HAMPTON ROADS PASSENGER RAIL VISION PLAN ALTERNATIVES ANALYSIS EXECUTIVE SUMMARY

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Prepared in cooperation with the U.S. Department of Transportation (USDOT), the Federal Highway Administration (FHWA), the Virginia Department of Rail and Public Transportation (DRPT), and the Virginia Department of Transportation (VDOT). The contents of this report reflect the views of the Hampton Roads Transportation Planning Organization (HRTPO). The HRTPO is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the FHWA, VDOT or DRPT. This report does not constitute a standard, specification, or regulation.

These opinions, findings and conclusion are preliminary in nature and do not represent final statements of fact or final projections of high speed and intercity passenger rail service to Hampton Roads. It is anticipated upon completion of a NEPA Service Development Plan and/or TIER I Environmental Impact Statement, these initial study results will be refined to a level that supports the Hampton Roads Vision Plan for High Speed and Intercity Passenger Rail services from Washington D.C. to the Hampton Roads metropolitan area.

NON-DISCRIMINATION
The HRTPO assures that no person shall, on the ground of race, color, national origin, handicap, sex, age, or income status as provided by Title VI of the Civil Rights Act of 1964 and subsequent authorities, be excluded from participation in, be denied the benefits of, or be otherwise subject to discrimination under any program or activity. The HRTPO Title VI Plan provides this assurance, information about HRTPO responsibilities, and a Discrimination Complaint Form.

DISCLAIMER
This report presents alternative high speed and intercity passenger rail proposals that are un-negotiated, un-funded and at a feasibility level of analysis. It is understood that in following detailed environmental and engineering studies, the details of integrating the proposed passenger operations with Norfolk Southern and CSX freight operations will be subject to close coordination and negotiation. The report contains only preliminary data which is subject to review, verification, and approval by both Norfolk Southern and CSX. Findings are not construed to be a commitment on the part of either Norfolk Southern or CSX to operate additional service.
EXECUTIVE SUMMARY

This Executive Summary describes the objectives and key results of the Phase 2B study, and the next steps needed to move the project towards the Tier I Environmental process.

PURPOSE OF STUDY

TEMS was commissioned by the Hampton Roads Transportation Planning Organization (HRTPO) to develop a Vision Plan for Enhanced and High-Speed Passenger Rail Service for the Hampton Roads region. The Hampton Roads Passenger Rail Study represents an important step in the development of a Vision Plan. The Virginia Department of Rail and Public Transportation (DRPT) submitted the Richmond/Hampton Roads Passenger Rail Project Tier I Draft Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA) to develop conventional passenger rail service in the Hampton Roads corridors. These options are being implemented as the first steps in achieving the goals of the HRTPO. To support and further develop the Commonwealth’s efforts, the HRTPO Board approved a resolution in October 2009 that endorses the designation of a “high-speed rail” corridor with ultimate speeds of more than 110 mph along the Norfolk Southern/Route 460 (Norfolk-Richmond) corridor and that enhances the intercity passenger rail service along the CSX/I-64 corridor (Newport News-Richmond).

The HRTPO Board Resolution #2009-05 provides an overarching vision for development of rail passenger service to the Hampton Roads region.

The resolution endorses:

- Designation of a “High-Speed Rail” corridor along the NS/Route 460 corridor; and
- Enhancement of existing intercity passenger rail service along the CSXT/I-64 corridor

PHASE 2B ALTERNATIVE ANALYSIS

In developing the Vision Plan for the HRTPO, TEMS has completed a number of studies designed to access the potential for Enhanced and High-Speed Rail in the Hampton Roads-Richmond-Washington corridor. In the March 2013 Phase 2A study, TEMS developed the databases needed to assess both Enhanced and High-Speed Rail options for the Norfolk-Richmond corridor. The current Phase 2B study focuses on identifying route options that would allow high-speed rail in the Norfolk-Richmond corridor segment.
ROUTE AND TECHNOLOGY ANALYSIS

For the Norfolk-Richmond corridor segment, three main route options have been developed utilizing a combination of greenfield and existing rail rights-of-way:

1) Southern Option via Petersburg,
2) Northern Option via Hopewell, and
3) Richmond Direct Option.

