Request for Expressions of Interest (RFEI) HSR# 15-02

Delivery of an Initial Operating Segment

September 25, 2015

Response to RFEI

Submitted to:
California High-Speed Rail Authority
770 L Street, Suite 620 MS 2
Sacramento, CA 92614

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September 25, 2015

Attn: Rebecca Harnagel
California High-Speed Rail Authority
770 L Street, Suite 620 MS 2
Sacramento, CA 95814

Dear Ms. Harnagel,

The OHL Group through its US subsidiaries, OHL Infrastructure, Inc. and OHL USA, Inc. (collectively "OHL"), is pleased to submit our response to the California High-Speed Rail Authority's (Authority) Request for Expressions of Interest (RFEI) for the Delivery of an Initial Operating Segment RFEI HSR#15-02, issued on June 22, 2015.

With our wide range of expertise across virtually all sectors within transportation infrastructure, OHL is uniquely positioned to develop, design, construct, finance, operate, and maintain complex transportation projects such as this Initial Operating Segment.

If you have any questions regarding our submittal, please feel free to contact either one of us directly. Tim Young, OHL Infrastructure, Inc., can be reached at (914) 219-4569, or via e-mail at tyoung@ohlinfrastructure.com. Oscar Guevara can be reached at (949) 242-4432, or via e-mail at oguevara@ohlusa.com. OHL would also be happy to attend a one-on-one meeting to visit with your team to discuss the ideas mentioned in our response and to provide additional information on our current assets and experiences in the global market.

We would also encourage you to visit www.OHLconcesiones.com and www.OHLUSA.com for a more detailed view of our expertise across a range of disciplines and projects. Both sites also include a link to the larger OHL Group website.

We look forward to the Authority advancing this regionally important project in the coming months. If there is anything OHL can do to further assist you in your efforts, please do not hesitate to give us a call. Thank you for the opportunity to participate in this important step in the process.

Cordially,

Timothy A. Young
Vice President
OHL Infrastructure, Inc.

Oscar Guevara
Business Development Manager - West Coast
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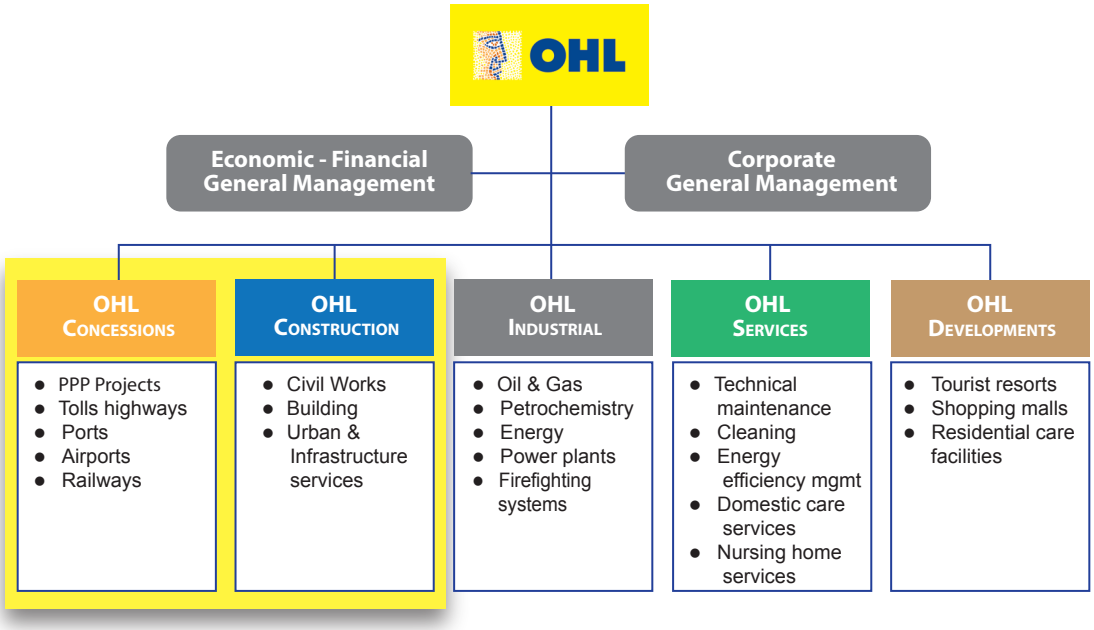
1. *Firm Experience and Team Structure*

The OHL Group (OHL) is a large international concessions and construction group with more than 100 years of building excellence. The firm currently operates in 30 countries across five continents.

