PARSONS

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September 28, 2015

Ms. Rebecca Harnagel
California High Speed Rail Authority
770 L Street, Suite 620 MS 2
Sacramento, CA 95814

Dear Ms. Harnagel,

Parsons is very pleased to respond to the California High Speed Rail Authority's (Authority's) Request for Expressions of Interest (RFEI) for the Delivery of an Initial Operating Segment. We recognize your commitment to the successful implementation of this key infrastructure investment and are eager to assist the Authority in shaping the right procurement process to deliver the nation's first true high-speed train project.

In that spirit, and based on our experience designing, building, and implementing complex infrastructure projects, we offer the following comments for your consideration. Although we have already teamed with partners for design-build, are soliciting systems design and installation partners, and are investigating operations and maintenance in anticipation of potential work on the project, we have responded to this RFEI based on Parsons' well-established individual experience as an equity member in large design projects and, more recently, our role in public-private partnerships and as an equity partner in concessions.

We remain at your disposal should you have any additional questions.

Please note that Parsons' point of contact for this RFEI is:

Robert Davis
2201 Dupont Drive, Suite 200
Irvine, CA 92612
(949) 857-6323
Robert.Davis@parsons.com

Sincerely,

[redacted]

Robert A. Davis
Vice President
Parsons Transportation Group Inc.

Firm Experience and Team Structure

Firm Experience and Team Structure

Parsons Transportation Group Inc. (Parsons) is a global business unit of Parsons Corporation, an engineering, construction, technical, and management services firm with revenues of more than $3 billion in 2014. Founded in 1944, with headquarters in Pasadena, California, the company has more than 15,000 employees engaged in more than 2,000 projects in 50 states and 25 countries. Parsons has successfully completed the design and construction of more than 106 alternative project delivery (APD) transportation projects over the last 25 years, with a value of more than $35.3 billion. The firm has an extensive set of best practices for the delivery of design and construction for APD (such as design-build) that achieve the objectives of owners, are well coordinated with construction, and meet third-party stakeholder requirements.

Parsons has worked on more than 400 passenger and freight railroad systems around the world, including every major transit system in North America. Over the past 30 years, we have worked on high-speed rail preliminary engineering and environmental studies in 20 states and 10 of the Federal Railroad Administration's (FRA's) 11 nationally designated high-speed rail corridors.

RELEVANT PROJECT EXPERIENCE

Parsons also offers a highly successful record of delivery on design-build and design-build-operate-maintain transportation projects, as detailed in the following table. To date, Parsons has completed, or is actively working on, more than $35.3 billion in transportation alternative delivery projects, which includes 19 transit projects. For light rail alone, Parsons is responsible for the delivery of 10 projects, totaling more than $5.4 billion in constructed value.

CALIFORNIA HIGH-SPEED RAIL, INITIAL CONSTRUCTION SECTION CP 1 DESIGN-BUILD | Fresno to Madera, CA

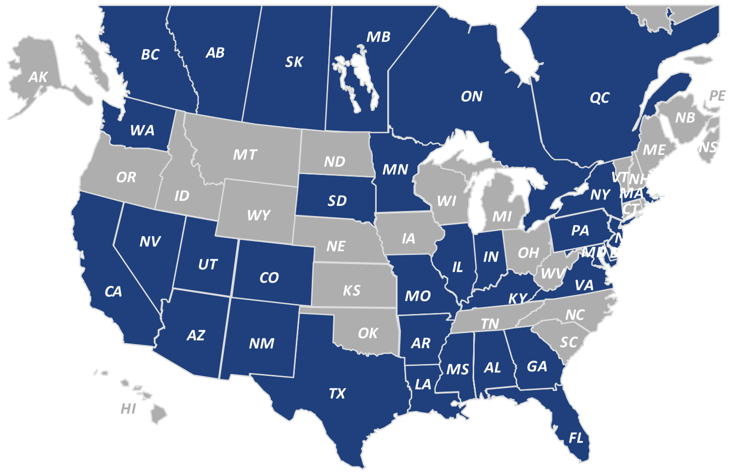
Parsons, as part of the TPZP joint venture, is currently designing for construction the initial 29-mile segment of the California High-Speed Rail program. This is the first complete high-speed rail system in the United States. Construction Package 1 (CP 1) runs from Avenue 17 in Madera County to East American Avenue in the southern part of the City of Fresno, California. The project includes the maintenance of traffic (MOT), utility relocations, street relocations and grade separations, grading, drainage, bridges, and structures required to complete the 29-mile alignment. CP 1 is being designed in conformance with the California High Speed Rail Authority (CHSRA) design memoranda, project environmental documents, and the request for proposal. Management of CP 1's design-build schedule is in full conformance with CHSRA milestone requirements. Coordination ensures that designs are in accordance with the CHSRA's agreements with federal, state, and local agencies including Caltrans, City of Fresno, County of Fresno, Fresno Irrigation District, Fresno Metropolitan Flood Control District, Madera County, and Madera Irrigation District. Parsons is coordinating with private stakeholders, railroads, residential and agricultural interests, and property owners.

ALAMEDA CORRIDOR MID-CORRIDOR DESIGN-BUILD | Los Angeles, CA

Parsons was a 20 percent equity partner in a JV for the Mid-Corridor Trench Project design-build contract. Parsons provided management team staff, including the deputy project manager, railway systems manager, and construction QC manager. Parsons managed and performed the project design and provided business/project control management. The project consisted of constructing a 10-mile-long, 40-foot-deep, 51-foot-wide depressed rail corridor in a permanently supported concrete channel. The entire length of the depressed U channel and the at-grade portion covered approximately 15 miles and traversed several cities between Los Angeles and the ports of Long Beach and Los Angeles. The JV was responsible for all aspects from preconstruction services to construction completion and acceptance. Services included safety and quality; final design to meet program elements and budget; self-performing construction; and soliciting and managing subcontractors, DBE firms, community outreach, and local hiring and training programs.

