian tern (*Sterna caspia*).

Williamsburg Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, data provided to this Department from the Virginia Department of Agriculture and Consumer Services (VDACS) document the federally endangered small whorled pogonia (*Isotria medeoloides*) approximately 2 miles east of the project corridor. A great blue heron (*Ardea herodias herodias*) rookery has been documented 2.5 miles east of the project site.

Hog Island Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, nesting activity of the federally threatened bald eagle (*Haliaeetus leucocephalus*) has been documented within one mile of the project corridor. Therefore, activities related to this project should be coordinated with this Department and the USFWS. The following state special concern species have been observed in the vicinity of the project corridor: common barn-owl (*Tyto alba*), northern harrier (*Circus cyanus*), common moorhen (*Gallinula chloropus cachinnans*), Caspian tern (*Sterna caspia*), and Forster's tern (*Sterna forsteri*).

Yorktown Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, the state threatened Mabee's salamander (*Ambystoma mabeei*) has been documented at three locations adjacent to the northern end of the project corridor; therefore, the applicant should coordinate project activities with this Agency. The state threatened barking treefrog (*Hyla gratiosa*) has been documented 2 miles west of the project corridor. Nesting of the state special concern great egret (*Casmerodius albus egretta*) has also been documented 1.5
miles west of the project corridor. Other species of concern that may be in the project corridor include the following state special concern species: little blue heron (*Egretta caerulea caerulea*), Caspian tern (*Sterna caspia*), least tern (*Sterna antillarum*), and northern harrier (*Circus cyaneus*).

**Mulberry Island Quadrangle**

There are currently no documented occurrences of listed species in the vicinity of the project corridor. Observations of the state special concern great egret (*Casmerodius albus egretta*) and nesting of the state special concern common barn-owl (*Tyto alba*) have been documented in the general project area.

**Newport News North Quadrangle**

The state endangered canebrake rattlesnake (*Crotalus horridus atricaudatus*) has been documented within the project corridor and at several locations just east of the project corridor. Therefore, the applicant should coordinate project activities with this Agency. The state threatened Mabee's salamander (*Ambystoma mabeei*) has been documented further east of the project corridor.

**Newport News South Quadrangle**

There are currently no documented occurrences of listed species within the project corridor. The following species have been documented approximately 1.5 miles from the project corridor: federally endangered peregrine falcon (*Falco peregrinus*), federally threatened piping plover (*Charadrius melodus*), federal candidate northern diamondback terrapin (*Malaclemys terrapin terrapin*), and rookeries of the state special concern yellow-crowned night-heron (*Nyctanassa violacea violacea*) and least tern (*Sterna antillarum*). There is the potential for the federally endangered Kemp's Ridley sea turtle (*Lepidochelys kempi*), federally threatened Atlantic green sea turtle (*Chelonia mydas*), and federally threatened loggerhead sea turtle (*Caretta caretta*) to occur when water temperatures exceed 60°F. This area serves as an important nursery/foraging area for the Atlantic bottlenose dolphins (*Tursiops truncatus*) due to increased food availability and added protection from environmental perturbations. The coastal migratory stock of bottlenose dolphins was listed as "depleted" in April 1993 under the Marine Mammal Protection Act and a conservation plan is being developed by the National Marine Fisheries Service. In addition to marine mammals and sea turtles, anadromous fishes including alosid species.
(American shad, hickory shad, blueback herring, alewife) and striped bass have been documented in the James River at the Hampton Roads Tunnel. This area is a migratory pathway to upstream spawning sites. The state special concern Atlantic sturgeon (*Acipenser oxyrhynchus*) has been documented near the Hampton Roads Tunnel.

Endangered plants and insects are under the jurisdiction of the Virginia Department of Agriculture and Consumer Services, Bureau of Plant Protection. Questions concerning sensitive plant and insect species which may be found at the project site should be directed to John Tate at (804) 786-3515.

There is a processing charge of $275.00 for our response. Please remit a check, made payable to TREASURER OF VIRGINIA, within 30 days to Mary Beth Murr at the address listed on the first page. Include a copy of this letter with your payment to ensure that your account is properly credited.

This letter summarizes the likelihood of the occurrence of endangered or threatened animal species at the project site. If you have additional questions in this regard, please contact me. Please note that this response does not address any other environmental concerns. These issues are analyzed by our Environmental Services Section, in conjunction with interagency review of applications for state and federal permits. If you have any questions in this regard, please contact Ray Fernald at (804) 367-8999.

Sincerely,

Tom Wilcox
FWIS Aquatic Analyst

cc: R.T. Fernald, VDGIF
K. Mayne, USFWS
J. Tate, VDACS
D. Schwab, VDGIF
Philip A. Shucet  
Vice President  
Michael Baker Jr., Inc.  
770 Lynnhaven Parkway, Suite 120  
Virginia Beach, Virginia 23452

Dear Mr. Shucet:

In response to your request for information regarding endangered and threatened species in the vicinity of the Hampton Roads Crossing Study areas within the James River, the National Marine Fisheries Service (NMFS) has jurisdiction over endangered and threatened marine species including some of the large baleen whales, sea turtles and shortnose sturgeon. In addition to the listed species, the Atlantic bottlenose dolphin (coastal population only) is listed as "depleted" under the Marine Mammal Protection Act, and the harbor porpoise is proposed for listing as "threatened" under the Endangered Species Act. The only species that may occur in your project areas are Loggerhead (listed as threatened) and Kemp's ridley (listed as endangered) sea turtles, Atlantic bottlenose dolphin, and harbor porpoise.

According to the Virginia Institute of Marine Science (VIMS) and the Virginia Marine Science Museum sea turtles, Atlantic bottlenose dolphin and harbor porpoise may be present in the lower James River (May 15 - November 30). Because specific project plans are currently unavailable, we cannot comment on possible impacts of the project on these species. We will comment further when the environmental impact statement becomes available for review. Please be advised that if any hopper dredging or blasting (for footings) is proposed, Section 7 consultation will be required.

If you have any further questions, you may call John C. Strempel at (410) 226-5771.

Sincerely,

[Signature]
Timothy E. Goocher
Assistant Coordinator

cc: COE - Alice Allen-Grimes  
Doug Beach  
FWS - William Hester
Mr. Philip A. Shucet  
Vice President  
Michael Baker Jr., Inc.  
770 Lynnhaven Parkway, Suite 120  
Virginia Beach, VA 23452  

RE: Endangered or threatened plant or insect species in or near areas included in the Hampton Roads Crossing Study

Dear Mr. Shucet:

This letter is in response to your request for information on listed threatened or endangered plant or insect species in the vicinity of the Hampton Roads Crossing Study. To date, there are no listed threatened or endangered plant or insect species known to occur in the areas outlined on the quad maps (Williamsburg, Hog Island, Yorktown, Mulberry Island, Newport News North, Newport News South, Hampton, Norfolk North, Norfolk South, Bowers Hill, Chuckatuck, Windsor, Zuni, Raynor, Ivor, Manry, Waverly, Disputanta South, Disputanta North, and Prince George) that you provided. The absence of data does not necessarily mean that no listed species occur within the project area, but that our files do not currently contain information to document their presence.

The small whorled pogonia, *Isotria medeoloides*, (state endangered, federal threatened) is known to occur in the Williamsburg quad and the northeastern beach tiger beetle, *Cicindela dorsalis dorsalis*, (federal threatened) has been documented in the Hampton quad. The known occurrences of these listed species is sufficient distance from the project areas that no impact is anticipated.
The Virginia Department of Agriculture and Consumer Services has jurisdiction over listed plant and insect species only. The Virginia Department of Game and Inland Fisheries has jurisdiction over all other listed threatened or endangered species. Additional information on unique geologic formations, rare or critical habitat, rare species, and candidate species can be obtained from the Virginia Department of Conservation and Recreation, Division of Natural Heritage.

If you have questions or need additional information, please contact me.

Sincerely,

John R. Tate
Endangered Species Coordinator
Office of Plant Protection
(804) 786-3515  FAX (804)371-7793
CHAPTER 9
REFERENCES


Allen, Raymond M., III, September 1984, Environmental Assessment of Thimble Shoal Channel Borrow Site, Applied Marine Research Laboratory, Old Dominion University, Norfolk, Virginia.


Point, Virginia. Prepared for the Virginia Department of Transportation as a Technical Appendix to Hampton Roads Crossing Study.


California Department of Transportation, 1990. CAL3QHC - A Versatile Dispersion Model for Predicting Air Pollutant Levels Near Highways and Arterial Streets.


City of Chesapeake. 1995. Western Branch Area Plan, Chesapeake, Virginia.


Department of Environmental Quality. 1995. Personal communication with Mary Anne Massie, Water Division.


Department of Game and Inland Fisheries, 1996. Correspondence dated July 30, 1996.


Lutz, Peter J., and J. A. Musick, 1997. The Biology of Sea Turtles, CRC Marine Series


MINUTP, Travel Demand Forecasting Model, 1996 version: Comsis Corporation, March, 1996


12/11/00
Thimble Shoal Channel Borrow Site, Applied Marine Research Laboratory, Old Dominion University, Norfolk, Virginia.


Section 107.01 (LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC, Laws to Be Observed), Commonwealth of Virginia.


Tidewater Motor Truck Association. 1994. Personal communication with Shirley Roebuck, Chairman.


Tidewater Regional Transit, Pentran, James City County Transit, 1993. Crossroads Transit Study.

Tidewater Regional Transit. 1998. personal communication with Jayne Whitney, Director of Program Management.

Tiner, et al. 1994. (Re. wetlands).

Title 40, Code of Federal of Regulations, August 9, 1982.


U.S. Environmental Protection Agency, 1970. National Ambient Air Quality Standards {Title 42, United States Code, Part 1857 (Section 109, 1970 Clean Air Act)}.


U.S. Environmental Protection Agency. 1995a. The State of the Chesapeake Bay. edited by Robert Magnien, Daniel Boward, and Steven Bieber. prepared for Chesapeake Bay Program.

U.S. Environmental Protection Agency. 1995b. Chesapeake Bay: Introduction to an Ecosystem. edited by Kathryn Reshetiloff. prepared for Chesapeake Bay Program.


US Navy. 1995. Personal communication with Ray Kirby, Transportation Engineer at Norfolk Naval Base.


Virginia Department of Transportation, 1985, Final Report on Monitoring of Sea Turtle Migration Routes into the Chesapeake Bay (Project #0664-121-102-PE101) Submitted by J. A. Music, R.A. Byles, R.C. Klinger, S. A. Bellmund


Virginia Institute of Marine Science. 1996. Personal communication with R. Mann


Virginia Marine Science Museum. 1996. personal communication with Susan Barco, Stranding Program Research Technician.


APPENDIX A
SECTION 404 (b) (1)
ALTERNATIVES ANALYSIS
APPENDIX A
HAMPTON ROADS CROSSING STUDY
Section 404(b)(1) Alternative Analysis

I. INTRODUCTION

The primary federal program regulating activities in streams and wetlands is Section 404 of the Clean Water Act. The purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The Act requires the issuance of a permit from the U. S. Army Corps of Engineers (Corps) for the discharge of dredged or fill material into waters of the United States. The Corps is solely responsible for making final permit decisions. The Corps will fully consider other Federal agencies' project-related comments when determining compliance with the NEPA, Section 404(b)(1) Guidelines, and other relevant statutes, regulations and policies.

The 404(b)(1) Guidelines prohibit all discharges of dredge or fill material into regulated "waters of the United States" (including wetlands) unless a discharge constitutes the least environmentally-damaging practicable alternative to achieve the basic project purpose. Projects which propose to fill fewer acres and/or which avoid ecologically significant areas are generally assumed to be less damaging than those alternative which do not. Practicable is defined as available and capable of being done, taking into account cost, logistics and overall project purposes. The 404(b)(1) Guidelines also require a sequential project review by considering avoidance, minimizing impacts, and compensating for impacts.

This analysis documents that the proposed project meets the 404(b)(1) Guidelines and the requirements of the NEPA process. This document provides supplemental information which should be reviewed in concert with the 1999 DEIS and the 2000 FEIS. These documents provide the full discussion of alternatives considered for the proposed project.

II. PROJECT PURPOSE

The project's primary purpose was established and concurred with by the resource agencies as part of the 1999 DEIS. The primary purpose of the project as presented in the DEIS is: “to develop and analyze intermodal alternatives that can work together to improve accessibility, mobility and goods movement in the Hampton Roads metropolitan area to help relieve the congestion that occurs at the existing Hampton Roads Bridge Tunnel”. Following concurrence by the resource agencies, the next steps in the Section 404 “process” were to develop alternatives; determine if those alternatives would meet the project's primary purpose and evaluate the environmental consequences, including encroachment on waters of the U.S.
III. ALTERNATIVE DEVELOPMENT

Initially, 45 alternatives were considered based on input from the public, resource agencies, and the Hampton Roads Crossing Study Coordinating Committee. Each alternative was compared to a set of measures of effectiveness based on the project’s primary purpose and its underlying needs. Following this comparison, eleven (11) Candidate Build Alternative (1000’ wide “corridors”) were carried forward for additional analysis.

Each of the eleven (11) “corridors” was then assessed relative to its ability to serve the project’s primary purpose and its environmental impacts including encroachment on waters of the U.S. These “corridors” were assessed on a “macro” scale in the Major Investment Study (MIS) prepared for this project as then required by Federal Highway Planning Regulations (23 CFR 450). The Hampton Roads Metropolitan Organization (MPO) concluded the MIS by unanimously voting to recommend Transportation Corridor 9 as the locally preferred alternative that meets the project’s primary purpose. After receiving public and resource agency comments, the number of Candidate Build Alternatives was reduced to three (3) to be carried forward into the NEPA document.

Following, this assessment a DEIS was prepared and circulated in 1999. During the DEIS process, additional engineering was completed to locate an approximately 300’ alignment (roadway plus right-of-way) within each of the 1000’wide MIS Candidate Build Alternative “corridors”. Avoidance and minimization of wetland encroachments, where practicable, played a major role in alternative location within each of the Candidate Build Alternatives as it had in the development of the initial 1000’ wide corridor location during the MIS process. Details of these analyses are found in the FEIS (Chapter 3). For instance, some redesign of the connection to VA 164 in Portsmouth was conducted early in the DEIS phase to reduce wetland impacts. Candidate Build Alternatives 2 and 9 originally connected to VA 164 near Coast Guard Boulevard. However, after conducting the wetland fieldwork, it was determined that 8.3 hectares (20.4 acres) of wetlands were impacted in this area. Thus, another connection further to the east on VA 164 was selected for analyses in the DEIS, reducing the wetland impacts in this area by 6.8 hectares (17 acres).

IV. Preferred Alternative

On July 19, 2000 results of the DEIS study, public and resource agency comments and the MPO’s recommendation were presented to the Virginia Commonwealth Transportation Board (CTB). On July 20, 2000, the CTB voted to identify Alternative 9 as the approved location. The Commonwealth Transportation Board’s decision was based on Alternative 9’s abilities to best meet the primary project purpose and its underlying needs. In fact, Alternative 9 is the only alternative that addresses all aspects of purpose and need (see Table S-2 of EIS). Candidate Build Alternative 9 also does the best job of improving total mobility between the Southside and the Peninsula (see Table S-2). Candidate Build Alternative 9 can also be constructed in usable segments with each segment: 1) contributing to project purpose and need and; 2) having logical termini and independent utility. Each of the segments
therefore can be considered a single and complete project. The proposed segments for the Preferred Alternative and the construction sequence is:

1. A new bridge tunnel and roadway from existing Monitor Merrimac Memorial Bridge Tunnel to I-564 in Norfolk with 4 conventional travel lanes and 2 lanes for multimodal use. Widen I-564 in Norfolk to 8 conventional travel lanes and 2 multimodal use lanes.

2. A new bridge tunnel parallel to existing I-664 Monitor Merrimac Memorial Bridge Tunnel with two tubes of the tunnel carrying 4 conventional travel lanes and one tube carrying 2 multimodal use lanes.

3. A 4 lane connection from the new facility, just east of Craney Island, running south to VA 164 in Portsmouth.

4. Widen I-664 on the Peninsula to 8 conventional travel lanes and 2 additional lanes for multimodal use

5. Widen I-664 on the Southside to 6 conventional travel lanes

Candidate Build Alternative 9 requires fewer estimated residential relocations than either of the other two alternatives. Candidate Build Alternative 9 would require the relocation of 38 residential units, potentially impacting 101 people. Candidate Build Alternatives 1 and 2 would each require the relocation of 128 residential units, with both alternatives potentially impacting 368 people. Although minor, Candidate Build Alternative 9 is also the alternative that has the least disproportionate impact on minority populations as required by E.O. 12898 (Environmental Justice). Candidate Build Alternatives 1 and 2 relocate 42 residential units occupied by minorities and 16 residential units occupied by persons of low income. Candidate Build Alternative 9 relocates 36 minority residential units and 12 low income units.

V. AVOIDANCE and MINIMIZATION

A. Corridor Location (MIS)

Because of the nature of the project- essentially densely urban land use – location of each of the CBA’s was constrained by the need to avoid large numbers of relocations particularly within minority communities and, at the same time, to minimize the impact to the natural environment - particularly wetlands and the Piping Plover- a federally and state listed threatened species. To accomplish avoidance and minimization and to provide transportation efficiency, CBA corridors were, where possible, located adjacent to existing interstate highway facilities.

