

Table of Contents

Part I – About This Report

Part II – Statewide Freight Study

| | |
|--|-----------|
| 1.0 Virginia Freight Study..... | 1 |
| 1.1 Findings and Recommendations | 1 |
| 1.2 Programmed Near-Term Projects..... | 4 |
| 1.3 Potential Longer-Term Projects | 13 |
| 1.4 Potential Freight Strategies..... | 25 |
| 1.5 Freight Plan Evaluation..... | 28 |
| 2.0 Benefit-Cost Evaluation Tool..... | 42 |
| 2.1 Introduction | 42 |
| 2.2 Methodology | 43 |
| 2.3 Using the Model | 47 |
| 2.4 Examples | 50 |

Part III – Virginia Corridors

Interstate 64 Multimodal Corridor

| | |
|---|----|
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 8 |
| Transportation System Facilities and Performance..... | 12 |
| Alternative Scenarios | 23 |
| Key Project Recommendations..... | 26 |
| Conclusions | 31 |

Interstate 66 Multimodal Corridor

| | |
|---|----|
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 8 |
| Transportation System Facilities and Performance..... | 11 |
| Alternative Scenarios | 18 |
| Key Project Recommendations..... | 21 |
| Conclusions | 25 |

Interstate 77 Multimodal Corridor

| | |
|-----------------------------|---|
| Geographic Definition | 1 |
|-----------------------------|---|

| | |
|---|----|
| Economic Profile..... | 2 |
| Commodity Profile..... | 7 |
| Transportation System Facilities and Performance..... | 11 |
| Alternative Scenarios | 16 |
| Key Project Recommendations..... | 19 |
| Conclusions..... | 21 |
| Interstate 81 Multimodal Corridor | |
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 8 |
| Transportation System Facilities and Performance..... | 12 |
| Alternative Scenarios | 20 |
| Key Project Recommendations..... | 23 |
| Conclusions..... | 27 |
| Interstate 95 Multimodal Corridor | |
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 9 |
| Transportation System Facilities and Performance..... | 13 |
| Alternative Scenarios | 23 |
| Key Project Recommendations..... | 26 |
| Conclusions..... | 32 |
| U.S. 13 Multimodal Corridor | |
| Geographic Definition | 1 |
| Economic Profile..... | 2 |
| Commodity Profile..... | 8 |
| Transportation System Facilities and Performance..... | 12 |
| Alternative Scenarios | 20 |
| Key Project Recommendations..... | 23 |
| Conclusions..... | 28 |
| U.S. 17 Multimodal Corridor | |
| Geographic Definition | 1 |
| Economic Profile..... | 4 |
| Commodity Profile..... | 9 |
| Transportation System Facilities and Performance..... | 13 |
| Alternative Scenarios | 23 |
| Key Project Recommendations..... | 26 |
| Conclusions..... | 32 |
| U.S. 29 Multimodal Corridor | |
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 8 |
| Transportation System Facilities and Performance..... | 12 |

| | |
|---|----|
| Alternative Scenarios | 20 |
| Key Project Recommendations..... | 24 |
| Conclusions | 28 |
| U.S. 58 Multimodal Corridor | |
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 8 |
| Transportation System Facilities and Performance..... | 11 |
| Alternative Scenarios | 22 |
| Key Project Recommendations..... | 25 |
| Conclusions | 32 |
| U.S. 220 Multimodal Corridor | |
| Geographic Definition | 1 |
| Economic Profile..... | 2 |
| Commodity Profile..... | 8 |
| Transportation System Facilities and Performance..... | 11 |
| Alternative Scenarios | 17 |
| Key Project Recommendations..... | 21 |
| Conclusions | 24 |
| U.S. 460 Multimodal Corridor | |
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 9 |
| Transportation System Facilities and Performance..... | 13 |
| Alternative Scenarios | 24 |
| Key Project Recommendations..... | 27 |
| Conclusions | 33 |
| Northern Virginia Subregion | |
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 8 |
| Transportation System Facilities and Performance..... | 11 |
| Alternative Scenarios | 17 |
| Key Project Recommendations..... | 20 |
| Conclusions | 23 |
| Hampton Roads Subregion | |
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 8 |
| Transportation System Facilities and Performance..... | 12 |
| Alternative Scenarios | 22 |
| Key Project Recommendations..... | 25 |
| Conclusions | 30 |

Richmond Subregion

| | |
|---|----|
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 9 |
| Transportation System Facilities and Performance..... | 13 |
| Alternative Scenarios | 21 |
| Key Project Recommendations..... | 24 |
| Conclusions | 27 |

Roanoke Subregion

| | |
|---|----|
| Geographic Definition | 1 |
| Economic Profile..... | 3 |
| Commodity Profile..... | 8 |
| Transportation System Facilities and Performance..... | 11 |
| Alternative Scenarios | 19 |
| Key Project Recommendations..... | 22 |
| Conclusions | 25 |

