1. QUALIFICATIONS/EXPERTISE OF FIRMS ON TEAM

1A/1B. TEAM INFORMATION

Jacobs understands the complexity of developing a business case to support ultra high-speed ground transportation (UHSGT) between Portland, OR and Vancouver, BC. Our team has the expertise to continue our work from Phase I by narrowing down technology, creating a flexible and future-ready demand model, evaluating financing options, and generating interest from investors to continue future phases. Recognizing the importance of this project, we built a team that brings world-class talent to analyze the UHSGT business case and are invested in growing and further exploring the next phase of UHSGT with WSDOT. Our dynamic team’s expertise is demonstrated in Table 1A.1.

The Jacobs Team offers:

**Phase I Experience:** Having worked on Phase I of the Ultra High-Speed Ground Transportation Study, our team is ready to hit the ground running with a keen understanding of the project expectations and goals. We will maximize efficiency and available resources by using data from Phase I. Our local presence with offices in Portland, Seattle and Vancouver combined with access to local transit, roadway, and aviation demand models gives us an understanding of the local transportation market and an additional leg up to getting the study up and running.

**Investor Engagement Expertise:** Our team includes specialists in transactions advisory services and have advised on over $25 billion of successful transactions since 2013 including the recent sale of High Speed 1 (HS1), the United Kingdom’s only high-speed rail line, and acting as Lenders’ Traffic Advisor on the new Tours to Bordeaux high-speed line in France. The team brings both an understanding of the financial community, their critical success factors in rail transactions, and existing relationships which will be leveraged within the investor engagement element of the study.

**Multimodal Knowledge:** A robust business case for UHSGT requires not only an understanding of high-speed rail (HSR) and similar technologies, but also those modes from which demand may shift. Given the complexity of the corridor and alternative transport modes, we will deploy a multidisciplinary team to the demand forecasting tasks which includes expertise in highways, aviation, bus/coach and conventional rail in addition to the high-speed technologies.

**Technology and Decision-Making Experts:** To perform a thorough technology assessment, our team has nationally recognized experts in high-speed rail, magnetic levitation (maglev), and hyperloop technologies. Additionally, we have brought on a strategic decision making facilitator to help objectively narrow down the technologies.

**Innovative Mobile Data Collection:** Our approach to the data collection and survey includes innovative and cost-effective use of cell phone data for transport modeling. Jacobs has been at the forefront of this, having led the development of a national database of interurban road, rail and air trips in the United Kingdom. Deploying such an approach will provide superior data quality for the study compared to traditional methods.

**Transparent, Future Ready Model:** Our team will use an investor friendly logit model to forecast demand and revenue that will lay the groundwork for future exploration.

### Table 1A.1: Firm Information

<table>
<thead>
<tr>
<th>Qualifications and Expertise</th>
<th>Jacobs</th>
<th>DB Engineering &amp; Consulting USA Inc.</th>
<th>AECOM</th>
<th>Envirosolutions</th>
<th>RSG Inc.</th>
<th>Insight Strategic Partners</th>
<th>Paladin Partners</th>
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<tbody>
<tr>
<td>Years Experience</td>
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<td>Firms’ Expertise</td>
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<tr>
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</tr>
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<td></td>
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<tr>
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<tr>
<td>Finance (P3), Economic Analysis</td>
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<td>✓</td>
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<tr>
<td>Finance (P3), Economic Analysis</td>
<td>✓</td>
<td></td>
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<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
TEAM STRUCTURE

Our leads have specialized experience to move the study forward independently while sharing technical resources and collaborating to build a cohesive study. Several of our teaming partners worked on Phase I and we are excited to continue with them. The project organizational chart below (Figure 1A.2) depicts our experts available to support this phase of the study.

**Project Management:** David Solow, armed with his subject matter expertise, will manage the project alongside Scott Richman and Tom McDonald.

**Demand and Revenue Forecasting:** Ian McGookin will lead the team in the development of the demand and revenue forecasting tool. This includes data collection using stated preference (SP) surveys and mobile phone data.

**Operations Planning and Costing:** We have teamed up with DB Engineering & Consulting USA Inc. (DB) to study UHSGT operating and capital planning needs. Their team has performed similar services on high-profile projects such as the California High-Speed Rail.

**Technology Assessment:** AECOM has unparalleled experience with advanced technologies such as maglev and hyperloop. Led by Kenneth Sislak, our team will quickly narrow down technology options within our demand and revenue forecasting model.

**Governance and Stakeholder Facilitation:** Marty Loesch will help lay the foundation for governance strategies able to feed into future phases. Angie Thomson will continue her work from Phase I and facilitate the stakeholder advisory group.

**Finance (P3), Economic Analysis:** Under the guidance of Jon Clyne, this team will explore public and private funding options to build the business case for investors. As stated above, this team includes transaction advisory specialists with a keen understanding of what investors need to know for further exploration.

Our strategic advisors further provide expertise to create the comprehensive business case.

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**Figure 1A.2: Org Chart**
1B. TEAMING HISTORY

Jacobs’ teaming partners for this project not only provide key local resources, but also staff with unique and relevant expertise to develop this study. Jacobs’ past and/or current relationships with our subconsultants is highlighted in the table below. (See table 1B.1 below.)

<table>
<thead>
<tr>
<th>Firm Name</th>
<th>Project (Last 3 Years)</th>
<th>Firm Responsibilities (role)</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB ENGINEERING &amp; CONSULTING USA INC.</td>
<td>Ultra-High-Speed Ground Transportation Study</td>
<td>Jacobs: Prime DB: Technology Assessment</td>
<td>June 2017 - Dec 2017</td>
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<tr>
<td>AECOM</td>
<td>Ultra-High-Speed Ground Transportation Study</td>
<td>Jacobs: Prime AECOM: Technology Assessment and Economic Analysis</td>
<td>June 2017 - Dec 2017</td>
</tr>
<tr>
<td>ENVIROISSUES</td>
<td>Ultra-High-Speed Ground Transportation Study</td>
<td>Jacobs: Prime EnviroIssues: Stakeholder Engagement and Facilitation</td>
<td>June 2017 - Dec 2017</td>
</tr>
<tr>
<td>INSIGHT STRATEGIC PARTNERS</td>
<td>1-90 SR 18 Interchange Improvements</td>
<td>Jacobs: Prime Insight Strategic Partners: Strategic Planning, Government/Community Relations</td>
<td>2017 - Present</td>
</tr>
</tbody>
</table>

Table 1B.1: Teaming History

1C. AVAILABILITY OF KEY STAFF

Table 1C.1 below illustrates hours of monthly availability for the Ultra High-Speed Ground Transportation Study: Business Case Analysis. Our Project Manager, David, understands the capabilities and capacities of all firms on our team, and he will monitor the workload of key staff members to ensure the right resources are available when they are needed, and will continue to be available through the course of the study.

<table>
<thead>
<tr>
<th>Key Team Members</th>
<th>Role</th>
<th>Firm</th>
<th>Hours Available per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<tr>
<td>David Solow</td>
<td>Project Manager</td>
<td>Jacobs</td>
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<tr>
<td>Scott Richman</td>
<td>Deputy Project Manager</td>
<td>Jacobs</td>
<td>88</td>
</tr>
<tr>
<td>Tom McDonald</td>
<td>Scheduling &amp; QA Manager</td>
<td>Jacobs</td>
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<tr>
<td>Ian McGookin</td>
<td>Demand &amp; Revenue Forecasting Lead</td>
<td>Jacobs</td>
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<tr>
<td>Steve Weller</td>
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<td>Jon Clyne</td>
<td>Finance (P3), Economic Analysis Lead</td>
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</tr>
<tr>
<td>Greg Spitz</td>
<td>Demand &amp; Revenue Forecasting (Survey)</td>
<td>RSG</td>
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<td>Yoev Hagler</td>
<td>Operations Planning and Costing Lead</td>
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<tr>
<td>Ken Sislak</td>
<td>Technology Assessment Lead</td>
<td>AECOM</td>
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<tr>
<td>Marty Loesch</td>
<td>Governance and Cross-Border Governance</td>
<td>Insight</td>
<td>20</td>
</tr>
<tr>
<td>Angie Thompson</td>
<td>Stakeholder Facilitation</td>
<td>EnviroIssues</td>
<td>60</td>
</tr>
</tbody>
</table>

Table 1C.1: Availability
1D. PREVIOUS RELEVANT EXPERIENCE

Below is Jacobs’ and our subconsultants’ experience providing the relevant services and expertise needed to successfully complete this project.

Jacobs (formerly CH2M) recently completed an ultra high-speed ground transportation feasibility study on behalf of WSDOT for a potential future link between Portland, Seattle and Vancouver, British Columbia. The high level study examined potential demand, revenue, alignments, and technology.

The team reviewed high-speed rail, maglev, and hyperloop technologies, along with factors including the number and general locations of new stations, ridership and costs, potential implementation models for funding/financing and governing a new service between two states and the Province of B.C. The study also incorporated a broader agglomerated economic benefits assessment funded by Microsoft and trade organizations.

The results of our study provided high-level yet comprehensive results compelling enough for WSDOT to further explore ultra high-speed ground transportation. Our team was able to deliver all project goals in a compressed time frame to meet project funding deadlines.

Our team’s focus included:

- Analysis using the FRA CONNECT Model
- Identifying and examining new alignments and existing alignments
- Technology identification and assessment
- Funding and financing analysis

Our current teaming partners were integral to the quality and success of phase I of the study.

DB evaluated technological options for ultra high-speed rail and developed capital and operating costs for inclusion in the FRA CONNECT Model.

AECOM lead the technology assessment and economic analysis. The technology assessment evaluated technologies capable of sustained speeds of at least 250 mph, which included high-speed rail, maglev and hyperloop. Economic analysis included using the FRA CONNECT sketch planning tool that provided cost recovery data, ridership and consumer surplus as part of the benefit/cost analysis. Wider economic impacts were also considered.

EnviroIssues led stakeholder engagement and facilitation of a 20-member Advisory Group that provided key insight on engineering, economic and policy feasibility. They also developed content for the project’s website and final report.
Jacobs (formerly CH2M) acted as technical advisor to MyHSR, the agency created by the Malaysian Government to develop and deliver a new 217 mile High-Speed Rail (HSR) system between Kuala Lumpur, Malaysia and Singapore. As sole technical advisor to MyHSR during the critical early development stage of the project, Jacobs has had a pivotal role in this transformational cross-border project. Our advisory role was critical in developing demand forecasts and creating an appropriate economic and regulatory framework to produce incentives on all parties to deliver high service quality, by optimizing use of the new high-speed rail assets. The Jacobs team also advised MyHSR on the commercial and economic case for the scheme, working with potential investors and other key stakeholders – in particular, we produced analysis of the commercial potential of the new stations, the associated economic benefits, and potential corridor and alignment options to seek to optimize the scheme within capex constraints.

LeighFisher, wholly owned by Jacobs, was appointed by Ontario Teachers Pension Plan and Borealis Infrastructure to undertake sell side vendor due diligence in relation to a divestment in High Speed 1 Ltd (HS1). Our scope of work was to develop passenger demand and train path forecasts for international operators, domestic services and freight operators using HS1. A multidisciplinary team including rail and aviation experts reviewed passenger and operational data across all rail operators and, for international services, reviewed competing air demand, capacity and journey times. Spreadsheet-based passenger demand forecasting models were built for both international and domestic services, and our operational experts converted these into train path forecasts, considering infrastructure capacity, demand profile, rolling stock availability, OPEX and CAPEX. International passenger services also considered border / immigration considerations, and explored new markets for future service expansion (e.g. Amsterdam, Bordeaux and Geneva). We also reviewed ancillary revenues associated with HS1-owned car parks at 4 of the stations.

In 2008, the federal government of Québec and Ontario awarded a contract to the EcoTrain Consortium, with DB as a partner, for an update and revision of an existing study. This revision of this study was to provide the clients with a detailed survey of the environmental and financial effects of the proposed high-speed rail project, and it included an assessment of high-speed train technologies; potential routings; traffic forecasts; financial and economic (cost-benefit) analyses. DB was assigned to perform and revise the technology assessment, operations planning, and compilations of capital costs.
<table>
<thead>
<tr>
<th>Project Description</th>
<th>Cost</th>
<th>Relevance</th>
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<td>AECOM</td>
<td>VIRGIN HYPERLOOP ONE AND COLORADO DOT, HYPERLOOP ONE COLORADO FEASIBILITY ANALYSIS</td>
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<td>AECOM</td>
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<td>$4,000,000</td>
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<tr>
<td>DB ENGINEERING &amp; CONSULTING USA INC.</td>
<td>CAHSRA, SAN JOSE TO BAKERSFIELD</td>
<td>$30,000,000</td>
</tr>
<tr>
<td>ENVIROISSUES</td>
<td>WSDOT, AMTRAK STATION FREIGHTHOUSE SQUARE RELOCATION</td>
<td>$64,000</td>
</tr>
</tbody>
</table>

DB is the “Early Train Operator” between San Jose and Bakersfield. DB is consulting on operational specifications affecting high-speed trains, systems, and stations. This includes the operations and maintenance cost modeling and forecasting, ridership and passenger revenue forecasting, service planning and scheduling, and operations control systems. As the Early Train Operator, DB is also working closely with CAHSRA in order to help with revenue optimization, and support for procurement, and testing of high-speed trains.

This continued study for VH1 and CDOT outline both vision and technology application, and how this technology will benefit the region in traffic impacts, economic development and quality of life. The study also includes an economic benefit analysis, transportation demand modeling, route planning, stakeholder engagement, and development of a regulatory and implementation strategy. AECOM is coordinating and collaborating closely with both VH1 and strategic stakeholder engagement across several municipalities.

AECOM is preparing an environmental impact statement (EIS) for a proposed SCMAGLEV train system between Washington, DC and Baltimore, Maryland, with an intermediate stop at Baltimore/Washington International Thurgood Marshall Airport. The EIS has seven official co-operating agencies including the Federal Aviation Administration, the Federal Transit Administration and the Surface Transportation Board. There are also 23 participating agencies including Federal Highway Administration, as well as nearly all of the Maryland and Washington DC environmental regulatory and planning agencies. AECOM is leading collaboration between all agencies and also hosting a project website to keep stakeholders and agencies informed.

EnviroIssues helped WSDOT Rail develop and implement a communication and outreach strategy for the relocation of the Amtrak Station to Freighthouse Square in Tacoma. With strong opposition from the community on early designs, and stakeholder relationships strained, EnviroIssues helped engage the community, and rebuild trust through an open and transparent site selection and design process. Their involvement eased the opposition the relocation was facing and allowed the involved stakeholders to reach concurrence and arrive to a consensus based solution.
ENVIROISSUES | SOUND TRANSIT, LONG-RANGE PLAN UPDATE AND ST3 | 2013-2018
FEE RECEIVED: $1,450,000

EnviroIssues provided comprehensive and inclusive engagement, strategic communications, comment management, graphic design and web development services. This led to a successful ballot measure resulting in a $54 billion transit funding package that passed in November 2016. They developed and implemented an intensive 45-day scoping comment/outreach period, built outreach toolkit, and developed a graphic-rich website which received nearly 60,000 surveys. Their involvement led to a successful ballot measure resulting in a $54 billion transit funding package that passed in 2016.

RSG | VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION, SOUTHEAST HSR TIER II EIS- RICHMOND TO POTOMAC | 2014-ONGOING | FEE RECEIVED: $951,355

RSG conducted a turnkey project—including surveying, modeling, and forecasting—to determine the feasibility of a higher-speed rail connection between Washington, DC, and Richmond, Virginia. The surveys involved experiments that required respondents to choose between travel time, access time, reliability, and other service elements. These data were then used to estimate mode choice models, from which demand elasticities and values of time were imputed. The field surveys (train, air, and bus) were used to inform a forecasting model of intercity travel along the Washington-Richmond corridor, including rail, bus, air, and automobile travel.

RSG | FLORIDA RAIL ENTERPRISE, TAMPA TO ORLANDO HIGH SPEED RAIL | 2010-2011 | FEE RECEIVED: $485,215

RSG helped develop ridership forecasts for the Tampa-Orlando high-speed rail corridor. RSG designed, implemented, and analyzed a web-based stated preference survey to understand current travel behavior and to estimate how future travelers may respond to the different service characteristics of the high-speed rail service (e.g., travel time, cost, reliability, access modes, amenities). The stated preference data was used to develop multinomial and nested logit models for use in the travel demand forecasts.

INSIGHT STRATEGIC PARTNERS | WSDOT, I-90 EASTLINK | 2016-2017
FEE RECEIVED: $100,000

1-90 Eastlink will bring Sound Transit light rail across the I-90 floating bridge to Mercer Island and beyond. Insight Strategic Partner’s (Insight) supported negotiations with Mercer Island regarding permitting and mitigation. Insight provided consultation and advice for discussions with local, county, state, and federal officials, developing strategic position and messaging for negotiations, and participating in those negotiations on behalf of and with the WSDOT Regional Manager.
1E. PREVIOUS CONTRACTING EXPERIENCE WITH WSDOT

Over the last 5 years, Jacobs has successfully negotiated over $63 million in WSDOT contracts. We understand your procedures and have demonstrated an ability to work through the contracting process to get projects moving. Jacobs acquired CH2M in 2017; both firms has a long history of completing projects for WSDOT across multiple disciplines and regions. Both respective business entities have WSDOT audited overhead rates and current ante tables, therefore this process should be seamless for WSDOT.

On the previous WSDOT Ultra-High Speed Ground Transportation Study, initiated in Spring 2017, David and Scott demonstrated their ability to quickly and efficiently contract with WSDOT. They proactively coordinated with subconsultants and WSDOT contracting staff to secure approved ANTE Rate Tables. They developed and negotiated an appropriate scope of work and corresponding cost to execute an initial startup Task Order in June, 2017. This initial task order enabled WSDOT to provide our team with notice to proceed to set up and kick off the study, while we completed needed contract documents with WSDOT for subconsultants who needed to establish WSDOT contracting approval. WSDOT signed the initial task order on June 15th and issued NTP the following day on June 16th and held a kick-off meeting the following week. Our diligent work with WSDOT to initiate the contract was critical to completing the study to support the mandated Legislative report-out in December, 2017.

Contract Negotiation Best Practices

- Everyone on our team has experience contracting with WSDOT will have submitted overhead audited rates for this project prior to selection.
- Upon notice of award, David and Scott will begin working with you to define the scope of work details and expected deliverables. Our team will come to Olympia to work through assumptions, milestones, schedule and deliverables. Beginning with the scope of work developed at the conclusion of Phase I, we will refine scope to meet the unique needs of this phase.
- Once we have agreed to the scope of work, we will finalize the level of effort required to develop the business case. We understand this study needs to be completed within the budget allocated by the State Legislature and have already started to discuss options for refining our costs.
- We will seek early Notice to Proceed for time critical scope elements; Initial critical path work can proceed while the entirety of the project is scoped and contracted.
- We have developed a standard Diversity Inclusion Plan template to quickly comply with WSDOT documentation requirements.
2. QUALIFICATIONS OF PROPOSED PROJECT MANAGER

DAVID SOLOW | PROJECT MANAGER

David Solow brings 39 years of experience in starting, building, and leading complex rail transportation operations. David is an experienced and accomplished project manager and consensus builder who will work along-side WSDOT to guide this study to a successful completion. He brings national experience conducting rail analyses, and guiding and developing rail programs with the U.S. Federal Rail Administration (FRA). As Project Manager, David will bring his former commuter rail CEO experience in order to bring an investor’s perspective to project development and delivery and his unmatched experience uniting and collaborating with diverse groups, stakeholders, and interests to successfully deliver a business case study that addresses WSDOT’s needs.

DAVID BRINGS:

 ✓ Life-long public agency experience in guiding projects to successful completion in challenging political and stakeholder environments.
 ✓ Experience working with WSDOT, first in oversight role working for the FRA and second, as Senior Advisor in the just completed Phase 1 study.
 ✓ National experience conducting passenger rail analyses including high-speed rail studies.
 ✓ Keen understanding of the US federal decision-making process for approval of rail projects.

2A. PROJECT EXPERIENCE

FRA, High Speed Rail and Intercity Passenger Rail Programs | Executive Advisor | May 2010 - July 2017

David assisted FRA in evaluating project applications, service development plans, operations simulations and stakeholder agreements, required for current and future funding under the $10.5 billion (US) High-Speed Rail and Intercity Passenger Rail Programs. He developed program guidance for FRA staff, grantees, stakeholders and host railroads. David assisted FRA with negotiating project agreements with host railroads and State grantees and the tracking of those agreements. He assisted FRA in its analysis of policy options for identifying project benefits for future funded projects. Additionally, David supported FRA in network integration planning for the CA High Speed Rail Program, Initial Operating Segment.

WSDOT, Ultra-High-Speed Ground Transportation Study | Operations and Planning Lead | June 2017 - December 2017

David provided operations and planning expertise for a high-level study evaluating high-speed rail alternatives between Vancouver, BC and Portland, OR. Utilizing FRA’s CONNECT model, the study included ridership and revenue, mode share, operating and total cost recovery estimates for this almost 300-mile corridor. It also analyzed connecting corridors east to Spokane, WA and south to Sacramento, CA. David provided overall project guidance and assisted in management to ensure that this project completed its scope within a very challenging budget and schedule. David was specifically responsible for overseeing the modeling component performed by the FRA and the institutional and financing tasks for the study.

Texas DOT, Oklahoma-Texas Passenger Rail Alternatives Analysis, EIS and High Speed Rail Engineering | QA/QC, Funding and Financing Task Lead | June 2014 - January 2017

David lead the funding and financing analysis task and proving QA and QC for the Service Development Plan (SDP) task for this FRA funded alternatives analysis, Tier 1 EIS and High-Speed Rail Preliminary Engineering study of a 850-mile multi-segment rail corridor from Oklahoma City to Dallas/Ft. Worth to multiple termini in South Texas and Mexico. The FRA required service development plan (SDP) included service, capital and operations and maintenance costing, station analysis and maintenance planning at a level required to assess the initial impacts of the project. David was specifically responsible to ensure that the SDP met federal guidelines. The program successfully received an FRA Record of Decision (ROD) in mid-2017.
2B. FAMILIARITY WITH RELEVANT STATE AND FEDERAL REGULATIONS AND/OR PROCEDURES

David brings 39 years working, with and for, public agencies and their regulations/procedures. Prior to consulting, David was the CEO of the Southern California Regional Rail Authority (SCRRA). In that position, David and his team dealt with numerous federal (FTA, FRA), state and local funding sources, each of which have unique regulations and procedures. David was a senior member of the team that performed the first phase of the WSDOT UHSGT project.

