

Table of Contents

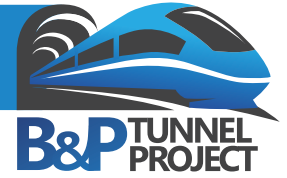


Table of Contents



TABLE OF CONTENTS

EXECUTIVE SUMMARY	ES-1
A. Overview of the NEPA Process	ES-1
B. Project Background	ES-1
C. Purpose and Need	ES-3
D. Alternatives Development.....	ES-3
1. Alternative 1: No-Build.....	ES-5
2. Alternatives 3A, 3B, and 3C.....	ES-5
E. Preferred Alternative.....	ES-7
1. Comparison of Preferred Alternative to Alternative 1: No-Build	ES-7
2. Comparison of Preferred Alternative to Alternative 3A	ES-7
3. Comparison of Preferred Alternative to Alternative 3C	ES-8
4. Ventilation Facilities.....	ES-8
5. Future of the Existing B&P Tunnel	ES-9
F. Affected Environment and Environmental Consequences	ES-9
1. Socioeconomics.....	ES-9
2. Cultural Resources	ES-10
3. Section 4(f) Evaluation	ES-11
4. Natural Resources	ES-11
5. Hazardous Materials	ES-12
6. Solid Waste	ES-12
7. Air Quality	ES-12
8. Noise	ES-13
9. Vibration	ES-14
10. Construction Impacts.....	ES-14
11. Indirect and Cumulative Impacts	ES-15
12. Comparison of Intermediate Ventilation Facility Sites	ES-15
G. Mitigation	ES-16
H. Agency, Elected Official, and Public Coordination and Comments	ES-17
I. INTRODUCTION	I-1
II. PURPOSE AND NEED.....	II-1
A. Project Background	II-1



