Sacyr Concesiones

EXPRESSION OF INTEREST FOR THE DELIVERY OF AN INITIAL OPERATING SEGMENT

RFEI HSR#15-02

Date: September 28, 2015

CALIFORNIA
High-Speed Rail Authority

Friday, September 28, 2015

Ms. Rebecca Harnagel
California High-Speed Rail Authority
770 L Street, Suite 620 MS 2
Phone: (916) 324-1541
Fax: (916) 322-0827
Email: deliveryapproach@hsr.ca.gov

Re: **California HSR Expression of Interest RFEI #15-02**

Dear Ms. Harnagel,

Sacyr Concesiones S.L. ("Sacyr") respectfully submits its Expression of Interest ("EOI") in response to the California High Speed Rail Authority ("Authority") request for Expressions of Interest for the Delivery of an Initial operating Segment RFEI HSR#15-02 released on June 22, 2015, as amended.

As a duly authorized representative of Sacyr, I hereby certify that we are submitting individually as Sacyr Concesiones S.L. Our P3 Concessionaire is comprised of highly specialized engineers and veteran designers who are committed to providing the Authority with the very best, first high-speed rail system in the United States.

Internationally known, Sacyr Group is globally recognized conglomerate that has constructed some of the most challenging projects across the Globe. Sacyr Concesiones S.L. touts experienced problem solvers and professionals with varied backgrounds who will ensure a successful outcome for the California High-Speed Rail System. We look forward to demonstrating our capabilities in a future procurement opportunity.

Sincerely,

[redacted]

Carlos Berriochoa Alberola
Investment Director
Sacyr Concesiones S.L.
Paseo de la Castellana, 83-85 7th Floor
Madrid, SPAIN 28046

RESPONSE TO CHSRA QUESTIONS

11.3. FIRM EXPERIENCE AND TEAM STRUCTURE

> ***The EOI should include a brief statement describing the Respondent's experience with similar projects and similar services. To the extent that the Respondent is submitting an EOI as part of a joint venture or consortium, then the EOI shall include a description of the proposed team structure, including what strengths and experience each entity brings to the overall team.***

Sacyr Group is a global infrastructure firm which operates in more than twenty countries on five continents. We are a world leader in the design, construction and management of infrastructure projects worldwide, with unparalleled expertise in delivering high speed rail. With headquarters in Spain, Sacyr has been operating in the U.S. since 2002 and currently maintains offices in Washington DC and Miami, Florida.

Sacyr's main business lines have a project orderbook in excess of $29 billion. These include:

- Construction
- Infrastructure construction and maintenance concessions
- Public services
- Industrial

Sacyr maintains an extensive orderbook, which reflects our ongoing development of strong business and technological capabilities and supports the company's ambitious international expansion plans.

Sacyr is a publicly listed company on the Madrid stock exchange. Sacyr is also part of the IBEX-35, an index comprised of the most liquid Spanish stocks traded on the Madrid Stock Exchange. Sacyr's public ownership and high-profile presence in our domestic market guarantees compliance with transparency and reporting policies of the Spanish Securities and Exchange Commission.

As described above, Sacyr has extensive experience in the rail sector in general and, specifically in the HSR infrastructure. With more than fifteen years of experience in HSR, Sacyr has completed more than 40 projects for twelve different HSR lines totaling over 226 miles, including infrastructure, rail track, traction power or Overhead Contact System (OCS) and systems (signaling and communications).

Sacyr has developed and constructed over 577 miles of rail track, acting as a contractor and/or concessionaire. Our rail experience also includes conventional rail, HSR, streetcar and metro lines in different countries such as Ireland, Italy, Portugal, Spain, Brazil and Mexico. Sacyr has also delivered over 334 miles of OCS.

SACYR's EXPERIENCE IN HSR PROJECTS

ACTIVITY	FIGURE
HSR Substructure Projects	43 projects
Total HSR Substructure Length Built	226.1 miles
HSR Track Projects	16 projects
Total HSR Track Length laid	157.1 miles
Total HSR Overhead (OCS) length executed	163.6 miles
HSR corridors maintained	3 corridors
Total HSR length maintained	773.0 miles
Total Track length laid (incl. conventional rail)	577.4 miles
Total OCS length executed (incl. conventional rail)	334.7 miles

(*) In Spain project scopes are typically procured using four tiers: (i) Substructure, which includes everything below ballast, (ii) Track, which includes track and ballast, (iii) OCS, and (iv) Systems.

As part of the 226 miles of HSR infrastructure developed, **Sacyr** has successfully delivered:

- Over 13 miles of bridges.
- Over 64 miles of tunnels: 22.4 miles using the New Austrian Tunneling Method (NATM), 7.8 miles of Top-Down Cut and Cover, 11.1 miles of Bottom-Up Cut and Cover and 23 miles using Tunnel Boring Machines (TBM).
- 7 HSR stations.

Sacyr's long term commitment to project success and optimal risk transfer is further demonstrated by our HSR maintenance experience. Through its subsidiary NEOPUL, Sacyr has provided or has been providing maintenance for three HSR corridors totaling approximately 1,171 miles of OCS and 773 miles of ballast track. We have included below descriptions of two remarkable projects that illustrate Sacyr's exceptional capabilities in the area of HSR infrastructure:

- **Spanish HSR Line Madrid-Zaragoza-Barcelona-French Border.** Segment: Barcelona, Sants-La Sagrera – Sacyr was responsible for design and construction of 3.2 miles of tunnel of 34.1 feet inner diameter. Excavation works were performed using an Earth Pressure Balance TBM through a heavily developed area in downtown Barcelona that included some of the most important historical sites and structures in Spain such as Sagrada Familia Cathedral. Real time continuous monitoring of foundation shifts was achieved using robotic systems. A vertical shaft sinking machine was used for the execution of access and ventilation shafts due to the small area available and to avoid severe traffic impacts. This project demonstrates our ability to construct tunnel under extremely difficult subsurface and sensitive surface conditions.
- **Spanish HSR Line North-North West. Section: Guadarrama Tunnels** – Sacyr designed and constructed a twin-bore tunnel of 17.6 miles length and 27.9 feet diameter using two double shielded TBMs. Emergency evacuation galleries that connected both tunnels were excavated at a uniform interval of 820 feet and a large 1,640' evacuation hall was excavated as a cavern at the half-way point in the alignment.

