



Siemens Industry, Inc., Mobility Division

Expression of Interest

Delivery of an Initial Operating Segment

**RFEI No.: HSR15-02
September 28, 2015**

TABLE OF CONTENTS

1.	(11.2 / 11.3) TRANSMITTAL LETTER AND FIRM EXPERIENCE	i
2.	(11.4) PROJECT APPROACH	1
3.	(11.6) COMMERCIAL QUESTIONS	6
3.1	(11.6.1) DELIVERY STRATEGY	6
3.2	(11.6.2) INTEGRATION AND INTERFACE RISK	9
3.3	(11.6.3) SCOPE	10
3.4	(11.6.4) CONTRACT TERM	12
3.5	(11.6.5) CONTRACT SIZE	13
3.6	(11.6.6) COMPETITION	15
4.	(11.7) FUNDING AND FINANCING QUESTIONS	16
4.1	(11.7.7) FINANCING SOURCES AND AMOUNT	16
4.2	(11.7.8) CHANGES TO FUNDING SOURCES	17
4.3	(11.7.9) PAYMENT MECHANISM	19
5.	(11.8) TECHNICAL QUESTIONS	20
5.1	(11.8.10) COST AND SCHEDULE IMPACTS OF PREFERRED DELIVERY MODEL (BUNDLING)	20
5.2	(11.8.11) COST, LCC AND SCHEDULE IMPACTS OF SINGLE PROCUREMENT	21
5.3	(11.8.12) TECHNICAL CHANGES TO DECREASE COSTS AND ADVANCE SCHEDULE	21
6.	CONCLUSION	23

Expression of Interest (EOI)

Delivery of an Initial Operating Segment

1. (11.2 / 11.3) *Transmittal Letter and Firm Experience*

Name of the interested firm: **Siemens Industry, Inc.**

For many years, a Californian High-Speed Rail System has served as an inspiring vision for many California citizens and businesses. With this EOI, the CHSRA is progressing one step closer to realizing this important vision and we, at Siemens, have been following and supporting the CHSRA and its activities for years. Siemens is convinced that a high-speed rail project connecting San Francisco to Los Angeles will help the State of California to reach its long-term objectives such as economic development of all regions, infrastructure that provides fast and convenient transportation means and protection of the environment.

Siemens is responding to the Request for Expression of Interest (RFEI) as a single firm – prepared to provide a significant part of the scope envisioned by the RFEI. Siemens is highly interested in delivering the E&M (electrical & mechanical) infrastructure for the complete alignment as well as the rolling stock including the respective depots and maintenance for both portions. With more than 60,000 skilled employees in the US, Siemens is in a unique position to supply and service the US railroading market from its multiple manufacturing locations, which are fully experienced with Buy America and all applicable American standards.

We base our response on five key elements:

- global experience spanning over three decades in high-speed rail
- long-term experience with maintenance contracts for E&M infrastructure and rolling stock, including the required maintenance depots
- in-house high-speed rail competence for E&M infrastructure including R&D and manufacturing locations throughout the US
- permanent manufacturing facilities for rolling stock and components in Sacramento since 1984 to get built out for the manufacture of high-speed trainsets
- comprehensive financing solutions by Siemens Financial Services, including debt and equity

The core design aspects for electrification, signaling and communication equipment including control centers, and maintenance facilities are Siemens in-house knowledge, to deliver integrated solutions including financing to our customers. We will partner this knowledge with experienced firms for track installation and construction services.

Siemens has extensive experience with complex integrated solutions around the world and in the US. A select set of examples is shown in the following table:

Table 1: Siemens Experience

HSR References	Country	Electrification	Signaling	Rolling Stock	Maintenance	Financing
HSL Zuid	Netherlands	Yes	Yes	separate	Yes	PPP
Beijing - Tianjin (JJ Line)	China	Yes	Yes	Yes	No	No
Cologne- Rhine/Main	Germany	Yes	Yes	separate	No	No
Madrid-Seville	Spain	Yes	Yes	separate	Yes	No

Transit References	Country	Electrification	Signaling	Rolling Stock	Maintenance	Financing
Houston LRT	US	Yes	Yes	Yes	No	No
Portland LRT (Milwaukie Line)	US	Yes	Yes	separate	No	No
BTS Skytrain Bangkok	Thailand	Yes	Yes	Yes	Yes	PPP
Metro Santo Domingo	Dominican Republic	Yes	Yes	separate	Yes	No

Already located in the US, Siemens has the necessary project management expertise to competently and professionally manage highly complex engineering and supply projects. In addition to the local team members, Siemens can leverage expertise from all corners of the globe, transferring knowledge and experience to further strengthen its domestic team.

Examples of such complex projects include the pioneering re-signaling of the New York City subway, the 25kV, 60 Hz electrification in the Northeast Corridor including complex static frequency converters. As a key stepping stone for high-speed Intercity express travel Siemens is providing rolling stock and maintenance for Amtrak and All Aboard Florida. For further references related to high-speed rolling stock, please see our EOI for Tier III Trainsets dated October, 22, 2014.

For ease of reference we have used the numbering provided in the RFEI in parentheses in the titles of the sections in this document.

If there are any other areas we can assist with, please do not hesitate to contact the person below:

Armin Kick
 Director Business Development High-Speed Rail
 Siemens Industry, Inc.
 7464 French Road
 Sacramento, CA 95828

Cell: (916) 799-0843
 e-mail: armin.kick@siemens.com

2. (11.4) Project Approach

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

This section of the EOI shall also include any innovative ideas for delivering both projects.

Based on our understanding of the CHSRA needs, our experience in delivering and developing high-speed rail projects all over the world and after carefully reviewing the documents provided with the RFEI, Siemens understands that the CHSRA is looking for the following:

1. Speed-up of the project (earliest possible start of operation)
2. Best value for money (more miles per \$) by optimizing each of the systems and having the best system integration
3. Using financing from the industry to best allocate resources
4. Reducing project risk by clearly defined and manageable interfaces
5. Reducing risk of failure (time / cost / quality / default) of the project

Following an analysis of multiple procurement models in various high-speed rail projects, we discovered competing relationships between the targets for the procurements. The spider graphs shown in figures 1-3 illustrate these relationships for 3 key procurement elements:

- Conventional vs. PPP
- Medium vs. large lot sizes
- Geographic vs. horizontal bundling