B. Prior Studies - Baltimore’s Railroad Network..... II-1

C. National High-Speed Rail Program Investments II-1

D. Purpose of the Project..... II-3

E. Need for the Project II-3

 1. Physical Condition II-4

 2. Existing Track Alignment..... II-5

 3. Bottleneck in NEC Operations..... II-6

 4. Operational Needs of the NEC II-8

 5. System Linkage and Rerouting..... II-11

 6. Capacity to Support Existing and Projected Demands..... II-12

F. Summary..... II-15

III. ALTERNATIVES DEVELOPMENT III-1

A. Alternative Design Elements III-1

 1. Alternatives Design Goals III-1

 2. Alternative Design Criteria III-3

 3. Four Tracks..... III-4

 4. Plate H Clearance III-4

 5. Four Separate Tunnel Bores..... III-5

 6. Ventilation Facilities..... III-6

B. Preliminary Alternatives Development and Screening III-7

 1. Engineering III-8

 2. Operational III-9

 3. Environmental..... III-9

C. Alternatives Development and Screening in the Alternatives Report III-11

 1. Alternative 2: Reconstruct/Modernize Existing Tunnel III-11

 2. Alternative 11 Option A III-12

 3. Alternative 11 Option B III-13

D. Alternatives Considered in the DEIS..... III-13

 1. Alternatives 3A, 3B, and 3C..... III-14

E. Alternatives Descriptions and Refinement after the DEIS III-14

 1. Alternative 3A III-15

 2. Alternative 3B III-18

 3. Alternative 3C III-20



F.	Ventilation Facilities	III-23
1.	Intermediate Ventilation Facility	III-23
2.	North and South Ventilation Facilities	III-26
G.	Comparison of DEIS and Refined Alternatives	III-27
H.	Evaluation and Identification of Preferred Alternative	III-30
1.	Comparison of Preferred Alternative to Alternative 1: No-Build	III-30
2.	Comparison of Preferred Alternative to Alternative 3A	III-30
3.	Comparison of Preferred Alternative to Alternative 3C	III-39
4.	Selection of Alternative 3B as the Preferred Alternative.....	III-40
IV.	PREFERRED ALTERNATIVE	IV-1
A.	Introduction.....	IV-1
B.	Overview.....	IV-1
C.	Alignment	IV-11
1.	Description.....	IV-11
D.	Ventilation Facilities	IV-13
1.	Intermediate Ventilation Facility	IV-14
2.	South Ventilation Facility.....	IV-18
3.	North Ventilation Facility.....	IV-21
4.	Intermediate Ventilation Facility Plenum	IV-24
E.	Emergency Egress.....	IV-25
F.	West Baltimore MARC Station	IV-26
G.	Roadway	IV-27
H.	Utilities.....	IV-27
I.	Construction	IV-27
1.	Tunnel Construction Methods	IV-27
2.	Construction Staging Areas.....	IV-29
3.	Truck Routes for Construction Staging Areas	IV-34
4.	Impacts to Light Rail, Metro, and I-83	IV-34
J.	Capital Cost Summary	IV-34
V.	AFFECTED ENVIRONMENT.....	V-1
A.	Socioeconomics.....	V-1
1.	Population.....	V-1
2.	Housing	V-5



3. Minority Race and Ethnicity and Low-Income Populations	V-6
4. Land Use and Zoning	V-10
5. Transportation	V-11
6. Economy.....	V-16
7. Neighborhoods and Community Facilities	V-20
8. Visual and Aesthetic Resources	V-27
B. Public Health and Safety.....	V-28
1. Air Quality	V-28
2. Noise	V-28
3. Hazardous Materials	V-28
4. Safety	V-28
5. Children’s Health.....	V-29
C. Cultural Resources.....	V-30
1. Area of Potential Effects	V-31
2. Historic Architecture	V-31
3. Archaeology	V-37
4. Section 106 Consultation	V-38
D. Section 4(f) Properties.....	V-39
1. Public Parks and Recreation Areas.....	V-41
2. Historic Properties	V-41
E. Natural Resources	V-41
1. Soils	V-42
2. Topography, Geology, Aquifers, and Groundwater.....	V-43
3. Water Resources.....	V-44
4. Coastal Zones	V-48
5. Wildlife and Habitat	V-48
6. Rare, Threatened and Endangered Species	V-50
F. Hazardous Materials.....	V-50
G. Solid Waste.....	V-61
H. Air Quality.....	V-62
I. Noise.....	V-64
J. Vibration	V-66
1. Technical Overview	V-66