Unmatched Transportation DB/PPP Experience

106 DB/PPP Projects in North America $35.3B (USD)
39 Projects as a DBJV (noted in orange) $17.9B (USD)



ARIZONA
SR 68, Bullhead City to Golden Valley - $42M
US 60 (Superstition Freeway) - $184M
51st Avenue Bridge - $12.8M
Central Mesa LRT - $200M
SR 101L - $90M
East Valley LRT (PM) - $1.4B

ARKANSAS
Clinton National Airport Terminal Redevelopment CMAR - $37M

BRITISH COLUMBIA AND ALBERTA
Kicking Horse Canyon PPP - $124M
Northeast Stoney Trail PPP- $427M
Northwest Anthony Henday Dr. PPP - $1.0B
Calgary Airport CMAR - $428M
Southeast Stoney Trail - $770M
Coast Meridian Bridge - $132M

CALIFORNIA
El Portal Road (Route 140) - $34M
San Joaquin Hills Transportation Corridor - $1.1B
Garden Grove Freeway (SR 22) – $500M (PM)
SR 125 South Toll Road - $650M (PM)
Gold Line Light Rail (Ph. 1) - $460M
SR 91 Corridor Improvement - $1.3B (PM)
Alameda Corridor - $790M
Gerald Desmond Bridge - $1.1B (PM)
Mid-City Expo LRT - $687M
BART Oakland Airport Connector (OAC) - $367M
Metrolink PTC - $122M
Gold Line Light Rail (Phase 2a) - $482M
Caltrain PTC - $138M
CA HSR Ph. 1 - $985.1M
I-15 Cajon Pass - $125M
Westside Purple Line Extension, Sec. 1 - $1.6B

COLORADO
E-470 (POE) - $940M (full build-out, PM)
E-470 Segment IV - $230M
I-225/ I-70 Northwest Flyover - $5M
Southeast Corridor T-REX Project (I-25) - $1.287B

DISTRICT OF COLUMBIA
DC Wards 3 & 4 Local Streets - $37M
CSX National Gateway
Anacostia Water Tunnel - $250M

FLORIDA
SR 408/I-4 Bridge Widening - $4M
I-10/Escambia Bay - $27M
Blackwater Bridge - $32M
Evans Crary Bridge - $32M
Ernest Lyons Bridge - $46M
Sawgrass Expressway - $88M
I-95 St. Johns County - $25M
US 1 Flagler County - $5M
Regency 2 (Tredinick Pkwy) - $25M
Tri-County Double Track - $328M (PM)
MIA North Terminal CMAR - $1.1B
MIA South Terminal CMAR - $844M
MIA Mover - $259M
Lee Roy Selmon - $64M
SunRail - $156M
I-75 SR 52 to Pasco Cty - $45.8M

GEORGIA
Northwest Corridor DBF - $599M

ILLINOIS
CTA Substation Rehabilitation - $22M
O'hare ATS Expansion & Modernization DBOM - $310M
CTA Ravenswood Loop Connector Signal Upgrade - $32M
Metra PTC - $79.9M

INDIANA
I-69 Section 4 - $109M
NB I-65 onto WB I-70 - $12.4M
NICTD PTC - $80M

KENTUCKY
Ohio River Bridges - $2.6B (PM)

LOUISIANA
John James Audubon Bridge - $359M

MARYLAND
ICC Contract "A" - $479M
ICC Contract "B" - $561M
CSX National Gateway Ph. II - $48M
Central Light Rail Lines Ph. I and II - $460M (PM)

MASSACHUSETTS
Fore River Bridge - $280M

MINNESOTA
Hastings Bridge - $120M
Hiawatha LRT - $329M
I-494 Reconstruction - $136M
Maryland Avenue - $15M
I-94 Reconstruction - $28M

MISSISSIPPI
US 90 Biloxi Bay Bridge - $338M
I-59 Bridge Widening - $10M
I-55 Bridge Widening - $10M
I-59/I-20 Bridge Widening - $10M
SR 9 - $90M

MISSOURI
I-64 Reconstruction - $535M
kcICON - $232M
Route 364 Ph. 3 - $90M
Columbia I-70 Bridges - $17.5M

NEVADA
Reno Transportation Rail Access Corridor (RETRAC) - $170M

NEW JERSEY
New Jersey Transit PTC - $151M

NEW MEXICO
GRIP I-40/Coors Blvd. Interchange - $91M

NEW YORK
Lincoln/Holland Tunnel ITS - $5.2M
Amtrak: Facilities Improvement Phase 1 - $1.1M
Goethals Bridge - $934M

ONTARIO
ViVa BRT Program - $770M
DRIC-NITC PPP - $1.5B (PM)

PENNSYLVANIA
Amtrak PTC - $59.3M

QUEBEC
A-25 PPP - $487M
Turcot Interchange - $1.5B

SASKATCHEWAN AND MANITOBA
Circle Drive PPP - $214M
Center Port Way PPP - $212M
Regina Bypass PPP - $1.2B (CAD)
Winnipeg Interchange - $204M (CAD)

SOUTH DAKOTA
I-229 Reconstruction - $33.8M

TEXAS
DART Orange Line Ext - $437M
Houston METRO - $1.26B
DART I3 - $148M
Grand Parkway - $1.04B
IH-35E - $1.18B
SH 183 - $847M

UTAH
I-15 Reconstruction - $1.59B
Mid-Jordan LRT- $243M
Draper Transit Corridor - $117M
I-15 Beck St. - $124M
Pioneer Crossing - $172M
Geneva Road - $41M
I-15 POINT - $250M

VIRGINIA
I-895 Connector - $400M
Dulles Metro Rail Extension - $1.2B
I-395 HOV Ramp at Seminary Rd - $55M
Military Road CFI - $60M
Downtown/Midtown Tunnel - $1.9B (PM)

WASHINGTON
Tacoma Narrows Bridge - $615M
SR 532 - $54M
Elliott Bay Seawall CM/GC-$300M (PM)
I-405 Corridor GEC - $1.5B (PM)