The Southern and Northern options each have variants based on a greenfield route (Option A) and a route parallel to the existing Norfolk Southern (NS) rail right-of-way (Option B). The three main route options along with their NS variants are shown below.
TECHNOLOGY OPTIONS FOR ANALYSIS

Train technology has been evolving rapidly in the last twenty years as new, faster, more efficient higher and high-speed technologies have been developed. For the three main route options (including the two variant options that utilize the NS alignment), two maximum train speeds: 130-mph diesel and 220-mph electric were selected to represent Enhanced and High-Speed Rail options. The five route options with two technology/speed variants lead to a total of ten options that have been assessed in this study.

ENVIRONMENTAL SCAN

In developing route options for the study, an overview of environmental issues is a critical element of National Environmental Policy Act (NEPA) compliance. For the current study, TEMS completed a high level Environmental Scan for the purpose of identifying any major flaws and the types of mitigation that might be needed, as is required for the next step in applying for funding for a Tier I EIS.

Environmental data collection and resulting tabulations were derived for the environmental study area that extends from Norfolk to Richmond, VA. The results of the high level scan show that, at a conceptual level, there are no fatal flaws that would prohibit any of the currently selected route options from moving forward into the EIS process.
MARKET ANALYSIS

As found in the July 2010 Phase 1 Preliminary Vision Plan, the Hampton Roads-Richmond-Washington corridor is one of the top intercity corridors in the U.S. – being comparable with, in terms of population density (i.e., population per route mile), California’s San Francisco-Los Angeles, Florida’s Miami-Orlando, Ohio’s Cleveland-Columbus-Cincinnati, Pennsylvania’s Philadelphia-Harrisburg-Pittsburgh, and Texas’s Houston-Dallas corridors. Furthermore, this corridor is much stronger than the other Southeast High-Speed rail corridors like Atlanta-Charlotte or Charlotte-Raleigh and Raleigh-Richmond. As such, the corridor has independent utility as a high-speed corridor. In addition, the Hampton Roads-Richmond-Washington corridor is logically to be the southern extension of the Northeast corridor and a logical part of the “East Coast Mega Region” that stretches from Boston to New York to Philadelphia to Washington and on to Richmond and Hampton Roads. The impact of being linked to this Mega Region effectively doubles the volume of trips that the corridor would have as a freestanding corridor, and thus significantly enhances its potential for High-Speed and Enhanced Intercity Passenger Rail.

A Market Analysis was completed for the entire study area that extends from Charlotte, NC to Boston, MA, which included developing the travel demand forecast for the HRTPO study area that spans from Hampton Roads to Washington, DC. For this purpose, a 333-zone system was developed to determine the socioeconomic growth and transportation projections for the entire corridor and study area. The entire study area used for zone system development and for deriving the long-range socioeconomic and transportation forecasts, is shown graphically on Page 5.
The demand for intercity travel in the corridor is very strong and will continue to grow. The Hampton Roads region hosts a large number of finance and business services, research and high-tech industry, government agencies and military bases; and as a result, the Hampton Roads-Richmond-Washington corridor has a high level of business, commuter, social and tourist travel between its urban areas. In 2012 the Hampton Roads-Richmond-Washington corridor had an estimated 59 million total annual intercity one-way trips (average resident takes 6.6 one way or 3.3 round intercity trips per year), with a population of nearly ten million, employment of over six million, and a per capita income of $39,648. In 2040, the population is projected to be over 12 million; employment will be about 8.5 million; and, average per capita incomes will grow to about $53,227 (2012 dollars). Projections, therefore, indicate that the corridor’s demographic and economic growth will continue over the next several decades giving a forecasted total trip volume of 79 million trips by 2045, a growth of 34%.
Ridership and Revenue Analysis