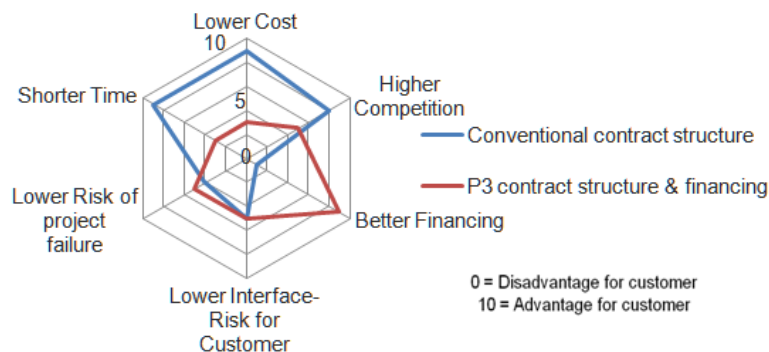


Figure 1 - Comparison conventional vs. PPP contract structure

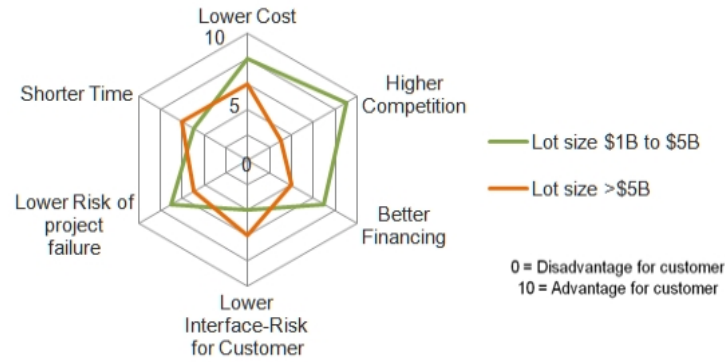


Figure 2 - Comparison medium vs. large lot sizes

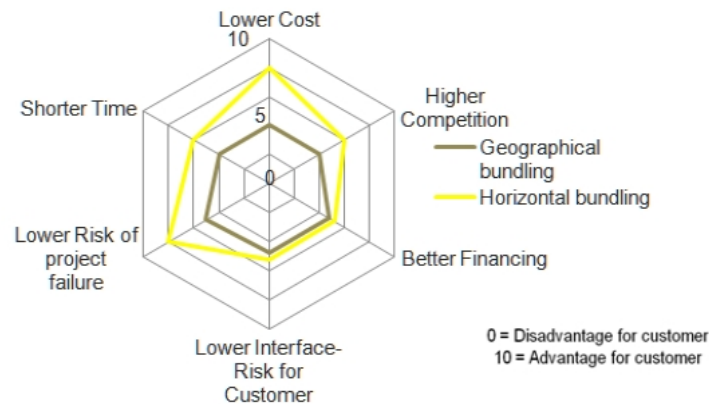


Figure 3 - Comparison geographical vs. horizontal bundling

Under consideration of these analyses and the specific situation of the CHSRA project, Siemens recommends a specific hybrid approach: Geographic/vertical separation for the civil works, coupled with the system-wide procurements for the E&M infrastructure, (i.e. horizontal slicing). We furthermore recommend separately procuring rolling stock for the entire system. Please see the diagram below:

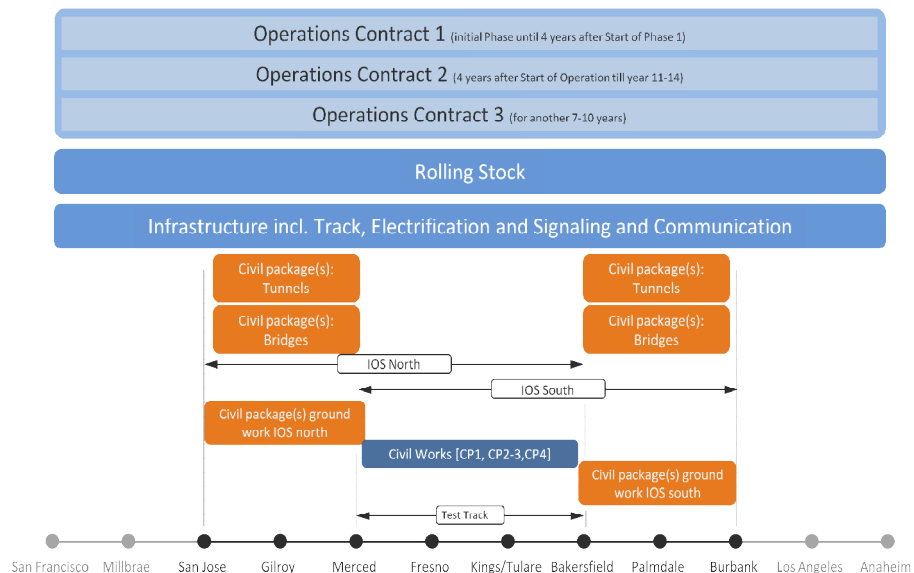


Figure 4 - Proposed delivery strategy

Background to the proposed structure:

The costs of the civil works determine the majority of the project volume. This is the only part, which can be split geographically without putting the project at risk and without creating any deficiencies. Moreover, it is important not to create a scope too large in size (e.g. > \$5 billion), which would lead to a significant reduction of competition and less attractive financing conditions. Finally, separating groundwork, major bridges and major tunnels can help to optimize the yearly financial burden by matching the lifetime of each construction element with its respective financing structure.

In order to achieve best value for money, a consideration of LCC-costs is required and therefore maintenance should be included in each of the respective contracts. This reduces interface risk and a substantial source of claims.

Regarding the construction activities, we understand that both (IOS-North and IOS-South) are currently undergoing environmental clearance. Taking into account the geological situation and the already ongoing enhancement of the Caltrain network, we believe the IOS-North segment can be accomplished most quickly, and would ultimately help the overall progress of the project by allowing additional time for the more challenging environmental clearance in the southern segment. While building the IOS-North, early works could commence in the environmentally cleared areas in the Southern section. This coupled with predefined E&M infrastructure and trainset characteristics would ultimately accelerate the overall project implementation.

E&M infrastructure, also known as the “superstructure”, including track work, electrification and signaling/communication is mainly technology driven and those systems have many technical interfaces that can and should be optimized. By keeping this package in a bundle, major interfaces can be managed by the industry, which results in a major risk reduction for the CHSRA.

Furthermore, it is possible to optimize the systems and the interfaces (e.g. integrated signaling and electrification system minimizing the energy consumption and power grid access along the alignment). This package can also be financed and structured as a PPP under an availability performance payment mechanism, however from a timing perspective the recommended approach would start with a conventional purchase agreement for the test track. This superstructure bundling/turnkey approach was used by successful high-speed projects such as HSL Zuid (Amsterdam – Antwerp, an example for a PPP procurement) and JJ-Line (Beijing – Tianjin, an example for a conventional procurement).

Rolling stock is the prime interface to the end customer of the system and has a major influence on the success of the high-speed rail project ranging from reliability and availability of the trainsets, to travel times, comfort and appearance. Furthermore, the trainsets have a major influence on the operations costs of the alignment. Therefore it is recommended to award a separate contract to the best value trainset supplier. Looking at high-speed rail projects all over the world, this approach has proven successful in countries such as Spain, Russia, China and Turkey. A release of the already finalized RFP for rolling stock will furthermore help to speed-up the project and realize the earliest possible start of operation, especially taking into account the potential Buy

America Act (BAA) waiver process with FRA for rolling stock. The latest experience in this regard is the Amtrak procurement, where this process is still ongoing and has taken 10 months so far. A potential timeline, showing the effect of such a BAA waiver process is depicted below.