List of Tables

Part II – Statewide Freight Plan

| | | |
|-----|--|----|
| 1.1 | Programmed Near-Term Projects, <i>Summary</i> | 4 |
| 1.2 | Programmed Near-Term Projects, <i>Detail</i> | 5 |
| 1.3 | Potential Longer-Term Projects, <i>Summary</i> | 13 |
| 1.4 | Potential Longer-Term Projects, <i>Detail</i> | 14 |
| 1.5 | Potential Freight Strategies..... | 25 |
| 1.6 | Selected Monetized Transportation Benefits, <i>Year 2035</i> | 34 |
| 1.7 | Selected Monetized Economic Benefits, <i>Year 2035</i> | 35 |
| 1.8 | Freight Share of High-Ranking Near-Term Highway Projects..... | 37 |
| 1.9 | Freight Share of High-Ranking Potential Longer-Term Highway Projects | 39 |
| 2.1 | Highway Improvement Impacts Estimated..... | 44 |
| 2.2 | Rail Improvement Impacts Estimated | 44 |
| 2.3 | Rail-Grade Separation Projects Impacts Estimated..... | 45 |
| 2.4 | Truck to Rail Diversion Projects Impacts Estimated | 45 |
| 2.5 | Seaport Expansion Projects Impacts Estimated..... | 46 |
| 2.6 | Airport Expansion Projects Impacts Estimated | 47 |

Part III – Virginia Corridors

Interstate 64 Multimodal Corridor

| | | |
|----|--|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal on Interstate 64 Corridor by Tons (2004) | 9 |
| 2. | Critical Commodities Inbound, Outbound, and Internal on Interstate 64 Corridor by Value (2004) | 10 |

| | | |
|-----|---|----|
| 3. | Trading Partners by Tonnage for the Interstate 64 Corridor Domestic Inbound and Outbound (2004) | 10 |
| 4. | Trading Partners by Value for the Interstate 64 Corridor Domestic Inbound and Outbound (2004) | 11 |
| 5. | Interstate 64 Intermodal Connection..... | 12 |
| 6. | Interstate 64 Summary of Lane Widths | 13 |
| 7. | Interstate 64 Road Condition by Jurisdiction..... | 15 |
| 8. | Virginia's Freight Railroads | 17 |
| 9. | I-64 Multimodal Corridor Warehouse and Distribution Facilities | 22 |
| 10. | Cargo Airport Performance..... | 23 |
| 11. | I-64 Multimodal Corridor Project List | 28 |

Interstate 66 Multimodal Corridor

| | | |
|-----|---|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal on Interstate 66 Corridor by Tons (2004) | 9 |
| 2. | Critical Commodities Inbound, Outbound, and Internal on Interstate 66 Corridor by Value (2004) | 10 |
| 3. | Trading Partners by Tonnage for the Interstate 66 Corridor Domestic Inbound and Outbound (2004) | 10 |
| 4. | Trading Partners by Value for the Interstate 66 Corridor Domestic Inbound and Outbound (2004) | 11 |
| 5. | Interstate 66 Intermodal Connections..... | 11 |
| 6. | Interstate 66 Summary of Lane Widths | 12 |
| 7. | Interstate 66 Road Condition by Jurisdiction..... | 13 |
| 8. | Virginia's Freight Railroads | 15 |
| 9. | Interstate 66 Warehouse and Distribution Facilities..... | 17 |
| 10. | Cargo Airport Performance..... | 17 |
| 11. | I-66 Multimodal Corridor Project List | 23 |

Interstate 77 Multimodal Corridor

| | | |
|----|--|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal on Interstate 77 Corridor by Tons, 2004..... | 9 |
| 2. | Critical Commodities Inbound, Outbound, and Internal on Interstate 77 Corridor by Value, 2004..... | 9 |
| 3. | Trading Partners by Tonnage for the Interstate 77 Corridor Domestic Inbound and Outbound, 2004 | 10 |
| 4. | Trading Partners by Value for the Interstate 77 Corridor Domestic Inbound and Outbound, 2004 | 10 |
| 5. | Interstate 77 Intermodal Connections | 11 |
| 6. | Interstate 77 Summary of Lane Widths | 11 |
| 7. | Interstate 77 Road Condition by County | 13 |
| 8. | Virginia's Freight Railroads | 13 |
| 9. | Interstate 77 Warehouse and Distribution Facilities | 16 |
| 10 | I-77 Multimodal Corridor Project List | 20 |

Interstate 81 Multimodal Corridor

| | | |
|----|--|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal on Interstate 81 Corridor by Tons, 2004..... | 9 |
| 2. | Critical Commodities Inbound, Outbound, and Internal on Interstate 81 Corridor by Value, 2004..... | 10 |
| 3. | Trading Partners by Tonnage for the Interstate 81 Corridor Domestic Inbound and Outbound, 2004 | 10 |
| 4. | Trading Partners by Value for the Interstate 81 Corridor Domestic Inbound and Outbound, 2004 | 11 |
| 5. | Interstate 81 Intermodal Connections | 12 |
| 6. | Interstate 81 Summary of Lane Widths | 13 |
| 7. | Interstate 81 Road Condition by Jurisdiction | 15 |
| 8. | Virginia's Freight Railroads | 17 |
| 9. | Interstate 81 Warehouse and Distribution Facilities | 19 |

| | | |
|-----|---|----|
| 10 | Cargo Airport Performance | 19 |
| 11. | I-81 Multimodal Corridor Project List | 25 |