As shown below, the differences in Southside ridership between the three principle route options are relatively small. The biggest impact to passenger rail ridership and revenues is due to the selection of rail technology options 220 mph or 130 mph. Each route option has about 3.5 million trips for the 130-mph technology option and 5 million plus for the 220-mph technology option. Option 3, however, with 3.7 million trips for the 130-mph option and 5.3 million for the 220-mph option, has the best results. In terms of revenues, Option 3 is again marginally higher than Options 1 or 2, having revenue of $194 million for the 130-mph option and $324 million for the 220-mph option in 2025.
FINANCIAL AND ECONOMIC RESULTS

The financial results for the Hampton Roads-Richmond-Washington corridor show that all of the route and technology options produce positive operating ratios and as such, will not need an operating subsidy. As expected, the 220-mph options showed higher financial returns than the 130-mph options, with Option 3 Richmond Direct having marginally higher financial results than the two Southern routes (Options 1A and 1B) via Petersburg or the two Northern routes (Options 2A and 2B) via Hopewell. The operating surplus for the 220-mph Option 3 is $182 million in 2025 and continues to grow over the life of the project. This makes the option franchisable, and a potential candidate for a Public Private Partnership (P3).

In Benefit-Cost terms, a similar set of results was found for the Richmond Direct (Option 3), which showed a marginal improvement over the Northern and Southern Route Options 1 and 2. And, again, the results for the 220-mph trains were better than the results for 130-mph trains. For Option 3 at 220 mph, the Total Benefits are $12.5 billion. Total Costs are $7.9 billion and the Cost Benefit Ratio is 1.57. Option 3 also remains positive at a 7% discount rate, the OMB requirement for USDOT funding.
KEY FACTORS FOR CONSIDERATION AND CONCLUSION

The results of the analyses reveal that all of the options have independent utility and could be implemented. In fact, the rankings of the different route options are so close given the quality of the alignments, that it is likely that external factors will determine which route is selected. Two key external factors are:

- The potential for options sharing track and cost with the SEHSR trains going from Richmond to Washington.
- The potential for connecting the Richmond Direct option with the Newport News-Richmond service and both corridors being able to share track on the final approach into Richmond.

In conclusion, the results of the analyses clearly show that the potential for developing a true high-speed (220-mph) passenger rail system from Norfolk-Richmond is very real. It is clear from the initial market, engineering, environmental, financial and economic analyses, that greenfield routes could be developed that would attain USDOT FRA financial and economic requirements and that avoid, at an environmental scan level, “fatal flaws” preventing their construction. However, the specifics of the final route selection would depend on the likely degree of integration with the SEHSR or with the Newport News-Richmond route. At the current time, it appears that the potential synergy with the Peninsula service is very strong and would greatly increase the financial returns and the Benefit/Cost Ratio for investment with only a small (10%) increase in cost. As a result, connecting the Richmond Direct option to the Peninsula shows great potential for attracting a P3 with both Federal and private sector investment.

NEXT STEPS

To move towards implementing the HRTPO Board Objectives, the HRTPO should:

- Work closely with the communities of the Peninsula to identify the potential of a Richmond Direct Improved Option (as shown on the map on Page 9) benefiting both the Southside and Peninsula communities in Hampton Roads. This Option is a very cost effective way of developing higher speed options for the Peninsula, as well as achieving the high-speed objectives of the Southside. It would give both communities the higher and high-speed options they are seeking in line with the HRTPO Board’s recommendations.

- Evaluate the potential cost savings by linking with the Southeast High-Speed rail in Richmond. This could save $1 - $2 Billion in capital costs.

- Develop a Service Development Plan and a Service NEPA in order to make application to the USDOT FRA and/or the Commonwealth of Virginia for funding for a Tier I High-Speed Rail EIS that determines the selection of the Final Preferred Alternative for the Hampton Roads-Richmond-Washington corridor.

