HIGH SPEED RAIL COSTS, BENEFITS, AND FINANCING
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MANAGING DIRECTOR
AECOM

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OUTLINE

• Introduction
• Costs of High Speed Rail
• Benefits of High Speed Rail
• Financing High Speed Rail
• Summary
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WHAT IS HIGH SPEED RAIL

• High-Speed Rail – Intercity Passenger Rail service that “is reasonably expected to reach speeds of at least 110 mph” (49 U.S.C. 26106(b)(4)).

  – HIGH SPEED RAIL EXPRESS – ABOVE 150 mph top speed
  – HIGH SPEED RAIL REGIONAL – 110 mph to 150 mph top speed
  – EMERGING HIGH SPEED RAIL – 90 TO 110 mph top speed (Distance of 100 to 600 miles)

• BENCHMARKS
  – 130 mph - Cruising speed of Japan's Shinkansen high-speed rail service (Tokyo to Osaka).
  – 186 mph - Speed of Spain's AVE service (Madrid to Barcelona).
  – 160 mph - Speed of France's TGV service (Paris to Nice).
  – 357 mph - World speed record, set by France's TGV in 2007
WHAT IS HIGH SPEED RAIL

• CURRENT ACTIVE HIGH SPEED RAIL EXPRESS PROGRAMS IN UNITED STATES
  – AMTRAK NEXT GENERATION (‘NEXT-GEN’) HIGH SPEED RAIL PROGRAM FOR NORTHEAST CORRIDOR
  – CALIFORNIA HIGH SPEED RAIL PROGRAM
  – DESERTXPRESS PROGRAM

• MOST OTHER INTERCITY PASSENGER RAIL PROGRAMS ARE ‘EMERGING HIGH SPEED RAIL PROGRAMS’ ALTHOUGH SOME MAY ULTIMATELY BECOME ‘HIGH SPEED RAIL REGIONAL’
FRA DESIGNATED HSR CORRIDORS
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AMTRAK NEXT-GENERATION NORTHEAST CORRIDOR RAIL PLAN
AMTRAK NEXT GENERATION NEC COSTS

<table>
<thead>
<tr>
<th>COST CATEGORY</th>
<th>COST ($ 2010 BILLIONS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track, Structure, &amp; Stations</td>
<td>67</td>
</tr>
<tr>
<td>Right of Way</td>
<td>13</td>
</tr>
<tr>
<td>Vehicles</td>
<td>3</td>
</tr>
<tr>
<td>Soft Costs</td>
<td>21</td>
</tr>
<tr>
<td>Contingencies</td>
<td>13</td>
</tr>
<tr>
<td>TOTAL</td>
<td>117</td>
</tr>
</tbody>
</table>
The Bay to Basin system will connect the San Francisco Bay and Los Angeles metropolitan areas, along with the state’s fastest growing region—the Central Valley—with world-class high-speed rail service.
# California High Speed Rail Phase 1 Capital Costs

<table>
<thead>
<tr>
<th>SECTION</th>
<th>Incremental Capital Costs (Billions $ 2010)</th>
<th>Cumulative Capital Costs (Billions $ 2010)</th>
<th>Completion of Section</th>
<th>Incremental Year of Expenditure Capital Dollars</th>
<th>Cumulative Year of Expenditure Capital Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Const Section</td>
<td>5.2</td>
<td>5.2</td>
<td>2017</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Initial Operating Segment S</td>
<td>21.4</td>
<td>26.6</td>
<td>2021</td>
<td>27.2</td>
<td>33.2</td>
</tr>
<tr>
<td>Bay to Basin</td>
<td>14.2</td>
<td>40.8</td>
<td>2026</td>
<td>21.1</td>
<td>54.3</td>
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<tr>
<td>Phase 1 Blended</td>
<td>14.1</td>
<td>54.0</td>
<td>2030</td>
<td>23.9</td>
<td>78.2</td>
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<tr>
<td>Phase 1 Full HSR</td>
<td>10.5</td>
<td>65.4</td>
<td>2033</td>
<td>19.9</td>
<td>98.1</td>
</tr>
</tbody>
</table>
DESERTXPRESS – VICTORVILE TO LAS VEGAS
DESERTXPRESS – VICTORVILLE TO LAS VEGAS
DESSERTXPRESS CAPITAL COSTS