As illustrated in Figure 1 below, OHL is comprised of five business divisions: Concessions, Construction, Industrial, Services, and Developments.

Figure 1: OHL's five strategic business divisions.



In the US, OHL's concessions and construction divisions operates through OHL Infrastructure, Inc. and OHL USA, Inc. with offices in California, Texas, New York, Florida, Virginia, and Illinois. Additionally, OHL Group operates in the US through the following affiliates and subsidiaries:

- **OHL-Community Asphalt Corporation** traditionally focused on paving activities, but following OHL's investment in 2006, has successfully diversified its operations to include rail works and transportation infrastructures, including a contract for improving the largest highway crossroads of Miami.
- **OHL Building, Inc.** has significant experience with the construction of public facilities that encompass challenging construction components. OHL Building has built award-winning projects on both Civic and University Campuses, including the University of Miami's Richter Library and the South Miami Dade Cultural Arts Center and has built several projects for government agencies.
- **OHL-Arellano Construction Company** is an experienced firm in the construction and renovation

OHL HIGHLIGHTS

- Constructed over 860 miles of HSR trackwork
- Installed over 700 miles of OCS in HSR
- Leader in railway, roadway, and bridge construction
- Involved in over 103 design-build projects
- Similar HSR projects in Spain, Turkey, and Saudi Arabia.
- Over 24,000 employees worldwide
- Over 1,200 employees in the US

of commercial facilities, hospitals, institutions, and shopping centers.

- **Judlau Contracting, Inc.** is one of the premier construction companies in the New York Metropolitan area and a leader in heavy construction specializing in large public works projects. The firm's expertise includes mass transit, bridges and tunnels, surface and subsurface utilities and water mains, electrical and signal work, and design-build projects.

With its wide range of expertise across virtually all sectors within transportation infrastructure, OHL is uniquely positioned to develop, finance, design, construct, operate, maintain, and manage large complex projects such as the proposed California High-Speed Rail System.

Figure 2: High-Speed Line AVE Madrid-Sevilla, Spain—OHL was responsible for the construction of 40 miles double track, railway Infrastructure, superstructure, electrification, 2 Stations in Cordoba and Seville, and maintenance

Our interest in this Project is multi-faceted - as developer, financier, design-build contractor, and long-term maintenance provider:

- *As Developer* — OHL will bring its best practices in project development and stakeholder relations, as well as a strong balance sheet to support the required equity investment;
- *As Financier* — OHL also has extensive experience in financing large, complex infrastructure projects employing a wide range of financial instruments to meet the needs of the Project. Working closely with the Authority and its team of advisors, we will develop the optimal financing plan for the Project;
- *As Design-Build Contractor* — OHL will bring both innovative design techniques and construction expertise for large, complex infrastructure rail projects, and a robust management team with the experience to deliver large infrastructure projects on budget and on time; and finally,
- *As Maintenance Provider* — OHL will bring its best practices in the long-term maintenance of such complex infrastructure projects.

The Group's highly qualified team approaches each new job with cutting-edge technologies, leading quality standards, and a design and execution philosophy aimed to minimize impacts and preserve the environment. OHL's technical know-how, financial and investment capabilities and sound equity underpinnings to provide the right expertise to deploy a leading-edge offering of construction and services placing OHL as leaders in integrated project management business, from design through construction and financing to operation and maintenance.

OHL's experience in similar projects includes:

- **Spain HSR**
  - Involvement in approximately 10% of Spain's HSR network, totaling $3.5 billion in contracts across the country.
- **Turkey HSR**
  - First HSR line in Turkey.
  - OHL Group designed and built the entire system, including civil works, trackworks, electrification

system, communications, and signaling.