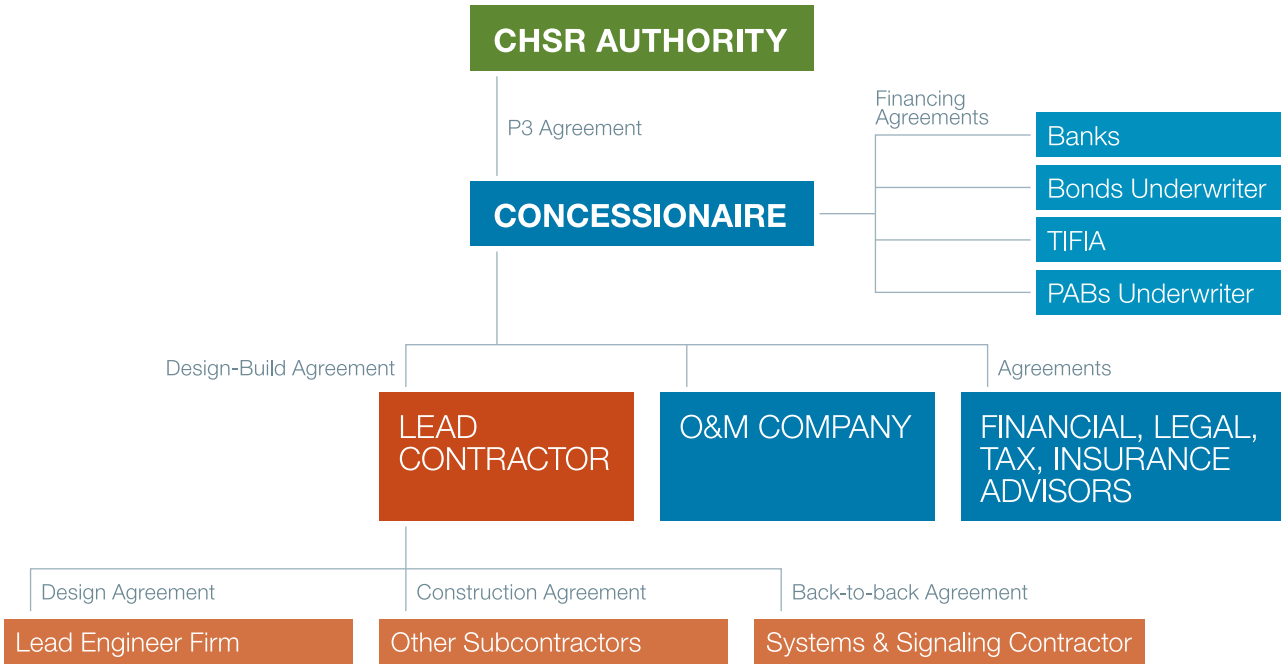
Concerning HSR maintenance SACYR/NEOPUL has been responsible for the maintenance of the following HSR corridors:

- Spanish HSR Line Madrid-Zaragoza-Barcelona-French Border. Traction Power systems maintenance services: Overhead Contact Line, electric substations and associated systems for the High Speed Line Madrid-Sevilla, Córdoba-Málaga (Cover page picture) y La Sagra-Toledo-Madrid-Zaragoza-Barcelona-Frontera Francesa, Zaragoza-Tardienta y Vandellós-Tarragona-Madrid-Valencia and Albacete-Alicante-Madrid-Valladolid Y and branch Olmedo-Medina in an overall extension of 293 miles double track (586 miles overall).
- Spanish HSR Section 2 Northeast Infrastructure Management. Preventive and corrective maintenance of the High Speed Overhead Contact Lines (300 miles double track overall) and of the substations of electrified lines of the Maintenance and exploration direction of the conventional network (585 miles).
- Spanish HSR section Gabaldón-Valencia and Gabaldón-Albacete. Infrastructure, track and turnouts maintenance of the new Madrid-Castilla la Mancha-Comunidad Valenciana-Región de Murcia railway access in an overall extension of 276 miles overall, and also Spanish HSR section 2 Gabaldón – Alicante. High speed infrastructure, track and turnouts maintenance. 3 sections: High speed line Madrid-Castilla la Mancha-Comunidad Valenciana-Región de Murcia in an overall extension of 289 miles.
- Spanish HSR Madrid- Calatayud stations. Infrastructure Maintenance, trackworks and turnouts. High Speed Line Madrid - Figueras. Scope: Brihuega and Calatayud stations.

SACYR'S EXPERIENCE IN P3 PROJECTS – SACYR CONCESIONES

Sacyr Concesiones is the concessions arm of the Sacyr group. We have extensive experience in delivering and maintaining P3 projects worldwide and a track record of more than 60 successfully completed projects over the past 18 years. The company has developed infrastructure assets in nine countries, including Brazil, Chile, Costa Rica, Colombia, Ireland, Italy, Peru, Portugal and Spain. Sacyr's P3 assets include highways, hospitals, transportation hubs, railroads, airports and highway rest areas. The company currently manages a global concession portfolio of 36 assets with a 28-year average remaining life.

Sacyr Concesiones provides design, construction, financing, operation and maintenance services to deliver state-of-the-art infrastructure projects as a one-stop-shop, using internal resources and capabilities within the group supplemented by local expertise. We draw upon the vast resources of other Sacyr Group companies as needed for individual projects. This relationship between companies within the same group ensures an integrated team, and alignment of interests, resulting in a higher efficiency which is a hallmark of any P3.



Sacyr has implemented the structure shown above with proven results and a high degree of client satisfaction. In our experience, a clear division of roles and responsibilities governed by specific and detailed agreements, and monitored by the concessionaire's staff, facilitates the completion of the entire scope and leads to highly successful, date-certain project delivery.

As described in this section, **Sacyr** is a strong infrastructure group, with extensive experience in the procurement and development of HSR infrastructure worldwide. We are therefore exceptionally well-placed to assist the California High Speed Rail Authority (CHSRA) to develop and implement this challenging project which is one of the most important infrastructure projects in not only California, but in the entire United States.

11.4. PROJECT APPROACH

> ***The Authority would like to know whether each Respondent is interested in the IOS-South cope, 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.***

It appears to us that the Authority is flexible in considering refinements to currently envisaged IOS's. Therefore, we have performed a high level analysis to examine both IOS North and IOS South together with a number of additional scenarios that included realistic refinements to the project based in publicly available information. It is important to note that we performed this analysis solely for the purpose of providing you with information that may be helpful in defining the full configuration of the IOS.

We have compared the IOS North and IOS South scopes, estimating investment costs on a comprehensive basis (all cost categories), and assessing them in the context of the population served by each option. This per-capita analysis provides an interesting preliminary range of likely outcomes. We further analyzed the main features of each segment of the IOS North and IOS South alternatives along with the corridor extensions San Francisco - San José and Burbank - Los Angeles taking into account the overall trackage lengths to evaluate the incremental benefit.

To better approach and define the different sections we included estimates on the recurrence of special structures such as bridges, viaducts and tunnels and the number of envisaged stations and their features considering that the projects may experience further evolution as final construction techniques and alignment options are refined. In addition, we considered the topography and size of the constituencies that would benefit from the projects.

The following features have been preliminarily identified and subsequently assigned to segments which are part of Phase 1 San Francisco - Los Angeles Section. We derived these numbers via the reference documents provided in the RFEI document. The served population figure resulted from aggregation of population along the project alignment, increasing population catchment area wherever we felt that adequate local transit service was available.