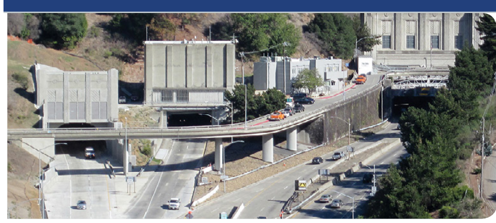
LEGEND
Orange - DBJV Projects
Italic - Program Management Projects

HOUSTON METRO LIGHT RAIL EXPANSION DB PROJECT | Houston, TX

Parsons is the managing partner of the construction joint venture and is the facility provider, responsible for overall program management, integrated program schedule, small business enterprise (SBE) compliance, community outreach, vehicle procurement and commissioning, the startup and testing of each line, and facility before turnover to METRO for revenue service. As 34% JV partner, Parsons is delivering to Houston METRO a $1.26 billion expanded light rail system consisting of three new corridors totaling 15 miles of double-track light rail transit (LRT), 23 stations, storage and inspection facilities, and system safety and operational upgrades to the existing 7.5-mile LRT system. It will also include the acquisition and commissioning of 58 new light rail vehicles and major renovations to the existing operations control center. The Parsons-led design also conformed to the requirements of numerous stakeholders, including the City of Houston, Texas DOT, utility providers, and the Union Pacific Railroad (UPRR). Parsons was responsible for obtaining and complying with regulatory permits and ensuring environmental compliance. A rigorous self-certified quality management plan with quarterly audits by the owner was a hallmark of the project.

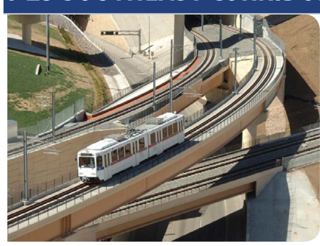
Awards: 2013 AdWheel Award: Group 3, Category 3, 3-A Public Relations/Awareness or Educational Campaign from American Public Transportation Association; 2013 AdWheel Award: Group 3, Category 1, 1-E Brochure from American Public Transportation Association; 2013 AdWheel Award: Group 3, Category 2, 2-C Video Presentation from American Public Transportation Association

CALDECOTT 4TH BORE TUNNEL AND BUILDING | Alameda and Contra Costa Counties, CA



The tunnel is approximately 3,389 feet long, adds two additional lanes of traffic in the westbound direction, and is designed to alleviate traffic congestion along the SR 24 corridor. The tunnel has seven interconnecting personnel passageways to facilitate maintenance and emergency access and includes a 6,000-square-foot operations and maintenance center. Caltrans/Parsons designed the 4th bore, which has two 12-foot lanes, a 10-foot north shoulder, a 2-foot south shoulder, and emergency walkways. It is approximately 41 feet wide and 3,389 feet long.

I-25 SOUTHEAST CORRIDOR TRANSPORTATION EXPANSION DESIGN-BUILD (I-25 T-REX) | Denver, CO



Parsons, as the lead designer and member of a design-build JV, was responsible for delivering the award-winning, $1.28 billion, I-25 T-REX project — the largest transportation project in Colorado's history. The project included the reconstruction of 17 miles of interstate highway while simultaneously adding 19 miles of new double-track light rail transit; highway, pedestrian, and bicycle facilities; 13 new train stations; and a new operations control center.

Awards: 2007 National Achievement Award from National Partnership for Quality; 2007 AON Build America Grand Award Winner from General Contractors of America; 2007 Silver Pick Award for Brochures/Special Publications, greater than $10,000 from Public Relations Society of America, Colorado Chapter; 2007 Outstanding Project of the Year from Rocky Mountain Chapter American Concrete Institute International; 2007 AON Marvin Black Excellence in Partnering from General Contractors of America; 2007 National Design-Build Award from Design-Build Institute of America

EAST SIDE ACCESS/GRAND CENTRAL CONNECTOR | New York, NY

The East Side Access/Grand Central Connector is a $10.8 billion, 18-year-long project to bring Long Island Rail Road (LIRR) service to the east side of New York City. Parsons' primary role includes preliminary engineering, final design, and design support services for construction of the railroad and facility systems elements. The systems elements include all signaling, communications, traction power, overhead catenary, trackwork, and third-rail systems, as well as all auxiliary power, station ventilation, fire suppression, fire alarm, and security systems.

AMTRAK PTC SYSTEM INTEGRATOR I-ETMS, PHASE I | Philadelphia, PA

Amtrak awarded Parsons a three-year contract to install an interoperable electronics train management system (I-ETMS) PTC system for the Northeast Corridor (NEC) and the Harrisburg Line. This contract studied, designed, and tested an I-ETMS-compliant PTC overlay that can operate without interference with or by the advanced civil speed enforcement system (ACSES) along the corridor or in adjacent territory.

CALTRAIN CBOSS (PTC) | San Francisco and San Mateo, CA

Parsons is completing the design and installation of the $138 million interoperable Communications-Based Overlay Signal System (CBOSS) positive train control (PTC) project. This contract includes compliance with Federal Railroad Administration (FRA) requirements, meeting the mandates of the Railroad Safety Improvement Act of 2008, as well as creating functions that will improve the performance of Caltrain passenger operations. Parsons is designing, installing, testing, integrating, commissioning, and providing warranty services to PCJPB, enabling Caltrain to place CBOSS PTC into revenue service this year. This PTC implementation involved construction and installation on the entire length of the Caltrain right-of-way (ROW) and involved every rail system, including signals, communications, dispatch, and rolling stock. As the sole prime contractor, Parsons is responsible for all design, construction, and test activities on the active Caltrain and UPRR ROWs.

NEW JERSEY TRANSIT PTC SYSTEM | Newark, NJ

Parsons, as design-builder, is providing a turnkey system to develop, install, and integrate an interoperable FRA-certified PTC system on NJ Transit's 300-mile regional commuter rail system. The PTC system will be fully interoperable with Amtrak's, NS's, and CSX's PTC systems. NJ Transit's PTC systemwide implementation program will consist of a PTC back-office system (two systems); PTC onboard computers, speed display units, Crash Hardened Event Recorders, global positioning system (GPS) tracking, and radios on more than 400 cab cars and locomotives; a stop enforcement system; wayside interface to NJ Transit's signal interlocking; and a systemwide communication network to link the wayside signals, trains, and the centralized dispatch office using the ACSES II-compliant 220-MHz radio system and NJ Transit's backhaul communication infrastructure. This DB project includes the installation of wayside communications and onboard installations. NJ Transit forces are installing the wayside signal work under the management of Parsons.