Given the nature of the project’s environment- the Hampton Roads is surrounded by tidal wetlands except in those areas utilized by existing industry (e.g., ship repair yards, ports) which would not be practical to relocate – wetland avoidance was not possible. From the beginning of the MIS study however, one of the major goals of
this project has been to avoid, minimize, or mitigate environmental impacts (MIS, 1998, p. 11) while still meeting the project’s primary purpose.

B. Alternative Location (DEIS)

A comparison of wetland encroachments among the three alternatives carried forward in the DEIS revealed that each of the three corridors contained wetlands: CBA 1- 0.96 acres encroached upon, 1.38 acres bridged; CBA 2- 11.40 acres encroached upon, 7.20 acres bridged; and CBA 9- 18.31 acres encroached upon, 6 acres bridged. However because CBA 9 was determined (see above and FEIS, Chapter II) to be the only alternative that fully met the project’s purpose and need, it is considered to be the only practicable alternative.

The question then was what appropriate and practicable measures could be developed to minimize encroachments (e.g., design features, location of the alignment within the 1000’ wide preferred corridor). Development of such measures is consistent with 1990 EPA and Department of the Army’s MOA. Measures to avoid or minimize encroachment were analyzed as part of the FEIS process. The results of those efforts are detailed in the Avoidance and Minimization Table presented below for each of the project’s segments and in the proposed project sequence of construction. As the result of those efforts, direct wetland encroachment was reduced from the 18 acres reported in the DEIS to approximately 7 acres. Additional avoidance and minimization measures will be considered during final design activities.

The impacts listed for Alternative 9 in the Avoidance and Minimization Table do not include wetlands impacted from Hampton Boulevard to I-564. These wetlands will be included in the permit for the I-564 Intermodal Connector project.

VI. Proposed Project and Permit Sequencing

It is the intention of VDOT to design and build this large complicated and costly project in segments. This approach can be adopted because each of the proposed segments of the preferred alternative has logical termini and independent utility and each segment independently contributes to serving the project’s primary purpose. Because each of the segments (See Section IV above), will require years of engineering design and construction and because each may require sequential identification of separate or non-traditional funding sources, it is proposed that Section 404 permits be issued as each segment enters the final design process.

Sequential design and construction of large complicated projects is consistent with FHWA regulations and guidance (23 CFR 771.111(f)(1) and Development of Logical Project Termin). It is also consistent with the Corp of Engineers’ general policy of only permitting highway construction projects that have independent utility and logical termini and represent single and complete projects.
## AVOIDANCE AND MINIMIZATION TABLE BY SEGMENT
### AND
### PROPOSED SEGMENT CONSTRUCTION SEQUENCE

### Segment 1 – MMMBT to Hampton Blvd/I-564

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/Value Analysis</th>
<th>Avoidance - Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-1</td>
<td>0.07</td>
<td>0.07</td>
<td>100%</td>
<td>Uniformly low</td>
<td>Lies under mainline approximately 200’ east of Elizabeth River tunnel entrance. Avoidance not possible due to geometric requirements of tunnel entrance</td>
<td>No minimization measures practicable for this “marginal” wetland</td>
</tr>
<tr>
<td>5-7</td>
<td>0.27</td>
<td>1.7</td>
<td>16%</td>
<td>Moderate to Low</td>
<td>Lies under exit ramp from mainline to “B” Avenue. Shift to east would encroach on large wetland S-3. Bridging not practicable for this small low functioning wetland on Navy base.</td>
<td>No minimization possible without compromising required design configuration of exit ramp.</td>
</tr>
<tr>
<td>5-9</td>
<td>1.41</td>
<td>1.41</td>
<td>100%</td>
<td>Low</td>
<td>Lies within proposed access ramps from mainline to Naval Stations “B” Avenue, a major dock route. Shifting ramps to west would encroach on athletic fields and other Navy facilities. Shifting to east would cause encroachment on Wetland 5-3 Bridging would require unacceptable grades on approach to mainline and “B” Avenue</td>
<td>“Tightening” curves of access ramps would not meet modern design standards</td>
</tr>
</tbody>
</table>
### Segment 1 – MMBT to Hampton Blvd/I-564 (Continued)

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/Value Analysis</th>
<th>Avoidance- Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-4</td>
<td>2.22</td>
<td>2.3</td>
<td>97%</td>
<td>Moderate to Low</td>
<td>Lies within proposed I-564 Intermodal Connector and impacts will be permitted for that project.</td>
<td></td>
</tr>
<tr>
<td>5-5</td>
<td>0.33</td>
<td>7.9</td>
<td>4%</td>
<td>Moderate to Low</td>
<td>Lies within proposed I-564 Intermodal Connector and impacts will be permitted for that project.</td>
<td></td>
</tr>
<tr>
<td>5-6</td>
<td>0.45</td>
<td>1.8</td>
<td>25%</td>
<td>Moderate to Low</td>
<td>Lies within proposed I-564 Intermodal Connector and impacts will be permitted for that project.</td>
<td></td>
</tr>
<tr>
<td>5-8</td>
<td>0.39</td>
<td>3</td>
<td>13%</td>
<td>Moderate to Low</td>
<td>Lies within proposed I-564 Intermodal Connector and impacts will be permitted for that project.</td>
<td></td>
</tr>
</tbody>
</table>

### Segment 2 – MMBT to Newport News

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/Value Analysis</th>
<th>Avoidance- Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>NONE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Segment 3 – VA 164 Connector

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/ValueAnalysis</th>
<th>Avoidance- Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-2</td>
<td>0.25</td>
<td>1.6</td>
<td>15%</td>
<td>Low</td>
<td>Encroachment due to fill slope. Avoidance not possible because of necessity of maintaining acceptable mainline curve on north</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>7-3</td>
<td>1</td>
<td>1.50</td>
<td>75%</td>
<td>Low</td>
<td>Shifting either east or west would shift into larger wetland systems.</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>7-6</td>
<td>0.60</td>
<td>87.5</td>
<td>0.6%</td>
<td>Moderate</td>
<td>Encroachment due to fill slope. Avoidance not possible because of necessity of maintaining acceptable mainline curve on north</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>7-13</td>
<td>.01</td>
<td>2.6</td>
<td>0.3%</td>
<td>Low</td>
<td>Encroachment due to fill slope. Avoidance not possible</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
</tbody>
</table>

### Segment 4 – Widen and Improve I-664 in Newport News

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/ValueAnalysis</th>
<th>Avoidance- Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland #</td>
<td>Encroachment (acres)</td>
<td>Total Wetland Size (ac)</td>
<td>% Encroach</td>
<td>Function/Value Analysis</td>
<td>Avoidance- Line Shift</td>
<td>Minimization Measures</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>------------------------</td>
<td>------------</td>
<td>------------------------</td>
<td>-----------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>8-2</td>
<td>0.25</td>
<td>0.25</td>
<td>100%</td>
<td>Low</td>
<td>Located within new access ramp from S.R. 136 (College Dr.) onto mainline. Final design may be able to avoid encroachment</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>8-8</td>
<td>0.14</td>
<td>0.14</td>
<td>100%</td>
<td>Low</td>
<td>Located within new access ramp from S.R. 136 (College Dr.) onto mainline. Final design may be able to avoid encroachment</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>8-4</td>
<td>0.13</td>
<td>0.24</td>
<td>25%</td>
<td>Low</td>
<td>Located within new access ramp from S.R. 136 (College Dr.) onto mainline. Final design may be able to avoid encroachment</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>8-6</td>
<td>1.20</td>
<td>9.5</td>
<td>13%</td>
<td>Low</td>
<td>Linear encroachment approx 20’ wide to accommodate additional lane on southbound I-664. No avoidance possible</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>8-5</td>
<td>1.74</td>
<td>9.37</td>
<td>18%</td>
<td>Low</td>
<td>Linear encroachment of approx 20’ wide to accommodate additional lane on northbound I-664. No avoidance possible</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>9-5</td>
<td>0.37</td>
<td>9.6</td>
<td>4%</td>
<td>Low</td>
<td>Narrow linear encroachment approx. 20’ wide to accommodate additional lanes on southbound mainline. No avoidance possible</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
</tbody>
</table>
### Segment 5 – Widen and Improve I-664 on Southside (Continued)

<table>
<thead>
<tr>
<th>Wetland #</th>
<th>Encroachment (acres)</th>
<th>Total Wetland Size (ac)</th>
<th>% Encroach</th>
<th>Function/Value Analysis</th>
<th>Avoidance - Line Shift</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-7</td>
<td>0.04</td>
<td>0.04</td>
<td>100%</td>
<td>Moderate to Low</td>
<td>Located within new access ramp from S.R. 136 (College Dr.) onto mainline. Final design may be able to avoid encroachment</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>9-6</td>
<td>0.38</td>
<td>50+</td>
<td>&gt;1%</td>
<td>Low</td>
<td>Narrow linear encroachment approx. 20’ wide to accommodate additional lanes on northbound mainline. No avoidance possible.</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>9-3</td>
<td>0.01</td>
<td>0.26</td>
<td>3%</td>
<td>Low</td>
<td>Fill slope and ramp from northbound mainline to S.R. 259 (Pughesville Rd). Design requirements preclude avoidance</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
<tr>
<td>9-8</td>
<td>0.03</td>
<td>6.25</td>
<td>0.48%</td>
<td>Moderate to Low</td>
<td>Narrow linear encroachment approx. 20’ wide to accommodate additional lanes on northbound mainline. No avoidance possible</td>
<td>During final design, fill slope modifications to minimize encroachment will be investigated</td>
</tr>
</tbody>
</table>
IV. Analysis of Degradation of Waters of United States

The wetland encroachment acreage will not significantly degrade or lead to the further degradation of waterbodies in the project area. Wetland encroachments are generally limited to small wetlands with limited functions. Of the approximately 7 acres of unavoidable wetland encroachment, 30% are encroachments on small (<0.6 acre), relatively low functioning, isolated wetlands (Figures 1 through 8). Large wetland systems present in the project area were avoided or the alignment was so located as to minimize locational encroachment. For example, Wetland 9-6 is a large diverse PFO. While there is some unavoidable encroachment (0.38 acres) on these systems, the encroachment, was limited to its edge currently within VDOT I-664 right-of-way as opposed to deep within the system.

By plotting the wetland acreage encroached upon versus total wetland size, it is apparent that avoidance measures limited wetland encroachments to small systems while sparing large systems from significant encroachment (Figure 9). Because of the avoidance and minimization measures undertaken, and the mitigation plans included in the FEIS (e.g., wetland replacement, stormwater control), no significant degradation of waters of the United States will occur as the result of construction of any single segment or construction of the entire project.
Figure 9: A Comparison of Wetland Size and Encroachment Size
APPENDIX B
TO
HAMPTON ROADS CROSSING STUDY
FINAL ENVIRONMENTAL IMPACT STATEMENT

BIOLOGICAL ASSESSMENT
OF THE
SEA TURTLES OF THE CHESAPEAKE BAY

Loggerhead (*Caretta caretta*)

Kemp’s Ridley (*Lepidochelys kempii*)

JULY 2000
SUMMARY
The Virginia Department of Transportation, in cooperation with the Federal Highway Administration, is proposing to construct a new bridge-tunnel crossing of Hampton Roads in southeastern Virginia. Impacts on sea turtles resulting from the proposed construction and associated dredging could be the direct contact of turtles with the dredge heads. However, time of year restrictions (May through November) will be used for the project to avoid any adverse effect to or taking of sea turtles.

IDENTIFICATION OF ENDANGERED SPECIES
Research has been conducted on sea turtles in the Chesapeake Bay and adjacent waters since 1979 (Keinath et al., 1987). Juvenile Kemp’s Ridley Sea Turtles (Lepidochelys) and juvenile Loggerhead Sea Turtles (Caretta caretta) use the Chesapeake Bay and adjacent waters (e.g. Hampton Roads) as a foraging area. The Atlantic Green Sea Turtle (Chelonia mydas), a federally and state listed threatened species, was referenced by the Virginia Department of Game and Inland Fisheries as having the potential to occur in the study area. The Green Sea Turtle has been reported as occasional visitors to the Chesapeake Bay (Brady, 1925), but the densities at that time were not known (Musick 1972, 1979). A verified occurrence of the green sea turtle has not been reported for over 20 years (Bellmund et al., 1987). Atlantic Green Sea Turtles do not nest in Virginia.

The two sea turtle species that occur regularly and in relatively large numbers are the loggerhead sea turtle and the Kemp’s ridley sea turtle. The Chesapeake Bay is an important foraging area for juvenile loggerhead and Kemp’s ridley sea turtles during the warmer months (Byles, 1988; Bellmund et al., 1987; Keinath and Musick 1991a, 1991b; Keinath et al., 1987, 1991; Lutcavage, 1981; Lutcavage and Musick, 1985; Musick et al., 1985a). There have been a few reports of adult loggerhead sea turtles in the Chesapeake Bay, but there have been no reports of adult Kemp’s ridleys within the Chesapeake Bay (Allen, 1984).

Loggerhead Sea Turtle
The loggerhead sea turtle is federally listed as threatened and state listed as endangered. It is a common visitor to the Chesapeake Bay and its estuarine tributaries during the spring, summer, and fall. Because the Hampton Roads is an estuarine tributary to the Chesapeake Bay, it seems logical to assume that this species is present, at times, within it. Foraging occurs in the river mouths and in the channels of the Bay (Bellmund et al., 1987; Carr, 1952; Ernst and Barbour, 1972; Hardy, 1969). The majority of the loggerhead’s diet consists of benthic crustaceans (primarily horseshoe crabs) and bivalves. The loggerhead’s diet also includes jellyfish, sponges, bivalves, gastropods, squid, crabs, shrimp, barnacles, fish, and sea grasses (Allen, 1984; Bellmund et al., 1987).

Although nesting has been reported occasionally on the barrier islands of Virginia and in Back Bay National Wildlife Refuge, the evidence suggests that the Chesapeake Bay is more important as a nursery for immature loggerheads than as a nesting beach (Allen, 1984; Bellmund et. al, 1987; Musick, J.A., 1983).

Juveniles become residents for the summer along channel edges (5 to 13 meters deep) and forage back and forth along the bottom within a home range of 10 to 80 square kilometers. Juveniles show a strong foraging fidelity. Turtles displaced more than 100 kilometers have been reported to return to within a few kilometers of their point of origin within a few weeks. There have also been reports of turtles returning to a foraging location for up to four consecutive seasons (Lutz et al., 1997).

An estimated 3,600 loggerhead sea turtles visited the Chesapeake Bay in 1983 (Allen, 1984). In 1984, it was estimated that 5,670 turtles inhabited the lower Chesapeake Bay (Bellmund et. al, 1987). VIMS has estimates
that between 2,000 and 10,000 loggerhead sea turtles use the Bay during the summer each year (Byles, 1988; Keinath et al., 1987; Keinath et al., 1994).

**Kemp’s Ridley Sea Turtle**

The Kemp’s ridley sea turtle is federally and state listed as endangered. It was listed as endangered throughout its range on December 2, 1970. The Kemp’s ridley population has declined since 1947 when an estimated 42,000 females nested in one day to a current nesting population of approximately 500. Despite protection of the Kemp’s ridley primary nesting beach, since 1978, the number of nests have declined at a rate of approximately 14 nests per year (NMFS, 1995; USFWS, 1992).

The Kemp’s ridley is the second most abundant turtle in the Chesapeake Bay. It is much smaller than the Loggerhead. The weight of adults are generally less than 45 kg and the carapace length is about 65 cm. Adult Kemp’s ridleys shells are almost as wide as long, and it appears to prefer depths of one to three meters. Young Kemp’s ridleys feed on sargassum and associated species. More mature Kemp’s ridley’s diet consists primarily of shelled benthic invertebrates, especially the blue crab (*Callinectes sapidus*) (Bellmund, 1987; NMFS, 1995; USFWS, 1992).

The only known nesting ground of Kemp’s ridley is on a single beach in the Gulf of Mexico (NMFS, 1995; USFWS, 1992). The occurrence of substantial numbers of immature turtles (perhaps 500 to 700) (J. A. Musick, 1983) in the Chesapeake Bay suggests that this species relies upon the Bay as a nursery ground.

**Turtle Migration**

Migration of juvenile sea turtles into and out of the Chesapeake Bay follows the 19° and 20° isotherm (Allen, 1984). Based on data from the VIMS sea turtle stranding network and aerial surveys, turtles are present within the Chesapeake Bay each year from May to November, which coincides with water temperatures in excess of 16 to 18 degrees Celsius (Bellmund et al., 1987; CETAP, 1982a, b; Lutz, et al., 1997; Musick et al., 1985; Shoop et al., 1981).

During the spring, sea turtles tend to congregate near the mouth of the Bay. As the waters get warmer, usually during the last week of May, the turtles enter to forge in the same river systems that they used the previous year. This concentrated migration into the Bay, which occurs between May 15 and June 30, is also the peak of turtle mortality (Musick, et al., 1984; Lutcavage & Musick, 1985). During the fall, the sea turtles begin to migrate out of the Bay in a more diffuse pattern than they used to enter the Bay. This emigration usually coincides with a pronounced decrease in temperature, usually caused by northeastern storms which occur in October or November (Bellmund et al., 1987; Keinath et al., 1987, 1994; Lutcavage and Musick, 1985; Musick, 1988; Musick et al., 1985b). Turtles cannot survive in the bay during the winter because their lethal lower water temperature limit is about 10°C. Virginia coastal and Chesapeake Bay water temperatures drop to 1°C to 4°C during most winters.

After leaving the Bay, the turtles return to their wintering sites from Cape Hattaras, North Carolina to as far south as Florida (Allen, 1984). Juvenile loggerheads have been reported brominating in the winter by digging head-first into the mud in the Canaveral Ship Channel. There is no evidence of turtle bromination in Virginia during the winter months (Lutz et al., 1997).