ID	SECTIONS	LENGTH (mi)	TUNNEL (mi)	BRIDGES & VIADUCTS (mi)	# MAIN STATIONS	# ANC. STATIONS	OROGRAPHY	SERVED POPULATION (million)
1	San Franciso - San José	46.5	10.3	16.7	3	0	Urban - Plain	2.53
2	San José - Gilroy	35.0	7.0	3.5	1	1	Periurban - Plain	1.11
3	Gilroy - Intersection (Chowchilla)	85.0	9.0	5.0	0	0	Plain	0.27
4	Merced - Intersection (Chowchilla)	12.0	0.6	0.5	0	1	Plain	0.29
5	Intersection (Chowchilla) - Northern End CP1 (Madera)	6.0	0.5	0.4	0	0	Plain	0.06
6	CP1	28.0	4.0	2.5	1	0	Plain	0.78
7	CP2-3	65.6	9.6	1.0	0	1	Plain	0.30
8	CP4	22.0	0.6	0.6	0	0	Plain	0.00
9	Southern End CP4 - Bakersfield	28.0	12.0	3.0	1	0	Urban - Plain	0.44
10	Bakersfield - Palmdale	113.0	19.0	15.0	1	0	Uneven - Wavy	0.40
11	Palmdale - Burbank	49.0	21.0	1.0	1	0	Uneven - Wavy	2.51
12	Burbank - Los Angeles	18.0	12.0	3.0	1	0	Urban - Wavy	9.04

Our objective was to develop a preliminary estimate to identify which alternative will potentially be more cost-effective and reach the greatest number of potential passengers. It is important to note that cost effectiveness and financial feasibility may not result in the same outcome.

These are preliminary numbers, presented at an order of magnitude level for the sake of demonstrating the value we can add to CHSRA's work through the decades of experience we have on a broad range of HSR projects.

ID	SECTIONS	IOS SOUTH (USD Mn)*	IOS SOUTH Extended (USD Mn)*	IOS NORTH (USD Mn)*	IOS NORTH Extended (USD Mn)*
1	San Franciso - San José				6,108.2
2	San José - Gilroy			3,075.6	3,075.6
3	Gilroy - Intersection (Chowchilla)			5,473.0	5,473.0
4	Merced - Intersection (Chowchilla)	741.8	741.8	741.8	741.8
5	Intersection (Chowchilla) - Northern End CP1 (Madera)	378.8	378.8	378.8	378.8
6	CP1	2,296.3	2,296.3	2,296.3	2,296.3
7	CP2-3	4,458.5	4,458.5	4,458.5	4,458.5
8	CP4	1,144.5	1,144.5	1,144.5	1,144.5
9	Southern End CP4 - Bakersfield	3,137.0	3,137.0	3,137.0	3,137.0
10	Bakersfield - Palmdale	11.845.5	11.845.5		
11	Palmdale - Burbank	5,826.2	5,826.2		
12	Burbank - Los Angeles		2,952.7		

The four options evaluated through our analysis have been the following:

- IOS South (Merced - Fresno - Kings/Tulare - Bakersfield - Palmdale - Burbank)
- IOS South Extended (including Burbank - Los Angeles section)
- IOS North (San José - Gilroy - Merced - Fresno - Kings Tulare - Bakersfield)
- IOS North Extended (including San Francisco - San José section)

The table below summarizes the analysis:

	IOS SOUTH	IOS SOUTH Extended	IOS NORTH	IOS NORTH Extended
Project Cost (USD Mn)*	29,828.7	32,781.4	20,705.7	26,813.9
Population served (Mn)	5.1	11.7	3.2	5.8
Per capita Cost (USD)	5,819.1	2,812.3	6,383.3	4,645.8

* Project Cost Estimates consider all associated costs including but not limited to civil works and platform

We believe that, although both the North and South options appear technically and financially feasible, the viability of IOS North section would be enhanced with the incorporation of the San Francisco - San José stretch just like the IOS South segment would also be boosted by the corresponding addition of the Burbank - Los Angeles segments.

This approach may also result in a large increase in the overall population benefited by both projects and could achieve an earlier commencement of operations for the San Francisco - San José and Burbank - Los Angeles segments than is currently envisioned.

The following findings may be helpful to the Authority in determining the final Initial Operating Segment:

1. The average cost per potential user for the IOS North is slightly higher than the average cost for the IOS South, but the delta is not significant enough to recommend one starter segment over the other.

2. If the Burbank - Los Angeles section was added to the scope of the IOS South (IOS South Extended), we estimate that the extra investment of approximately 10% (from roughly 30,000 million USD to 33,000 million USD), would potentially benefit twice as many tax-payers by tapping into the ridership potential of the Los Angeles metropolitan area.

   This option seems to be the most cost-effective and socio-economically favorable of the four options evaluated. The average cost per benefited tax-payer would be approximately half of the ratio obtained for the IOS South as originally defined.

3. We estimate that the inclusion of San Francisco - San José section in the IOS North scope (IOS North extended) would represent an increase of 30% in the overall investment level for IOS North but it would reach 80% more potential beneficiaries.

Without prejudice to Sacyr's interest in both projects, the outcome of our analysis shows that the most cost effective solution would be to extend IOS South to Los Angeles as the average cost per benefited tax-payer (2,800 USD approx.) would be half of the average cost of developing IOS South as defined through the RFEI (5,800 USD approx.). However, if funding concerns continue, IOS North is definitely the section with which to move forward as this section is the one requiring the smallest investment (even though the cost per benefited tax-payer is lower, similar to the IOS South section).

In summary, our analysis and observations, based on our extensive experience developing HSR lines, point to the need for further work on the definition of the initial operating segments in order to optimize them for feasibility. We presented a number of trade-offs that could be considered by the Authority in structuring the IOS. While IOS-North has lower capital cost, it offers limited ridership potential. On the other hand, the IOS South has significant connectivity potential with XpressWest and it is likely to generate more ridership per dollar spent, but it requires nearly 1.5 times as much capital cost.

Finally, we understand that a number of studies have explored the potential connection between XpressWest and CHSRA service through the High Desert Corridor. While we assume that of CHSRA's views on this connection will continue to evolve over time, publicly available documentation indicates that this connection could potentially result in an order-of-magnitude increase in ridership and revenue for CHSRA. We are well aware of the technical, institutional and financial difficulties in integrating the three different types of segments. Nevertheless, in our opinion, if XpressWest were able to raise the required capital to build the Victorville-Las Vegas segment, the IOS South Extended might become a very compelling option.

The Authority may also want to revisit the interpretation of the no-subsidy clause with the elected officials. It appears reasonable to request subsidy during initial years of operations (ramp up period). This will ensure that the Authority will have sufficient resources to cover the availability payments to the Concessionaire during the first years of operation, in which ridership revenue is very uncertain. Finally, we believe that technical requirements are well defined and feasibility accurately concluded.

Please bear in mind that while our very preliminary observations are based on decades of experience in developing HSR, and on publicly available data, they are based on order-of-magnitude numbers and need to be refined and corroborated using more reliable information.

SACYR'S APPROACH TO THE PROJECT

Sacyr will rely on the experience acquired in the successful delivery and operation of PPP Projects and the construction of large-scale complex projects requiring massive human and material resources, such as the construction of the Third Set of Locks of the Panama Canal, a design & built project which involved an average of 7,000 workers on the job at any given point. Both IOS North and IOS South will create thousands of jobs and bring huge economic benefit to the state. Sacyr's experience would help boost the performance of the Concessionaire and subsequently the project schedule.

Below are some of the key features that would be part of Sacyr's approach to the development regardless of which section is chosen as the Initial Operating Segment:

Seville Metro

- Integration of local and global expertise: Sacyr has successfully demonstrated its ability to integrate global expertise with local knowledge and experience to deliver mega infrastructure projects around the globe. We strongly believe that this fundamental partnership strategy will be a cornerstone in delivering California High Speed Rail projects. These projects combine both highly complex components that require specialized knowledge and expertise with traditional infrastructure work that may be performed by local firms. It is important to note that, as one of the most important infrastructure markets in the world, California is home to many highly specialized infrastructure firms which will play key roles in project delivery. Sacyr will adhere to its best practice and proven partnership strategy, through the incorporation of a range of relevant players both international and local such as key investors, designers, builders, operators, and local suppliers and subcontractors.