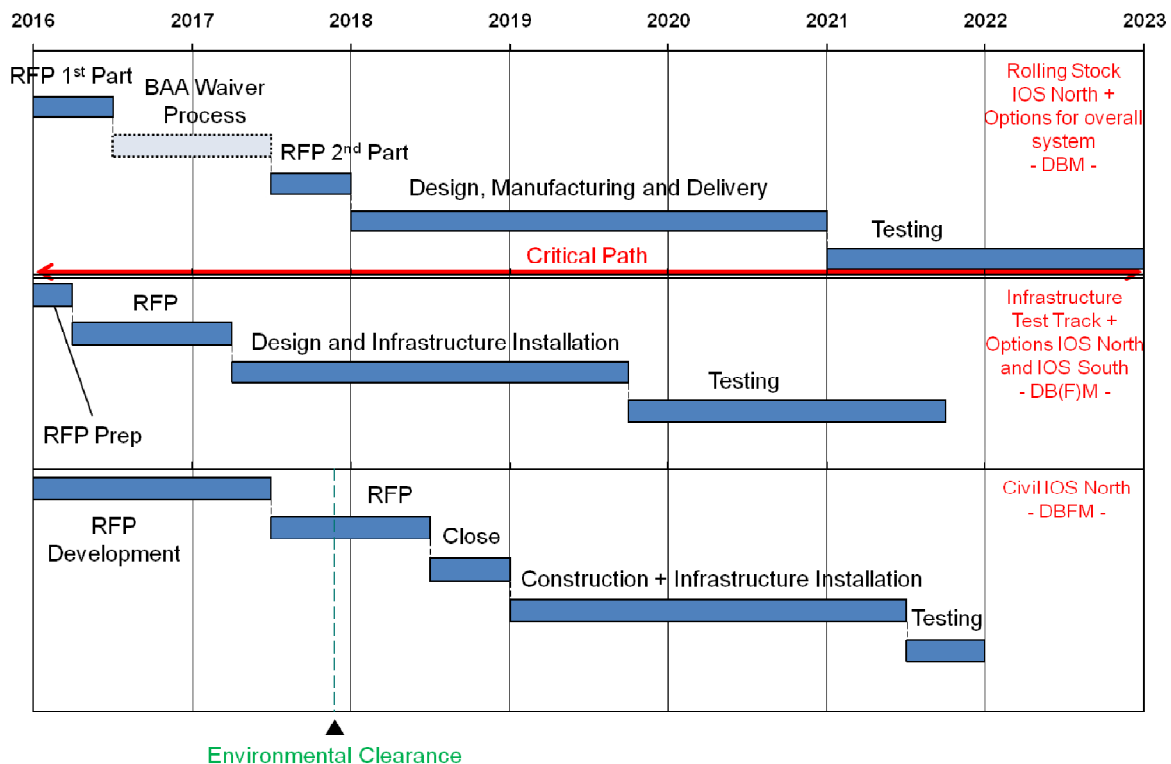


Figure 5 - Identification of critical path

Operations should be awarded separately as this addresses a totally different industry compared to civil, E&M infrastructure and rolling stock and the tender process can take place at a later stage. In order to avoid underselling of the concession, it is recommended to limit the operations contract to 7-10 years and to start with a management contract until a stable forecast of passenger numbers can be foreseen (roughly 3-5 years after start of operation of Phase 1). Further details and background regarding operations can be found under 3.3 (11.6.3) Scope.

We would like to reference a report from PricewaterhouseCoopers in 2010, which outlines the relationship between project sizes and the associated transfer of risk.

"It is not practical to transfer revenue risk to the private sector on a new-build railway in Western Europe and Public sector involvement in the funding of projects of this size is inevitable" (Fast Forward – Funding Report; Delivery of High Speed Rail in Britain; February 2010 by PricewaterhouseCoopers)

Table 2: Funding Structures / Source PricewaterhouseCoopers "Fast Forward – Funding Report"

Funding structures used for other large rail projects

Project	Value	Fixed Price contract?	Details
Crossrail	£16bn	No	Mainly publicly funded with some private funding
Taiwan HSR	£9.3bn	Yes	Private ownership financed through a combination of Government grants and private finance, currently being rescued by Government following shortfall in revenue
West Coast Mainline	£8.6bn	No	Initially to be funded by Railtrack but had to be funded mainly by Government through Network Rail after Railtrack's insolvency
CTRL (now HS1)	£5.8bn	Initially	Combination of Government grants and Government guaranteed private finance. Taken over by Government following shortfall in revenue but now to be sold to a private investor
RAVE (Portugal)	£5.7bn	Yes	PPP split into 3 high speed lines currently in procurement. Supported by capital grants from European Commission
HSL-Zuid (Holland)	£4.8bn	Mixed	Superstructure procured as PPP raising £0.8bn. Substructure of £4bn was procured directly by Government
Öresund Bridge (Denmark/Sweden)	£3bn	No	Financed by government guaranteed bonds issued by the government owned project company
Nuremberg-Munich (Germany)	£1.6bn	No	Funded by Deutsche Bahn, the Government owned national railway company
Perpignan Figueras (France)	£0.8bn	Yes	PPP

The table provides an overview of past and present multi-billion pound rail and high speed rail projects. It suggests that there is a ceiling above which the funding requirement and risks become too large to attract private investors on a fixed price basis. It is therefore highly likely that some form of construction risk sharing and possibly contract packaging will be necessary in order to deliver HSR in the UK.

Financing structures (e.g. availability schemes) can be used to ease the yearly financial burden of the CHSRA. Those structures could be used among other things for the civil parts of IOS-North, major bridges and major tunnels as those are the main parts of the project. As the majority of the technological risk would be in the construction and not in the operations phase, such financing should achieve price levels similar to conventional long-term financing. Cap & Trade or other funding sources could be used as a designated funding source for repayment of loans/securitized transactions or even for DBFM schemes. The last section of the project (e.g. Bakersfield – Los Angeles) may be awarded as a revenue-based concession combining civil with operations for the complete alignment. The upside of this approach is that for the complete alignment a positive revenue situation can be foreseen and the project can be completed, the downside is still that this revenue based concession would be awarded at a point of time, when no substantial passenger numbers will be available and the concession is at risk of being undersold.

3. (11.6) Commercial Questions

3.1 (11.6.1) Delivery Strategy

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

While innovation certainly offsets some of the cost increases, the scope is limited, as there is only a contractual but not a technical relationship between the different scopes, such as electrification, bridges, signaling, tunnels, etc., within the overall project.

While the delivery strategy of a single, very large DBFM contract for civil works and E&M infrastructure may initially appear appealing, due to the perceived lack of interface risk, it has a negative impact on whole-life costs and the project schedule, the reasons for which are outlined below:

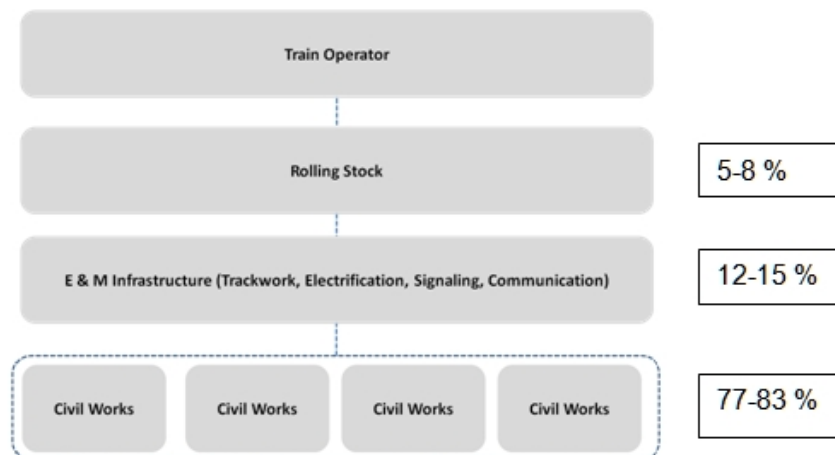


Figure 6 - Simplified procurement scheme

Whole-life costs:

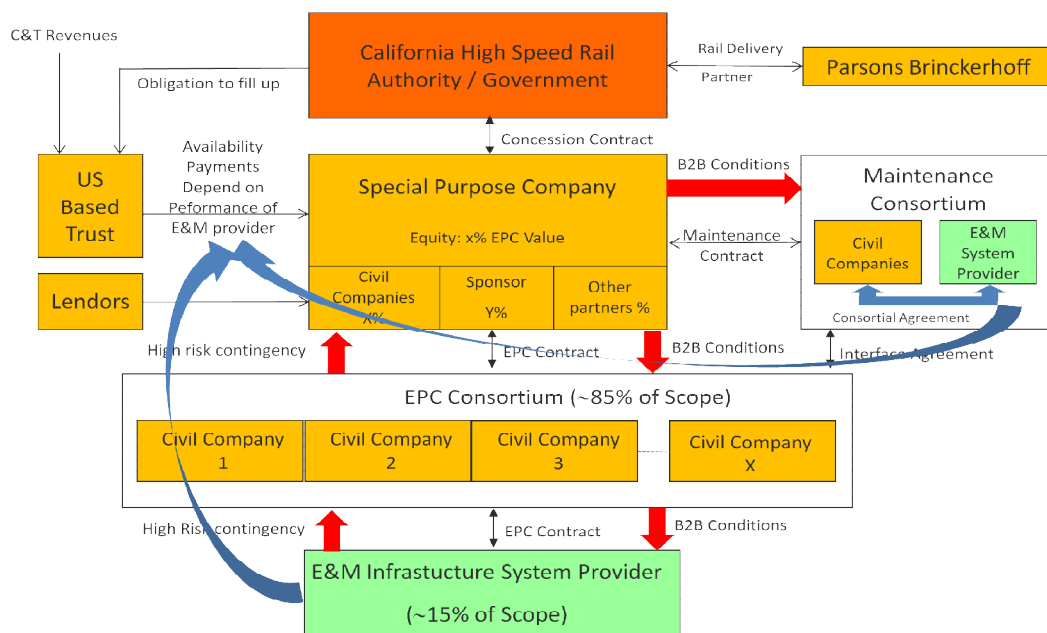
As the major portion of the project scope will be composed of civil works and structures, the project sponsors and companies teaming up in a special purpose concession company are likely to be civil companies and associated investors. The relatively minor E&M infrastructure scope (approx. 15 %) in comparison to the overall scope makes it very unlikely that an E&M infrastructure provider would be part of the concession company, but is more likely to be a subcontractor (to the civil works contractor's EPC) instead.

The RFEI proposes that the DBFM contract would be availability based, meaning that payments will depend mainly on the performance of the E&M infrastructure provider. To limit their high risk, civil partners and other special purpose company sponsors will naturally try to push as many risks as possible onto the E&M infrastructure provider via back-to-back (BtB) conditions. The performance risk of the E&M infrastructure provider

with a scope of probably less than 15% of the complete scope would therefore increase significantly. Assuming that a provider would be willing to accept such conditions, the E&M infrastructure price and its maintenance contract will have to include a high risk contingency to reflect this exposure. Additionally each of the civil partners would need to consider a high risk contingency in its price to cover for the eventuality that the E&M infrastructure provider or one of the other civil partners does not perform or defaults (joint and several liability). Overhead and margins from the EPC joint venture as well as from the special purpose company may be added to the individual lots. Moreover, risk contingencies due to mixing different disciplines with different risk profiles would be added to the project price.

From a lending perspective, such a mix of various disciplines and the associated higher risk profile might appear challenging and could lead to higher contingencies (e.g. for higher construction risk). Hence lending entities and institutional co-investors might reflect this in their price, i.e. interest rate and/or ask for additional support from EPC, which adds further costs for risk. Therefore the proposed delivery strategy can lead to significant margin and risk stacking, as well as to redundant risk contingencies within the offering joint venture, increasing the total cost of the project considerably.

Due to the enormous size of the CHSRA Project and in order to avoid a disproportionate risk to any one company's balance sheet, it would require multiple companies to join forces. This would have two primary negative effects on price: Reducing competition and adding risk contingencies.



Payment of Special Purpose Company depends mainly on a supplier with only around 15% of scope
→ High risk priced in

Figure 7 - Complexity of a potential contract structure

Schedule:

From a schedule point of view, Siemens considers that a very large DBFM will not yield any improvements, on the contrary Siemens expects considerable delays in the schedule if this contracting approach is implemented.

This is due to two main factors:

- Longer duration until financial close
- Extended buffer between successive work packages

The most similar PPP project would probably be the Taiwan High Speed Project, with a volume of about \$18 billion. For this project it took approx. 6 years from the definition as a BOT model to the start of the first civil contract, source:

http://www5.thsrc.com.tw/en/about/ab_comp.asp

Other examples: London Underground: 4 years; HSL Zuid: 3 years; Eurotunnel: 3 years.

The above examples can serve as references. The time needed in the case of CHSRA might be different, however during the time necessary for the setup of a PPP there would be no progress other than the completion of the current CP1-CP4 packages on the California High-Speed Rail Project.

Recommended Changes to Delivery Strategy

Siemens recommends splitting up the complete scope into smaller packages, with an estimated size of \$1 to 5 billion each, which can be better managed and financed.

Packages should be split “horizontally”. We recommend the following packages:

E&M infrastructure Package:

A single provider is responsible for the delivery of the complete rail infrastructure for the whole alignment. This includes track work, electrification, signaling and communications. Within this package cost reduction through innovation can be achieved if the contractor is allowed flexibility in the package design. Also the execution time can be reduced via optimized and parallel design and construction, assuming that all relevant approvals are available.

To allow continuous and fast construction progress, Siemens recommends the E&M infrastructure package to be contracted as a conventional DBM contract for the sections corresponding to CP1-CP4. Subsequent E&M infrastructure packages can be awarded to the selected provider under a DBM or DBFM structure according to the progress made on the civil side. During this procurement process, the option exists to convert the initial E&M infrastructure package into a DBFM structure of a larger E&M infrastructure section.

Civil Packages:

Arranged to package similar specialties such as tunnels, bridges, preparation works etc. to attract specialized companies; thereby minimizing risk and optimizing cost. Smaller packages expediting the overall progress of the project might be executed as DB contracts, the large packages might be executed as DBFM contracts, also allowing for optimized contract duration times, according to life cycle time of each specialty.

With this approach, all major critical interfaces are contained within the optimized packages. The interfaces between the E&M infrastructure and the trainsets are manageable as long as standardized interfaces are used. The interfaces wheel-rail and pantograph-catenary etc. are standard for today's high-speed rail projects and are fully specified in the documents CHSRA has provided in the Draft RFP. We therefore see a very low risk using this approach.

Vertical splitting should be avoided especially within the E&M infrastructure package, as this generates additional interfaces between the different track sections, adding technical risk, integration effort and cost.

3.2 (11.6.2) Integration and Interface Risk

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?

The delivery strategy proposed in the RFEI transfers most of the technical integration and interface risks to the private sector, provided standard open source interface specifications are adhered to.