- Develop a partnership with freight railroads for engaging in discussions for shared right-of-ways, particularly on the low speed approaches in urban areas.

- Engage SEHSR in a discussion of the potential synergies associated with the HRTPO Enhanced and High-Speed corridors options.
- Develop the institutional framework to support a process for Public Private Partnership (P3) Development throughout the Environmental Process. This involves holding regular workshops with potential P3 partners through the environmental process.

- Identify the potential financial parameters for a public-private partnership considering: Design, Build, Operate, Maintain and Finance (DBOM-F) options similar to the approach in Florida that attracted $1.8 Billion in USDOT FRA money for a P3 project between Miami-Orlando-Tampa.

Key Documents for FRA Funding for high-speed rail include:

- Service Development Plan/Service NEPA
- Environmental Documentation
- Railroad Agreements where existing rail rights-of-way will be used
- Agreements on Station Development with local communities
- Financial and Funding Plan
- Work with the USDOT FRA to document the requirements for operating 220-mph trains similar to those currently proposed for the Northeast Corridor and California.
## RESULTS OF THE VISION PLAN ALTERNATIVES ANALYSIS

| HRTPO Route Options: Summary and Comparison of Results for All Analyses |
|---|---|---|---|---|---|---|---|---|---|---|
| | SOUTHERN OPTION 1 (Via Petersburg) | NORTHERN OPTION 2 (Via Hopewell) | OPTION 3 - RICHMOND DIRECT |
| | Southern Option 1A - Greenfield | Southern Option 1B - Norfolk Southern | Northern Option 2A - Greenfield | Northern Option 2B - Norfolk Southern |
| Rail Ridership | Year 2025 (Million Annual Person Trips) | 3.73 | 5.38 | 3.73 | 5.38 | 3.69 | 5.23 | 3.69 | 5.23 | 3.91 | 5.55 |
| Financial: Year 2025 (Millions$) | Total Revenue | $210.30 | $357.43 | $210.30 | $357.43 | $206.17 | $348.32 | $206.17 | $348.32 | $218.79 | $360.99 |
| | Operating Cost | $132.95 | $179.51 | $132.95 | $179.51 | $131.57 | $175.77 | $131.57 | $175.77 | $134.63 | $178.63 |
| | Operating Surplus | $77.35 | $177.92 | $77.35 | $177.92 | $74.60 | $172.55 | $74.60 | $172.55 | $84.16 | $182.36 |
| | Operating Ratio | 1.58 | 1.99 | 1.58 | 1.99 | 1.57 | 1.98 | 1.57 | 1.98 | 1.63 | 2.02 |
| Capital Cost (Million$) | Capital Cost at 3% (Discount Rate) | $3,941.50 | $5,452.35 | $3,910.74 | $5,409.80 | $3,942.62 | $5,453.90 | $3,896.73 | $5,390.41 | $3,835.92 | $5,306.29 |
| Economic NPV (Million$ - 3% Discount Rate) | Total Benefits | $8,295.25 | $12,244.85 | $8,295.25 | $12,244.85 | $8,174.55 | $11,969.32 | $8,174.55 | $11,969.32 | $8,609.07 | $12,503.48 |
| | Total Costs | $5,997.21 | $8,102.31 | $5,966.44 | $8,059.75 | $5,975.30 | $8,059.78 | $5,929.41 | $7,996.29 | $5,901.66 | $7,943.42 |
| | NPV(Surplus) | $2,298.05 | $4,142.55 | $2,328.81 | $4,185.10 | $2,199.24 | $3,909.54 | $2,245.14 | $3,973.03 | $2,707.41 | $4,560.07 |
| | Benefit/Cost Ratio | 1.38 | 1.51 | 1.39 | 1.52 | 1.37 | 1.49 | 1.38 | 1.50 | 1.46 | 1.57 |

Note: Financial/Economic Results aggregate both Peninsula and Southside.