  Sacyr has developed a number of successful rail P3 projects. Sacyr collaborated with highly qualified firms to design, construct and operate the Seville Metro Line 1 (Spain) with capital cost of $744 Million. Sacyr's partners included a major Spanish construction company, a leading local company, the rolling stock provider and the Public Authority itself, as it participated directly in the concessionaire company as a minority shareholder. This project provides strong evidence of Sacyr's ability to approach complex projects from an integrated perspective.

- Interagency and Stakeholder coordination: An Initial Operating Segment, whether it is North, South or a variant, will traverse diverse geographic regions, as well as the jurisdictions of different local and county governments and Regional Transportation Agencies (RTAs). A successful delivery approach must include a comprehensive strategy to incorporate their valuable input. In particular, we understand that the RTAs, Amtrak, Caltrain, the Federal Railroad Administration (FRA) and several railroad companies along the corridor will play significant roles during the entire lifecycle of the project, from project development to operations and maintenance. Therefore, it will be very important to work collaboratively with CHSRA at the outset of the project to develop an effective interagency and stakeholder participation plan.

  The Seville Metro Line 1 Public Relations and Communications Office, run by the client, greatly facilitated interagency coordination. The Office stayed abreast of regional and local authorities' requests and also functioned as liaison between the concessionaire and the communities. Communications flowed in such a way that all stakeholders benefited from sharing construction schedule information provided by Sacyr. Local feedback was critical to ensuring a better understanding of urban space use and dynamics so that innovative solutions could be implemented.

- Environmental strategy: The segments that constitute the proposed IOS pass through a number of environmentally sensitive zones, major agricultural regions and degraded urban and peri-urban areas. These areas will definitely require the implementation of suitable preventive and corrective measures. It is particularly important that construction activities in urban environments be well coordinated, to reduce the impact on communities as much as possible, especially in larger populated areas such as San José, Gilroy and Bakersfield.

Reducing environmental impact was a major project requirement on the Seville Metro Line 1 project. Significant mitigation measures were implemented to reduce the impact of traffic diversions; protect waterways and river banks (accomplished through the construction of tunnels and viaducts); renovate urban areas, roadways, sidewalks, parks and recreational areas; plant new trees; protect existing adjoining buildings in advance of construction activity; and develop effective signage and community education programs for the construction areas.
Sacyr has developed similar projects such as La Sagrera – Sants HSR tunnel in Barcelona (Spain) with a capital cost of $230 million, which is the largest urban rail tunnel in Europe. It involved significant mitigation measures to control the potential impacts of vibration caused by excavation and tunneling activity on the foundations of the existing historical buildings in the city (particularly UNESCO World Heritage protected La Sagrada Familia), also resulting in minimum impacts on the communities and culturally important sites involved.

In addition, the integration with the existing regional commuting networks is one of the most relevant aspects which will definitely add value to the project. As described in the 2014 Business Plan, HSR service will be linked to regional rail networks such as Caltrain, BART, the Altamont Corridor Express, the Los Angeles Regional Rail Connector and the San Diego Metropolitan Transit System-Blue Line. We believe our expertise in the integration of HSR with regional commuter networks will provide a critical added value to the project.

Furthermore, as further expansion of the HSR is already contemplated, such as the connection of the IOS-North to Stockton and Sacramento via Merced, the XpressWest corridor connecting Los Angeles and Palmdale to Las Vegas and Denver, and the High Desert Corridor linking Palmdale and Apple Valley in San Bernardino County, it will be crucial to heighten awareness of the project and improve communication and transparency with the relevant stakeholders, to ensure success in delivering the project.

CONCLUSION

Sacyr is tremendously excited about participating in the development of both the IOS South and IOS North, however they are ultimately defined and prioritized.

Our preliminary observations point to the fact that extending the Initial Operating Segment to the major cities (Los Angeles and San Francisco) can significantly improve the cost effectiveness of the project, based on cost per resident served. A detailed Benefit Cost analysis can shed more light on these preliminary observations.

We believe that the viability of IOS North would be enhanced with the incorporation of the San Francisco - San José stretch (IOS North Extended) as the IOS South would be boosted with the corresponding addition of the Burbank - Los Angeles section (IOS South Extended). The 2014 business plan seems to indicate a different phasing in terms of extending the IOS chosen in the opposite direction to the one we propose. Independently of the Initial Operating Segment ultimately chosen, focusing the CHSRA's efforts on the completion of a link that includes one major population center at one end (either San Francisco or Los Angeles) will boost ridership and revenues early on and enhance the project's feasibility and attractiveness to the private sector.

This approach may also result in a large increase of the overall population benefited by both projects and could be useful in order to accelerate the scheduled start of operations for the San Francisco – San José and Burbank – Los Angeles sections (now planned for 2028).

With regard to funding, per our understanding, it is key to be consistent with requirements of Proposition 1A and other funding sources such as Cap and Trade as well as Authority Policies and Goals when identifying and delivering an IOS.

Based on the 2014 Business Plan, it appears that, excluding Cap and Trade revenue, there is a funding shortfall of approximately $20B to meet capital cost requirements. While forecasts of Cap and Trade revenue may be uncertain, based on the LAO report it appears that approximately $5B can be expected by 2020. Thus, a substantial funding gap for meeting capital cost requirements exists even after accounting for Greenhouse Gas Reduction Fund (GGRF) revenue. Our observation is based on a likely GGRF revenue level of $15B, as noted in the LAO report, and 33% of GGRF revenue being directed CHSRA projects. Obviously, a higher level of GGRF revenue can have substantial impact on the funding gap. Given that both segments would require similar unit O&M costs, the funding gap for the capital cost of IOS North would be much smaller than that of IOS South and perhaps can even be bridged if GGRF contribution is higher than $5Bn.

Finally, the available information on ridership forecasts is not sufficient to derive revenue estimates for partial segments (e.g. the IOS South) as presented in the RFEI. Therefore, it is difficult to comment on the commercial viability of the operations. However, based on the terminal points and the alignment of the segment, it is our opinion that the revenue from ridership may not be sufficient to cover all O&M cost. It is worth reiterating that HSR experience from around the world suggests that it is very difficult for the farebox to support O&M unless the rail line connects two significant population centers. Therefore, it may be difficult to achieve a commercially viable operation if operating subsidies are not granted after construction.