Interstate 95 Multimodal Corridor

| | | |
|-----|--|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal on Interstate 95 Corridor by Tons, 2004..... | 10 |
| 2. | Critical Commodities Inbound, Outbound, and Internal on Interstate 95 Corridor by Value, 2004..... | 11 |
| 3. | Trading Partners by Tonnage for the Interstate 95 Corridor Domestic Inbound and Outbound, 2004 | 11 |
| 4. | Trading Partners by Value for the Interstate 95 Corridor Domestic Inbound and Outbound, 2004 | 12 |
| 5. | Interstate 95 Intermodal Connections..... | 13 |
| 6. | Interstate 95 Summary of Lane Widths | 14 |
| 7. | Interstate 95 Road Condition by Jurisdiction | 16 |
| 8. | Virginia's Freight Railroads | 18 |
| 9. | Interstate 95 Warehouse and Distribution Facilities | 22 |
| 10 | Cargo Airport Performance | 23 |
| 11. | I-95 Multimodal Corridor Project List | 28 |

U.S. 13 Multimodal Corridor

| | | |
|----|--|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal on U.S. 13 Corridor by Tons, 2004..... | 9 |
| 2. | Critical Commodities Inbound, Outbound, and Internal on U.S. 13 Corridor by Value, 2004..... | 10 |
| 3. | Trading Partners by Tonnage for the U.S. 13 Corridor Domestic Inbound and Outbound, 2004 | 10 |
| 4. | Trading Partners by Value for the U.S. 13 Corridor Domestic Inbound and Outbound, 2004 | 11 |
| 5. | U.S. 13 Intermodal Connections | 12 |
| 6. | U.S. 13 Summary of Lane Widths | 13 |

| | | |
|-----|---|----|
| 7. | U.S. 13 Road Condition by County | 14 |
| 8. | Virginia's Freight Railroads | 16 |
| 9. | U.S. 13 Warehouse and Distribution Facilities | 20 |
| 10 | Cargo Airport Performance | 20 |
| 11. | U.S. 13 Corridor Project List | 25 |

U.S. 17 Multimodal Corridor

| | | |
|-----|--|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal on U.S. 17 Corridor by Tons, 2004..... | 10 |
| 2. | Critical Commodities Inbound, Outbound, and Internal on U.S. 17 Corridor by Value, 2004..... | 11 |
| 3. | Trading Partners by Tonnage for the U.S. 17 Corridor Domestic Inbound and Outbound, 2004 | 11 |
| 4. | Trading Partners by Value for the U.S. 17 Corridor Domestic Inbound and Outbound, 2004 | 12 |
| 5. | U.S. 17 Intermodal Connections | 13 |
| 6. | U.S. 17 Summary of Lane Widths | 14 |
| 7. | U.S. 17 Road Condition by County | 16 |
| 8. | Virginia's Freight Railroads | 18 |
| 9. | U.S. 17 Warehouse and Distribution Facilities | 22 |
| 10 | Cargo Airport Performance..... | 22 |
| 11. | U.S. 17 Multimodal Corridor Project List | 28 |

U.S. 29 Multimodal Corridor

| | | |
|----|---|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal on U.S. 29 Corridor by Tons, 2004..... | 9 |
| 2. | Critical Commodities Inbound, Outbound, and Internal on U.S. 29 Corridor by Value, 2004..... | 10 |
| 3. | Trading Partners by Tonnage for the U.S. 29 Corridor Domestic Inbound and Outbound, 2004..... | 10 |

| | | |
|-----|---|----|
| 4. | Trading Partners by Value for the U.S. 29 Corridor Domestic Inbound and Outbound, 2004..... | 11 |
| 5. | U.S. 29 Intermodal Connections | 12 |
| 6. | U.S. 29 Summary of Lane Widths | 13 |
| 7. | U.S. 29 Road Condition by County | 15 |
| 8. | Virginia's Freight Railroads | 17 |
| 9. | U.S. 29 Warehouse and Distribution Facilities | 19 |
| 10 | Cargo Airport Performance | 19 |
| 11. | U.S. 29 Multimodal Corridor Project List | 25 |

U.S. 58 Multimodal Corridor

| | | |
|-----|--|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal on U.S. 58 Corridor by Tons, 2004..... | 9 |
| 2. | Critical Commodities Inbound, Outbound, and Internal on U.S. 58 Corridor by Value, 2004..... | 10 |
| 3. | Trading Partners by Tonnage for the U.S. 58 Corridor Domestic Inbound and Outbound, 2004 | 10 |
| 4. | Trading Partners by Value for the U.S. 58 Corridor Domestic Inbound and Outbound, 2004 | 11 |
| 5. | U.S. 58 Intermodal Connections | 12 |
| 6. | U.S. 58 Summary of Lane Widths | 13 |
| 7. | U.S. 58 Road Condition by Jurisdiction | 15 |
| 8. | Virginia's Freight Railroads | 17 |
| 9. | U.S. 58 Warehouse and Distribution Facilities | 21 |
| 10 | Cargo Airport Performance | 21 |
| 11. | U.S. 58 Multimodal Corridor Project List | 27 |