  - OHL responsible for systems integration of the different segments and the rolling stock.
  - The contract included *128 miles* (double track) of high-speed track, one tunnel, four viaducts, two bridges, 26 overpasses, 29 underpasses and 382 culverts.

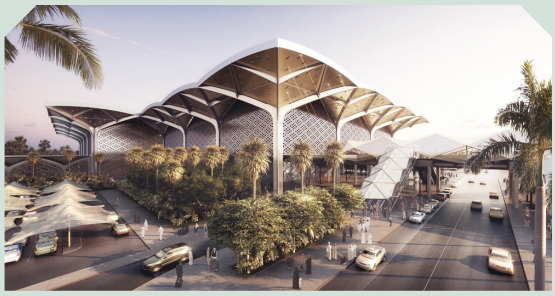
- **Saudi Arabia HSR**
  - Lead contractor for the $8.9 billion Haramain High-Speed Railway, Phase II Mecca-Medina
  - Scope includes design and construction of superstructures, electrification, signaling and communications, commissioning, rolling stock, operations, and comprehensive maintenance for 12 years.
  - Responsible for interfacing with Phase I (civil works).

Figure 3: OHL completed construction of 128 miles of HSR on the Ankara-Istanbul HSR Project in Turkey. Scope of work also included design and construction of infrastructure, tunnel, buildings, platforms, trackwork, electrification, signaling, and communications.

Figure 4: OHL's involvement in HSR lines in Spain, including High Speed Line AVE Madrid to Valladolid.

The table below showcases some of our rail infrastructure experience in recent years.

PROJECT	DESCRIPTION	DELIVERY TYPE	CLIENT	PROJECT STATUS
Ankara-Istanbul High-Speed Line Project, Phase I (Section Esenkent-Hasanbey) $943 million, Turkey	The project involved design and construction of double track HSR, civil infrastructure, track and systems, electrification, signaling and communications, tunnel, buildings, and platforms. Additionally, OHL was responsible for the integration of rolling stock. 	Design-build	Turkish State Railways	Completed

PROJECT	DESCRIPTION	DELIVERY TYPE	CLIENT	PROJECT STATUS
Haramain High-Speed Railway (HHR), Phase II ($8.9 billion), Mecca-Medina, Saudi Arabia	Phase 2 of the project includes the remaining infrastructure not included in Phase-1: track, signaling, telecommunications, power, and electrification etc. It will also include procurement of rolling stock and operations & maintenance for a period of 12 years after completion. 	Design, Build, Maintenance, and Operation	Saudi Railway Organization	Ongoing
North-Northwest Spain HSR Access ($571 million), Soto del Real-Segovia, Spain	The project entails the longest HSR tunnel in Spain (9.5 miles), viaducts, stream crossings, infrastructure, systems, and interfacing with contractors working on other sections of the HSR system. 	Design-Build	ADIF	Completed
Madrid-Zaragoza-Barcelona-French Border HSR Lleida-Martorell Section ($122 million), Spain	As a HSR civil infrastructure project, construction involved two viaducts, wildlife monitoring, and construction on both rural farmlands and dense urban settings. The HSR segment accommodated design speed of up to 220 mph. 	Design-Bid-Build	ADIF	Completed

PROJECT	DESCRIPTION	DELIVERY TYPE	CLIENT	PROJECT STATUS
AirportLink Metrorail Extension ($360 million), Miami, Florida	This is a public transportation infrastructure project which includes a rail transit system with an elevated guideway in an urban area. Due to the elevated guideway and construction taking place in a high traffic area, traffic maintenance as well as the constant coordination and integration of the operational Metrorail system is required. 	Design-Build	Miami Dade Transit	Completed

2. *Project Approach*

Prior to describing our approach to the Project, we have summarized our general outlook of the Authority's strategy and preferred model for the development of the initial operating segement (IOS), according to what we have reviewed from the Request for Expressions of Interest (RFEI) HSR# 15-02 and the 2014 Business Plan.