11.6. COMMERCIAL QUESTIONS

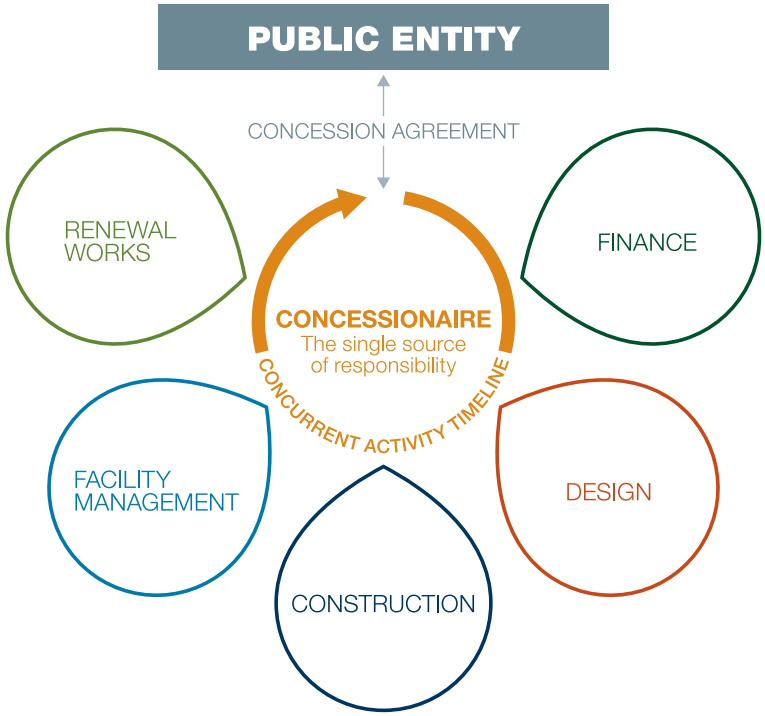
> **1.** ***Is the delivery strategy (i.e. combining civil works, track, traction power, and infrastructure) likely to yield innovation that will minimize whole-life costs and accelerate schedule? If so, please describe how.***

THE TRADITIONAL DELIVERY METHOD

With the traditional delivery method, innovations or efficiency solutions are conducted primarily by the design firm, with little interaction from other players, who may have innovations and solutions to contribute as well. As a result, CHSRA would be required to act as construction and project manager, overseeing each of the players involved in the project delivery separately, which is a demanding task and does not allow for the same level of risk transfer and optimization.

THE P3 DELIVERY METHOD

Through the P3 delivery method such as the one proposed, which bundles a wide spectrum of tasks, all innovations and solutions are fully led by the concessionaire, and cost benefits associated with these innovations or solutions become savings during the life of the asset. The unified P3 service simplifies the public entity's role as the owner of the facility and client of the P3 developer, and favors ongoing communication flow and coordination among the different stakeholders of the project. Finally, flexibility offered by a P3 mechanism is often misunderstood. The public entity defines the contract structure, including roles, responsibilities, risk allocation, and the extent of services from the concessionaire. The public entity retains the overall supervisory and management role that allows them to ensure that the concessionaire is adhering to the terms and conditions set forth in the P3 agreement. A P3 delivery mechanism offers the owner options and flexibility that a traditional delivery method cannot.



In summary, there are the five ideas that we will further develop below in relation to the delivery strategy:

- It is a **great idea to use a P3** as the delivery method to meet CHSRA goals, delivering the infrastructure on time and adding cost certainty.
- It is certain that combining civil works, track, traction power and infrastructure within the P3 scope will yield innovation, minimizing life-cycle costs and accelerating schedule.
- Systems (as defined in item 7.2.4 and 8.2.4 of the REI) should be procured separately.
- It is a good idea to procure the rolling stock and the train operator role under a separate contract.
- Stations could be added to the scope of the IOS contract.

> ***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.***

We recommend **procuring systems and signaling separately.** In our opinion, this approach provides the following benefits:

ENHANCED COMPETITION	MORE FLEXIBILITY FOR CHSRA	ACCELERATED DELIVERY	NO CHANGE IN RISK TRANSFER
Competition will result in better prices for the Authority and increased small business participation. Few companies have capacity to supply systems and signals for such a large scale HSR network, and with such high design speeds. Without a doubt, keeping systems bundled with the rest of the projects would drastically reduce the number of competing teams, make it harder for local small businesses to participate, and likely result in higher costs for the CHSRA.	The Authority should not have to be committed to one system at an early stage of the project. Our experience shows that "true compatibility" among various system providers does not exist, meaning that CHSRA may have to live long-term with the constraints of the system provider for the first IOS if the system is bundled with other components of the project. This approach will result in less flexibility for the Authority and the project.	CHSRA has limited resources available to develop, run and manage procurements. The Authority can focus and expedite civil work first, procuring a system and signal contractor when it becomes necessary. This will likely result in the overall acceleration of program delivery.	It is important to note that the characteristics of risk transfer, including integration and interface risk, can be achieved exactly the same way in both scenarios i.e. with or without bundling of systems and signals into one contract.

A separate contract for systems will allow CHSRA to take a big-picture approach, considering system-wide solutions for the whole network. The P3 contract will obviously include an interface agreement to ensure a smooth interaction between the systems contractor and the P3 concessionaire that will allow a timely delivery of the project.

> **2.** ***Does the delivery strategy adequately transfer the integration and interface risks associated with delivering and operating a high speed rail-system?***

A **P3 delivery approach** is shown to optimize overall risk allocation including integration and interface risks associated with delivering and operating a high speed rail system. It should be noted that our recommendation to procure systems under a separate contract has no impact on transferring interface and integration risk.

To achieve this outcome, an interface agreement should be put in place, creating a contractual relationship between the P3 concessionaire and the systems provider. The interface agreement would clearly establish the mutual obligations of the parties while working together on the same segment, and allow them to issue claims to each other for damages if obligations are not honored, without recourse to CHSRA.

What are the key risks that will be borne by the State if such risk transfer is not affected?

We believe that ridership revenue risk and ROW acquisition risk should remain with the public sector, no matter what delivery method is chosen. The other key risks that the state will almost certainly face, should it decide not to do a P3, are cost overruns and delays. Both of these risks are potentially very significant and can effectively be avoided by structuring the IOS as a P3 with availability payments.

The state should retain ridership (revenue) risk, under any delivery method. This is because the IOS will attract a commercially viable number of passengers only after the two main cities (San Francisco and Los Angeles) are linked. Only the state has the authority to make this happen, and the timing of full system operation and the duration of the ramp-up period are out of the control of any private partner.

It would also be advisable, in order to speed up the delivery of the project and manage the costs associated with acquiring linear real estate parcels, that the State retain responsibility for Right of Way (RoW) acquisition, especially where a large number (i.e. >20) residential properties are required for the project alignment. In this manner the RoW acquisition process can advance in parallel with the procurement, award and design phases of the project. In some P3 projects the concessionaire is responsible for ROW acquisition with assistance from the government to exercise its powers of eminent domain as required, but this course should be pursued only on smaller-scale projects where a small number of residential properties are included in the project requirements.

Remaining risks should be allocated between the private and the public sectors following industry standards. A basic principle governing the optimal risk allocation is that each risk should be allocated to the party that is best equipped to manage it.

If the P3 delivery method is not implemented then the State may not be able to achieve optimal risk allocation. We have proposed a sample risk allocation for the CHSRA.

PROPOSED RISK MATRIX ALLOCATION

RISK	CHSRA	CONCESSIONAIRE	OTHER
NEPA Approvals	✔		
Right of Way	✔		
Traffic volume / demand risk	✔		
Financing		✔	
Permitting		✔	
Design		✔	

PROPOSED RISK MATRIX ALLOCATION

RISK	CHSRA	CONCESSIONAIRE	OTHER
Utilities		✔	
Ground Conditions		✔	
Construction cost and term		✔	
Quality Assurance/Quality C.		✔	
Infrastructure maintenance cost		✔	
Life-cycle cost		✔	
Stations (construct & operate)		✔	
Systems (signaling and communic.)			✔
Rolling stock (supply & operate)			✔

What are the key risks that are most appropriate to transfer to the private sector?