METROLINK PTC SYSTEM | Los Angeles County, CA

Parsons has completed the design and installation for the Southern California Regional Rail Authority (SCRRA), the governing board of Metrolink, as the vendor/integrator to provide a turnkey system to develop, install, and integrate an interoperable FRA-certified PTC system on Metrolink's 512-mile regional commuter rail system. This significant contract represents the first interoperable PTC systemwide implementation to be awarded in the United States rail industry. It is also the first application of PTC in compliance with the United States Rail Safety Improvement Act of 2008 by a commuter railroad, which mandates that passenger and freight railroads install PTC by the end of 2015. The PTC system is fully interoperable with the UPRR and Burlington Northern Santa Fe (BNSF) Railway PTC systems. The Metrolink PTC project was installed on Metrolink tracks, which is an active railroad corridor that includes Amtrak, UPRR, and BNSF, as well as Metrolink.

BANEDANMARK SIGNALING PROGRAM | Copenhagen, Denmark

Parsons, as part of a joint venture, was awarded a 12-year, USD $5 billion multidisciplinary consultancy contract to upgrade and modernize the Danish railway network, which generated approximately 39,000 delayed trains per year. Scope of work includes tender preparation, contract negotiation, supplier oversight, the implementation of an early deployment scheme, and rollout over the entire Danish mainline rail network of a European rail traffic management system (ERTMS). The implementation of a Level 2 ERTMS will provide the opportunity to achieve full interoperability on the Danish network and integration of automatic traffic management in a few centers for the whole country. The Danish signaling program is expected to be the largest implementation of its kind in Europe and will utilize the newest proven signaling technology to improve the safety, punctuality, and reliability of the rail network, as well as lower life-cycle costs achieved through economies of scale, reduced lineside equipment, and increased centralization of the control systems.

TAIWAN SHINKANSEN TAIWAN HIGH-SPEED RAIL | Taiwan

The Taiwan High Speed Rail (TSHR) project is the world's largest build-operate-transfer rail project and uses Japanese Shinkansen technology. Parsons' involvement was initiated as a client-funded technical and management peer review consultant. During the project's life, the scope was developed to include provision of rail systems management and technical specialists to support Taiwan Shinkansen Corporation (TSC) with the design, build, installation, testing and commissioning, and revenue startup for the program. TSC, composed of three Japanese Companies (Mitsubishi Heavy Industrial [MHI], Toshiba, and Kawasaki Heavy Industrial [KHI]), was responsible for supplying the core system for TSHR. The core system includes high-speed rolling stock, advanced signaling, communications, power supply, overhead catenary system, and building services. TSC designed, installed, tested, and commissioned the core system to allow for a smooth transition to full operational capability. Parsons, as a subcontractor on the project, provided the full range of strategic and management capabilities, quality assurance, and direct technical support to MHI for signaling. THSR is planning to set up 13 stations along the western corridor in Taiwan for the 346-kilometer main line.

Project Approach

Project Approach

The Authority would like to know whether each Respondent is interested in the IOS-South scope, IOS-North scope, or both, as well as any recommendations for improvement to its delivery strategy. The EOI shall include a description of how the Respondent will approach each project scope and how each approach will meet the goals and objectives of the Authority and the hurdles to overcome to deliver the project(s) on time and on budget.

This section of the EOI shall also include any innovative ideas for delivering both projects. California High-Speed Rail Authority RFEI No.: HSR15-02

We feel that due to the size and complexity of either the IOS North or IOS South project it may be more beneficial to procure in distinct packages. For example,

- civil works
- track and passive infrastructure (duct banks, ect)
- traction power, signaling, SCADA and communications
- rolling stock.

This was the successful approach utilized for segments CP 1 to CP 4 and was planned to continue with CP 5 and CP 6.

Scheduling benefits which can be seen on the attached Gantt charts (Figure 1 Separate Packages and Figure 2 IOS Procurement) would result with continuation of the distinct packages. After a preliminary study of the various work items to be procured, we believe that a schedule savings of 18-24 months is achievable. We see completion being possible by mid-2023. The procurement and testing of the rolling stock is the controlling feature as detailed on the Gantt chart. The FRA required testing period is assumed to be 2 to 2.5 years that cannot begin until delivery of the pilot vehicles.

Separating these packages gives flexibility to the buyer (the Authority) to solicit offers at more competitive prices, as a wider range of firms with specific qualifications relevant to the package will participate in the bidding process, as opposed to a large civil consortium bringing only one supplier. Separating packages additionally enables the Authority to benefit from procuring the best technology solution available in the market in the shortest amount of time, as a variety of technology providers can qualify and participate.

Strategic focus on the North IOS, as a portioned or bundled procurement, in comparison with the South IOS may prove to be the better segment to procure first. The North IOS has different challenges when compared to the South IOS. In particular, topographical challenges related to more tunneling makes the South IOS more challenging. A shift to procure the North IOS first may prove slightly less complex, helping to maintain momentum and keeping the entire system-wide procurement on track.

