

**Attachment 2:**  
**Electric Container Mover System: An Overview of  
Current Activities in Southern California**

**Prepared by POLB, July 2008**

**ELECTRIC CONTAINER MOVER SYSTEM:  
AN OVERVIEW OF CURRENT ACTIVITIES IN SOUTHERN CALIFORNIA**

**Submitted to:**

**Board of Harbor Commissioners  
The Port of Long Beach**



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**Transportation Planning Division  
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### Attachments

- Attachment 1: San Pedro Bay Throughput Projections, March 2008
- Attachment 2: POLB/POLA ZECMS Project Task 1 Final Report (Excluding Appendices)
- Attachment 3: Status Report on the Proposed ECMS Scope of Work by USC Keston Institute
- Attachment 4: Proposed Scope of Work on ECMS by Alameda Corridor Engineering Team (ACET)
- Attachment 5: Draft I-710 Corridor Project EIR/EIS Newsletter. Summer 2008 Edition
- Attachment 6: Initial RFP Scope of Services, SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy
- Attachment 7: Southern California Regional High Speed Transit JPA and Response Letter by GCCOG
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- Attachment 9: Port of Los Angeles Zero Emissions/Electric Container Mover System Information Package dated April 2008
- Attachment 10: Additional Product Information

## Introduction

This report, prepared in response to the Board of Harbor Commissioners' request, provides an overview of several concurrent planning activities regarding possible deployment of alternative technology container mover systems near the San Pedro Bay Ports and in the Southern California region. The report summarizes studies and issues raised by stakeholders as well as the interdependency of logistical, technical and operational issues.

Since mid-2007, the following initiatives have been undertaken to evaluate various alternative technologies for moving containers to and from the Ports:

- A feasibility study of zero-emission cargo conveyance technologies for possible applications within the Port complex was conducted by Cambridge Systematics, Inc. and URS Corporation in mid-2007. A technical report was completed in April 2008.
- The recently initiated I-710 Corridor EIR/EIS project examines, as a project alternative, electric container mover systems (ECMS) along/near the I-710 corridor to reduce the volume of trucks servicing both ports.
- In spring 2008 Congressman Rohrabacher recommended the establishment of a joint power authority between the port complex and the Gateway Cities COG for constructing an ECMS system in the near future.
- The Southern California Association of Governments (SCAG) will soon commence a multi-year study on goods movement and implementation strategies including an ECMS for the entire region.
- Concurrent to the activities above, the Cities of Los Angeles, Ontario, and West Covina have recently entered into a "High Speed Transit" Joint Powers Agreement (JPA) to provide passenger service between West Los Angeles, Union Station, West Covina, and the Ontario Airport. The High Speed Transit JPA also envisions a spur of ECMS to the port complex, an option that is strongly opposed by the Gateway Cities Council of Governments (COG).

In addition to the above-mentioned activities which are focused on evaluating container mover systems, several studies on throughput projections and initiatives on use of local inland ports raised additional factors and constraints that must be taken into account for moving containers in/out of the Ports efficiently.

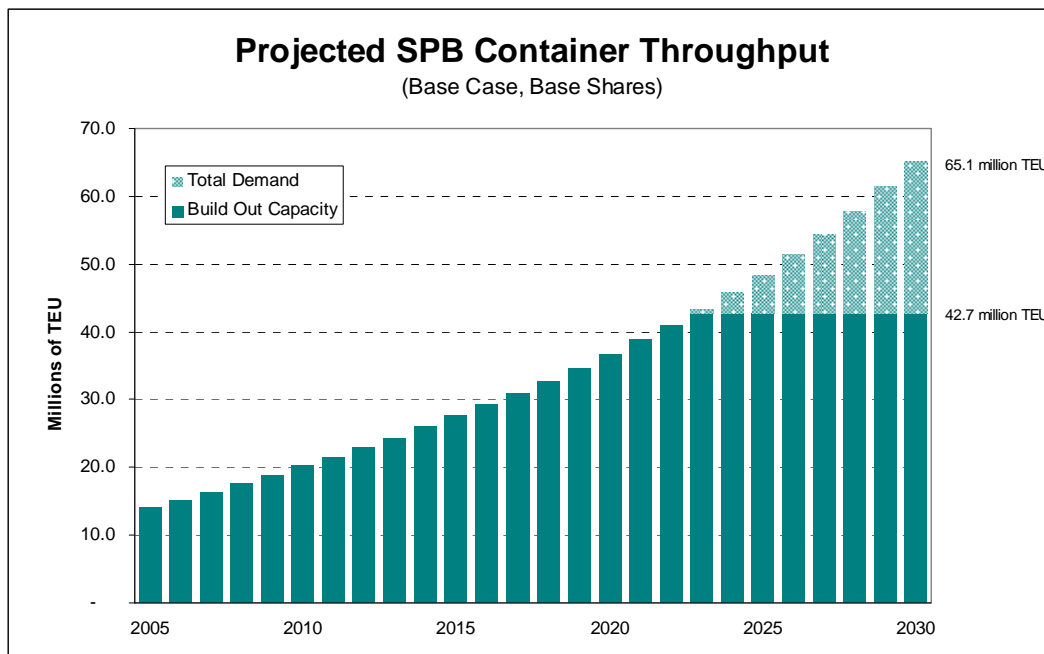
A number of options exist when selecting the "right" zero-emission container mover system. In the broadest sense the ports could sponsor a demonstration project within