2C. PROJECT MANAGER’S ABILITY TO MANAGE PROJECT

Southern California Regional Rail Authority (SCRRA) | CEO

Schedule: During the 11 years of his CEO tenure, the schedule was always met and no budget amendments were required unless the agencies scope increased. This points to an acute awareness of the need to meet scope, schedule and budget. As an operating entity providing daily services, SCRRA had to adopt an operating budget by the beginning of the next fiscal year (July 1). This required an adherence to a strict schedule with extensive negotiations among SCRRA’s five-member agencies.

Scope of Work/Scope of Work Creep: Anticipated annual projects changed due to unforeseen circumstances or shifting priorities. In response to these changes, David modified other budgeted expenses, to incorporate the change without asking for a budget amendment.

Community and Stakeholder Engagement: David addressed constituent and community issues along the 500-route mile service area in five counties in the LA basin through sharing timely and relevant information from all perspectives, and promoting early engagement. David’s instructions to his staff was to always address an issue as soon as possible, as opposed to allowing the issue to get out of hand.

Budget Issues: Annually, David developed both an operating and capital budget, negotiated its contents with five county based member agencies, and got approved prior to the beginning of each fiscal year.

Project Changes: During the 11 years that David was CEO of SCRRA, there were continual requests for service frequency increases. David ensured that all steps were taken to efficiently and cost effectively budget for those increases with sufficient lead time for successful implementation.

WSDOT, Ultra-High-Speed Transportation Study | Operations and Planning Lead

Schedule: David was instrumental in working to adaptively sequence the FRA work, through multiple stages of review and refinement. Scott and WSDOT relied on David’s guidance to make schedule adjustments that ensured the analysis results were properly presented and caveated in both interim deliverables and stakeholder meetings, while retaining the overall project schedule.

Scope of Work/Scope of Work Creep: Scott and David adjusted the service planning deliverables to reflect the technologically neutral study, and that focusing on specific corridors and potential station sites would introduce unneeded risks at this initial level of study. This managed the work scope by appropriately framing the study around the most critical elements, and eliminating unnecessary work where less specificity was needed.

Community and Stakeholder Engagement: David worked with the project team to appropriately adjust the meeting agendas and presentations, to reflect actual project progress. David also provided critical content for Advisory Group presentations and WSDOT’s public messaging.

Budget Issues: David coordinated closely and frequently with Scott to focus his time and activities most efficiently, and to provide advice regarding most effective budget allocation amongst tasks.

Project Changes: The primary project change was that representatives from the private sector, including Microsoft, and contractor trades, requested information about potential economic benefits of UHSGT to the greater Seattle and Vancouver metropolitan areas. This requested information, needed to be drawn from additional analysis and was not included in the initial study scope of work. Scott and David worked with WSDOT to develop an amended work scope and task order to complete this work while not delaying scheduled delivery of the UHSGT study final report to the State Legislature in December, 2017. The additional analysis was incorporated into the revised final study report within the contract terms, in February, 2018.

2D. PROFESSIONAL LICENSES/ACCREDITATIONS

N/A
Ultra High-Speed Ground Transportation Study: Business Case Analysis

SCOTT RICHMAN, AICP, PMP | DEPUTY PROJECT MANAGER & CORRIDOR ASSESSMENT LEAD

Over his 25-year career, Scott has led multi-modal transportation planning and project development for large, complex projects with multiple stakeholder entities. He brings experience working as a task lead or project manager for various rail corridor studies and projects including the initial phase of the WSDOT Ultra High-Speed Ground Transportation Study and the FRA’s Southeast Regional Rail Study. His experience working on projects with multiple stakeholders across jurisdictions, along with his project management experience will be critical to the success of this project as he works with David to manage an expert international multi-disciplinary team to successfully complete this study.

SCOTT BRINGS:
✓ Recent experience working with WSDOT PM and other Rail, Freight and Ports staff to execute expedited contract and task order amendments, and successfully deliver the initial UHSGT study phase.
✓ Extensive experience leading pre-NEPA and NEPA studies for complex, transportation projects involving diverse stakeholders.
✓ Deep knowledge of federal Department of Transportation (DOT), and multiple states’ planning and environmental guidance, policies and regulations.

2A. PROJECT EXPERIENCE

WSDOT, Ultra High-Speed Ground Transportation Study | Project Manager | June 2017-February 2018
Scott led the consultant team through the initial UHSGT study that examined a high level a range of north-south “conceptual corridors” for a future ultra-high-speed system to link the urban areas of Vancouver, British Columbia, Seattle, Washington, and Portland, Oregon. Scott worked closely with WSDOT to setup and kick off the project, and create a milestone-based project schedule which met the studies delivery date of December 15, 2017. He worked to accommodate any changes in scope while meeting the targeted delivery date. Along with the WSDOT Rail, Freight and Port Division Director, Scott presented the study results to the Washington State Legislature’s Joint Transportation Committee. The study findings and recommendations were instrumental in helping the State of Washington attain legislative support for the current Business Case phase.

ODOT, Oregon Passenger Rail Corridor (OPR) Investment Plan | NEPA Task Lead | August 2016-Present
As the NEPA task lead, Scott was part of a multi-consultant team preparing a Tier 1 Environmental Impact Statement (EIS) and Service Development Plan (SDP) for enhanced intercity passenger rail service between Eugene and Portland, Oregon. Scott led a multi-consultant team to completion of multiple technical documents and a Tier 1 Environmental Impact Statement (EIS) that the FRA will publish in July 2018. The team completed scoping, developed project alternatives, and completed analysis documented in the Draft EIS that the Federal Railroad Administration will publish in Summer 2018. Throughout this process Scott attained experience and in-depth understanding of the FRA-led NEPA corridor-to-project development process, and comprehensive familiarity with the Pacific Northwest Passenger Rail Corridor and it’s unique issues and stakeholder entities.

FRA, Southeast Regional Rail Study | Base Market Conditions Assessment Lead and Key Author | August 2016-Present
The Southeast Regional Rail Study was conducted with six state DOTs in the southeast U.S. to identify multi-state, metropolitan area connections that could support future intercity, high-performance passenger rail service. Scott is the lead author working with David and the FRA to complete the draft and final study report. He led development and presentation to stakeholders of the baseline market conditions, and coordinated data needs from FRA’s updated CONNECT network planning tool for the market conditions work that informed development of initial intercity passenger rail network scenarios and subsequent analysis and refinement. As a result, he compiled and reported complex information for a very large geographic area in clear and concise ways to a broad spectrum of stakeholder interests.
2B. FAMILIARITY WITH RELEVANT STATE AND FEDERAL REGULATIONS AND/OR PROCEDURES

Over his career of more than 25 years of transportation and environmental planning and project management, Scott has led or provided key contributions for numerous USDOT-led NEPA processes that have advanced projects into final design and construction. Through his project work for federal lead agencies that have included the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), and Federal Railroad Administration (FRA), and through work and supplemental training in states including Oregon and Washington, Scott has developed and maintained a strong understanding of federal and state legal and regulatory requirements and procedures.

2C. PROJECT MANAGER’S ABILITY TO MANAGE PROJECT

Oregon Passenger Rail (OPR) Corridor Investment Plan (CIP) and Tier 1 Environmental Impact Statement

Schedule: As schedule and budget savings measures that MAP-21 accommodated, Scott documented justification and schedule savings for ODOT and the FRA to identify a recommended Preferred Alternative in the DEIS, and to streamline the final decision documents into a combined Final EIS and Record of Decision (ROD) that is expected in 2019.

Scope of Work/Scope of Work Creep: During the OPR project, Scott and ODOT supported developing a “white paper” to articulate the high-level outlook of the feasibility of true high-speed rail in Oregon. As the consultant team’s project manager, Scott facilitated the production of this parallel effort to inform and help clarify the feasible alternatives and the state’s decision process for the Tier 1 EIS, while minimizing delay and additional cost to the project.

Community and Stakeholder Engagement: For the OPR Project, Scott has been deeply involved in developing strategy, planning, and participating as a project representative. This included development of public information materials, presentations at group and committee meetings, and public open houses over the course of this project, from Scoping, through Preferred Alternative Recommendation.

Budget Issues: From the beginning of the OPR CIP project, Scott worked with ODOT and coordinated a team of multiple consultants to develop an overall project budget, plus a breakdown of projected costs by five major project stages – with each stage representing a separate ODOT Work Order Contract. Through the first four project contracts, the consultant team has completed all work under the contracted budget.

Project Changes: A major project change has been refinement of the alternative that would improve the existing Amtrak Cascades service along the existing route owned by Union Pacific Railroad. The team went through extensive technical analysis and refinement to develop an alternative that could be improved incrementally to accommodate the planned increase in intercity passenger trains within a reasonable range of costs, while likely avoiding significant environmental impacts.

WSDOT, Ultra-High-Speed Ground Transportation Study

Schedule: From the beginning of the study, Scott communicated frequently with WSDOT as needed, to plan and complete deliverables, making adjustments as needed over the course of the study, but maintaining the work flow to complete the final study report by the Washington Legislature’s directed delivery date of December 15, 2017.

Scope of Work/Scope of Work Creep: Scott worked to adjust the service planning deliverables to reflect the fact that this study was going to remain technologically neutral, and that focusing on specific corridors and potential station sites would introduce unneeded risks and associated complexities at this initial level of study.

Community and Stakeholder Engagement: Successful engagement of a Stakeholder Advisory Group was a critical task in this study made more complicated by it covering two states and two countries.

Budget Issues: Scott’s efficient budget management created flexibility to respond to WSDOT requests that included an additional in-person meeting with the Governor’s Advisor and Microsoft, and for Scott to assist WSDOT in presenting the key study elements and outcomes to the State Legislature representatives.

Project Changes: Microsoft, and contractor trades, requested information about potential economic benefits of UHSGT to the greater Seattle and Vancouver metropolitan areas. This needed to be drawn from additional analysis, was not included in the initial study scope of work. Scott and his team worked with WSDOT to develop an amended work scope and task order to complete this work while not delaying scheduled delivery.

2D. PROJECT MANAGER’S ABILITY TO MANAGE PROJECT

American Institute of Certified Planners (AICO), Project Management Professional (PMP)
# 3. KEY TEAM MEMBERS QUALIFICATIONS

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Relevant Projects</th>
</tr>
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<tbody>
<tr>
<td><strong>Ian McGookin</strong></td>
<td><strong>Travel Demand and Revenue Forecasting Lead</strong></td>
<td>Jacobs was appointed by Ligne A Grand Vitesse Sud Europe Atlantique (LISEA) as Traffic Advisor for potential debt providers in relation to the potential refinancing and/or restructuring of the new high-speed line between Tours and Bordeaux, France which opened in July 2017. Ian led the due diligence review of the LISEA business plan, including assessments of passenger demand, modal shift from airlines, train path requirements and train scheduling assumptions.</td>
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<tr>
<td>**Lenders to LISEA, LISEA Concession Lenders’</td>
<td>Traffic Advisor</td>
<td>2017</td>
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<tr>
<td>**OTPP and Borealis, Sell Side Vendor Due Diligence in relation to the sale of HS1</td>
<td>Project Manager</td>
<td>2017</td>
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<tr>
<td>**GIC and EDF Invest, Commercial and Technical Due Diligence in the United Kingdom Government’s sale of 40% of Eurostar</td>
<td>Project Manager</td>
<td>2014-2015</td>
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<tr>
<td><strong>Steve Weller</strong></td>
<td><strong>Demand and Revenue Forecasting Model Lead</strong></td>
<td>Steve brings a long history of investment grade ridership and revenue forecasting for intercity passenger and high-speed ground transportation and toll roads. Steve has developed sketch, intermediate, and investment grade forecasts in support of Florida high-speed rail corridors, Southeast High Speed Rail, and the Northeast Corridor. Steve has successfully completed investment grade forecasts for the Florida Overland Express (FOX), Indiana Toll Road, the Capital Beltway and I-95 Express Lanes in Virginia, and Northwest Parkway and has provided intermediate level demand and traffic and revenue forecasting for multiple toll facilities across the US.</td>
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<tr>
<td>**Metrolinx, UP Express Ridership and Revenue Forecast Upgrade</td>
<td>Modeling Lead</td>
<td>2016-2017</td>
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<tr>
<td>**FRA, Economic Analysis of Long-Term Investment in Rail</td>
<td>Modeling Task Lead</td>
<td>2010-2011</td>
</tr>
<tr>
<td>**WSDOT, Passenger Rail Forecasts for the Cascades Corridor</td>
<td>Demand Forecaster</td>
<td>2000-2001</td>
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**Reg. Exp.**

Steve has worked for various public agencies throughout his career, adapting to each agencies regulations and procedures. Steve has participated in numerous projects developing NEPA documentation, Interchange Justification and Modification Reports, and several sensitive and confidential analyses and Investment Grade Studies for State and Federal agencies, private concessionaires, lenders, and bond rating agencies, and he has used the state’s travel forecasting policy manual to ensure all steps of the process meet or exceed agency guidelines.
<table>
<thead>
<tr>
<th>Greg Spitz</th>
<th>Survey Lead</th>
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<tbody>
<tr>
<td>Greg is a transportation economist, planner, and project manager with both domestic and international experience. His focus is researching transit, using multiple types of transit surveys: origin-destination (O-D), stated preference (SP), customer satisfaction, and market analysis. From these surveys, Greg estimates demand models to create travel market forecasts. As part of the Demand and Revenue Forecasting team, Greg will collaborate with the rest of the team to develop and distribute the transit surveys, moderate focus groups, and conduct descriptive and multivariate statistical analyses in order to collect accurate data to ensure a detailed and valid forecast for demand and revenue.</td>
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<tr>
<th>Virginia Department of Rail and Public Transportation and FRA, Southeast HSR Tier II EIS – Richmond Area to Potomac</th>
<th>Project Advisor</th>
<th>2014 - Ongoing</th>
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<tbody>
<tr>
<td>Greg was the Project Advisor for this high-speed rail study, and he oversaw the design and implementations of the stated preference survey, the data collection efforts at intercity bus stops and Amtrak trains, and an online survey for travelers in the corridor across multiple modes of transportation. He also helped develop a discrete choice model to estimate the relative importance of travel time, station location, price, and other factors on a future high-speed rail link.</td>
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<tr>
<th>Caltrain, Pricing and Revenue Study</th>
<th>Project Manager</th>
<th>2017</th>
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<tbody>
<tr>
<td>Greg was the Project Manager on this cooperative research program study. His responsibilities included overall study management, questionnaire design, sampling plan, sample recruitment, modeling and analysis, and reporting. The project modeled nontraditional factors in addition to standard level-of-service variables, such as underlying attitudes and values, to measure their influence on mode choice for intercity travel. His responsibilities included overall study management, questionnaire design, sampling plan, sample recruitment, modeling and analysis, and reporting.</td>
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<tr>
<th>Transportation Research Board, Intercity Passenger Rail in the Context of Dynamic Travel Markets</th>
<th>Project Manager</th>
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<tbody>
<tr>
<td>Greg was the Project Manager for this cooperative research program study. This project modeled nontraditional factors in addition to standard level-of-service variables, such as underlying attitudes and values, to measure their influence on mode choice for intercity travel. His responsibilities included overall study management, questionnaire design, sampling plan, sample recruitment, modeling and analysis, and reporting.</td>
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<tr>
<th>Greg Spitz</th>
<th>Survey Lead</th>
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<tr>
<td>Greg has over 20 years of experience working with public agencies and adhering to their procedures. He has the experience to ensure work groups are properly guided and in close cooperation with WSDOT to ensure deliverables meet applicable regulations and procedures.</td>
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<tr>
<th>Yoav Hagler</th>
<th>Operations Planning and Costing Lead</th>
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<tr>
<td>Yoav brings 12 years of experience in railway or the rail transit industry. He brings expertise and knowledge of rail operations analysis, service planning and scheduling, as well as strategic planning for high-speed rail. With a strong background in economics and finance and experience in quantitative analysis and modeling, Yoav is an invaluable resource, and brings expertise and experience with data analysis, site development review, and rail systems operations management for clients like the FRA, and CAHSRA, which will be critical to the success of the business case study.</td>
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<tr>
<th>FRA, Midwest Regional Rail Plan</th>
<th>Task Lead Network Development &amp; Service Analysis</th>
<th>2016 - Ongoing</th>
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<tbody>
<tr>
<td>The Midwest Regional Rail Plan is developing a comprehensive vision for an integrated regional rail network for twelve state regions centered on Chicago. Yoav is leading all technical analysis for the development of the Regional Rail Plan, including strategic planning, service planning, and infrastructure assessment. Mr. Hagler is responsible for developing the methodology and approach to network development, overseeing its execution, and communicating the methodology and results to stakeholders including state DOTs and other interested parties.</td>
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<tr>
<th>CAHSRA, Peninsula Corridor Expansion Master Plan</th>
<th>Project Manager</th>
<th>2017 - Ongoing</th>
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<tbody>
<tr>
<td>Yoav is leading a study to support the California High Speed Rail Authority and Caltrain in developing an integrated investment program that will identify the elements required in the short, medium and long term to accommodate HSR and Caltrain service in a blended service environment. Mr. Hagler is developing service concepts, infrastructure requirements, and evaluation methods for developing this integrated investment program.</td>
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<tr>
<th>CAHSRA, Connected Corridors Study - North</th>
<th>Project Manager</th>
<th>2016 - 2017</th>
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<tr>
<td>The CAHSRA initiated the Connected Corridors Study: North to develop an integrated phased investment strategy in partnership with the key stakeholders in the Merced-Sacramento corridor. As project manager, Yoav led all aspects of this effort. He was responsible for developing the strategic approach and oversaw all analysis including service planning, GIS, and high-level conceptual engineering, and stakeholder engagement.</td>
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<tr>
<th>Yoav Hagler</th>
<th>Operations Planning and Costing Lead</th>
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<tbody>
<tr>
<td>Yoav brings over 12 years of regulatory experience working for a multitude of local, state, and federal agencies. These include CAHSRA, FRA, Virginia Department of Rail and Transportation, Amtrak, and the Northeast Corridor Commission. He is well versed in national regulations and guidelines and is prepared to adopt any additional WSDOT regulations and procedures.</td>
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</table>
Kenneth Sislak | Technology Assessment Lead
Kenneth has 32 years of extensive public transit and rail operations, planning, and consulting experience. His project involvement includes management of major investment studies, development of project operating and maintenance plans, technology assessment and the examination and review of project finance plans. He has held positions in the transportation industry in both the private and public sectors, and is the former director of rail transportation at the Greater Cleveland Regional Transit Authority. As our Technology Assessment Lead, Kenneth brings not only conventional technology for High Speed Rail, but is one of the foremost experts in Hyperloop technology where he and AECOM are performing a feasibility analysis in Colorado.

WSDOT, Ultra-High-Speed Ground Transportation Study | Technology Assessment Task Leader | 2017
Kenneth was the Technology Assessment task leader for the previous phase of the Ultra High Speed Rail Study which studies the feasibility of an ultra-high-speed ground transportation feasibility study for a potential future link between Portland, Seattle and Vancouver, British Columbia. As the Technology Assessment task leader, he evaluated technologies capable of sustained speeds of at least 250 mph, which included high-speed rail, Maglev and Hyperloop.

Georgia DOT, Chattanooga High Speed Ground Transportation Tier 1 EIS | Senior Advisor | 2010-2017
Georgia and the Tennessee Departments of Transportation are examining the feasibility of developing high-speed ground transportation alternatives including Maglev and high-speed rail in the corridor between Atlanta and Chattanooga. As a senior advisor, reviewed the project purpose and need and goals and objectives and technology assessment for the Tier 1 EIS.

Ohio DOT, Ohio Statewide High-speed Rail Project Programmatic EIS | Project Manager | 2010-2011
Kenneth was the Project Manager, for a statewide study examining the feasibility, environmental and economic impacts of developing higher speed and more frequent intercity passenger rail service in Ohio on five corridors linking all of Ohio’s major cities and adjacent states. His responsibilities included, evaluation of alternatives included technology assessment and comparisons of capital, operating and maintenance costs, ridership and cost effectiveness.

Marty Loesch | Governance & Cross Border Relationships Lead
Marty is the founding partner of Insight Strategic Partners and a highly sought out advisor and strategist who served as Chief of Staff to Washington Governor Chris Gregoire. In the governor’s office, Marty was general counsel and director of external affairs before becoming chief of staff. In that role, Marty led the executive team and served as the principal advisor to the governor on policy, legislative, legal, communications, and political matters. As the Governance & Cross Border Relationships Lead, he will be responsible for coordinating with the various political stakeholders and governmental agencies to support collaborative engagements and agreements.

Cascadia Innovation Corridor, Cascadia Innovation Corridor Conference | Advisor/Consultant | 2016-Ongoing
The Cascade Innovation Corridor aims to unite Vancouver, Seattle and ultimately Portland into an inter-connected, globally competitive region. High Speed Rail has been a central focus of the effort from its very beginning. Marty worked on behalf of the Washington Roundtable first and now through Challenge Seattle to help the CIC effort get off the ground. He supported the first contacts between the British Columbia and Washington State governments and assisted in the negotiations of the Memorandum of Understanding between the two jurisdictions that still governs their interactions.

WSDOT, Mercer Island Eastlink Light Rail Project | Consultant | 2016-2017
Marty was hired by WSDOT to support the negotiations among the City of Mercer Island, Sound Transit, Federal Highway Administration, King County and WSDOT related to the mitigation and enhancements resulting from the Eastlink Light Rail project across the I-90 floating bridge and station on Mercer Island. Marty worked with representatives from all of the involved entities, state legislators and representatives of our congressional delegation and Governor Inslee’s office to secure commitments to sustained collaborative engagement, constructive problem solving and clear communication. Marty represented WSDOT in meetings and presented WSDOT positions and perspectives in negotiations with various parties. Marty supported responses to media inquiries and helped WSDOT to develop strategies for effective engagement.