**DESCRIPTION OF PROPOSED WORK**

The Virginia Department of Transportation (VDOT), in cooperation with the Federal Highway Administration (FHWA), is proposing to construct a new bridge-tunnel crossing of Hampton Roads in southeastern Virginia. A Draft Environmental Impact Statement (DEIS) was published in October of 1999 and a Final EIS is currently being prepared. Three Candidate Build Alternatives and the No-Build Alternative were studied in the
DEIS. On July 20, 2000, the Virginia Commonwealth Transportation Board voted to identify Candidate Build Alternative 9 as the preferred alternative (Figure 1).

Candidate Build Alternative 9, the Preferred Alternative, provides a new crossing parallel to the existing I-664 Monitor Merrimac Memorial Bridge Tunnel, and it includes a new interchange near the south approach structure of the Monitor Merrimac Memorial Bridge Tunnel connecting to a new roadway and bridge tunnel extending from I-664 to I-564 in Norfolk. On the Peninsula, Candidate Build Alternative 9 begins at the I-64 interchange in Hampton and widens I-664 to the I-64/I-264 interchange in Chesapeake on the Southside. Candidate Build Alternative 9 also includes a connection along the east side of Craney Island to VA 164 in Portsmouth. A paralleling, three-tube tunnel typical section to the west of the existing I-664 Monitor Merrimac Memorial Bridge Tunnel has been developed for the crossing of Hampton Roads, and a three-tube typical section has also been developed for the crossing of the Elizabeth River entrance. Two of the tubes will carry two lanes each of vehicular traffic. The third tube will be used for multimodal travel and is dimensioned to accommodate all multimodal possibilities: H.O.V., passenger rail, and/or bus travel.

In order to maintain the navigable shipping channels in Hampton Roads, tunnel construction for each of the Candidate Build Alternatives will be of the submerged tube-type in which the tube sections will be placed in a dredged trench on the bay bottom in a position below the future shipping channel. Each tunnel will originate on artificial islands built on either side of the shipping channels. Candidate Build Alternative 1 will require two islands, one on each side of the Newport News Channel. Candidate Build Alternatives 2 and 9 will require three islands, one on each side of the Newport News Channel and one on the west side of the Norfolk Harbor Channel. Each of the islands will measure about 285 feet at their tops.

The Thimble Shoal Channel is proposed as a potential resource for fill material for the Hampton Roads tunnels and islands. The Thimble Shoal Channel extends from the Virginia Capes across the lower end of the Chesapeake Bay into the deep waters of Hampton Roads. Thimble Shoal Channel is presently 1,000 feet wide and approximately 13 miles long. The channel is heavily used by commercial ships and military ships, and the channel must be dredged periodically to maintain navigation. The channel is currently 50 feet deep within the 650-foot wide outbound lane and 45 feet deep within the remaining 350-foot wide inbound lane. Authorized improvements for Thimble Shoal Channel provide for deepening to 55 feet (HRMA, 1997).

ASSESSMENT OF POTENTIAL EFFECTS

Sea turtles do not breed or nest within the project area. Therefore, the proposed construction and associated dredging will have no effect on sea turtle breeding or nesting. Potential impacts to the sea turtles could include loss of individuals during construction and dredging operations. Additional information on dredging such as an estimate of dredging and fill quantities, effects of dredging, dredging equipment and methods, dredge operation criteria, and a proposed water quality monitoring program can be found in Chapter 4, Section X of the DEIS.

Indirect impacts to sea turtles resulting from the proposed dredging will be minimal and short-lived. Impact through destruction of turtle food items is not a concern because both the Loggerhead Sea turtle and Kemp’s Ridley feed on mobile arthropods (such as Blue Crabs and Horseshoe Crabs) that are widely distributed during the period when the turtles are present. Although potential sea turtle foraging ground may be temporarily disturbed by dredging, the impacted areas represent a tiny fraction of the food.
FIGURE 1
CANIDATE BUILD ALTERNATIVE 9
resources available to the sea turtles and will be quickly replaced by benthic communities of similar composition (Dauer, 1985). Long-term impacts to sea turtles are not expected because a new crossing of Hampton Roads will not be a physical barrier to the movement of sea turtles into or out of Hampton Roads.

During construction of the I-664 Monitor Merrimac Memorial Bridge Tunnel, a hopper dredge mined sand fill for tunnel island and inner harbor construction from the eastern reach of Thimble Shoal channel in lower Chesapeake Bay, and no sea turtles were taken. Dredging operations at the Chesapeake Bay borrow site were conducted from February 26 until March 28, thus avoiding the warm-water migration period of sea turtles (Alden et al., 1992). Juvenile sea turtles are present in the Chesapeake Bay and its tributaries from May through November.

Time of year restrictions on dredging (May – November) will be used for this project to avoid impacts to these species.

**MITIGATION OF POTENTIAL EFFECTS**

No adverse effects are expected, and mitigation is not necessary.
REFERENCES


Allen, Raymond M., III, September 1984, Environmental Assessment of Thimble Shoal Channel Borrow Site, Applied Marine Research Laboratory, Old Dominion University, Norfolk, Virginia.


Lutz, Peter J., and J. A. Musick, 1997. The Biology of Sea Turtles, CRC Marine Series


VDOT, 1985, Final Report on Monitoring of Sea Turtle Migration Routes into the Chesapeake Bay (Project #0664-121-102-PE101) Submitted by J. A. Musc, R.A. Byles, R.C. Klinger, S. A. Bellmund
APPENDIX C

BIOLOGICAL ASSESSMENT
FOR THE 3RD CROSSING OF THE HAMPTON ROADS
FOR PIPING PLOvers (CHARADARIUS MELODUS)
This Biological Assessment (BA) has been prepared to determine the effect, if any, that construction, operation and maintenance of the preferred alternative for the Hampton Roads Crossing Study may have on the federally threatened species Charadrius melodus (Piping Plovers). This BA concludes that a third crossing of the Hampton Roads as proposed is not likely to adversely affect the Piping Plovers.

I. Introduction

Section 7 of the Endangered Species Act states that "each federal agency shall .... insure that any action authorized, funded or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of [critical] habitat of such species...." (50 CFR 402.07(a)(2). This requirement means that federal agencies are required to consider two main issues during Section 7 consultation with respect to a threatened or endangered species: (1) whether the proposed action is likely to jeopardize the continued existence of the species and (2) whether the proposed action would destroy or adversely modify designated critical habitat for that species. If the federal agency finds, based on the BA, that an action is not likely to adversely affect a species, and the USFWS concurs with that finding, then it is presumed that the action will not jeopardize the species and Section 7 consultation is concluded for that species.

II. Proposed Action

The Virginia Department of Transportation (VDOT) and the Federal Highway Administration (FHWA) are currently preparing a Final Environmental Impact Statement for the proposed project. In that document, Alternative 9 will be identified as the preferred alternative. That alternative (Figure 1) consists of the following segments:

1. construction of an over-the-water interchange on I-664 just south of the current tunnel entrance and a new easterly transportation link, consisting of 4 plus 2 multimodal lanes, to Norfolk. Elevated on bridge structure, with a roadway surface elevation of 5.25 meters (17.25 feet) above mean sea level this transportation link will pass approximately 400 meters (1300 feet) north of and parallel to the northern most limit of Craney Island (Figure 2). It will then tunnel under the Elizabeth River and surface in Norfolk between the US Navy Base and Sewell's Point Terminal. This segment will then proceed east crossing over Hampton Blvd and connecting with I-564.
Figure 1
Alternative 9
General Location
(Not to Scale)
Figure 2
Diagrammatic Representation of Preferred Alternatives
Location Relative to Craney Island
(Not to Scale)
2. A 4-lane connector road will tie-into the third crossing mainline with an interchange just off Craney Island’s northeast corner. That connector then proceeds to the south on structure along Craney Island’s eastern shore before intersecting with VA 164 (Figure 2). This interchange and the connector are on pile supported bridge structure. The connector consists of two parallel bridge structures 15.4 meters (50.5 feet) wide that are approximately 10 meters (33 feet) apart for a total footprint of 40.8 meters (134 feet). Starting at the northeast corner, the centerline of the footprint follows the eastern shoreline of Craney Island until it comes to a point approximately 700 meters (2300 feet) north of Craney Island’s southeast corner. From this point the connector curves slightly to the west as it crosses over Craney Island Creek. It then continues south to VA 164. There is 300-meter (984 feet) section (approximately 12,240 square meters) of the connector at the southeast corner that is on the land of Craney Island proper. However, this section bisects the perimeter road around Craney Island and may require a bridge structure. This will be investigated in later stages of the project.

- Pier spacing, or the centerline distance between supporting uprights, of the bridge structures, while they are not yet designed, will be between 38 and 46 meters (125 and 150 feet). This applies to the bridge on both the north and east sides of Craney Island.

3. upgrading I-664 to 8 regular plus 2 multimodal lanes from it’s intersection with I-64 in Hampton through Newport News;

4. a new crossing (tunnel) under the Newport News Shipping Channel, parallel to the existing Monitor-Merrimac Memorial Tunnel, with an additional 4 plus 2 multimodal lanes on structure

5. adding an additional regular lane in each direction (north and south) to I-664 from the over-the-water interchange to its intersection with I-64 and I-264 at Bowers Hill in Chesapeake.

A. CONSULTATION HISTORY

Coordination with the U.S. Fish and Wildlife Service has occurred throughout the development of the project. Table 1 lists meetings held to date. The Hampton Roads Crossing Study Purpose and Need Statement and Technical Appendix was distributed to all resource agencies in November of 1994. The Major Investment Study (MIS) was distributed in November of 1997, the pre-draft EIS in June of 1999, and the Draft EIS was distributed in October of 1999. During the development of the MIS and DEIS, letters, including figures depicting the alternatives, were sent to the U.S. FWS and the VA Department of Game and Inland Fisheries requesting
information on threatened and endangered species. Written consultation received on the Piping Plover is included in Appendix B of this Biological Assessment.

Additionally, telephone conversations (consultation) have occurred between VDOT’s consultant and William Hester, U.S. FWS; Ann Hecht, U.S. FWS; Ruth Beck, College of William and Mary; and Renee Held, College of William and Mary concerning various issues and status of the piping plover.

### TABLE 1

**RESOURCE AGENCY MEETINGS**

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>December, 1993</td>
<td>Introductory presentation at VDOT’s monthly Interagency Coordination Meeting (IACM)</td>
</tr>
<tr>
<td>February, 1994</td>
<td>Update at IACM</td>
</tr>
<tr>
<td>August, 1995</td>
<td>Update at IACM</td>
</tr>
<tr>
<td>October, 1995</td>
<td>Update at IACM; Solutions carried forward for detailed study in MIS shown</td>
</tr>
<tr>
<td>March, 1996</td>
<td>Update at IACM</td>
</tr>
<tr>
<td>January, 1999</td>
<td>Project update and present results of hydrodynamic and sedimentation model</td>
</tr>
<tr>
<td>February, 1999</td>
<td>Field view of Craney Island with Ruth Beck and U.S. FWS.</td>
</tr>
<tr>
<td>July, 1999</td>
<td>Review of pre-draft EIS</td>
</tr>
</tbody>
</table>

### B. EXISTING ENVIRONMENT

Located in the City of Portsmouth and extending north into the Hampton Roads, Craney Island is a 2,500 acre confined dredged material disposal site constructed in the late 1950’s and owned by the U.S. Army Corps of Engineers. The site is divided into three subcontainment areas, designated as north, center and south cells. Dredged material is directed to the east side of a given cell as is required. The effluent flow passes over the weirs of a cell into receiving waters of the Hampton Roads. The weirs are located at the west corners of each cell. Dredged material is transported to the cells in “slurry” form from a central pumping area located off shore of Craney Island in the Elizabeth River on the east side of Craney Island. The island beyond the cells contains a circumferential gravel road and, beyond the road, a narrow beach (Figure 3).

Craney island offers habitat and nesting opportunities to a wide range of shorebirds including avocets, stilts and occasionally piping plovers (see discussion below).
III. PIPING PLOVERS

A. General

The Piping Plover was officially listed (and protected) as an endangered species under the Endangered Species Act (ESA) on January 10, 1986. The piping plover is therefore protected from taking, harassment or harm as defined in the ESA. The Piping Plover is also afforded protection under the Migratory Bird Treaty Act of 1918. It is also listed as a threatened species by the Virginia Department of Game and Inland Fisheries.

B. Description

Piping plovers are small sparrow-sized shorebirds (six to seven inches in length). Their plumage coloration is generally pale whitish with complete or incomplete black breast band (Bull and Farrand, 1977). They have a short stubby bill that is orange at the base and tipped with black. The legs are a bright orange. Males and females are generally alike but the females’ breast band and forehead are often a more brownish black. Juveniles are similar to adults but their upperpart feathers are fringed pale buff. In contrast to adults their, stubby bills are black and legs are a dull orange (Marchant et al., 1986).

C. Distribution and Migration

Piping plovers are endemic to North America. They spend most of the year in wintering areas. Distribution in wintering populations along the Atlantic and Gulf Coasts appears to be related more to habitat heterogeneity than to any single habitat variable (e.g., number of small inlets, presence of mudflats). During the winter cycle, piping plovers are usually (99% of the time) associated with other shorebird species (Nicholls and Baldassarre, 1990).

Haig and Oring (1985) reported that piping plovers can be found wintering from North Carolina south along the Atlantic Coast and along the Gulf Coast to the Yucatan Peninsula in Mexico. They reported that summer (breeding) range of the piping plovers includes the Atlantic Coast from North Carolina north to Newfoundland, Canada and prairie states from Nebraska north to the Canadian provinces of Alberta and Manitoba.

D. Population Trends

1. General

Haig and Orings 1985 study, reported that the largest summer (breeding) populations were found in Massachusetts (100 pair) on the Atlantic Coast and the Canadian providence of Saskatchewan Province (350 to 600 pair) in the prairie region. The U.S. Fish and Wildlife Service (FWS) reports (FWS Piping Plovers
Atlantic Coast Population Recovery Plan: Population Status and Distribution, 2000) that the number of breeding pairs in the Southern Region (Delaware, Maryland, Virginia, North and South Carolina) increased somewhat between 1986 and 1995 (158 and 217 respectively). In Virginia, the Recovery Plan reports a similar trend between those same years (100 and 118 respectively) but the FWS concludes that because of differing methodologies the "real" population may range somewhere between the two numbers.

2. Craney Island

Piping plovers were first noted on Craney Island in 1989 and have been observed there for 10 of the 24 years of observation (Beck, personal communication, 1999). Observations of breeding pairs in 1994 and 1995 found that nests were placed mostly on the island’s western side (5 nests) with one nest on the northern shore and one on the eastern side of the island on the eastern side of the center cell (U.S. FWS, field notes, Appendix A, Figure 4). The maximum number of breeding pairs of piping plovers observed since 1989 was five (5) pairs in 1994 (Hester, personal communication, 2000). According to Hecht (personal communication, 2000), no piping plovers were seen on Craney Island in 1998 or 1999 and none have been observed so far this year (Held, 2000 personal communication). These findings appear to be consistent with the observations reported by Cairns and McLaren (1980) that piping plovers are uncommon breeders on the west side of the mouth of the Chesapeake Bay.

D. Threats to the Piping Plovers

The FWS in its publication *Piping Plovers Atlantic Coast Population: Overview* lists the factors contributing to the overall decline of this species. Those factors are:

- “Commercial, recreational and residential development have decreased the amount of coastal habitat available for piping plovers to nest and feed
- Human disturbance often curtails breeding success. Foot and vehicular traffic may crush nests or young. Excessive disturbance may cause the parents to desert the nest, exposing eggs or chicks to summer sun and predators. Interruption of feeding may stress juvenile birds during critical periods in their development.
- Pets especially dogs, may harass the birds
- Developments near beaches provide food that attracts increased numbers of predators such as raccoons, skunks and foxes. Domestic and feral cats are also very efficient predators of plover eggs and chicks.
- Stormtides that may inundate nests” (USFWS, 2000)

These, as they relate to the proposed third crossing of the Hampton Roads, are discussed at IV below.
Figure 4
Approximate Site Locations of Piping Plover Nests on Craney Island 1994 & 1995
(USFWS Field Notes, Appendix A)
(Not to Scale)
IV. Direct and Indirect Effects of Action

The proposed project will not effect Craney Island's current land use. Craney Island is owned by the U.S. Army Corps of Engineers (COE) as a dredge disposal site. There are no current plans by the COE to change that use. There is a COE study currently underway to examine the feasibility of expanding Craney Island to the east to provide a fourth cell for dredged material. The Virginia Port Authority has expressed an interest in possibly locating a marine terminal on the fourth cell. This project is independent of the proposed third crossing. Because the third crossing will not induce a land use change of Craney Island, it will not lead to commercial, recreational or residential development that would effect piping plovers use of the island. It would also not increase the use of Craney Island for recreational or other activities.

The proposed third crossing would cross to the north of Craney Island’s northern shore and would consist of a new 4-lane highway facility plus two additional multi-modal use lanes. This facility will be approximately parallel with the northern shore of Craney Island approximately 400 meters (1300 feet) from the mean high tide boundary on the island. It will be elevated on structure approximately 5.25 meters (17.5 feet) above mean high tide on piers spaced 38 to 46 meters (125 to 150 feet) apart. It is not expected that any use other than possible deposition of dredged material will be made of Craney Island during construction of this segment of the third crossing. No staging or barging areas will be required on Craney Island during construction.