or near the Port complex. Alternatively the Ports could consider partnering with a private enterprise for the short or long-haul systems. The next steps outlined in this paper will provide the Board of Harbor Commissioners with more information on each option.

## Background

Over the last two decades, the Southern California five-county region, i.e. Los Angeles, Orange, Riverside, San Bernardino, and Ventura, has become the State’s and nation’s principal gateway to Pacific Rim import and export trade. The San Pedro Bay Ports handle 44 percent of the nation’s containerized imports and 86 percent of California’s port throughput. According to a report by the Los Angeles County Economic Development Corporation for the Southern California Trade Corridor Consensus Group, the San Pedro Bay Ports generates over \$7 billion annually in state and local taxes within California and these trade activities generate 718,000 jobs for California residents. LAEDC estimates that by 2030, over 1 million jobs will be tied to exports and imports traveling through the Southern California region<sup>1</sup>.

The recently released San Pedro Bay Ports throughput projection reveals that both ports combined will handle 42.7 million TEUs of by the year 2030<sup>2</sup> (Attachment 1), rather than 65 million TEUs which is commonly referenced by other planning agencies. The projected throughput, in fact, is constrained by build out capacity in the port complex and is far below the market demand.



<sup>1</sup> Executive Summary. The Southern California TCIF Census Working Group Brief Book, February 2008

<sup>2</sup> San Pedro Bay Throughput Projections, by the Ports of Long Beach and Angeles, March 2008

The increase in container throughput will result in daily port-generated truck traffic increasing from 60,000 truck trips per day in 2005 to 140,000 by 2030. Increase in moving goods from/to manufacturers, warehousing and distribution centers that serve the domestic and local markets are expected to account for about two-thirds of all freight movement within the SCAG region. According to the State's 2007 Goods Movement Action Plan (GMAP) prepared by the Business, Transportation and Housing Agency and the California Environmental Protection Agency, that:

*Increasing the fraction of container traffic that moves by rail is a critical strategy to reducing congestion and emissions caused by trucks. Without expanded facilities to load and unload containers on and off railcars, railroads have limited economic incentive to expand the mainline trunk routes required to handle more rail traffic<sup>3</sup>.*

