TABLE 1
Responsibility for Project Management Control

Project	Procurement Method	Owner	GEC	Other Consultants	Turnkey Contractor
Baltimore CLRL Extensions	Modified Civil D/B	X		X	X
BART San Fran. Airport Extension	Modified Civil D/B	X	X		X
NJ Transit HBLRTS	Full DBOM	X	X	X	X
San Juan Tren Urbano	Modified DBOM	X	X		X
Baltimore CLRL Phase I	Conventional	X		X	
BART Colma Station Project	Conventional	X	X		

Figure 6 Responsibility for project management control.
Source: Schneck, Donald C., and Stross, R. Andrew, "Project Management Control Resource Paper," Lessons Learned—Turnkey Applications in the Transit Industry (Washington, D.C.: Federal Transit Administration, U.S. Department of Transportation, October 1997) Pg. III-18

Session 6 – Project Control

Session Chair:
L.G. (Gary) Byrd
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Session Highlights

- The role of the turnkey contractor is a new consideration in project management and control.
- While the roles of the agency/owner, the designer and the contractor are well established on conventional projects, turnkey projects may require different project controls depending on the turnkey approach and conditions.
- In the FTA Turnkey Demonstration Projects the innovative procurement necessitated additional control measures as contrasted to conventional procurements.
- There are examples of minimal project controls on turnkey highway projects with complex systems components. These should be analyzed for their applicability to transit capital projects.
- The owner's management philosophy, teaming approach, and the quality and competence of the turnkey consortium all influence and impact the degree and type of project management control.

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Mr. Schneck presented the resource paper "Project Management Control" which he co-authored with R. Andrew Stross. The paper focuses on project management control as it was achieved in the five FTA Turnkey Demonstration Projects (see FIGURE 6). The goals were to document the key issue areas encountered in project management for turnkey projects; describe the extent of control functions utilized; and highlight the initial lessons learned in project management control for the turnkey demonstration projects.

The analysis focused on the evolving process of achieving reasonable balances for the roles of each of the major project organizations and the extent of project management control functions assigned to the roles for:

- Schedule Management and Control
- Progress Payments
- Cost Control and Job Accounting Systems
- Technical and Scope Configuration Control
- Change Orders and Claims Management
- Quality Assurance/Quality Control Program
- Owner Monitoring/Contractor Reporting
- Subcontractor and Disadvantaged Business Enterprise (DBE) Management
- Escrowed Bid Documentation
- Verification/Close-out and Project Delivery.

Mr. Schneck indicated that turnkey procurement introduces a new perspective on a traditionally well defined process that must be addressed in determining the level of management control—the role of the turnkey contractor

and agency. The turnkey contractor is given responsibility for overall project execution, including assuming selected roles in project management typically reserved for the owner agency staff and/or consultants.

The FTA turnkey projects were considered to have an high overall level of project control by the owner agency for the information and systems aspects of management. Other functions of project management, such as project scheduling, quality control, systems integration and configuration control, are shared with the contractor at varying levels of responsibility depending on specific local preferences, agency capabilities, and other project influences.

Project management control systems have been used to provide a mechanism for owner agencies to retain visibility over a turnkey project that is provided by agency staff on a more conventionally contracted project. Increased monitoring functions which require more detailed cost, payment, progress and schedule reporting have been used to enhance the owner's communication with the turnkey contractor. Enhanced project management requirements can serve as a means for the owner to retain an informational control over the project at the key decision points while still providing the increased allocation of risk and responsibility to the turnkey contractor.

It was observed that the extent of management control for each project was influenced by the developmental conditions of the project and the capability of the agency owner. The combined owner and contractor resources applied to the various management control functions are a function of local area, agency and the project particulars, including:

- nature of the project
- project size and scope
- owner staff experience
- right-of-way location, and
- whether the project is a new start or an extension.

It was further observed that complex turnkey projects, such as design/build/operate/maintain contracts, typically have a higher level of applied resources and systems control by the owner as contrasted to lower cost and less complex civil design-build contracts. The level of project management control can vary between management functions within the same contract.

