DBOM UPDATE

Independent Evaluation of Alternative Approaches
Relating to Operations and Maintenance Component
of DBOM Contract for the SMP Green Line

January 2004

Nossaman Guthner Knox & Elliott, LLP
445 S. Figueroa Street, 31st Floor
Los Angeles, CA 90071

Lea + Elliott, Inc.
14325 Willard Rd., Suite 200
Chantilly, VA 22021

Primary Authors:
Nancy C. Smith
Philip Castellana
# Table of Contents

EXECUTIVE SUMMARY ...............................................................................................1

BACKGROUND .............................................................................................................6

PROCESS FOLLOWED ..................................................................................................8

SUMMARY OF INTERVIEWS AND INFORMATION REVIEW .........................10

1. Project Owner Use of DBOM ........................................................................10

2. Labor Union Representatives and Other Commentators ......................14

ANALYSIS ....................................................................................................................16

1. Impact of DBOM on SMP Goals ..................................................................16
   a) On time delivery .....................................................................................16
   b) Under budget .........................................................................................16
   c) Break even on operations by 2020 .....................................................17
   d) Excellent design .....................................................................................18
   e) True to grassroots history/Transparency and accountability to public ...........................................................................................................20
      (1) Diversity ..........................................................................................20
      (2) Owner control and flexibility ............................................................21
      (3) Wages and benefits .........................................................................21

2. Issues Associated With O&M Option ......................................................21

CONCLUSIONS ........................................................................................................23

EXHIBIT A: SURVEY QUESTIONS ................................................................1

EXHIBIT B: INFORMATION ABOUT PROJECTS AND PROJECT OWNERS .................................................................................................................1

EXHIBIT C: PUBLIC INTEREST ISSUES RELATING TO CONTRACTING FOR O&M SERVICES ........................................................................1

EXHIBIT D: BIBLIOGRAPHY ................................................................................1
EXECUTIVE SUMMARY

The Seattle Monorail Project (“SMP”) asked its lead procurement counsel, Nossaman Guthner Knox and Elliott, LLP, and its systems engineers, Lea + Elliott, to conduct an industry survey and literature review on the advantages and disadvantages of the proposed design-build-operate-maintain contracting method in achieving the SMP’s goals and policy objectives, and on the suitability of alternative approaches to contracting for operations and maintenance. Nossaman and Lea + Elliott were selected by the SMP for this survey because of (1) the depth of their experience in representing owners of public transportation systems with respect to the full range of contracting methods and (2) their independence from entities that contract with public agencies for operations and maintenance services (in accepting engagements, both firms have a policy of avoiding engagements that might lead to organizational conflicts of interest in their representation of public agencies, and as a result neither firm represents operations and maintenance contractors for transportation projects).

The SMP has established six specific goals relating to construction and operation of the Monorail, requiring the staff to work to complete the Green Line on time, under budget, with breakeven operations by 2020, with excellent design, to remain true to its grassroots heritage, and with transparency and accountability to the public. The SMP has also developed a number of policy objectives, including ensuring environmental sustainability, creating opportunities for participation by small, local and disadvantaged businesses, and creating family-wage jobs and benefits and spurring growth of the local economy. In reviewing the SMP’s contracting approach for the Green Line, it is important to confirm whether that approach meets all of the SMP’s financial, design-related, and societal goals and objectives.

Background

In December 2002, after an extensive analysis of contracting methods during development of the Seattle Popular Monorail Plan by the SMP’s predecessor, the Elevated Transportation Company, and after review of a report prepared by a team of staff, board members and consultants comparing different delivery methodologies that could be used to deliver the Green Line, the SMP Board directed staff to proceed with a design-build-operate-maintain contracting approach for the Green Line.

The reasons for using design-build (DB) or DBOM, rather than a traditional design-bid-build approach, as stated in the December 2002 report, included the ability to reduce risks relating to system integration by requiring the designer, builder and supplier to work together; to encourage use of innovative, cost-saving approaches; to avoid liability for design defects; and to obtain greater certainty regarding the cost of and schedule for delivery of the system—thereby promoting the goals relating to time, cost and quality in project delivery. The primary reasons, in addition to the foregoing, cited for using design-build-operate-maintain (DBOM) is that it provides a powerful incentive for the team to build a high-quality system that will stand the test of time—thereby promoting the goals relating to project and service quality, as well as providing early certainty regarding O&M costs. By having the proposing teams bid on all aspects of the Project as part of a single package, costs, including base operations and maintenance costs, are
known up front with a greater degree of certainty. This avoids a common problem often seen in large construction projects where budgets for construction and operation and maintenance are developed in the early design phase based on assumptions that later prove incorrect. It also ensures that the entity designing the Project will be thoughtful about the expense of operations and maintenance, since inefficiencies affecting those aspects of the Project will cut into its profitability. Lastly, the DBOM approach is often used to minimize the challenges of start-up problems, claims and system integration often experienced by complex high technology projects in their initial years of operation.

Purpose and Process of the Study

The Board has requested additional information regarding the DBOM process, to determine whether industry experience with DB and DBOM projects has been consistent with expectations for those delivery methodologies, and to allow the Board to review the ways in which the DBOM approach enhances or diminishes the SMP’s ability to achieve its goals.

Research conducted in preparing this report included interviews with representatives of public agencies, consultants, union labor organizations and educators, as well as a review of available information regarding DB and DBOM projects and "contracting out" of operations and maintenance services generally.

Reasons to Use DBOM

Information obtained from interviews and review of materials provide corroborative evidence confirming the validity of the following reasons for using DBOM identified in the December 2002 report:

- DBOM acts as an effective “quality hook” in design and construction of projects, incentivizing the project designer to consider enhancements to project quality to reduce operations and maintenance expense and to avoid system failures and resulting decreases in system availability.

- DBOM provides significant benefits with regard to system integration and reduces risks relating to system integration by requiring the designer, builder and supplier to work together.

- DBOM diminishes the challenges of start-up problems, claims and system integration.

- DBOM provides early certainty regarding design, construction and operation and maintenance costs, reduces opportunities for cost growth and increases likelihood of achieving financial targets.

- DB/DBOM encourages use of innovative, cost-saving approaches that can be highly beneficial to the project.

- DB can greatly accelerate the completion schedule and provide schedule certainty; DBOM enhances the schedule certainty advantages provided by DB.
The chart at the end of this Executive Summary provides a summary analysis of issues relating to achievement of the SMP goals using (a) DBOM, (b) DB with O&M services separately contracted out, and (c) DB with O&M services provided in-house.

**Operations and Maintenance as an Option**

We were asked to look at the advantages and disadvantages of structuring the O&M contract as an option exercisable by the SMP prior to commencement of operations. This approach was specifically considered and rejected in developing the draft contract documents for the Project, for the reasons discussed in this report. An analysis shows that this approach would require reexamination of various contract terms because it dilutes the quality advantages of the DBOM approach and increases concerns regarding project integration and liability issues. Furthermore, adoption of such an approach appears likely to result in higher prices for both the DB and O&M phases.

A number of the individuals interviewed identified potential problems that can be associated with “contracting out” operations and maintenance. It is possible, in our view, to effectively mitigate these concerns by including provisions in the contract specifically addressing the underlying policies, and by carefully monitoring contract compliance. To avoid those types of problems, SMP staff and consultants have developed contract provisions specifically addressing SMP’s fiscal and societal goals and providing incentives to the contractor to achieve them. Several of the interviewees suggested provisions to include in O&M contracts to mitigate potential problems. Staff and consultants will be able to take these suggestions into account in finalizing the contract language.

**Conclusions**

In summary:

1. DBOM offers significant advantages to the SMP as a new agency deploying a system using complex technology. Most of the transit agencies surveyed strongly endorsed DBOM by stating that they were satisfied with DBOM and/or were interested in using it on future projects. One of the transit agency representatives indicated that he would not be interested in using DBOM in the future because any future projects would be extensions of an existing system, but stated that DBOM appeared to be an appropriate methodology for the SMP.

2. Our analysis found that use of an O&M option would adversely affect the procurement and would not provide benefits to the SMP.