Figure 1 Separate Packages

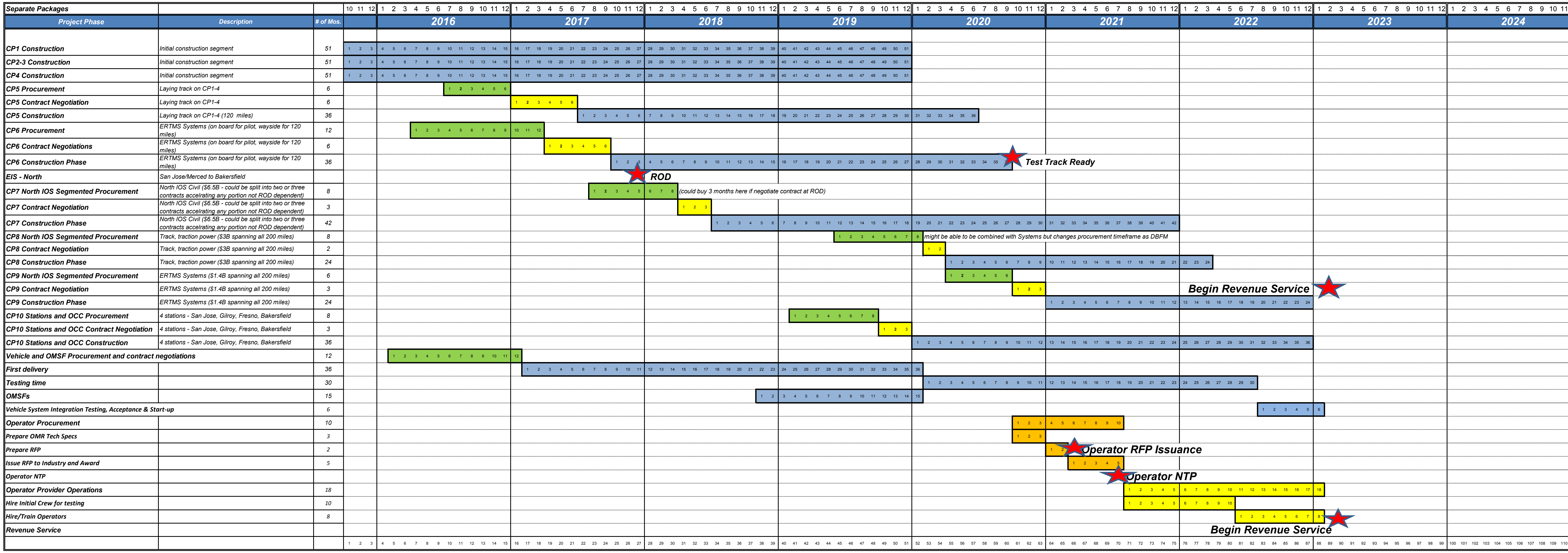
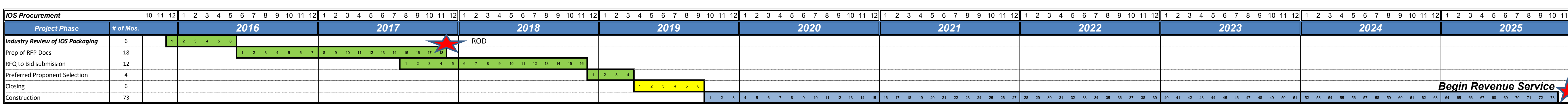


Figure 2 IOS Proecurement



Responses to Questions

Responses to Questions

A. COMMERCIAL QUESTIONS

1. Is the delivery strategy (i.e., combining civil works, track, traction power, and infrastructure) likely to yield innovation that will minimize whole-life costs and accelerate schedule? If so, please describe how. If not, please recommend changes to the delivery strategy and describe how those changes will better maximize innovation and minimize whole-life costs and schedule.

With the size and complexity of this project, it may be more beneficial to procure the project in distinct packages, similar to the partitioning of the rolling stock. For example, civil works, track, and infrastructure would be procured separately. This was the successful approach utilized for segments CP 1 to CP 4 and is to continue with CP 5 and CP 6.

Scheduling benefits, which can be seen on the attached Gantt chart, would result with the continuation of the distinct packages. After a preliminary study of the various work items to be procured, we believe that a schedule savings of 18-24 months is achievable. We see completion being possible by mid-2023. The procurement and testing of the rolling stock is the controlling feature, as detailed on the Gantt chart. The FRA's required testing period is assumed to be 2 to 2.5 years and cannot begin until delivery of the pilot vehicles.

A revised schedule for an IOS DBFM would most likely require a six-month period for industry input necessary for the consolidated approach. That would be followed by 18 months to deliver the RFP, a 12-month bid phase, and 9 months of contract negotiations. A construction period of approximately 73 months is assumed, equal to the anticipated construction period for the Sud Europe Atlantique High Speed Line (Tours-Bordeaux high speed rail line) currently under construction in France, which is a reasonable comparison here. That line consists of a 187-mile alignment. A DBFM procurement for IOS North, for example, will reach final completion in late 2024.

Furthermore, more competition and cost saving may result from the separate procurement of the various packages. A procurement of distinct work packages based along technical demarcations may allow for greater competition, resulting in enhanced design as the scope is confined to a more concentrated area of expertise.

Lastly, as detailed in our Funding and Financing Question Responses below, the financing required for DBFM contracts of this magnitude ($15-$20 billion expected) may prove to be beyond the limits of the current debt and surety markets without significant buy-down by the public sector.

2. Does the delivery strategy adequately transfer the integration and interface risks associated with delivering and operating a high-speed rail system? What are the key risks that will be borne by the State if such risk transfer is not affected? What are the key risks that are most appropriate to transfer to the private sector?

For a complex, multifaceted project like this one, a P3 approach allows for risk transfer to the appropriate entity. The key risk in a high-speed rail project, or indeed most rail projects, to be transferred to the private sector is the integration/interface risk. Much of the integration risk lies in the rolling stock-systems interface and in the trackworks-systems interface. Utilizing a separate procurement for the rolling stock may negate much of this risk transfer. However, the participants expected to participate in this procurement are large, experienced companies well versed in these types of endeavors. Well-crafted contractual terms and well-defined scope of work documents to ensure compliance between the various pieces of the project will need to be developed to ensure that the risks associated with the State maintaining the integration risk are addressed and minimized.