2. Existing Vibration Levels V-67

K. Energy V-67

VI. ENVIRONMENTAL CONSEQUENCES VI-1

A. Socioeconomics VI-1

1. Population VI-1

2. Housing VI-2

3. Minority Race and Ethnicity and Low-Income Populations VI-4

4. Land Use and Zoning VI-14

5. Transportation VI-17

6. Businesses VI-20

7. Economy VI-23

8. Neighborhoods and Community Facilities VI-34

9. Visual and Aesthetic Resources VI-38

10. Mitigation VI-44

B. Public Health and Safety VI-45

1. Public Health VI-45

2. Safety VI-47

3. Children’s Health and Safety VI-48

4. Mitigation VI-49

C. Cultural Resources VI-51

1. Historic Architecture VI-51

2. Archaeology VI-53

3. Programmatic Agreement VI-53

4. Mitigation VI-57

D. Final Section 4(f) Evaluation VI-58

1. Use of Section 4(f) Properties VI-59

2. Avoidance Analysis VI-72

3. All Possible Planning to Minimize Harm VI-76

E. Natural Resources VI-81

1. Soils VI-81

2. Topography, Geology, Aquifers, and Groundwater VI-83

3. Water Resources VI-83

4. Coastal Zone VI-85



5.	Wildlife and Habitat	VI-85
6.	Rare, Threatened, and Endangered Species	VI-87
7.	Mitigation.....	VI-87
F.	Hazardous Materials.....	VI-89
1.	Alternative 1: No-Build.....	VI-89
2.	Preferred Alternative	VI-89
3.	Alternative 3A	VI-100
4.	Alternative 3C	VI-103
5.	Mitigation.....	VI-108
G.	Solid Waste	VI-109
1.	Alternative 1: No-Build.....	VI-109
2.	Preferred Alternative	VI-109
3.	Alternative 3A	VI-110
4.	Alternative 3C	VI-110
5.	Mitigation.....	VI-110
H.	Air Quality.....	VI-110
1.	Operational Emissions Analysis.....	VI-111
2.	Greenhouse Gas Emissions	VI-112
3.	Construction Emissions.....	VI-113
4.	Ventilation Facility Emissions.....	VI-115
5.	Mitigation.....	VI-118
6.	Conclusions	VI-118
I.	Noise.....	VI-119
1.	Impact Assessment Methodology.....	VI-119
2.	Evaluation Criteria.....	VI-119
3.	Impacts.....	VI-122
4.	Mitigation.....	VI-124
J.	Vibration	VI-126
1.	Operational Impact Assessment Methodology	VI-126
2.	Operational Vibration Impact Assessment	VI-128
3.	Construction Vibration.....	VI-131
4.	Mitigation.....	VI-134
K.	Energy.....	VI-135



1.	Alternative 1: No-Build.....	VI-135
2.	Preferred Alternative	VI-135
3.	Alternative 3A	VI-136
4.	Alternative 3C	VI-136
L.	Construction	VI-136
1.	Impacts.....	VI-136
2.	Mitigation.....	VI-138
M.	Indirect and Cumulative Impacts.....	VI-140
1.	Regulatory Requirements	VI-140
2.	Methodology.....	VI-140
3.	Resources to Be Evaluated.....	VI-141
4.	Geographic Boundary	VI-141
5.	Temporal Boundary	VI-141
6.	Land Use and Zoning.....	VI-141
7.	Planning.....	VI-143
8.	Past, Present and Reasonably Foreseeable Projects	VI-145
9.	Indirect Effects	VI-147
10.	Cumulative Impacts	VI-149
N.	Irreversible or Irrecoverable Commitments of Resources.....	VI-152
O.	The Relationship between Local Short-Term Uses and the Maintenance and Enhancement of Long-Term Productivity	VI-152
P.	Comparison of Intermediate Ventilation Facility Sites.....	VI-153
1.	Socioeconomic	VI-155
2.	Cultural Resources	VI-156
3.	Natural Resources	VI-157
4.	Hazardous Materials	VI-158
5.	Air Quality	VI-158
6.	Noise	VI-158
7.	Vibration	VI-158
8.	Construction.....	VI-158
9.	Indirect and Cumulative Effects.....	VI-159
VII.	MITIGATION.....	VII-1
VIII.	AGENCY, ELECTED OFFICIAL, AND PUBLIC COORDINATION AND COMMENTS.....	VIII-1