U.S. 220 Multimodal Corridor

| | | |
|----|---|---|
| 1. | Critical Commodities Inbound, Outbound, and Internal on U.S. 220 Corridor by Tons, 2004 | 9 |
|----|---|---|

| | | |
|-----|--|----|
| 2. | Critical Commodities Inbound, Outbound, and Internal on U.S. 220 Corridor by Value, 2004 | 10 |
| 3. | Trading Partners by Tonnage for the U.S. 220 Corridor Domestic Inbound and Outbound, 2004..... | 10 |
| 4. | Trading Partners by Value for the U.S. 220 Corridor Domestic Inbound and Outbound, 2004..... | 11 |
| 5. | U.S. 220 Intermodal Connections | 11 |
| 6. | U.S. 220 Summary of Lane Widths | 12 |
| 7. | U.S. 220 Road Condition by Jurisdiction | 13 |
| 8. | Virginia's Freight Railroads | 15 |
| 9. | U.S. 220 Warehouse and Distribution Facilities | 17 |
| 10 | Cargo Airport Performance | 17 |
| 11. | U.S. 220 Multimodal Corridor Project List | 22 |

U.S. 460 Multimodal Corridor

| | | |
|----|--|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal on Corridor by Tons, 2004..... | 10 |
| 2. | Critical Commodities Inbound, Outbound, and Internal on Corridor by Value, 2004..... | 11 |
| 3. | Trading Partners by Tonnage for the Corridor Domestic Inbound and Outbound, 2004 | 11 |
| 4. | Trading Partners by Value for the Corridor Domestic Inbound and Outbound, 2004 | 12 |
| 5. | U.S. 460 Intermodal Connections | 13 |
| 6. | U.S. 460 Summary of Lane Widths | 14 |
| 7. | U.S. 460 Road Condition by County | 16 |
| 8. | Virginia's Freight Railroads | 17 |
| 9. | Warehouse and Distribution Facilities | 23 |
| 10 | Cargo Airport Performance | 23 |

| | |
|---|----|
| 11. U.S. 460 Multimodal Corridor Project List | 29 |
|---|----|

Northern Virginia Subregion

| | |
|---|----|
| 1. Critical Commodities Inbound, Outbound, and Internal for the Northern Virginia Subregion by Tons, 2004..... | 9 |
| 2. Critical Commodities Inbound, Outbound, and Internal for the Northern Virginia Subregion by Value, 2004..... | 10 |
| 3. Trading Partners by Tonnage for the Northern Virginia Subregion Domestic Inbound and Outbound, 2004..... | 10 |
| 4. Trading Partners by Value for the Northern Virginia Subregion Domestic Inbound and Outbound, 2004..... | 11 |
| 5. Northern Virginia Intermodal Connections..... | 11 |
| 6. Northern Virginia Subregion Summary of Lane Widths | 12 |
| 7. Northern Virginia Subregion Road Condition, <i>by Jurisdiction</i> | 13 |
| 8. Virginia's Freight Railroads | 15 |
| 9. Cargo Airport Performance | 17 |
| 10 Northern Virginia Subregion Project List | 21 |

Hampton Roads Subregion

| | |
|---|----|
| 1. Critical Commodities Inbound, Outbound, and Internal for the Richmond Subregion by Tons, 2004 | 9 |
| 2. Critical Commodities Inbound, Outbound, and Internal for the Richmond Subregion by Value, 2004 | 10 |
| 3. Trading Partners by Tonnage for the Richmond Subregion Domestic Inbound and Outbound, 2004 | 10 |
| 4. Trading Partners by Value for the Richmond Subregion Domestic Inbound and Outbound, 2004..... | 11 |
| 5. Hampton Roads Subregion Intermodal Connections | 12 |
| 6. Hampton Roads Subregion Summary of Lane Widths | 14 |
| 7. Hampton Roads Subregion Road Condition, <i>by Jurisdiction</i> | 16 |
| 8. Virginia's Freight Railroads | 18 |

| | | |
|-----|---|----|
| 9. | Hampton Roads Subregion Warehouse and Distribution Facilities | 21 |
| 10 | Cargo Airport Performance | 22 |
| 11. | Hampton Roads Subregion Project List | 27 |