3. Concerns regarding the effect of contracting out on societal goals are best addressed through clear contract provisions, combined with a commitment by the SMP to oversee and enforce such provisions.
### ABILITY OF DIFFERENT O&M APPROACHES TO ACHIEVE SEATTLE MONORAIL PROJECT GOALS AND POLICY OBJECTIVES

<table>
<thead>
<tr>
<th>GOAL</th>
<th>DBOM</th>
<th>DB WITH O&amp;M CONTRACTED OUT TO THIRD PARTY</th>
<th>DB WITH IN-HOUSE O&amp;M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ON TIME DELIVERY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Early certainty re schedule</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>• Delivery within schedule</td>
<td>High probability</td>
<td>High probability</td>
<td>High probability</td>
</tr>
<tr>
<td></td>
<td>Note: additional interfaces increase risk of delayed opening</td>
<td>Note: additional interfaces increase risk of delayed opening</td>
<td></td>
</tr>
<tr>
<td><strong>DELIVERY UNDER BUDGET</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Early certainty re construction cost</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Note: Price likely to be higher than for DBOM approach due to Contractor uncertainty regarding interfaces with third party operator</td>
<td>Note: Price likely to be higher than for DBOM approach due to Contractor uncertainty regarding interfaces with third party operator</td>
<td></td>
</tr>
<tr>
<td>• Avoidance of construction cost growth</td>
<td>Probable</td>
<td>Probable</td>
<td>Probable</td>
</tr>
<tr>
<td><strong>BREAK EVEN ON OPERATIONS BY A DATE CERTAIN</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Early certainty re O&amp;M costs, thus facilitating planning to achieve goal</td>
<td>Base O&amp;M costs are fixed (subject to escalation provisions); pricing provided for 15 years of operations</td>
<td>O&amp;M cost must be estimated for planning purposes; actual amount will be determined only when the contract is awarded; contract will probably be short-term, reducing value of information for planning purposes.</td>
<td>O&amp;M cost must be estimated for planning purposes; little information available for purposes of long-term planning</td>
</tr>
<tr>
<td><strong>EXCELLENT DESIGN</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• High quality design/construct on</td>
<td>Probable--DBOM provides incentives for contractor to address O&amp;M issues during design and construction.</td>
<td>Since there is no built-in incentive to improve design to reduce life cycle costs, the owner should consider alternative means of achieving that goal.</td>
<td>Since there is no built-in incentive to improve design to reduce life cycle costs, the owner should consider alternative means of achieving that goal.</td>
</tr>
<tr>
<td>• Addressing life-cycle cost</td>
<td>Due to the complexity of the system and likelihood of glitches during the initial operations period, the system designer and supplier is the best qualified to correct start-up challenges, achieve reliability most quickly and avoid claims and disputes between multiple contractors or contractor and owner.</td>
<td>This approach would require owner to manage interface between design/ construction and O&amp;M personnel, creating opportunity for contractor claims and allowing arguments that O&amp;M contractor</td>
<td></td>
</tr>
<tr>
<td>• Efficiently managing system integration and transition to operations phase</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*DBOM Update*
*January 2004*
## Executive Summary

### GOAL

<table>
<thead>
<tr>
<th>GOAL</th>
<th>DBOM</th>
<th>DB WITH O&amp;M CONTRACTED OUT TO THIRD PARTY</th>
<th>DB WITH IN-HOUSE O&amp;M</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td></td>
<td>caused problem. Also, owner would need to hire O&amp;M staff/consultants to provide input into design and construction. Note: Third party probably will not be able to perform as well as the system supplier during the initial operations phase. If problems arise during O&amp;M period, contractor may claim they are due to faulty maintenance or operator error.</td>
<td>O&amp;M personnel caused problem. Also, owner would need to hire O&amp;M staff/consultants to provide input into design and construction. Note: Owner probably will not be able to perform as well as the system supplier during the initial operations phase. If problems arise during O&amp;M period, contractor may claim they are due to faulty maintenance or operator error.</td>
</tr>
</tbody>
</table>

### Environmental sustainability

- Yes (contract performance standards and compliance mechanisms required).
- Note: SMP’s sustainability team believes there is an advantage to DBOM due to built-in incentives to consider life-cycle cost. Many sustainability solutions have higher up-front costs, but cost can be recouped with lower operating costs (e.g. regenerative braking and low voltage lighting)
- Contract includes provisions incentivizing contractor to minimize power usage.

### Social sustainability (family wages/benefits)

- Yes (O&M contract performance standards and compliance mechanisms required)
- Yes (contract performance standards and compliance mechanisms required)
- Yes (direct owner control)

### Diversity (during O&M phase)

- Yes (contract performance standards and compliance mechanisms required).
- Note: DBOM offers long-term opportunity to strategize and collaborate with the contractor. RFP requirement to including up-front proposals on diversity during O&M stage requires proposers to focus on key opportunities over life of project.
- Yes (contract performance standards and compliance mechanisms required)
- Yes (direct owner control)
BACKGROUND

The Seattle Popular Monorail Authority (known as the Seattle Monorail Project or SMP) was created by a voter initiative in November 2002. The SMP is charged with building and operating the 14-mile monorail Green Line, as set forth in the Seattle Popular Monorail Plan (the Plan). The Plan was developed by the SMP’s predecessor agency, the Elevated Transportation Company (ETC).

The SMP has adopted six goals, committing to complete the Green Line:

- On time, directing staff to work toward opening an initial section by December 15, 2007, and the entire line by December 2009;
- Under budget, staying within the revenues provided by the voter-approved plan;
- With break-even operations by 2020;
- With excellent design;
- True to its grassroots heritage; and
- With transparency and accountability to the public.

The ETC was initially created by a citizen’s initiative in 1997 and brought back to life with another vote in 2000. From its earliest days, the ETC focused on innovative contracting methods that would allow a new agency, with limited staff, to design, build and operate a transit system using automated, advanced monorail technology. The ETC Board first began discussing the design-build-operate-maintain (DBOM) contracting method as a potential tool in 1998. In 2002, while developing the Plan, the ETC Board and staff had detailed discussions and briefings on contracting methods, and focused on DBOM for the Green Line based on feedback from potential suppliers, research and interviews with other owners of transportation projects, and recommendations from its consultants (including Nossaman and Lea + Elliott). Representatives of both of the major monorail systems providers strongly recommended using DBOM for an initial line. The ETC assumed an integrated DBOM procurement in its development of the budget and schedule that were contained in the Plan and provided to the voters.

In December 2002, the SMP Board (which, under the petition, was initially composed of the members of the ETC Board) directed staff to begin a procurement process using the DBOM approach. The Board discussed the extensive evaluation that had occurred during the five years that the ETC was developing the Plan. The staff and consultants briefed the Board on the different procurement methods and the experience with DBOM at projects such as the Hudson-Bergen Light Rail Transit Line in New Jersey, various automated airport people movers (APMs), and the Tolt and Cedar River water treatment plants in Seattle. The staff and Board also discussed the importance of local jobs with family wages, and strong competition. The Board commented that it was important for the entity responsible for operation and maintenance (O&M) to participate in the design-build (DB) effort to ensure that O&M considerations were addressed and that the systems were well integrated. Board members stated that a DBOM
approach, with the DB contractor and O&M contractor working together as members of the same team, would minimize the likelihood of contractor claims and finger-pointing. At that time, some Board members discussed the possibility of structuring the O&M contract as an option.

Pursuant to the Board’s direction, the staff issued a Request for Qualifications in March 2003 and qualified two teams (Team Monorail and Cascadia Monorail Company, LLC) in July 2003. During the qualifications process, staff and key consultants (led by Nossaman, Lea + Elliott, and Bechtel/Jacobs) began work on the elements of the Draft Request for Proposals (RFP) including the important contract terms. This work included extensive review of the contract terms that had been included on other DB and DBOM projects and important lessons learned. Based on this work, the SMP’s consultant team recommended that the proposed Operations and Maintenance Contract (OMC) be structured as a minimum five-year term, with the initial term extended upon substantial completion of Phase II to allow five full years of operation following substantial completion, and with up to two 5-year options at the owner’s sole discretion. These recommendations, and other elements of the OMC, were presented at an extended briefing of the Green Line Design and Construction Committee on August 19, 2003, which was conducted by the SMP staff and consultants. This recommendation was then incorporated into the Draft RFP that was issued for public comment in December 2003.
PROCESS FOLLOWED

In order to update the information previously provided to the Board regarding DBOM projects, we conducted a review of available literature and conducted interviews regarding the following projects:

- Hudson-Bergen LRT and River Line LRT [formerly SNJLRTS]
- JFK AirTrain and Newark International Airport APM
- Las Vegas Monorail
- Atlanta International Airport APM
- Denver International Airport APM
- San Francisco International Airport APM
- Tampa International Airport APMs
- City of Seattle -- Tolt River and Cedar Water Treatment DBOM projects

The primary focus of these interviews was to determine the project owner’s level of satisfaction with DBOM, to obtain the benefit of any lessons learned relating to the O&M phase of the project, and to obtain input relevant to the SMP’s use of DBOM for the Green Line.

In order to obtain additional information regarding social sustainability issues, we asked the agencies to provide contact information for labor representatives. This question produced limited contact information. Marc Auerbach put us in touch with several union representatives (including the union that represents Hudson-Bergen workers), and we interviewed them to obtain their perspective on DBOM contracts and to ask whether they had thoughts with regard to potential problems.

We also contacted public agencies that had made decisions to use DB for project delivery, to find out why they decided not to use DBOM, as well as to ascertain how they assured project quality and dealt with system integration issues (the primary reasons for the SMP’s original decision to use DBOM). As a result, we conducted interviews relating to the following DB projects:

- Airport MAX (Portland)
- Hiawatha LRT
- Los Angeles to Pasadena Metro Gold Line
- T-REX (Denver)
• Miami Downtown People Mover

• I-15 Reconstruction Project (Utah)

Finally, we reviewed available literature relating to contracting for O&M services generally (including non-transit enterprises), and interviewed various commentators on the subject.