A. Scoping Period VIII-1

B. Agency Coordination VIII-2

 1. Participation VIII-2

 2. Interagency Review Meetings VIII-3

C. Elected Official Coordination VIII-4

D. Public Involvement: Alternatives Development and Evaluation VIII-5

 1. Public Open House: June 19, 2014 VIII-5

 2. Public Open House: October 29, 2014 VIII-5

 3. Public Open House: June 16, 2015 VIII-6

 4. Project Community Meetings VIII-6

 5. Community Association Meetings VIII-7

E. Public Involvement: DEIS Comment Period Process and Mitigation VIII-7

 1. DEIS Comment Period and Public Hearings VIII-7

 2. Public Open Houses: April 6, 2016 and April 16, 2016 VIII-9

 3. Community Association Meetings VIII-9

 4. Mitigation Working Group Meetings VIII-10

F. Agency and Public Comments VIII-10

IX. LIST OF PREPARERS IX-1

X. DISTRIBUTION OF THE FINAL EIS X-1

 Federal Agencies X-1

 State Agencies X-1

 Regional Agencies X-1

 City/County/Other Agencies X-1

 Community Organizations X-2

 Stakeholders X-3

 Elected Officials X-3

XI. REFERENCES XI-1

 GIS Mapping Data Sources XI-6

XII. ACRONYMS XII-1



LIST OF APPENDICES

- Appendix A:** Environmental Resource Impact Mapping
- Appendix B:** Agency Correspondence
- Appendix C:** List of Project Technical Reports and Documents
- Appendix D:** Table of Minority Race and/or Ethnicity and Low Income Populations and Potential Environmental Justice Block Groups
- Appendix E:** Socioeconomic Data Tables
- Appendix F:** List of Permits
- Appendix G:** List of Authorizing Laws and Regulations
- Appendix H:** Programmatic Agreement
- Appendix I:** Draft Environmental Impact Statement Comments and Responses
- Appendix J:** Plan and Profile Drawings

LIST OF FIGURES

Figure ES-1: B&P Tunnel Project Study Area Overview	ES-2
Figure ES-2: B&P DEIS Build Alternatives	ES-4
Figure II-1: Existing B&P Tunnel Project Vicinity	II-2
Figure II-2: Elevation Changes along the NEC	II-7
Figure III-1: Ventilation Facility Schematic.....	III-6
Figure III-2: Alternative 3A Plan and Profile.....	III-17
Figure III-3: Alternative 3B Plan and Profile.....	III-19
Figure III-4: Alternative 3C Plan and Profile.....	III-22
Figure III-5: Intermediate Ventilation Facility Sites Considered	III-25
Figure III-6: Alternative 3B Ventilation Plenum Concepts	III-26
Figure IV-1: B&P Tunnel Preferred Alternative Plan and Profile	IV-2
Figure IV-2: Preferred Alternative Plan Sheet 1 of 7.....	IV-3
Figure IV-3: Preferred Alternative Plan Sheet 2 of 7.....	IV-4
Figure IV-4: Preferred Alternative Plan Sheet 3 of 7.....	IV-5
Figure IV-5: Preferred Alternative Plan Sheet 4 of 7.....	IV-6
Figure IV-6: Preferred Alternative Plan Sheet 5 of 7.....	IV-7
Figure IV-7: Preferred Alternative Plan Sheet 6 of 7.....	IV-8
Figure IV-8: Preferred Alternative Plan Sheet 7 of 7.....	IV-9
Figure IV-9: Alignment between Franklinton Road and the South Portal	IV-12
Figure IV-10: Rendering of North Portal Area.....	IV-13
Figure IV-11: Intermediate Ventilation Facility.....	IV-15
Figure IV-12: Representative Site Layout for Intermediate Ventilation Site at 900-940 West North Avenue	IV-16
Figure IV-13: East Elevation at 900-940 West North Avenue Site ①	IV-17
Figure IV-14: West Elevation at 900-940 West North Avenue Site ②.....	IV-17
Figure IV-15: South Elevation at 900-940 West North Avenue Site ③	IV-17
Figure IV-16: North Elevation at 900-940 West North Avenue Site ④	IV-18

Figure IV-17: Proposed Location and Representative Site Plan for the South Ventilation Facility IV-19

Figure IV-18: Section ① of South Ventilation Facility..... IV-19

Figure IV-19: East Elevation of South Ventilation Facility ① IV-20

Figure IV-20: North Elevation of South Ventilation Facility ② IV-20

Figure IV-21: South Elevation of South Ventilation Facility ③ IV-20

Figure IV-22: West Elevation of South Ventilation Facility ④ IV-21

Figure IV-23: Proposed Location and Representative Site Plan for the North Ventilation Facility IV-22