Figure 5: OHL's HSR project in Turkey—One of the largest HSR project awarded to a Spanish company.

IOS Construction and Commissioning

The operation, readiness, and commissioning of a high speed rail (HSR) system is a tremendously sophisticated issue that requires the full integration of all Railway Technological Components (RTC) -track, communication, signaling, and traction power. The delivery of this scope of work requires a highly qualified team. Therefore the RTC integration represents the most critical issue of the Project.

Awarding a contract to a single developer, responsible for the integration and maintenance of the RTC is, in our opinion is the best choice. Segregating these responsibilities into several contracts, either by components, segments, or supply and maintenance, would transfer a high integration risk to the Authority as it would become the *de facto* responsible party.

While civil works does not have the same degree of complexity as the RTC integration, its inclusion in a single contract with integration would be justified because it would simplify the procurement process and be accommodated by a robust funding plan.

A Single Integrated Contract For Full IOS HSR Infrastructure

A single developer for construction, commissioning, and maintaining the infrastructure of the IOS through a delivery contract under the formula design, build, finance, and maintain (DBFM) or similar, is very complex due to the size of the Project (including bonding availability for construction).

Using a DB delivery for the entire or part of the IOS for civil works while using a single DBFM contract or similar for RTC of the whole segment, with none or little involvement in civil works, is a solution that provides benefits to the Authority and reduces the complexity of the Project.

Therefore, the option to include the remainder (or portion of the remainder) of the pending civil works within the IOS DBFM contract would be a topic for further review and discussion. As a result of the discussions, different options might arise in such a way that the delivery becomes more balanced.

On the other hand, if the Authority's funding sources for the DBFM contract, or contracts, based on the continuous flow of resources from the CAP & TRADE proves to be viable, it could be advantageous to include all civil works in the DBFM developer contract because, otherwise, it would be difficult to find appropriate availability payment mechanisms for pure DB civil work contracts.

An alternative solution could be for the developer to retain only part of the civil works scope, while subcontracting the remaining civil works to other builders. The ultimate responsibility for delivery would remain with the developer. This alternative facilitates the fulfilment of bonding requirements, allowing the developer to transfer part of these requirements to third parties.

IOS

OHL is interested in both scopes of work— IOS-South and IOS-North. The scope of work is similar to other rail projects that our team has worked on. However, we consider the segment that can be developed in the shortest time to be the most desirable. As we have done in the past, we will form a consortium of international HSR experts combine with local expertise to deliver this Project on time and on budget based on best practices and lessons learned. The cost and schedule will be ensured by a fully integrated team of professionals with proven successful experience in projects of similar scope and complexity.

Figure 6: HSR Variante de Ordes, Spain – Guaranteeing continuity through the ROW is crucial for on-time project delivery.

Project Approach

OHL has participated in numerous HSR projects in the world. The projects include Ankara-Istanbul HSR in Turkey, Haramain High Speed Railway - Mecca-Jeddah-Medina in Saudi Arabia, and the Spanish HSR network (the largest greenfield HSR network built in Europe).

In these projects, OHL's role has been the "Railway Infrastructure and Production Chain overall provider" including design, management, logistics, civil and earthworks, trackworks, electrification and communications, and integrator of the complete HSR infrastructure system.

OHL understands the complexity and has the skills and experience needed to deliver a project like the California HSR IOS, and we intend to streamline the configuration of consortium comprising of local and international companies meeting and exceeding all the expectations of the Authority and deliver the Project on time and budget.

The scope of work we would like to assume, similar to that established in the preferred model, are the following:

- Provide financing based on an availability payment mechanism.
- Design, build, and maintain the civil works that could be integrated in the contract and to maintain the civil works delivered for the segment under separate DB contracts.
- Design, install, and maintain the track of the complete segment.
- Design, install, and maintain the communications, signaling, and traction power systems.
- Ensure full integration of all components across the alignment.

Innovative Ideas For Delivering The Projects

It is our understanding that tasks assigned to the developer in the RFEI during the operation phase is exclusively the role of system maintainer; therefore the train operator will be responsible for managing the Operation Control Center (OCC), dispatching of trains, and traffic control and safety, and in addition to the operation of trains.