A 4-lane connector road will tie-into the third crossing mainline with an interchange just off Craney Island’s northeast corner. That connector then proceeds to the south on structure along Craney Island’s eastern shore before intersecting with VA 164 (Figure 2). This interchange and the connector are on pile supported bridge structure. The connector consists of two parallel bridge structures 15.4 meters (50.5 feet) wide that are approximately 10 meters (33 feet) apart for a total footprint of 40.8 meters (134 feet). Starting at the northeast corner, the centerline of the footprint follows the eastern shoreline of Craney Island until it comes to a point approximately 700 meters (2300 feet) north of Craney Island's southeast corner. From this point the connector curves slightly to the west as it crosses over Craney Island Creek. It then continues south to VA 164. There is 300-meter (984 feet) section (approximately 12,240 square meters) of the connector at the southeast corner that is on the land of Craney Island proper. However, this section bisects the perimeter road around Craney Island and may require a bridge structure. This will be investigated in later stages of the project.

Traffic studies conducted for this project predict that the average daily traffic volume on the new crossing that runs north of Craney Island will be 75,000 in the year 2018. The projected 2018 average daily traffic volume on the segment that runs along the eastern shore of Craney Island to VA 164 is 39,000. While disturbance has been
identified as a significant threat to breeding populations of the piping plovers, the studies that have focused on disturbance have generally dealt with direct disturbance from humans on foot or motor vehicles directly approaching piping plovers nests.

As currently proposed, the proposed facility will pass in front of Craney Island and along its eastern shore line. Piping plovers have generally nested along the western edge of Craney Island or inland on the island; observations of nesting pairs have only identified one piping plover nest on the northern shore. Piping plovers nesting on the western edge of the island and inland on the island would not be within the viewshed of the project. Lighting on the proposed facility will be directed onto the facility. Fugitive light will be limited, as is currently the case on the Monitor-Merrimac Bridge Tunnel and the Hampton Roads Bridge Tunnel, to a small footprint near the facility. Because of the distance between the new facility and the areas on Craney Island (western and northern shores) historically utilized by piping plovers, fugitive light from the facility light will not illuminate historically preferred piping plover habitat.

While there have been no studies reported on the effects of "distant" traffic passing "in front of" piping plovers nests, two studies have suggested that piping plovers may habituate to the presence of continuous human presence as long as that presence does not directly interfere with nesting pair or interdict and disturb feeding areas. Cairns and McLaren (1980) suggested that: "probably mere presence of people, within limits, does not affect reproductive success. Actual destruction of nests and young is more serious". Patterson et al's (1991) findings seemed to support Cairns and McLaren. They conclude in part that: "Because piping plovers typically nest far above high tide line and appear capable of habituating to some levels of recreational activity. Restricting recreational use to narrow zones immediately adjacent to the high energy beach might reduce indirect recreational disturbance to plovers nesting on beaches with a wide berm".

The proposed project’s mainline will be on structure 400 meters (1300 feet) from the Craney island’s northern shore and on structure along the island’s eastern shore line. Because of the distance between the proposed facility and the area’s on the island historically utilized by piping plovers (see above), and the reported habituation ability of the piping plover, it seems likely that this distance will ensure no disturbance of piping plovers that may be on Craney Island.

Mammalian and avian nest predation opportunities will not be substantially increased as a result of the new facility. According to Beck (personal communication, 1999) potential nest predators on the island include the red fox and raccoon. Avian predation from gulls may be increased slightly as the result of additional perching sites afforded by the new facility and its appurtenances (e.g., light fixtures). However, a relatively large colony of least terns nest on the island which may serve to attract avian predation away from a few, at least historically, difficult to find piping lover nests.
IV. Conclusions

The third crossing will not adversely affect the piping plover because the third crossing:

1. will not directly use piping plover habitat or induce land use changes on Craney Island that would destroy piping plovers or their habitat;

2. will not serve as a substantial attractor to additional predators that might effect piping plover breeding success and;

3. will not interdict piping plover access to the island or;

4. will not induce additional recreational use, foot or motorized traffic on the island
VII. References Cited


Haig and Oring, 1985 (Distribution and Status of the Piping Plovers Throughout the Annual Cycle. J. Field Ornith 56(4): 334-354)


ATTACHMENT 1 FOR PIPING PLOVER BA

United States Fish and Wildlife Coordination Correspondence
Mr. Roberto Fonseca-Martinez  
Division Administrator  
Federal Highway Administration  
Post Office Box 10249  
400 North 8th Street, Room 750  
Richmond, Virginia 23229

Dear Mr. Fonseca-Martinez:

This is in response to the request for the Department of the Interior’s comments on the Draft Environmental Impact Statement (DEIS)/Section 4(f) Evaluation for the proposed New Bridge-Tunnel Crossing of Hampton Roads in Southeastern Virginia; Isle of Wight and York Counties, Virginia.

**SECTION 4(f) EVALUATION COMMENTS:**

We concur that there is no prudent and feasible alternative to the proposed project, if project objectives are to be met. However, we do not believe that all possible planning has been done to minimize harm to the Hampton Institute and the Pasture Point Historic District. Therefore, we recommend continued cooperation and coordination with the State Historic Preservation Officer in order to prepare a Memorandum of Agreement (MOA) which should include measures to avoid and/or minimize harm to the Hampton Institute and the Pasture Point Historic District, in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. A signed copy of the MOA should be included in the Final Section 4(f) Evaluation.

**ENDANGERED SPECIES ACT COMMENTS:**

For actions considered to be a major federal construction activity significantly affecting the quality of the human environment (i.e. one requiring an EIS under the National Environmental Policy Act), Section 7(c) of the Act requires that the agency prepare a biological assessment to determine the effects of the project on any listed species or proposed species that may occur in the impact area. Since the piping plover (*Charadrius melodus*) occurs in the vicinity of the proposed project, the
Federal Highway Administration (FHWA) must determine whether the project may affect this species. A biological assessment pursuant to Section 7(c) will therefore be required for this project.

On page 180 of the DEIS, it is stated that the biological assessment will be performed prior to construction. To allow thorough review by the public and timely review by the U.S. Fish and Wildlife Service (FWS), FHWA, and Virginia Department of Transportation (VDOT), the FWS recommends that the biological assessment for this species be included in the final EIS.

The FWS notes that the Dismal Swamp southeastern shrew will likely be delisted as a federally threatened species before March of 2000. Therefore, the FWS does not recommend preparation of a biological assessment for this species. The peregrine falcon (*Falco peregrinus*) was delisted on August 25, 1999 and therefore, is no longer protected under the ESA.

**FISH AND WILDLIFE COORDINATION ACT COMMENTS:**

The FWS recommends that a more complete discussion of wetland impacts be included in the document including figures showing the location of anticipated wetland impacts for each candidate build alternative. The FWS also recommends that the final EIS include a table of wetland impacts, their classification and acreage, for each alternative.

Based on a review of the DEIS, the FWS understands that the use of concrete for tunnel construction, as opposed to steel, would result in a substantial avoidance of impacts to aquatic resources. The FWS therefore recommends the use of concrete tubes for tunnel construction associated with this project.

The FWS is pleased that the applicant is considering the establishment of oyster reefs as compensation for the large-scale disturbance of subtidal bottom and its associated turbidity and other water quality impacts that will result from this project. The FWS strongly supports the creation of oyster reefs as compensation for the impacts of this project on the marine environment of Hampton Roads. The Virginia Marine Resources Commission and other state and Federal agencies are currently involved in an oyster restoration program throughout suitable tidal habitat in Virginia. The FWS recommends that VDOT work closely with the Virginia Marine Resources Commission and Virginia Institute of Marine Science to formulate an oyster reef restoration plan as compensation for subtidal impacts associated with this project. The FWS would be glad to assist with such an effort.
Oysters and their associated reefs provide numerous ecosystem services including habitat creation and water purification. Oysters and their reefs provide three-dimensional habitat for numerous aquatic species of fish, other bivalves, birds, and numerous intertidal invertebrates. Oyster reefs can serve as foraging and perching habitat for many bird species including oystercatchers, other shorebirds, wading birds, waterfowl, and many other bird species. Through water purification, oysters can facilitate the establishment of submerged aquatic vegetation beds. Oysters and their reefs also buffer wave action, thereby ameliorating erosion and improving water clarity.

Matters pertaining to fish and wildlife resources should be directed to Mr. William Hester, U. S. Fish and Wildlife Service, Ecological Services, 6669 Short Lane, Gloucester, Virginia 23061 at (804) 693-6694, ext. 134, if you have questions or would like additional information.

**SUMMARY COMMENTS:**

We will provide you with further comments on the Section 4(f) aspects of this project upon the circulation of the Final Environmental Impact Statement/Section 4(f) Evaluation for public review and comment.

We appreciate the opportunity to provide these comments.

Sincerely,

Willie R. Taylor
Director, Office of Environmental Policy and Compliance

cc:
Mr. Kenneth E. Wilkinson
Environmental Planner
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219
Mr. Ken Wilkinson  
Virginia Department of Transportation  
1401 East Broad Street  
Richmond, Virginia 23219-1939

RE: Virginia Department of Transportation  
Hampton Roads Crossing Study  
Draft Environmental Impact Study  
ESSLOG# 5952

Dear Mr. Wilkinson:

We have reviewed the Draft Environmental Impact Study (DEIS) for the project referenced, and offer the following comments. The Department of Game and Inland Fisheries (VDGIF), under Title 29.1 of the Code of Virginia, is the primary wildlife and freshwater fish management agency in the Commonwealth. We have full law enforcement and regulatory jurisdiction over those resources, inclusive of state or federally endangered or threatened species, but excluding listed insects. We are a consulting agency under the U.S. Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and we provide environmental analysis of projects or permit applications coordinated through the Virginia Department of Environmental Quality, the Virginia Marine Resources Commission, the Virginia Department of Transportation, the U.S. Army Corps of Engineers, the Federal Energy Regulatory Commission, and other state or federal agencies. Our role in these procedures is to determine likely impacts upon fish and wildlife resources and habitats, and to recommend appropriate measures to avoid, reduce, or compensate for those impacts.

The Virginia Department of Transportation proposes to construct a new bridge-tunnel crossing of Hampton Roads in southeastern Virginia. Due to current time restraints within the Environmental Services Section of the Department of Game and Inland Fisheries, we are unable to comment on specific alternatives at this time. However, we were able to review the fishery data and recommend that the Final EIS state that striped bass (Morone saxatilis) occur year-round at the project site, not just in March and April as stated in the DEIS. The DEIS states that dredging will not adversely impact migrating anadromous fish because the dredge operation will only affect a small percentage of the channel at any given time. However, if the dredging is occurring within the channel area, which is the preferred migratory pathway, we recommend an instream work time-of-year restriction (TOYR) from 15 February - 30 June. We are currently working with the U.S. Army Corps of Engineers to evaluate our TOYR, which may lead to migratory studies of anadromous fish in the James River in the near future.

Thank you for the opportunity to comment on this proposed project. Please call me or Tom Wilcox at (804) 367-8999 if we may be of further assistance.

Sincerely,

[Signature]

Raymond T. Fernald, Manager  
Environmental Services Section

4010 WEST BROAD STREET, P.O. BOX 11104, RICHMOND, VA 23230-1104  
(804) 367-1000 (V/TDD)  Equal Opportunity Employment, Programs and Facilities  FAX (804) 367-9147
United States Department of the Interior
FISH AND WILDLIFE SERVICE

Ecological Services
6669 Shaw Lane
Gloucester, Virginia 23061

August 11, 1999

Mr. Bruce Turner
Planning and Environmental Manager
Federal Highway Administration
Dale Building, 1504 Santa Rosa Road
Richmond, Virginia 23229

Re: Hampton Roads Crossing - Preliminary Draft EIS

Dear Mr. Turner:

The U.S. Fish and Wildlife Service has reviewed the preliminary Draft Environmental Impact Statement for the Hampton Roads Crossing Study that was provided to this office by the Virginia Department of Transportation by a cover letter dated June 15, 1999. The Virginia Department of Transportation, in cooperation with the Federal Highway Administration is proposing to construct a new bridge-tunnel crossing of Hampton Roads in southeastern Virginia. The study area includes the Cities of Chesapeake, Hampton, Poquoson, Newport News, Norfolk, Suffolk, and Virginia Beach, and the Counties of Isle of Wight and York. Project termini include the I-64 and I-664 interchange in Hampton; the I-64 and I-564 interchange in Norfolk; Virginia Route 164 near Coast Guard Boulevard in Portsmouth; and the I-64, I-264, and I-664 interchange in Chesapeake. This letter constitutes the comments of the Service and the Department of the Interior on the preliminary Draft EIS and is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the National Environmental Policy Act of 1969 (42 USC, subsections 4321-4370a, as amended).

The Service has provided previous comments on this project in our letters dated July 22, 1998, December 8, 1998, and April 23, 1999. Rather than repeating these comments herein, we refer you to our previous letters.

Endangered Species Act Comments

As you are aware, for actions considered to be a major federal construction activity significantly affecting the quality of the human environment (i.e. one requiring an EIS under the National Environmental Policy Act), Section 7(c) of the Act requires that the agency prepare a biological assessment to determine the effects of the project on any listed species or proposed species that
may occur in the impact area. Since the piping plover (Charadrius melodus), Dismal Swamp southeastern shrew (Sorex longirostris fisheri), and peregrine falcon (Falco peregrinus) occur in the vicinity of the proposed project, the Federal Highway Administration must determine whether the project may affect any of these species. A biological assessment pursuant to Section 7(c) will therefore be required for this project. General recommendations for the preparation of a biological assessment are enclosed. We will be pleased to discuss the consultation process with you.

The Service notes that the Dismal Swamp southeastern shrew will likely be delisted as a federally threatened species, during or before October of 1999 and the final rule to delist the peregrine falcon should be published in late August of 1999. Therefore, we do not recommend preparation of a biological assessment for these species at this time.

Fish and Wildlife Coordination Act Comments

The Service has reviewed the document entitled: Three-Dimensional Hydrodynamic and Sedimentation Modeling - Hampton Roads Crossing Study that was provided to this office by VDOT via a cover letter dated January 28, 1999. We note that minutes from the January 22, 1999 meeting on this study revealed that according to the model, there is a reduction in the residual flow (non-tidal current) at the mouth of the Elizabeth River as measured along transect 1. Such preliminary findings concern the Service. We understand that additional studies are ongoing to refine the circulation modeling for this project. The Service looks forward to reviewing the study results and we will provide additional comments upon our review.

We understand that an eastward expansion of Craney Island is being considered as a part of the Corridor 9 alternative. If so, the Service recommends that this option be discussed in detail in the DEIS. Discussion topics should include, at a minimum:

- area of fill of subtidal and tidal bottom, and wetlands,
- source of fill,
- timeline for creation of the eastward expansion,
- anticipated impacts of this activity on aquatic resources and hydrodynamics and sedimentation in Hampton Roads.
The Service appreciates your coordination of this document with us. If you have questions, please contact William Hester at (804) 693-6694, ext. 134.

Sincerely,

Karen L. Mayne
Supervisor
Virginia Field Office

Enclosure

cc: Mr. Ken Wilkinson
VDOT Headquarters, Richmond, VA
Mr. Peter Kube, Norfolk District Corps of Engineers, Norfolk, VA
Biological Assessment Guidelines

If a Federal agency determines a project to be a major Federal construction activity significantly affecting the quality of the human environment (i.e., one requiring an environmental impact statement under the National Environmental Policy Act), Section 7(a) of the Endangered Species Act, as amended, requires that the agency prepare a biological assessment to determine the effects of the project on listed and proposed species that may occur in the project impact area. The biological assessment shall be completed before any contract for construction is entered into and before construction is begun. Biological assessments are recommended, but not required, for other Federal actions that may result in significant impacts to threatened or endangered species and their critical habitats, but which do not require the preparation of an EIS. The contents of the biological assessment depend on the nature of the Federal action. In general, the U.S. Fish and Wildlife Service (Service) recommends the following steps be taken:

1. Conduct a scientifically sound on-site inspection of the area affected by the action, which must in most cases include a detailed survey of the area to determine if listed or proposed species are present or occur seasonally and whether suitable habitat exists within the area for either expanding the existing population or potential reintroduction of populations.

2. Interview recognized experts on the species at issue, including those within the Service, State conservation agencies, universities, and others who may have data not yet found in scientific literature.

3. Review literature and other scientific data to determine the species' distribution, habitat needs, and other biological requirements.

4. Analyze the effects of the action on individuals and populations of each species and its habitat, including indirect and cumulative effects of the action.

5. Analyze alternative actions that may provide conservation measures.

6. Conduct any studies necessary to fulfill the requirements of (1) through (5) above.

7. Review any other relevant information.

If the Federal action agency determines that the proposed action may affect any listed species or critical habitat, the agency must request, in writing, formal consultation with the Service pursuant to Section 7(a)(2). If the action agency determines that the action is likely to jeopardize the continued existence of proposed species or result in the destruction or adverse modification of proposed critical habitat, the agency must confer with the Service.