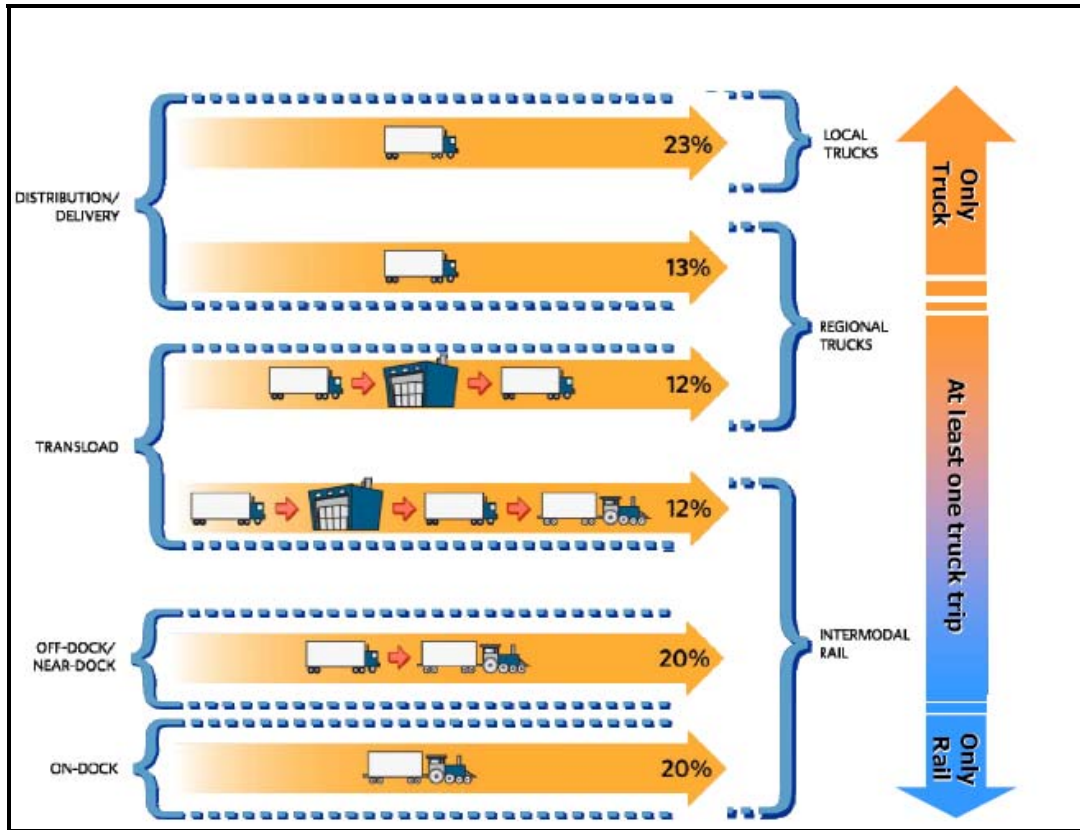
Proactive planning is well underway at the Port to increase on-dock rail capacity and usage. The projected increase in truck trips would have significant effects on the region's already-congested transportation network unless an alternative way of moving freight is developed. It is conceivable that a "conveyor" system for transporting marine containers in and out of ports could significantly reduce truck trips. Therefore reducing highway congestion and with zero-emission technology, improving air quality.

A short-haul conveyor system could reduce regional truck trips originate from and destine to the port complex. To be financially viable, the overall cost must be comparable to or lower than trucking. A long-haul conveyor system beginning at single or multiple near/off-dock facilities for national shipments could possibly reduce additional drayage truck trips. The following cargo flow chart illustrates the modal split of import cargo flow from the Port to different destinations<sup>4</sup>.

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<sup>3</sup> Page V-17. California State Goods Movement Action Plan. January 2007

<sup>4</sup> Modal split reflects 2005 data. Source: MCGAMP, Presentation to Stakeholder Advisory Group on March 6, 2008



The development of conveyor system not only has to be technically feasible in moving containers, but must also be supported by sufficient loading/unloading operations and space. Furthermore, the system's constructability will be contingent upon available rights-of-way, origin and destination space, community acceptance, and other environmental considerations. Finally, the future trend of warehouse clustering throughout the region, largely constrained by local ordinances, and the adaptability by the shipping industry will influence the overall costs of using such system and its acceptance by users.

The following figure illustrates the spatial relationship of nine concurrent studies and initiatives related to ECMS, followed by detail description on scope and progress of each activity.