We believe that the private sector is positioned to manage the following risks:

i. Deliver the entire project at a fixed cost, within a fixed timeframe and per the contractual requirements in the P3 agreement.

ii. Effectively provide for the availability and maintenance of the facility per the contract specifications for the duration of the concession term. In the event that the ridership risk is not fully retained by CHSRA, O&M costs should be proportional to service demand so as to not jeopardize the final feasibility of the project.

iii. Transfer the completed project back to CHSRA in an appropriate state of repair as defined by the handback clause in the P3 agreement.

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)?*

We believe that the components that should be included in the scope of work for each project are the ones specified on the table above: financing, permitting, design, utility relocation, construction and maintenance of infrastructure and superstructure and potentially stations.

We agree with CHSRA that there are some elements that could be extracted from the global scope of work due to their particular features, such as rolling stock, train operations, certain systems, and station facilities. In such a large network, this approach is probably the most appropriate to meet the goals of CHSRA.

However, even if the final scope varies, we feel confident in our ability to provide an integrated delivery. For instance, the Seville Metro Line 1 P3 project included the design, construction of railroad infrastructure, stations, all facilities and systems (including the overhead line and energy supply) and operation and

maintenance, as well as the rolling stock. We believe that our experience could be valuable for the CHSRA in providing an integrated, highly-qualified service with a sole contractor.

Whether a fully integrated approach is adopted or not, we strongly recommend implementing a detailed set of Key Performance Indicators (KPIs) that will allow for identification of the primary responsible party for each failure. This is because a single malfunction can affect the service levels of several distinct contractual areas and KPIs affect the amount of the availability payment. It is important to define the different areas of responsibility to clarify the interfaces between the different components of the system and avoid potential issues such as conflicts of interest and double-counting in penalties.

In particular we would recommend including the Stations in the scope of the P3 contract for the reasons described in the next response.

> ***If so, how will this help meet the Authority's objectives as stated in this RFEI?***

If CHSRA bundles the stations in the scope of the P3 contract they could benefit from the fact that the same contractor will bring synergies, and will eliminate discussions among different players. Also the availability payment mechanism could easily be used to pay for the maintenance of the stations, streamlining the operations of the whole facility.

Stations are not typically high-complexity components that require specific manufacturing expertise, therefore it is unlikely that CHSRA will derive any benefit from excluding them from the P3 scope. Moreover, including stations in the scope is likely to help increase the level of SBE, DBE, DVBE and MBE participation. However, we also understand that there are many factors in addition to risk transfer that affect such decisions, including those driven by various stakeholders, and that CHSRA might wish to procure some specific stations that are considered city landmarks under separate contracts (i.e. Transbay Terminal in San Francisco or ARTIC in Anaheim).

> **4.** ***What is the appropriate contract term for the potential DBFM contract?***

We would recommend staying within the industry-standard terms which are 30-50 years, but longer terms could also be contemplated depending on the requirements of the Authority.

> ***Will extending or reducing the contract term allow for more appropriate sharing of risk with the private sector?***

Assuming that ridership risk is retained by the CHSRA, the basic impact of the duration of the concession term is twofold: (1) from a risk transfer perspective, an extension of the contract will allow the public sector to transfer a much longer term risk while (2) from an affordability perspective, the reduction in the amount of periodic payment may improve the financial feasibility and/or the cash flow of CHSRA. In our experience, it is solely a public sector decision and it seldom has any impact on other risk transfer.

> ***If the Respondent recommends a different delivery model, what would be the appropriate term for that/those contract(s)?***

We would not recommend a different delivery method due to the significant advantages of a P3 delivery in terms of protecting the government and tax-payers from cost overruns and delays in delivery. However, Sacyr has strong credentials in design-build contracting and design-bid-build contracting and will be equally interested in CAHSR if the Authority decides to adopt traditional delivery mechanism.

> **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?*

In defining the size, CHSRA should keep in mind the following factors:

- Risk concentration
- Synergy and economies of scale
- Adequate competitive landscape
- Small business participation
- Bankability of the project

We recommend that the individual P3 contracts have a capital value that does not exceed $4 billion for the following reasons:

- While economies of scale can be achieved in larger projects, experience shows that beyond a certain project size, other factors materialize that may negatively impact CHSRA's interests.
- If a project is too large, only a small number of companies will have capacity to complete the project scope. The result is that there could be reduced competition, which will inevitably the drive prices up.
- Smaller segments provide multiple opportunities for CHSRA to refine its approach. By issuing smaller contracts, CHSRA can compare how each P3 contractor progresses and solves the problems encountered.
- While large scale financings have been completed in the private markets, in case of exceptionally large financings for high technology projects like the California HSR system, the bankability of the project could be negatively impacted, complicating and making the project more expensive.
- Lastly, smaller contracts provide more opportunities for local contractors to participate in the HSR.

> *Do you think that both project scopes should be combined into a single DBFM contract?*

Although combining the two projects into one might seem attractive from a of simplicity perspective, we do not believe that the two projects should be combined into one, because the scale of the combined project would be too large to take advantage of all the benefits of economies of scale and risk transfer and still avoid the pitfalls described above. Finally, corporate completion guarantees required by the private financial markets may be unavailable for projects above a certain capital cost threshold (c.$4 billion).

However, we can state with strong confidence that Sacyr has a proven track record of managing large and complex projects, for example the expansion of the Panama Canal, which is one of the largest infrastructure projects in the world. Sacyr is the lead contractor of this design-build project which is about to be commissioned. It entails colossal amounts of excavation (over 80 million cubic yards), concrete (6 million cubic yards), and reinforced steel (240,000 tons – enough to construct 22 Eiffel Towers).

6. *Does the scope of work for each project expand or limit the teaming capabilities?*

We believe that the scale of these projects will require coordination between several companies teaming together. As mentioned above, we recommend that CHSRA carefully consider the trade-offs between harnessing the economies of scale and risk transfer among the parties and difficulties that may arise in an ultra-large P3 project (see Question 5). We strongly believe that a proper consideration of above trade-offs would indicate the optimal project size in the range of $3-4B.

Does it increase or reduce competition?

We believe that there are several parts of the overall scope which, if included as part of the contract, would limit competition as described above.

11.7. 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?*

Issues in raising financing for an availability-based P3 project critically depend on the quality of funding sources, as perceived by the lenders and typically based on the credit rating, and the level of commitment i.e. the position of the availability payments in the waterfall.

Clearly defined, credible sources of funding available for the duration of the project, and with a reasonably high level of commitment, would minimize the issues with raising financing. Based on our understanding of the financial analysis in 2014 Business Case, assuming that allocated Federal funding does not expire and the Authority is able to obtain local funding matches to access the full value of funds available under the Proposition 1A limit (i.e. a combined total of $12.5B), the IOS South would still need another approximately $20.9B. The two major sources identified in the Business Case available for bridging this gap include Cap and Trade and fare box revenues.