Reg. Exp.
Marty brings unparalleled connectivity throughout Washington State at the Federal, State, local and tribal government levels. Marty has extensive experience working with WSDOT across many projects and for many years, including in the Mercer Island Eastlink Light Rail Project, and most recently on the I-90/SR 18 Interchange Project, giving him an extensive understanding of WSDOT regulations and procedures.
### Angie Thomson | Stakeholder Facilitator

Angie has two decades of professional experience including community outreach, public involvement, facilitation and science education. She brings experience facilitating conversations about passenger rail plans and facilities around the Puget Sound region and is skilled in building relationships with stakeholders. Angie’s transportation expertise allows her to balance ‘high-tech’ and ‘high-touch’ methods to engage the public and translate technical information into a form understandable by the public.

**Prior Relevant Projects**

- **WSDOT, Ultra High-Speed Ground Transportation Study | Stakeholder Engagement Lead and Facilitator | 2017**
  Angie supported the development of a feasibility study for a future ultra-high-speed transportation system between Vancouver, BC and Portland, OR. She helped convene and facilitate an advisory group comprised of business, legislative, non-profit and government stakeholders who provided input and direction on the study. Angie served as the point of contact for advisory group members, facilitated advisory group meetings and worked with the project team to define discussion topics and meeting structure. Angie also developed website content for the feasibility study and contributed to elements of the final report submitted to the Washington State Legislature.

- **WSDOT, Amtrak Station Relocation | Facilitator/Communications Strategist | 2015-2017**
  Angie supported WSDOT Rail staff to develop and implement a communications strategy for the relocation of Tacoma’s Amtrak Station to Freighthouse Square, a 100-year old building in south downtown Tacoma. She helped design and facilitate a series of listening sessions, open houses, workshops and community advisory group meetings, helping the community rebuild their trust in the agency and feel part of the decision-making process.

- **Sound Transit, Tacoma Trestle Track and Signal Project | Outreach and Communications Manager | 2013-Ongoing**
  Angie managed outreach and communications for the replacement of the Tacoma Trestle, including developing messages, strategic communications approaches, and assisting Sound Transit staff in on-the-ground outreach. She helped develop a comprehensive strategy to engage the community in the design process by sharing visualizations at key project milestones. As the project moved to construction, she worked implement the outreach strategy so the public knew what to expect.

### Jon Clyne | Finance (P3), Economic Analysis Lead

Jon is Jacobs’ Global Practice Lead for Transport Economics, with over 25 years’ experience as a financial, transport and regulatory economist in the public and private sector, specializing in the economics of major projects. He has extensive senior level experience in the United Kingdom and international transport industry with experience working in Malaysia, Singapore, Brazil, Venezuela, and the United Kingdom. Jon brings economic expertise in major rail projects and transactions, a deep understanding and knowledge in demand, revenue, and cost forecasting, financial modeling, and recent experience working on high-speed rail projects across international borders, including providing expert consultation and documentation of international high-speed rail governance, plus funding and financing models for the WSDOT UHSST study.

**Prior Relevant Projects**

- **MyHSR, Kuala Lumpur - Singapore High-Speed Rail | Economics/Commercial Lead | 2016-2017**
  Jon has acted as lead for the economic and commercial workstream advising MyHSR, the Malaysian Government agency responsible for delivery of the new US$20 billion high-speed rail line linking Kuala Lumpur and Singapore. Jon’s role was critical in developing the right commercial and regulatory framework to deliver commercial revenue at the new stations and produce incentives on all parties to deliver high service quality. He helped develop a commercial revenue and station development plan for all seven proposed new stations, linked to underlying demand, and briefing on an appropriate regulatory framework for bilateral negotiations with Singapore.

- **Department of Transport (DFT), West Midlands Franchise Competition | Technical Lead | 2015-2016**
  Jon was technical lead for this major advisory project, advising DFT Rail on franchise objectives, planning, business case development, detailed specification of the franchise and the ITT/tender evaluation. This high-profile project has involved working closely with a relatively small DFT project team and multiple stakeholders in a dynamic environment, while providing compelling, robust analysis.

- **IDB/Brazilian Government (BNDES/ANTT), “TAV” Brazil High-speed Rail Feasibility Study and Technical Support | Project Manager | 2009-2013**
  Jon as the Project Manager for this study, and helped in the detailed demand and revenue forecasts, route alignment studies, financial modeling work, the economic appraisal of options and provided advice on concessioning approaches, rail operations, capital costs and land use impacts. He delivered expert advice to government on development of the concession model for TAV, ITT documentation, and development of technical standards and a performance management regime.

- **Reg. Exp.**
  Jon has a wealth of experience in working with public agencies & regulators on similar projects. For example, on the Malaysia- Singapore HSR project, Jon worked effectively with the public sector client (the HSR authority) but also with the national transport regulator, SPAD. Jon frequently acts as Technical lead for similar advisory projects for United Kingdom public agencies such as the Department of Transport & the Office of Rail & Road.
Miguel Lopez-Dubois  
**Corridor Evaluation**  
*(Alignment/Engineering)*  
**Years of Experience:** **17**

Miguel’s expertise includes alignment and corridor design and oversight, cost estimating, and track section design. Miguel is fully knowledgeable of rail design standards, operating rules and procedures through his experience working closely with CAHSRA, BNSF Railway, UP RR, SJRR, CalTrain, SCCRA/NCTD, VTA, LA Metro, SFMTA and BART.

Christina Martinez  
**Environmental Strategy**  
**Years of Experience:** **18**

Christina’s expertise, versatility, and success comes from her wide variety of experience — from serving as a transportation and environmental technical specialist analyzing data and authoring technical reports, to leading teams to deliver environmental documents and permitting for all types of projects, whether straightforward or complex. She brings not only experience, but a long history with WSDOT and will help the team ensure they are meeting WSDOT standards.

Ottmar Grein  
**Technology Assessment**  
**Years of Experience:** **38**

Ottmar Grein has more than 38 years of experience in the rail industry and is the senior expert of high-speed rail systems for DB E&C. His experience includes transportation planning and demand forecast for high-speed rail and maglev routes, economic feasibility studies, network planning, high-speed rail technologies, railway operations.

Marc-Andre Klemenz  
**Operations Planning and Costing**  
**Years of Experience:** **15**

Marc brings over 15 years experience of transportation planning and railway operations. He’s been involved with projects all around the world including the Abu Dhabi Metro, Doha Metro, HS2 in United Kingdom, Suburban railway in Munich and GCC Railway in KSA, and brings his expertise on operational simulation, operational infrastructure planning, and operation concepts for high-speed transportation systems to this team.
Nurez Damani  
Finance (P3), Economic Analysis  
Years of Experience: 14

Nurez is experienced in project finance and funding for the procurement of major capital projects. He has contributed to client engagements of varying scope and complexity for 40+ projects with a combined spent or approved capital expenditure of over $32 billion, and brings an unmatched understanding of project finance and funding, including infrastructure financial markets including debt and equity financing, financial models, financing agreements, risk analysis and risk modeling, and the project financing structure and package.

Dan Speicher  
Strategic Advisor (Strategic Decision Making)  
Years of Experience: 28

Dan is an expert in facilitating, chartering, and initiating program and project groups to partner in achieving goals and generate innovative means to reach conclusions; leading organizations through vision/mission/goal setting; moving programs and project teams through organizational governance and team development; and leading groups through complex decision processes.

Shaun McCabe  
Strategic Advisor (Project Assessment and Financing)  
Years of Experience: 28

Shaun McCabe is an executive manager with domestic and international expertise in the transportation and energy sectors. He has specific expertise in project assessment, regulatory and legal affairs, and technology commercialization and served in such a capacity for the proposed Texas Central Partners HSR proposal. As a Strategic Advisor, he will bring a multi-faceted perspective in identifying issues, developing alternatives, and executing strategies.

Richard Eastman  
Strategic Advisor (HSR Operations)  
Years of Experience: 34

Richard is recognized around the world for providing solutions to complex transportation challenges. He is unique in having held positions responsible for passenger and freight operations, maintenance, strategic planning, enhancement design, construction strategy, implementation and commissioning, and has been involved in different roles linked to the development, construction, commissioning, interfaces and bringing into service, the United Kingdom’s High Speed 1 and other high-speed rail projects around the world.

Geoff Roberts  
Strategic Advisor (Governance Issues)  
Years of Experience: 27

Geoff brings nearly three decades of experience in major transport and infrastructure portfolios, programmes and projects around the world. He is experienced in applying a comparative approach to governance, contract and procurement strategies, negotiation, drafting and delivery. He specializes in integrating into existing senior leadership teams, bringing an independent perspective that enables objective comparison of the ‘as-is’ organizational and strategic approach against relevant best practices from other complex infrastructure portfolios, programs and projects.

Stephen Rutherford  
Strategic Advisor (Mobile Data)  
Years of Experience: 34

Stephen brings 35 years’ of experience in transport planning, gained in the United Kingdom and overseas, and is well experienced in leading multi-modal and multi-disciplinary studies, including studies in London, Milan, Hong Kong, China, Istanbul and Doha.

Stephen is currently Project Leader on Project Edmond for TfL, building detailed matrices of travel demand in London by mode, by fusing mobile phone data and other app based data for use in scheme appraisal. He is also Project Director on the Trip Information Study (TIS) for Highways England, building a matrix of all inter-urban vehicular and rail trips in the United Kingdom.
4. FIRM’S PROJECT MANAGEMENT SYSTEM

WSDOT has specific performance standards and expects that its consultants will share in its dedication to superior project management, quality design work, and adherence to design standards. Jacobs personnel have been delivering to your standard for 40 years. Jacobs has a stringent project management system (summarized in Exhibit 5) used on all projects and task orders. This system includes a formal QA/QC program, and provides a consistent and predictable approach toward managing your projects. We provide WSDOT with consistent, transparent, and quality project delivery. You get our highest commitment of excellence for each and every project we deliver with you.

The following includes specific details of how we will execute the elements of project delivery that are important to WSDOT.

QUALITY ASSURANCE AND QUALITY CONTROL PROCESSES

Our QA/QC Process. Paramount to executing an effective QA/AC process is work planning and the effective sequencing of deliverables. In conjunction with discipline leads, David, our PM, working with Tom will develop a QA/QC plan that includes the Jacobs required review for each element and tailored to this project. This plan will clearly define levels of reviews, who will perform the review and when reviews will be conducted, and will be distributed to the team. Tom is ultimately responsible for the execution of this plan.

The Proof. In just over a year, we completed more than 200 design submittals for the I-90 Snoqualmie Pass CRIP. A Quality Management Plan (QMP) defined the process for reviews, inter-discipline checks, and comment resolution.

The QMP was strictly implemented and audited on EVERY submittal. Atkinson Construction, to whom we were a subcontractor, commended us on our quality process and how it facilitated reviews within WSDOT and minimized field issues. The number of RFIs on our plans is less than half of what they experience from other design firms.

SCOP/E/BUDGET TRACKING PROCESS

Our Tracking Process. David will develop a Project Management Plan (PMP) that confirms the scope of work, budget, project team, schedule, roles and responsibilities, communications protocols, work breakdown structure, QMP, risk management, and safety protocols that will govern our work. This PMP provides the foundation for all measurement and monitoring of scope and budget and ties in with the project schedule by producing an earned value metric to track progress against the deliverables.

Scope Monitoring. We will divide the negotiated scope and projects into a Work Breakdown Structure (WBS) of subtasks prior to the start of work. The WBS includes a responsibility matrix, assumptions, activities, and deliverables. We will then track each of these key components not only on a project baseline schedule, but also in periodic management meetings with the WSDOT Project Manager. This allows David to break the projects into manageable pieces, anticipate and mitigate scope creep, and keep you fully apprised of our progress at all times.
**SCHEDULING PROGRAM/PROCESS**

Scheduling Process. Our baseline schedule goes hand-in-hand with the scope of work, and includes all critical work elements, durations, interdependent relationships, deliverables, and milestones. In coordination with the WSDOT Project Manager, David and Scott will develop a critical path schedule using Microsoft Project or Primavera (at WSDOT’s request). Also, Jacobs has the experience of making all our schedule systems compatible with WSDOT’s in order to maximize reporting. Our project managers use industry standard scheduling software programs. Example projects include:

- WSDOT Cascades High Speed Rail Program (Primavera)
- SR 167 Southbound Hot Lane Design-build (MS Project)
- WSDOT, I-90 Snowshed to Keechelus Dam Phase 1C (CRIP) (Primavera)

**The Proof.** The ARRA funding for the Cascades High Speed Rail Program controlled the schedule delivery date. To meet schedule commitments and ensure project funding, Tom had to manage effective coordination of multi-agency reviews by 9 different organizations. He then had to consolidate sometimes conflicting comments and lead a comment resolution process. To keep the program moving forward on schedule, Tom held weekly meetings to review action items and facilitate decisions. Each project in the program was managed in Primavera P6 and tied to the program’s Master Schedule. The final project in the program is schedule to be completed by December 2017 facilitating Amtrak to begin service on the Point Defiance By-Pass route on December 18, 2017.

**INTERACTION WITH INTERNAL TEAM, CLIENTS, AND STAKEHOLDERS**

Internal/External Team Coordination.

Effective, targeted communication is critical for efficient, timely project delivery. Working in an interdisciplinary team, we communicate frequently and openly to share information crucial to the project. The tools we use to promote clear communication with our internal project team include:

- **Kick-off Meetings** are held at the start of each project assignment to confirm expectations, goals, and objectives; communication protocols; staff roles and responsibilities; and performance measures.
- **PMPS** provided to all team members so everyone is “on the same page” at the start of each project.
- **Coordination Meetings** are held regularly to review project progress and provide opportunities to proactively identify and address any of WSDOT’s concerns.
- **Electronic Systems.** Depending on the work task and the physical location of our team members, we may use email, FTP sites, voice and web conferencing, and SharePoint sites to communicate with the project team, set up meetings, share ideas, disseminate information, facilitate reviews, and share electronic documents.

**The Proof.** In the first UHSGT study, the Jacobs team used these methods to ensure ongoing project communication and coordination. With an international team located in the United Kingdom, Germany and across the United States, web-based tools such as SharePoint and ProjectWise, video conferencing, and teleconferencing fostered continuous communication among the team. This constant communication was vital to delivering the report within the legislative deadline.

Interaction with WSDOT. We view the WSDOT and Jacobs’ relationship in managing and delivering projects as a partnership. We know that for us to be successful we need to be aligned. That is why we have selected key staff and project managers that have worked with you in the past and know how to effectively coordinate with you. David and Scott will be your primary points of contact for all tasks and contractual discussions and consultant team management. They will work with you to support the WSDOT project manager in establishing the project’s scope, schedule, and budget. Our team members will integrate and interact with WSDOT’s staff following communications protocols established in the PMP including the means, methods, and frequency of our interactions with WSDOT’s staff.

Interaction with Stakeholders. The Jacobs Team, and our sub-consultant, Envirolissues, will work with WSDOT to design a comprehensive program to inform and involve a wide range of stakeholders interests. As this project evolves, it will attract more political and policy attention, on both sides of the border. The goal will be to achieve buy-in from stakeholders and elected officials by ensuring that they are engaged early, communicated clearly, and that they know when opportunities to participate will occur, understand how their input is being used to make decisions, and ensure they are heard and integrated appropriately into the project team as partners in the decision-making process.
5. PROJECT DELIVERY APPROACH

5A1. WORK PLAN DEVELOPMENT

We understand that the overarching project goal is to develop a preliminary business case study that will feed into future project phases and generate excitement and interest from the investment community to participate in future phases. To build a comprehensive study, our work plan consists of 10 tasks to address all quantitative and qualitative data needed to build the business case. To maximize efficiency, we will execute certain tasks concurrently as shown in Figure 5A1.1.

Following the project chartering and travel demand model scoping, our team will build a multimodal demand and revenue model that will be able to provide the data needed to create a strategic and compelling delivery and operations case. The corridor evaluation and technology assessment will narrow down options to help better understand capital and operating costs. Governance strategies and feedback from our stakeholder advisory group will be incorporated into the preliminary business case.

Figure 5A1.2 shown in the next page illustrates the proposed work flow, including dependencies and iterations of critical activities.
5A2. DECISION MAKING PROCESS

Creating a successful business case requires combining many inputs in a structure to produce the required outputs needed to better understand how to optimize UHSGT. Stakeholder engagement through our advisory group, governance strategy, and prospective investors will help us understand their needs and perspectives and establish decision authorities, roles and responsibilities, and performance expectations into our objective decision making process. WSDOT will provide feedback throughout the process during regular check-ins.

**Stakeholder Advisory Group and Governance Strategies:** The stakeholder advisory group will represent political interests, business interests (for example Microsoft and Amazon), and community members from Portland, Seattle, and Vancouver, BC. Their input will be critical to providing policy and business recommendations that will shape our team’s understanding for the business case. They will help us understand key questions the business case needs to answer in order to maintain interest for future phases. Travel demand and corridor characteristics, viable technologies, operating and capital cost recovery, P3 potential, and proposed short-and long-term viable governance models for this cross-border environment will be further refined through stakeholder engagement.

Dan Speicher will lead our technical leaders through strategic decision making exercises to objectively analyze their inputs.

Marty Loesch will connect political and business interests by getting the right people to the table, giving them the right info, and opportunities to provide feedback. This will lay the ground work for formal discussions in future phases.
advisory group workshops scheduled throughout the project.

**Investors:** We will leverage our relationships with the major infrastructure financial community, developed through the successful delivery of project work in both the rail and broader infrastructure space from projects such as the HS1. At the start of the study, we would engage a small number of prospective investors with WSDOT with whom we would share emerging results from the study. In the latter stages of the study, when preliminary economic and financial outputs are developed, we propose sharing emerging estimates for the financial case with this selected set of potential investors. This would provide an early indication of how the investment community would view this project and what key performance indicators (KPIs) they would be tracking to determine their participation. We will incorporate any key feedback areas within the study to maximize likelihood of a marketable financial business case at the close of this phase of work.

### 5A3. ELEMENTS OF THE WORK PLAN

<table>
<thead>
<tr>
<th>Task and Deliverables</th>
<th>Elements of Task</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TASK 1 - PROJECT MANAGEMENT</strong></td>
<td>Lead by David and Scott, the progress of tasks two through 10 will be tracked in relation to the budget’s scope, schedule, and budget.</td>
</tr>
<tr>
<td>1a - Work Plan</td>
<td></td>
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<tr>
<td>1b - Scope of Work</td>
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<tr>
<td>1c - Schedule</td>
<td></td>
</tr>
<tr>
<td><strong>TASK 2 - STAKEHOLDER ENGAGEMENT</strong></td>
<td>Our key stakeholder advisory group is integrated into our project approach for information and consensus gathering.</td>
</tr>
<tr>
<td>2a - Establish stakeholder advisory group</td>
<td></td>
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<tr>
<td>2b - Host six advisory group meetings</td>
<td></td>
</tr>
<tr>
<td>2c - Website development and management</td>
<td></td>
</tr>
<tr>
<td><strong>TASK 3 - DATA COLLECTION AND REVIEW</strong></td>
<td>Critical to establishing a robust model for estimating ridership.</td>
</tr>
<tr>
<td>3a - Survey Scoping and Other Data Sources Report</td>
<td></td>
</tr>
<tr>
<td>3b - Interim Survey Summary Updates</td>
<td></td>
</tr>
<tr>
<td>3c - Summary of Survey Findings &amp; Model Inputs</td>
<td></td>
</tr>
<tr>
<td>X - Draft / Final Business Case Reports</td>
<td></td>
</tr>
<tr>
<td>Y - Final Report</td>
<td></td>
</tr>
<tr>
<td><strong>TASK 4 - DEMAND MODELING AND REVENUE FORECASTING</strong></td>
<td>Central to this study as it drives estimated ticket revenue but also the level of service required to accommodate passengers, which has a direct impact on estimated operating (OPEX) costs. Also the estimated level of ridership is the key driver of economic benefits from the scheme.</td>
</tr>
<tr>
<td>4a - Model Scoping Report</td>
<td></td>
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<tr>
<td>4b - Base Year Validation Report and Forecasting Model Assumptions</td>
<td></td>
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<tr>
<td>4c - Interim Forecasts</td>
<td></td>
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<tr>
<td>X - Draft / Final Business Case Reports</td>
<td></td>
</tr>
<tr>
<td>Y - Final Report</td>
<td></td>
</tr>
<tr>
<td><strong>TASK 5 - CORRIDOR EVALUATION</strong></td>
<td>Using a data base already developed for the Phase 1 study, the selected corridor and alignment (including required structures such as bridges and tunnels) will drive capital costs (CAPEX) for the infrastructure, in combination with the selected technology.</td>
</tr>
<tr>
<td>5a - Draft and revised Corridor Evaluation Framework</td>
<td></td>
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<tr>
<td>5b - GIS “map book” base maps</td>
<td></td>
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<tr>
<td>For up to three UHSGT technologies if required :</td>
<td></td>
</tr>
<tr>
<td>5c - GIS conceptual corridors horizontal (plan view) and vertical (profiles) alignments</td>
<td></td>
</tr>
<tr>
<td>5d - Conceptual station areas</td>
<td></td>
</tr>
<tr>
<td>5e - Documentation of corridor development and evaluation process</td>
<td></td>
</tr>
<tr>
<td>5f - Report on recommended conceptual corridor alignment(s) and station areas</td>
<td></td>
</tr>
<tr>
<td><strong>TASK 6 - OPERATIONS PLANNING AND COSTING</strong></td>
<td>Explore opportunities for service to markets, based on stakeholder defined service goals. A number of service alternatives will be developed along with their coinciding infrastructure requirements. Capital and operation and maintenance (O&amp;M) cost estimates will serve as an input for the subsequent financial modeling.</td>
</tr>
<tr>
<td>6a - Description of the cost model and the corresponding input data</td>
<td></td>
</tr>
<tr>
<td>6b - Costs per year within the analysis period</td>
<td></td>
</tr>
</tbody>
</table>
Ultra High-Speed Ground Transportation Study: Business Case Analysis

### Task and Deliverables

<table>
<thead>
<tr>
<th>Task</th>
<th>Deliverables</th>
<th>Elements of Task</th>
</tr>
</thead>
</table>
| **TASK 7 - TECHNOLOGY ASSESSMENT** | 7a - Evaluation criteria and methodology  
7b - Evaluation matrix with data  
7c - Technology assessment report  
7d - PowerPoint slide deck on technology | Build on Phase 1 technology with qualitative and quantitative evaluations to narrow the technologies for further evaluation. The technology used for the UHSGT will drive OPEX and capital costs (CAPEX), including infrastructure costs and purchasing the fleet. |
| **TASK 8 - GOVERNANCE STRATEGIES** | 8a - Develop white paper on possible governance options including identification of legal and regulatory challenges  
8b - Report of recommendations for future action | Identify potential legal and regulatory structures most conducive to advancing regional priorities and bi-national and bi-state issues. Governance options will be informed and guided by the advisory group, a group of elected officials and other stakeholders who will be engaged in facilitated discussions with the goal of developing an agreed-upon set of recommendations that will be delivered to WSDOT. |
| **TASK 9 - FINANCE (P3) AND ECONOMIC ANALYSIS** | 8a - Interim financial forecasts  
8b - Summary of financial & economic cases | Examine the potential monetary benefits of other revenue sources, perform preliminary risk analysis, and perform Initial Financial Analysis for inclusion the preliminary business case. |
| **TASK 10 - PREPARE THE PRELIMINARY BUSINESS CASE** | 10a - Draft / Final Business Case Reports | With all inputs combined, we will draft and finalize the business case. |

### 5A4. WORK PLAN TO ADDRESS CONTINGENCIES

Our approach to contingencies always starts with early identification and appropriate mitigation. This project must be very tightly managed and expectations understood since the Washington State Legislature set a budget (with additional funding from other sources) and a schedule, which requires the study to be completed by June 30, 2019. Initially, we will work with WSDOT to prepare a complete project scope, budget and schedule to guide the project with the understanding that adjustments will likely be required as the schedule progresses. Should contingencies arise, we will address them with the following methods and tools:

- **Project Team Chartering:** David and Scott will lead a chartering workshop to obtain WSDOT and consultant buy-in, thereby avoiding potential disagreements associated with differing objectives during project execution. In this session, Jason Beloso and other WSDOT staff should actively participate in a facilitated session to identify project goals and objectives, define the project sequence and schedule, define expectations, and kick off the project. In addition, the Province of British Columbia is a first-time contributor to the project and their participation and role needs to be defined. Lastly, WSDOT needs to articulate what roles they see the advisory group having so that an appropriate approach at the first advisory group meeting is understood by all parties.