• CAPITAL COSTS GENERALLY REPORTED TO BE IN RANGE OF $6.0 TO $6.5 BILLION
  – Capital costs reflect a Record of Decision (ROD) based on the Final Environmental Impact Statement (FEIS)
  – Unable to find documentation of capital costs in the public domain
  – Unclear if the capital costs are $2010 or $ year of expenditure
Major Investments have been made to preserve Rail Corridor
FLORIDA TAMPA – ORLANDO (PHASE 1) HSR CAPITAL COST

• Estimated capital cost $2.65 billion ($ yoe)
  – Excludes value of FDOT contributed ROW .57 billion
MIDWEST REGION WEST HIGH SPEED RAIL LINES
MIDWEST REGION EAST HIGH SPEED RAIL LINES
## MIDWEST HIGH SPEED RAIL CAPITAL COSTS

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>MILES</th>
<th>CAPITAL COST ($ MILLIONS 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago to Minneapolis/St. Paul</td>
<td>455</td>
<td>$28,643</td>
</tr>
<tr>
<td>Chicago to St. Louis</td>
<td>311</td>
<td>$15,861</td>
</tr>
<tr>
<td>Chicago to Cincinnati</td>
<td>284</td>
<td>$14,182</td>
</tr>
<tr>
<td>Chicago to Detroit/Cleveland 2)</td>
<td>420</td>
<td>$26,488</td>
</tr>
<tr>
<td>Chicago West Loop HSR Station</td>
<td>n/a</td>
<td>$466</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1,457</td>
<td><strong>$83,572</strong></td>
</tr>
</tbody>
</table>
COMMENTS ON HIGH SPEED RAIL CAPITAL COSTS

• High speed rail requires an alignment with very limited curves and grades – and extremely tight tolerances – and hence is expensive to both build and to maintain
• Policy decisions must be made when significant cost uncertainty remains
• Amtrak Next Gen Northeast Corridor Program - $117 billion (2010 $)
  – No environmental clearance or engineering work has yet been accomplished
  – Costs are estimated in 2010 $ (because there is no construction schedule as yet)
  – Challenging environment for constructing major infrastructure projects
• California High Speed Rail Program – $98 billion (year of expenditure $)
  – Estimated cost is for Phase 1 only
  – Environmental clearance and preliminary engineering work is being accomplished for the Initial construction Segment but not as yet for the other Phase 1 segments
  – Challenging environment for constructing major infrastructure projects – particularly in the major urban areas
COMMENTS ON HIGH SPEED RAIL CAPITAL COSTS

• DesertXpress - $6.0 to 6.5 billion
  – Victorville to Las Vegas Segment only
  – Record of Decision has been obtained and sufficient engineering to obtain ROD has been accomplished
  – Final engineering remains to be accomplished
  – Less challenging environment for constructing major infrastructure project

• Florida Tampa to Orlando Phase 1 HSR project
  – Estimate cost is about $3.2 billion if contributed ROW included
  – Some prospective vendors expressed concern that capital cost underestimated
  – Impact of Federal Railroad Administration regulations (including Buy America not fully appreciated)
  – Impact of transferring ridership and revenue risk to concessionaire not fully appreciated

• Midwest High Speed Rail Program - $84 billion (2010 $)
  – No environmental clearance or engineering work has yet been accomplished
  – Costs are estimated in 2010 $ (because there is no construction schedule as yet)
  – Challenging environment for constructing major infrastructure projects in urban areas
COMMENTS ON HIGH SPEED RAIL CAPITAL COSTS