The questions asked in the interviews were developed with reference to the SMP’s six goals identified above. The survey questions are set forth in Exhibit A. Information regarding the project owners and projects are set forth in Exhibit B. Materials reviewed are listed in Exhibit C.
SUMMARY OF INTERVIEWS AND INFORMATION REVIEW

1. Project Owner Use of DBOM

The information obtained in our interviews of transit, people mover and water agency representatives strongly supports a decision to proceed with a DBOM contract for the Green Line. Most agencies that are currently using DBOM are satisfied with the results and would recommend it to the SMP. Of those project owners who used DB only, most had reasons for not using DBOM that are not applicable to the SMP Green Line.

Project Owners Using DBOM

Project owners using DBOM generally perceived a number of benefits from using DBOM. Although one owner indicated some dissatisfaction with operations services, he thought that DBOM had resulted in a high quality product, and specifically recommended DBOM for projects such as the Green Line. The experiences of the project owners included the following:

• New Jersey Transit's representatives felt that use of a single procurement for both DB and O&M resulted in a much better product, particularly since the equipment supplier was part of the DBOM consortium. On Hudson-Bergen, there was much better integration than would otherwise be expected, although there were some integration problems on the River Line. The representative also felt that by using DBOM, New Jersey Transit avoided disputes between agency operating personnel and the contractor as to whether a problem was due to bad design or bad maintenance. The maintenance provided by the O&M contractor is much better than that on agency-operated systems. However, there have been problems in operations, including the contractor's use of a commercial/financial approach to risk management affecting safety issues, and slow response times. For future DBOM contracts, one representative said he would want a different payment structure giving the agency more direct control over operations, i.e. paying on a time and materials basis rather than having a fixed base price. He noted that there is less reason for a large experienced transit agency with substantial in-house resources to use DBOM, but stated that he would recommend DBOM for new small agencies.

• For the JFK Airtrain, the representatives of the Port Authority of New York and New Jersey (Port Authority) stated that the basic reason for using DBOM was to obtain guarantees of the technology. The system provider would not guarantee what another entity operates, and a third-party operator would not provide availability guarantees for a system built by another entity. Particular advantages noted by these representatives were the ability to commence use of discrete systems prior to completion of the entire system, and the quality of employee training provided by the O&M contractor.

• Seattle Public Utilities completed the Tolt River Water Treatment Plant in 2000, on schedule and within budget, and is currently developing the Cedar Water Treatment Plant, which is ahead of schedule and within budget. The agency
representatives interviewed strongly believe that these results are tied to the fact that the contracts include operations. They also believe that the capital cost savings are tied to the high level of industry interest in the O&M work. (Contracting out operations is widely used in the public water industry and is very competitive.) They particularly cited contractual incentives and liquidated damages for a number of factors (e.g., water quality) as effectively motivating the contractor to perform to a high standard during the 24-month operation period to date. The agency also had strong goals regarding diversity and sustainability and wages that they achieved using DBOM.

- Although there were some schedule challenges, the representative of the SFO APM Transit System was pleased to have received a high-quality transit system within budget.

- The project owner representative for the Denver International Airport APM felt that DBOM worked well for this project. He felt that DBOM made the coordination of the APM within a major project (a new airport) reasonable. Advantages included less concern about warranties and no disputes between DB and O&M contractors about scope, responsibility, etc. Software development was a major challenge, although it is not clear that this was due to DBOM. One significant service disruption occurred apparently due to lack of failure-management preparedness.

- Although Dade County used DB (not DBOM) in developing its Downtown People Mover project 20 years ago, it has used DBOM for the automated people mover system at the Airport’s Concourse E, and is using DBOM for the North Terminal automated people mover project as well as for a planned automated people mover connecting the Miami Intermodal Center and the Airport.

- Atlanta International Airport APM project owner has had a good experience with its DBOM contract. The O&M contract is time and materials-based, rather than performance-based, but a new contract is currently in negotiations which may be performance-based.

An insight into the contractor's perspective was provided by our interview of a representative of the DBOM contractor team for the Tren Urbano Project in Puerto Rico. That contract imposes graduated penalties and/or graduated incentives to enforce system availability and reliability standards as well as preventive maintenance standards. According to the representative, this system gives the contractor motivation not only to achieve high standards in the O&M phase, but also to consider the quality of materials and construction practices during the DB phase.

Most of the agency representatives with DBOM experience would consider using DBOM again, although they might modify the approach based on lessons learned in previous projects. Some of the challenges faced on, and/or lessons learned from, these projects were as follows:
• The Port Authority representatives would "absolutely" use DBOM again, although they noted that the project owner should still have a strong in-house management team to oversee the O&M contractor.

• Seattle Public Utilities used essentially the same DBOM process/contract for the Cedar project as was used for the Tolt River Project, which indicates its satisfaction.

• The San Francisco International Airport APM representative stated that not only would he use DBOM again, he would expand the scope to include responsibility for stations in order to avoid interface problems between systems and stations provided by the project owner. He also would expand the scope of the O&M contractor's station cleaning responsibilities and more explicitly define them. Other challenges were difficulties with new train control software and underestimation of prevailing wage rates for O&M technicians.

• The representatives for the Denver International Airport APM and Atlanta International Airport APM stated that they would use DBOM again. The Atlanta project owner is currently in the process of buying a new APM system, and will most likely use DBOM again.

**Project Owners Using DB**

We asked project owners who had used DB to develop transit projects why they decided not to incorporate O&M services into the contract, and whether they would consider using DBOM in the future. Four of the five transit/APM project owners indicated that they did not use DBOM because their projects were extensions of existing systems and would need to be integrated with operation of the existing system. No explanation was provided for Dade County’s decision to use DB instead of DBOM for the Miami Downtown APM—although it is possible that DBOM was simply not an option considered, since the project was completed 20 years ago. The County has since used DBOM for an airport APM project and plans to use DBOM for an upcoming APM project. Three of the other project owners indicated that they would be interested in using DBOM for an appropriate project. One of those three was currently evaluating DBOM for a separate commuter rail project unconnected to their existing LRT system, and another is considering DBOM for highway projects.

The fifth owner stated that, although his agency had no plans to use DBOM, he thought it would be appropriate for a monorail project to be developed by a start-up agency. He suggested that such a contract provide for joint operation by the system supplier and owner for an initial 5-year period. This would allow the owner personnel to become familiar with the system and able to make an informed decision whether to extend the O&M contract or make other arrangements for future operations.

It was apparent that the reasons cited for not using DBOM by the DB project representatives are not applicable to the SMP's Green Line project. Those factors fell into the following categories:
- **Lack of Authority**: Two of the four projects (the Gold Line and Hiawatha LRT) were constructed by agencies that did not have legal authority to use DBOM. In both cases the agency had been given authority to develop, but not operate, transit systems. Although theoretically a DBOM procurement could still have occurred in this type of situation through use of intergovernmental agreements, no attempt was made to do so. It is also possible that Section 13(c) issues (federal law giving transit employees the right to continuing employment) and/or collective bargaining agreements would affect an agency’s decision regarding use of DBOM.

- **Interfaces with Existing System**: Three of the four projects (the T-REX, Airport MAX and the Gold Line) were developed as part of existing systems, using the same technology as other parts of the system. In such a case, it is impractical to split operations into two parts. Section 13(c) issues and/or collective bargaining agreements would also have to be considered before a decision could be made to contract out.

- **Experience and Size of Project Owner Operations Staff**: All four of the operating agencies interviewed have extensive experience in transit operations. One of the agencies (Metro Transit, in Minneapolis) did not have experience with light rail operations, but the other three agencies were fully staffed to incorporate the new extension into their operations. For the Hiawatha project, the operating agency issued a request for competitive proposals for operations services, awarding the work to the transit agency staff about a year ago (two years prior to scheduled completion).

At the suggestion of Marc Auerbach, Executive Board Officer, Amalgamated Transit Union Local 587, we reviewed a paper entitled “Driverless Rapid Transit Systems Take Hold,” by Hal Lindsey and David Little, Lea+Elliott, Inc., presented at a 2001 APTA conference, and an updated paper by Hal Lindsey entitled “Driverless Rapid Transit Systems Move to the Mainstream.” The paper surveys 22 driverless rapid transit systems worldwide, only one of which (the original Vancouver SkyTrain) was developed using DBOM. We asked the author of the paper whether he had any insight into this statistic, and whether he would recommend use of DBOM for the Seattle Monorail. He first noted that the definition of “Driverless Rapid Transit System” purposely excluded circulator systems and focused on systems of regional scale. As a result, significant DBOM systems like JFK AirTrain, Las Vegas Monorail, and the three FTA-sponsored Downtown People Mover Projects (Miami, Detroit and Jacksonville) were excluded from the survey. He further stated:

> [N]ot all of the other 21 systems are operated and maintained by the public sector since third party operators are used for some of the systems. For example, we believe that the Copenhagen system has contracted with the system supply team for O&M. Likewise, many if not all of the Siemens/Matra systems are operated and maintained by a third party entity. However, by and large, regional governments and transit authorities were/are the sponsoring agencies and most opted/opt to operate and maintain the systems...
with their own forces. This may be a philosophical issue related to transfer of O&M responsibility and risk.