- **Model Scoping:** Our first deliverable describes, in full, the structure and methodology of the travel demand model. We will scope out all aspects of the model approach to earn WSDOT buy in on the methodology. Opportunities to refine areas for further development during the incremental QA and audit process will avoid risking getting partially through without having the right information.

- **Advisory Group Chartering:** The role of the advisory group will be clearly understood by the participants to “advise” and provide comments on study subjects. The advisory group may have a more substantial role when it comes to “Governance” recommendations.

- **Issues Log:** The team will maintain an issues log, which will be an agenda item at regular team meetings. The goal is to identify issues and risks immediately and resolve them at the lowest effective level. In conjunction with WSDOT, David and his team will identify potential issues, record them on an issues log, and monitor their resolution as the project progresses.

- **Appropriate Documentation:** Proper documentation is necessary for successful project delivery. The project team leaders will take an active role in making sure that all deliverables are reviewed and approved and WSDOT is kept continually informed of project execution and schedule issues. 
5B. APPROACH TO RESOLVING ISSUES

Risks and opportunities associated with major transportation program development are best managed by a team that possesses the experience from planning, designing, and implementing similar projects. Our approach to resolving issues that could arise with the consultant team, client(s) and stakeholders draws from our expertise and abilities to identify and document potential project risks, and seek agreement from consultant team’s task leads, the team’s project managers and the WSDOT PM, and to monitor potential issues and commit to appropriate mitigation measures.

- **Risk Management Log:** At the project onset, we will collaborate with Jason Beloso to identify potential project issues, mitigation approaches, and ultimate resolution. Our team will engage our Strategic Advisors, as required, to discuss and estimate the probability of occurrence of each risk, and describe the consequences, should a risk occur. As Jacobs staff has done for other projects, including leading a half-day risk management workshop with FRA and ODOT for the Oregon Passenger Rail Corridor Investment Plan, we will facilitate the process to surface, document and monitor potential issues using a risk management log for all stakeholders who may own facets of the project and outcomes.

- **Project Charter:** Establishing a project charter through a partnering process with WSDOT and other participants as they determine will serve as the blueprint for the clients and project team. The charter will articulate the decision process, detailed schedule, including critical paths, and conflict management/resolution between client partners and the consultant team.

- **Stakeholder Advisory Group and Investor Engagement:** The business case created by our study needs to help stakeholders and potential investors understand the project and determine if it’s viable for future investigation. Ensuring that our study and the business case that evolves from it, provides that information is the critical role of the stakeholder advisory group. At the onset of the project, our team will interview and survey the advisory group members to gather their list of big picture questions. The subsequent workshops will demonstrate our progress with updates on key findings and provide the opportunity for feedback and questions. At the end of each workshop, a survey will be provided to get quantitative and qualitative data on our progress towards answering the big picture to understand what’s missing from the study.

5C. ASSUMPTIONS FOR WORK BREAKDOWN STRUCTURE

We have assembled a team able to effectively lead and execute all technical aspects of the study. We understand WSDOT will have a small team managing this project and our team will be able to move the project forward with minimal WSDOT oversight. To get the study started on the right foot, we will have a project chartering and model scoping session with WSDOT to get your buy-in on how we manage the process and what the model will produce. WSDOT will have the opportunity to assess progress during regular incremental check-ins to see if the project is on track in the most time efficient manner possible.

5D. KEY ISSUES AND CRITICAL MILESTONES

**Developing the Passenger Demand and Revenue Forecasting Model for Phase II and Beyond**

A critical component of our work plan is to develop a travel demand, ridership and revenue forecasting tool that will be:

- Able to compute alternative scenario ridership and revenue forecasts reflective of technology, alignment, operational characteristics and costs of all relevant modes, and passenger demand growth;
- Presentable to stakeholders and investors to better understand P3 and investment opportunities; and
- A solid cost-effective foundation to develop robust ridership and revenue forecasts for future UHSGT project phases.

**Identifying the best platform for model**

Our team, led by Ian McGookin, proposes to build a spreadsheet-based model platform that will enable multi-modal logit demand modeling between high-speed ground transportation, traditional rail, highways,
and aviation. We have successfully built similar spreadsheet-based models for HS1 and Malaysia – Singapore HSR, and our experience is that such an approach allows for faster and more transparent model development. This enables earlier analysis of scenarios and initial results to inform other dependent workstreams. This approach will have the following advantages:

- **Run Models Throughout Model Development**: The model is built incrementally (in stages) which allows us to run and test scenarios throughout model development. Temporary modules will be used to develop interim results, before updates are made as new data collection and analysis is complete, allowing for commencement of dependent workstreams and more robust forecasts.

- **Cost Effective**: The development of a spreadsheet model allows us to focus on the elements of the demand model that are critical for developing solid ridership and revenue forecasts as opposed to developing an overly complex network model which would require additional data on all potential trips in the corridor – including those that are out of scope for intercity UHSGT. By using a spreadsheet platform, we can pull relevant input data from various sources into the model application.

- **Investor Friendly**: Investors can be skeptical of “black box” models where it’s unclear how the output is created. Our spreadsheet models are both transparent and robust, allowing stakeholders and investors to look “under the hood” at assumptions, input data, trip matrices, and intermediate calculations.

- **Incremental Quality Assurance (QA) and Audit Process**: Developing the model in a spreadsheet allows us to set up an incremental QA and audit process while development is underway to give WSDOT confidence in the model’s integrity. This mitigates errors and reduces time needed for final model audit. WSDOT’s feedback will be integral and captured within our Model Scoping Report.

- **Future Phase Ready**: The model will act as a building block for further refinement and expansion to an Investment Grade Model during subsequent phases, rather than requiring a new model.

**What will this model tell us?**

- **Ridership and Revenue Potential**: The model will forecast passenger demand through operational scenario testing to find a “sweet spot” in terms of cost and revenue potential for stakeholders and investors. Passenger revenue would be determined by the ridership multiplied by the fare. If, in this or in future iterations of the study, different classes of service are investigated, the model can be upgraded and disaggregated to determine the ridership and revenue by class. The model components will be combined, expanded, and annualized based on existing information and assumptions developed from HSR systems around the world. If more detailed information is required for ridership patterns, existing monthly travel patterns could be analyzed to determine monthly or quarterly ridership and revenue estimates.

- **Travel Demand on other Modes**: While the model will focus on the UHSGT, we need to also understand and model competing modes, including passenger demand on air, conventional rail, bus, and auto travel. Demand for all of these modes will be an output of the model process. To ensure the specific characteristics of each mode are captured, our modeling team will be multidisciplinary in nature and include experts from across the rail, highways and aviation sectors. We have successfully deployed such an approach in our work on the HS1 sale.

**How will we make the model?**

- **Using existing data**: To maximize efficiency and costs, our team will review available data and models, including the work from Phase I, to determine what can be refined and reused. There is not one network model covering the entire study area, so we will utilize existing network models from Vancouver, Seattle, and Portland to generate model inputs, including their complex highway and transit systems to understand

The multidisciplinary approach adds value as the introduction of high-speed rail invariably leads to some modal shift from air services. This has led, in some markets, to the removal of direct air services altogether on some busy corridors, such as Cologne to Frankfurt (in Germany), and increasingly the airlines have entered into a through-ticketing, code share partnership arrangement with the rail operators to encourage such travel. These aspects will need to be considered within the study.
the impact of station locations.

• **Geographic representation:** Zones define the geographical representation of the study area. The study area which would be defined in the study, includes the I-5/Amtrak Cascades corridor. The zones would be defined to respect county, census, and other existing definitions. Zone data may include socio-economic variables such as population, employment, and average income or household income stratification.

• **Surveying:** Our team will gather data on existing travel markets through stated preference (SP) surveys, existing household travel surveys, and other information. Market segmentation will include estimating business and non-business models. Other finer market segment models may be modeled if sufficient data is available. The business/non-business segments are important as these travelers have different willingness to pay values (among other differences) that are important for estimating demand and the resulting revenue. RSG has estimated both business and non-business models on many different HSR studies, in order to properly estimate demand and revenue.

• **Innovative data collection using cell phone data:** The recent availability of new sources of passive data from mobile phones and apps provides a step change in our ability to derive robust base year OD matrices. Jacobs has been at the forefront of using this data for this purpose. We lead the development of a national database of inter urban road, rail and air trips for Highways England in the United Kingdom, Project Edmond in London, United Kingdom – which created an integrated set of demand data for Greater London by fusing mobile phone data, Oyster smartcard data and other apps- and various HOV toll projects in the United Kingdom. For this study, we propose to collect locational-based-services data from Cuebiq, which has a 23% market share of all app-based data, and is not tied to a single mobile network. Four months of data will be collected, which will provide millions of anonymous locational “pings” within the study area, each with a spatial accuracy of less than a half mile. We will use this data to derive trips by mode, and infer journey purpose using data collected anonymously using the apps. International trips will require bespoke analysis, as many travelers will switch mobile phone providers when crossing the border. This approach will provide far superior data for the study than other approaches, with key benefits including greater coverage and use of the most current information.

• **Existing trip tables:** Data from the surveys and other “Big Data” sources will inform the base year demand matrix. These trips will be segmented by trip purpose and mode in order to develop the calibrated model that represents existing travel choices in the corridor.

• **Model estimation and calibration:** The logit choice models will be estimated using the data collected in the SP surveys. While models will be estimated based on the data collected, it will generally consist of the following variables for all modes: travel time, cost, frequency of service, alternative specific constants, and other variables, not limited to amenities and comfort, classes of service, etc. The values of the model coefficients determine the value of time and elasticities of the model. The model estimation process continuously reviews and adapts the model to ensure coefficients are reasonable as well as statistically significant.

• **Model structure:** Determination of the model structure will be decided through the model estimation process and will be used to develop the most adequate model. It is important to not presuppose the model structure, but prior analyses can help guide us in the process.

• **Growth of travel markets:** This is likely done using population and employment and utilizing a Fratar growth method, but other methods are possible. Understanding the conventional rail and air growth in response to gas prices and other global measures can add sensitivity to the growth and choice models.

**What data will be put into model?**

• **Operational schedule of high-speed ground transportation:** Times of departure and arrival, frequency, and fare (cost of tickets) are critical for understanding the choice of travel mode.

• **Details of competing modes, including demand, schedules and fares:** Within the air market, Portland, Seattle and Vancouver are all major airports, with Seattle in particular acting as a significant hub for
connecting flights between the Pacific Northwest and points across the United States and globally. Using recognized industry data sources from the US DoT and OAG, we will analyze air traffic flows in the corridor to assess the levels of traffic that are true origin and destination between these cities (as opposed to transfer passengers whose final destination is elsewhere). This will allow us to: identify passengers likely to consider switching to rail, assess the average fare paid for passengers on these routes, and review the effect of the entry of airline competition on air fares. Similar analyses will be undertaken across other modes as appropriate.

• **Access/Egress costs:** Sensitivity to access/egress time and costs are critical for all public modes. These would likely be based on highway travel times, costs, and distances from the zones to the stations.

• **Socioeconomic growth:** Growth of existing travel markets is based on growth models driven by socioeconomic variables such as population, employment, income (at the zonal level) and global variables such as GDP and gas prices. The future socioeconomic assumptions are inputs to the process to determine the growth of the trip tables. In this way scenarios can be tested to look at high, normal, and low growth alternatives.

**How will we know it’s accurate?**

**Benchmarking:** We will benchmark our forecasts and the impact of the UHSGT lines on competing modes against similar high-speed ground transportation systems around the world, ensuring the forecasts generated are in line with real world systems.

**Risk Analysis:** All forecasts are inherently subject to a level of risk. The risks associated with ridership forecasts can be ascribed to three main sources:

• Risks associated with independent input assumptions or factors directly applied to model outputs
• Risks associated with processes or parameters within forecasting models
• Risks associated with base data from which base year models are derived (such as data omissions, low sampling or other inadequacies, actual data errors, etc).

Given that some degree of uncertainty will always be present, it is useful to quantify this uncertainty to allow the risk associated with the forecast ridership to be determined and judged. Proper risk assessment procedures take into account the principal causes of variation in ridership levels, and produce a probability distribution that indicates the complete range of possible outcomes and the associated level of certainty. We therefore propose using a Monte Carlo risk model, that through the use of individual risk probability distribution functions and the prescribed individual risk ranges will simulate the probability of all the risks occurring to different degrees at the same time. This will provide WSDOT not only robust risk analysis and assurance but an industry leading approach to modeling risk.

**Selecting the Most Viable Technology**

**What is the purpose of the technology assessment?**

The purpose of the technology assessment is to provide WSDOT with an evaluation of existing technology options currently available to support an ultra-high-speed ground transportation program now and in the foreseeable future. This technology assessment will narrow the choices to help determine whether or not the project is technically and financially feasible.

**What ultra-high-speed ground transportation technology options will be considered?**

Included in this assessment will be a semi-technical review of the current status of each ultra-high-speed rail technology. Numerous technologies are available that can meet the WSDOT ultra-high-speed requirement (>250 mph). These technologies have been defined and discussed during the first phase of this study and include high-speed rail, magnetic levitation (maglev) and hyperloop.
How will we narrow the choices?
We will develop multiple factor evaluation criteria in collaboration with WSDOT and stakeholders. The evaluation criteria would include site specific and performance features and commercial availability, and technical maturity features. Site specific features would include geometric constraints (vertical and horizontal curvature) right-of-way widths and station footprints. Performance features would include speed, seating capacity, passenger throughput (passengers per hour per direction). This would be informed by demand estimates so the system is sized correctly for both opening year and planning horizon year. Commercial availability and technical maturity would be evaluated based on estimated probable cost to construct, operate and maintain; the current number of systems deployed and planned and the technical maturity and revenue service proven operations of each of the technology options.

How will we make the recommendation?
Each of the technologies will be evaluated based on the agreed upon criteria and will be arrayed in a matrix for ease of comparison. Through outreach and dialogue with WSDOT and stakeholders, the evaluation criteria will be weighted in terms of relative importance and then scored accordingly. Once the scoring is completed, the comparisons will be judged and a determination using logic and reasoning will be completed. The findings will be reported. Through collaborative dialogue, an informed choice will be made and recommended for further detailed technical analysis as part of the Business Case analysis.

Governance Strategy: Consensus Building Across Borders
From our experience with cross-border projects between British Columbia and Washington, we believe that three key characteristics are required for success: commitment, clarity, and communication.

Past efforts have shown that long term projects can only succeed through succession in political leadership and economic cycles if there is substantial commitment from the highest levels of government through the administrative functions within ministries and agencies. Building a learning process that embeds each project development into the organizations responsible for delivery will help to ensure that the project can withstand the passage of time.

In multi-jurisdictional efforts, clarity around roles, responsibilities, commitments, and authorities is incredibly important. Legal structures will be created to ensure that all parties understand what the other can do, the right participants are engaged, and relevant jurisdictional issues are surfaced.

Early, frequent, and clear communication with potential stakeholders, public and private, will build confidence in the broad engagement of project. We will design communication protocols and capacities to be used later to reach decision-makers to create a sense of momentum, to build understanding of the scale of effort and to draw together the coalition on both sides of the border that will be required for success.

Investor Outreach
Our team has deep experience working closely with the investor community on projects similar to UHSGT, built up through successful delivery of project work in both rail and the broader infrastructure space, such as the HS1 commission. We understand the importance of engaging with investors throughout the course of a project, to ensure that key investment highlights and benefits to investors are communicated as the project develops. We understand that investors require concise, clear presentation of a project’s key risks...
and opportunities, so they can understand not only the base financial case for the project, but also the risks associated with delivery and operations – particularly cashflow risks such as expected variations in project revenues. Investors will also want to understand the proposed model(s) for project governance and delivery so they can take a view on the level and type of private participation in a project. For example, does the proposed governance model:

- Allow reasonable profits to be retained by investors; and
- Clearly separate out uncontrollable risks affecting costs or revenues - such as unanticipated changes in law.

Our team is experienced and adept at presenting the overall business case for major rail schemes to the investor community, which is demonstrated through the international examples outlined below:

- Ongoing (current) market engagement with financial institutions for a current confidential project for United Kingdom Government on developing an enhanced delivery model for rail investment, with a focus on the London-Edinburgh mainline route;
- Expert presentations and briefing notes to the investor community for our HS1 sell-side role in 2017, which produced substantial levels of interest from bidders for the United Kingdom high-speed rail assets;
- Planning and delivery of successful market sounding events to the investor community in London and Singapore for the proposed HSR system between Malaysia & Singapore, which attracted interest from over 70 financial institutions;
- Planning and delivery of successful market sounding events to the financial community in São Paulo for the proposed high-speed rail system in Brazil (between Rio de Janeiro and São Paulo); and
- Briefing and presentation at a series of market sounding and market testing events for new rail franchises in the United Kingdom, including Northern Rail, Transpennine Express and West Midlands.

**Milestones**

Table 5D.1 below provides closer details on our work plan’s schedule and associated milestones.

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Months</th>
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<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
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<tr>
<td>Work Plan, Scope, Schedule</td>
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<tr>
<td>Stakeholder Engagement Strategy</td>
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<td>Stakeholder Website Development</td>
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<tr>
<td>Modeling Strategy</td>
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<tr>
<td>Survey and Data Gathering</td>
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<td>Model Development</td>
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<tr>
<td>Model Runs and Analysis</td>
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<td>Corridor Evaluation</td>
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<td>Service Planning</td>
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<td>Cost Development</td>
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<tr>
<td>Technology Assessment</td>
<td></td>
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<tr>
<td>Governance Strategies</td>
<td></td>
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<tr>
<td>Finance and Economic Analysis</td>
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<tr>
<td>Draft Business Case</td>
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<tr>
<td>Investor Review</td>
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<tr>
<td>Stakeholder Workshops</td>
<td></td>
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<tr>
<td>Final Business Case</td>
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</table>

**Figure 5D.1: Milestones**
STATEMENT OF QUALIFICATIONS
JUNE 12, 2018

Ultra High-Speed Ground Transportation Study: Business Case Analysis

Submitted by: WSP

Submitted to: WSDOT
A Partnership to Foster Support and Move Ultra High-Speed Ground Transportation (UHSGT) Forward

The WSP team will partner with WSDOT to develop a business case that demonstrates UHSGT’s potential to be a catalyst for economic growth and takes the conversation from vision toward implementation.

WSP’s team, including Project Manager Karen Hedlund, former deputy administrator of the Federal Railroad Administration (FRA), brings together top national and international strategists with unparalleled experience fostering support for and delivering and operating UHSGT projects worldwide (Exhibit 1). This expertise is combined with leadership in regional transportation improvements and relationships with key stakeholders. Our team includes key partners Steer Davies Gleave (SDG), disadvantaged and women-owned business enterprise (DBE/WBE), EnviroIssues, Paladin Partners and Transportation Solutions. Our team offers WSDOT the following key expertise:

Business Case Development: WSP has developed business case analysis for numerous major UHSGT projects including six for the California High-Speed Rail (CAHSR) program. WSP’s efforts, including proposed Corridor Planning Lead David Carol’s work for CAHSR, was widely praised for presenting a realistic, logical and feasible means of delivering the program through a phased implementation strategy. Our proposed business case analysis lead, Nathan Macek, is supporting the business case for the $300 million Amtrak Gateway Program, leading development of the funding and finance plan. SDG’s recent business case work includes efforts for the $15 billion Metrolinx project in Canada, where Michael Colella (also leading business case analysis) led development of a new business case guidance framework. SDG’s additional experience includes the London Overground concession, HS2 in the United Kingdom, and supporting Amtrak in its development of a strategic Business and Financial Plan for its 30-year, NextGen Northeast Corridor HSR program.