If the determination is "no effect," neither consultation nor conference is necessary, unless requested by the Fish and Wildlife Service. A copy of the biological assessment document should be provided to the Fish and Wildlife Service.
United States Department of the Interior
FISH AND WILDLIFE SERVICE
Ecological Services
P.O. Box 99
6669 Short Lane
Gloucester, Virginia 23061

April 23, 1999

Mr. Roberto Fonseca-Martinez
Planning and Environmental Manager
Federal Highway Administration
Dale Building, 1504 Santa Rosa Road
Richmond, Virginia 23229

Colonel Allan B. Carroll
District Engineer
Norfolk District, Corps of Engineers
Fort Norfolk, 803 Front Street
Norfolk, Virginia 23510-1096

Attn: Bruce Turner, FHWA
Peter Kube, Corps

Re: Hampton Roads Crossing

Gentlemen:

On February 5, 1999, representatives from the U.S. Fish and Wildlife Service, the Norfolk District Corps of Engineers, the Virginia Department of Game and Inland Fisheries, the College of William and Mary, and consultants for the Virginia Department of Transportation performed a site visit of Craney Island, located in the City of Portsmouth, Virginia. The site visit was organized in furtherance of Section 7 consultation regarding the potential impacts of this project on the federally threatened piping plover (Charadrius melodus). The Federal Highway Administration (FHWA) in cooperation with the Virginia Department of Transportation (VDOT), proposes a new crossing of Hampton Roads in southeastern Virginia. The project study area is generally bounded by the interchange of I-64/I-664 on the north, I-64/I-564 on the east, I-264/I-64 on the south, and the I-664 alignment on the west. At least one of the project alternatives would be located on or adjacent to Craney Island. This letter constitutes the comments of the Service and the Department of the Interior on the proposed project and is submitted in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).
Participants at the site visit first reviewed the current status of the piping plover on Craney Island and the proposed location of the roadway. This information was provided by Dr. Ruth Beck of the College of William and Mary, and representatives of VDGIF and the Corps. Attendees next toured Craney Island, specifically, those portions of Craney Island where plovers typically nest. The site visit concluded with a discussion of future Section 7 requirements and potential roadway designs that could minimize impacts to plovers.

We understand that a draft Environmental Impact Statement is currently being produced by VDOT. The Service recommends that this document contain a biological assessment regarding the potential impacts of this project on the piping plover and Dismal Swamp southeastern shrew (Sorex longirostris fisheri).

For actions considered to be a major Federal construction activity significantly affecting the quality of the human environment (i.e. one requiring an EIS under the National Environmental Policy Act), Section 7(c) of the Act requires that the agency prepare a biological assessment to determine the effects of the project on any listed species or proposed species that may occur in the impact area. Since Federally listed species occur in the vicinity of the proposed project, the Federal Highway Administration must determine whether the project may affect any of these species. A biological assessment pursuant to Section 7(c) will therefore be required for this project. General recommendations for the preparation of a biological assessment are enclosed. We will be pleased to discuss the consultation process with you. To assist you with preparation of a biological assessment for piping plovers, the Service has enclosed a document entitled, “Ocean City Water Resources Feasibility Study, Immediate Restoration of Assateague Island - Biological Assessment.”

We note that the exact location of any alternative likely to be located near or on Craney Island has not been determined. We therefore recommend that the biological assessment address the impacts of all the likely alternative corridors on the piping plover. This alternatives analysis should include an alternative that would bridge over the open water of Hampton Roads in the vicinity of Craney Island to avoid impacts to the plover.

In fulfillment of our mutual responsibilities under the Endangered Species Act, the Service would like to work with the Corps to produce a comprehensive and long-term management plan for piping plovers on Craney Island. The Service would be happy to work closely with the Corps to complete such a plan. Please contact Mr. William Hester at (804) 693-6694, ext. 134, to discuss this option.
Mr. Fonseca-Martinez and Colonel Carroll

The Service appreciates your early coordination of this project with us. If you have questions, please contact Mr. Hester.

Sincerely,

Karen L. Mayne
Karen L. Mayne
Supervisor
Virginia Field Office

Enclosure

cc: Mr. Ken Wilkinson
VDOT Headquarters, Richmond, VA
Biological Assessment Guidelines

If a Federal agency determines a project to be a major Federal construction activity significantly affecting the quality of the human environment (i.e., one requiring an environmental impact statement under the National Environmental Policy Act, Section 7(c) of the Endangered Species Act, as amended, requires that the agency prepare a biological assessment to determine the effects of the project on listed and proposed species that may occur in the project impact area. The biological assessment shall be completed before any contract for construction is entered into and before construction is begun. Biological assessments are recommended, but not required, for other Federal actions that may result in significant impacts to threatened or endangered species and their critical habitats, but which do not require the preparation of an EIS. The contents of the biological assessment depend on the nature of the Federal action. In general, the U.S. Fish and Wildlife Service (Service) recommends the following steps be taken:

1. Conduct a scientifically sound on-site inspection of the area affected by the action, which must in most cases include a detailed survey of the area to determine if listed or proposed species are present or occur seasonally and whether suitable habitat exists within the area for either expanding the existing population or potential reintroduction of populations.

2. Interview recognized experts on the species at issue, including those within the Service, State conservation agencies, universities, and others who may have data not yet found in scientific literature.

3. Review literature and other scientific data to determine the species’ distribution, habitat needs, and other biological requirements.

4. Analyze the effects of the action on individuals and populations of each species and its habitat, including indirect and cumulative effects of the action.

5. Analyze alternative actions that may provide conservation measures.

6. Conduct any studies necessary to fulfill the requirements of (1) through (5) above.

7. Review any other relevant information.

If the Federal action agency determines that the proposed action may affect any listed species or critical habitat, the agency must request, in writing, formal consultation with the Service pursuant to Section 7(a)(2). If the action agency determines that the action is likely to jeopardize the continued existence of proposed species or result in the destruction or adverse modification of proposed critical habitat, the agency must confer with the Service.

If the determination is "no effect," neither consultation nor conference is necessary, unless requested by the Fish and Wildlife Service. A copy of the biological assessment document should be provided to the Fish and Wildlife Service.
December 17, 1998

Ken Wilkinson  
Virginia Department of Transportation  
Environmental Division  
1401 E. Broad Street  
Richmond, VA 23219

Re: Hampton Roads Crossing Study

Dear Mr. Wilkinson:

The Department of Conservation and Recreation’s Division of Natural Heritage (DCR) has searched its Biological and Conservation Data System (BCD) for occurrences of natural heritage resources from the area two alternatives outlined in your letter. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

Alternative 1:
According to the information currently in our files, Least Terns (*Sternula antillarum*, G4/S2/NF/SC) and Black Skimmers (*Rynchops niger*, G5/S2/NF/NS) have been documented in the vicinity of the Hampton Roads Bridge Tunnel and Willoughby Spit utilizing the area for nesting and foraging.

Least Terns nest on broad, flat, beaches with minimal vegetation and forage in saltwater near the shore (Beck, 1991). Threats to this species include loss of nesting habitat due to development and disturbance of breeding colonies by human activities and high numbers of predators (Beck, 1991). Please note that the Least Tern is currently classified as a special concern species by the Virginia Department of Game and Inland Fisheries (VDGIF).

Black Skimmers occur primarily along coastal waters, including bays, estuaries, lagoons and mudflats, and rivers and lakes in migration and in winter. They nest primarily near coasts on sandy beaches, shell banks, coastal and estuary islands, on wrack and drift of salt marshes, and on dredged material sites. They typically feed on small fish and crustaceans by skimming food from the surface of the water while flying. Black Skimmers roost in flocks of up to the hundreds.
or thousands of birds. In the Eastern United States, major threats include flooding of nests, predation, and human disturbance.

**Alternative 9:**
The Great Egret (*Ardea alba*, G5/S2B,S4N/NF/SC) has been documented in the Pinchurst area. This species is found along freshwater and saltwater marshes, mud flats, damp meadows, river margins, and lake shores. In Virginia, this species prefers relatively open wetlands for foraging. The greatest threat to the Great Egret is the urbanization of available nesting and foraging habitat (Bradshaw, 1991). Please note that the Virginia Department of Game and Inland Fisheries (VDGIF) currently classifies this as a state special concern species.

The Peregrine Falcon (*Falco peregrinus*, G3/S1/LB/LE) has been documented nesting on the bridge over the Western Branch of the Elizabeth River. This species nests on cliffs, bluffs, talus slopes, old tree hollows, and abandoned nests of other birds of prey (Byrd, 1991). Currently, nesting pairs in Virginia use artificial structures such as tall buildings, bridge supports, and towers (Byrd, 1991). The Peregrine Falcon was once extirpated from Virginia, but breeding pairs now occur on the coastal plain. Please note that this species is currently classified as endangered by the United States Fish and Wildlife Service (USFWS) and the Virginia Department of Game and Inland Fisheries (VDGIF).

The Piping Plover (*Charadrius melodus*, G3/S2/LE/LT), Least Tern (*Stern antillarum*, G4/S2/NF/SC), and Black-necked Stilt (*Himantopus mexicanus*, G5/S1/NF/NS) have been documented at Craney Island. Piping Plovers inhabit coastal areas, utilizing the flat, sandy beaches of barrier islands for breeding (Cross, 1991). Threats to this species include predation of eggs and young and the development and disturbance of barrier island brooding sites (Cross, 1991). Please note that the Piping Plover is classified as endangered by the United States Fish and Wildlife Service (USFWS) and is listed as threatened by the Virginia Department of Game and Inland Fisheries (VDGIF).

As noted above, Least Terns nest on broad, flat, beaches with minimal vegetation and forage in saltwater near the shore (Beck, 1991). Threats to this species include loss of nesting habitat due to development and disturbance of breeding colonies by human activities and high numbers of predators (Beck, 1991). Please note that the Least Tern is currently classified as a special concern species by the Virginia Department of Game and Inland Fisheries (VDGIF).

Black-necked Stilts primarily occur near shallow salt or fresh water bodies with soft muddy bottoms, including grassy marshes, wet savannas, mudflats, shallow ponds, flooded fields, and the borders of salt ponds. They nest along the shallow water of ponds, lakes, swamps, or lagoons and may nest on the ground in the shallow water on a plant tussock. The Black-necked Stilt feeds on insects, crustaceans, and small fish, as well as the seeds of aquatic plants.

The oak toad (*Bufo quercicus*, G5/S1/NF/SC) has been documented in the general area. This species inhabits southern pine woods where it hides under all manner of objects. Unlike most other toads, the oak toad is active by day. Breeding occurs in shallow pools, ditches, cypress and
flatwoods ponds from April to October, depending on the arrival of warm, heavy rains (Conant, 1991). Please note that this species is currently classified as a state special concern species by the VDGIF.

DCR recommends that the draft environmental impact statement address potential impacts to these species. We also recommend coordination with the USFWS and the VDGIF due to the status of these species.

An absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. New and updated information is continually added to BCD. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

Should you have any questions or concerns, feel free to contact me at 804-371-2708. Thank you for the opportunity to comment on this project.

Sincerely,

[Signature]

Lesa S. Berlinghoff
Project Review Coordinator

cc: Alice Allen-Grimes, ACOE
    William Hester, USFWS
    Ray Fornald, VDGIF
    Rebecca Wadja, VDGIF
Literature Cited


Virginia Department of Conservation and Recreation  
Definition of Abbreviations Used in Natural Heritage Resource Lists

Natural Heritage Ranks
The following ranks are used by the Virginia Department of Conservation and Recreation to set protection priorities for natural heritage resources. Natural Heritage Resources, or "NHR's," are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The primary criterion for ranking NHR's is the number of populations or occurrences, i.e., the number of known distinct localities. Also of great importance is the number of individuals in existence at each locality or, if a highly mobile organism (e.g., sea turtles, many birds, and butterflies), the total number of individuals. Other considerations may include the quality of the occurrences, the number of protected occurrences, and threats; however, the emphasis remains on the number of populations or occurrences so that ranks will be an index of known biological rarity.

S1  Extremely rare and critically imperiled, with 5 or fewer occurrences or very few remaining individuals in Virginia; or because of some factor(s) making it especially vulnerable to extirpation in Virginia.
S2  Very rare and imperiled, with 6 to 20 occurrences or few remaining individuals in Virginia; or because of some factor(s) making it vulnerable to extirpation in Virginia.
S3  Rare to uncommon in Virginia with between 20 and 100 occurrences; may have fewer occurrences if found to be common or abundant at some of these locations; may be somewhat vulnerable to extirpation in Virginia.
S4  Common and apparently secure, with more than 100 occurrences; may have fewer occurrences with numerous large populations.
S5  Very common and demonstrably secure in Virginia.
S1U  Historically known from Virginia, but not verified for an extended period, usually > 15 years.
SU  Status uncertain, often because of low search effort or cryptic nature of the element.
SX  Apparently extirpated from Virginia.
S4B  Breeding status of an animal within Virginia.
S4W  Non-breeding status within the state. Usually applied to winter resident species.

Global ranks are similar, but refer to a species' rarity throughout its total range. Global ranks are denoted with a "G" followed by a character. Note that GA and GN are not used and GX means apparently extinct. A "Q" in a rank indicates that a taxonomic question concerning that species exists. Ranks for subspecies are denoted with a "T". The global and state ranks combined (e.g., G2/S1) give an instant grasp of a species' known rarity. These ranks should not be interpreted as legal designations.

Federal/Local Status
The Division of Natural Heritage uses the standard abbreviations for Federal endangerment developed by the U.S. Fish and Wildlife Service, Division of Endangered Species and Habitat Conservation.

LE - Listed Endangered - threatened with extinction throughout all or a significant portion of its range
LT - Listed Threatened - likely to become endangered in the foreseeable future
PE - Proposed Endangered
PT - Proposed Threatened
E(S/A) - treat as endangered because of similarity of appearance
T(S/A) - treat as threatened because of similarity of appearance
C - Candidate - enough information is available to propose for listing, but listing is "postponed by other pending proposals of higher priority"

State Local Status
The Division of Natural Heritage uses similar abbreviations for State endangerment.

LE - Listed Endangered
LT - Listed Threatened
SC - Special Concern - animals that merit special concern according to VDGIF (not a regulatory category)

For information on the laws pertaining to threatened or endangered species, contact:
U.S. Fish and Wildlife Service for all FEDERALLY listed species
Virginia Department of Agriculture and Consumer Services Plant Protection Bureau for STATE listed plants and insects
Virginia Department of Game and Inland Fisheries for all other STATE listed animals

VDNR/DOH, 1997
Mr. Roberto Fonseca-Martinez  
Federal Highway Administration  
1504 Santa Rosa Road  
Richmond, Virginia 23229

Colonel Allan B. Carroll  
District Engineer  
Norfolk District, Corps of Engineers  
Fort Norfolk, 803 Front Street  
Norfolk, Virginia 23510-1096

Attn: Mr. Edward Sundra, FHWA  
Mr. Peter Kube, Corps

Re: Hampton Roads Crossing Study

Dear Colonel Carroll:

The U.S. Fish and Wildlife Service (Service) has reviewed the letter from Mr. Ken Wilkinson of the Virginia Department of Transportation (VDOT), dated November 17, 1998, regarding the Hampton Roads Crossing Study. VDOT requested more detailed information on federally listed species within the vicinity of candidate build alternatives 1 and 9, for preparation of the environmental impact statement for this project. Hampton Roads Crossing is a proposed transportation facility to address traffic congestion in the Hampton Roads area of Virginia. This letter is submitted in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

The federally threatened piping plover (Charadrius melodus) and Dismal Swamp southeastern shrew (Sorex longirostris fisheri) are located within the potential impact area of alternative 1 and 9. Piping plovers typically nest on Craney Island; and the exact nest locations vary from year to year. At this point, it appears that formal Section 7 consultation for the plover would be necessary, if alternative 9 were selected as the build alternative.
Mr. Fonseca-Martinez and Colonel Carroll

The Dismal Swamp southeastern shrew is potentially located within the impact area of alternative 1, depending on the exact construction boundaries and potential secondary and indirect impacts of the project. The specific area of concern is in the Jolliff Road/Bowers Hill area. Based on our present understanding of the location of this alternative and the current status of the shrew under the Endangered Species Act, it appears that formal Section 7 consultation for the shrew would be necessary, if alternative 1 were selected as the build alternative. As you are aware, the Dismal Swamp southeastern shrew may be delisted as a federally threatened species in 1999. Until such time however, we should continue consultation.

For actions considered to be a major Federal construction activity significantly affecting the quality of the human environment (i.e. one requiring an EIS under the National Environmental Policy Act), Section 7(c) of the Act requires that the agency prepare a biological assessment to determine the effects of the project on any listed species or proposed species that may occur in the impact area. Since Federally listed species occur in the vicinity of the proposed project, the Federal Highway Administration or U.S. Army Corps of Engineers must determine whether the project may affect any of these species. A biological assessment pursuant to Section 7(c) will therefore be required for this project. General recommendations for the preparation of a biological assessment are enclosed. We will be pleased to discuss the consultation process with you.

The Service appreciates your coordination of this project with us. If you have questions, please contact William Hester at (804) 693-6694, ext. 134.

Sincerely,

Karen L. Mayne
Supervisor
Virginia Field Office

cc: Mr. Ken Wilkinson
VDOT Headquarters, Richmond, VA
Mr. Bruce Turner  
Planning and Environmental Manager  
Federal Highway Administration  
Dale Building, 1504 Santa Rosa Road  
Richmond, Virginia 23229

Attn: Bruce Turner

Re: Hampton Roads Crossing - Notice of Intent

Dear Mr. Turner:

The U.S. Fish and Wildlife Service has reviewed the Notice of Intent to prepare an Environmental Impact Statement (EIS) on the proposed new crossing of Hampton Roads in southeastern Virginia (FR vol. 63, no. 104, June 1, 1998). The Federal Highway Administration (FHWA) in cooperation with the Virginia Department of Transportation (VDOT), will prepare an EIS to determine the impact of a proposed new crossing of Hampton Roads in southeastern Virginia. The EIS will examine construction alternatives in the area generally bounded by the interchange of I-64/I-664 on the north, I-64/I-564 on the east, I-264/I-64 on the south, and the I-664 alignment on the west. This letter constitutes the scoping comments of the Service and the Department of the Interior on the proposed project and is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the National Environmental Policy Act of 1969 (42 USC, subsections 4321–4370a, as amended).