It is our understanding that Legislative Analyst's Office (LAO) has estimated that the total revenue from Cap and Trade through 2020 will be in the range of $12B - $45B. Assuming that CHSRA gets 1/3 of the Cap and Trade revenue, the overall project funding gap would range from $6B to $17B. The project has already received several billion dollars in Federal funding, which are being allocated to the starter segment between Merced and Bakersfield. In our view financing will be very difficult to secure if it the sole source of repayment will be Cap and Trade revenue. The project finance markets typically require funding sources that are directly related to the project being financed, and a loan secured by a separate state-level program that would be subject to separate political interests and unpredictability in revenue is unlikely to be well-received in the capital markets. Our strong recommendation is for CHSRA to provide availability-payments that are backed by an agency of the state using dedicated local, state, and federal resources.

It is not possible to predict what the future role of the Federal government will be in helping to bridge the project's funding gap. It is unlikely that additional federal allocations will occur until well after the next presidential election.

It is possible that the project could access a RRIF loan from the Federal Railroad Administration and/or TIFIA loans, and it would be beneficial for the successful private partner if CHSRA could approach both institutions early in the process to socialize the project and its funding sources to ensure compliance with existing Federal policies. The role of the RRIF and TIFIA programs in helping California High Speed Rail become a reality should not be underestimated, as they will add flexibility and help the project reach financial feasibility. In the end, however, they will need to be backed by real funding with clearly spelled-out commitments and timelines in order to generate the kind of credit-worthiness that will be necessary for both private and government lenders to consider financing the project.

We do not have sufficient information about future public funding at this stage, nor do we know how the CHSRA plans to treat the risk associated with Cap and Trade revenue, both in terms of the ultimate overall size of the Cap and Trade program and in terms of how much of it is actually allocated to the HSR project.

Fare box revenue projections appear strong for Phase 1, but this is highly dependent on actually linking the two center cities, San Francisco and Los Angeles, as they would significantly boost system wide ridership. IOS scenarios short of the SF/LA connection will likely not generate sufficient ridership to even support O&M costs.

Once the funding sources, their amount and their position in the waterfall from each source are identified, we will be able to answer this question with greater certainty.

> *IOS-North project scope?*

The same comments stated above for IOS South apply to IOS North. However, IOS North requires an initial investment that could be 35 to 40% lower than that of IOS South. Therefore, if a funding gap indeed exists, it should be easier to bridge it for IOS North than for IOS South.

While the unanswered questions about future federal or new sources of funding for the California HSR project are the same for IOS-South and North, there are some interesting opportunities associated with the IOS-North. The future high-speed rail terminal is being built at the Transbay Transit Center in San Francisco, and Caltrain is preparing to electrify the corridor between San Francisco and San José, which will be shared with high speed rail service. Joint operations along that corridor need to be considered further. Folding these projects and services together may offer efficiencies as well as access to funding and operating revenues that could open up a better mix of financing options and get the ultimate link between SF and LA delivered sooner. There are challenges stemming from the complexity of the underground link between the existing Caltrain depot and the Transbay Transit Center and others raised by right-of-way issues and community opposition along the alignment. The more flexibility there is to modify and combine those projects as currently proposed, the more likely we will find financial feasibility.

Both IOS North and South?

Leaving aside the fact that an even larger project scope would pose a significant funding challenge in terms of initial funding, it is clear that the sooner the whole Phase 1 (i.e. between San Francisco and Los Angeles) is completed, the higher the ridership revenue will be. We believe that ridership revenue will show an increase by an order of magnitude when the entire phase 1 is opened, and that the increase would be more abrupt that the one forecast in the business model. Moreover, XpressWest may play an important role in bringing a much needed induced ridership to IOS south and the entire Phase 1 HSR. We consulted various studies performed by LA Metro and publicly available information on XpressWest and believe that an integrated study of this corridor in conjunction with IOS South and/or entire Phase 1 may be very helpful in identifying a self-sufficient segment that leverages the above mentioned non-CHSRA corridor.

What are the limiting factors to the amount of financing that could be raised?

The amount of financing is generally limited by the following factors:

i. **Credit Quality of the Funding Sources/Owner:** It is well known that the credit quality of pledged funding (such as Proposition 1A and sources of local match) will play an important role in raising financing for the project. In particular, we would like to highlight the following sources of funding:

   a. **Treatment of Cap and Trade Revenue:** As noted by the LAO and various other analysts, the forecasted revenue from Cap and Trade depends on a large number of unknowns and are therefore highly uncertain. While Cap and Trade is clearly expected to generate a significant amount of revenue, a financing based on pledging Cap and Trade revenue will present substantial difficulty and higher costs. Furthermore, the duration of Cap and Trade does not appear to be determined which may pose another difficulty in raising money. The CHSRA will benefit from absorbing the risk of Cap and Trade revenue, which can be achieved by securing a guarantee from the State for a level of revenue that both the State and CHSRA agree is reasonable and achievable.

   b. **Ridership and Revenue Allocation:** As mentioned above, raising financing based on fare box revenue will be very limited and likely expensive. For this reason, the CHSRA may want to securitize the future ridership revenue but pledge other robust funding sources for availability payment. This would likely reduce the cost of borrowing capital as well as increase the amount of money that can be raised.

ii. **Commitment of matching funds:** We understand that Proposition 1A funds can be fully utilized only when local matching funds are made available. Similar to the above points, the quality of pledge to support the local match (either by the local authority or CHSRA) will also have impact on amount and cost of financing.

iii. **Capacity (availability) of the financial system:** At the most basic and arguably theoretical level, the amount of financing that can be raised will depend on the capacity of the debt and

equity market. While there is significant capacity in the financial markets for infrastructure assets, the amount of financing needed by the HSR system is unprecedented. Therefore, we would recommend that CHSRA procure projects of increasing size, starting with a size that is $1.5 – 3b, be considered to "test the market" without putting the entire IOS at risk.

iv. **Delivery Risk:** It is obvious that raising financing for a relatively "risky" project will likely be both limiting and expensive. While projects similar to the HSR have been constructed around the globe, the only delivery-related risk arises from size of the currently planned project that may be bigger than the largest P3 project in the US history by an order of magnitude. The Authority may want to mitigate this risk by starting with a reasonable size project which is comparable with some of the largest P3 projects in U.S.

8. *What changes, if any, would you recommend be made to the existing funding sources?*

The funding sources are appropriately identified in the business case. We recommend that, with the exception of federal and Proposition 1A funds, funding sources are used for internal purposes. The State of California should use other less uncertain pool of money (e.g. General state fund) for pledging purposes.

In addition, we believe that the scale of the projects should be linked to the existing funding sources: an ultra-large project will be difficult for both the public and private sector partners to deliver.

What impact would these changes have on raising financing?

Our experience shows that changes as proposed above will likely reduce the financing cost and increase the amount of financing that can be raised.

9. *Given the delivery approach and available funding sources, is an availability payment mechanism appropriate?*

Absolutely. The availability payment mechanism is the best way to ensure (i) the bankability of the project, (ii) high-quality private sector participation, and (iii) and adequate risk sharing.

The IOS segment passenger revenue depend entirely on how quickly the whole corridor is completed, what other connections are constructed in the future, and how well the train stations are connected to other means of transportation. None of these factors can be managed or predicted by the private sector, and therefore a demand-risk sharing may not be viable for this project.