Nevertheless, in the alternative delivery strategy as proposed by Siemens in answer to the previous question only a few additional technical interfaces would be left with the public sector, which Siemens considers of rather low complexity and risk whilst leveraging the upsides and price efficiencies.

In a large PPP project, special attention has to be paid not only to technical interfaces and risks, but additionally to an equitable distribution of risk between public and private sector. To optimize the project and increase its chances of success, all risks should be allocated to the party which has the best control over it, other risks could be shared.

The following table gives an overview of the recommended risk allocation for a successful PPP project:

Table 3: Proven risk allocation for PPP projects

Risk	Public Sector	Private Sector
Enabling and other prior Works	X	
Land Acquisition and Availability	X	
Subsurface Conditions	X	
Utilities Diversion	X	
Consents and Permits	X	X
Changes in Law	X	
Design & Construction Works		X
Maintenance and Operation		X
System Performance / Availability		X
Ridership	X	
Financing and Refinancing	X	X
Energy Consumption and Pricing	X	X
Insurance Availability and Terms	X	X

For risk allocation, please also refer to the fast forward - funding report from PricewaterhouseCoopers. (*Delivery of High Speed Rail in Britain; February 2010 by PricewaterhouseCoopers*)

3.3 (11.6.3) Scope

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?

In general, the CHSRA's approach correctly recognizes that cross-specialty bundling is counterproductive from a cost, schedule and risk perspective. Bundling more components into each project is likely to have the effect of reducing quality, increasing prices and slowing the project schedule down as shown below.

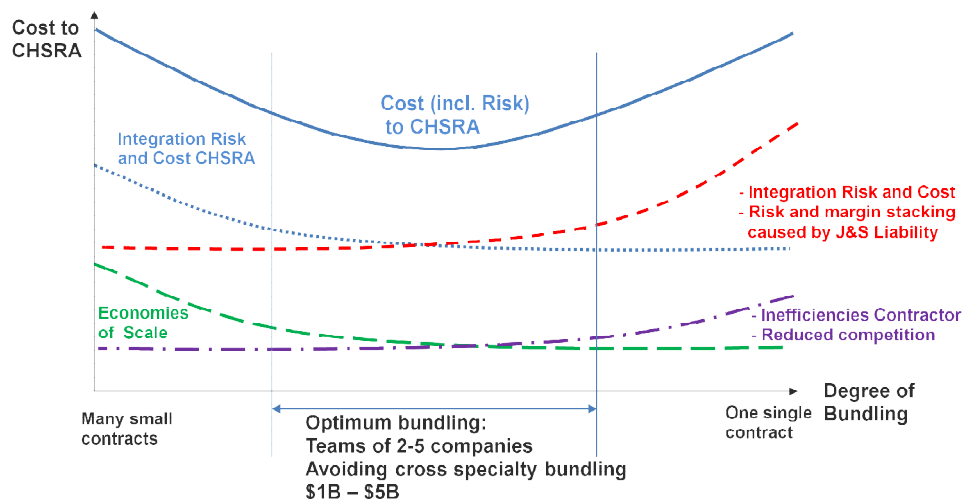


Figure 8 - Optimal bundling approach

By purchasing rolling stock separately, the CHSRA retains its influence on the most important interface between the passengers and the project, which would otherwise become a very small part of an overall delivery package, in turn diluting the significance of an intrinsic customer-system interface. Moreover bundling rolling stock with other parts of the project (e.g. with E&M infrastructure) could reduce competition. In the UK, it is not unusual for Train Operating Companies (TOC's) to procure new rolling stock for franchises where the ridership levels are already established and stable. Such new rolling stock can increase the attractiveness of the franchise and increase the number of passengers. In the case of new lines such as CHSRA, the trend in recent years has been for the Government itself to step-in and procure large rolling stock orders directly from the train manufacturers, before an operator has been selected.

In March 2013, the then UK Transport Minister, Stephen Hammond, explained his decision to directly procure the Crossrail rolling stock, maintenance and associated depot facilities as follows: *"As a new route that is currently under construction it has no inherited train fleet and without new trains the service cannot open. Transport for London and the Government believe this decision is an appropriate course of action to deliver a very complex and unique infrastructure project within the delivery timetable."* Especially under consideration of the specific Buy America regulation for rolling stock applicable to this project and the potentially lengthy waiver process, a separate procurement of rolling stock is strongly recommended.

Similarly, station development lends itself to be procured separately. The skill sets required for such specialized real estate is different to that required for rail development. A major drawback of bundling operations into a supply package is that it would be procured too early, resulting in underselling this element. Until sufficient ridership experience is established, the premium applied for potential revenue risk would be expensive. We recommend a start-up operations contract of around 4 years. Once the segment has been operational for that period, there is a potential to procure the long-term train operations under a concession agreement. A concession with a shorter fixed term (of around 7 to 10 years) would enable the CHSRA test the market more frequently and thereby benefit from competition between potential contractors. In order to reflect the operational needs during the tendering phase, there is a possibility to use a Shadow Operator. The Shadow Operator is a consultant with experience in the operation of high speed rail systems and his task is to consider all aspects of operations over the entire life cycle of the E&M infrastructure and the Rolling Stock from an operations point of view with regards to timetable stability and reliability.

Whilst breaking a high-speed rail project into smaller, more manageable pieces is not without its drawbacks, in particular the requirement to co-ordinate additional interfaces, it will enable more companies to compete, and increases the chances that competition among firms will result in lower prices, innovative solutions and better quality.

All three suggested scope elements (*rolling stock, train operations, stations*) require specialist knowledge which in turn would mean more joint venture members which, combined with the large volumes indicated in the Business Plan, may not lead to the indicated objectives being realized.

Competition is a key requirement for the success of any project. A recent report by US PIRG Education Fund made the observation that “Private sector participation in government infrastructure projects is only likely to be beneficial in cutting costs, improving quality, and mitigating risk if private sector firms are forced to compete against one another for the projects. It is also likely to be beneficial only to the extent that the projects do not become “too big to fail”.

3.4 (11.6.4) Contract Term

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)?

The appropriate contract term for a potential DBFM contract is related to the infrastructure component with the shortest design life within the bundle (reference is made to CHSRA table for design life of infrastructure components). Based on the data provided and also building on experience made on other rail projects, an appropriate contract term is in the range of 30 years. However, in order to leverage the duration to the utmost benefit to the CHSRA, a separation especially of the components with longer economic useful life would bring additional value in terms of stretching the financing period of such assets, leading to easing of the repayment profile. For example, bridges last longer than “normal” civil works but shorter than tunnels. Of course such considerations need to be aligned with the duration/capacity in the financial market, which is mainly dependent on the underlying credit risk. As indicated above a homogenous bundle paired with a sound and bankable off-take structure can achieve the longest possible terms and hence the best value for CHSRA. Contract durations with an inherent imbalance of achievable financing term and associated risk profile, bear a refinancing risk adding an additional layer of complexity to a project resulting in higher contingencies, if not adequately covered.