Ridership and Modeling: Since 2008, when the Obama administration announced major funding for high-speed and intercity passenger rail (HSIPR) projects, SDG has produced ridership and revenue forecasts for most of the studies. Ridership and Revenue Lead Mark Buckmaster managed the development of the investment grade forecasts for the 54-mile proposed HSR service that is part of the High Desert Corridor in Southern California. Masroor
Hasan, who is serving as a ridership expert advisor for our team, and WSP partnered to develop the first version of the Conceptual Network Connections Tool (CONNeCT) tool for the FRA in 2012 and deployed the model in the Southwest Regional HSR Study. SDG has further developed the tool and both firms applied the revised tool for the Midwest as well as the Southeast Regional Rail Planning Studies on behalf of the FRA.

Attracting Private-sector Interest: Our team has been involved in outreach and negotiations with private-sector investors for numerous UHSGT projects, including the CAHSR in its selection of an Early Operating Partner and the High Desert Corridor HSR project. Our team member, Shaun McCabe assisted the Texas Bullet Train project in obtaining support from the Japan Bank for International Cooperation. While with FRA, Karen Hedlund led evaluations of Railroad Rehabilitation & Improvement Financing (RRIF) loan applications from private investors for Florida’s Brightline HSR between Orlando and Miami and XpressWest HSR between California and Las Vegas.

In addition to SDG’s work on most of the recent HSIPR studies across the United States, the firm has also supported private consortia developing HSIPR services in Florida (the currently under construction Brightline service); Texas (the proposed Texas Bullet Train); and Nevada/California (the proposed XpressWest HSR). Our work has supported the critical investment decisions of a wide range of private entities, including operating companies, rolling stock manufacturers, leasing companies and investors.

Federal/FRA Relationships: WSP brings strong working relationships with federal agencies. In addition to Karen Hedlund’s role at FRA, team member John Porcari is former deputy secretary at the U.S. Department of Transportation (USDOT). David Carol led the team supporting FRA in business case development for the next 50 years of improvements to the U.S. Northeast Corridor (NEC). WSP and SDG have been working with the FRA planning group on all the regional planning studies (i.e., the Southwest, the Midwest, and the Southeast.)

New Technologies: WSP has supported multiple states, coordinating across agencies and stakeholders to develop strategic plans for connected and automated vehicles in Maryland, Michigan, Minnesota and Utah. Our team was recently selected to provide facilitation of the Washington State Autonomous Vehicles (AV) Working Group.

SDG advises public- and private-sector clients on policy and strategic scopes, and has provided insights into market potentials and regulatory implications of new technologies, such as hyperloop, maglev and AV technologies, including advising Hyperloop One in Europe and Asia.

Governance /Project Delivery: For the Amtrak Gateway Program Development, WSP is developing an overarching strategy and plan for funding and financing the various projects that comprise the program. Our work provides research and analytic tools to guide decisions including governance and project delivery. The WSP team helped develop a non-profit corporation with representatives from two states and Amtrak to implement the program. SDG project delivery and governance advisory work includes the London Overground and FRAs Southeast Regional Rail Planning Study.

Funding: Since 2009, WSP has helped clients secure over $20 billion in Federal Discretionary Grant funding and financing for more than 100 transportation projects, including passenger rail. Our expertise includes former federal senior staff and political appointees, and members of our team have helped establish the requirements and procedures that guide grant programs today.

Corridor-wide Relationships: The WSP team offers expertise across the region that understands local stakeholders and infrastructure challenges.
Exhibit 2: The WSP UHSGT team brings specialized expertise to deliver this project.

<table>
<thead>
<tr>
<th>Firm/Role</th>
<th>Years of Expertise</th>
<th>National Staff</th>
<th>Washington Staff</th>
<th>Areas of Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSP – Prime Consultant</td>
<td>133</td>
<td>7,174</td>
<td>200</td>
<td>Project management, transportation/transit planning, strategic advisory services structural, civil and geotechnical engineering, hydraulic and traffic engineering, utilities, mechanical/electrical, design-build support, design-build support, construction management, project controls, tolling analysis and design, design visualization, stakeholder/public involvement, environmental, stormwater management</td>
</tr>
<tr>
<td>Steer Davies Gleave (SDG)</td>
<td>40</td>
<td>73</td>
<td>N/A</td>
<td>Ridership and revenue forecasting, business case development; economic analysis, stated preference/surveys, railroad operations</td>
</tr>
<tr>
<td>EnviroIssues (EI)</td>
<td>28</td>
<td>104</td>
<td>106</td>
<td>Public outreach, stakeholder facilitation and engagement, strategic communications, research, graphic design</td>
</tr>
<tr>
<td>Paladin Partners (PP)</td>
<td>9</td>
<td>6</td>
<td>N/A</td>
<td>NEPA and USACE regulatory and FRA safety compliance for HSR operations; drafting HSR safety and security regulations; soliciting and vetting of international HSR contract operations and maintenance contractors</td>
</tr>
<tr>
<td>Transportation Solutions (TS)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Strategic advisory services in the construction, design, financing, operations and maintenance of major transportation infrastructure projects. Strategic planning for federal and state HSR projects.</td>
</tr>
</tbody>
</table>

Exhibit 3: Organization Chart. The WSP team includes national and international leaders in UHSGT projects combined with leadership in local transportation improvements and relationships with key stakeholders.

WSP High-Speed Transportation Council: The WSP team has formed a group of experts and geographic leaders in Oregon, Washington and Vancouver BC, including John Porcari, senior infrastructure advisor; Paula Hammond, senior policy advisor; Jason Tell, senior Oregon infrastructure advisor; Paul Nimigon, senior Canadian infrastructure advisor; and Neil Peterson: senior stakeholder outreach advisor. This group provides an internal, yet independent, review of the technical work. It also provides expertise and industry best practices in areas of the potential additional scope such as economics, governance, P3 and policy; the group’s expertise will be leveraged in preparation for and engagement with the Advisory Group and Steering Committee so that the right emphasis is being placed on moving this study to the next phase.

All staff are WSP unless noted. = Key personnel.

Subconsultants: EI EnviroIssues (DBE/WBE) SDG Steer Davies Gleave
TS Transportation Solutions PP Paladin Partners
B. Experience Working with Subconsultants

The table below illustrates select examples of our team’s history working together successfully on similar assignments. This shared experience and our existing relationships support constructive and efficient collaboration to benefit WSDOT.

<table>
<thead>
<tr>
<th>WSP and SDG: CAHSR Program</th>
<th>Client: California High-Speed Rail Authority (CAHSRA)</th>
<th>Location: California</th>
<th>Dates: 1998–present</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSP:</td>
<td>Since 1998, WSP has been assisting to position and implement the 800-mile CAHSR corridor network. WSP is currently leading program management supporting the CAHSRA on a range of project development activities. <strong>SDG</strong>: As part of the program management team, SDG is providing support in commercial delivery and economic analysis.</td>
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<table>
<thead>
<tr>
<th>WSP and EnviroIssues: Long-Range Plan Update and ST3</th>
<th>Client: Sound Transit</th>
<th>Location: Seattle, WA</th>
<th>Dates: 2013–2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSP: WSP was the prime consultant for this update to Sound Transit’s Long-Range Plan and development of the ST3 strategic plan to extend light rail and bus rapid transit across the region. <strong>EnviroIssues</strong>: EnviroIssues provided comprehensive and inclusive engagement, strategic communications, comment management, graphic design and web development. The effort led to a $54 billion transit funding package.</td>
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</table>

<table>
<thead>
<tr>
<th>WSP and Paladin Partners: Texas Bullet Train</th>
<th>Client: Texas Central Partners</th>
<th>Location: Texas</th>
<th>Dates: 2017-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSP: WSP is supporting the train developers with engineering, cost estimating, and scheduling as this 240-mile, multi-billion-dollar HSR project moves forward to the pre-construction phase. <strong>Paladin Partners</strong>: PCG’s managing partner is serving as a senior rail advisor. Shaun McCabe leads the safety regulatory approvals needed from the FRA and conducts the hazards and risk analyses used to define and iterate many high-value design decisions.</td>
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<table>
<thead>
<tr>
<th>WSP and Transportation Solutions (TS): Metro ExpressLanes Program Management Support</th>
<th>Client: Los Angeles County Metropolitan Transportation Authority</th>
<th>Location: Los Angeles, CA</th>
<th>Dates: 2015-present</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSP: WSP is leading program management support, providing a full range of services for laying the groundwork for implementing ExpressLane projects in Los Angeles County. <strong>TS</strong>: TS is a subconsultant on the team for strategic advice on governance in the state.</td>
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</tbody>
</table>

C. Current Availability of Key Staff and Resources

The WSP team is committed and available to support WSDOT in this important effort.

<table>
<thead>
<tr>
<th>Name/Role</th>
<th>Expertise/Capability</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karen Hedlund: Project Manager; Governance/P3</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Dave Warner: Principal-in-Charge</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Nathan Macek, AICP: Business Case Analysis Lead; Funding &amp; Finance Models, Risk &amp; VfM</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Michael Colella: Business Case Analysis Lead</td>
<td>60</td>
<td>60</td>
<td>60</td>
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<tr>
<td>Angie Thompson: Communications &amp; Outreach Lead</td>
<td>60</td>
<td>60</td>
<td>60</td>
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<tr>
<td>Mark Buckmaster: Ridership &amp; Revenue Lead</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>David Carol: Corridor Planning Lead; Technology</td>
<td>60</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Masroor Hasan: Ridership Expert Advisor</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Lucile Kells: Model &amp; Survey</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Ken Zatarain: Alignment &amp; Station Area</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Pierre Vilain: Economic Growth, Land Use &amp; Latent Demand</td>
<td>30</td>
<td>30</td>
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<tr>
<td>Stefan Reul: Multimodal</td>
<td>40</td>
<td>40</td>
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<tr>
<td>Larissa King Rawlins: Land Use</td>
<td>40</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Ira Hirschman: Economics &amp; Benefit/Cost Analysis</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Shaun McCabe: Regulatory Opportunities</td>
<td>30</td>
<td>30</td>
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</tr>
<tr>
<td>John Porcari: Senior Infrastructure Advisor</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Paula Hammond: Senior Policy Advisor</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Jason Tell: Senior Oregon Infrastructure Advisor</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Paul Nimigon: Senior Canadian Infrastructure Advisor</td>
<td>40</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>Neil Peterson: Senior Stakeholder Outreach Advisor</td>
<td>10</td>
<td>10</td>
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## D. Similar Team Project Experience

Similar projects that each firm on the WSP team has completed in the last three years.

### CALIFORNIA HIGH-SPEED RAIL (CAHSR) PROGRAM MANAGEMENT

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<tbody>
<tr>
<td><strong>Staff:</strong></td>
<td>David Carol (Planning/Business Case Support); Ken Zatarain (Lead Access Planner); Michael Colella (Contributor); Stefan Reul (Contributor)</td>
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Since 1998, WSP has been assisting the CAHSRA to position and implement the CAHSR corridor to connect San Diego, Los Angeles, Sacramento and San Francisco, including 24 stations. WSP’s support covered initial funding through business case development, planning and oversight of the environmental process, full preliminary engineering and implementation of our comprehensive systems integration approach. While with FRA, Karen Hedlund assisted with the award of more than $3 billion in federal grant funds for CAHSR.

**Key services include:**

- Development of the 2018 Business Plan that:
  - Lays out the newly appointed CEO’s vision for how to implement the system in the face of challenges that projects around the world of similar magnitude and complexity have faced and addressed.
  - Presents a comprehensive summary of the high-speed rail program’s costs, ridership and revenue forecasts and funding and financing strategies and re-emphasizes the significant environmental, economic and mobility benefits associated with delivering HSR as part of an integrated statewide rail network and its transformative potential for California.
- Financial plan and outreach program to secure funding and kick-off project implementation by gaining consensus and support of the local agencies, transportation authorities and the public by addressing issues related to corridor alignment, station placement and system integration.
- Evaluation of system parameters, including alignment design criteria, unit costs and operational assumptions from previous studies, and validated these against current technological advances, ridership, service needs, and specific requirements of local counties and cities.
- Addressed station location issues dealing with the siting, analyzing urban versus suburban stations and the merit of stations that would provide service to major airports.
- Assessment of potential of shared right of way on corridors currently serving commuter, Amtrak and freight services that would reduce overall costs and provide benefits to existing rail service.

### TEXAS BULLET TRAIN

<table>
<thead>
<tr>
<th>Firm: WSP and Paladin Partners (PCG)</th>
<th>Client: Texas Central Partners</th>
<th>Amount: $22M (WSP); $5.6M (PP)</th>
<th>Location: Texas</th>
<th>Dates: 2017 - present (WSP); 2013 - present (PP)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staff:</strong> Ken Hedlund (Funding, Financing and Governance (as independent consultant); Shaun McCabe (Program Manager, Early Development)</td>
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</table>

The Texas Bullet Train is a high-speed passenger train that will connect Dallas and Houston. Traffic between the two cities is expected to double by 2035. Departing every 30 minutes during peak hour and on the hour for off-peak, the private-investor-owned rail system would help commuters avoid delays and reduce traffic along the highway corridors.

**Key services include:**

- WSP will perform pre-construction planning and support with engineering, cost estimating, and scheduling as the multi-billion-dollar project moves forward to the pre-construction phase.
- In a separate contract, Karen Hedlund is providing advice regarding financial assistance for the project through the USDOT TIFIA and RRIF loan programs, including requirements and procedures of the Build America Bureau. She has also assisted in working with Congress to obtain needed changes to these programs, including authorization and appropriation of the “credit risk premium” that otherwise must be paid by borrowers to obtain RRIF loans. Congress appropriated the first amount for credit risk premiums in the 2018 Omnibus Appropriation Act.
- In a separate contract, Paladin Partners’ managing partner is serving as a senior rail advisor. Shaun McCabe led the early development strategies for HSR system with respect to all FRA/NEPA and USACE/404, 408 requirements – with a highlight on environmentally sensitive and politically challenging landscapes.

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**Statement of Qualifications**

Ultra High-Speed Ground Transportation Study: Business Case Analysis

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**WSP**

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**WSDOT**

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**Page 5**
AMTRAK GATEWAY PROGRAM

Staff: Karen Hedlund (Funding, Financing and Governance); Nathan Macek (Task Manager Developing Funding and Financing Plans); John Porcari (Interim Executive Director of the Gateway Development Corporation)

The Amtrak Gateway Program is a proposed series of rail infrastructure improvements designed to preserve and improve rail service into New York City. The program will ultimately create new capacity to double passenger trains running under the Hudson River. The program will rebuild or replace existing assets and build additional infrastructure with the capacity to accommodate growth.

Key services include:
✔ Leadership of the overall program development which includes business case elements.
✔ Assistance with establishing a governing framework through creation of the Gateway Program Development Corporation, a non-profit corporation with representatives from two states and Amtrak to implement the program.
✔ Development of an overarching strategy and plan for funding and financing the various projects that make up the program, including financing planning, strategic advisory services, and the development of a comprehensive financial model.
✔ Research and development of analytic tools to guide decisions regarding governance, project sponsorship, funding and project delivery.
✔ Analysis of New Starts and Core Capacity funding opportunities and evaluation of federal financing programs, including USDOT Transportation Infrastructure Finance and Innovation Act (TIFIA) direct loans and RRIF Program loans.
✔ Comprehensive review of innovative funding options, such as state cap-and-trade funding, congestion pricing, user fees and value capture mechanisms.
✔ Strategic advisory support on federal policy and stakeholder outreach to the Trump administration and Congress on legislation related to potential federal rail funding and financing programs.

High Desert Corridor Investment Grade High-Speed Rail Ridership & Revenue Forecasts

Staff Involved: TS: Neil Peterson (Project Manager); SDG: Mark Buckmaster (Project Manager); Lucile Kellis (Stated Preference / Survey Lead); Masroor Hasan (Peer Reviewer); Karen Hedlund (Senior Adviser: Federal Funding and Financing)

The High Desert Corridor is a proposed multipurpose corridor that includes a 54-mile HSR connection between Victorville in San Bernardino County, CA, with Palmdale in Los Angeles County, CA. It will also provide a connection between the CAHSR network and XpressWest’s planned line to Las Vegas.

Transportation Solutions: Neil Peterson is the principal network consultant advising the High Desert Corridor Joint Powers Authority on this project. Karen Hedlund is a subconsultant (separate from WSP) providing senior advisory on funding and financing.

SDG: SDG produced investment grade ridership and revenue forecasts for rail services using the proposed line.

Key services include:
✔ Analysis of the current and future size of the “in-scope” market – subset of trips made between Las Vegas and California by travelers for whom the proposed HSR service could be a viable travel option.
✔ Assessment of how much of this market HSR could capture at a given fare – including design, development, implementation and analysis of Stated Preference survey of over 4,000 travelers.
✔ Estimation of how much additional travel could be “induced” by the presence of the HSR service itself.
✔ Extensive sensitivity testing to understand key project risks.

Relevance to this Project:
- Proposed HSR would enable trains to connect two major metropolitan areas in under 30 minutes.
- Investment grade HSR ridership and revenue forecasts.
- Included extensive stated preference survey to enhance understanding of traveler choices.
- Collaboration between WSP team, including multiple staff from SDG, Karen Hedlund and Neil Peterson.
**London Overground Technical Advisor**  

**Staff Involved:** Michael Colella (Project Manager (while with TfL))

SDG served as technical advisors to develop the specification and support the procurement of a concession to operate and maintain the London Overground system. SDG advised TfL on the unique capabilities required for the concession that would set it apart from other passenger rail concessions and deliver exacting standards of service and quality to match those of the London Underground system. The concession model has been able to influence directly the level of investment and customer experience — new and now longer trains, more frequent services, improved and more accessible stations, and much-improved customer information.

**Key services include:**

✔ Concession specification design that identified operator requirements to support improved performance which supported a strong business case for investment
✔ Revenue enhancement opportunity identification and development of a service quality and performance incentive list of contractual operator obligations
✔ Development of an efficient operator Financial Comparator Model to support a strong return-on-investment in hiring an operator
✔ Preparation of an information memorandum on historical performance that analyzed what was not working in the past so operators could propose robust improvements
✔ Development of risk-adjusted cost projections

**Relevance to this Project:**

- Development of a concession for a transformative rail project that considered how the project would attract private-sector investors
- Work led by SDG supported the business case that was being led by Michael Colella while with TfL
- Assessed opportunities to enhance revenue and improve performance and service quality

**Preliminary Business Case for HSR on the Toronto to Windsor Corridor**  
*Firm: SDG  Client: Metrolinx  Amount: $300k  Location: Ontario, Canada  Dates: 2015-2017*

The Ministry of Transportation for Ontario (MTO) appointed SDG to develop the preliminary business case for HSR, including a review of previous business cases and feasibility studies; preliminary scenario/option design; cost estimation (capital, renewal, operating); ridership and revenue forecasts; and the completion of a business case. The business case clearly articulated how HSR achieves policy goals/project vision (strategic case); the value of HSR to society based on user and societal benefits (economic case), the financial implications of HSR, including costs and revenue (financial case); and key deliverability opportunities and risks (deliverability case).

**Key services include:**

✔ Development of strategic goals and objectives
✔ Definition and evaluation of multiple service scenarios
✔ Development of ridership, revenue, economic and social benefit forecasts
✔ Support of development of the Metrolinx business planning process in particular the prioritization of projects

**Relevance to this Project:**

- Canadian HSR project working with the MTO
- HSR business case development that identified economic benefits
- Effort included input and forecasting for ridership, revenue, economic and social benefits

**Ultra High-Speed Ground Transportation Feasibility Study**  
*Firm: EnviroIssues  Client: WSDOT  Amount: $45,000  Location: Seattle, WA  Dates: 2017*

**Staff Involved:** Angie Thompson (Communications & Outreach)

Feasibility study for a UHSGT system between Vancouver, BC, and Portland, OR. EnviroIssues led stakeholder engagement and facilitation of a 20-member Advisory Group that provided key insights on engineering, economic and policy feasibility.

**Key services include:**

✔ Designed a stakeholder engagement strategy
✔ Convened and facilitated the stakeholder Advisory Group
✔ Managed UHSGT meeting logistics including agenda development, meeting content and meeting documentation
✔ Developed content for website and final report

**Relevance to this Project:**

- Initial feasibility phase provides insights and understanding to the business case study
- Facilitation of the 20-member Advisory Group
- Engagement with key project stakeholders and understanding of concerns and priorities
E. Successful Contract Negotiation

We recognize the need to begin the UHSGT Study quickly. Through our extensive history supporting contracts for WSDOT, our Seattle-based contracting specialists understand WSDOT’s business processes and will facilitate a quick and seamless project start. In 2016, our team simultaneously and efficiently advanced master agreements for two major WSDOT projects: the Gateway PMO and SR 167 GEC. WSP signed and returned the final master agreements for both projects to WSDOT within 40 days of Notice of Award.

We are committed to a streamlined negotiation approach to reach notice to proceed within two weeks, as shown in Exhibit 4. Our approach builds on our deep knowledge of WSDOT contracting procedures. We are constantly working within the WSDOT master agreement structure and the Actuals Not To Exceed Table (ANTE) approval process, through which we have approved labor and overhead rates. We have experience working with WSDOT’s standard fee, as well as the Consultant Fee Calculation Form. In addition, our work has involved guiding subconsultants through the WSDOT approval process.

We propose the following methods to use time efficiently and effectively during the contract negotiation phase:

- Our key team members will meet with WSDOT upon selection to confirm the work plan approach and study objectives. The contract and scope of work will reflect any refinements to the work plan.
- We will use our online approval process for efficiency and clear documentation of scope and fee approvals. All approvers are in the Seattle office. To avoid delays if an approver is not immediately available, we employ delegation of authority.
- Our contracting department employs eight personnel, which means that our team has full coverage to meet an expedited schedule at any given time.
**CRITERION TWO**

Qualifications of Proposed Project Manager

**A. Introduction to Karen Hedlund**

Karen Hedlund brings more than 35 years of experience driving the implementation of major transportation improvements. She has effectively guided multifaceted teams of technical advisory, legal and government representatives to deliver massive federal and local government rail projects.