The partitioned approached that we detail in the response to Question 1, above, may not add any undue integration risk to the State. Grading contracts followed by track-laying contracts is common in many types of civil infrastructure projects (for example, grading followed by pavement construction in a large highway project) and should not present any undue risks. The systems design and construction, while dependent upon the track layout, is a separate skill set that should be able to function without adding any undue risks to the State. The question here would be who retains the risk — the State or the contractor. In fact, the rolling stock-systems interface risk is there for the State regardless of the procurement model chosen, as the rolling stock is being procured separately.

Once the project has reached substantial completion satisfactorily, the operations risk will be borne by the operator. The long testing period for the vehicle and systems should have ensured that the myriad pieces of the system are functioning as envisioned.

In terms of the North and South IOS sections, separate procurements along technical specialties (civil, track, etc.), as detailed in Response 1 above, may provide for a smoother procurement because one very large contract may be difficult to finance. Please refer to the finance question responses below.

Strategic focus on the North IOS, as a portioned or bundled procurement, in comparison with the South IOS may prove to be the better segment to procure first. The North IOS has different challenges when compared to the South IOS. In particular, topographical challenges related to more tunneling makes the South IOS more challenging. A shift to procure the North IOS first may prove slightly less complex, helping to maintain momentum and keeping the entire system-wide procurement on track.

3. *Are there any other components of a high-speed rail system that should be included in the scope of work for each project (e.g., rolling stock, train operations, stations)? If so, how will this help meet the Authority's objectives as stated in this RFEI?*

Including the rolling stock and train operations in the scope would, in theory, mitigate the interface and integration risk that is retained by the Authority with the proposed procurement process described in the RFEI. However, including the rolling stock in the scope of work will exacerbate the competition issue discussed in our responses to Questions 1, 5, and 7 in that very few contractors will wrap vehicle risk (and be joint and several in a contract that includes vehicle acquisition, testing and commissioning), leading to few consortiums forming and bidding such a procurement. Further, adding the cost of the vehicles to a larger procurement aggravates the notion that contractor balance sheets can only take on so much risk (driven by the size of the contract).

With respect to schedule, in order to achieve a revenue service date in 2023, not only is our segmented procurement approach necessary, the procurement of the rolling stock becomes a driver of the critical path in that a ready test track requires vehicles to provide any value and vehicles are typically the element requiring the longest lead time in rail system development. With the long lead time overall expected prior to reaching revenue service, operations can be procured at a later date (see the Gantt chart depicting the recommendation of segmented procurement in the Project Approach section) to be in a position to take advantage of any technological advances or best practices that become standard in the intervening years.

As discussed in our Question 2 response above, a well defined scope of work document in addition to contractual mechanisms to incentive schedule certainty across the phased DB contracts should be able to minimize the integration and interface risks when implementing our proposed segmented approach. In addition, procurements around the world are done with separate rolling stock and operator procurements and have proven to be successful.

4. *What is the appropriate contract term for the potential DBFM contract? Will extending or reducing the contract term allow for more appropriate sharing of risk with the private sector? If the Respondent recommends a different delivery model, what would be the appropriate term for that/those contract(s)?*

Our suggested separate packaging of distinct aspects will allow for differing DBFM terms and appropriate allocation of longer term maintenance risks. Whereas the civil works contractors are not usually willing or suited to engage in long term maintenance contracts this requirement might be better positioned with the Authority or operator. As for the rolling stock, signals, communications and systems, technology vendors are more comfortable with long term (common in the industry up to 30 years) maintenance contracts. Each would then be able to have the right value for money DBFM contract.

5. *What is the appropriate contract size for this type of contract? What are the advantages and disadvantages of procuring a contract of this size and magnitude? Do you think that both project scopes should be combined into a single DBFM contract?*

The size of these DBFM contracts, with their expected contract values on the order of $15 billion, will test the limits of project finance for these types of transactions. The largest contract in the transport sector to date that we are aware of is the Sud Europe Atlantique High Speed Line, in France. It had a contract value of approximately USD $9 billion and had substantial federal subsidies. Bonding capacity for projects of this size would become an issue and would, quite possibly, be a limiting factor on possible competition as participants would struggle to meet the capacity requirements. In addition, the debt markets have not been tested to these limits.

A contract size on the order of $3-$5 billion is probably a reasonable upper limit. As detailed in our Funding and Financing Question Responses, below, $3-$5 billion contracts with adequate public-sector funding, resulting in debt financing of no more than $2 billion, are feasible.

6. Does the scope of work for each project expand or limit the teaming capabilities? Does it increase or reduce competition?

The scope of work and the size of the contract can be a limiting factor on competition. Bundling scope items into large contracts may reduce competition as the large contracts will necessitate only a few large corporations having the capacity to pursue the projects. As we detailed in our response to Question 1, above, contracts partitioned into distinct scope items along technical demarcations can help increase innovation competition and provide enhanced design resulting in cost savings.

Further discussion, including open platform systems' impact on teaming capabilities and competiton, is described in response to Question 10.

B. FUNDING AND FINANCING QUESTIONS

7. Given the delivery approach and available funding sources, do you foresee any issues with raising the necessary financing to fund the IOS-South project scope? IOS-North project scope? Both? What are the limiting factors to the amount of financing that could be raised?

Similar to any high-speed rail system worldwide, government funding and financing support play a significant role in the capital structure. At an estimated total project cost exceeding $15+ billion each, the IOS-South and the IOS-North projects will require a significant public-sector subsidy in addition to any potential private financing. Even with the significant funding sources identified, including the remaining Proposition 1A funds and the estimates from the cap and trade program, the total funding identified is still insufficient to deliver one of the IOS scopes when considering the remaining funding needs for the rolling stock, stations, and test track. This shortfall, as well as the uncertainty around these sources, must be addressed.

Any transportation project financing worldwide in excess of $5 billion has required significant public support, including federal or multi-lateral agency backed financing facilities, export credit products, and large-scale grants. The largest recent P3 surface transportation project worldwide, Sud Europe Atlantique High Speed Line, in France, utilizes the largest loan ever awarded in France by the European Investment Bank, the largest loan of its kind ever made by the Caisse des Depots, and the first French government guarantee mechanism put in place in 2009 to encourage P3 financing.