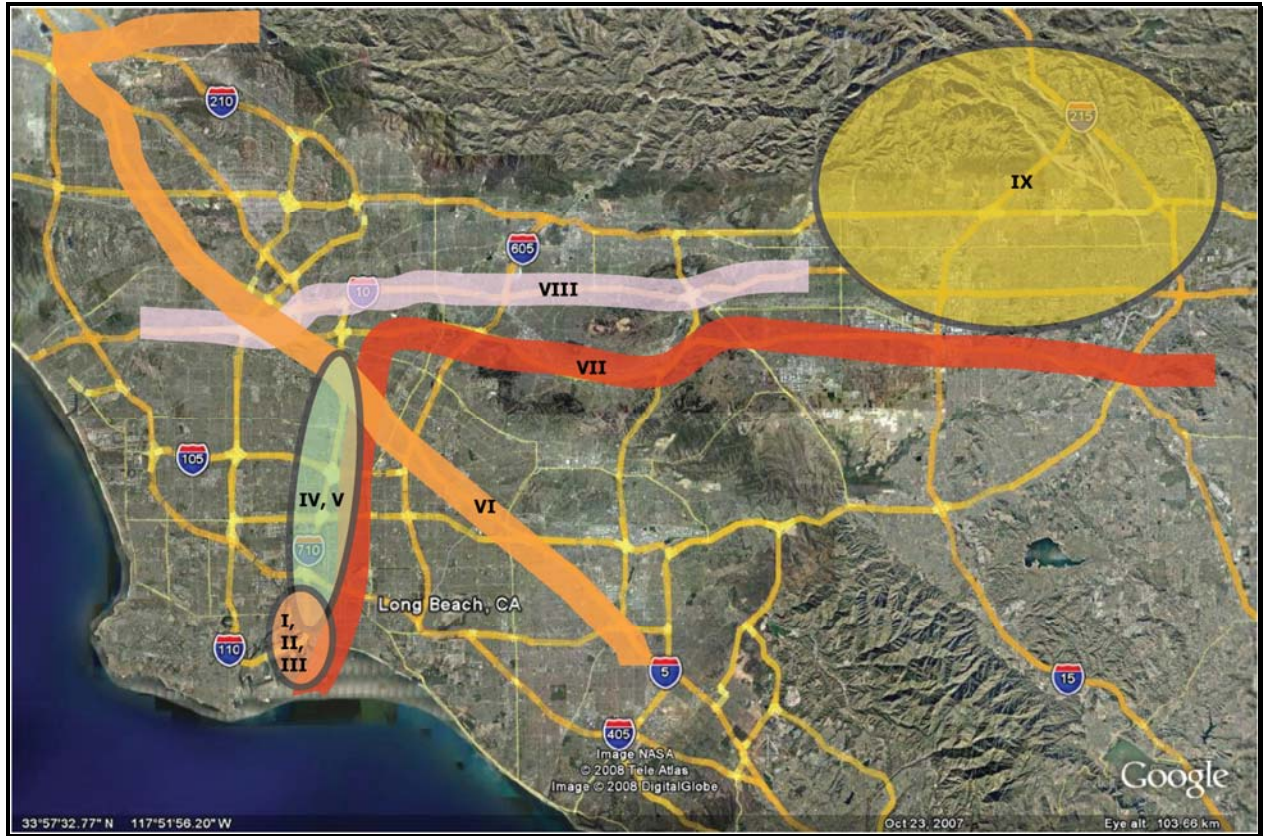


Image credit: Google Earth

## Studies Initiated by POLB and POLA

### I. Zero Emissions Container Mover System (ZECMS) Feasibility Study

In January 2008 staff provided an update on the Zero Emission Container Mover System (ZECMS) Feasibility Study to the Board of Harbor Commissioners. The objectives of this project were: (1) to evaluate zero-emission cargo conveyance technologies for possible applications in the ports of Long Beach and Los Angeles, and the five-county region; and (2) to identify technologies that are market ready and technically appropriate for possible near-mid-long term implementation. The project team, lead by Cambridge Systematics, completed a review of alternative technologies for moving containers within the Port complex and between the Port and an intermodal facility less than five miles away. Subsequently the consultant team prepared a report and presented its preliminary findings on each technology's market readiness and financial feasibility to the Board on February 11, 2008 (Attachment 2).

**Consulting Team: Cambridge Systematics, Inc. and URS Corporation**  
**Timing: May 2007 – February 2008. Task 1 completed.**

### II. Technical Assistance by USC Keston Institute for Public Finance and Infrastructure Policy

The Port solicited a proposal from the Keston Institute of USC for the evaluation and deployment of various container mover systems. Specifically, Keston Institute would develop a test and evaluation methodology that includes outcome measures and performance metrics. The team would also provide technical and economic assessments on the systems' readiness for the various technologies. A status report to the Board dated July 14, 2008, along with the scope of work proposed by the Keston Institute, are included in Attachment 3.