For Seattle, as with all driverless systems, we believe it makes enormous sense to task the system supplier with the first term of Operations and Maintenance (contract provisions can of course allow the owner to take over before the end of the term should certain conditions occur). Here are a few of the reasons why:

* The system designer and supplier is the best qualified to wring out the early wrinkles, achieve steady state, and make the system work at a high level of reliability. No one knows the system as well as the original designer/installer. The owner can try to get his own forces up to speed (even with the best training) before system opening, but it is hard to do. The result is a system with more downtime during the early months, longer mean time to repair (MTTR) and shorter mean time between failures (MTBF).

* Financial incentives and penalties can be applied to the O&M provider to ensure there are positive and negative consequences for their performance.

2. **Labor Union Representatives and Other Commentators**

We interviewed a number of labor representatives and other stakeholders that were suggested by project representatives or by Marc Auerbach. We also conducted an extensive review of literature suggested by these commentators. Most of the comments received focused on the broad debate relating to “contracting out” public services, often in mature agencies where public employees already provide services. This debate is discussed more extensively in Exhibit C. Most comments from these representatives focused on O&M cost-containment issues, as opposed to the design-quality and integration risk issues that were cited by the SMP Board in its initial decision to pursue DBOM contracting.

A number of the individuals contacted stated that it is critical for workers to be paid a fair wage, and were concerned that fixed price contracts for provision of O&M services give the contractor a built-in incentive to minimize worker payments and benefits. Labor representatives also stated that it was important to avoid any contractual arrangement that would permanently prevent public operation of the system or integration with other public systems.

Specific comments included:

- New Jersey Transit received union complaints that it was "giving work away" by using DBOM. In fact, the Hudson-Bergen O&M workers were organized one week before commencement of operations. The labor union representative who was interviewed for this survey identified several areas of concern in dealing with the operating company. He recommended that any DBOM contract require the O&M contractor to pay rates comparable to those paid to workers in other systems, and require the contractor to have a labor relations liaison on its
management staff. (Note: as discussed below, the SMP staff has asked us to review the proposed contract language for the OMC and develop language that, to the extent allowed by law, addresses prevailing wage and labor harmony issues.)

- Certain additional issues to consider were raised by Elliott Sclar, a professor at Columbia University who has written extensively on privatization in public transportation. He cautioned any agency thinking about contracting out services relating to a complex undertaking to carefully consider the implications before making its decision. As projects become more complex, the requirements become more complicated, and the contract documents become longer and more difficult to interpret. These complexities increase the likelihood of disputes and make it more difficult for the public agency to control the situation. If taken to the logical extreme, it appears that Professor Sclar would recommend use of a design-bid-build approach, which we do not believe is a practical solution for this Project given the nature of the systems involved, the schedule and budget demands and the need for early cost certainty.
ANALYSIS

1. Impact of DBOM on SMP Goals

   a) On time delivery

   Early schedule certainty and schedule acceleration are significant benefits of DB and can be enhanced by DBOM. In general, DB reduces the project implementation time by fully integrating different elements of the project’s implementation, allowing a DB project to be completed more rapidly than a comparable project designed to 100% before bidding out construction. DBOM builds on the inherent schedule advantages of DB due to the early involvement in design by O&M personnel—allowing potential problems to be identified early in the project development process instead of surfacing close to project completion when they are more likely to hit the critical path. A DBOM approach also gives the contractor a greater level of control in managing interfaces with O&M personnel, which is also beneficial to the project schedule. Finally, personnel familiarity with the system helps to avoid operator error during the acceptance period that might delay the project opening.

   Consistent with this premise, most of the projects surveyed (regardless of whether a DB or DBOM approach was used) were completed early, on time, or relatively close to the originally scheduled completion date.

   The only notable completion delays among the projects surveyed occurred on New Jersey Transit’s River Line (delay of 1-1/2 years, issues currently in litigation) and the JFK AirTrain (1-year delay due to accident during testing). Completion of both of these projects is nevertheless much earlier than would have been the case had a design-bid-build approach been used.

   b) Under budget

   DB provides greater degree of certainty regarding construction costs at an earlier design stage than for design-bid-build, and DBOM enhances the budgetary advantages of DB. Specifically,

   • A DB/DBOM approach provides a fixed price for the construction work early in the design process. Transfer of responsibility for final design to the DB contractor, with limited opportunity for a price increase, ensures that the DB contractor will keep cost growth to a minimum.

   • For DB/DBOM projects, when the owner is considering whether to make a change in the project scope, the evaluation can be made with a much better idea of the total costs associated with the change. Knowledge of the total cost of a change prior can discourage the project “tinkering” that sometimes takes place under the traditional project delivery approach.

   • Transfer of risk to the DB/DBOM contractor avoids many of the opportunities for price increases seen in conventional construction.
Many sources of claims are eliminated by a DB project delivery approach because project interfaces are placed within the bounds of the contract. For a DB/DBOM contract this advantage is enhanced, because the O&M provider is an integrated part of the team, and the DB contractor thus has the ability to manage interfaces with the O&M provider efficiently.

Use of DB/DBOM does not guarantee that the DB price at the end of the job will remain the same as the original contract price. The price will be subject to increase if the owner directs or causes changes or delays in the project after the DB/DBOM contract is awarded. It is also subject to increase due to risks that are contractually assigned to the owner.

Information regarding the projects reviewed was generally consistent with the premise that DB projects are likely to remain within budget. However, one of the projects surveyed is currently in litigation and could therefore go over budget for reasons that are unrelated to operations and maintenance. The other projects all appear to have been completed within budget or are anticipated to be completed within budget. A number of the projects involved DB price increases for owner-directed changes or which the owner agreed were otherwise appropriate under the terms of the contract. For at least one of the projects, the owner stated that the contractor underbid the project and subsequently lost money, while the cost to the owner stayed within budget.

c) Break even on operations by 2020

One benefit offered by a DBOM approach that is not offered by DB is the ability to obtain base pricing for O&M services early in the project development process. The Green Line proposers will be required to provide O&M pricing for the system for a total of 15 years, starting with acceptance of the initial operating segment. That period extends several years beyond the SMP’s 2020 goal for break-even operations. The availability of this information is a critical component in the SMP’s ability to develop a plan for breaking even by 2020.

SMP’s plan will depend primarily on two factors—O&M costs and SMP revenues beyond debt service requirements. Using DBOM does not provide the SMP with any information relating to availability of revenues, but it does enable SMP to predict with a reasonable degree of certainty what the future O&M costs will be. The prices proposed for O&M services will be subject to adjustment for inflation factors, with special rules applying to power costs, and will also be subject to change if the SMP directs a change in service levels. The actual O&M costs therefore will not be known with certainty until the year of performance. Nevertheless, assuming a particular level of service and making assumptions regarding variable expenses, it is possible for SMP to obtain reasonable certainty, currently, regarding future O&M costs.

While the DBOM contractor does not guarantee revenues (since fares and other revenues are controlled or heavily influenced by SMP), the compensation scheme provides a strong incentive to provide the highest level of service availability, which in turn, will have a positive impact on ridership and revenues.
If the SMP elected not to use DBOM, it would be handicapped for planning purposes by the lack of concrete information. Although some information regarding future O&M costs can be estimated, an estimate is much less certain than a fixed price proposal. Furthermore, there may be significant differences in O&M costs depending on which system is selected. The only way to be confident about the future costs is to ask the proposers to provide them and to then include those prices in a contract with the selected proposer.

It should be noted that the proposed contracting approach involves a 5+ year initial term with up to two five-year extensions. These extensions may be granted or withheld in the SMP’s sole discretion. If the SMP believes that the option prices are too high, it will have the opportunity to renegotiate them or seek competitive pricing from third parties. The SMP would also have the ability to hire in-house staff to handle operations in lieu of exercising the option. The proposal price therefore can reasonably be viewed as a cap on the O&M base price—extremely valuable information to have in projecting the SMP’s ability to achieve this goal.

d) **Excellent design**

Use of DB can generate design improvements as a result of the dialog between designers and constructors that is inherent in that procurement approach. If a high quality product is desired, provisions can be included in the DB contract and procurement to encourage the contractor to pay attention to the issue. Adding O&M to the contractor's responsibilities significantly enhances its motivation to provide a design that exceeds the minimum requirements, because of the DBOM commercial interest in the long-term maintenance and operation of the system. While most of the DBOM project owner representatives who were interviewed for this report saw benefits to use of DBOM, some directly credited the DBOM approach (or D-B-M in the case of a highway) for design quality. These benefits were specifically called out for Hudson-Bergen Line, the San Francisco International Airport APM, and the I-5 highway project.