• Capital costs tend to increase – even after the FEIS is complete and the ROD has been issued
• Example: Phase 2 of Dulles MetroRail Project – capital costs increased from $2.5 billion (YOE $) in ROD to $3.8 billion (YOE $) before cost shifting and cost reduction measures implemented
• Reasons for capital cost increases include:
  – Inflation
  – Right of way cost growth
  – Third party requests for project enhancements
  – Utilities
  – Scope increases
  – Changing design standards
  – Schedule delays
  – Contractor assessment of biddings risks
  – Competitive bidding environment
  – Terms and conditions of contractual arrangements
  – Claims
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## AMTRAK NEXT GEN BENEFIT COST ANALYSIS

<table>
<thead>
<tr>
<th>PROJECT COSTS</th>
<th>TOTAL NET PRESENT VALUE 2010-2060</th>
<th>(BILLIONS $ 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISCOUNT RATE</td>
<td>3%</td>
<td>7%</td>
</tr>
<tr>
<td>CONSTRUCTION COSTS</td>
<td>72.8</td>
<td>41.8</td>
</tr>
<tr>
<td>CREDIT FOR RESIDUAL PROJECT VALUE</td>
<td>20.3</td>
<td>5.5</td>
</tr>
<tr>
<td>CREDIT FOR AVOIDABLE NEC MASTERPLAN COSTS</td>
<td>8.3</td>
<td>6.3</td>
</tr>
<tr>
<td>NET PROJECT COSTS</td>
<td>44.3</td>
<td>29.9</td>
</tr>
</tbody>
</table>
# AMTRAK NEXT GEN BENEFIT COST ANALYSIS

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<thead>
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</thead>
<tbody>
<tr>
<td>DISCOUNT RATE</td>
<td>3%</td>
<td>7%</td>
</tr>
<tr>
<td>OPERATING SURPLUS (REVENUES MINUS O&amp;M COSTS)</td>
<td>11.0</td>
<td>3.6</td>
</tr>
<tr>
<td>TRAVEL TIME &amp; COST SAVINGS, ACCIDENT AVOIDANCE, HIGHWAY DELAY REDUCTION,</td>
<td>16.3</td>
<td>5.0</td>
</tr>
<tr>
<td>ENERGY &amp; ENVIRONMENTAL BENEFITS</td>
<td>1.3</td>
<td>0.4</td>
</tr>
<tr>
<td>COMMUTER NETWORK BENEFITS (SLOTS, NEW COMMUTERS, REDUCED DELAYS)</td>
<td>26.4</td>
<td>8.3</td>
</tr>
<tr>
<td>AIR SYSTEM IMPACTS (REDUCED AIR SYSTEM / TRAVELERS DELAYS)</td>
<td>21.5</td>
<td>6.8</td>
</tr>
<tr>
<td>MARKET PRODUCTIVITY BENEFITS</td>
<td>23.8</td>
<td>7.3</td>
</tr>
<tr>
<td><strong>TOTAL PROJECT BENEFITS</strong></td>
<td><strong>100.2</strong></td>
<td><strong>31.4</strong></td>
</tr>
<tr>
<td><strong>BENEFIT COST RATIO</strong></td>
<td><strong>2.26</strong></td>
<td><strong>1.05</strong></td>
</tr>
</tbody>
</table>
KEY CATEGORIES OF BENEFITS

- **NEC Capacity and Travel System Gains** – Travelers’ shift to high-speed rail would free up capacity and reduce delays on competing modes (on highways and especially at congested NEC airports), create roughly 126 new commuter rail service “slots” in key urban areas, with time savings for existing commuters by reducing delays (eliminating Acela-related conflicts), plus cost savings to new rail commuters. These factors add up to an overall value of $15.1 billion.