Within North America, Eglington LRT represents the largest rail project financing to come to market, government milestone and completion payments brought the long term financing down to CAD $1.2 billion while the total capital costs exceeded CAD $5.5 billion. It's important to note that only two bidding consortiums formed during the procurement phase despite the public sector's significant outreach to encourage the forming of a third team. We estimate that the U.S. market could support a scope of approximately $5 billion (constrained by both the capacity of sureties to provide performance support as well as contractor balance sheets) so long as $3 billion of the construction financing is taken out with milestone and completion payments by the end of construction, leaving no more than $2 billion in the long-term debt markets.

Even with the participation of a TIFIA and/or RRIF loan at 25 to 44 percent of the financing, as well as export credit agency guarantor products, market capacity represents a significant limiting factor to the amount of financing that can be raised.

Similar to the conclusion reached by the UK government in determining the delivery and funding method to be used to advance the HS2 project in phases, Infra-News reported in June, "The government believes that the scale of the project is too large [estimated between $15 billion and $20 billion] for the private sector to be able to afford. 'It is beyond the balance sheet of companies concerned,' a source said." (http://www.infra-news.com/news/transport/1544026/public-funds-to-pay-for-bulk-of-hs2.thtml) Combining the IOS-North and IOS-South scopes into a single package totaling close to $35 billion is simply not financially feasible when considering either contractor or debt market capacity.

Critical to any financing program, regardless of the size, is a creditworthy counterparty for the long-term contract in addition to a committed funding source, independent of the use (i.e., ridership revenue) of the system. The CAHSRA will require backing or a second party, providing a reliable and sustainable revenue stream that can be relied upon over the financing term, to serve as a viable counterparty from a credit perspective. Furthermore, it would reduce financing costs for the Authority.

Isolating the funding stream risk from the operational demand risk is key. Greater certainty around the availability of the cap-and-trade dollars is necessary beyond simply the portion of total cap and trade dollars (i.e., 25 percent of the GGRF). The amount of future cap and trade dollars will be affected by the amount of future auction revenue driven by the number of state allowances purchased, as well as the selling price. Legislative changes could create significant shortfalls or even eliminate the funding source altogether. These market-driven risks, as well as the exposure to change in law, represent exposure that is best borne by the public sector, as the private entity delivering the DBFM scope cannot control or mitigate these risks. A clear understanding of the funding stream available to deliver other contracted elements of the project, particularly those supporting the segment of the project (i.e., stations, rolling stock, OCC), as well as any future extensions of the system, will also be necessary.

8. What changes, if any, would you recommend be made to the existing funding sources? What impact would these changes have on raising financing?

Please see our response to Question 7, specifically the certainty around the availability of the cap-and-trade funding sources and the creditworthiness of the public counterparty.

We recommend that the Authority explore its ability to leverage the near-term cap-and-trade funds available to publicly finance CP 5 and CP 6, in addition to the civil works and track and traction power for IOS North (for example).

Having established greater certainty around the cap-and-trade funds, as well as the creditworthiness of the counterparty (be it CAHSRA or the State, for instance), the Authority could then advance the IOS North systems work (including the long-term maintenance of the then-existing test track), as well as the stations and OCC work, as separate P3s. A priority of payments will address any long-term availability payment and the outstanding debt service payments.

9. Given the delivery approach and available funding sources, is an availability payment mechanism appropriate? Could financing be raised based on future revenue and ridership (i.e., a revenue concession)? Would a revenue concession delivery strategy better achieve the Authority's objectives?

If the Authority elects to deliver the project under a DBFM procurement, an availability payment is essential. The AP must come from a creditworthy counterparty with a committed funding source, not be subject to the operational risk of the system, and be subject to a reasonable and manageable performance regime. The term, however, should not extend beyond 30-35 years, as there are few financing products that extend beyond that term that would provide value for money to the Authority.

Financing could not be based on future revenue and ridership at this time. At best, the Authority should look to support operations and maintenance from ridership revenue, as is currently contemplated. With no ridership history on this corridor and limited HSR use in the United States, projections are unreliable and not likely to support an acceptable and bankable ridership and revenue study. In the future, when the ridership potential is demonstrated, so long as the operating funds exceed operational costs or can be isolated from such costs, ridership revenues could be leveraged for extensions of the system.

C. TECHNICAL QUESTIONS

10. Based on the Authority's capital, operating, and lifecycle costs from its 2014 Business Plan, describe how the preferred delivery model could reduce costs, schedule, or both. Please provide examples, where possible, of analogous projects and their cost and/or schedule savings from such delivery models.

Although the preferred delivery model is known in the rail industry, it is not widely used. Multibillion-dollar projects usually result in only a couple of consortiums competing, and their risk pricing would inflate their bids compared to smaller packages that have fewer, more specifically defined risks. The primary reason that the preferred delivery model has not met with much success is that it creates higher risk for technology companies, including signaling, communication, rolling stock, and dispatch system manufacturers, thereby reducing the competition. It is a widely known practice in the rail industry, especially in Europe and also now in the emerging markets in the Middle East, that technology packages are separated from the civil construction package. The main reason for this approach by the rail authorities is to diversify product supply sources, which in return reduces capital costs (CapEx), due to the high level of competition. It furthermore improves operation costs (OpEx), as spare parts prices are also competitive. It additionally allows the supplier to better manage its schedule and improve delivery times.

Data over the past 10 years from Europe and the Middle East and North Africa (MENA) region indicates that projects involving 100-plus miles of new construction of railroad have generally been packaged as follows (in no particular order):

- Right-of-way acquisition, utilities relocation, and advance civil work
- Track and passive infrastructure for electrification
- Civil work including tunnels and stations
- Signaling, communication, traction power, SCADA, and dispatch
- Rolling stock

These various packages are typically combined into one single package only when the rail network is divided into smaller sections of approximately 25 to 30 miles, and those sections are developed in various phases with each phase procured on a competitive bid basis.