**Consulting Team: USC Keston Institute**  
**Timing: Summer 08 – Summer 09 (Tentative)**

### III. Feasibility Study by ACTA Engineering Team

In February 2008, ACTA Board of Directors directed ACTA staff to conduct a feasibility analysis for development of system planning alternatives for the ECMS in the port complex and neighboring near-dock rail facilities, including a connection to the I-710 Corridor. The ACTA study will evaluate various business models based demand to cost to determine the extent of needed capital in order to make the ECMS work. The study will

also document physical constraints and factors, such as the rights-of-way available for the support structures along the route and degree of impact on nearby communities due to the size of load terminal, that make the ECMS financially feasible.

The ACTA team would also coordinate this effort with LACMTA, SCAG, and the Gateway Cities COG which are examining the feasibility of ECMS alternatives along the I-710 Corridor and other transportation corridors providing access to rail yards near downtown Los Angeles and beyond.

ACTA's first task is to support the upcoming ECMS Joint Board Public Workshop, which is currently scheduled for September 3, 2008. The goal of the workshop would be to familiarize those in attendance with the practical considerations related to the deployment of an ECMS near the Ports and potential effects on regional transportation system.

Key tasks of ACTA Study include analyses of a stand-alone on- and near-dock ECMS; a near-port system that only connects to I-710 Corridor or one that connects to I-710 and the rest of region. The scope of work is included in Attachment 4.

**Consulting Team: Alameda Corridor Engineering Team**  
**Timing: Begins in September 08**

## Activities within the Gateway Cities COG/Sub-Region

The Gateway Cities COG is an active participant in the development of the I-710 Corridor Project EIR/EIS, which both Ports are also directly involved. The following comments regarding the evaluation and development of alternative technology container mover systems along the I-710 Corridor were provided by GCCOG staff:

- Such a freight movement corridor needs to go beyond the I-710 corridor in order to be effective. Any technology that can effectively move containers to the rail yards in Vernon and Commerce could also move containers further inland.
- Other than the I-710 Corridor, there are not many options to service the rail yards without community impacts that might not be acceptable, even the alternative technology conveyor system. GCCOG recommends, however, that the I-710 Corridor Project consider all options when reviewing different alignments.
- GCCOG expressed concerned that if the ACTA study focuses only on moving containers to and from the SCIG, it would be difficult to connect the SCIG with the I-710 freeway without going through neighborhoods in either Long Beach or Carson. GCCOG suggests that the ACTA study explore some other staging area

options, or systems, or alignments that might make it easier to access the I-710 corridor.

#### IV. Joint Power Authority Concept of Congressman Rohrabacher

Congressman Rohrabacher has expressed his support in developing a magnetic levitation drayage system extending from both ports to warehouses and distribution centers in the Inland Empire. In spring 2008 joined by Congresswoman Laura Richardson, and Long Beach Councilman Gary DeLong, Congressman Rohrabacher requested representatives from General Dynamics, CSULB, the U.S. Department of Transportation and others to determine the next steps needed to make the Electrodynamic Cargo Conveyor maglev system (ECCO) developed by General Atomics a reality.

Congressman Rohrabacher supports the establishment of a joint powers authority (JPA) among the cities of Southern California and both ports as the first step (see Attachment 6 - Newswire on Rohrabacher). Once the JPA is established, the first phase of a 1.5-mile track from the ports of Long Beach and Los Angeles to a nearby intermodal yard could begin. The goal is to start construction within three years with the system eventually extending to Victorville and Beaumont in the Inland Empire<sup>5</sup>.

#### V. I-710 Corridor Project EIR/EIS

The ports of Long Beach and Los Angeles have each contributed \$5 million toward the preparation of an environmental impact report to analyze the range of possible improvement alternatives for the I-710 corridor between the port complex and the Pomona Freeway. As shown in the right, the study area encompasses 18 cities and unincorporated areas in Los Angeles County adjacent to I-710. The project progress will be disseminated to communities and decision-makers through printed materials, e-mails, regular community meetings. The first edition of the I-710 Corridor Project EIR/EIS project newsletter to be released in summer 2008, is included in Attachment 5.