- **Market Productivity** – Better connections among the corridor’s high-value-added urban centers, access to a broader, diverse labor pool and client base and increased economic density around high-speed rail stations would enhance the productivity of the NEC economy, with convenient, high-speed connections facilitating face-to-face contact among specialized labor. The overall market value is conservatively estimated at $7.34 billion over the analysis horizon, creating roughly 100,000 new jobs by 2040 and $25 billion in wages over the 2025-2050 period.
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HIGH SPEED RAIL FINANCING CHALLENGES

• Large Capital Costs for HSR Special Purpose Vehicles (SPVs)
  – Highway SPV’s are currently seldom larger that $3 billion to $4 billion and these typically require a consortium of several concessionaires
  – The smallest HSR SPV (DesertXpress) has a value of $6.5 billion
  – Significant challenges in financing and bonding infrastructure project of this magnitude

• Significant (and generally unacceptable) financial risk exposure associated with SPV accepting ridership and revenue risk

• Significant issues associated with assigning responsibility and liability if multiple concessionaires involved in an HSR program

• Concerns about creditworthiness of public counterparties to SPV for availability payment based concessions
CHSRA MAJOR FINDINGS FROM PRIVATE SECTOR OUTREACH

- Surety bonds are a challenge to secure
- Separating civil procurement from systems procurement is acceptable
- Contractor capacity is available
- Very few if any HSR Projects have transferred significant ridership risk
- Industry is generally comfortable with Availability Payments
- Most respondents are not willing to accept real estate compensation; a few have experience with real estate development and may be willing to take such risk depending on situation
- Financial plan based on:
  - Federal grants used as pay go during construction and as modified availability payments subsequently
  - Bidder finance remaining uses based on future Federal grants subject to surface transportation reauthorization
BASED ON OUR MARKET UNDERSTANDING, WE BELIEVE THAT

1. There are any US true high speed rail projects which will throw off sufficient cash from operations to 100% finance their capital costs
2. Unlikely that concessionaires, vendors, and / or contractors will accept ridership and revenue risk
3. Concessionaires and / or vendors may be willing to lease the rolling stock to the SPV if they are at the top of the waterfall
4. Awarding an HSR development concession based on including land development rights in the vicinity of the stations has proven to be poor public policy and does not resolve HSR financing challenge
5. Financing and funding a true HSR program on their own has proven to be beyond the financial capacity of any of the 50 states
STRATEGIES FOR FINANCING A TRUE HSR PROGRAM

1. HSR programs should be implemented incrementally and the increments should have independent utility.
   
   A. An incremental implementation can be accomplished most readily in the Northeast Corridor
   
   B. An intercity passenger rail service upgrade program – improving conventional rail service to Emerging HSR and HSR Regional is inherently easier to implement on an incremental basis.
   
   C. The states indicated in a recent AASHTO study that they could effectively use a Federal intercity passenger rail service funding program in the range of $5 billion to $6 billion annually to advance their intercity passenger rail service upgrade programs.
STRATEGIES FOR FINANCING A TRUE HSR PROGRAM

2. The Federal government must be a reliable partner to the states, Amtrak, and the private sector in implementing a HSR programs.
   A. The Federal government has funded the on-going upgrade intercity passenger rail upgrade program in the Amtrak owned Northeast Corridor for the past 40 years.

3. Credit support from the Federal government – through the RRIF and TIFIA program – can be an important element of the Federal role.
   A. Denver Union Station financed in part by Railroad Rehabilitation & Improvement Financing (RRIF) and Transportation Infrastructure Finance and Infrastructure Act (TIFIA) loans.
   B. Miami Intermodal Center (MIC) financed in part by TIFIA loan.
STRATEGIES FOR FINANCING A TRUE HSR PROGRAM

4. States need to be meaningful partners with the Federal government in Implementing their HSR programs.
   A. The Federal Transit Administration’s ‘New Starts’ program provides an example of a Federal – State – Local partnership program.

5. The State and / or multi-state entities should be able to enter into public private partnerships - which are funded by availability payments - to implement and operate their HSR programs.

6. Joint development programs should be pursued at stations – with a particular emphasis on funding / financing the respective stations and related facilities.
P3 BENEFITS

• Value of money – promotes innovation and efficiency
• Risk sharing – P3 allows public sector to transfer significant risk - transparency of risk sharing promotes increased accountability and performance
• Increased probability of on-schedule and on-budget project delivery
• Public borrowing capacity available for other purposes
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INTERSTATE HIGHWAY SYSTEM
FRA DESIGNATED HSR CORRIDORS