Figure IV-24: South Elevation of the North Ventilation Facility ① IV-22

Figure IV-25: North Elevation of the North Ventilation Facility ② IV-23

Figure IV-26: East Elevation of the North Ventilation Facility ③ IV-23

Figure IV-27: West Elevation of the North Ventilation Facility ④ IV-23

Figure IV-28: Ventilation Plenum (900-940 West North Avenue) IV-24

Figure IV-29: Cross-section of Plenum to Intermediate Ventilation Facility IV-25

Figure IV-30: Parallel Egress Tunnel..... IV-26

Figure IV-31: Tunnel Boring Machine and Precast Concrete Segments IV-28

Figure IV-32: Construction Staging Area Near South Portal IV-30

Figure IV-33: Construction Staging Area at Intermediate Ventilation Facility..... IV-31

Figure IV-34: Construction Staging Area at North Ventilation Facility IV-32

Figure IV-35: Construction Staging Area Near North Portal IV-33

Figure V-1: Study Area Census Tracts and Block Groups V-2

Figure V-2: Age Distribution of the Study Area..... V-3

Figure V-3: Educational Level of the Study Area..... V-4

Figure V-4: Minority and Low Income Block Groups within the Study Area V-7

Figure V-5: Existing Land Use within the Study Area V-13

Figure V-6: Existing Zoning within the Study Area V-14

Figure V-7: ZIP Codes within the Study Area V-18

Figure V-8: Neighborhoods within the Study Area V-22

Figure V-9: Community Facilities within the Study Area V-24

Figure V-10: Baltimore and Ohio Railroad Baltimore Belt Line Bridge over Jones Falls Valley V-32

Figure V-11: Reservoir Hill Historic District..... V-33

Figure V-12: Midtown-Edmondson Historic District..... V-34

Figure V-13: Atlas Safe Deposit and Storage Company Warehouse Complex..... V-35

Figure V-14: American Ice Company..... V-35

Figure V-15: Edmondson Avenue Historic District..... V-36

Figure V-16: Ward Baking Company V-36

Figure V-17: Fire Department Engine House No. 36..... V-37

Figure V-18: Historic Architectural Resources within the APE..... V-40

Figure V-19: Natural Resources within the Study Area V-45

Figure V-20: Potential Hazardous Material Locations within the Study Area V-53

Figure V-21: South Portal Sites of Concern and Sample Locations..... V-58

Figure V-22: Tunnel Area Sites of Concern and Sample Locations V-59

Figure V-23: North Portal Sites of Concern and Sample Locations..... V-60

Figure V-24: Typical Ground-Borne Vibration Levels (FTA, 2006) V-66

Figure VI-1: Alternatives within Census Tracts and Block Groups VI-3



Figure VI-2: Alternatives within Minority and Low- Income Block Groups..... VI-6

Figure VI-3: Alternatives within Land Use Types VI-15

Figure VI-4: Alternatives within Zoning Districts VI-16

Figure VI-5: Alternatives within ZIP Codes..... VI-21

Figure VI-6: Alternatives within Neighborhoods VI-35

Figure VI-7: Alternatives and Community Facilities..... VI-36

Figure VI-8: Historic Architecture Area of Potential Effects VI-54

Figure VI-9: Alternative 3A North Portal Section 4(f) Resources VI-64

Figure VI-10: Alternative 3A South Portal Section 4(f) Resources VI-65

Figure VI-11: Alternative 3A, 3B, & 3C Intermediate Ventilation Facility Section 4(f) Resources VI-66

Figure VI-12: Alternative 3B North Portal Section 4(f) Resources VI-67

Figure VI-13: Alternative 3B South Portal Section 4(f) Resources VI-68

Figure VI-14: Alternative 3C North Portal Section 4(f) Resources VI-70

Figure VI-15: Alternative 3C South Portal Section 4(f) Resources VI-71

Figure VI-16: Section 4(f) Avoidance Alternatives VI-74

Figure VI-17: Alternatives and Natural Resources..... VI-82

Figure VI-18: Preferred Alternative Hazardous Material Sites of Concern..... VI-96