An alternative option is for traffic control and train dispatch to be assigned to the infrastructure developer as in many international railway models and like in other modes of transport where the transport operator does not manage the infrastructure (roads, ports, and airports).

This option would bring several advantages to the Authority, as follows:

- A clear and segregated accounting system, where the railway operations are separated from the maintenance and infrastructure management.
- Allows greater competition in operations, as this option facilitates that the same infrastructure could be used by more than one train operator, preventing a monopoly in the HSR services and optimizing the use of this mode by the public and therefore its efficiency. This aspect will be of increasing importance as the operation extends to new sections or when the network is extended to other lines.
- The availability mechanism would be more realistic as it could be applied to something real as the train dispatching and the effective slots provided to the transport operators instead of a more theoretical concept as infrastructure availability.
- It would ease the extension of the HSR network to future connections, allowing the implementation of new services outside the initial line without interruptions. This alternative would also foster one-seat rides—reducing the need for passengers to get on and off trains when travelling to new destinations.
- The emergence of new transport undertakings could create a market for infrastructure usage fees that could potentially optimize revenues obtained from operators

In this option the train operator, taking traffic risks and without subsidies, would pay fees for using the infrastructure that would cover, at least, the cost of maintaining and operating the infrastructure.

As previously mentioned, OHL is interested in the Project as an infrastructure developer participating in the preferred option expressed by the Authority or in the alternative model as suggested.

Figure 7: OHL stands out for its work on traction power, electrification, and overhead catenary systems—having carried out major catenary modernization and new construction and maintenance work on tracks throughout Europe and Asia.

3. *Responses to Questions*

Commercial Questions

Figure 8: Through different contracts, OHL has been involved in approximately 10% of Spain's HSR network.

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.***

In terms of schedule, an availability payment model will offer a shorter term and less risk of delays than a DB model.

As the private partner begins to be paid once the revenue operations start, it has the incentive to finish as soon as possible, planning a shorter schedule, and will try to finish the work on time as any delay will reduce revenues. On the other hand, if the private partner is able to manage all the tasks as defined on the critical path of the schedule, this gives the entity the capacity of acting and mending any issues that may affect the schedule.

The DBFM delivery strategy is likely to result in the most desired innovation due to an alignment of interest. In this method, the developer is incentivized to not only optimize CAPEX, but also OPEX. Separating CAPEX decisions from OPEX decisions often leads to undesirable consequences. Combining multiple disciplines under one contract will promote design, construction, and O&M integration leading to significant cost and time savings while reducing interface risks.

However, in this project due to its nature and size, procure all the civil works in one package together with the RTC (track, communication, signaling, traction power) does not seem that it could allow to decrease terms and prices for the, probably, non-existence of economies of scale for the civil works specially in a project of this size and the inability of a single group to contribute with enough capacity to develop the construction (work fronts) that would be needed to decrease schedule. In our opinion, the division of the civil works into several contracts under a DB scheme would lead to greater efficiency.

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?***

Some of the major transportation projects built in recent years such as airports (Berlin) or railways (Sao Paulo Metro), have had significant problems and delays in commissioning and beginning revenue operations due to problems in the integration of the overall technological subsystems and operation readiness, causing major economic damage to the project.

In the HSR, due to the complexity of its subsystems, it is especially important to consider the importance of integration to avoid possible risks, non-compliance, and unavailability.

The risk of integration of the technological subsystems is the major risk of the California High-Speed Rail Project in addition to other typical risks of any large linear infrastructure project such as geological, environmental, and ROW risks.

Combining the delivery of RTC (track, traction power, signaling, and communication systems) through a single contract with a single expert developer, who assumes its commissioning, will reduce the risks of technological integration resulting in greater reliability in meeting deadlines and budgets.