System reliability, maintainability and life cycle cost efficiency are of direct concern to a design team that is also responsible for, and impacted financially by, system operation and maintenance. For example, all of the automated systems surveyed that were constructed using the DBOM approach are currently achieving 99+ percent availability with one exception, the monorail at Newark International Airport. The Miami DPM, which was originally a DB project where the contractor trained personnel for an in-house O&M staff, also has a performance below 99 percent. Of the DBOM projects surveyed, all are currently being operated and maintained by the original contractor (or corporate successor).

Some of the advantages to be gained by making the design builder also responsible for O&M obligations are most apparent in the early operation period. Some startup problems must be anticipated when implementing the complicated technologies necessary for automated transit systems. Such difficulties can be mitigated by making the entity most knowledgeable about the system responsible for the startup process. Similarly, disputes relating to warranties and indemnification claims are reduced when the design/builder will have responsibility for operating and maintaining the result of its work. The DBOM approach was particularly cited by the Project Owner representative for the Denver International Airport APM as reducing the need for concern about warranties, as well as eliminating disputes between DB and O&M contractors.
about scope, responsibility, etc. The Las Vegas Monorail developer noted that a much longer warranty would have been needed had it used a DB contract instead of DBOM.

Properly structured contract terms can be used to maximize the DBOM contractor's interest in developing an excellent design that meets long-term performance objectives. For example, Seattle Public Utilities’ water treatment DBOM contracts include contractual incentives and liquidated damages for a number of factors, including water quality. The owner representative was pleased with the results, advising us that the system has consistently operated well above regulatory standards. Confirmation that such incentives and penalties do in fact motivate contractors is also provided by our discussion with a representative of the DBOM contractor team for the Tren Urbano in Puerto Rico. That contract imposed graduated penalties and/or graduated incentives to enforce system availability and reliability standards as well as preventive maintenance standards. The representative cited this structure as providing contractor incentives not only to achieve high standards in the O&M phase, but also during the DB phase. The SMP should, however, consider whether the incentives and disincentives are so high that they automatically give rise to disputes—an issue raised by one of the interviewees.

Environmental sustainability is one area that is particularly appropriate for design enhancement in a DBOM contract. SMP staff and consultants have performed extensive analysis regarding how best to address this issue in the contract, and believe that DB/DBOM offers significant advantages over traditional design-bid-build contracts in terms of achieving environmental sustainability goals, including:

- Achievement of performance standards is the primary concept behind DBOM project delivery. Although these standards may relate to any aspect of a project, most standards relating to environmental sustainability naturally lend themselves to minimum performance measurement. Examples would include energy efficiency, water efficiency, material conservation, etc.

- The DBOM approach encourages the contractor to complete the work using innovative and cost-effective measures. Environmental sustainability strategies contribute to both innovation and cost effectiveness by reducing long-term costs associated with operation and maintenance, and are therefore likely to be attractive to the contractor for inclusion in the project design.

- The DBOM approach encourages the contractor to complete the design efficiently, integrating engineering, design, construction and operations under a single point of responsibility. This results in greater efficiency in both design effort and building performance by eliminating redundancy in building systems.

- Having a long-term responsibility for operations and maintenance is a clear incentive for quality on the part of the contractor, because projects built using durable and efficient systems will be less costly to operate and maintain over time.

- Long-term savings can be further encouraged by using incentive opportunities for energy or other savings that are passed along to the contractor.
• A common problem on large-scale projects with environmental sustainability strategies is that there is often a disconnect between the funds allocated for construction and funds for operation and maintenance. Projects have a fixed construction budget that cannot be exceeded, meaning that cost-effective energy efficiency measures may be eliminated when a project goes over budget. The DBOM form of contract provides a means of linking these two budgets together that is critical to achieving energy efficient buildings and other long-term sustainability strategies.

• Including life cycle costing information in DBOM bids can provide a means of bid evaluation that is based both on price and long-term value to the project. Life cycle costing is well suited to the assessment of high long-term costs such as energy consumption, or for comparing alternatives within a project scope.

• Further opportunities for bid evaluation exist through the development of a quality credit system for proposed environmental sustainability strategies. Staff is considering various alternative approaches.

Even though including an O&M obligation in the contract will create certain built-in incentives relating to quality, it is important to keep in mind that the performance standards may in fact set both a minimum and maximum standard for the contractor, due to costs associated with a decision to exceed the minimum standards. The owner should therefore carefully consider its objectives and ensure that its expectations for performance, innovation, and responsible practices be made clear within the contract documents.

e) True to grassroots history/Transparency and accountability to public

(1) Diversity

Diversity is another important SMP goal. The planned approach to meet this goal is described below.

The Contract Documents identify the SMP's diversity program requirements, applicable to both the DBEC and the OMC. Each Proposer will submit a Diversity Plan with its Proposal which will identify how it plans to address diversity during both the DB and O&M phases. The DBOM Contractor and the SMP will negotiate a final Diversity Plan around the time of contract award, which will become part of the Contract Documents.

This Diversity Plan is designed to evolve through the various phases of the work over time. For example, at first the plan will concentrate on efforts to engage minority- and women-owned businesses and small businesses during the design work. Later, the plan will evolve to incorporate construction activity. Ultimately, the plan will evolve into the operation and maintenance phases of work, as these phases become "ripe." In this manner, the DBOM contractor and the SMP will collaborate to identify eligible firms and structure the contractor’s work plan to engage such firms into the fabric of the work.

As a practical matter, there is an advantage to a DBOM approach, because it gives SMP the opportunity to strategize and collaborate with the DBOM Contractor over the long term. For
The draft contract terms and conditions require the contractor to develop and administer a Technical Assistance Program. Such a program can be effective only over the long term. Because one of the key issues with any diversity program is the availability of a qualified pool of employees and contractors, the longer time horizons provided by the O&M Contract should create greater opportunities for training and technical assistance than would be available during the tight timeframes of the DB Contract.

(2) **Owner control and flexibility.**

The O&M Contract makes it clear that the owner retains the ability to address the issues of primary concern to its constituents—namely the rates to be charged and level of service provided. In addition, the owner may wish to self-perform certain non-technical O&M functions involving interaction with the public, perhaps directly hiring personnel such as station attendants, security staff and/or public information staff, with the contractor’s scope of services focused on maintenance services and the technical aspects of operations.

With regard to the contractor’s performance obligations, both the DB Contract and the O&M Contract will include various provisions allowing the owner to exercise control over the project if needed. The contract documents give the owner certain approval rights and a number of provisions obligate the contractor to cooperate with the owner and others. If efforts to obtain contractor cooperation fail, the owner’s ultimate remedies include the change order provisions that give the owner the right to direct changes; the owner's ability to suspend work; and the owner's right to terminate the contract for default or for convenience.

(3) **Wages and benefits**

The O&M Contract requires the Contractor to pay prevailing wages in accordance with RCW 39.12 (relating to payment of prevailing wages for certain categories of work on public works projects). The DBOM contracts for Airtrain and Tolt River contain similar provisions.

2. **Issues Associated With O&M Option**

We were asked to consider the advantages and disadvantages of structuring the initial term of the OM contract as an option that can be exercised by the owner. This approach was specifically analyzed during the development of the draft DBOM documents. For the reasons discussed below, we conclude that this would provide limited advantages and considerable disadvantages.

In recent years, several highway agencies have entered into DB contracts that include a maintenance option. These agencies all have in-house resources enabling them to staff up quickly to perform the services themselves. This is not the case for the Green Line. In addition, the consequences of a decision not to exercise a maintenance option for a highway project are much simpler to address than a similar decision for the Green Line. For highway projects, maintenance needs are relatively well defined and much less complex than for a project such as the Green Line. If the SMP decides to contract out O&M services, it will need to rely on the contractor to define the services to be provided by O&M personnel.
None of the contracts for DBOM transit projects surveyed provided for an optional initial O&M term. It is not clear whether any of the agencies considered having an optional initial term. It is also not clear how the contractors will react to an optional O&M initial term—other than the likelihood that they will include their O&M proposal costs in the DB price. Possible reactions include:

- A determination that it is necessary to price O&M services low in order to be assured that the owner will in fact exercise the option—which would predictably result in the DB price being increased to ensure that all costs are covered.

- Due to the possibility that the option will not be exercised, a decision to spend less time working on the O&M proposal than might otherwise be the case—which would predictably result in a lower quality proposal and higher price.

- If the proposer perceives that the agency places less importance on the O&M option, it may increase the O&M price to discourage exercise of the option.

Use of an option approach appears to be inconsistent with one of the primary reasons for using DBOM for a complex project—the desire to achieve a high level of service quality during project start-up and throughout the first years of project operations. Although a mature agency with a large number of in-house O&M personnel might be able to take over the O&M obligation relatively smoothly, as a start-up agency the SMP would require a significant amount of lead time to be ready to assume responsibility for O&M services. Ideally, in order to preserve the contractor’s quality incentives relating to O&M, the contract should provide for the owner to make a decision on the option at the latest possible time. For highway projects that include a maintenance option (such as the I-15 Reconstruction Project) the deadline for exercising a similar option is typically six months prior to completion. For the I-15 project, despite numerous requests by the contractor for advance information regarding the owner’s intent, the owner waited until close to the deadline before advising the contractor that the owner would not exercise the option. One reason for this delay was that the owner perceived the maintenance option as a major quality incentive, and wanted to retain the benefit of that incentive for as long as possible. From the contractor’s standpoint, the same six months of lead-time could apply to the Green Line contract, since mobilization for O&M services would start close to that date. However, from the owner’s point of view a longer lead time is necessary in order to allow sufficient in-house O&M staff to be hired and trained, or to issue procurement documents if the work will be contracted out. The issue is further complicated for the SMP since it does not have other transit operations and would need to significantly modify its organization plan in order to proceed with in-house O&M.