This study will include preliminary engineering evaluation and design for an ECMS. For planning purpose, the southern-most boundary of the ECMS alignment is currently envisioned at the intersection of Anaheim Street and I-710; and the northern-most boundary is in the BNSF Hobart yard located between Bandini Boulevard and



<sup>5</sup> Source: American Shipper+ Shippers' NewsWire, Date Posted: 3/3/2008 9:48:34 AM

Washington Boulevard and I-710. The study will examine the effectiveness of various ECMS alignments that will be compared to dedicated truck lanes on I-710. Finally, the study of this system will be evaluated in concert with the on-going SCAG regional goods movement implementation strategies.

**Consulting Team: URS Corporation (Prime Consultant)**  
**Timing of the Study: February 2008 – late 2011**

## Studies by Other Regional Stakeholders

### VI. SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy

A request for proposals was issued by SCAG in early 2008 for the development of a fully integrated regional goods movement plan that (1) refines its 2008 Regional Transportation Plan (RTP) Goods Movement section and (2) enhances the performance of the regional goods movement system through new technologies. SCAG initially budgeted \$6-\$8 million for this 36-month study. SCAG has since reduced the project budget to \$4 million and is currently in the process of negotiating with a selected consultant team.

The SCAG study will include a preliminary evaluation and screening of a new line-haul system along defined corridors between intermodal centers, warehouse centers, transloading facilities, ports and proposed inland port sites. Specifically, such new system would be developed by incorporating the following parameters:

- Different freight markets the system would serve, i.e., regional distribution, national distribution, intermodal, and non-intermodal.
- Types and volumes of freight the system would carry
- Feasible routes and/or corridors
- Design characteristics
- Operational characteristics
- Functional relationship to other available goods movement systems
- Substitution for or augmentation to other goods movement projects

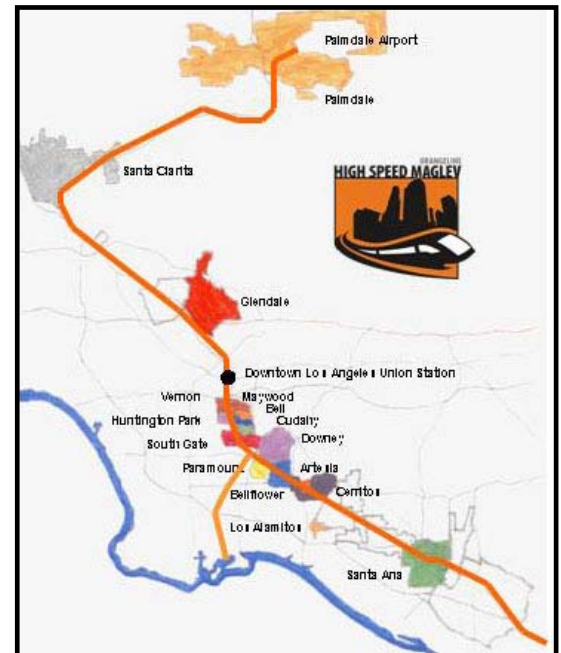
The study would include specific recommendations for a “roll-out” plan based on a five-year increments phased to year 2035 of new technologies that would be applied to line haul freight, truck lanes, and mixed flow lanes with high volumes of forecasted truck traffic in the region.

The initial scope of work included in the SCAG Request for Proposals is included in Attachment 6. The above-mentioned evaluation on an ECMS is described in Task 9 of the RPF scope of work.

**Consulting Team: Under Negotiation**  
**Timing of the Study: Summer 2008 – early 2011**

### VII. California Orangeline High Speed MAGLEV<sup>6</sup>– Orange County, Santa Clarita, and Palmdale

As of July 2008, fifteen cities have joined the Orangeline Development Authority to develop a high-speed Maglev system to move people and cargo between Orange County, Santa Clarita, and Palmdale. The 108-mile, \$19 billion high speed rail system would include 18 stations with potential for high-density transit-oriented developments. The project would be constructed through public-private partnership (PPP). Future revenues generated through passenger fares and cargo fees would then be used to cover the cost of construction and operations.



As illustrated in the project’s route map to the right, the project appears to include a spur between the ports of Long Beach and Los Angeles and downtown Los Angeles. Port staff recently contacted the development team for further clarification. While the Gateway Cities Council of Governments and the City of Long Beach may have expressed support of the project concept of moving containers, the development team has not revealed any detail analyses or alignments. The development team expressed its interest in meeting with port staff for further discussion.