On the other hand, splitting the delivery of the RTC in different contracts (by sections or/and by subsystems) will involve the Authority in the integration process, which we do not consider the most efficient allocation in this case. In this scenario, the Authority should provide all the technical specifications up to a detail level that defines the interfaces and guarantees the integration of all the systems. The Authority would be responsible of any problem concerning the specifications, in addition to cost overruns and delay risks.

The scarce existence of worldwide HSR networks have been developed in a progressive manner in the last 40 years by a very limited set of railway undertakings. The Authority may take advantage of this knowledge to carry out its mission of developing a HSR network in California, optimizing costs and schedule, and guaranteeing its commissioning by transferring risks to entities with qualified experience.

The table below summarizes our understanding on the allocation of the some of the main risks of HSR between the public and private sector. The private sector includes at least the rail infrastructure developer, train provider and operator, and the stations facility manager. It shows where the main risks should be allocated, with the understanding that all risks at some point are shared between the public and private sector.

RISK	PUBLIC	PRIVATE	COMMENTS
Land Acquisition	+	-	N/A
Civil Works Construction	-	+	Authority should assume force majeure risk and some specific geological risks.
RTC and Rolling Stock Supply	-	+	Authority should provide technical specifications or rely on existing ones.
Integration and Commissioning	-	+	N/A
Maintenance	-	+	N/A
Operation	-	+	N/A
Financing	=	=	Authority should provide guarantees for the availability of payments.
Demand	+	-	Authority assumes the risk during ramp-up phase.
Stations	+	-	Authority in charge of the interchange with other modes and the urban insertion of the station

The DBFM strategy is a proven method for transferring integration and interface risks on many infrastructure projects with complex systems including rail. The Authority should be prepared to retain hazmat, user demand, force majeure (and other compensation events), permitting, and ROW risks. The private sector is positioned to accept risks relating to financing, design, construction, price, schedule, testing and commissioning, and availability.

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?***

Figure 9: Madrid Atocha Railway Station, Madrid, Spain.

We understand that infrastructure and train operations are very distinct services and given the different characteristics of assets and type of business, they are better managed separately by a different entity.

The function of the carrier (train operator), who will compete for the same customer with airlines companies or private vehicles to use their services, requires a corporate culture that is very different from the developer of infrastructure.

We believe that the supply and maintenance of rolling stock should not be included in the infrastructure developer's scope of work.

Traffic control, signaling, and communication equipment necessary for train operation should be a component provided by the infrastructure developer.

The management of the movement of trains, should be assigned to the infrastructure developer, linking infrastructure availability to the effective allocation of slots for train circulation, and allowing competition among train operators.

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)?***

A long term DBFM contract or similar will be required to allow the developer to earn a return on investment through availability payments. We understand that this decision depends on several factors including the financial and maintenance costs of the IOS infrastructure, and the revenue generated from the CAP & TRADE.

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?***

Typically, large complex projects such as this Project requires a consortium of companies to combine their respective technical, commercial, and financial strengths to deliver the project. This Project is no different. Given the absolute magnitude of the remaining scope of work, if the scope of work is too large, agencies will likely see fewer competitors, thus potentially not maximizing the full impact of a multi-bidder field. This is likely the biggest challenge for the Authority to address.

Due to the magnitude of civil works in this Project, we recommend to split this part of the scope as multiple contracts. It should be taken into consideration the complexities for the developer in assuming the large bonding capacity of this project.

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

The competition will be reduced as long as the contract becomes bigger in size and complexity. Less groups with financial strength and experiences will be capable to provide the complete scope of work required.

Figure 10: Having extensive OCS installation experience, OHL knows that catenary integration is crucial in project delivery.

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?*

In addition to the complexities of raising the financing for such large complex projects, another challenge would be the certainty of the CAP & TRADE proceeds as a funding source. This would not be a risk that would typically be managed by the private sector. As the CAP & TRADE is a market-based system of trading, the total funding could be subject to fluctuations. There would need to be some assurances from the Authority (and/or other governmental agencies) that the funding of the construction and future availability payments would be protected from such market fluctuations, and that in the event of a shortfall, there would be other funding available to fill such gaps.

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

We recommend providing some sort of guarantee on the CAP & TRADE proceeds in the case the amount is below estimates.