FTA has recently provided owners with increased flexibility and authority to modify project management practices. This has resulted in eased procurement and administrative requirements for grantees, with benefits for both turnkey and conventional projects. Several areas for potential refinement particular to turnkey projects are:

- More unique agency/contractor payment methods (i.e. the New Jersey Transit turnkey demonstration project). This may require further consideration of the progress payment reporting mechanisms outlined in FTA's Third Party Contracting Requirements.
- The FTA value engineering requirements (Grant Management Guidelines) may need to be modified to account the inherent value engineering incentives in the turnkey contract structure.
- Further research into existing lease and equipment management guidelines presented in FTA's Grant Management Guidelines (FTA Circular 5010.1B). This may identify issues regarding satisfactory continuing control and monitoring of FTA funded assets under turnkey projects.
- Project Management Plan requirements may benefit from selected revisions to better accommodate turnkey issues of contractor roles in project management, with attention to schedule monitoring and QA/QC programs.
- The timing of the full-funding grant agreement for turnkey projects must be moved forward in the project development process to follow preliminary design. The Federal funding commitment can be reflected in the turnkey project finance plan and procurement process to broaden contractor interest and competition.

While turnkey projects undertaken in the U.S. to date have evidenced a variety of assignments of management control responsibilities, several trends are developing toward a preferred approach. The lessons learned to date include:

- While several factors influence the level of project management control, the more complex and longer term contracts demonstrate a higher level of pre-planned management systems control by the owner;
- Development of project management roles and responsibilities should receive significant attention prior to the development of the procurement process, with clear definitions of the owner and the contractor responsibilities.
- Combining schedule management, progress payments, and cost control through the cost-loaded schedule process can provide owners with a high level of monitoring while streamlining the required resources for the overall project management process.
- The bid documents should carefully define the QA/QC program so that the participating owner and contractor can avoid conflicts of interest. The owner may have to monitor closely initially to ensure the program is functioning properly.
- The complexities of turnkey contracts require additional levels of reporting and/or detail by the contractor team and a more thorough review by the owner to ensure compliance with specifications and progress.
- Turnkey projects may require the owner to raise the threshold amounts for change orders/claims requiring

senior staff approval so that staff have the necessary authority to advance the project and make decisions at the appropriate level of the organization

Geoffrey A. Fosbrook,
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Mr. Fosbrook's presentation focused the Tren Urbano project and the project management control measures which have been incorporated in the project. Tren Urbano was selected in 1993 as one of five FTA Turnkey Demonstration Projects. Mr. Fosbrook started by noting how the procurement strategy has influenced the project management controls. Tren Urbano is in the first of four possible phases. The GMAEC is completing studies for the first extension and following the Authority's review will be conducting the major investment and environmental studies for the extension.

Phase I was explained to include a 17 kilometer heavy rail system guideway, with 14 stations and a maintenance and storage yard. Half of the alignment takes advantage of existing R-O-W, with sixty percent of the alignment elevated and the remaining portions at-grade. The capital cost is estimated at $1.25 billion and estimated year 2010 ridership is 114,000 passengers per day.

Mr. Fosbrook discussed the Authority's consideration of several implementation alternatives. In deciding on a procurement, he noted that the Authority's most important activity was to decide on the risk which it wished to accept in the joint development and the risk it would pay the contractor to accept. The Authority desired for the contractor to have responsibility for initial operations and maintenance, and to have maximum participation by local designers and contractors. This led to the decision on a modified turnkey system contract with six separate design/build civil packages. The decision increased the coordination responsibility of the Authority while satisfying the other objectives.

In July 1995 the Authority adopted legislation which enabled the procurement of design/build contracts under a two step competitive negotiation process. The issuance of the Request for Proposals was accompanied by other documents which outlined the detailed requirements, the proposal evaluation process and contract documents. It is believed that this process greatly facilitated the proposal development. The documents defined the project management controls that would be adopted during implementation of the project. These included requirements for configuration management, design reviews, document control, schedule reporting, progress reporting and the work breakdown structure to be used for schedule and cost tracking. Multiple contractors required standardization in reporting elements and formats which were all spelled out in the procurement documents.

In considering the systems and test track turnkey (STTT) contract an Interface Control Manual (ICM) was required to aid in the coordination of the six design/build civil contracts and the STTT turnkey contractor. The Authority outlined the ICM as part of the STTT procurement documents. The road map for uniform tracking and reporting of schedule and cost was established by the Authority through various levels of the work breakdown structure (WBS).

A summary level schedule was established by the Authority early in the preliminary design and procurement process. An analysis of the schedule relationships among the contracts was conducted by the GMAEC and incorporated into the procurement documents. All contractors are required to submit their schedules in a Primavara P3 format. These are merged in the overall project schedule. The STTT contractor has responsibilities pertaining to schedule, design and construction tracking regarding the alignment section contractors. All contractors are required to present a schedule of values which are derived from the cost loaded schedule. A monthly progress report is required to be submitted along with the application for payment.