An option approach is also inconsistent with the goal of breaking even on operations by 2020. If the SMP decides not to exercise the option, its alternatives are to contract out the services to a third party contractor or to perform O&M in-house. If services are contracted out, the term of the contract will be relatively short and therefore of limited utility for long-term planning purposes. If the services will be performed in-house, even less certainty will be obtained.
Finally, it is not clear what benefit is associated with use of an option. If the owner decides not to exercise the option, it will not obtain the benefits associated with performance of O&M services by the supplier. Thus, initial service quality is likely to be adversely impacted, and it may become more difficult to enforce warranties and obtain timely replenishment of spare parts. Contract terms appropriate for a DBOM contract, with its built-in incentives, may be inadequate for a DB contract. As an example, the developer of the Las Vegas Monorail specifically noted that the one-year warranty included in its DB contract was acceptable only because of the performance assurances included in the O&M contract. A third party operator is not likely to provide the same level of guaranteed performance. If the option approach is adopted, it may be necessary to have longer warranty provisions for the DB-only alternative, which would complicate the procurement process.

For the foregoing reasons, it appears inappropriate to include an O&M option in the Green Line contracts. It would be more appropriate for the SMP to decide now whether it will use DB or DBOM, and structure the contract documents accordingly.

CONCLUSIONS

DBOM is an appropriate means of delivery for the Green Line project, in large part due to the fact that the DB contractor’s obligation to provide O&M services acts as an incentive to develop a high quality system. In addition, the DBOM approach will give SMP staff the opportunity to receive training regarding operations and maintenance of the system over the course of the initial O&M term. This will enable SMP to make an informed decision regarding the available alternatives in deciding whether to exercise the renewal option or not. Most of the transit agencies surveyed strongly endorsed DBOM, either by stating that they were satisfied with the delivery methodology and/or that they were interested in using it on future projects. Only one of the transit agencies surveyed indicated that it would not be interested in using DBOM in the future, but stated that DBOM offered significant advantages for a new agency such as SMP, since it does not currently have in-house staff prepared to assume responsibility for operations and maintenance of a complex system.

Our analysis shows that it would be necessary to reexamine the contract terms if the SMP wishes to restructure the contract to include an option for O&M services. Use of an option would reduce the potential benefits of DBOM, with possible higher pricing by the contractors and possible adverse impact to project quality. Higher pricing would result from the uncertainties associated with the SMP’s discretion to exercise the option. Project quality could be adversely impacted because the effectiveness of the “quality hook” tied to the contractor’s obligation to perform O&M services for a fixed base price will be diminished once the contractor becomes aware that the O&M option will not be exercised. Although the option could in theory be exercised late in the contract period, in actuality the SMP will need a significant amount of time to implement an alternate approach (i.e. contracting out or hiring staff in-house).

SMP can address certain of its societal goals and objectives by including appropriate provisions in the DB and O&M Contracts. Changes to the contract requirements will require a corresponding change in the contract price. It is therefore critical that SMP evaluate how it wishes to address its goals and objectives, and be prepared to take action as necessary to oversee and enforce such provisions. SMP staff and consultants have undertaken an evaluation of
approaches that will promote achievement of SMP’s financial, design-oriented, and societal goals and policy objectives, and have been developing contractual provisions to address the goals and objectives and incentivize the contractor to achieve them. The comments from this survey and sample provisions obtained through this study will provide valuable insight into issues that need to be addressed, as well as providing precedent to be considered in finalizing the contract language.
EXHIBIT A: SURVEY QUESTIONS

DBOM Survey Questions

1. Provide general information about the project and its current status.

2. What challenges did you face in including O&M services in the projects, and how did you deal with them?

3. If you were able to start from scratch again, would you still use DBOM? What would you do differently?

4. What do you think worked well in your process?

5. What were the cost drivers for the project?

6. Describe approach to risk allocation and any lessons learned.

7. Duration of warranty, have any warranty issues come up, lessons learned relating to warranties.

8. Are your O&M workers unionized? If not, has that presented any issues? If so, please explain how the process worked.

9. Is prevailing wage or a comparable wage rate indicator required for O&M workers? Are there labor harmony provisions/requirements in the contract? If so, may we get a copy?

10. Please provide contact information for labor representatives.

D-B Survey Questions

1. Provide general information about the project and its current status.

2. Why did the agency decide to use design-build instead of DBOM?

3. Would the agency consider using DBOM for future projects? Why or why not?

4. How did the contract address integration/life cycle cost issues? Lessons learned?

5. Approach to design and construction quality assurance/quality control? Lessons learned?

6. What were the cost drivers for the project?

7. Describe approach to risk allocation and any lessons learned.

8. Duration of warranty, have any warranty issues come up, lessons learned relating to warranties.
Questions for Labor Representatives

1. Disadvantages to DBOM approach?
2. Advantages to DBOM?
3. Suggestions as to how to obtain better results

Questions relating to I-15 D-B-M Highway Project

1. Provide general information about the project and its current status.
2. Describe the contract provisions relating to post-completion maintenance.
3. Why did the Department decide to include maintenance as an option instead of including a mandatory maintenance period?
4. How was the maintenance option factored into the evaluation process? Lessons learned?
5. Were the maintenance proposals/maintenance prices competitive?
6. Does the Department believe that the optional maintenance obligation was a factor in the overall project quality? Why? Does the Department believe the contractor might have acted differently had the maintenance obligation been mandatory?
7. Why did the Department decide not to exercise the maintenance option?
EXHIBIT B: INFORMATION ABOUT PROJECTS AND PROJECT OWNERS

NEW JERSEY TRANSIT: HUDSON-BERGEN AND RIVER LRT SYSTEMS (DBOM)

Owner information  New Jersey Transit  
One Penn Plaza East, 12th Floor  
Newark, NJ 07105-2246  
(973) 491-8960

HUDSON-BERGEN LRT DBOM PROJECT

Contractor: 21st Century Rail Corporation (including Washington Infrastructure Group, Itochu Rail Car, and Kinkisharyo USA)

Single contract covering design, construction, operations and maintenance, awarded in 1995  
15 year O&M term

Hudson-Bergen is a manually operated light rail system. Initial 7.5-mile system has 12 stations and 29 articulated light rail vehicles. The initial operating segment opened in 2000. Six-mile extension added to contract in 2000, scheduled for completion in 2005.

SOUTH JERSEY LRTS (RIVER LINE)

Contractor: Southern New Jersey Rail Group, LLC., a consortium led by Bechtel and Adtranz

Single contract covering design, construction, operations and maintenance, awarded in 1999.  
15 year O&M term

The River Line is a 34-mile diesel Light Rail Transit system in southern New Jersey (manually operated). It will run along the Delaware River connecting Camden to Trenton, running on existing Conrail right-of-way for most of the line. The system is planned to improve mobility, enhance access to jobs, help relieve traffic congestion and improve transit connections to other modes. The system includes 20 station stops; over 20 rail bridge/overpass structures (renovations, upgrades, replacements, and new bridges); over 50 grade crossings; an equipment, maintenance, and yard facility; and the supply of vehicles.

The project is scheduled to open shortly after year and a half delay; there is resulting litigation with contractor (Bechtel) which does not appear to be interrelated with the contractor’s obligations relating to O&M.
PORT AUTHORITY OF NEW YORK AND NEW JERSEY:
JFK AIRTRAIN (DBOM) AND NEWARK INTERNATIONAL AIRPORT APM (DBOM)

Owner information:  Port Authority of New York and New Jersey
225 Park Avenue South
New York, NY 10003
(212) 435-6910
(212) 435-6838 (Fax)

JFK AIRTRAIN

Airtrain is an 8-mile automated transit system, with 3 stations, serving JFK. Opened to revenue service on December 18, 2003. Approximate 1-year delay in start of operations due to accident during manual operations in testing. Contractor is ARTC, a joint venture of Skanska and Bombardier. Both companies provided parent guarantees and agreed to joint and several liability through operating term.

Operating term is 5 years, plus two 5-year options. Approx. cost $25 million per year. System may already be exceeding projections of 34,000 passengers per day.

System is totally automated. Security is provided through emergency telephones on each car. (Live cameras are not yet available, but one is being beta-tested by a Spanish company that looks both inside and outside the cars.) Cars are not walk-through due to safety/security concerns. Cars have two sets of doors to increase capacity (people tend to cluster near doors, leaving center of car with excess capacity). Doors are extra-wide. Vehicle is 10-feet wide.