**Development Team: Orangeline Development Authority**  
**Timing of the Study: On-going**

<sup>6</sup> Source of information: [www.orangeline.calmaglev.org](http://www.orangeline.calmaglev.org)

## VIII. Southern California Regional High Speed Transit – West Los Angeles to Ontario Airport

The Cities of Los Angeles, Ontario, and West Covina have recently entered into a Joint Powers Agreement (JPA) in early 2008 to begin the planning of a high speed passenger transit service between West Los Angeles, Union Station, West Covina, and the Ontario Airport. The JPA is governed by an 8-member Board and intended to complete planning, implementation, construction, and operation of the system.

The High Speed Transit JPA also envisions a spur of ECMS to the port complex. This option is strongly opposed by the Gateway Cities Council of Governments (COG), as shown in Attachment 7.

**Consulting Team: Information unavailable**  
**Timing of the Study: Information unavailable**

## IX. SCAG Inland Port Feasibility Study

SCAG retained the Tioga Group to conduct a feasibility study of an inland port. A draft report for released to agency review in June 2008 is included in Attachment 8. The purpose of this project was to determine whether and how inland port concepts could be implemented to reduce truck trips and generate related public benefits in the SCAG region<sup>7</sup>.

The Tioga study includes a preliminary analysis of innovative container mover systems in its appendix and raises the following issues:

- Potential Benefits by innovative container mover systems:
  - Increased throughput capacity free of road and rail congestion
  - Reduced emissions and energy use through electric propulsion (except the automated diesel rail vehicles)
  - Low operating costs through automation and efficiency
- Potential Issues:
  - Security
  - Vulnerability to disruption
  - Lack of gathering and distribution ability
  - Marine terminal intrusion

<sup>7</sup> Inland Port Feasibility Study Tasks 3-5 Draft Report. By the Tioga Group, Inc. June 5, 2008

- Capacity
- Operating cost
- Capital cost

## Technical and Operational Considerations

The following information was presented to the POLA Board of Harbor Commissioners in April 2008 (see Attachment 9). It summarizes the key issues and questions to be considered by the Board of Harbor Commissioners of each port in order to move forward with the ultimate objective of implementation of one suitable system in the near future:

- Logistics - The interface between the marine/rail terminal and an ECMS.
- Private investment – Validation of the financial model and assumptions.
- Financial viability – Would a short-haul system attract private investment?
- Demonstration vs. deployment of a short-haul system.
  - What are the advantages and area of concerns if Ports elect to advance a short-haul system to/from POLB/POLA and ICTF? What are the advantages to partner with a private partner?
  - What are the advantages and issues of concerns if Ports elect to contribute funds toward a demonstration project outside of the Port complex?

## Summary of Vendors & Technologies

The following table was originally developed by Cambridge Systematics/URS for the ports' ZECMS project report. Additional edits and updates have been incorporated by POLA.

Technology	Proponent	Summary	Status of Technology
AirHelo	International, Inc.	Airship	Concept only
Automated Shuttle Car System	Automated Terminal Systems, Inc.	Fully electric cars; power is delivered to the cars via a contact shoe and a third rail	Proposed to build a system for the Port of Tarano in Italy; designed & proposed system for Shanghai
CargoRail/Cargo Tram	MegaRail Transportation Systems	Automated or manual transport of trucks and containers in a train consist on an elevated guideway; electric motor driven wheels	Currently completing full-scale, fully-functional MicroRail demonstrator project for passenger rail system
Container Port Skid	Tubular Rail	Terminal-to-rail loading only; no line-haul application	Concept only
Container express Corridor	Cit-Car	Use conventional rail trackage; would require conventional locomotive to move electric power driven railcar to automated guideway; no design for railcar motor power source	Concept only
Electric Cargo Conveyor System	General Atomics	Magnetic levitation system	Proof-of-concept built
Environmental Mitigation and Mobility Initiative Logistics Solution	American Maglev	Magnetic levitation system	Passenger proof-of-concept built
Freightrapid	Transrapid International-USA	Magnetic levitation system using synchronous longstator linear motors	Operating passenger system in Shanghai