Endangered Species Act Comments

Based on the information provided to us by VDOT, the following endangered or threatened species could potentially be impacted by this project:

- Piping plover (*Charadrius melodus*) - Federally listed threatened. This shorebird nests regularly on Craney Island and development on the island will likely disturb breeding plovers and adversely affect reproduction. As project plans are refined, the Service will keep FHWA and VDOT apprised of survey needs and other Section 7 issues. To the maximum extent possible, the Service recommends that FHWA avoid construction on Craney Island.
Peregrine falcon (*Falco peregrinus*) - Federally listed endangered. Peregrine falcons nest on bridges and other elevated transportation structures throughout Hampton Roads. Based on our review of the alternatives currently under consideration, it does not appear that this species will be impacted by the project. Therefore, it does not appear likely that additional Section 7 consultation will be necessary.

Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*) - Federally listed threatened. Dismal Swamp southeastern shrews have been found in the immediate vicinity of U.S. Route 13/58/460 and Interstate Highway 64, both east and west of Bowers Hill. Dismal Swamp southeastern shrews have not been found on surveys of the Interstate Highway 664 corridor located north of Bowers Hill. Depending on the extent of construction impacts in this area, surveys and formal Section 7 consultation may be necessary. The Service will provide additional information as project plans are refined.

Loggerhead sea turtle (*Caretta caretta*) - Federally listed threatened. This turtle occurs in the Hampton Roads area and Chesapeake Bay during the spring and summer. Section 7 consultation for this species in the project area will be administered by the National Marine Fisheries Service at the following address:

National Marine Fisheries Service  
904 South Morris Street  
Oxford, Maryland 21654  
(410) 226-5771

Other federally threatened or endangered sea turtles may also occur in the project vicinity. Any Endangered Species Act consultation on these species should also be coordinated with NMFS at the above address.

The species listed above, in addition to other species with no federal status, are protected under the Virginia Endangered Species Act. If you have not already, you should contact the Virginia Department of Game and Inland Fisheries at the following address, to determine coordination requirements:

Virginia Department of Game and Inland Fisheries  
Environmental Services Section  
P.O. Box 11104  
Richmond, VA 23230  
(804) 367-8999

*Fish and Wildlife Coordination Act Comments*

The Service notes that several initiatives are currently underway to bring about no net loss of wetlands in the United States and to restore the Chesapeake Bay. A more localized initiative is underway to restore the Elizabeth River. Due to the magnitude of this project and its potential to adversely impact natural resources and water quality in Hampton Roads and the Chesapeake
Bay, we encourage FHWA and VDOT to provide project-related funding to restore the former biological integrity of the lower James River and Hampton Roads through pro-active restoration projects as part of the compensation plan. We have provided several suggestions below, of feasible projects that could help accomplish the goals stated above:

- oyster reef establishment/restoration,
- estuarine/palustrine wetland restoration in the James River basin,
- submerged aquatic vegetation restoration and monitoring,
- shoreline erosion control.

The Service would be glad to meet with you to discuss any or all of the above projects.

We are aware that the Hampton Roads Metropolitan Planning Organization selected a preferred alternative that would require, among other things, the widening of I-664 in the Cities of Suffolk and Chesapeake, Virginia. Wetland compensation sites used to compensate for wetland impacts associated with the construction of the existing I-664, and at least one tidal wetland compensation bank, are located on either side of I-664 primarily in the City of Chesapeake just north of Bowers Hill. The invasive wetland species phragmites (*Phragmites australis*) has become established in a number of these sites and in at least two sites, phragmites is now the dominant species. The U.S. Army Corps of Engineers has brought this problem to VDOT's attention and in the case of the compensation bank, the Corps has informed VDOT that no more credits may be withdrawn from the bank until the phragmites has been successfully removed.

Phragmites is an unwanted, invasive species that is of limited value to fish and wildlife. Under proper conditions, it forms monotypic stands that displace other more valuable wetland plants and greatly reduces habitat diversity. Based on the history of phragmites invasion in this area, we recommend that any wetland compensation associated with this project be properly designed to avoid colonization by phragmites.

The Service has reviewed the letter to VDOT from Mr. Tom Barnard of the Virginia Institute of Marine Science dated June 8, 1998. That letter includes numerous pertinent issues and the Service concurs with VIMS’ recommendations.

As you are aware, the Service typically provides several generic scoping comments on wetland trends, mitigation, compensation and project timing, indirect impacts, and various construction designs. We have enclosed these recommendations.

At the March 1991, Mid-Atlantic Region Highways and Environment Conference, the integration of the NEPA and Section 404 processes was identified as one of the highest priorities of the transportation, regulatory, and resource agencies. This led to the formation of an interagency task force to investigate ways to fully integrate NEPA and Section 404 to ensure the development of an integrated review process. In July of 1992, the document entitled,
"Integrating NEPA/404 for Transportation Projects," was signed by Regional Administrators of the Environmental Protection Agency, Federal Highway Administration, U.S. Army Corps of Engineers, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. You will recall that interagency coordination on this project was initiated under the NEPA/404 process and this process was terminated by VDOT and/or FHWA after agency concurrence on Purpose and Need. The Service again recommends that future project coordination be conducted using the NEPA/404 process.

We note that not all issues of concern to the Service can be anticipated in this very early phase of the project. While we have attempted to list our concerns herein, we acknowledge that new and unforeseen issues may arise during the review process.

The Service appreciates your early coordination of this project with us. If you have questions, please contact William Hester at (804) 693-6694, ext. 134.

Sincerely,

Karen L. Mayne
Supervisor
Virginia Field Office

Enclosure

cc: Mr. Ken Wilkinson
    VDOT Headquarters, Richmond, VA
    Ms. Alice Allen-Grimes, Norfolk District Corps of Engineers
    Norfolk, VA
Enclosure: Generic Service Comments on Wetland Trends, Mitigation, Compensation and Other Project Design Criteria

A primary concern of the Service is the protection of wetlands for the numerous functions and values they provide. Wetlands are some of the most biologically productive ecosystems and they provide habitat for a variety of fish and wildlife species. Wetlands can improve water quality by trapping sediments and absorbing nutrients and pollutants. Forested wetlands preserve water quality by slowing and filtering runoff from uplands, buffering water temperature fluctuations, stabilizing stream banks, and contributing organic matter to the food chain. One-third of our Federally endangered species depend on wetlands for at least a portion of their life history requirements and one-half of our protected migratory birds depend upon or frequent wetlands and associated habitats (U.S. Department of the Interior 1990). Yet wetlands comprise only 5% of the total land area of the contiguous United States (Tiner 1984) and only 4% in Virginia (Tiner 1987). Numerous studies on the status and trends of wetlands indicate that palustrine forested wetlands are declining at a significant rate, with national losses totaling 3.4 million acres from the mid-1970s to the mid-1980s (Dahl and Johnson 1991) and losses within the mid-Atlantic region totaling 70,000 acres between the mid-1950s and late 1970s (Tiner and Finn 1986).

The Service has recently completed a study of wetland trends in the 63,000-square mile watershed draining into Chesapeake Bay. Wetland status and trends were estimated for the time period of 1982 to 1989. An estimated 1.7 million acres of wetlands and 3.5 million acres of deepwater habitat (including the Bay) existed in the watershed in 1989. Almost 90% of the wetlands are palustrine, with forested wetlands being most abundant. An estimated total of 22,000 acres of palustrine wetlands were lost in the Chesapeake Bay watershed during the study period and Virginia experienced the heaviest losses (Tiner et al. 1994). Because of the value of these areas and the national policy of no net loss of wetlands, the Service recommends avoiding wetland impacts.

To preserve wetlands, the Service has formulated a Mitigation Policy to guide our coordination of projects with potential wetland impacts. According to the Service's Mitigation Policy (FR Part III, Vol. 46, No. 15, Jan. 23, 1981, p. 7660) wetland impacts should be avoided or minimized to the maximum extent practicable and should be mitigated in a sequential fashion as listed below:

1. Avoiding the impact altogether by not taking a certain action or parts of an action,

2. Minimizing the impact by limiting the degree or magnitude of the action and its implementation,

3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment,

4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action,

5. Compensating for the impact by replacing or providing substitute resources or environments.
After numbers 1 through 4 above have been completed, if unavoidable wetland losses remain, we generally recommend that emergent wetland losses be compensated by creating similar emergent wetlands from low habitat value upland sites on a 1.5 to 1 areal basis and that unavoidable losses of scrub/shrub and forested wetlands be compensated in-kind on a 2 to 1 areal basis. These general recommendations incorporate more than simple areal replacement because of the inherent risk in wetland creation and the time lag between the loss of existing habitat and the replacement of that habitat value in the created wetland.

The Service makes several generic recommendations for habitat compensation. Sediment and erosion control measures should be implemented to prevent soil movement in the adjacent wetlands and waterways. The local Natural Resources Conservation Service office should be consulted regarding the soil amendments and planting schedule needed to maximize the likelihood of successful soil stabilization. No point source discharge (i.e. stormwater outfalls) should be directed into the restored or created wetlands.

To ensure successful compensation and to provide a basis for compliance monitoring, we recommend that the applicant be required to prepare, and submit for interagency review and concurrence, a detailed compensation plan that addresses the following items:

- a detailed diagram of the compensation area boundaries and elevations;
- a description of the soil conditions to be created or restored, including required pH, organic content, and necessary soil amendments (i.e. pH adjustments, fertilizer);
- a description of the hydrologic conditions to be created or restored, including at least a description of the frequency and duration of soil saturation and/or inundation and the measures to be taken to develop this hydrologic regime;
- a description of the plant communities desired, their proposed locations and means of establishment, the source of propagules, and the timing and density of establishment;
- a detailed schedule describing when the proposed fill, dredging, planting, transplanting, or other actions will occur;
- a post-compensation monitoring plan establishing monitoring methodologies, reporting schedules, and performance standards to be used to evaluate whether the compensation effort restored or replaced the affected wetland functions, including fish and wildlife habitat, flood storage, and water quality maintenance;
- a description of actions to be taken by the applicant if the compensation measures are not successful.

All compensation should be completed prior to or concurrent with project-induced habitat impacts. Compensation plans should include a construction chronology and deadlines for completion of all habitat construction. All compensation plans should be published in the Record of Decision that is required in fulfillment of the obligations for this project under the National Environmental Policy Act.
In accordance with Executive Order 11988 (Protection of Floodplains), floodplain impacts should be mitigated to the maximum extent possible, including compensation for any unavoidable floodplain impacts. We recommend that the applicant mitigate floodplain impacts following the recommendations listed above for wetland mitigation.

The Service requests that the following information be included for each alternative in the EIS:

1. maps showing location and acreage of all habitat types to be impacted including streams, wetlands, and uplands,
2. dominant plant species within each habitat type,
3. maps showing impacts within the 100-year floodplain,
4. stormwater management plans,
5. locations of soil borrow and disposal sites,
6. sequence and timing of project construction,
7. locations of soil borrow and disposal sites.

We request information on the potential indirect impacts to both upland and wetland habitat types predicted to result from each project alternative and the anticipated acreage to be impacted. Examples include land development for industrial facilities, travel corridors, etc., that would be facilitated as a result of this transportation project.
Literature Cited


December 20, 1995

Mr. Philip A. Shucet, Vice-President
Michael Baker Jr., Inc.
770 Lynnhaven Parkway, Suite 120
Virginia Beach, VA  23452

REF: ESS LOG# 5952

Dear Mr. Shucet:

This letter is in response to your October 6, 1995 letter regarding documentation of threatened and endangered species in the vicinity of Hampton Roads Crossing Study Corridors.

Information about fish and wildlife species was generated from our agency’s computerized Fish and Wildlife Information System, which describes animals that are known or may occur in a particular geographic area. Field surveys may be necessary to determine the presence or absence of some of these species on or near the proposed area. Also, additional sensitive animal species may be present, but their presence has not been documented in our information system.

**Prince George and Waverly Quadrangles**

This Department has recommended that the Blackwater Swamp from County Route 635 crossing (Near Disputanta, Prince George County) upstream to US Route 460 Crossing and that Coppahauk Swamp from its confluence with Blackwater River upstream including headwaters, including Harrell's Pond and its tributaries, be designated as "Outstanding State Resource Waters—Waters Containing Endangered or Threatened Species" (VR 680-21-07.2-C) due to the documented occurrence of the state endangered blackbanded sunfish (*Enneacanthus chaetodon*). On the Prince George Quadrangle, the project corridor comes within a mile of the specified reach and crosses several tributaries to it. On the Waverly Quadrangle, the project corridor crosses the specified reach of Coppahauk Swamp and several of its tributaries. Also on the Waverly Quadrangle, the state special concern little blue heron (*Egretta caerulea caerulea*) has been observed within one mile of project corridor.
Maury Quadrangle

The corridor passes within a mile of an active nesting colony of the federal endangered red-cockaded woodpecker (*Picoides borealis*) and also through potential nesting habitat.

Disputanta North Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor.

Disputanta South Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor.

Ivor Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor.

Raynor Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor.

Windsor Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor.

Chuckatuck Quadrangle

The federally threatened Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*) has been documented within the project corridor. Due to the presence of the federally threatened Dismal Swamp southeastern shrew within the project corridor specific project activities should be coordinated with the Department and the United States Fish and Wildlife Service (USFWS).
Bowers Hill Quadrangle

The federally threatened Dismal Swamp southeastern shrew (Sorex longirostris fisheri) and the state endangered canebrake rattlesnake (Crotalus horridus atricaudatus) have both been documented within and adjacent to the proposed project corridor. The applicant should coordinate with this Department regarding the canebrake rattlesnake and with this Department and the USFWS for the Dismal Swamp southeastern shrew. The state special concern great egret (Casmerodius albus egretta) and the state special concern yellow-crowned night-heron (Nyctanassa violacea violacea) have been documented in the general area. They may occur within the project corridor if habitat conditions are appropriate.

Zuni Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, there is the potential for the occurrence of the state threatened Mabee’s salamander (Ambystoma mabeei) if habitat conditions are appropriate.

Norfolk North Quadrangle

There is a colonial bird rookery within the project corridor. This rookery supports nesting black skimmers (Rynchops niger), common terns (Sterna hirundo), and gull-billed terns (Gelochelidon nilotica). The federal candidate northern diamondback terrapin (Malaclemys terrapin terrapin) has been documented within the project corridor. The following state special concern species may occur in the project corridor if habitat conditions are appropriate: great egret (Casmerodius albus egretta), yellow-crowned night-heron (Nyctanassa violacea violacea), least tern (Sterna antillarum), and the common barn-owl (Tyto alba).

Norfolk South Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, there is the potential for the occurrence of the federal candidate northern diamondback terrapin (Malaclemys terrapin terrapin) within the project corridor. The state special concern great egret (Casmerodius albus egretta), state special concern Forster’s tern (Sterna forsteri), and the state special concern yellow-crowned night-heron (Nyctanassa violacea violacea) have been documented in the general area. They may occur within the project corridor if habitat conditions are appropriate.
Hampton Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, there is the potential for the occurrence of the federal candidate northern diamondback terrapin (*Malaclemys terrapin terrapin*) within the project corridor. The following state special concern species may occur in the project corridor if habitat conditions are appropriate: yellow-crowned night-heron (*Nyctanassa violacea violacea*), least tern (*Sterna antillarum*), and the Caspian tern (*Sterna caspia*).

Williamsburg Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, data provided to this Department from the Virginia Department of Agriculture and Consumer Services (VDACS) document the federally endangered small whorled pogonia (*Isotria medeoloides*) approximately 2 miles east of the project corridor. A great blue heron (*Ardea herodias herodias*) rookery has been documented 2.5 miles east of the project site.

Hog Island Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, nesting activity of the federally threatened bald eagle (*Haliaeetus leucocephalus*) has been documented within one mile of the project corridor. Therefore, activities related to this project should be coordinated with this Department and the USFWS. The following state special concern species have been observed in the vicinity of the project corridor: common barn-owl (*Tyto alba*), northern harrier (*Circus cyaneus*), common moorhen (*Gallinula chloropus cachinnans*), Caspian tern (*Sterna caspia*), and Forster's tern (*Sterna forsteri*).

Yorktown Quadrangle

There are currently no documented occurrences of listed species in the vicinity of the project corridor. However, the state threatened Mabee's salamander (*Ambystoma mabeei*) has been documented at three locations adjacent to the northern end of the project corridor; therefore, the applicant should coordinate project activities with this Agency. The state threatened barking treefrog (*Hyla gratiosa*) has been documented 2 miles west of the project corridor. Nesting of the state special concern great egret (*Casmerodius albus egretta*) has also been documented 1.5
miles west of the project corridor. Other species of concern that may be in the project corridor include the following state special concern species: little blue heron (*Egretta caerulea caerulea*), Caspian tern (*Sterna caspia*), least tern (*Sterna antillarum*), and northern harrier (*Circus cyaneus*).

**Mulberry Island Quadrangle**

There are currently no documented occurrences of listed species in the vicinity of the project corridor. Observations of the state special concern great egret (*Casmerodius albus egretta*) and nesting of the state special concern common barn-owl (*Tyto alba*) have been documented in the general project area.