Richmond Subregion

| | | |
|-----|--|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal for the Richmond Subregion by Tons, 2004 | 10 |
| 2. | Critical Commodities Inbound, Outbound, and Internal for the Richmond Subregion by Value, 2004 | 11 |
| 3. | Trading Partners by Tonnage for the Richmond Subregion Domestic Inbound and Outbound, 2004 | 11 |
| 4. | Trading Partners by Value for the Richmond Subregion Domestic Inbound and Outbound, 2004 | 12 |
| 5. | Richmond Subregion Intermodal Connections | 13 |
| 6. | Richmond Subregion Summary of Lane Widths | 14 |
| 7. | Richmond Subregion Road Condition, <i>by Jurisdiction</i> | 15 |
| 8. | Virginia's Freight Railroads | 17 |
| 9. | Richmond Subregion Warehouse and Distribution Facilities | 20 |
| 10 | Cargo Airport Performance | 21 |
| 11. | Richmond Subregion Project List | 25 |

Roanoke Subregion

| | | |
|----|---|----|
| 1. | Critical Commodities Inbound, Outbound, and Internal for the Roanoke Subregion by Tons, 2004 | 9 |
| 2. | Critical Commodities Inbound, Outbound, and Internal for the Roanoke Subregion by Value, 2004 | 10 |
| 3. | Trading Partners by Tonnage for the Roanoke Subregion Domestic Inbound and Outbound, 2004 | 10 |
| 4. | Trading Partners by Value for the Roanoke Subregion Domestic Inbound and Outbound, 2004..... | 11 |
| 5. | Roanoke Subregion Intermodal Connections | 11 |

| | | |
|-----|--|----|
| 6. | Roanoke Subregion Summary of Lane Widths | 12 |
| 7. | Roanoke Subregion Road Condition, <i>by Jurisdiction</i> | 14 |
| 8. | Virginia's Freight Railroads | 16 |
| 9. | Roanoke Subregion Warehouse and Distribution Facilities | 18 |
| 10 | Cargo Airport Performance | 18 |
| 11. | Roanoke Subregion Project List | 23 |

List of Figures

Part II – Statewide Freight Study

| | | |
|------|---|----|
| 1.1 | Locations of Programmed Near-Term Projects, <i>Statewide</i> | 9 |
| 1.2 | Locations of Programmed Near-Term Projects, <i>Northern Virginia Detail</i> | 10 |
| 1.3 | Locations of Programmed Near-Term Projects, <i>Hampton Roads/Richmond Area Detail</i> | 11 |
| 1.4 | Locations of Programmed Near-Term Projects, <i>Southwest Virginia Area Detail</i> ... | 12 |
| 1.5 | Locations of Potential Longer-Term Projects, <i>Statewide</i> | 21 |
| 1.6 | Locations of Potential Longer-Term Projects, <i>Northern Virginia Detail</i> | 22 |
| 1.7 | Locations of Potential Longer-Term Projects, <i>Hampton Roads/Richmond Detail</i> ... | 23 |
| 1.8 | Locations of Potential Longer-Term Projects, <i>Southwest Virginia Detail</i> | 24 |
| 1.9 | Existing Freight Bottlenecks | 28 |
| 1.10 | Bottlenecks Addressed by the Virginia Multimodal Freight Study | 29 |
| 1.11 | Remaining Bottlenecks Not Addressed | 30 |
| 1.12 | Virginia Multimodal Corridors | 31 |
| 1.13 | Freight Congestion Index, Freight Plan versus No Action, <i>Averaged Over All Virginia Multimodal Corridors</i> | 32 |
| 1.14 | Freight Congestion Index, Freight Plan versus No Action, <i>By Individual Multimodal Corridor</i> | 33 |
| 2.1 | Project Input Screen..... | 48 |
| 2.2 | Highway Improvement Data Section | 49 |

Part III – Virginia Corridors

Interstate 64 Multimodal Corridor

| | | |
|-----|---|----|
| 1. | The Interstate 64 Multimodal Corridor | 3 |
| 2. | Historic and Forecast Population Growth, 1990-2030 | 4 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia, and I-64</i> | 5 |
| 4. | Employment by Freight-Related Cluster in the I-64 Multimodal Corridor and Virginia..... | 7 |
| 5. | Share of Employment by Cluster..... | 7 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 7 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 8 |
| 8. | Mode Share of Total Corridor Freight Value, 2004 | 8 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 9 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 9 |
| 11. | Average AADT and Truck Percentages | 14 |
| 12. | Intermodal Facilities..... | 16 |
| 13. | Hampton Roads Freight Transportation Bottlenecks..... | 18 |
| 14. | Richmond Area Transportation Bottlenecks..... | 19 |
| 15. | Virginia Freight Transportation Bottlenecks | 20 |
| 16. | Hampton Roads Navigation Channels With Locations of Virginia Port Authority and Maersk Terminals | 21 |
| 17. | Future Improvements to the I-64 Multimodal Corridor | 25 |
| 18. | Freight Congestion Index for the I-64 Corridor..... | 26 |