Mr. Fosbrook closed by noting that in addition to project management controls that are typical of conventional transit project design and construction, innovative procurement has necessitated additional control measures. Many of these additional control measures are incorporated into the Interface Control Manual. The STTT contractor has important coordination responsibilities. More is expected to be learned as the project progresses.

Gregory G. Henk
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Mr. Henk discussed the Transportation Corridor Agencie's (TCA) experience in turnkey highway project development and the relative performance of the Agency's three turnkey highway projects, as a group, with Orange County's largest toll highway projects.

The three turnkey projects discussed were the San Joaquin Hills Transportation Corridor, the Eastern Transportation Corridor and the toll collection and revenue management system. TCA is comprised of two public toll road agencies with a single (TCA) staff administering turnkey projects in behalf of the agencies building three roads. San Joaquin Hills Transportation Corridor Agency (SJHTCA) is one agency building a toll road that is nearing completion in approximately one

month; a segment opened to traffic in July 1996. The SJHTCA is three and one half months ahead of schedule. The Foothill/Eastern Transportation Corridor Agency is a separate agency, made up of two corridors. The Foothill corridor has partially completed and opened two traffic segments in 1993 and 1995; a third segment is under construction. There is a fourth Foothill Segment that has not received environmental clearance. A design-build contractor is being selected for the fourth segment. Once selected the contractor will participate in the environmental clearance. The Eastern Transportation Corridor is included in a single design-build contract.

TCA has issued $2.7 billion in debt and has $2.2 billion in contracts at this time. TCA has a number of financial partners including:

- FHWA with $220 million in lines of credit (ridership contingency), $25 million in construction contingency and no actual cash;
- Caltrans with a major financial stake although not specifically valued. Caltrans is responsible for maintenance, owns the competed roads, is responsible for tort liability and has some cash contribution;
- local governments who collect developer impact fees ($130 millions collected to date and $500 million projected over the life of the bond);
- bonds;
- developers through rights-of-way;
- contractors in subordinated debt accepted in lieu of cash payment;
- value engineering through the contractors worth about $50 million to date;
- state gas tax (STPP);
- state general funds; and
- a contractor line of credit.

For the SJHTC, the bonds are the bulk of the funds, however state gas tax revenues, state general funds, and project revenue certificates are the important finance elements. In the ETC with $1.5 billion in financing, the bonds are most important. These include fixed and variable rate bonds leveraged by tolls, development impact fees, lines of credit and state funds. SJHTC was the largest U.S. design-build until the New Jersey Transit Turnkey Demonstration project. The ETC project is second in size to SJHTC in the size of the design-build for a domestic U.S. project.

Mr. Henk referred to the $600 million design-build-operate-maintain project which TCA has with Lockheed-Martin IMS to implement a toll collection and revenue management system (TCARMS) for the agency's toll roads. The TCARMS contract is performance based while the other turnkey contracts were technical requirements driven. The TCARMS is in place on fifteen miles of existing TCA roadway.

The TCA turnkey projects have performed very well to date when compared with other, conventional, Orange County projects. TCA has an engineering staff of six. TCA is a risk adverse organization; they stay out of the risk loop totally. The organization feels strongly that time is money. The contract timing agreements are rigidly enforced with severe penalties for delayed completion.

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Mr. Campion reviewed and emphasized important factors related to design/build project management and control. The overarching importance of developing an operational teaming perspective was discussed. Teaming must involve all stakeholders and all the stakeholders must accept that responsibility. It is not the owner's responsibility to manage the turnkey subcontractors. The owners responsibilities include ensuring the technical qualifications of the project participants. Key systems and project criteria must be defined early, incorporated into the procurement process, and understood by the turnkey contractor and all subcontractors. The project criteria should include design requirements, important specifications, and sign-offs.

Scheduling and schedule requirements must be well defined. Interfaces must be laid out so that the sequencing and timing of deliverables are understood. Detailed agreed upon milestones must be defined early. Very important is holding to the schedule delivery date established in the initial schedule. Expenditure reporting and the basis for payments require resource reporting and price loaded schedules. Schedule and cost monitoring are important to expediting the processing of payments.

The QA/QC requirements are challenging. Plans must be developed in conjunction with the contacting community to see that the QA/QC processes of the contractor ensure the requirements of the owner. This was recognized as a difficult area for owners who are not trusting of the QA/QC processes and intentions of contractors. The QA/QC process should be relatively independent of the other aspects of the turnkey process to ensure a strong independent judgment.

It is important to have a formal partnering agreement, not just with the contractor but also with other tangential agencies whose involvement is necessary.