Figure VI-19: Preferred Alternative South Portal..... VI-97

Figure VI-20: Preferred Alternative Tunnel..... VI-98

Figure VI-21: Preferred Alternative North Portal..... VI-99

Figure VI-22: Noise Monitoring Locations and Estimated Noise Impacts..... VI-121

Figure VI-23: Typical A-Weighted Sound Levels..... VI-124

Figure VI-24: Predicted Ground-Borne Noise Impacts from the Preferred Alternative VI-130

Figure VI-25: Estimated Vibration at Ground Surface from TBM Tunneling VI-132

Figure VI-26: Estimated Vibration at Ground Surface due to Blasting for the Preferred Alternative . VI-133

Figure VI-27: Indirect and Cumulative Effects Analysis Area VI-142

Figure VI-28: Intermediate Ventilation Facility Site Options VI-154

LIST OF TABLES

Table ES-1: B&P Tunnel Project Preliminary Alternatives ES-5

Table ES- 2: Comparison of Key Criteria for Alternatives 3A, 3B (Preferred) and 3C ES-7

Table II-1: Maximum Allowable Speeds on Amtrak's NEC through Baltimore II-6

Table II-2: Current Trip Times Through the Existing B&P Tunnel II-7

Table II-3: NEC Trips through the Existing B&P Tunnel Corridor II-13

Table II-4: Critical Dimensions and Associated Car Types..... II-13

Table III-1: Design Criteria and Assumptions III-3

Table III-2: Preliminary Alternatives Screening Results III-10

Table III-3: Estimated Cost of Intermediate Ventilation Facility Sites by Location..... III-24

Table III-4: Comparison of DEIS and Refined Versions of Alternatives 3A, 3B, and 3C..... III-28

Table III-5: Full FEIS Evaluation Matrix..... III-31

Table III-6: Comparison of Key Criteria for Alternatives 3A, 3B (Preferred) and 3C..... III-40

Table IV-1: Intermediate Ventilation Facility Dimensions IV-14

Table IV-2: South Ventilation Facility Dimensions IV-18



Table IV-3: North Ventilation Facility Dimensions IV-21

Table IV-4: Capital Cost Estimate for the Preferred Alternative..... IV-35

Table V-1: Racial Composition of the Study Area V-4

Table V-2: 2013 Housing Units and Occupancy Characteristics V-5

Table V-3: Population and Minority Statistics in Maryland, Baltimore City, and the Study Area by Block Group V-8

Table V-4: Study Area Public Housing..... V-9

Table V-5: Land Use Summary V-10

Table V-6: Zoning Districts V-12

Table V-7: Labor Force Characteristics V-16

Table V-8: Summary of Resident Occupations..... V-17

Table V-9: Number of Business Establishments per NAICS Business Sector by ZIP Code V-19

Table V-10: Median Household Income..... V-20

Table V-11: Neighborhoods within the Study Area V-21

Table V-12: Schools within the Study Area V-23

Table V-13: Places of Worship within the Study Area V-25

Table V-14: Fire and Rescue Facilities within the Study Area..... V-26

Table V-15: Public Recreation Centers within the Study Area..... V-26

Table V-16: Public Pools within the Study Area..... V-27

Table V-17: Architectural Historic Properties within the APE..... V-31

Table V-18: Soil Units within the Study Area V-42

Table V-19: Low Priority Hazardous Material Sites near the Existing B&P Tunnel..... V-54

Table V-20: Medium Priority Hazardous Material Sites near the Existing B&P Tunnel..... V-55

Table V-21: High Priority Hazardous Material Sites near the Existing B&P Tunnel V-56

Table V-22: General Conformity *de minimis* Thresholds (tons per year) V-62

Table V-23: Tunnel Operating Characteristics in the Existing Year (2014) V-63

Table V-24: FTA Land Use Categories and Noise Metrics V-65

Table V-25: Existing Noise Levels V-65

Table V-26: Estimated Energy Consumption of Existing Amtrak and MARC Service in the Study Area. V-68