Interstate 66 Multimodal Corridor

| | | |
|----|--|---|
| 1. | The Interstate 66 Multimodal Corridor | 2 |
| 2. | Historic and Forecast Population Growth, 1990-2030 | 4 |

| | | |
|-----|--|----|
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia, and I-66 Corridor</i> | 5 |
| 4. | Employment by Freight-Related Cluster in I-66 Corridor and Virginia..... | 7 |
| 5. | Share of Employment by Cluster, <i>I-66 Corridor</i> | 7 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 7 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 8 |
| 8. | Mode Share of Total Corridor Freight Value, 2004 | 8 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 9 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 9 |
| 11. | Average AADT and Truck Percentages | 13 |
| 12. | Interstate 66 Intermodal Facilities | 14 |
| 13. | Northern Virginia Freight Transportation Bottlenecks..... | 16 |
| 14. | Future Improvements to the Interstate 66 Corridor | 20 |
| 15. | Freight Congestion Index for the I-66 Corridor..... | 21 |

Interstate 77 Multimodal Corridor

| | | |
|-----|---|---|
| 1. | The Interstate 77 Multimodal Corridor | 2 |
| 2. | Historic and Forecast Population Growth, 1990-2030 | 3 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia and I-77 Corridor</i> | 4 |
| 4. | Employment by Freight-Related Cluster in I-77 Corridor and Virginia..... | 6 |
| 5. | Share of Employment by Cluster, <i>I-77 Corridor</i> | 7 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 7 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 8 |
| 8. | Mode Share of Total Corridor Freight Value, 2004 | 8 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 8 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 8 |

| | | |
|-----|---|----|
| 11. | Average AADT and Truck Percentages | 12 |
| 12. | Virginia Freight Transportation Bottlenecks | 15 |
| 13. | Future Improvements to the I-77 Corridor | 18 |
| 14. | Freight Congestion Index for the I-77 Corridor..... | 19 |

Interstate 81 Multimodal Corridor

| | | |
|-----|---|----|
| 1. | The Interstate 81 Multimodal Corridor | 2 |
| 2. | Historic and Forecast Population Growth, 1990-2030 | 4 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia and Corridor 81</i> | 5 |
| 4. | Employment by Freight-Related Cluster in I-81 Corridor and Virginia..... | 7 |
| 5. | Share of Employment by Cluster, <i>I-81 Corridor</i> | 7 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 7 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 8 |
| 8. | Mode Share of Total Corridor Freight Value, 2004 | 8 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 9 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 9 |
| 11. | Average AADT and Truck Percentages | 14 |
| 12. | Interstate 81 Intermodal Facilities | 16 |
| 13. | I-81 and Statewide Freight Transportation Bottlenecks..... | 18 |
| 14. | Future Improvements to the Interstate 81 Corridor | 22 |
| 15. | Freight Congestion Index for the I-81 Corridor..... | 23 |

Interstate 95 Multimodal Corridor

| | | |
|----|---|---|
| 1. | The Interstate 95 Multimodal Corridor | 3 |
| 2. | Historic and Forecast Population Growth, 1990-2030 | 5 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia, and I-95</i> | 6 |

| | | |
|-----|--|----|
| 4. | Employment by Freight-Related Cluster in I-95 Corridor and Virginia..... | 8 |
| 5. | Share of Employment by Cluster, <i>I-95 Corridor</i> | 8 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 8 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 9 |
| 8. | Mode Share of Total Corridor Freight Value, 2004..... | 9 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 10 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 10 |
| 11. | Average AADT and Truck Percentages | 15 |
| 12. | Interstate 95 Intermodal Facilities | 17 |
| 13. | Richmond Area Transportation Bottlenecks..... | 19 |
| 14. | Northern Virginia Freight Transportation Bottlenecks | 20 |
| 15. | Virginia Freight Transportation Bottlenecks | 21 |
| 16. | Future Improvements to the I-95 Corridor | 25 |
| 17. | Freight Congestion Index for the I-95 Corridor..... | 26 |

U.S. 13 Multimodal Corridor

| | | |
|-----|---|---|
| 1. | The U.S. 13 Multimodal Corridor | 2 |
| 2. | Historic and Forecast Population Growth, 1990-2030 | 4 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia, and U.S. 13 Corridor</i> | 5 |
| 4. | Employment by Freight-Related Cluster in U.S. 13 Corridor and Virginia | 7 |
| 5. | Share of Employment by Cluster, <i>U.S. 13 Corridor</i> | 7 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 7 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 8 |
| 8. | Mode Share of Total Corridor Freight Value, 2004..... | 8 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 9 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 9 |

| | | |
|-----|--|----|
| 11. | Average AADT and Truck Percentages | 14 |
| 12. | U.S. 13 Intermodal Facilities..... | 15 |
| 13. | Hampton Roads Freight Transportation Bottlenecks..... | 17 |
| 14. | Virginia Freight Transportation Bottlenecks | 18 |
| 15. | Hampton Roads Navigation Channels With Locations of Virginia Port Authority and Maersk Terminals | 19 |
| 16. | Future Improvements to the U.S. 13 Corridor..... | 22 |
| 17. | Freight Congestion Index for the U.S. 13 Corridor | 23 |