Before joining WSP, Karen played an instrumental role in U.S. railway transformation. After serving as chief counsel, Karen was appointed FRA deputy administrator. During her tenure, she was an integral member of the FRAs $12 billion HSR grant program, credited for investing $3 billion in the development of California’s HSR system and another $3 billion to improve Amtrak’s Northeast Corridor.

Karen brings the technical and regulatory knowledge and proven leadership to help WSDOT navigate financial, regulatory and technical challenges to develop a robust business case for UHSGT.

**GET TO KNOW KAREN:**

**Q What perspective do you bring to this project from your history working with FRA and advancing mega-rail projects?**

A key perspective I bring from my experience at FRA and 35 years of working in financing public transportation is not only knowing who should be at the table to make decisions, but knowing what information they need to get on board.

I understand the interests of private investors. They want to see projects that have a high likelihood of success within a defined time frame and a business case that can overcome the concerns of opponents. At FRA, I engaged with foreign investors and I understand their interests and priorities to support UHSGT in the United States. I met with numerous foreign delegations to learn about their HSR projects and my safety staff gained important lessons learned from site visits to China, Japan and elsewhere. This means I can help WSDOT determine what the project would need to attract the interest of international HSR investors.

I also assisted in the implementation of FRA’s award of more than $3 billion for the initial segment of CAHSR. We worked closely with the CAHSRA and Governor Jerry Brown, whose support was essential to getting the project off the ground.

**Q What is your approach to managing an integrated team successfully?**

Partnering is essential for any project. This means a strong partnership with WSDOT as well as our team individuals and firms. My approach to team management is based on communication, a shared understanding of goals and a shared passion for the project. We have existing relationships and a successful history working with all our subconsultants. The integration of this team truly started happening months ago on our first phone call about the project. As project manager, I will nurture that momentum.

**Q What are your thoughts on both the hurdles and opportunities for this study?**

The greatest opportunity is to make a case for continuing public and private financial support. Communicating the economic and transportation benefits to key stakeholders and public entities will be essential. One of the challenges will be developing ridership projections in which investors have confidence. This means a level of detail and an approach that meets international standards for such studies.

The other key challenge is developing an alignment that is technically feasible and cost-effective. A good alternative analysis will then inform subsequent environmental studies and higher-level cost estimates. The ridership and revenue study will also help determine the amount of capital and/or operating cost that might be financed based on fares alone, and the likelihood that public subsidies or other sources of revenue will be needed.

**Q What are your thoughts on the impact a future UHSGT system can provide?**

This project is an exciting opportunity to improve communities, grow the economy, and open doors for people and businesses to prosper across an entire region in a sustainable, future-focused way. When we met with Microsoft about this project, they talked about the advantages UHSGT could offer them. Imagine the impact of a large company in Seattle able to access workforce in Vancouver that is only an hour away, or a person able to live in a rural community outside of Portland, but commute daily to Seattle. And that is just one aspect. Others include job growth, land use improvements, access to housing, and enhancements to international collaboration with Canada, to name a few. This is exciting!
Karen Hedlund’s Project Examples

### Amtrak Gateway Program

<table>
<thead>
<tr>
<th>Role: Strategic and Financing Team Lead</th>
<th>Dates: 2015–present</th>
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<tbody>
<tr>
<td>Karen is providing strategic and financing advice to Amtrak and the Gateway Program Development Corporation (GDC) as they develop their financing and institutional plan for this $23 billion program. The program is an integrated group of rail infrastructure projects along the NEC between Newark and New York. The NEC is the most heavily used passenger rail line in the U.S. in terms of ridership and service frequency, with 200,000 passengers and 450 trains per weekday. Karen initially led a multi-jurisdictional team to create an innovative governmental structure to develop the project, including formation of a New Jersey non-profit corporation, whose trustees include representatives of New Jersey Transit (NJT), the New York State Department of Transportation and Amtrak. She is now leading a consultant team to develop applications for federal financing support under TIFIA and RRIF.</td>
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#### Karen’s Roles and Responsibilities:
- Leading a multidisciplinary team of rail and financial analysts.
- Providing ongoing coordination with GDC officials, Amtrak, NJT, the Port Authority of New York and New Jersey (PANYNJ) and USDOT’s Build America Bureau.
- Providing federal perspective on credit issues from experience as general counsel and deputy administrator of FRA, including membership on the USDOT Credit Council.

#### Relevance to this Project:
- Providing project management of multidisciplinary team
- Providing local agency coordination with NJT and PANYNJ
- Providing coordination with USDOT Build America Bureau personnel
- Quickly pulling resources for emergent tasks and specialty skill sets
- Coordinating with representatives of Gateway stakeholders
- Managing project budget, schedule and scope of work

### City of Chicago O’Hare Express System

<table>
<thead>
<tr>
<th>Role: Strategic and Technical Team Lead</th>
<th>Dates: 2016–present</th>
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<tbody>
<tr>
<td>Karen is leading a team of technical and strategic advisors in developing and implementing a public-private partnership (P3) procurement for a 17-mile express rail service between downtown Chicago and O’Hare International Airport. Relying entirely on developer investment and financing, qualified teams include a consortium that will develop existing freight rail right of way connection to a downtown commuter rail station. A second proposal from Elon Musk’s Boring Company would involve transporting passengers on high-speed, 16-passenger “skates” through a bored tunnel from downtown to O’Hare.</td>
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#### Karen’s Roles and Responsibilities:
- Leading a multidisciplinary team of ridership analysts, engineers and financial analysts.
- Providing ongoing coordination with the City of Chicago, the Chicago Infrastructure Trust, and the Chicago Department of Airports and its financial and legal consultants.
- Providing advice on P3 procurement issues.

#### Relevance to this Project:
- Providing project management of multidisciplinary team
- Providing local agency coordination
- Quickly pulling resources for emergent tasks and specialty skill sets
- Managing project budget, an accelerated schedule and scope of work
- Managing change throughout the life of the project

### FRA High-Speed Rail Program and RRIF Loan Program

<table>
<thead>
<tr>
<th>Role: Deputy Administrator</th>
<th>Dates: 2010–2014</th>
</tr>
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<tbody>
<tr>
<td>As deputy administrator of the FRA, Karen oversaw the implementation of the $12 billion HSR grant program. Under her leadership, FRA approved applications for grant funding for high-speed and intercity passenger rail systems in 32 states and the District of Columbia, including Washington. Karen also oversaw the administration of the FRA RRIF Program, including evaluations of loan requests to finance proposed private passenger rail connecting Las Vegas, Nevada, and Southern California and connecting Miami and Orlando, Florida.</td>
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</table>

#### Karen’s Roles and Responsibilities:
- Overseeing a multidisciplinary agency team of planners, safety specialists, lawyers and finance advisors.
- Advising the FRA administrator and secretary of transportation on grants contracts with Amtrak and various state rail agencies.
- Testifying before the U.S. House Subcommittee on Rail on contract administration, including the $3 billion grant to CAHSRA.
- Assisting state agencies with negotiation of service outcome agreements with host railroads.

#### Relevance to this Project:
- Providing project management of multidisciplinary team
- Overseeing Amtrak and local agency relationships
- Advising on public and Congressional communications
- Reviewing grantees’ project budgets
- Managing change throughout the duration of the grant processes

### B. Familiarity with Relevant State and Federal Regulations

Karen brings a strong understanding of HSR planning, having led the implementation of HSR in compliance with USDOT, working closely with program management and safety staffs charged with certifying safety on new alignments. Karen has also participated in meetings of the Engineering Task Force, which established the requirements of Tier 4 HSR equipment. She oversaw the RRIF, including review of applications for proposed HSR in Nevada and Florida. Her current efforts include working with the Build America Bureau in the Office of the Secretary of Transportation, which is implementing department
loan programs, including RRIF and TIFIA. Karen’s legal background in advising state DOTs across the country provides insight into state-level procurement and financing issues. She is also assisting WSDOT in the application for funding under the FRA Consolidated Rail Infrastructure and Safety Improvements (CRISI) grant program, including funding for a service development plan on the Cascadia Corridor, which is required for FRA grant funding. She is also working on the Texas HSR program and a proposed HSR project connecting Los Angeles and Las Vegas.

C. Karen’s Proven Project Management Abilities

<table>
<thead>
<tr>
<th>Amtrak Gateway Program</th>
<th>Role: Project Manager Dates: 2015–present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karen is providing strategic and financing advice to Amtrak and the GDC as they develop their financing and institutional plan for the $23 billion Gateway project, an integrated group of rail infrastructure projects between Newark Penn Station and Penn Station New York.</td>
<td></td>
</tr>
<tr>
<td><strong>Schedule:</strong> Karen oversaw WSP’s funding and financing team in preparing submissions to FTA and the Build America Bureau. The submissions were delivered on a set schedule to permit initiation of project design and construction by a certain date.</td>
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<tr>
<td><strong>Scope:</strong> Karen ensured that all WSP work products were developed within the parameters of the budget, schedule and scope as determined by and in close collaboration with the client.</td>
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<tr>
<td><strong>Community and Stakeholder Engagement:</strong> Karen supported development of strategic messaging for the CEO of the GDC to use in public board presentations and communications with congressional delegation and department of transportation representatives.</td>
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<tr>
<td><strong>Budget:</strong> Karen worked closely with Amtrak to establish realistic budgets for various phases of the work on this complex project as it has developed over time.</td>
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<tr>
<td><strong>Change:</strong> Karen and the team assisted GDC in responding to new initiatives and policies as the Obama administration transitioned to the Trump administration.</td>
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<tr>
<th>City of Chicago O’Hare Express System</th>
<th>Role: Project Manager Dates: 2016–present</th>
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<tr>
<td>Karen is leading a team of technical and strategic advisors in developing and implementing a P3 procurement for a 17-mile express rail service between downtown Chicago and O’Hare International Airport for the City of Chicago.</td>
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</tr>
<tr>
<td><strong>Schedule:</strong> Karen worked with WSP engineering and program development teams to develop a delivery schedule that enabled the City of Chicago to implement an innovative procurement process on a highly accelerated basis. This process resulted in a schedule savings of more than six months.</td>
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<tr>
<td><strong>Scope:</strong> Karen worked with the City to define the required engineering and program development tasks, which had parameters that evolved over time.</td>
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<tr>
<td><strong>Community and Stakeholder Engagement:</strong> Karen assisted in coordination with the Department of Airports and negotiations with host railroads.</td>
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<tr>
<td><strong>Budget:</strong> Karen worked closely with City and WSP staff members to develop an accurate budget and avoid budget issues. The team met all of the City’s expectations and required services within the agreed-upon budget.</td>
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<tr>
<td><strong>Change:</strong> Karen helped shape a procurement process that embraced two different technologies and incorporates both a traditional commuter railroad solution as well as an innovative tunneling proposal offered by Elon Musk’s Boring Company.</td>
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<tbody>
<tr>
<td>Karen served as deputy administrator of the FRA, delivering a range of projects in support of major transportation projects.</td>
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<tr>
<td><strong>Schedule:</strong> Karen was charged with administering HSR grants and helped ensure that grantees would be able to complete their projects by the deadline set under the American Recovery and Reinvestment Act (ARRA).</td>
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</tr>
<tr>
<td><strong>Scope:</strong> Karen worked with program staff members to develop scopes of work for third-party consultants advising on HSR grant applications and RRIF loan applications. Karen managed consultants to ensure they stayed within the agreed-upon scope.</td>
<td></td>
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<tr>
<td><strong>Community and Stakeholder Engagement:</strong> Karen assisted state and local grantees in negotiating service outcome agreements with host Class I Railroads for improvements funded with ARRA. She also served as the USDOT representative on the National Freight Advisory Commission and defended the HSR Program in testimony before the House Railroad Subcommittee.</td>
<td></td>
</tr>
<tr>
<td><strong>Budget:</strong> Karen oversaw legal and technical consultants to the FRA RRIF program to ensure that the work was completed within budget and schedule while meeting FRA’s needs for input and advice.</td>
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<tr>
<td><strong>Change:</strong> Karen helped FRA set up a new program to implement $10 billion in grants appropriated under ARRA and subsequent appropriations. Up until that time, FRA was not primarily a grant-making agency. Karen helped to quickly set up procedures and human resources to implement the program.</td>
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D. Karen’s Professional Licenses and Accreditations

**Member of the Bar:** District of Columbia (2007); California (1989).
The success of this UHSGT Study requires a strategic, creative and experienced team that will work collaboratively with WSDOT staff to deliver a business case analysis that resonates with public and private stakeholders across the region. Our staffing decisions are based on:

- Business case experience for major infrastructure improvements involving ridership and revenue forecasting, funding, P3, governance and project delivery
- Experience developing and implementing national and international UHSGT projects, bringing a wealth of best practices to WSDOT
- Relationships with private and public stakeholders and ability to bring these key players together, including Microsoft, WSDOT, ODOT, Canada’s Ministry of Transportation and Infrastructure and the FRA
- Experience addressing similar planning challenges and stakeholder coordination on WSDOT and other high-profile transportation projects
- History collaborating together on UHSGT improvements
- Leadership in cutting-edge transportation technologies

As PIC, David will work closely with WSDOT and Karen Hedlund to ensure staffing plan requirements are met in a timely manner and that expectations from WSDOT are clearly communicated to the entire study team. He will also take an active role as the local WSP representative during key team and advisory group meetings. David’s engagement in the Pacific Northwest HSR vision began in 2010, when America 2050 asked him to participate in a two-day workshop that included public officials and transportation interests. The workshop included a series of focused discussions to understand the opportunities and implications of HSR in Cascadia and testing an HSR scenario in Cascadia against the land use and station area development scenarios, economic strategies and transportation connections required to optimize HSR investment.
Nathan Macek, AICP  Business Case Analysis Lead, Funding & Finance Models, Risk & Value for Money

Nathan has extensive experience performing financial analysis, funding studies, policy analysis and planning studies for transit systems, including major rail programs. He has conducted cash flow modeling and uncertainty analyses of capital and operating funding, applying innovative financing approaches to address the budgetary challenges public agencies face. Nathan has created integrated financial models to evaluate funding, alternative project delivery and innovative financing for projects worldwide. He is a specialist in developing financial capacity analysis plans supporting FTA New Starts grant applications, including five projects awarded Full-Funding Grant Agreements (FFGAs) worth more than $7.2 billion.

<table>
<thead>
<tr>
<th>Project</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Amtrak, Gateway Program Development</strong>&lt;br&gt;Funding/Financing Plan, New York, NY (2013–ongoing)&lt;br&gt;Led the task to develop funding and financing plans for Amtrak’s multi-billion dollar Gateway Program, which includes replacing the Hudson Tunnel and Portal North Bridge. He performed a comprehensive review of funding and financing options; developed a financial model to evaluate funding, financing and delivery options; and provided guidance on emerging federal passenger rail funding and financing legislation. He is managing the team developing financial plans for federal grants and loans.</td>
<td><strong>Amtrak, Baltimore &amp; Potomac Tunnel Program Development</strong>, Baltimore, MD (2013–ongoing)&lt;br&gt;Managing study to review funding/financing options, economic analysis and governance and organizational design options to replace and upgrade Amtrak’s NEC through Baltimore. The 144-year-old tunnel also serves Norfolk Southern freight trains. The study will investigate federal, state and local funding and financing options, including funds from the FTA and FRA and federal RRIF loans.</td>
</tr>
<tr>
<td><strong>TCRP G-15: Public Transportation Resource for Small- and Medium-Sized P3 Initiatives</strong>, Washington, DC (2015–2017)&lt;br&gt;Project manager and principal investigator who researched best practices and lessons learned by public transportation providers on small- and medium-sized P3s. The study examined innovative partnerships between transit agencies and the private sector to improve existing services and/or more efficiently deliver new services or facilitate, addressing how the mix of partnerships is quickly evolving to include collaboration with technology companies, last-mile transportation providers and others.</td>
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**Understanding of WSDOT and other Relevant Regulations/Procedures:** Nathan understands the rigor of financial planning for major rail programs, particularly the balance required to pursue federal grants and loans. He has investigated funding sources for numerous rail projects, aligning creative funding mechanisms with project funding needs to address the budgetary challenges faced by project sponsors. He is familiar with local statutes affecting possible value capture mechanisms.

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Michael Colella  Business Case Analysis Lead

Michael has more than 20 years’ experience in commercial, economic and planning issues for clients around the world. Before joining SDG, he held a number of senior roles at Transport for London (TfL), including secured funding for the £15 billion Crossrail project, changes to the $66.4 billion HS2 project, and developing TfL’s first 10-year business plan.

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<tr>
<td><strong>Department for Transport, West Coast Partnership (WCP) HS2 Shadow Operator Assessment</strong>, UK (2017–ongoing)&lt;br&gt;Project lead in assessing the future roles/responsibilities, governance and project control assessment needs to develop the HS2 future operator requirements as part of the wider privatized West Coast Partnership rail franchise procurement. Activities include establishing the optimum balance of responsibilities between the HS2 future operator and the HS2 delivery company constructing the new high-speed line, as well as how to ensure a rigorous decision-making and assurance process given the objectives of the various organizations.</td>
<td><strong>Transport for Wales (TfW), Wales &amp; Cross Border Rail Services, Wales, UK (2016–ongoing)</strong>&lt;br&gt;Senior advisor to TfW and the Welsh government on securing approval of the devolution of rail services in Wales and the transfer of Cardiff Valley Lines infrastructure from Network Rail. He is providing commercial and technical advice on ensuring the terms of the transfer of responsibility. He is supporting development of plans for the transformation of Cardiff Valley Lines into South Wales Metro scheme, including assessing alternatives/business cases assessment, developing station investment packages, and identifying infrastructure maintenance strategies.</td>
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<td></td>
<td><strong>Metrolink, Regional Express Rail (RER) Business Case, London, UK &amp; Toronto, ON, Canada (2017)</strong>&lt;br&gt;Project director leading the development of a new business case guidance framework for the regional transportation authority as well as applying it to the transformative $15 billion RER program of works. Assessing the economic, commercial/financial, operational and societal impacts of the various key components to ensure that an optimum package of works (including electrification of some lines, all-day service, new stations, new trains and commercial development) is implemented and risks understood.</td>
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</table>

**Understanding of WSDOT and other Relevant Regulations/Procedures:** With experience in both public and private sectors, planning, strategy and major projects, Michael has extensive experience in understanding client needs and can develop realistic practical solutions to secure senior management approval and stakeholder buy-in.
**Angie Thomson** Communications and Outreach Lead

Angie has more than 20 years of professional experience, including community outreach, public involvement, facilitation and science education. She brings experience facilitating conversations about passenger rail plans and facilities around the Puget Sound region and is skilled in building relationships with stakeholders. Angie's transportation expertise allows her to balance of “high-tech” and “high-touch” methods to engage the public and translate technical information into a form understandable by the public.


Angie supported this feasibility study by convening and facilitating an advisory group of diverse stakeholders that provided input and direction on the study. She was the point of contact for Advisory Group members, facilitated group meetings and worked with the project team to define discussion topics and meeting structure. She also developed website content for the feasibility study and contributed to the final report submitted to the Washington State Legislature.

**WSDOT Rail Division, Amtrak Station Relocation, Tacoma, WA (2015–2017)**

Angie supported WSDOT to develop and implement a communications strategy for the relocation of Tacoma’s Amtrak Station to Freighthouse Square, a 100-year old building in downtown Tacoma. She helped design and facilitate a series of listening sessions, open houses, workshops and community advisory group meetings, helping the community feel part of the decision-making process. Angie also helped coordinate between WSDOT and Sound Transit to resolve project issues and move design forward.

**Sound Transit, Tacoma Trestle Track and Signal Project, Tacoma, WA (2013–ongoing)**

Angie managed communications and outreach for the replacement of the Tacoma Trestle, including developing messages, strategic communications approaches, and assisting Sound Transit in on-the-ground outreach. She helped develop a strategy to engage community members in the design process by sharing design visualizations at key project milestones. As the project moved into construction, she continued to implement the outreach strategy to ensure residents, community leaders and Sounder riders knew what to expect.

**Understanding of WSDOT and other Relevant Regulations/Procedures:** For 14 years, Angie has provided comprehensive communications, engagement and facilitation support to WSDOT. She was facilitator on the initial UHSGT Study in 2017, and brings experience facilitating and coordinating multi-agency stakeholders to help move complex transportation projects forward. Angie is a trusted advisor on WSDOT projects and skilled at bringing together what matters — technical, regulatory and policy issues, along with community values, and plans for communication and public involvement.

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**Mark Buckmaster** Ridership and Revenue Lead

Mark is an accomplished project manager with a track record of delivering successful outcomes in challenging project environments. He has been involved in numerous large-scale ridership, revenue and business case projects, including managing the development of investment grade ridership and revenue forecasts for a proposed HSR line across the High Desert Corridor in California and Nevada.

**High Desert Corridor Joint Powers Authority, Investment Grade Ridership & Revenue Study, CA/NV (2016–2017)**

Project manager for developing investment grade forecasts for the proposed HSR rail line across the High Desert Corridor. This work included analyzing the current and future size of the in-scope market for rail; assessing how much of this market HSR could capture; estimation of how much additional travel could be induced by the presence of the HSR service itself; and extensive sensitivity testing to understand key project risks.

**Massachusetts Bay Transportation Authority (MBTA), Rail Vision, US (2018–ongoing)**

Currently leading SDG’s work on the development of a long-term vision for the future of rail services on behalf of a U.S. transit agency. SDG is involved in all aspects of the work, including establishment of strategic objectives; market assessment; development of service alternatives; ridership, revenue, cost and operations assessments; and development of a practical and commercially viable implementation plan.


Managed the financial capacity assessment of Houston METRO, which involved assessing the composition of sources and uses of funds, analyzing METRO’s finances, and considering key risks regarding the future evolution of revenues and costs. SDG considered the sustainability of operations in the longer term, identifying the means and extent to which additional operating expenditure could be covered before committing to new capital expenditure.