**Newport News North Quadrangle**

The state endangered canebrake rattlesnake (*Crotalus horridus atricaudatus*) has been documented within the project corridor and at several locations just east of the project corridor. Therefore, the applicant should coordinate project activities with this Agency. The state threatened Mabee's salamander (*Ambystoma mabeei*) has been documented further east of the project corridor.

**Newport News South Quadrangle**

There are currently no documented occurrences of listed species within the project corridor. The following species have been documented approximately 1.5 miles from the project corridor: federally endangered peregrine falcon (*Falco peregrinus*), federally threatened piping plover (*Charadrius melodus*), federal candidate northern diamondback terrapin (*Malaclemys terrapin terrapin*), and rookeries of the state special concern yellow-crowned night-heron (*Nyctanassa violacea violacea*) and least tern (*Sterna antillarum*). There is the potential for the federally endangered Kemp's Ridley sea turtle (*Lepidochelys kempi*), federally threatened Atlantic green sea turtle (*Chelonia mydas*), and federally threatened loggerhead sea turtle (*Caretta caretta*) to occur when water temperatures exceed 60°F. This area serves as an important nursery/foraging area for the Atlantic bottlenose dolphins (*Tursiops truncatus*) due to increased food availability and added protection from environmental perturbations. The coastal migratory stock of bottlenose dolphins was listed as "depleted" in April 1993 under the Marine Mammal Protection Act and a conservation plan is being developed by the National Marine Fisheries Service. In addition to marine mammals and sea turtles, anadromous fishes including alosid species
ESS LOG# 5952
Michael Baker, Inc.
December 20, 1995
Page 6

(American shad, hickory shad, blueback herring, alewife) and striped bass have been documented in the James River at the Hampton Roads Tunnel. This area is a migratory pathway to upstream spawning sites. The state special concern Atlantic sturgeon (Acipenser oxyrhynchos) has been documented near the Hampton Roads Tunnel.

Endangered plants and insects are under the jurisdiction of the Virginia Department of Agriculture and Consumer Services, Bureau of Plant Protection. Questions concerning sensitive plant and insect species which may be found at the project site should be directed to John Tate at (804) 786-3515.

There is a processing charge of $275.00 for our response. Please remit a check, made payable to TREASURER OF VIRGINIA, within 30 days to Mary Beth Murr at the address listed on the first page. Include a copy of this letter with your payment to ensure that your account is properly credited.

This letter summarizes the likelihood of the occurrence of endangered or threatened animal species at the project site. If you have additional questions in this regard, please contact me. Please note that this response does not address any other environmental concerns. These issues are analyzed by our Environmental Services Section, in conjunction with interagency review of applications for state and federal permits. If you have any questions in this regard, please contact Ray Fernald at (804) 367-8999.

Sincerely,

Tom Wilcox
FWIS Aquatic Analyst

cc: R.T. Fernald, VDGIF
    K. Mayne, USFWS
    J. Tate, VDACS
    D. Schwab, VDGIF
ATTACHMENT 2 FOR PIPING PLOVER BA

United States Fish and Wildlife Service
Craney Island
Piping Plover Observation
Field Notes
1994 and 1995
<table>
<thead>
<tr>
<th>TO: CINDY SHULTZ</th>
<th>OFFICE: U.S. FISH &amp; WILDLIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHONE: (804) 693-6691</td>
<td>FAX: (804) 693-9032</td>
</tr>
<tr>
<td>FROM: BILL RAWLS</td>
<td>FAX: (804) 481-3304</td>
</tr>
<tr>
<td>TOTAL PAGES (including Header): 9</td>
<td>DATE: 8 MAY 94</td>
</tr>
</tbody>
</table>

**REMARKS:**  BIRD OBSERVATIONS FOR 4/25/94-3/5/94 AT U.S. ARMY.
COMMISSIONER, CHAIRY ISLAND, PORTSMOUTH, VA.
April 27, 94

CRANEY ISLAND

PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

B. Buck
B. Akers
M. Malde
TO: CINDY SHULTZ
PHONE: (804) 693-6694

FROM: BILL RAWLS
FAX: (804) 484-3844

TOTAL PAGES (Including Header): 5  DATE: 26 MAY 94

RELEASER'S SIGNATURE: William L. Rawls

REMARKS: BIRD OBSERVATIONS FOR 18, 23, 24 & 25 MAY 94 AT U.S. ARMY
CORPS OF ENGINEERS, CRANEY ISLAND, PORTSMOUTH, VA.
May 18, 1994 2:44 PM

FORALIA

CRANED ISLAND adults nesting
36-40

PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

area on south dune
road is flagged with white flag & pole
in place need 10 MORE
May 23, 1994 7:15 AM 3:00 PM Survey/monitor

R. Beck
J. Crumrine

CRANEY ISLAND

Dog Tracks
30 Birds

1 pair of Least Tern

Least Tern

3,500 Least Tern

Piping Plover

3 Bird Nest Washed Out

Cameras:

1 pair

Piping Plover

New Colony on North Barrier Levy, 6/5/94

4 BK Necker Bilt

3,500 Least Tern

Counting, SCAV Nests, Incubation

Pump a two foot sand layer where indicated

Area should be pumped into for approximately three days

- Check with B. Rawls about well pad use
- Met Barland, Skip, Tampa, Duncan

Summary:

1) South dyke - road, colony posted + continuing

   To nest - post spawning fish then down toward spill box

2) Vehicle traffic traveling around

   Road closed sign on p. outside road

3) Going West - Least Tern, Canoeing, Scope + 4 BK Necker 6/5/94

4) New Colony on North Barrier Levy - Spain
PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

MAY 24
Piping Plover (IPr.), 8f + 9 oystercatchers
MATING ON MAY 24 AT 6:15 PM

Nest building in progress - scrape with lining - area marked off with flag

MAY 25 - 2 birds on nest, eggs at 2:15 AM
TO: CINDY SHULTZ
PHONE: (804) 693-6694
OFFICE: VA. FISH & WILDLIFE
FAX: (804) 693-9032

FROM: BILL RAWLS
FAX: (804) 484-3844

TOTAL PAGES (Including Header): 4 DATE: 2 JUNE 94

RELEASER'S SIGNATURE: [Signature]

REMARKS: BIRD OBSERVATIONS FOR 27 & 31 MAY 94 AT U.S. ARMY CORPS OF ENGINEERS, CRANEY ISLAND, PORTSMOUTH, VA.
May 27, 1994  J.C. IRINE

8:30 AM - 12:15 PM

Clear, sunny, windy  CRANEY ISLAND

PUMP A TWO FOOT SAND LAYER WHERE INDICATED
AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

SUMMARY:

1) pair of piping plovers nesting (and have one egg) on North Division Rd.
   - observed nesting (?) at 12:00 PM

2) 11 black-necked stilts observed at dock pad area.
CRANEY ISLAND

PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY

THREE DAYS

Recommendations / Summary

1. 3 Piping Plover Pairs on Territory
   - 3 Nests
     - A) North Dyke Nest 4 Eggs
     - B) North Perimeter Road - 3 Eggs (2 Nests)
     - C) Been Road Between North Dyke Road
       + North-West Corner, Just North of
       New Wick Access Road (2 Eggs)
   - Posted Notice South of Area around Nest
3. posted 4 signs at least 500' eating
Between N & S lanes of dyke road on west side

4. Need to post additional signs around piping plant west – least tern calas
5 pairs also nesting in area –

5. Keep all visitors & Uchichelan traffic out of posted areas –

31 May 94
Page 2
**Department of the Army**
**U. S. Army Corps of Engineers**
**Craney Island Project Office**
**4599 Rivershore Road**
**Portsmouth, Virginia 23703-1513**
**(804) 484-1021**

---

**Facsimile Header**

<table>
<thead>
<tr>
<th>TO:</th>
<th>CINDY SHULTZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHONE:</td>
<td>(804) 693-6694</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OFFICE: VA. FISH &amp; WILDLIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHONE:</td>
</tr>
<tr>
<td>FAX:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FROM: BILL RAWLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL PAGES (INCLUDING HEADER): 1</td>
</tr>
<tr>
<td>DATE: 7 JUNE 94</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IN INITIALS &amp; SIGNATURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>William J. Rawls</td>
</tr>
</tbody>
</table>

| REMARKS: BIRD OBSERVATIONS FOR 2, 3 & 7 JUNE 94 AT U.S. ARMY CORPS OF ENGINEERS, CRANEY ISLAND, PORTSMOUTH, VA. |
JUNE 3-94
8/30 - 3/30
CRANEY ISLAND

1. EXCLUDE CONCRETE + Piping at 20

2. All plates checked
   APP = 42gpa
   APPC = 28gpa

3. All trans checked
   Status same

4. Do not remove crane 240 until P.BECK comes early in June 7, 94
   Terne + Piping
   Terne + 1 1/2" pipe 1/4" fine on upper end Road

5. Leave
   Exclusion materials within working
   Compound to use for Work Area

UMP A TWO FOOT SAND LAYER WHERE INDICATED
EA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

4" x 12" inside will mesh
piping, pipeline (B)
JUNE 7, 94

10' 15" RM
BECK, PEAKE
B. RAWLS FOR UPPER CRANE & N.W. GRAIN
CRANEY ISLAND

1. Monitor entire facility
2. Checked pipe - 3 N. Piping floor
3. Active west
4. Surveyed area - ONE PAIR
   - Non-terminal piping floor
   - O.R. (inactive) - PAIR COPULATING
5. Marked least
6. Rawls' notes

PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY
THREE DAYS

[Diagram of area]

1. Marked all areas that should be pumped
2. Check: A pair of crane 240 removal to
   least determined to piping floor
3. After crane 240 removal - all bids returned
   to meet immediately. Site was accomplished
   with a minimum of difficulties
June 2, 1994 - 9:13 PM

Tide: low

Weather: sunny, hi = 78°

Craney Island

Pump a two foot sand layer where indicated.

Area should be pumped into for approximately three days.
<table>
<thead>
<tr>
<th>TO: CINDY SHULTZ</th>
<th>OFFICE: VA. FISH &amp; WILDLIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHONE: (804) 693-6894</td>
<td>FAX: (804) 693-9032</td>
</tr>
</tbody>
</table>

| FROM: BILL RAWLS | FAX: (804) 484-3944 |

| TOTAL PAGES (Including Header): 7  | DATE: 16 JUNE 94 |

RELEASER'S SIGNATURE: 

REMARKS: BIRD OBSERVATIONS FOR 7, 8, 10, 13, 14 & 16 JUNE 94 AT U.S. ARMY CORPS OF ENGINEERS, CRANEY ISLAND, PORTSMOUTH, VA.
JUNE 7, 94
10:15 AM
BECK, PEAK, B. RAWLS FOR UPPER DYLCE - N.W. CONNEX

Craney Island

Pump a two foot sand layer where indicated. Area should be pumped into for approximately THREE DAYS.

12 Black-Nickel Sheel observed. Bed are terminal + mostly dry, needing SUMMARIES TO DO

1. Monitor all areas with least water + piping planes.
2. Dechannel water of crane 240 to removal.
3. After crane 240 removal - all work resumed
   to meet immediately. This activity has accomplished
   with a minimum of disturbance.
4. Close off area, start area immediately N of new waterline section.
June 8, 1994 - Wednesday
J. CROMKINE
9:30 AM - 26:45 PM
Tide high - CRANEY ISLAND

1. All observations made from far enough away up to
   disturbed adults -

2. Piping Plover
   A = 9 - eggs
   B = 9 - eggs
   C = 9 + 9 - eggs

3. No least tern observations

Pump A two foot sand layer where indicated
Area should be pumped into for approximately
thirty days

Consider upping van enclosure canned area at North Drive Rd. pair C. Wait for
4th egg.
JUNE 10, 1994 - FRIDAY
J. CRUMBLING
9:00 AM - 12:00 PM
Tide: High
Weather: Overcast

CRANEY ISLAND

PUMP A TWO FOOT SAND LAYER WHERE INDICATED
AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

*: FEMALE ON UPPER DYLE ROAD HAS ONE NEW EGG. 4 TOTAL.
♀ Returned to nest - EXCUSE on Monday.
JUNE 12, 1994 - MON.
J. CRUMINE
7:30 AM - 10:45 AM
Tide very low
clear, sunny

CRANEY ISLAND

PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY
THREE DAYS

NOTE: UPPER Dike NEST EMPTY - POSSIBLE TRACKS (PAINT)
      OBSERVED APPROACHING NEST... ALL EGGS GONE
      ADULT PLOVERS NOT FOUND.

Nest A =  nest empty
No eggs

Nest B =  nest empty but deep possible tracks

Nest C =  nest occupied
with 4 eggs

1. Monitor nest immediately
2. All fine
   except
   North Upper
   Dike Nest
   Pigeon C =
   Nest Abandoned
   With 4 Eggs

3. Terns idle
   present
   This Plover
   area.
BECK, CRUMNANE  JUNE 16, 94

CRANEY ISLAND

PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

Summary:

1. Piping Plume C - ABANDONED
2. Fox Tracks - 1 Ghost Crab Hole Area
3. All other areas ok - Terns Beginning Hatching
4. 3 Black Necked Stilt Nests
   1 - 6 Egg Nest Around Rod/Wire Pile

Results:

1. All Least Tern colonies stable with exception of BYKE colony - Area Abandoned. Also

June 16, 94

Beck, Crumnae

1. Monitored Enviromental Facility
2. Least Tern Colonies all checked
3. Piping Plume Areas checked
4. Stilt survey

Piping Plumes Report:

Pair A - 1 Egg, 2,4 Flighting
Pair B - 3 Eggs, 2,3 Flighting
Pair C - Nest Abandoned
1 P. at nest
1 P. on same dimensional
Facsimile Header

TO: Cindy Shultz  
Office: VA. Fish & Wildlife  
Phone: (804) 693-6694  
FAX: (804) 693-9032  
Total Pages: 3  
Date: 15 July 1994

FROM: Bill Rawls  
Office: Craney Island  
Phone: 804-484-1021  
FAX: 804-484-3844


PECK, CRANKIN: July 13

Summary for Deb
PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

1. Piping Places - pp A, B, C, D, E

2. EA - June 17 - NA/CH/HU2/NEO/IGS ONTUNE 18
   June 17 - MARCH 18

3. ppB - June 18
   3.1 cm Cylindrical - Wasting Date: July 1-4
   3.2.2 Cylindrical - Disappearance By July 1
   3.3.3 Cylindrical - Disappearance By July 1
   3.4.4 Cylindrical - Disappearance By July 1
   3.5.5 Cylindrical - Disappearance By July 1

4. ppC - Absear - For Predation on June 13

5. ppD - Nest with 3 eggs (2 hatched) [RM577]

6. ppE - 2 adult foraging / carrying [RM577]
   6.1.1 Forage on July 1
   6.1.2 Forage on July 1

7. ppF - a & OR pair generally foraging in Wickan
PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

- Least tern colony on South Avena Road, young from 4 days to fledged & free flying - 60 pairs total - on small debris.
- 46 pairs in Beach & N.W. corner.
- 6 B.K. necked stilts 16 adults - 2 young
- 4 adult Avoets (migrating) 1st seen in July.
Department of the Army
U. S. Army Corps of Engineers
Norfolk District
Craney Island Project Office
4599 Rivershore Road
Portsmouth, VA  23703-1513

Facsimile Header

TO:  Cindy Shultz                        Office: VA. Fish & Wildlife
Phone:  (804) 693-6694                FAX:  (804) 693-9032
Total Pages:  2                        Date:  25 July 1994

FROM:  Bill Rawls                        Office: Craney Island
Phone:  804-484-1021                FAX:  804-484-3844

Remarks:  Bird Observation Summary for 16 July thru 21
July 94 at the U.S. Army Corps of Engineers, Craney
Island, Portsmouth, Va.
JULY 21, 1994
T. CRUMPINE
7:25 - 10:15 AM
TIDE HIGH

CRANEY ISLAND

PUMP A TWO FOOT SAND LAYER WHERE INDICATED
REA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

SUMMARY

1) SAT, JULY 10, 1994
5 adult p. plumes (3 females, 2 males)
30 young on beach
1 pm. (6♀+♂) at nest
1 pm. foraging 3♀♂
extra 2♀ foraging
- least tern colony active - 65 young counted
- R. B. REESE SURVEYOR

2) MONDAY, JULY 18
T. CRUMPINE
7 adult p. plumes on beach foraging
(3 pairs + 1 ♀♀)
- 1 pm. with nest - 3♂♂♀
- 3 pm. foraging + 1 ♀♀
- least tern colony active

b) 4 still young +
3 adults foraging on beach
2) 5 avocets on beach

10-15
7 black backed stilts
young, 2 adults
Department of the Army
U. S. Army Corps of Engineers
Norfolk District
Craney Island Project Office
4599 Rivershore Road
Portsmouth, VA 23703 1513

TO: Cindy Shultz  Office: VA. Fish & Wildlife
Phone: (804) 693-6694  FAX: (804) 693-9032
Total Pages: 2  Date: 29 July 1994

FROM: Bill Rawls  Office: Craney Island
Phone: 804-484-1021  FAX: 804-484-3844

Remarks: Bird Observation Summary for 28 July 94 at
the U.S. Army Corps of Engineers, Craney Island,
Portsmouth, Va.
PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

Large flocks of shorebirds

1. Western
2. Pectoral sandpiper
3. Surf sandpiper
4. Large flocks of Western Grebes
5. Terns
6. Sooty terns (red)
7. Wilson's stilts
8. 17 BK - Red-Necked stilts
9. 1 Avocet
10. Combinailed sandpipers
11. Laughing gulls
12. 90 Royal Terns
13. Many Brants
14. Pelican
15. Snow geese
16. 180 Greylag Geese
17. 61 Snow Geese
18. Many Brants
Facsimile Header

TO: Cindy Shultz  
Office: VA. Fish & Wildlife  
Phone: (804) 693-6694  
FAX: (804) 693-9032

Total Pages: (3)  
Date: 15 August 1994

FROM: Bill Rawls  
Office: Craney Island  
Phone: 804-484-1021  
FAX: 804-484-3844

CRANEY ISLAND

PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

1. Leaking plum. told for Aug 6
2. Adult + 2 yokeday young
3. Large Plunk of mixed shrubs
4. 8 Blm's
5. 2 Avoets
6. Mosquitos abounding

Aug 6, 94
Bless, Crumm
M. Maulle
major front passed the
Ald 5 pm, 10 pm Aug 5, 84

L. Gall 15 lbs
Regal 32 lbs + Regal 150
43 lbs Yellows
15 lbs Gull
31 Royal
43 G.B. Bold

Aug 8
5.50 lbs C. 8
2.30 lbs C. 10
PUMP A TWO FOOT SAND LAYER WHERE INDICATED

AREA SHOULD BE PUMPED INTO FOR APPROXIMATELY THREE DAYS

1. All signs (posted during breeding season) for designating nesting area of plants, trees, shrubs, etc. - Removed - 32 total -

2. No piping plants observed on this survey -

3. Least tern adults fledged young (007 Young Plants)
Facsimile Header

TO: Karen Terwilliger
Phone: (804) 367-6913
Total Pages: 3
Date: 23 May 1995

FROM: Bill Rawls
Phone: 804-484-1021

Office: U.S. Fish & Wildlife
FAX: (804) 367-0262

Office: Craney Island
FAX: 804-484-3844

May 18, 95

LOCATION MAP: CRANEY ISLAND

OBSERVERS: R. Beck, N. Havill, E. Meritus, A. White
            Consists of W.M. Biology

VISITORS: May 4, 7, 11, 15, 18, 18

IN MAY

1) 2 pairs piping plover
10:00-3:30

2) 2 nests - A nest w/ 4 eggs.