As these structures deviate from normal procurements, such life-cycle-cost / long-term models require a strong focus on the stability of the key suppliers. The supplier is not only essential for proper execution of such a structure (incl. long-term maintenance), but also for the bankability of such a transaction. A financially strong supplier has a substantially lower probability of default, which in turn can influence the overall project rating and therefore leads to lower financing costs. Also, supplier access to meaningful but cost-effective security packages would provide significant value, when compared with low-rated suppliers. A default of the supplier during the life of such long-term projects would have tremendous effects on the project, e.g. forced re-tendering of a part of the project, negative political fallout, etc. The financial strength, reliability and track record of stable suppliers and contractors should provide comfort to banks, resulting in attractive terms and conditions.

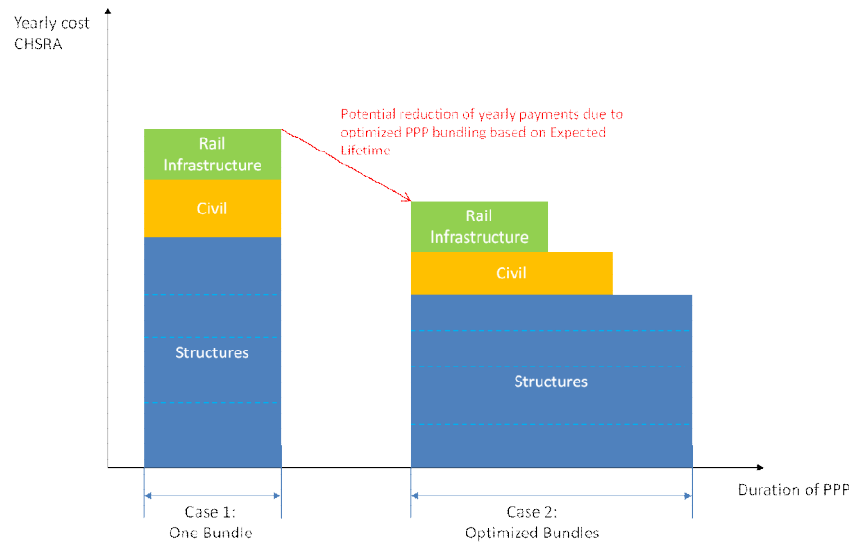


Figure 9 - Optimization of yearly cost to CHSRA

3.5 (11.6.5) Contract Size

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

The advantages of bundling the scope into one package as proposed in the RFEI are:

- Very limited interface risks for the CHSRA
- Very limited integration effort for the CHSRA
- If structured as an availability based DBFM, payments are made only on availability of complete infrastructure
- “One Stop” financing solution, if feasible

Nevertheless Siemens sees also important disadvantages to this approach:

- Process from start of RFP documentation preparation to financial close will be very long, with no construction activity during that time
- Uncertain outcome of process (number of capable participants, financial feasibility)
- Large teams will have to be established, to overcome balance sheet limitations. Such teams are extremely difficult to manage, and are frequently prone to failure due to the multitude of parties involved, each of whom carries its own independent risk of failure. Failure of a single member, causes the entire team to stall activities with calamitous effects on the project progress.
- Very large projects lead to increased complexity and associated cost
- Severely reduced competition
- Price will increase compared to optimum sized packages due to additional risk and margin stacking (see answer to “Delivery Strategy”)
- No customer choice regarding technology elements

- Higher financing cost due to complexity and funding size constraints in the market
- Higher project costs due to long implementation period and committed funds for E&M infrastructure which will be delivered at a much later date due to civil works

Based on Siemens experience the maximum value for a DBFM contract should be limited to values of around \$5 billion.

Conversely, packages which are too small, will reduce the economies of scale, and introduce considerable integration efforts and risks on the customer's side. The "Figure 8 - Optimal bundling approach" illustrates how reasonably sized packages will have a positive impact on overall cost.

The following figure shows the size of DBFM projects developed in the US in the last years, where a clear growth in contract volume can be observed; nevertheless the largest project is still below \$4 billion. Moreover, those projects were not privately financed in their totality and implied a substantial percentage of publicly financed portions, either by use of grants or other publicly related loan programs, e.g. TIFIA.

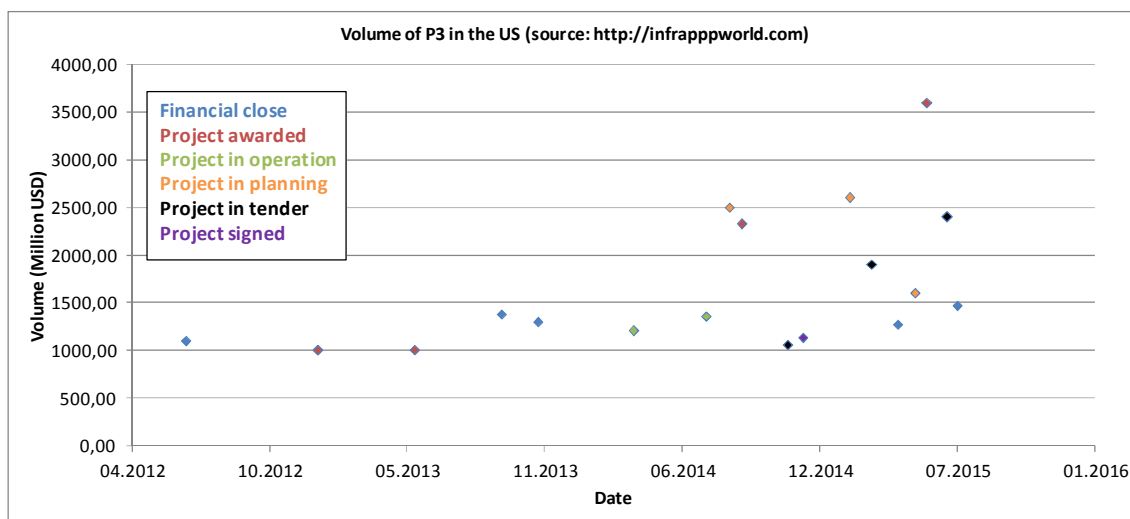


Figure 10 - Volume of recent PPP - projects in the US

Given the above constraints, Siemens believes that while the civil works should be apportioned in several smaller packages, we recommend that the E&M infrastructure package should be combined for both the IOS-North and IOS-South scopes, and a single provider should be chosen for the complete alignment to avoid interface risks and assure performance of the whole alignment.

If the IOS is split vertically, which is not recommended, the unavailability of one section would result in trains being unable to operate continuously along the line, however, most of the availability payments will still have to be made.

3.6 (11.6.6) Competition

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

The proposed approach from the CHSRA to bundle the IOS into one single, large DBFM contract will significantly reduce competition. This would be the largest PPP the rail world has ever seen. Only the Taiwanese PPP was comparable, but still smaller from a volume perspective and at that time only two consortia were able to participate. Those consortia contained already nearly all major players in the civil / rail world. The large DBFM contract will furthermore have a very high risk profile, which might prevent major players from participating in any tender. Last, but not least the complexity and challenge is increased by US specific requirements such as Buy America and Small Business regulations.

The most competition and therefore the lowest price will be reached with separate packages as described in 3.1. This approach has the following impacts on the competition:

1. Manageable size of the project will increase competition as even smaller companies can participate and less teaming is necessary
2. E&M infrastructure package consisting of track, electrification, signaling and communication is known in the rail market and therefore the industry appetite is larger
3. Joint and several liabilities are a key drivers that reduces competition as only a few very large companies are able to take such great risks

4. (11.7) Funding and Financing Questions

4.1 (11.7.7) Financing Sources and Amount

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?