**Understanding of WSDOT and other Relevant Regulations/Procedures:** Mark is an experienced project manager, with particular technical expertise in ridership and revenue forecasting; business case, financial and funding analysis; and strategic and regulatory advice. He has developed and applied this expertise on rail studies across the United States and internationally.
David Carol  Corridor Planning Lead

David is WSP’s U.S. lead for passenger rail and HSR services. He has served as project manager on several HSR projects, including the $2.5 billion NEC FUTURE traversing major cities in the Northeast region including Washington, DC, New York and Boston, and the New Haven-Hartford-Springfield HSR Corridor, and has supported the CAHSR Program. He prepared the original 2016 Cascadia HSR Corridor White Paper, making the case for one-hour service between the two cities. Prior to joining WSP, David led Amtrak’s Acela HSR Program, including acquisition of the Acela HSR trains and development of the HSR service.

Understanding of WSDOT and other Relevant Regulations/Procedures: David has worked for nearly 25 years on supporting the Cascades Service, helping to establish it while with Amtrak and to advance its funding and upgrading over the past decade with WSP. As Cascades has demonstrated, the key to advancing a new HSR Cascadia corridor program will be to develop broad consensus for the program objectives, engage the community — particularly the business sector — and being transparent about the benefits and costs.

Masroor Hasan  Ridership Expert Advisor

Masroor leads SDG’s Advisory practice in the United States, and has directed, managed and played key roles in many high-speed and intercity passenger rail studies nationwide. He was the project manager for SDG’s HSIPR best practices for public benefits, ridership forecasts and operating costs project for the USDOT OIG and was one of the lead authors for the ridership and revenue forecasting guidance document.


Project manager for reports describing best practice methods for forecasting ridership and revenue, operating costs and public benefits for HSIPR projects. Masroor drew from worldwide experience, reviews of publicly available documentation from HSIPR studies, and previous international studies that compare forecasting methodologies and experience. These best practice guidance reports contribute to USDOT’s development of appropriate rail planning methods. The Government Accountability Office in the US relied heavily on these reports in its recent review of the California HSR ridership and economic impact forecasts.

Understanding of WSDOT and other Relevant Regulations/Procedures: Masroor has managed and worked on a wide range of transportation projects involving intercity passenger rail, commuter rail, public transit, infrastructure financing, P3 and survey analysis. He also has a strong background in econometrics and its application to travel demand forecasting and market research.


David served as project manager of the consultant team supporting FRA in developing the Tier 1 EIS, capital program and business case for the next 50 years of improvements to the NEC. The project includes extensive intercity and commuter rail service planning, development of ridership and capital cost estimates, and outreach with the 13 railroads operating on the NEC and key federal and state officials.


David was the project manager supporting Connecticut DOT in preparing the HSIPR funding grants, approving the Tier1/2 EIS, and planning the final design and construction. David was responsible for managing the planning, design, project controls, quality assurance (QA) and strategy supporting the upgrade of the 62-mile rail line, which included new double-track and rail infrastructure, as well as new stations.

CAHSRA, California High-speed Rail Corridor (CAHSR) Program, CA (2009–2017)

David supported the project teams part-time in management and planning for the program, including preparation of costing and risk chapters of the Business Plan and serving as a member of the WSP California High-speed Train Project (CHSTP) Advisory Board. Special focus was placed on planning for implementation of the new HSR service.


SDG project manager for a business and financial plan to support Amtrak’s vision for a 30-year, multi-billion-dollar investment program to upgrade the passenger rail corridor between Washington, New York and Boston, including construction of a parallel HSR system operating at up to 220mph. The ambitious program involves infrastructure and rolling stock improvements. Masoor managed the preparation of ridership and revenue forecasts and major contributions to the development of the business plan, which reflect the greatly improved and expanded passenger rail services, including the staged introduction of a new generation of very high-speed trains.


SDG project director to develop and update a national-level air, highway and intercity passenger rail network sketch planning tool called CONNECT, which will aid multi-state rail plans and preliminary corridor feasibility studies nationwide. SDG wrote the software code to implement the CONNECT tool and developed the demand forecasting module, which enables a sketch-level assessment of the ridership and revenue associated with different levels of rail service for any HSIPR corridor in the US. The tool has been used in multi-state rail planning studies in the U.S. Southwest, Southeast and Midwest as well as for the preliminary UHSGT study for the Portland-Seattle-Vancouver corridor.

Understanding of WSDOT and other Relevant Regulations/Procedures: Masroor has managed and worked on a wide range of transportation projects involving intercity passenger rail, commuter rail, public transit, infrastructure financing, P3 and survey analysis. He also has a strong background in econometrics and its application to travel demand forecasting and market research.
Lucile Kellis  Model and Survey

Lucile is a noted expert in travel demand modeling with more than 10 years of experience managing rail projects. She is also one of SDG’s survey research experts. Her expertise includes mode choice modeling, stated preference survey design for behavioral analysis, and willingness to pay estimation techniques. Lucile has an extensive understanding of intercity rail ridership forecasting principles. She has recently managed major HSR ridership and revenue studies and an FRA rail demand forecasting methodology.

Texas DOT, Dallas–Houston HSR Tier 1 Ridership & Revenue Forecasts as Part of the Dallas–Fort Worth Core Express Service, TX (2015–2017)

Project manager for developing of ridership and revenue forecasts for a proposed HSR line between Dallas and Houston. This work included analyzing the current and future size of the “in-scope” market for rail; assessing how much of this market HSR could capture; and estimating how much additional travel could be generated by the presence of the Dallas to Fort Worth Core Express Service and for a variety of alternatives.

Understanding of WSDOT and other Relevant Regulations/Procedures: Lucile is an expert in discrete choice modeling and is leading SDG’s transportation survey capability in North America, managing a range of rail projects requiring rigorous application of econometrics skills. She has extensive experience in passenger rail demand forecasting and lead survey efforts of ridership and revenue forecasting studies.

Ken Zatarain  Alignment/Station Area

Ken joined WSP in 2017 following a 37-year career at TriMet in Portland, Oregon. With WSP, Ken leads the CAHSRAs multimodal station access planning program and plays a key role in station area planning. During his tenure with TriMet, Ken directed short- and long- range planning, scheduling, and performance analysis and was instrumental in developing a medium-size bus operation into a multimodal network that has become synonymous with smart growth.

CAHSRA, California High-speed Rail Corridor (CAHSR) Program, CA (2017–ongoing)

Lead access planner preparing estimates for mode of access/egress at stations based on ridership modeling and consultation with station cities and other stakeholders. His responsibilities include developing plans and program of projects in station areas for transit, pedestrian, bicycle, demand management and parking. These will inform station size, and parking and access needs. Ken is working in partnership with state agencies to identify potential funding sources for access improvements in station areas.

Understanding of WSDOT and other Relevant Regulations/Procedures: Following a long career with a public transit agency, Ken brings a strong understanding of projects from the owner’s perspective. He brings comprehensive understanding of planning major transit systems in collaboration with public and private stakeholders and jurisdictions.

TriMet, Director of Service Delivery, Service Planning and Scheduling, Portland, OR (2008–2017)

Director of transportation who worked closely with local jurisdictions and stakeholders to prioritize transit investments and be responsive to their long-term planning goals. Developed a partnership approach that ties transit investments to jurisdictions’ actions that encourage transit-supportive land uses, parking policies and street design.

TriMet, Director of Transportation Planning, Portland, OR (1998–2008)

Director of transportation who worked with government partners to formulate transit’s role in shaping long-range regional growth. Ken led the evaluation, design and modification of transit services, including successfully restructuring the bus network to integrate five light rail lines and two streetcar lines into the regional transit system. This involved the design of intermodal connections at stations, park-and-ride strategies, pedestrian/bicycle access, and demand management programs. He directed preparation of the five-year TriMet Transit Investment Plan for service and capital improvements in partnership with Portland-area government and agencies.
A. Quality Assurance/Quality Control Processes

WSP's history of successful WSDOT projects stems from our personal commitment to quality projects delivered on time and within budget—the principle at the heart of our project management system. We have consistently demonstrated this commitment on several WSDOT programs and projects in our more than 40-year working relationship, including the Alaskan Way Viaduct and Seawall Replacement Program, Amtrak Freighthouse Square Relocation, Washington State Ferries Ridership Forecasting Study and I-90 Peak Use Shoulder Lanes.

QA/QC Program

WSP has earned ISO 9001:2008 certification for our QA/QC processes, demonstrating that quality is a core firm value. Our rigorous QA/QC process, shown in Exhibit 5, benefits our clients by ensuring that schedules are met, reducing expenses by avoiding rework, and enabling continuous improvement to maximize efficiencies.

Exhibit 5: WSP’s QA/QC process.

Karen Hedlund will oversee the QA/QC process for this project. Ed Reynolds in our Seattle office will serve as technical editor for all submittals to ensure consistency and clarity across all documents.

We are committed to verifying that all work products meet WSDOT’s quality expectations. Our QA/QC process includes interim review of products as they are developed, and a series of formal review procedures conducted during preparation of major deliverables. We also closely review subconsultant deliverables. Our reviews confirm that deliverables meet the requirements of the scope of work and applicable guidelines, and include independent checks by senior staff members with specific and relevant expertise in the appropriate subject areas. Through the ongoing quality process, we share lessons learned with staff members to allow for a continual increase of knowledge and improvements to deliverables.

Specific QA/QC protocols include:

- Preparation of a quality management plan as part of our project management plan at the outset of the project to define the project criteria, standards and requirements. The plan identifies the senior independent reviewers and schedules the formal QC reviews.
- Previous lessons learned advice to the project team relative to the specific needs of the current project.
- Periodic progress reviews to ensure deliverables are developed according to expectations.
- Independent deliverable reviews by senior staff members of all items prior to submittal to WSDOT.
- Accuracy checks for grammar, spelling, readability and completeness on all reports.
- Validation of data, calculations, and assumptions on modeling, design plans and cost estimates by an independent senior reviewer. We submit final designs, models and cost estimates with a brief memorandum summarizing assumptions and resolutions to WSDOT review comments.
- Point-by-point responses to each WSDOT comment provided on draft deliverables. We create and maintain a detailed comment resolution matrix. If any comments
require further coordination with WSDOT to resolve, we typically schedule a comment resolution meeting to discuss that subset of comments and ensure we have clear direction on the changes to be undertaken. The matrix provides point-by-point responses to each comment. We then submit this matrix with each deliverable to give WSDOT a quick, systematic tool to validate that all comments were adequately addressed and incorporated.

- Incorporation of QC review of deliverables into the project schedule schedule.
- Identification of an experienced quality manager who will ensure the team is following established QC procedures.

### Tracking Systems for Monitoring Budget and Scope

To monitor our project’s scope, budget and schedule, WSP uses an Oracle©-based automated management information system that will provide Project Manager Karen Hedlund with biweekly updates on the status of staff hours, labor costs, direct expenses and subconsultant costs. This information will be organized based on the project work breakdown structure (WBS). Karen can review progress online at any time, with data updated weekly. The system distributes financial reports biweekly to facilitate regular tracking of expenditures as they pertain to specific tasks of the scope. These ongoing monitoring activities help manage the scope and budget and expedite invoice preparation and accuracy.

At key points throughout the project, WSP will initiate a project review that includes scope, schedule, and budget status as well as the expected cost to complete each task order, which we will share with WSDOT as desired. If tasks begin to lag, we will identify the causes and take corrective action to keep the task on schedule. Project schedules will be updated and modified as the project progresses. It is during these reviews that potential budget issues can be addressed and action can be taken to keep the project on time and within budget.

### Scheduling Program/Process

WSP is experienced with a variety of scheduling software, such as Primavera Project Planner (P3, P3e/c and P6), Microsoft Project and WSP’s customized project management software for earned-value tracking.

Karen’s scheduling process begins by confirming project delivery expectations with WSDOT. With these target dates, Karen and the project staff will create a task-order-based schedule that identifies appropriate project milestones, interim deliverables, task durations, predecessor and successor tasks, and critical path items. Karen is experienced in developing an effective schedule, with appropriate logic and flow between tasks to facilitate team communication, coordination and progress monitoring. Schedules are typically updated periodically or as project changes warrant. Karen and other key staff members are using Primavera P6 and a similar scheduling process on the the Amtrak Gateway Program.

### Internal Team Coordination

WSP recognizes that coordination and communication among team members are essential components of successful project delivery. Karen will regularly meet with project team members to coordinate project tasks, review the scope of work, resolve issues and develop proactive strategies to keep the project moving forward smoothly. These meetings allow her to meet with the task leads to verify that we are following the project’s scope of work and address any requested work that may be out of scope. Project team meetings will include schedule updates and progress, action item development and monitoring, and technical issues/events.

We have been working closely with our major subconsultant, SDG, during the proposal phase with great success. We have already used virtual working sessions to discuss our project approach, schedule, staffing and other proposal issues, and plan to continue this spirit of collaboration as the project kicks off.

During project delivery, we will use a secure, web-based information sharing site that allows all team members — including WSDOT staff members and team subconsultants —to access a common set of electronic documents. This portal can be used to exchange information, submit draft documents for review, submit agency comments for our technical staff members, and maintain a library of all project deliverables.

The site will be the main repository for the project management plan, risk management plan, deliverable templates and quality management plan, enabling easy
access for all team members. WSP has a couple of web portal options and will work with WSDOT to identify the preferred tool at the onset of the project. These tools have been effective in several recent WSP-led WSDOT projects, including the SR 432/SR 433 Intersection, SR 502 Corridor Widening, and Alaskan Way Viaduct and Seawall Replacement Program.

**Interaction with Client and Stakeholders**

**Client Interaction**

Karen will be the primary point of contact for WSDOT during project performance and will ensure WSP is efficiently executing the day-to-day project management. She will facilitate regular project status meetings with WSDOT, operating with a “no-surprises” approach. A successful endeavor will involve constant and honest communication with WSDOT. We recommend a regular check-in, whether as part of the team coordination or a separate discussion, to address project progress; issues needing resolution; and upcoming work, including immediate contact for critical issues.

**Project Kick-off:** Karen will work with Jason Beloso to kick off this contract with a workshop for key project constituents and consultant staff. This workshop will define the project objectives, roles and responsibilities, potential roadblocks, lessons learned from the past study, and an initial action plan. With a shared understanding of goals and responsibilities, delivery efficiencies can be established early and carried throughout the project.

Furthermore, we understand the WSDOT negotiation process and are committed to working within that system by developing a clearly defined scope of work and reasonable budget. WSP has an approved audited overhead rate on file with WSDOT to accelerate project negotiations. To advance negotiations, we have presented herein our team organizational chart, work plan and reporting structure to WSDOT for approval. We will also collaborate with WSDOT to identify any efficiency that can be applied to create a streamlined work plan that meets the project’s mission, identifies success factors, achieves major milestones, and addresses any known issues.

**Stakeholder Interaction**

Dave Warner, as the PIC for this project, will be a hands-on participant, given the high visibility of this study and complexity of public and private stakeholders that have contributed funding to advance the business case analysis. Dave is skilled at anticipating WSDOT and local stakeholder needs and is blocks from the Goldsmith Building should short-term issues arise that need immediate resolution. He will be especially engaged with the Steering Committee and Advisory Group based on the desire to have a deep and productive conversation with these stakeholders leading toward a coalition for progressing UHSGT.

**Communication Tools**

- Environmental strategy has more than 20 years of experience supporting WSDOT. Angie Thomson is adept at scaling communication strategies and tools to specific stakeholders:
  - Visual identities and creative services
  - Websites and social media
  - Outreach events and online open houses
  - Advisory Group support
  - Media relations

Communications and Outreach Lead Angie Thomson will provide strategy and implement communication and engagement plans for the Steering Committee and Advisory Group. To build momentum for the UHSGT, it is essential to build a strong and transparent line of communication with these groups. Karen, Dave and Angie will positively influence project outcomes by:

- Supporting regular, transparent communication opportunities
- Listening and understanding stakeholder concerns
- Developing and analyzing new ideas offered by stakeholders
- Striving to gain informed consent on project objectives and solutions
- Tracking concerns, communications and corresponding resolutions
To advance the vision for UHSGT within Cascadia, the WSP team will develop a robust business case analysis including a detailed corridor planning study informed by an enhanced ridership evaluation, and input from regional governmental and business leaders. It will provide decision-makers with a more reliable estimate of technical feasibility, costs and potential project revenues, as well as economic benefits to the region. This information will then give them a basis to determine whether to invest in the next stage of project development. Our team will deliver a work plan and study work product to be used at the second annual Cascadia Conference in British Columbia in October 2018, and the 2019 Washington Legislative Session.

A. Development of the Work Plan

The WSP team's proposed work plan is illustrated in Exhibit 6. Our approach is grounded by three principles for success:

1. Efficiently leveraging our team's strategic and technical experience delivering similar tasks needed to meet the study objectives;
2. Effective programing of discussion topics with the Advisory Group, including governance, technology, and financing and funding; and
3. Integrating the progression of the work with key milestones that provide opportunities for enhanced dialogue and buy-in for the project.

Exhibit 6: The WSP team work plan to deliver a study to be used at the 2018 Cascadia Conference and the 2019 Legislative Session.
**Decision-Making Process**

We envision the work plan approval to be a two-step process. First, WSDOT must review and approve the proposed work plan. To expedite the schedule for WSDOT approval, we have proposed a detailed work plan for consideration and are committed to making refinements prior to Notice to Proceed (NTP). Second, we will seek review of the work plan by the Steering Committee of the Advisory Group. This Steering Committee would include one representative from each of the governments of Washington state, Oregon and British Columbia, as well as one each from the business, labor and environmental communities.

As the work progresses, we anticipate that issues may arise that require internal team decisions, WSDOT approval or Advisory Group input. Issues requiring WSDOT approval will be identified at the earliest possible times by our project manager, Karen Hedlund, discussed with WSP internal task leaders accordingly, and then presented to WSDOT staff. We will also seek input from discussions with Advisory Group members, as appropriate. Our team is accustomed to evaluating options and recommending the best path forward so that decision-makers can make sound decisions.

**Elements of Proposed Work Plan**

1. **Business Case Analysis**

The 2018 Ultra High-Speed Ground Transportation Study prepared for WSDOT (2018 Study) examined, at a high level, the potential for the development of UHSGT on five conceptual north-south corridors. It also used FRA’s CONNECT to estimate the identified rail corridors and network performance for public benefits. As recognized in the 2018 Study, CONNECT is not a substitute for detailed corridor and network planning. The estimates of ridership, revenue, capital and operations and maintenance (O&M) costs, and public benefits presented in the 2018 Study are only order-of-magnitude estimates.

The WSP team will build on the research and high-level financial and economic analysis in the 2018 Study by providing a business case analysis of UHSGT in the Cascadia Corridor based on a “next-phase” corridor planning study informed by an enhanced ridership evaluation described in detail below. Our business case will provide:

- A rationale for implementing UHSGT as a catalyst for regional economic growth and integration across the Pacific Northwest, including input from our business and governmental partners regarding the transformative potential of one-hour regional service and options for building regional consensus to invest in UHSGT
- Projections of ridership and transformative economic impacts resulting from the paradigm of one-hour service between Seattle and Vancouver
- Definitions of the service attributes, route and stations that best support the investment in UHSGT
- Options for funding UHSGT from a range of possible sources
- Potential governance models

Our study effort will provide a higher level of certainty about the project economics, including whether there is a sufficient business and tourist market to generate the revenues necessary to cover a substantial portion of the cost of building and operating a high-speed link between Seattle and Vancouver, and/or between Portland and Seattle. We will also examine potential additional sources of revenue, including joint use of right of way and “value capture” from development surrounding stations or induced by the availability of high-speed connections between major employment centers. (Existing legal limitations on accessing such revenues will be considered.)

The UHSGT business case will build on the experience of other successful advanced rail projects world-wide to identify critical success factors, including:

- Broad consensus on the importance of the project to the economy of the region
- Agreement on cost sharing among stakeholders
- Bipartisan leadership by governmental officials
- Creation of effective multi-jurisdictional governance structures
- Dedicated sources of public and private funding, as required

We will seek to determine whether UHSGT can bring about the transformative integration of the Cascadia Corridor, serving and supported by some of the world’s largest companies, necessary to fund the new system. This will be achieved by:

1. Analyzing the business and tourism market and transformative potential of the Cascadia Corridor.
2. Determining the mix of service (frequency and travel time) and markets that could generate revenues from fare box, and related development necessary to support the new system.

3. Using that information to inform governance issues: What is the structure—political, financial and operations—necessary to bring the business case to fruition?

2. Corridor Planning
   a. Next Phase Corridor Planning Study

The business case analysis of UHSGT will be grounded in the following elements of corridor planning:

**Conceptual Corridor Design Analysis:** Although this study will remain technology-neutral, technology differences will require assessment for consideration in the ridership analysis. Our approach will consider a range of technologies to accommodate projected ridership demand and the service levels needed to meet that level of demand. These technologies can then be evaluated based on alignment requirements and costs, operational needs of UHSGT, station design and locations.

Options range from a fully dedicated alignment with its own infrastructure to sharing tracks using existing infrastructure at ends of the line. UHSGT also will be compared to more incremental improvements to the Cascadia rail corridor. The Japanese Shinkansen (proposed for the Texas Bullet Train project) runs on an entirely dedicated right of way, which enables high frequency of service to accommodate heavy passenger levels. Deployment of a non-standard gauge rail technology, e.g. maglev or hyperloop, would also require a dedicated alignment. In addition, Hyperloop would also require an alignment minimizing curves and elevation changes. CAHSR is developing a blended system at its “bookends” on the San Francisco Peninsula and in the Los Angeles area that includes system improvements to existing alignments, such as electrification, passing tracks, and grade separations.

**Station Locations and Service Plan Scenarios Relative to Market Demand.** We will develop several scenarios to evaluate the tradeoffs among station locations, alignment options and service operating patterns. For potential station locations and service scenarios relative to ridership and operating cost, we will evaluate ways to balance speed of travel with accessibility offered by the number of intermediate stations along the line. For example, providing more intermediate stations between major cities will increase end-to-end travel times, but will also increase accessibility of the line for potential customers, and potentially enhance public support. Some lower-demand stations could have less frequent service, with only some trains stopping at those stations and allowing faster end-to-end travel times.

Each HSR station is a major opportunity to develop or redevelop urban places. International examples demonstrate that HSR stations can be a catalyst for improved urban environments, including the station itself, as well as new development around the station, including streetscapes and public spaces that improve access to the station. This development around stations can also serve to stimulate economic growth and generate funding streams to help pay for UHSGT capital costs. This aspect of the line’s benefits should also be considered in station location decisions.