U.S. 17 Multimodal Corridor

| | | |
|-----|---|----|
| 1. | The U.S. 17 Multimodal Corridor | 3 |
| 2. | Historic and Forecast Population Growth, 1990-2030 | 5 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia, and U.S. 17 Corridor</i> | 6 |
| 4. | Employment by Freight-Related Cluster in U.S. 17 Corridor and Virginia | 8 |
| 5. | Share of Employment by Cluster, <i>U.S. 17 Corridor</i> | 8 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 8 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004 | 9 |
| 8. | Mode Share of Total Corridor Freight Value, 2004 | 9 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 10 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 10 |
| 11. | Average AADT and Truck Percentages | 15 |
| 12. | U.S. 17 Intermodal Facilities..... | 17 |
| 13. | Northern Virginia Freight Transportation Bottlenecks | 19 |
| 14. | Virginia Freight Transportation Bottlenecks | 20 |
| 15. | Hampton Roads Navigation Channels With Locations of Virginia Port Authority and Maersk Terminals | 21 |
| 16. | Future Improvements to the U.S. 17 Corridor..... | 25 |

| | |
|---|----|
| 17. Freight Congestion Index for the U.S. 17 Corridor | 26 |
|---|----|

U.S. 29 Multimodal Corridor

| | |
|---|----|
| 1. The U.S. 29 Multimodal Corridor..... | 2 |
| 2. Historic and Forecast Population Growth, 1990-2030 | 4 |
| 3. Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia, and U.S. 29</i> | 5 |
| 4. Employment by Freight-Related Cluster in U.S. 29 Corridor and Virginia | 7 |
| 5. Share of Employment by Cluster, <i>U.S. 29</i> | 7 |
| 6. Share of Employment by Cluster, <i>Virginia</i> | 7 |
| 7. Mode Share of Total Corridor Freight Tonnage, 2004..... | 8 |
| 8. Mode Share of Total Corridor Freight Value, 2004..... | 8 |
| 9. Directional Proportion of Total Corridor Freight Tonnage, 2004 | 9 |
| 10. Directional Proportion of Total Corridor Freight Value, 2004 | 9 |
| 11. Average AADT and Truck Percentages | 14 |
| 12. U.S. 29 Intermodal Facilities..... | 16 |
| 13. Virginia Freight Transportation Bottlenecks | 18 |
| 14. Future Improvements to the U.S. 29 Corridor..... | 22 |
| 15. Freight Congestion Index for the U.S. 29 Corridor | 23 |

U.S. 58 Multimodal Corridor

| | |
|---|---|
| 1. The U.S. 58 Multimodal Corridor | 3 |
| 2. Historic and Forecast Population Growth, 1990-2030 | 4 |
| 3. Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia, and U.S. 58</i> | 5 |
| 4. Employment by Freight-Related Cluster in U.S. 58 Corridor and Virginia | 7 |
| 5. Share of Employment by Cluster, <i>U.S. 58</i> | 7 |
| 6. Share of Employment by Cluster, <i>Virginia</i> | 7 |

| | | |
|-----|--|----|
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004 | 8 |
| 8. | Mode Share of Total Corridor Freight Value, 2004 | 8 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 9 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 9 |
| 11. | Average AADT and Truck Percentages | 14 |
| 12. | U.S. 58 Intermodal Facilities..... | 16 |
| 13. | Hampton Roads Freight Transportation Bottlenecks..... | 18 |
| 14. | Virginia Freight Transportation Bottlenecks | 19 |
| 15. | Hampton Roads Navigation Channels With Locations of Virginia Port Authority and Maersk Terminals | 20 |
| 16. | Future Improvements to the U.S. 58 Corridor..... | 24 |
| 17. | Freight Congestion Index for the U.S. 58 Corridor | 25 |

U.S. 220 Multimodal Corridor

| | | |
|-----|---|----|
| 1. | The U.S. 220 Multimodal Corridor | 2 |
| 2. | Historic and Forecast Population Growth, 1990-2030 | 3 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia, and U.S. 220</i> | 4 |
| 4. | Employment by Freight-Related Cluster in U.S. 220 Corridor and Virginia | 7 |
| 5. | Share of Employment by Cluster, <i>U.S. 220</i> | 7 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 7 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004 | 8 |
| 8. | Mode Share of Total Corridor Freight Value, 2004 | 8 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 9 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 9 |
| 11. | Average AADT and Truck Percentages | 13 |
| 12. | U.S. 220 Intermodal Facilities..... | 14 |

| | | |
|-----|--|----|
| 13. | Virginia Freight Transportation Bottlenecks | 16 |
| 14. | Future Improvements to the U.S. 220 Corridor..... | 19 |
| 15. | Freight Congestion Index for the U.S. 220 Corridor | 20 |