Technology	Proponent	Summary	Status of Technology
Rail Motor & SPM Maglev	Launchpoint Technologies	Electric propulsion of locomotives and magnetic levitation using linear induction; a motor is installed in the track, would require no mechanical connection to the vehicles	Conceptual design phase
LIM-Rail/MagRail	Innovative Transportation Systems Corporation	Electric propulsion of locomotives and magnetic levitation using linear induction; a motor is installed in the track, would require no mechanical connection to the vehicles	Conceptual design phase
Southern California Guideway	Southern California Guideway/ Whelan & Associates	Linear induction motor	Concept only
SAFE Freight Shuttle	Freight Shuttle Development Corporation	Linear induction motor in an automated, grade-separated, elevated guideway system	Prototyping process is currently underway; testing is scheduled for mid-2008
Air Rail	Skytech	Linear induction motor with electric transport above and below rails; overhead grid would move containers down monorail-like tracks	Concept only

Attachment 10 contains additional product information recently provided to Port staff.

## Comparison of Options

Staff has identified three potential options as the most probable approaches to advancing a demonstration project supported by POLB/POLA. Conceptually a demonstration system within the Port complex could be advanced sooner than the other two, but would involve extensive site assessment and negotiation with affected terminal operator(s) and ILWU. The following table summarizes each option's advantages and issues of concerns.

Potential Site	Advantages	Area of Concerns
<p><b>Demo System Within Port Complex</b></p>	<ul style="list-style-type: none"> <li>• Demonstrate the Port's commitment on advancing this program</li> <li>• Less expensive than full-scale deployment</li> <li>• Ports have better control of available space if the site is identified and permitted</li> <li>• Could begin construction within 5 years</li> </ul>	<ul style="list-style-type: none"> <li>• Require due diligence to develop details program, i.e., terminal interface and coordination with affected terminal operators and ILWU</li> <li>• Land/physical constraints to be assessed</li> <li>• More expensive than "isolated" pilot project</li> <li>• May not be compatible with potential regional system</li> </ul>
<p><b>Full-Scale Short-Haul System Deployment: From Port Complex to ICTF</b></p>	<ul style="list-style-type: none"> <li>• Would demonstrate critical elements</li> <li>• Could be part of regional system</li> <li>• Would be paid for by private funds assuming business model is viable</li> <li>• Consistent with GOCCOG/Ports JPA concept</li> <li>• Could begin construction within 5 years</li> <li>• Reduction in short-haul truck trips on I-710, I-110 and surrounding corridors</li> </ul>	<ul style="list-style-type: none"> <li>• Require extensive coordination with industry to develop, design, construct</li> <li>• Private financing model must be validated prior to design/construction phase</li> <li>• Potential environmental impact to be assessed</li> <li>• Institutional agreements and liability to be investigated</li> </ul>
<p><b>Demo System Outside of Port Complex</b></p>	<ul style="list-style-type: none"> <li>• Less expensive than full-scale deployment</li> <li>• Would not require coordination with TOs and ILWU</li> <li>• Site to be identified and permitted by other affected agencies</li> <li>• If a site is identified and permitted, could begin construction within 5 years for demo</li> </ul>	<ul style="list-style-type: none"> <li>• Financial responsibility for constructing and operating the demo system</li> <li>• Ports have no control of available space</li> <li>• No viable location with sufficient space outside Port in Los Angeles and Orange Counties to demonstrate and test terminal nodes/loading/railroad interfaces</li> <li>• Would require outside approval/permitting by affected agencies and communities</li> <li>• Demo system may not provide sufficient financial assurance to attract potential investors or industry</li> <li>• Institutional agreements and liability to be investigated</li> </ul>

## Next Steps

The Ports could sponsor a demonstration project within the port complex or outside of it through a competitive selection process based on the overall technical approach and business plan. Alternatively the Port could consider partnering with private enterprise for a long-haul system. However the financial viability of a private partner undertaking the costs of implementing the system needs further review. Both capital and operating aspects require review.

If further review of this option raises significant problematic challenges, staff recommends that the POLB/POLA focus its efforts on developing a longer-distance system via the I-710 Corridor EIR/EIS, which could eventually include connections to locations and/or terminals in the POLB/POLA.

Regarding a system connecting to the ICTF, additional information and analysis is needed on potential alignments, terminal interfaces, and impacts and costs (capital and operational) should be presented to the Board prior to consideration of any implementation funding commitment.