The Seville Metro Line 1 P3 Project, for example, where Sacyr was involved, was based on an availability payment mechanism. Although it included a small income percentage in the concept of "demand-sharing risk", it was capped, limiting the risk exposure of the concessionaire. In this particular project, investors accepted this risk because it was manageable by the concessionaire to a certain extent, considering that the project scope included the rolling stock and the full operation of the line. Another important factor was that the whole line was opened at the same time, ensuring full functionality for users from day one.

Could financing be raised based on future revenue and ridership (i.e. a revenue concession)?

We doubt that competitive financing could be structured at the outset of the project, given the nature (i.e. ridership for a new high speed rail) and size of the project. It should be noted that no greenfield HSR has been successfully delivered in the past through ridership risk transfer. Additionally, it is likely that the IOS that is the subject of the initial procurement will not reach both San Francisco and Los Angeles, resulting in reduced ridership expectations. The track record of greenfield user-pay P3 projects in the U.S. is negative, and both equity investors and the capital markets will likely face challenges in obtaining internal approvals required to undertake very large-scale projects that rely on ridership revenue as the sole source of debt repayment.

The two observations combined with our experience with lenders and other equity providers lead us to conclude that it will be extremely difficult, if not impossible, to raise financing based on untested ridership risk.

As an example, the HSR Figueres-Perpignan line, in the International HSR line from Madrid to the French border, is one of the few examples of a P3 model in HSR in the world. This P3 relies significantly on revenues associated with utilization of the line (per-train fees). Schedule savings in the design, acquisition of right of way and construction stages were achieved as per the plan because of the concessionaire's need to receive operating revenue as soon as possible. Operating revenue was based indirectly on the volume of use of the infrastructure, which turned out to be lower than that forecast. Inadequate ridership estimation and over-reliance on operating revenues eventually resulted in financial difficulties for the concessionaire. As a result, the Concessionaire had to file for Chapter 11 in July, 2015.

Would a revenue concession delivery strategy better achieve the Authority's objectives?

Revenue risk, in our opinion, is not a practical delivery approach. The financing can be achieved only at a very low debt-to-equity ratio but with high expectations of return to both debt and equity. The resulting higher financing costs will likely render the project unfeasible. Additionally, revenue risk projects, particularly for greenfield projects like the HSR, attract a much smaller pool of investors, which also drives up the pricing of debt financing.

Partial revenue risk can be transferred to the train operator because their costs are, in part, a function of ridership.

11.8. TECHNICAL QUESTIONS

10. *Based on the Authority's capital, operating, and lifecycle costs from its Business Plan, describe how the preferred delivery model could reduce costs, schedule, or both.*

Our recommended delivery approach is an availability payment based P3 model which is known to lower costs and ensure schedule and cost certainty. In particular, P3 offers these benefits via the following:

> ***Please provide examples, where possible, of analogous projects and their cost and/or schedule savings from such delivery models.***

The Seville Metro Line 1 P3 Project demonstrates the effectiveness of the public-private-partnership approach: the P3 contract included all of the elements described above. This project combined a well-structured risk-sharing mechanism with the highest quality standards during the design, construction and operation stages of the project. An efficient optimization of the O&M costs was carried out by the private partner that focused on safety and security, achieving 98% of key performance indicator (KPIs) targets which included levels of service in the following areas:

- Service reliability, including rolling-stock.
- Facility and systems reliability, through a set of indicators measuring the frequency of failures and breakdowns.
- Schedule reliability, including travel times between stations.
- Commercial image, including cleanliness and lighting in trains and stations, ticketing systems and functionality of dispensing devices and systems.

The integration of the KPIs, structured according to their levels of criticality, with a correct structuring of the O&M staff, resulted in efficient management and minimal negative service impacts. During the first five years of operation (April 2009- March 2014), Metro riders reported high levels of satisfaction, giving the system scores of more than 8 out of 10 points.

The P3 approach was able to significantly reduce the time to start of operations without affecting the goals set by the Authority, and the ride quality perceived by the users.

11. *How does this compare to separately procuring each high-speed rail component (i.e., separate contracts for civil works, rail, systems, power separately)?*

A separate procurement could also be an option for CHSRA. However, the P3 model would benefit from a level of integration that would enable CHSRA to transfer almost all interface risks and ensure a smooth transition into the maintenance contract.

As stated previously, civil works, rail, power and even stations can be procured jointly, especially under a P3 delivery because sufficient market capacity exists to create a level of competition. However, systems and rolling stock are fundamentally different than the rest of the infrastructure and should be procured separately. The reason for this is that the system and rolling stock contractors are highly specialized and each has its own proprietary technology. Once selected for an IOS, the same contractor would have to be engaged for the rest of the segments. Therefore, given the impact to the overall network, systems and rolling stock should be procured separately. For these reasons, System contracts are procured separately in Spain where more than 1,500 Miles of HSR have been constructed in last decade or so.

Please discuss design/construction costs, operating/maintenance/lifecycle costs, and schedule implications.

The design and construction phases will benefit both from cost and schedule savings if they are procured together i.e. combine design and construction.

The design solutions chosen to solve the engineering challenges of providing a suitable platform for the HSR along the alignment (earthworks, structures, tunnels), strongly affect the design optimization of track and power supply components, therefore, it is better for the project that these components are designed, built and tested together. It is worth mentioning that the California HSR network, where unprecedented design speeds are required, will benefit even more from the integration of all these activities since many new solutions will have to be developed from scratch for this project.

Procuring design and construction together will result in cost and schedule savings during the operation and maintenance phases as well. The operation period is where the highest cost savings can be realized since the private partner performs design and construction specifically with the objective of managing ongoing lifecycle costs.

As mentioned above, Systems integration in this package would reduce the number of firms who could compete for the project, resulting in increased costs of both phases. One needs to keep in mind that Systems are also the project component most likely to suffer from obsolescence, requiring more frequent upgrades which need to be coordinated throughout the network and not on a segment-by-segment basis. In this regard, as new segments are procured, the systems technology available at each point into the future would have significantly improved from the levels available at the time of construction of the IOS; therefore CHSRA would be able to control the impact of this evolution better by keeping systems within a separate contract.

12. ***For each project, are there any technical changes to the respective scope of work that would yield cost savings and/or schedule acceleration while still achieving the Authority's objectives? If so, please describe.***

As previously stated, delivering the project as a P3 scheme and integrating all elements of railroad infrastructure in a package will result in maximum cost savings. Undertaking systems delivery as a separate procurement will also yield significant savings.

From a technical side, one of the main cost drivers is the requirement of 220 mph operating speed. While we understand that the imposed operating speed is based on the committed policy maximum nonstop travel times between San Francisco and Los Angeles, one needs to keep in mind that 220 mph is higher than most if not all standard commercial speed for HSR, since it goes beyond the operating speed of similar HSR currently operating anywhere in the world. This speed, while technically feasible, significantly increases the cost, because the relationship between speed and cost is not linear. For a given speed increment, the cost grows exponentially. This is because new signaling, control and safety technology will have to be developed, or existing technology improved, to fit the new requirements, increasing both cost and schedule to delivery. Additionally, in terms of track technology and ballast requirements, there will be a need for very expensive solutions to meet the stated speed requirements. Due to the high-tech nature of the system infrastructure, operation and maintenance costs also grow exponentially.

A P3 is, without question, the best way to ensure that all of these innovative solutions are implemented in all areas in an integrated and optimum way ■