The capability of raising the financing is heavily dependent on various factors outlined below and in 4.2, but also on the quality of the project and its inherent risk structure.

Such a risk structure is not only driven by a sound procurement structure (e.g. reasonable size) governed by a balanced risk allocation between private and public sector (following the principle of allocation to the party best able to manage a specific risk), but also heavily influenced by the parties involved in such a transaction. Of course those partners must be able to demonstrate that they are capable of performing a project of such dimension and complexity. As already alluded to earlier, the financial strength of the various parties is a considerable component to that. Another important aspect driving “finance-ability” and cost is the performance regime within the availability structure and the associated guaranty package, as well as the quality of the off-taker.

Especially in terms of the availability of funding, the financial market perceives the introduction of Cap & Trade as great sign for the project with a lot of potential.

It is usual, when analyzing a revenue stream for any sort of monetization, for the market to receive a significant amount of data on past development/stability (approx. 10 years) as well as in-depth analysis of the future development. Occasionally such streams are also externally rated. Considering that the first auctions have outperformed expectations, enthusiasm has been raised but the limited historical data points do not establish sufficient comfort in the market regarding certainty of repayment for long durations. That being said, we perceive the market as very cautious in lending long-term based on this new kind of revenue stream, especially due to its early stage and potential self-diminishing nature. The market feels uncertain on legislative/regulatory questions like duration and how to assess potential procedural inconsistency related to the auctions held. Especially in this early phase of such a promising program, we see it as beneficial to hold off on long-term monetization to avoid underselling (both in regard of volume and pricing) this great funding source for the project.

Apart from the question of how to pay for the project(s), the previously mentioned ‘natural’ size of a transaction needs to reflect the receptivity in the financial markets. Especially, as there have been only two availability based projects contracted successfully in California (Presidio Parkway and Long Beach Courthouse), a reasonable sizing of projects is essential. Banks/institutions tend to steer away from too much concentration risk, lowering ticket sizes can increase the number of financing parties required in a deal, allow for broader competition and faster closing. A significant portion of public money has been seen in various projects in the past, lowering the amount to be raised on the banking market whilst also showing a certain level of public commitment. Combining Cap & Trade with the existing funds available, e.g. Prop 1A, on

reasonably sized transactions, would allow a phased approach of substantial steps in completing the alignments. Existing funds, as grant money, could lower the amount of private financing required. Cap & Trade could either be used as a designated funding source for availability payments/repayment or even be utilized down the road in the form of a securitization/monetization depending on the procurement model pursued.

Hence, Cap & Trade in its current stage and maturity could qualify for short-term financing, filling the gap on smaller tranche procurements in form of “pay as you go” or shorter term monetized transactions. Such approach would also allow time to establish Cap & Trade and consider some proposed changes as outlined below, while proceeding with the overall project and allowing CHSRA to capitalize on this funding source. Establishing more transparency and consistency along with regulatory certainty would help the market and ultimately the CHSRA to make use of Cap & Trade as a long-term funding source.

4.2 (11.7.8) Changes to Funding Sources

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

Building on the background of Section 4.1, the market tends to be cautious due to open regulatory and legislative questions (e.g. duration) as well as market risk components, which might not be sufficiently mitigated through past data. These drivers very much influence the duration and coverage requirements of the financial market.

Building on the rationale of how to capitalize best on Cap & Trade and the constraints outlined in 4.1, we outline below some ideas:

- An efficient way to make the market comfortable with this revenue stream could be to set a floor, securing a minimum payment in case Cap & Trade revenues should fall short. Associated with a proper duration, such a mechanism would allow for long-term monetization with efficient coverage rates due to the ‘guaranteed’ payments by the State of California reflected in the floor. Such a mechanism respectively a general underpin by the State of California would help to attract private funds at an attractive rate.
- An alternative could be a prioritization of revenues allocated to CHSRA within the overall Cap & Trade program. This might not fully take away market risk constraints, but due to the 1st lien character, a level of coverage would be implied and should provide additional comfort.
- In order to properly manage the market risk components (e.g. perceived self-diminishing nature, regulatory constraints and limited track record), we think the following aspects might accommodate the lenders’ position:
 - Back up Cap & Trade with another stable revenue source with a deeper track record and sufficient stability/sustainability
 - Establish Reserve Accounts to be either funded in advance to allow appropriate coverage in case of a Cap & Trade allocation shortfall or

- funded with a lower amount but with an obligation to replenish in case funds are drawn
- In the absence of a floor and given a certain level of dependency of the State's ability to influence Cap & Trade revenue, we think the market would also be receptive to a negative pledge, respectively a commitment from the state not to undermine the Cap & Trade program
- Building on the idea of a reserve and the replenishment obligation, we think General Obligation Funds in form of Prop 1A might be a good source upon which to capitalize. A structure building upon General Obligation bonds, in terms of CHSRA Prop 1A money, could be used to fund a reserve account initially and subsequently be used as back up for Cap & Trade. This would leverage Cap & Trade by using an initial smaller portion of the already approved Prop 1A to fund the reserve account. Such reserve would only need to be replenished by General Obligation/Prop 1A means in case Cap & Trade revenue should not be sufficient to pay the debt service backed by Cap & Trade. Assuming the success story of Cap & Trade, a replenishment would be limited if at all and could be facilitated either by existing Prop 1A or other allocated General Obligation funds.

Another factor we perceive as important is the reliability of Cap & Trade and other associated measures. In order to make proper use of such money, the legislative and regulatory framework needs to be stable, reliable and not prone to changes in administration. Financiers would like to be shielded from any litigation risk associated with such revenues. Such components would also be positively reflected in any sort of external rating to be conducted either for the revenue stream itself (e.g. for a bond issuance) or as a component embedded in a project finance rating.

Apart from Cap & Trade and other existing funds available to CHSRA, we would strongly recommend CHSRA to review use of additional federal funding programs and attract such means to the project. Not only are those funds, e.g. RRIF, TIFIA, meant to support such projects but also are specifically developed for rail related transactions and familiar to the financing community. Those means would not only lower the financing amounts required from the private sector, but would also indicate a greater level of public commitment to the project. CHSRA might also consider private finance structures under the umbrella of tax exempt schemes, in the form of Private Activity Bonds.

4.3 (11.7.9) Payment Mechanism

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?

In general, an availability payment mechanism could be seen as the most appropriate and proven way to pursue a PPP. The market per se is very averse to ridership risk and given the novelty and magnitude of the project, we do not recommend this approach.

PPPs in principle, take significant time to develop and contract and in light of the overall timeline for the project, we strongly encourage continuing to use conventional contracts for the rolling stock as well as for the initial E&M infrastructure as described in 3.1.

Regarding the possibility to raise financing on a fare box concession model, we think this would be challenging as a Greenfield project. It would be recommendable to wait until the ridership is ramped up and established/proven for at least 3 years before testing the market's appetite. This would require a phased approach. As the private sector in principle is not in a position to manage such ridership risk in the early stages, such regimes should foresee appropriate owner support, like a minimum ridership guarantee during the ramp-up phase.