Table VI-1: Summary of Potential Effects to Low-Income and Minority Populations VI-9

Table VI-2: Land Use Impacts..... VI-14

Table VI-3: Preliminary Design Cost Estimates VI-27

Table VI-4: Construction Costs..... VI-29

Table VI-5: Professional, Scientific, and Technical Services Costs VI-30

Table VI-6: RIMS II Multipliers by Region..... VI-30

Table VI-7: Net Effects of Construction Activity on Total Earnings..... VI-31

Table VI-8: Net Effects of Construction Activity on Total Employment..... VI-31

Table VI-9: Potential Community Facility Impacts VI-37

Table VI-10: Visual Sensitivity VI-40

Table VI-11: Summary of Effects to Aesthetics and Visual Resources..... VI-41

Table VI-12: Section 106 Effects of the Preferred Alternative on Historic Properties within the Historic Architectural APE VI-55

Table VI-13: Overview of Section 4(f) Impacts..... VI-60

Table VI-14: Estimated Travel Time Savings from Build Alternatives VI-80



Table VI-15: Potential Street Tree Impacts VI-86

Table VI-16: Hazmat Sites Impacted under the Preferred Alternative VI-90

Table VI-17: Low Priority Hazardous Material Sites near the Preferred Alternative VI-90

Table VI-18: Medium Priority Hazardous Material Sites near the Preferred Alternative..... VI-92

Table VI-19: High Priority Hazardous Material Sites near the Preferred Alternative VI-94

Table VI-20: Alternative 3A Low Priority Hazardous Material Sites VI-100

Table VI-21: Alternative 3A Medium Priority Hazardous Material Sites VI-102

Table VI-22: Alternative 3A High Priority Hazardous Material Sites..... VI-103

Table VI-23: Alternative 3C Low Priority Hazardous Material Sites..... VI-103

Table VI-24: Alternative 3C Medium Priority Hazardous Material Sites..... VI-106

Table VI-25: Alternative 3C High Priority Hazardous Material Sites VI-108

Table VI-26: Tunnel Operating Characteristics in the No-Build Alternative (2040)..... VI-111

Table VI-27: Tunnel Operating Characteristics for the Build Alternatives (2040) VI-111

Table VI-28: Diesel Locomotive Emissions (2040) VI-112

Table VI-29: Construction Emissions (tons) VI-115

Table VI-30: Ventilation Facility Emission Parameters and Rates VI-116

Table VI-31: Portal Emission Rates VI-116

Table VI-32: Ventilation Facilities Dimensions..... VI-116

Table VI-33: Ventilation Facility and Portal Emissions Results (parts per billion [ppb])..... VI-117

Table VI-34: Summary of Noise Source Reference Data..... VI-120

Table VI-35: Tunnel Operating Characteristics in the Build Year (2040) VI-120

Table VI-36: Number of Buildings Potentially Affected by Noise from the Preferred Alternative VI-123

Table VI-37: Comparison of Preferred Alternative Noise Impacts to DEIS Alternatives..... VI-123

Table VI-38: Required Noise Reduction to Mitigate Noise Impacts VI-125

Table VI-39: Preliminary Noise Barrier Design..... VI-125

Table VI-40: Ground-Borne RMS Vibration Impact Criteria for Annoyance During Operations and Construction..... VI-128

Table VI-41: Inventory of Ground-Borne Vibration Impacts Predicted During Operation VI-128

Table VI-42: Inventory of Ground-Borne Noise Impacts Predicted During Operation VI-129

Table VI-43: Potential Operational Mitigation Measures VI-134

Table VI-44: Maximum Estimated 2040 Amtrak and MARC Service Energy Consumption in the Study Area VI-135

Table VI-45: Transportation Plans Encompassing the ICE Analysis Area VI-144

Table VI-46: Intermediate Ventilation Facility Site Options Comparison VI-155

Table VII-1: Mitigation Measures..... VII-1

Table VIII-1: Agency Representation..... VIII-2