U.S. 460 Multimodal Corridor

| | | |
|-----|---|----|
| 1. | The U.S. 460 Multimodal Corridor | 3 |
| 2. | Historic and Forecast Population Growth, 1990-2030 | 4 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia, and U.S. 460</i> | 5 |
| 4. | Employment by Freight-Related Cluster in U.S. 460 Corridor and Virginia | 8 |
| 5. | Share of Employment by Cluster, <i>U.S. 460 Corridor</i> | 8 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 8 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 9 |
| 8. | Mode Share of Total Corridor Freight Value, 2004..... | 9 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 10 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 10 |
| 11. | Average AADT and Truck Percentages | 15 |
| 12. | U.S. 460 Intermodal Facilities..... | 17 |
| 13. | Hampton Roads Freight Transportation Bottlenecks..... | 19 |
| 14. | Richmond Area Transportation Bottlenecks..... | 20 |
| 15. | Virginia Freight Transportation Bottlenecks | 21 |
| 16. | Hampton Roads Navigation Channels With Locations of Virginia Port Authority and Maersk Terminals | 22 |
| 17. | Future Improvements to the U.S. 460 Corridor..... | 26 |
| 18. | Freight Congestion Index for the U.S. 460 Corridor | 27 |

Northern Virginia Subregion

| | | |
|----|-------------------------|---|
| 1. | Northern Virginia | 2 |
|----|-------------------------|---|

| | | |
|-----|---|----|
| 2. | Northern Virginia Subregion, Historic and Forecast Population Growth, 1990-2030 | 4 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia and Northern Virginia Subregion</i> | 5 |
| 4. | Employment by Freight-Related Cluster in Northern Virginia Subregion and Virginia | 7 |
| 5. | Share of Employment by Cluster, <i>Northern Virginia Subregion</i> | 7 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 7 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 8 |
| 8. | Mode Share of Total Corridor Freight Value, 2004 | 8 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 9 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 9 |
| 11. | Average AADT and Truck Percentages | 13 |
| 12. | Northern Virginia Intermodal Facilities | 14 |
| 13. | Northern Virginia Freight Transportation Bottlenecks | 16 |
| 14. | Future Improvements to Selected Facilities in the Northern Virginia Subregion | 19 |

Hampton Roads Subregion

| | | |
|----|---|---|
| 1. | Hampton Roads Subregion | 3 |
| 2. | Hampton Roads Subregion, Historic and Forecast Population Growth, 1990-2030 | 4 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia and Hampton Roads Subregion</i> | 5 |
| 4. | Employment by Freight-Related Cluster in Hampton Roads Subregion and Virginia | 7 |
| 5. | Share of Employment by Cluster, <i>Hampton Roads Subregion</i> | 7 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 7 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 8 |
| 8. | Mode Share of Total Corridor Freight Value, 2004 | 8 |

| | | |
|-----|--|----|
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 9 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 9 |
| 11. | Average AADT and Truck Percentages | 15 |
| 12. | Hampton Roads Subregion Intermodal Facilities..... | 17 |
| 13. | Hampton Roads Subregion Freight Transportation Bottlenecks..... | 19 |
| 14. | Hampton Roads Navigation Channels With Locations of Virginia Port Authority and Maersk Terminals | 20 |
| 15. | Future Improvements to Selected Facilities in the Hampton Roads Subregion.. | 24 |

Richmond Subregion

| | | |
|-----|--|----|
| 1. | Richmond Subregion | 3 |
| 2. | Richmond Subregion, Historic and Forecast Population Growth, 1990-2030 | 5 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia and the Richmond Subregion</i> | 6 |
| 4. | Employment by Freight-Related Cluster in the Richmond Subregion and Virginia..... | 8 |
| 5. | Share of Employment by Cluster, <i>Richmond Subregion</i> | 8 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 8 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 9 |
| 8. | Mode Share of Total Corridor Freight Value, 2004 | 9 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 10 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 10 |
| 11. | Average AADT and Truck Percentages | 14 |
| 12. | Richmond Subregion Intermodal Facilities..... | 16 |
| 13. | Richmond Area Transportation Bottlenecks..... | 19 |
| 14. | Future Improvements to Selected Facilities in the Richmond Subregion..... | 23 |

Roanoke Subregion

| | | |
|----|------------------------|---|
| 1. | Roanoke Subregion..... | 2 |
|----|------------------------|---|

| | | |
|-----|---|----|
| 2. | Roanoke Subregion, Historic and Forecast Population Growth, 1990-2030 | 4 |
| 3. | Economic Structure, <i>Shares of Employment by Major Industry Sector, United States, Virginia and Roanoke Subregion</i> | 5 |
| 4. | Employment by Freight-Related Cluster in Roanoke Subregion and Virginia . | 7 |
| 5. | Share of Employment by Cluster, <i>Roanoke Subregion</i> | 7 |
| 6. | Share of Employment by Cluster, <i>Virginia</i> | 7 |
| 7. | Mode Share of Total Corridor Freight Tonnage, 2004..... | 8 |
| 8. | Mode Share of Total Corridor Freight Value, 2004..... | 8 |
| 9. | Directional Proportion of Total Corridor Freight Tonnage, 2004 | 9 |
| 10. | Directional Proportion of Total Corridor Freight Value, 2004 | 9 |
| 11. | Average AADT and Truck Percentages | 13 |
| 12. | Roanoke Subregion Intermodal Facilities | 15 |
| 13. | Roanoke Subregion Freight Transportation Bottlenecks | 17 |
| 14. | Future Improvements to Selected Facilities in the Roanoke Subregion | 21 |