Bombardier will have approximately 120 employees (there are 160 -180 now), including 20 management. 2-3 people run the computer operations. They have 30-40 "rovers." These include "red coat" customer service personnel, who help with directions, bags etc. They also have one Airtrain "agent" (motorman) stationed at each station who can take manual control of a train if necessary. Port Authority staff numbers about 40-50.

NEWARK INTERNATIONAL AIRPORT APM (DBOM)

System Description: Fully automated people mover (monorail) system.
System Opening Date: 1997 - On-airport system.
2001 - Extension to NEC station.
DBOM Contractor: Bombardier Transportation – second 5-year O&M contract. (Original DBOM Contractor was VonRoll which was purchased by Bombardier prior to system opening.)
Scope of Services: Operation and maintenance of operating system.
LAS VEGAS MONORAIL (DBOM)

Owner information: Las Vegas Monorail Company
3720 Howard Hughes Parkway
Suite 200
Las Vegas, Nevada 89109
(702) 699-8200
(702) 731-3272 (fax)

The new Las Vegas Monorail will link seven stations over approximately three miles of dual-elevated guideway, integrating the two existing stations and re-equipping the approximate 1.6km guideway of the MGM-Grand Bally's former monorail line. The 36-car monorail fleet, to be operated in nine four-car trains, will provide direct service to eight major resort properties and the Las Vegas convention center.

The project developer has contracted with Granite Construction Company and Bombardier Transportation to design, build and equip the system, with Bombardier responsible for up to 15 years of operations and maintenance. The $354 million design, build, and equip contract calls for the contractor to be responsible for the turnkey design, construction, and system-wide elements of the complete monorail system.

Following completion, Bombardier will operate the system for an initial five years with an option for up to an additional ten years. The five-year operations and maintenance contract assigned to Bombardier carries a value of $56 million.

The monorail system is expected to enter revenue service in early 2004, and is expected to carry 19 million passengers the first year,
SAN FRANCISCO INTERNATIONAL AIRPORT APM (DBOM)

Owner information:  City and County of San Francisco
Department of Aviation
P.O. Box 8097
San Francisco, CA  94128
Tel:  (650) 821-7665

System Description: Fully automated people mover system. System included 2.8 miles of dual-lane guideway, 9 stations and 38 vehicles. Finish-out of Stations, Maintenance Facility and guideway running surface.

System Opening Date: 2002

DBOM Contractor: Bombardier Transportation – 3 year O&M contract with 3 one-year options. (Original DBOM Contractor was Adtranz which was purchased by Bombardier) Facilities (guideway and stations) built by Owner under separate contracts.

Scope of Services: Operation and maintenance of the AirTrain operating system.

System Availability: Currently exceeding 99.8 percent.
DENVER INTERNATIONAL AIRPORT APM (DBOM)

Owner information: Denver International Airport
Denver, CO 80249-6340
Tel: (303) 342-2853

Fully automated people mover system. The 1.2 mile dual-lane underground system has seven station stops. Initial fleet had 16 vehicles. Current fleet has 22 vehicles.

System Opening Date: 1994

DBOM Contractor: Bombardier Transportation (Original DBOM Contractor was Adtranz which was purchased by Bombardier). Facilities (tunnels) built by PB under a separate contract.

Scope of Services: Operation and maintenance of the operating system.

System Availability: The system has historically met or exceeded 99.5 percent availability. One significant service disruption occurred apparently due to lack of failure-management preparedness.
ATLANTA INTERNATIONAL AIRPORT APM (DBOM)

Owner information: Hartsfield-Jackson International Airport
City of Atlanta
Department of Aviation
Atlanta, GA 30320
Tel: (404) 530-6870

Fully automated people mover system. Initial underground system had 8 stations and 24 vehicles. Expanded in several phases to 12 stations and 49 vehicles. Original 24-car fleet was replaced in 2001.

System Opening Date: 1980 – Initial System

DBOM Contractor: Bombardier Transportation – 5-year O&M contract (negotiated following numerous previous O&M contracts). (Original DBOM Contractor was Westinghouse/Adtranz which was purchased by Bombardier)

Scope of Services: Operation and maintenance of the operating system.

System Availability: Achieving 99+ percent availability. Currently, the system carries 190,000 passengers each day, making it the 2nd largest transit system in Georgia.
TAMPA INTERNATIONAL AIRPORT APM (DBOM)

Owner Information: Hillsborough County Aviation Authority  
P.O. Box 22287  
Tampa, FL 33622  
Tel: (813) 870-8709

System Description: Fully automated people mover system. Each airside system consists of a dual-lane shuttle with one- or two-car trains. The parking garage system has five vehicles serving seven stations.

System Opening Date: 1971 – Airsides B, C, D, and E  
1985 – Airside F  
1991 – Parking Garage  
1993 – Airside A  
2002 – (new) Airside E

DBOM Contractor: Bombardier Transportation – 5-year O&M contract (negotiated following numerous previous O&M contracts).  
(Original DBOM Contractor was Westinghouse/Adtranz which was purchased by Bombardier)

Scope of Services: Maintenance of the operating systems

System Availability: All systems meet or exceed 99.5 percent availability.
TOLT RIVER AND CEDAR WATER TREATMENT PLANTS (DBOM)

Owner information: Resource Management Branch
Seattle Public Utilities
710 2nd Ave., 11th Floor
Seattle, WA 98104

These projects are drinking water treatment plants that are owned by the City of Seattle. Although not transportation projects, the experience with Seattle on these projects is relevant as the largest public agency projects in the metropolitan area that have used the DBOM method of procurement.

**Tolt River Project:**

120-million gallon per day Tolt River water filtration plant.

15-yr. DBOM contract, with two 5-yr. renewals

$101m capital cost.

Contractor: Camp Dresser & McKee/Azurix/Dillingham

The Tolt contract was awarded in May 1997 with the groundbreaking ceremony occurring about a year later. The plant began operation December 2000.

**Cedar Project:**

180-million gallon per day Cedar River water filtration plant; ultimate capacity of 275 million gallon per day.

15-yr. DBOM contract, with two 5-yr. renewals

$109m total cost ($78 million for design and construction, $31 million for 25 years of operation).

Contractor: Camp Dresser & McKee/Azurix/Dillingham

The Cedar contract was awarded in 2001. Scheduled to be operational by the end of 2004.
MIAMI DOWNTOWN PEOPLE MOVER (DB)

Owner Information: Metro Dade Transit
Dade County
Metro-Dade Center
Miami, FL 33128-1999
Tel: (305) 375-2961

System Description: Fully automated people mover system. The initial system was a 1.9 mile elevated loop with 12 stations and 14 vehicles, opened in 1986. North extension is 1.4 miles with six stations. South extension is 1.1 miles with six stations. Both extensions are elevated and opened in 1994. Current fleet is 29 vehicles.

System Opening Date: 1986 – Initial Downtown Loop
1994 – North and South Extensions

DBOM Contractor: 1st Year – Westinghouse direction of MDT maintenance employees.
Subsequent – Full MDT operation and maintenance.

Scope of Services: Operation and maintenance of the operating system.

System Availability: Official availability data is not published. Performance appears to be below 99 percent.
LOS ANGELES TO PASADENA GOLD LINE (D-B)

Owner information: Los Angeles to Pasadena Metro Blue Line Construction Authority  
625 Fair Oaks Avenue, Suite 200  
South Pasadena, CA 91030  
(626) 799-0080  

Los Angeles County Metropolitan Transportation Authority  
One Gateway Plaza  
Los Angeles, CA 90012-2952  
(213) 922-6000  
Web Site http://mitchellc@mta.net (Main Office)

The Metro Gold Line Project is a light rail project from downtown Los Angeles to Claremont (37 miles). Phase I of the Project extends 13.7 miles from Union Station in downtown Los Angeles, serving the communities of Los Angeles, Chinatown, Lincoln Heights, Highland Park, to South Pasadena, with six stations in Pasadena.

The Los Angeles to Pasadena Metro Blue Line Construction Authority was established by special act of the state legislature, in an attempt to expedite the Gold Line project (which at the time known as the Blue Line project) when the Los Angeles County Metropolitan Transportation Authority (LACMTA) announced that development of the project would be delayed. The enabling legislation required the project to be turned over to LACMTA upon completion, to be operated by the LACMTA.

The Authority decided to use a design-build methodology for the project in order to expedite the delivery schedule. The project was divided into two contracts, the first of which was a $25 million contract for the Chinatown Aerial Structure, awarded to a joint venture of Modern Continental Construction/HNTB Design-build Inc. in the summer of 2000 to the low bidder of three pre-qualified firms.

The Arroyo Seco contract covered the remainder of the 13.7-mile initial operating segment, and was awarded to a joint venture of Kiewit Pacific Co. and Washington Group International in October 2000.