Important Consideration of Interoperability:

The Authority must consider that the California High Speed Rail system will interconnect with other future networks in the United States, and it is therefore very important that technology and rolling stock purchased be commercial off-the-shelf (COTS), with open platforms able to integrate with any standard systems currently available in the market. For example, a future high-speed train from Nevada or Colorado should be able to travel on CAHSR tracks without requiring special additional equipment (a known problem with the Shinkansen solution). It should also meet most of the European System safety standards, such as Safety Integrity Level 4 (SIL4). These standards have been developed over the past 20 years and are being widely adopted in other parts of the United States for conventional systems.

11. *How does this compare to separately procuring each high-speed rail component (i.e., separate contracts for civil works, rail, systems, power separately)? Please discuss design/construction costs, operating/maintenance/lifecycle costs, and schedule implications.*

Procuring trackwork, signals and communications, and dispatch in separate packages, and implementing them in various phases, would get the work moving the fastest to provide ICS and test track. If planned for, it can also allow the Authority to put the system into passenger service in various segments, allowing for earlier usage of the system.

a) Design and Construction Costs:

The cost of a high-speed rail system, considered to be a system that operates at speeds over 220 mph (~355 kph), could range from $28 million/kilometer to $47 million/kilometer. Major cost-driving factors include the line design speed, topography along the alignment, weather conditions, land acquisition costs, the use of viaducts instead of embankments, the construction of major bridges across wide rivers, and the construction of stations. The typical duration to build 100 kilometers of double tracks in compliance with all the requirements from various local and federal authorities having jurisdictions could range from 20 months to 36 months, depending on the complexity of the alignment. The traction power system to energize 100 kilometers of high-speed tracks on a turnkey basis would take approximately 18 to 24 months. Likewise, other systems (signaling, communication, and SCADA) would be delivered in 20 to 26 months, depending on how many interlockings and grade crossings are within the segment.

With the aforementioned, if track, civil, systems, and traction packages are combined in one single package, the total duration of the project completion will be somewhere between three and a half and four years for civil and track, and another two and a half to three years for system and traction, making it a total of six to seven years implementation by one single consortium of contractors. Locking the prices of traction and other systems four to five years in advance of their procurement will result in transferring a very high risk of commodity price fluctuations for key raw materials, such as copper, silicon, and aluminum, for the product manufacturers and suppliers. This will result in high prices for the Authority and will also limit its ability to obtain the benefits of competitive pricing from various systems suppliers.

Looking at the delivery model of most of the major European high-speed railroads, including SNCF in France, ICE in Germany, and TrenItalia in Italy, all procurements were made in separate packages. Rolling stock was separate from traction power. Signaling and other systems were in one package. And civil work was in a separate package.

Separating these packages gives flexibility to the buyer (the Authority) to solicit offers at more competitive prices, as a wider range of firms with specific qualifications relevant to the package will participate in the bidding process, as opposed to a large civil consortium bringing only one supplier. Separating packages additionally enables the Authority to benefit from procuring the best technology solution available in the market in the shortest amount of time, as a variety of technology providers can qualify and participate. This also ensures that the latest technology will be utilized, considering that every five years, on average, technologies refresh. It furthermore allows for segments of the railroad to be put into early service, as well as complete the test tracks, yards, and repair workshop. Overall, it saves cost and delivers it faster. Combining all of the above, including civil, into one large package will slow the progress and increase the cost. The comparison to the Chinese high-speed rail network building 10,000 kilometers in eight years cannot be applied in the United States, particularly in California, due to its local and federal statutory requirements in addition to environmental, labor, and safety requirements.

b) Operational and Maintenance Costs

Traction power and rail systems are standard products. There are approximately eight to 10 world-class suppliers for traction power and at least six world-class suppliers for signaling, communication, and SCADA systems. The prices of the spare parts therefore remain very competitive, as well. Building the system in various packages will therefore not increase the O&M costs.

c) Schedule Implications

Combining traction, signaling, and communication into one package and implementing them in several phases will enable the Authority to put sections of the system into commercial use at an earlier date, thereby starting to generate revenue while the rest of the alignment remains under construction. There is no obvious technical benefit to packaging the entire corridor from LA to SF into one package; on the contrary, it creates risks for suppliers which in return increases the cost for the Authority.

12. For each project, are there any technical changes to the respective scope of work that would yield cost savings and/or schedule acceleration

It is our recommendation based on our global experience implementing large scale rail projects, that following civil construction packages the Authority create 3 major work packages (WP) and procure in the following sequence:

- WP1 – Rolling Stock
- WP2 – Track and Passive Infrastructure (duct banks, etc.)
- WP3 – Traction Power, Signaling, SCADA and Communication

WP1 would be the first package allowing for the long lead nature of rolling stock procurement and necessary test and commission timelines. The WP1 rolling stock procurement in a separate package, and prior to the remaining civil work solicitations for IOS, could help define tunnel sizing, structural weight requirements, etc. refining civil construction requirements, which would provide cost savings.

Following shortly afterwards would be WP2 and WP3 release. This allows systems contractors to influence the design that will determine track and civil work-related requirements that will be undertaken in WP2 by the civil contractors. Regarding WP1, the systems contractor will also determine what equipment will be required for the rolling stock.

WP3 design provides fundamental input to the civil design, and for the successful completion of civil work. Stations, tunnels and other civil work require knowledge of the location of all the foundations of the poles, location of the signal houses, under track infrastructure, signal locations, vertical shafts at the stations, and technical room sizes, etc. Additionally, as the system is a blended mix and will use shared tracks, it is highly likely that the Rail System will be similar to the European ETCS Level 2 of ERTMS system. This would require wayside Signaling, therefore requiring extensive infrastructure embedded in the track bed.

For WP2 and WP3 there may be different contractors. However, the Authority may specify in its requirements that the successful bidder shall provide an Interface Coordination team between both work packages, and also specify that a specific percentage (recommended 2 to 5 percent of the total contract value) will be paid upon successful completion and approval of combined services design (also referred to as Coordination Design) by both contractors. This model has been applied on several projects in Europe and yielded successful results in terms of interface coordination between track, civil and systems contractors.