In response to the second question, there is much to discuss with the potential lenders to this Project. While the size of the transaction is one factor, there are others factors that will impact the response by the financial markets, including the allocation of risk across the suite of project agreements, the strength and stability of the revenue funding (in the case of an availability structure), or the strength of the revenue predictions and experience of the equity partner(s) (in the case of the revenue-risk structure). It may be a little early in the process to be able to predict if lenders will support this Project.

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?*

OHL believes the availability payment is the most appropriate mechanism for delivery, maintenance, and operation of the infrastructure. This mechanism should provide a balance between revenues and penalties that do not endanger the repayment of construction and financing costs. Availability payments allow the

supplier of the technological components to provide services during maintenance and operation phases, incentives to reduce the lifecycle cost of the Project, and finally, lines up the interest of the Authority and the developer providing a greater value for money.

Figure 11: OHL was the first Spanish firm to undertake a rail construction project in the US with the $360 million AirportLink Metrorail Extension (Design-Build) in Miami, Florida.

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.***

We find mixed effects regarding costs and schedule on the preferred model. Our comments are as follows:

- A single integrated delivery contract would allow the suppliers to achieve scale economies allowing, in principal, a reduction of its costs.
- A single developer is able to achieve better coordination between all subsystems and activities as they will have a complete perspective of the whole process making it aware of any delays on the critical path. Moreover the single developer will be able to act on any task that is proving detrimental to the schedule.
- The reduced competition between suppliers together with higher risks on integration and interfaces assumed by the developer in the preferred model will both work to raise the costs.
- In the preferred model, the suppliers will likely be in charge of the maintenance of the line and will be paid upon the availability of the line. This way, the developer will be focused in lowering not only the construction/supply costs but also the lifecycle costs.
- The preferred delivery model seems to prevent the danger of costs overrun, at least, the ones derived from integration problems. Moreover, the availability payment model is a strong incentive for the developer to deliver an infrastructure performing at the expected parameters of speed and capacity since the very beginning.

In conclusion, we find that although the combination of all these mixed effects may, in the first moment, increases the initial costs, it is more than compensated by the greater certainty on cost, schedule, and performance offered by the integrated model. As explained throughout our RFEI response submittal, the accurate definition of all interfaces between systems and its integration are a risk of maximum importance in a highly sophisticated system as the HSR.

Nevertheless, the above considerations cannot be inferred to the civil works scope as their large budget and timing (civil works are concentrated in the construction stage but are much less significant during operations phase) leads to different conclusions; therefore a DB scheme divided into smaller contract packages will be more advantageous.

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.***

In the set of bullet points below, we show our point of view regarding the comparison of the DB model versus an availability payment model (PPP) for each railway subsystem in terms of i) design and construction costs; ii) operating/maintenance/lifecycle costs and iii) schedule. We assume that in the DB model with separate contracts for each component, the maintenance will rely on one single contract for all subsystems. Based on this assumption, our conclusion are as follows:

- **Civil Works:** Concerning the DB phase, even considering theoretically that an integrated contract would give more guarantees on schedule and limit cost overrun, we believe that in practical it would not be possible to implement the Project in a single contract due to its size. As the developer will need to split the civil works in multiple sections and outsource most part of the tasks. There will not be a great difference in terms of cost and schedule with a DB model where the Authority splits the Project in several sections with different suppliers. We find no significant differences between the two models concerning construction or lifecycle costs.
- **RTC (track, systems and power):** In our review, we have concluded that it is not clear the effect of the model on the rail design and construction cost. Nevertheless, lifecycle cost is reduced under the availability model as the supplier is also in charge of the operation and maintenance of the line and, therefore, is focused on the overall lifecycle costs reduction. In terms of schedule, besides the advantage for the availability model expressed in the previous item, we find a clear reduction of the system integration risks which leads to a more guaranteed schedule.

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.***

According to our experience in the development of HSR in Europe as well as in Asia, we consider in general terms that the design parameters and the technical solutions adopted in the reference documents are appropriate and suitable for the California HSR project.