**Analysis of International HSR and U.S./Canadian Infrastructure Projects:** International comparison projects tend to be of a larger scale and have been in operation for many years, but can offer valuable insights for the U.S. and Canada. Our work will include a discussion of the integrated organizations that are often found in Europe.

We will also look at the range of commercial approaches and performance for international stations on the High Speed 1 line (Channel Tunnel Rail Link) in the United Kingdom, including commercial aspects of real estate development and station retail concessions.

**Projected Transportation System Market:** We will review historical trends in travel along the corridor local and regional land use, transportation, and economic development plans for corridor cities, regions, the state and the province. This task will also include a review of available travel data for land and air travel patterns and volumes between potential UHSGT cities/regions. It will assess the relative door-to-door travel times of UHSGT compared with automobile and air travel. It will also include a measure of
travel time reliability of UHSGT compared to historical data for other modes, including roadway and airport congestion.

**Operational Models that Enhance Integration and System Efficiency:** Our approach will be to consider all aspects of a passenger’s journey need in planning of high-speed lines. The shorter amount of time on board the train made possible by HSR is only one component of overall travel time, which includes access time between the origin and the station, waiting time, and egress time to the destination. We will address a variety of multimodal connections at the station, including walking; biking; transit; pick-up/drop-off and parking; and new services and technologies, such as ridesharing and electric/autonomous vehicles.

Based on our experience on the CAHSR program, we will offer ways that each community with a HSR station can develop a station area access plan. Intercity rail stations can become transportation centers that generate a significant number of trips for local transit systems and encourage development of new services that connect to the station.

**Analysis of the Economic Environment and Structural Changes to the Relationship between Cascadia Subregions:** In connection with structural analysis of the Cascadia megaregional economy, as described in Section 4, below, analysis will be focused on the particular benefits of UHS GT to the megaregion in the areas of innovation technology, communications, development of green/sustainable technologies, as well as to more traditional regional export-oriented sectors, such as aircraft manufacturing, with possible extensions to other related manufacturing of smart AVs and most up-to-date UHS GT vehicles and equipment itself. The effort should include direct interviews/discussions with leaders in these various sectors, including representatives on the Advisory Group.

b. Enhanced Ridership Analysis
The prior ridership analysis undertaken in the corridor utilized the FRA’s CONNECT model, a sketch planning tool that estimates the overall performance of user-defined HSIPR corridors and networks. CONNECT was developed to provide an analytic basis for the decision-making process in the early stages of HSIPR network planning. (WSP and SDG well understand its limitation since we were both directly involved in its development and refinements.) As recognized in the 2018 Study, CONNECT is not a substitute for detailed corridor and network planning. The estimates of ridership, revenue, capital and O&M costs, and public benefits presented in the 2018 Study are only order-of-magnitude estimates. A key objective of this study is to take the prior study’s preliminary ridership analysis to the next step, thereby developing an enhanced understanding of the potential ridership and revenue associated with UHS GT. The unique situation of Vancouver–Seattle–Portland corridor will require a customized modeling approach to understanding the potential to capture existing travelers as well as latent/induced demand that could be unlocked through the investment. This approach needs to be integrated with the analysis of economic development and future market growth potential to ensure the full potential benefits are considered in relation to the capital and operating costs associated with the investment. Our proposed approach is outlined below.

As shown in Exhibit 7, our modeling framework consists of five major steps:

1. A macroscopic economic travel activity model that will be used to evaluate the potential change in economic activity within the corridor;

2. An evaluation of the tourism potential in the region and the potential for increases in tourism demand due to the reduced travel impedance with the project;
3. An analysis of business and tourism travel potential, highlighting the baseline demand and the potential unlocking of latent/induced demand from economic activity and increased tourism;

4. A travel demand and mode-choice model that will evaluate the likelihood of users choosing the UHSGT as compared to highway, air travel or existing transit modes, including sensitivity tests to key parameters (such as changes in fare, journey time, frequency, highway congestion, fuel/energy price and parking costs), and how the forecast UHSGT market share varies under each sensitivity; and

5. Financial feasibility, benefit-cost analysis and economic analysis arising from each of the prior steps, and feeding into the overall business case development.

Model Development - A Better Understanding of Potential Ridership Origin and Destination and Trip Preferences through Travel Survey and Stated Preference Survey: The travel demand and mode-choice model will be a traditional mode-split model using a generalized user cost approach, including cost for fares/fuel, parking and highway travel as well as travel time, service frequency, convenience of travel and various other parameters that are typically included in travel demand models. It will incorporate recent data and locally estimated parameters wherever possible, including:

- Multiple sources of demand data—including airport enplanements and border crossings—to provide a rigorous estimate of the current total potential market for UHSGT;
- Detailed Origin–Destination data on travelers, based on an assessment of regional travel pattern data that will be purchased for this study (such as GPS/cell phone data); and
- Outputs of the travel survey, including Stated Preference (SP) analysis, to be undertaken with existing users in the corridor. The survey will be designed, developed, hosted and analyzed by the WSDOT team, using an online panel of respondents to assess the value travelers place on different journey characteristics, and, therefore, the potential for mode shift to UHSGT.

- Sensitivity analysis. The ridership and revenue forecasts will be subjected to sensitivity tests, including alternative fare, journey time, frequency, highway congestion, fuel/energy price and parking cost scenarios. While there are no accepted models for assessing the impact of widespread use of connected and automated vehicles (CAV) on highway congestion and travel times, we will discuss the benefits of CAV to overcoming first-mile/last-mile travel impediments

Model Application - Optimizing Service Offering by Examining Maximizing Revenue Versus Ridership & Market Share Analysis: The assumptions outlined above for the generalized user cost inputs will be modified to reflect specific alignments of the proposed corridor alternatives, with variations in station locations and service programs.

The model will be applied to develop a market share analysis, including an estimate of latent demand and its sensitivity to changes in congestion, fuel/energy and parking costs.

Furthermore, the overall ridership and revenue forecasts will be subjected to sensitivity tests as outlined above, including alternative fare, journey time, frequency, highway congestion, fuel/energy price and parking cost scenarios.

For alternative fare tests, there will be a clear tradeoff between maximizing revenue and maximizing ridership. We would also note that the revenue curve (which provides outputs of the forecast revenue under different fare assumptions) tends to be relatively flat near its maximum point, so it is sometimes preferable to assume fares below the revenue-maximizing point to divert more riders from other modes, thereby generating more benefits. The output from the ridership model, as well as the macroscopic travel activity model and the tourism potential analysis, will provide input to further downstream analyses feeding the overall business case, such as the financial modeling and feasibility assessment, benefit-cost analysis and a summary of economic benefits from the investment. These items are discussed further below.

3. Additional Analysis

Some of the issues that the Request for Qualifications (RFQ) identified for additional analysis will be part and parcel
of the work described above. Additional issues we would propose to include in the study are described below.

a. Expanded Governance and Economic Framework

**Structural Growth and Shifts in Regional Economy:** A critical element in developing an understanding of the business case for investment in HSR is an analysis of historic and current trends in the economies of each region, and the potential for future shifts both with and without the development of HSR. Such economic shifts have the potential to not only impact the direct financial case of investment – through unlocking latent travel demand – but also to provide potentially significant indirect benefits which can help to drive the attractiveness of the project as a whole.

**Changes in the Regional Economy, Sectors and Industries Over Time:** A significant body of research and planning literature suggests that linking individual metropolitan areas to support the formation of larger natural economic units can capture synergies among these areas, resulting in major economic gains in competitiveness regionally, nationally and on a global scale. A particularly useful framework for understanding the potential economic benefits of UHSGT can be found in the Megaregions 2050 project. This project looked at 11 potential corridors, including Cascadia. It concluded that UHSGT would promote a unique “Ecolopolis.” Assessing the potential economic gains from UHSGT from a megaregion perspective will be one key element of a strategy to build stakeholder consensus and to support local, regional and state funding initiatives.

Several economic analysis methods will be examined to identify the most cost-effective approach. Possibilities include:

- Formal economic modeling, which can account for agglomeration economies, labor market accessibility, land use and transportation gravity models, etc.
- A deep dive into the economic structures of the individual metropolitan areas to identify economic sectors with the greatest growth potential and where sectoral synergies may be reinforced by UHSGT.

- Peer region comparisons in which similar UHSGT corridors are analyzed, including a time series analysis of economic growth effects and lessons learned.

**Benefit/cost analysis (BCA):** Economic impacts are not only related to the actual impact of the investment, but also secondary effects related to the investment. An estimate of the resultant economic activity changes will be developed, alongside estimates of other benefits that can feed into the overall benefit-cost-analysis, including:

- User benefits, including time savings, safety benefits and vehicle operating cost reductions;
- Economic impacts attributable to direct expenditures in terms of output, income, employment and additional taxes in the region; and
- Non-user benefits, including environmental, health and safety benefits.

Quantification of these wide-ranging benefits will help ensure that the proposed UHSGT is evaluated given a full appreciation of both the direct financial and the wider benefit implications of the investment. This approach is detailed in the new report “Framework for Assessing the ROI for High-Speed and Intercity Rail Projects” sponsored by APTA’s Committee on High-Speed and Intercity Passenger Rail. [http://www.apta.com/resources/reportsandpublications/Documents/HSR-ROI-2017.pdf](http://www.apta.com/resources/reportsandpublications/Documents/HSR-ROI-2017.pdf). WSP’s Ira Hirschman contributed to this report.

The WSP economic team has vast experience in conducting BCAs, including close to 100 BCAs to support TIGER and other grants, as well as BCAs for CAHSR, and for Amtrak’s Gateway project linking Amtrak NEC service to NYC with vastly improved and updated connectivity.

**P3 Scenarios and Funding and Finance Models:** With respect to P3 scenarios and funding and financing models well-cataloged in the 2018 Study, our study will take the results of our Corridor Planning and Enhanced Ridership Analysis, along with input from the Advisory Group, to suggest which of those scenarios and models may have the best applicability to development of the corridor.

**Sensitivity analysis:** See Enhanced Ridership above.

**Governance:** The 2018 Study identified several international and cross-border governance institutions that have been created to implement infrastructure projects. We
will seek the advice of the governmental members of the Advisory Group to determine which of those may be the most feasible, including consideration of those structures that could help facilitate timely decision-making. In addition, we will also examine another multi-government representative organization—the non-profit corporation, a form of which is being used to develop the multi-billion-dollar Gateway Bridge and Tunnel Project connecting New York and New Jersey. WSP is an advisor to the non-profit corporation entity for this project and can provide insight into its workings.

b. Funding and Financing Mechanisms

In addition to utilization of fare box revenues to finance the project, we will explore how to capture a portion of the benefits that will be generated for developers, businesses and residents. This basic approach is outlined below. We understand there are constitutional limitations on the use of “TIF Districts” based on property taxes in the State of Washington. However, we will discuss with the Advisory Group whether other mechanisms that have been previously identified might be employed to support UHSGT capital and operating costs. (See “Value Capture Financing in Washington”, Puget Sound Regional Council, February 2013).

**Exhibit 8: Capturing value from investing in transportation infrastructure.**

**Beneficiaries**
- Businesses
- Transportation Users
- Developers and Land Owners
- Federal/State Governments
- Public or Private Finance

**Risk Analyses to Assess Optimum Risk Transfer and Highest VfM:** We will work to develop an optimum risk transfer strategy to identify the types of inherent risks in the UHSGT project, and when these risks materialize during the project life cycle. These issues can then be mapped as part of a strategic assessment framework, which can be used not only to inform the business case, but also to allocate the key strategic risks. For example, to the extent that UHSGT revenue risks are linked to overall economic growth, then some portion of this risk may be best mitigated by government partners, as the private sector is unlikely to be able to develop strategies that can effectively offset these.

**Regulatory Challenges and Advancing Investment Opportunities:** We will evaluate the constraints associated with securing alternative or innovative funding resources, such as USDOT’s RRIF and TIFIA programs. Canada has recently established an infrastructure bank. In the U.S., there have been proposals to establish an infrastructure bank, but any enactment must await a future transportation reauthorization legislation, the timing of which is currently uncertain. We will work with WSDOT to reach out to Congressional representatives to support changes to federal program requirements that would facilitate private financing.

**Applicability of Alternative Transportation Funding Mechanisms:** The ability to “capture” a proportion of benefits generated by UHSGT depends on the type of mechanisms that are both available under the state laws of Washington and Oregon and Canadian statutes, and have the ability to demonstrate the benefits to groups affected by the new infrastructure. We will discuss with the Advisory Group several additional types of funding mechanisms that may require legislative authorization:

- Establishment of local improvement districts or other value capture methods;
- Wider benefit levies, such as the “Cap and Trade” funds or additional business levies relative to increased productivity; and
- Opportunity cost elements, such as allocating a proportion of gas taxes that would otherwise have been used to fund widening highways.

**Financial Responsibilities and Cost-sharing Model Options:** Robust project assurance is paramount in developing an effective cost-sharing model. Part of this assurance requires clarity on responsibilities across the different organizations around activities such as securing approvals, land acquisition, environmental mitigation, design, construction and operation. We would consider the following items in developing an appropriate cost sharing model:

- Source and robustness of various revenues, including fare box recovery;
The strength and transparency of the connection between the activity and funding;
- Risk allocation and incentive mechanisms;
- Consistency with government policy at each level and the required fiscal rules; and
- Ability for public and private investors to share in benefits realization, for example, demand/revenues above forecasts or reduced emissions.

**Revenue and Farebox Recovery:** This will be an output of the enhanced ridership analysis and alternative funding mechanisms discussed above.

4. **Communication and Community Outreach and Engagement**

Outreach for the UHSGT study will happen in three different forms: The Advisory Group and Steering Committee facilitation (described further below) is consistent outreach that will happen with a defined group of participants. With respect to the general public, we also propose public information sharing in the form of a booth or engagement at larger venues, such as forums on transportation issues sponsored by local agencies or key stakeholders. Last, the development of more refined ridership projections and assumptions requires a survey; this survey is further described in the enhanced ridership analysis approach.

a. **Advisory Group and Steering Committee Outreach**

Building on the prior study efforts, the WSP team will progress the outreach strategy to create momentum that continues beyond the business case study. We propose expanding the Advisory Group used in the prior study, with approval from WSDOT, to include additional business enterprises and advisory groups. Our approach to programming of the Advisory Group is shown in **Exhibit 9**.

The Steering Committee is a smaller subset of the Advisory Group, intentional in its make-up, to be charged with more strategic business, labor, environmental, and elected official outreach and collaboration to move the concept of UHSGT forward. The Advisory Group will meet at least every other month and the Steering Committee will meet monthly, if not biweekly, during more intense development of the study. The Steering Committee will provide focus around legislative leadership, business engagement, and labor and environmental collaboration, so that tactical actions are

**Exhibit 10: Advisory Group/Steering Committee relationship.**

### Advisory Group

**Prior study participants + key stakeholders:**
- Amazon
- Alaska Airlines
- Snohomish County Economic Alliance
- I-5 System Partnership
- Cascadia Rail

**Objectives:**
- Represent diverse interests
- Continuity from past study
- Put in place a structured approach to bringing forward and addressing study topics:
  - Governance
  - Technology
  - Funding and Financing

### Steering Committee

6 Committee Members

**Objectives:**
- Be intentional in make-up
- Drive legislative, business and stakeholder buy-in
- Strategic business, labor, environmental, and elected official outreach

**Exhibit 9: Programming of the Advisory Group**

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<tr>
<td>August 2018</td>
<td>October 2018</td>
<td>December 2018</td>
<td>February 2019</td>
<td>April 2019</td>
<td>June 2019</td>
</tr>
<tr>
<td>What models can be used?</td>
<td>What is needed to choose a technology?</td>
<td>What are the viable options that don’t take away from other regional priorities?</td>
<td>What ridership scenarios did we evaluate?</td>
<td>What policy decisions or barriers need to be considered?</td>
<td>What are the key takeaways from the study (executive summary)?</td>
</tr>
<tr>
<td>What does it take to create an authority?</td>
<td>What technologies existing; what are their trade-offs?</td>
<td>How can the private sector participate?</td>
<td>What do the results mean?</td>
<td>What are the next steps and what is the time line for policy?</td>
<td>What are the next steps for the project?</td>
</tr>
<tr>
<td>Where are we at the end of this study?</td>
<td>When does technology need to be decided?</td>
<td>What are the legislative needs for private sector participation?</td>
<td>How do the findings integrate with funding, financing and governance?</td>
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identified and acted upon to ensure robust participation and engagement during the Advisory Group meetings that ultimately lead to momentum and buy-in for next steps at the conclusion of this study. The Advisory Group can also build a coalition across government, business, environmental and non-profit organizations, which can help drive momentum to advance UHSGT. The meetings will also help test emerging results and allow the study to evolve to deliver a robust assessment.

**Support from outside the Corridor:** One of the key issues the project will be addressing is the question of how the project secures engagement, buy-in and eventual support throughout the state. Not only will this be a challenge in eastern Washington, but also in those parts of western Washington that will not have a station stop.

The Advisory Group and the Steering Committee offer the opportunity to test various ideas that are designed to address this question. For example, when the HSR initiative was before Congress in the last administration, a map was prepared that showed the economic impact, including the number of businesses and jobs that would be positively affected in each state and congressional district as a result of HSR projects that were planned in just a few states. This map provided the basis for conversations with key stakeholders in various parts of the country, even though the proposed HSR project did not specifically serve their constituencies.

**Addressing Contingencies**

Our work plan assumes that the greatest risk to the schedule and advancement of work is tied to external factors, such as obtaining timely input from the Advisory Group and Steering Committee members, addressing conflicting interest or priorities from various interest groups, and avoiding delays in the decision-making process. Gaining agreement at the outset of the study on the work plan and the programming of Advisory Group meeting agendas will mitigate challenges. Also, the concept of the Steering Committee is intended to provide a focused group working on seeking early input on the progression of work and topics surrounding the study.

We anticipate a limited contingency plan for this study that is tied to the overall scope and budget so that any additional work can be optimized. WSP is adept at identifying opportunities and providing appropriate language for scope contingencies and has successfully developed and executed contingencies on WSDOT contracts. During delivery, Karen Hedlund will track and resolve project issues, monitor budget and strive to resolve project issues and risks to complete the project without requiring contingency tasks. No work will be performed on a contingency task until properly authorized by WSDOT. Overall, WSP will use contingency tasks when additional needs can be identified and contracting time can be saved.

**B. Issue Resolution**

Throughout the project, WSP will identify, confirm, document and resolve project issues as they develop. This can occur during project meetings or general day-to-day communications or during milestone reviews. Issues identified will be tested with WSDOT to consider how to best resolve them, including identifying the most relevant owner. Once an issue is confirmed, WSP will document and track it in a project issues log that provides a description, magnitude, timeline, owner and actions to resolve. We will track actions and progress and document resolutions.

The intent will be to solve issues at the lowest possible project level, as quickly as possible. Included in this category are low-risk, low-impact issues and/or alternative preferences. Ideally these are solved by the discipline leads in consultation with Karen Hedlund as appropriate. In coordination with WSDOT, higher-risk and/or higher-impact issues will be elevated to the Karen and PIC, Dave Warner.

In the event an issue becomes critical in terms of risk, cost, schedule or stakeholder perception, issues will be elevated to the appropriate decision-makers, with recommendations.

**C. Assumptions for Work Breakdown Structure**

In general, our assumption is that the consultant is providing all document deliverables. There are several assumed WSDOT tasks and deliverables as follows:

- Two-week review of consultant draft deliverables, resulting in comments.
Formal letter from WSDOT or the Governor’s Office inviting Advisory Group and Steering Committee members to participate in the study.

- Templates, as necessary, to meet WSDOT format and style guides including power point templates for legislative briefings.
- Baseline information, as available, for consistency with regional assumptions for ridership, economics, etc.

Our work breakdown structure will reflect our work plan:

0.0: Project Administration
1.0: Business Case Analysis
2.0: Corridor Planning
3.0: Enhanced Ridership Analysis
4.0: Additional Analysis (optional)
5.0: Communication and Outreach

D. Key Issues and Critical Milestones

Key Issues

Our team has identified the following key issues that the business case analysis will seek to address:

1. Is the cost of UHSGT on the Cascadia Corridor affordable?  
   **Solution:** The enhanced ridership study will indicate what portion of estimated costs of each portion of the project could be recovered from the farebox revenues.

2. Why should the region invest in UHSGT when there are so many other needs—e.g. health, education, environment, etc.?  
   **Solution:** The economic analysis will explore the extent to which connecting major cities in the corridor by a one-hour trip will spur significant new growth in the region that will provide additional revenues to devote to solving other regional problems.

3. Will the UHSGT project replace the existing Cascadia service, which has recently received more than $800 million in investments?  
   **Solution:** The study will analyze the tradeoffs between multiple stations and time savings to determine the optimum service for UHSGT. It is likely the existing Cascadia line will continue to be needed to service interim stations.

4. What are the implications of building a rail project across international borders?  
   **Solution:** There are many precedents for bi-national support of projects that cross international borders, particularly where there are be significant economic benefits to cities on both sides. This study will explore such potential benefits that would be the basis of close cooperation with Canada.

5. How does the rest of the rail and transit system get addressed?  
   **Solution:** The study will look at how the upgrades to connecting intercity, commuter and transit lines can increase ridership to the UHSGT, and what UHSGT’s impact will be on connecting systems.

6. How can a project that will take years to develop and construct survive a change in political leadership, such as the recent events in Malaysia?  
   **Solution:** It is essential that the fundamentals of the project have widespread and enduring public support. This study will prove whether the fundamentals of UHSGT are strong enough to endure political and economic challenges.

Critical Milestones

Our team has identified the following critical milestones:

- **July 2018:** Work plan approval
- **August 2018:** Kick-off Advisory Group and Steering Committee Meetings
- **October 2018:** Cascadia Economic Conference
- **November 2018:** Corridor Planning Memorandum
- **December 2018:** Draft Base Case Ridership Forecast Results
- **January 2019:** Draft Ridership Scenarios Forecast Results
- **January - May 2019:** 2019 Legislative Session
- **March 2019:** Draft Business Case Analysis Report
- **May 2019:** Final Business Case Analysis Report