3) 3 sub colonies of least tern
MARKED with sign, east side area.

4. Road closed from N. end 8 am to 5 pm
Summary:
1) 2 Piping Plover Nests: (1w/4 eggs, 1b/3 eggs)
   1 Piping Plover Family: 1+ 1o+ 4y
2) 3 Least Tern Sub-Colonies: 74 Adults
3) No Piping Plovers seen along beach area

Recommendations:
1) Close South Division Drive Rd. to traffic as there are approx. 8 nests in the middle of the road
2) Remove all equipment from immediate vicinity of N. Division Drive road edge to Piping Plovers
TO: Cindy Shultz  
Office: VA. Fish & Wildlife
Phone: (804) 693-6694  
FAX: (804) 693-9032

Total Pages: (6)  
Date: 5 June 1995

FROM: Bill Rawls  
Office: Craney Island
Phone: 804-484-1021  
FAX: 804-484-3844

Summary:
1) Piping Plover (2) - parents and 4 young (5-6 days old?) still feeding at pond area on N. Avenue, Rd. (already)
2) 5 Black-necked Stilts feeding in the weed area
3) New pair of Piping Plovers found foraging in SE corner of pond. Also a Red-breasted Merganser out.
4) Piping Plovers (2) - 1 of incubating 4 eggs - area EXCLUDED, female returned after 2 minutes
5) Piping Plover (2) - 1 of incubating 4 eggs - EXCLUDED

Recommendations: Search further the SE corner for nests. Continue monitoring 100 yds. on either side of described area.
Summary:

1) [BLANK] (at [X]) incubating - no other
   [BLANK] seen (birds at all inst., went back on)

2) [BLANK] incubating ("Angel lady") - [BLANK]
   [BLANK] set [BLANK] - fox exclusions
   [BLANK]
   [BLANK]
   [BLANK]
   [BLANK]

3) [BLANK], but did not see [BLANK] at NDH. Punch
   [BLANK], [BLANK] apple - they saw or trying that. [BLANK]
Summary:
1) Heed Stilts, no sightings at Wick Rd. No ducks.
2) Piping Plover feeding at pond, Hampton cliff. Still have buckets at base of pole.
3) No Piping Plover sighted at SE corner on river (Piping Plover #2).
4) Piping Plover #3, still incubating, Piping Plover #1, not incubating.
5) Piping Plover pair seen flying in area on other side of DB Bailly.
6) Terns on S. Division Rd. Still don't have young, some cattail activity.
7) No Plowder on beach.
Recommendation: Away from pond area, 100 yards on either side.
8) Keep people away from pond area.
Piping Plover
Department of the Army
U.S. Army Corps of Engineers
Norfolk District
Craney Island Project Office
4599 Rivershore Road
Portsmouth, VA 23703-1513

Facsimile Header

TO: Cindy Shultz
Office: VA. Fish & Wildlife
Phone: (804) 693-6694
FAX: (804) 693-9032
Total Pages: (3)
Date: 5 June 1995

FROM: Bill Rawls
Office: Craney Island
Phone: 804-484-1021
FAX: 804-484-3844

Recommendations:

1) Keep all vehicles + foot traffic out of (6/en. 100 yards of) pond area where Piping Plover & family is foraging

2) Keep all vehicles off of beach and on closed road on North end (evidence of car + tractor on closed road & beach where posted signs are)

3) Need new fencing for parameter road (at road closed sign) - see map (#—#)
TO: Cindy Shultz | Office: VA. Fish & Wildlife
Phone: (804) 693-5694 | FAX: (804) 693-9032

FROM: Bill Rawls | Office: Craney Island
Phone: 804-484-1021 | FAX: 804-484-3844

Total Pages: (2) | Date: 7 June 1995

SUMMARY

1. Piping Plovers
   - A - 9 incubating 4 eggs
   - B - 11 attending 4 on nest
   - C - 5 & 6 of fledgling

2. Terns - continue to be in adults
3. stilts - terminal
Department of the Army
U. S. Army Corps of Engineers
Norfolk District
Craney Island Project Office
4599 Rivershore Road
Portsmouth, VA 23703-1513

TO: Cindy Shultz
Phone: (804) 693-6694

Office: VA. Fish & Wildlife
FAX: (804) 693-9032

FROM: Bill Rawls
Phone: 804-484-1021

Total Pages: (4) Date: 13 June 1995

June 3, 1995
9:30-1:00pm

Observer: A. White

LOCATION MAP: CRANEY ISLAND

Summary:
1. Piping Plover (1) on nest - 5 eggs present
2. No Shilts or Avocets at duck pond
3. Piping Avocet
4. Young feed at NOX ed. pond
5. Piping Plover (1), male - incubating, no sign of clutch
6. Least Terns incubating, counting on S. Ed - no sign of alighting
7. No Murre (ID) seen on beach or river

Recommendation: None
Summary:
1) Piping Plants B1, ot incubating (egg-1000 a month)
2) No Shells or Avocets at unit
3) Piping Plants C1, 01+02+2 young (inc. flying)
4) Piping Plants D1, incubating, nearby, if egg
5) Least Terns on 8th Ave. Rd. still incubating, no young
6) Beach Rd (closed red by Plant B1), no Piping Ot
7) Terns any longer to join of new vehicle traffic

Recommendation:
1) Keep vehicles off closed roads
Summary: 1) Beach (N) Rd. Closed sign needs to be repaired, blew down again (we fixed it temporarily)
2) Piping Plover (3) or, 4 eggs
3) No Stilts on Avocet or Wick Rd., no Stilts in N. Div. gulley
5) No Terns nesting on N. Beach Rd. (Closed Rd.)
6) No Pluvias feeding on SE corner (high tide, rough water)
7) at Piping Plover (9) feeding at N. Div. pond (hoo-orryang)
8) at Piping Plover (8) incubating
9) S. Div. Rd. very wet – didn’t walk down – too rainy
Facsimile Header

<table>
<thead>
<tr>
<th>TO: Cindy Shultz</th>
<th>Office: VA. Fish &amp; Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone: (804) 693-6694</td>
<td>FAX: (804) 693-9032</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FROM: Bill Rawls</th>
<th>Office: Craney Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone: 804-484-1021</td>
<td>FAX: 804-484-3844</td>
</tr>
</tbody>
</table>

June 15, 1995

Observers: A. Beck, N. Havill, B. Holcombe, L. Hudson, E. Martin, J. McDowell

VA FISH P.02

Craney Island

8:48 AM

13125NM

Diagram:

- Piping Plover A
- B. Div. Rd. 
- No piping
- 4 eggs
- Incubating
- No piping
- NE corner
- Black-necked Stilt

Observations:
1. Avocets + Stilts feeding on beach + Black-necked Stilts (2)
   - Avocets on nest (BNS) + 2 eggs in middle of nest + male
   - No stilts seen in cove or (or Avocets)
2. Piping Plovers at N Div. Rd. Pond
3. Piping Plover B + B. Div. Rd. + incubating 4 eggs + nearby
4. Least Terns on B. Div. Rd. washed at recent storm, near nest
5. Piping Plover A + incubating 4 eggs

Recommendations:
1. Place sign + barrier across North Rd. boundary before Plume A
2. Check + barrier across North Rd. before skimming vegetation
3. Activity should remain at least 1/4 mile from Plume A
Observation:

- East Martin
- Weather:
  - Wind (SO) moderate
  - Visibility

Location Map: Craney Island

Summary:

1. No Pieds in the check of the corner (very distant)
2. Looped en platform - SE corner - no young seen (getting ready)
3. Sibling older (B) - only 2 eggs, no young in sight - no predator tracks, no feeding, no nest

- New pair seen near Piping Shag, check Sibling older (B) - courtship
- Sibling nest - no young seen, both adults on nest, no sign when forced back
- Sibling older (B) - still incubating, 2 eggs
- Sibling older (B) - not feeding, nesting at North Point, a lot of Terns
- Black-backed Shearwater - incubating, 4 eggs in garden on N. Div. Rd.
- Black-backed Shearwater - incubating, 4 eggs in garden on N. Div. Rd.
- A few Terns hanging about West of N. Div. Rd - no nests seen

[Signature]
Summary:
1) No piping down (0) feeding on SC corner.
2) Osprey still on platform (SC corner by ferry)
3) Piping down 1 - 2 young hatched, 0+0+0, parents nearby. Still 2 eggs on nest - 0 pierced. "Extra" piping down 0, running around area - will look for nest. Thurs.
4) Terns on S. Div. Rd. Don't look very promising - only a few 1's eggs nest - no young.
5) N. Div. Rd. Both - both parents - young feeding up on N. Div. Rd. (Light Plane)
6) Nothing at wick
7) Split nest 0 + 0 eggs 0 + 0, Div. Rd. Parent incubating
8) Piping down 1 - one still incubating 0 eggs

Recommendation: if keep equip. away (0) still nest Div. Rd.
TO: Cindy Shultz
Phone: (804) 693-6694

FROM: Bill Rawls
Phone: 804-484-1021

OFFICE: VA. Fish & Wildlife
FAX: (804) 693-9032
Fax: 804-484-3844

Total Pages: (2)
Date: 22 June 1995

Remarks:

Bird Observation Summary for 22 June 1995 at
the U.S. Army Corps of Engineers, Craney Island,
Portsmouth, Va.
Summary:
1) Black-necked Stilt on N. Div. Rd. fully ok - 4 eggs, parent incubating
2) Nothing at Wick
3) 1 nest + other species (Tern) on N. Div. Rd. - we put rocks around it, but Rd. isn't closed
4) Piping Plovers at N. Div. Rd. pond - 3 adults - 20+ 10 yrs.
   800, new p. 4 or 5 fr. Piping Plover 4 p.m.?
5) Piping Plover? - at intake, 3 eggs (1 gone), on scrape area
   - scrape newly forming - no other signs of predation
   - young hatched; no new chicks
6) Piping Plovers? - A or B(?) nearby, but no eggs or chicks
7) 2 eggs (1 placed) left - or active forum (behind)

Recommendation:
1) Be careful of marked nests on N. Div. Rd.
   keep 100 ft fr. N. Div. Rd. pond at all times
TO: Cindy Shultz  
Office: VA. Fish & Wildlife  
Phone: (804) 693-6694  
FAX: (804) 693-9032  

FROM: Bill Rawls  
Office: Craney Island  
Phone: 804-484-1021  
FAX: 804-484-3844  

Total Pages: (2)  
Date: 26 June 1995

CRANEY ISLAND

Summary

Pluver A: 2 eggs & incubating

Wick: nothing

N. Div. Road: 2f, 2m, 1 juvenile (pairs c & d)

Pluver B: 2 f & m adults, 2 juveniles

S. Div. Road: ~20 pr. adult terns; Few 1/2 egg nests/scrapes; no ya

SE corner: nothing

N. Div. Road: tern scrapes - no eggs

Black-necked stilts nest - adult incubating 4 eggs

Recommendations: continue to keep equipment 100 yards away from pond & N. Div. Road

June 26, 1995

Observers: N. Hauill

L. Hudson

E. Mertus

Weather: warm, humid, overcast

9:30 AM - 11:10 AM
TO: Cindy Shultz  
Office: VA. Fish & Wildlife  
Phone: (804) 693-6694  
FAX: (804) 693-9032  

Total Pages: (3)  
Date: 5 July 1995

FROM: Bill Rawls  
Office: Craney Island  
Phone: 904-484-1021  
FAX: 804-484-3844

**Piping Plover**

Department of the Army  
U. S. Army Corps of Engineers  
Norfolk District  
Crane Island Project Office  
4599 Rivershore Road  
Portsmouth, VA 23703-1513

**Facsimile Header**

<table>
<thead>
<tr>
<th>TO:</th>
<th>Cindy Shultz</th>
<th>Office: VA. Fish &amp; Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone:</td>
<td>(804) 693-6694</td>
<td>FAX: (804) 693-9032</td>
</tr>
<tr>
<td>Total Pages:</td>
<td>(4)</td>
<td>Date: 16 July 1995</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FROM:</th>
<th>Bill Rawls</th>
<th>Office: Crane Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone:</td>
<td>804-484-1021</td>
<td>FAX: 804-484-3844</td>
</tr>
</tbody>
</table>

**Remarks:** Bird Observation Summary for 5, 10 & 14 July 1995 at the U.S. Army Corps of Engineers, Crane Island, Portsmouth, Va.
SUMMARY:
Black-necked stilts adults territorial on N. Div. Rd. gully. All 4 eggs hatched - young not seen.

2) Nothing seen at wick (deep) or N. Div. Rd. Pond (shells removed closure and 3 eggs for piping) - Line- over to Red.
3) Piping Flax seen foraging behind gully on S. Div. Rd.
4) 5 Piping Flax seen foraging behind gully on S. Div. Rd.
5) Terns still nesting S. Div. Rd.
6) 2 Piping Flax seen foraging on W. Beach + 2 Piping Flax at S.E. corner.

Recommendation:
1) Keep vehicles/equip. away from BNS at N. Div. Rd gully.
Summary:
1) Did not go on N. Div. Rd. due to vehicle constricry
2) Two Black-necked Stilts seen defending area on S. Div. Rd.
3) No Plumers seen on beach area or SE corner
4) Terns still nesting on S. Div. Rd. 4-5 Piping Plumers foraging in back of pullup off S. Div. Rd
5) Centred Rd. Closed (sign on far SE corner)

Recommendations:
1) Keep S. Div. Rd. closed continues to be away of nesting Black-necked Stilts
July 14, 1995

Observers:
R. Beck, Harrell
Hudson
E. P. Martin

School Students
12PM - 3PM

CRANEY ISLAND

Summary:
1) No Storks seen on beach
2) Terns still nesting on S. Div. Rd.
3) No Storks seen off S. Div. or N. Div. corner
4) Kestrel seen off Beach Rd. (N. Div. corner)
5) No Storks in Shells at N. Div. pond or Wick area
6) 4 Piping Plovers away in outer W. off Wick
7) No Storks in Shells (safety) in galley W. of Wick

Recommendation:
1) None
Facsimile Header

TO: Cindy Shultz  Office: VA. Fish & Wildlife
Phone: (804) 693-6694  FAX: (804) 693-9032

Total Pages: (2)  Date: 20 July 1995

FROM: Bill Rawls  Office: Craney Island
Phone: 804-484-1021  FAX: 804-484-3844

CRANEY ISLAND

Summary:
1) SW corner → 8 avocets, tri-colored heron, little blue heron
2) North Div. → 2 stilts; 1 avocet foraging in gulley (N); 2 plovers
3) Wick → plover foraging
4) pond on N. Div. → stilt foraging
5) S. Div. → 6 adult terns

Recommendations
None
Bird Observation Summary for 26 July 1995 at
the U.S. Army Corps of Engineers, Craney Island,
Portsmouth, Va.
The Arrive: 7:50 A.M. Depart: 11:30 P.M.

Summary: 1) 4 piping fowlers at N. Div. Pond (2 adults + 2 young?) 3 piping fowlers at beach -- (2 adults, 1 young) 2 young?) 3 stilts - S. Div. Rd (E. side) - 2 adults, 1 young 4 stilts - S. Div. Rd (W. side) - 2 adults, 2 young Many geese (adults, imm) 5 herons heron 5 loons 1 duck 1 activity at duck -2 stilts, 2 avocets, many

Note: Removed "Road Closed" signs fr. S. Divina Rd

Recommendation:
All roads open to vehicular traffic