We believe attempting a revenue based concession on a project without any proven ridership will result in the concession being undersold. Concessionaires and especially lenders will be extremely careful with their projections and would provide little benefit to the CHSRA. Global experience over the last years has shown that Greenfield rail projects have been challenged to generate enough revenues from farebox (and commercial business) to cover the debt service, investors' returns and maintenance costs especially during the ramp up. A good example is the high speed system in Taiwan which was procured on a BOT basis. The Taiwan system suffered from lack of revenues and finally had to be taken over by the government. Therefore we would see availability based remunerations structures or minimum income guarantees being necessary to raise the required financing for the project at reasonable costs once procured on a PPP basis.

5. (11.8) Technical Questions

5.1 (11.8.10) Cost and Schedule Impacts of Preferred Delivery Model (Bundling)

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.

After review of the CHSRA 2014 Business Plan, it can be said that the revenue forecast for the complete alignment (San Francisco – Los Angeles) seems to be realistic in comparison to current air traffic as well as under consideration of the population sizes of both urban areas. On the other hand, it still remains unpredictable how quickly the ridership and therefore the cash flow on an IOS will develop and when the cash flow will be sufficient to cover operations and maintenance costs of the alignment. We believe that our described approach optimizes the delivery schedule and is fundamentally cost effective.

In contrast, alternative methods, especially those involving large scale PPP projects, have significant failure risk. Julien Dehornoy (SNCF) did a review of 27 PPP rail projects in 2012 and came to the following conclusion:

"One of the major reasons for a public tender to chose a PPP rather than a public procurement is that PPPs are supposed to reduce lifecycle costs of a rail system. However:

- *financing costs are higher in the case of a PPP since interest rates on private debt are higher than on public debt and equity shareholder have to be rewarded for their risk taking;*
- *transaction costs (consultants, tendering) are much higher in the case of PPPs;*
- *additional delays are needed in the first phases of the project, both to organize the tendering process and in the final negotiation/closing phase."*

(PPPs in the rail sector - A review of 27 projects; April 2012 by Julien Dehornoy / SNCF)

The study provides further in-depth analysis of the advantages and disadvantages of PPP projects.

As described under 3.1 there is no positive whole-life cost impact expected out of the bundling of civil and E&M infrastructure. Moreover the cost might even lead to significant margin and risk stacking, as well as to redundant risk contingencies within the offering joint venture, increasing the total cost of the project considerably.

Also from a schedule point of view Siemens considers that a very large DBFM will not yield any improvements as described in 3.1.

The following table shows the main causes for failures of rail PPPs:

Table 4: Main Causes for Failures of rail PPPs

politics	complexity	commercial
<ul style="list-style-type: none"> - lengthy decisions processes may cause scope deviations - failure to execute / interference by public authority - "political entrepreneur syndrome" - public and market acceptance - involvement in incumbent train operating company - quality of legal and institutional framework 	<ul style="list-style-type: none"> - long and complex completion phase - technical intensity: proven technologies but complex integration: <ul style="list-style-type: none"> ↳ structures and ground conditions ↳ interaction of a variety of systems ↳ safety ↳ technical interfaces ↳ functional interfaces 	<ul style="list-style-type: none"> - revenue structure - demand forecast

* Painvain N. (2010), "High Speed Rail Projects : Large, Varied and Complex", Global Infrastructure & Project Finance, FitchRatings, 19 p.

5.2 (11.8.11) Cost, LCC and Schedule Impacts of Single Procurement

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.

Packages should be split "horizontally". For further details please refer to 2 (11.4) Project Approach.

The proposed approach adds only a few, relatively low risk and easy to handle interfaces compared to the single large DBFM contract approach. All major critical interfaces are contained within the optimized packages.

The schedule impact will be positive as no long-lasting contractual and financial closure is necessary. On the other hand the E&M infrastructure package still facilitates an integrated scheduling using all benefits from having tracks, electrification and signaling in one hand. The only "external" interface for the construction work is the civil / ground work company, which is a well-known and therefore easy-to-manage interface.

5.3 (11.8.12) Technical Changes to decrease Costs and advance Schedule

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.

The structure of the packages developed for the procurement process as we understand them thus far (civil works, trainsets, E&M infrastructure and operations) is appropriate for a HSR project. To advance the schedule, we believe it is of utmost importance to move forward with the rolling stock procurement. This is based on the timeline needed for the RFP incl. the potentially needed Buy America waiver process, the time for design, manufacturing and deployment of the rolling stock including the necessary testing and approval process compared to the planned timeline for civil and

E&M infrastructure. Selecting a trainset design will also answer a number of outstanding questions within other packages and reduce costs there.

The selection of the trainset will determine the exact axle loads the viaducts and bridges have to be designed for. The size of the trainset will determine the exact tunnel diameter to get built for the system. Without those answers it will be required to build for the maximum value for all those metrics at a significant extra cost, without any benefit. Once the trainset selection has been made the subsequent procurements for E&M infrastructure and civil packages can get updated so that they reflect the chosen standard. This will likely result in a significant reduction in costs and due to further clarity for the overall system, result in the schedule getting advanced.

The CHSRA was wise in selecting a blended approach to reach the end points of the Phase 1 alignment (San Francisco and Anaheim). The sharing of the Caltrain and Metrolink alignments is a major contributor for reaching the cost targets for the overall project. We recommend the E&M infrastructure scope for train control to include not only the train control for the dedicated alignment from San Jose to Burbank based on global HSR standard but also to include the integration of the CBOSS system on Caltrain and the Metrolink PTC system to reach Anaheim. It is feasible to have high-speed trainsets use those tracks and the E&M infrastructure procurement should include the requirement to integrate the new HSR train control system with the two PTC systems currently being deployed. The CHSRA should use a performance specification and leave it up to the bidders to propose attractive solutions for an end-to-end train control solution.

6. Conclusion

We believe the CHSRA is progressing the project down a correct path by sticking to the procurement sequences planned so far. The development of PPP models should start soon as that will take significant time. The volume for IOS-North as well as IOS-South is above the natural threshold for a PPP at this point.

In order to move the project forward while PPPs get developed, our recommendation is to continue with conventionally contracted packages in the following order:

- 1) Rolling stock
- 2) Initial E&M infrastructure
- 3) Potentially further civil packages based on their availability

The investments described above will naturally reduce the volume of PPPs downward, making it easier to place them in the marketplace. The goal will be to time the PPP procurements in such a way that the project progresses out of the conventional procurements seamlessly into PPPs.

This approach would also provide sufficient time for the implementation of the recommended modification whilst establishing a track record for Cap & Trade.

There are natural interfaces that the CHSRA is best positioned to retain. The top of civil works is a good example. We recommend the CHSRA to contract civil packages separate from E&M infrastructure as this is the most economical way to deal with this interface. By forcing civil contractors together with E&M infrastructure providers for systems elements such as electrification and train control the cost goes up as each side adds risk to the scope they do not perform. The CHSRA would get stuck with that extra cost whereas the interface itself can be relatively easily verified after the civil works are complete.

Our recommendation is to focus on operations contracts at a later stage with the operations plans for the ramp-up phase are more clearly defined. Launching into a concession too early will result in dramatically underselling the concession. Bids for the concession will get a lot more attractive once a base ridership has been established. We also recommend limiting the duration of the concession period after ramp-up to 7-10 years so the CHSRA can take advantage of attractive bids based on growing ridership and/or change the approach based on changing ridership patterns from generation to generation.