The project opened for revenue service in July 2003.
MINNEAPOLIS HIAWATHA LINE (D-B)

Owner information:  Minnesota Department of Transportation
            Hiawatha Project Office
            Ceresota Building
            155 5th Avenue South
            Suite 300
            Minneapolis, MN 55401

            Metro Transit
            560 Sixth Avenue North
            Minneapolis, MN 55411

The Hiawatha Light Rail project is an 11.6-mile line extending from downtown Minneapolis to the Minneapolis-St. Paul Airport through a tunnel to be built by the Metropolitan Airport Commission. The project will serve 17 stations and is planned to be fully operational in December 2004. The design-build contract for the project was awarded by the Minnesota Department of Transportation in 2000 to Minnesota Transit Constructors, a joint venture of Granite Construction Co., C.S. McCrossan, Inc., and Parson’s Transportation Group, Inc./Edwards and Kelcey, Inc. Upon completion the system will be operated by Metro Transit.
DENVER T-REX PROJECT (D-B)

Owner information: RTD - Regional Transportation District
7200 Alton Way
Englewood, CO 80112-2201
Phone (303) 357-8564
Fax (720) 529-4820

In 2001 CDOT/RTD awarded a $1.186 billion design-build multi-modal contract to a joint venture of Kiewit Construction Company and Parsons Transportation Group, Inc. The project involves improvement of approximately 17 miles of Interstate 25 and Interstate 225 in the Denver metropolitan area and adds approximately 19 miles of new Light Rail Transit line, including 13 new stations and improvements to the existing Broadway station. Completion is expected in the fall of 2006. Design is approximately 95% complete and construction is approximately 55% complete.
PORTLAND AIRPORT MAX (D-B)

Owner information: TriMet Administrative Offices
4012 SE 17th Ave.
Portland, OR 97202
503-962-2400
503-962-2100

Airport MAX Red Line is a $125 million, 5.5-mile (8.9km) extension of Tri-Met's Metropolitan Area Express light rail system, developed through an innovative public/private venture involving the Port of Portland, Tri-Met, the City of Portland, Portland Development Commission and Bechtel Enterprises. Bechtel contributed $28.2 million towards the $125 million project, in exchange for the right to build a 120-acre transit-oriented development at the airport entrance. Construction of the light rail system started in 1999, and the project opened for revenue service in September 2001.
I-15 RECONSTRUCTION PROJECT (D-B-M)

Owner information: Utah Department of Transportation
Calvin Rampton Building
4501 South 2700 West
Salt Lake City, UT 84119-5998
Web Site http://www.dot.state.ut.us

UDOT’s $1.4 billion design-build-maintain contract for the I-15 Reconstruction Project was awarded in 1997 to a joint venture of Kiewit Construction Company, Granite Construction Company, and Washington Construction Company. The project was completed prior to the late 2001 completion deadline. The Department did not exercise the maintenance option.

The project involved the reconstruction of I-15 from 600 North to 10600 South, approximately 17 miles of freeway. The project was completed in just four years, half the time that would have been needed using a traditional delivery approach, and came in under budget.
ADDITIONAL PERSONS CONTACTED

John Feltz, Executive Vice President, Transport Workers Union Local 2001
Phone: (914) 592-0221

Marc Auerbach, ATU Local 587

Blair Redlin, Canadian Center For Policy Alternatives (613) 237-1590 (x230)

Denis Houlihan, Labor Economist, American Federation of State, County and Municipal Employees, AFL-CIO (202-429-1000)

Elliott Sclar, Professor Of Urban Planning, Columbia University (212) 854-3700

Hal Lindsey, Lea + Elliott

Kathleen Kolar, Deputy Contract Manager, Massachusetts Water Resources Authority (617) 788-2019
EXHIBIT C: PUBLIC INTEREST ISSUES RELATING TO CONTRACTING FOR O&M SERVICES

Many of the nation’s transit agencies have made decisions to contract out bus or rail transit services. A recently published survey conducted by the Transportation Research Board shows that almost 60% of transit agencies do some contracting out. With regard to existing services, the decision is typically related to a desire to reduce operating costs and to improve cost efficiency. Contracting out is a controversial topic in all areas of public service, and there are numerous books and papers discussing why public agencies should never contract out services as well as numerous books and papers discussing the benefits of contracting out. Much of the literature that we reviewed and many of the interviews focused on the general advantages and disadvantages of contracting out for public services, as opposed to the appropriate contracting methods for the first phase of a complex, high technology project like the Green Line. Because we believe that this overall discussion is tangential to the questions affecting the SMP, we have summarized our review of these issues in this appendix.

The premise underlying the arguments against contracting out is that the profit motives driving the private sector in many cases do not coincide with the public interest. Opponents of contracting out maintain that, although it is possible to include provisions in contracts providing incentives for appropriate performance, such contracts can become complicated and require significant oversight in order to assure performance. They are further concerned that if the public needs change, it may be costly to implement a change in the service contract. The publications reviewed also lament the fact that public agencies making decisions to contract out existing services often do so in order to reduce operating costs, and maintain that cost reductions inevitably mean a reduction in the number of employees and/or reduced wages and benefits for the service workers.

The materials reviewed primarily focus on the question of cost effectiveness of contracting out, with widely divergent results based on the same underlying data. As an example, depending on which study is examined, contracting out bus services for the Foothill Transport District in Los Angeles resulted in cost savings in the 50% range, or no cost savings, or savings somewhere between zero and 50%. The TRB study on contracting out concluded that the data currently available does not support any determination regarding the cost-effectiveness of contracting out in general.

As noted above, the SMP’s initial decision to proceed with the DBOM contracting approach was not based solely on a desire to minimize costs. Instead, it was based on an analysis showing that a DBOM approach will further the SMP’s goals relating to excellence in design and O&M price certainty. As discussed above, other transit agencies using DB and DBOM strongly endorse the reasoning underlying the SMP’s decision to use DBOM. As a result, the SMP’s primary concern relating to O&M costs would presumably be to ascertain that the successful proposer’s O&M price is consistent with the SMP’s budget estimate. So long as the proposed costs are within budget, there does not appear to be any need to compare the relative costs associated with performance of services in-house vs. contracting out. Such a comparison would, however, be useful to the SMP in deciding whether or not to extend the maintenance term, after the project has started up and bugs have been worked out.
Several commentators and materials noted that contracting out for transit services involves safety concerns, specifically mentioning the derailment resulting in a fatality during testing on the JFK AirTrain. Although the accident cannot be excused, it is an isolated incident. It would be difficult to draw the conclusion, based on a single incident, that as a general matter private operations are less safe than public operations. The TRB study regarding contracting out specifically discussed allegations that private contracting reduced the quality of service and caused safety problems, concluding that such allegations have not been proven.

The report published by the Port Authority regarding the JFK Airtrain accident indicates that the incident does not present grounds for concern regarding the safety of the system. The Port Authority’s Safety Board concluded that the accident was caused by a combination of a failure by the test supervisor to communicate with test personnel, insufficient training of train operators, and incomplete documentation of test procedure modifications. The accident was not due to any design or construction deficiencies of the track, its supporting structure, the rail cars or automatic train control systems. The AirTrain system is essentially the same system used for SkyTrain, which has been operating safely for 16 years.

This report does not attempt to resolve the underlying philosophical questions about the merits of contracting out. Nevertheless, a number of the points raised relating to potential problems associated with contracting out are appropriate for consideration by the SMP, in light of the societal goals adopted by the agency. One issue of particular concern is the desire to ensure that O&M workers receive fair compensation for services provided. Information obtained from the union representative for Hudson-Bergen project indicates that wages paid to operators are low when compared with wages paid for comparable services on other projects. This circumstance has resulted in much greater turnover in personnel than normal. The Hudson-Bergen representative indicated that compensation for maintenance personnel was higher than for operators but that issues relating to maintenance personnel compensation have been raised to arbitration as well. For future DBOM projects, he suggested including a contract requirement for the operating company to be require to pay rates comparable to those paid to workers at other systems. He also said he would like the operating company to have a labor relations liaison on management staff, and to be more responsive to worker concerns in general.
EXHIBIT D: BIBLIOGRAPHY


Molofsky, R. The failure of transit privatization: False hope, costly promises. (undated paper, Amalgamated Transit Union)

Study reveals Denver taxpayers soaked by privatization. In Transit, 26-27. (undated)


San Diego’s competitive transit system. Policy Notes. Washington Institute Foundation (undated)

Public-private partnerships for transportation development. Policy Notes. Washington Institute Foundation (undated)

Norton, L., Amalgamated Transit Union Local 587. Letter to Joel Horn, Executive Director, Seattle Monorail Project (October 31, 2003)


Dannin, E. White paper on privatization. (undated paper written by law professor, California Western School of Law, San Diego, California).


Henke, Cliff (undated). Prospects for employing public-private partnerships in U.S. bus service delivery. NABI USA Inc. (undated)


Plewes, Sheri (June 2, 2003). Richmond / Airport / Vancouver Rapid Transit comparison of design/build and design/build/finance/operate. (Memorandum to GVTA Board of Directors)


Public derailment? Why publicly operated rapid transit is better for the Lower Mainland. Canadian Union of Public Employees Local 7000 (SkyTrain Employees).  May 2003 <www.cupe.ca/updir/Public%20derailment%20brief.pdf>


