The example of the Taipei Rapid Transit was cited as demonstrating the problems inherent in conventional transit construction projects, with 90 percent cost overruns and years behind schedule in completion. The problems in Taipei included:

inadequate organizational support

contracting difficulties resulting in disputes, claims and legal actions

poor communications between the general engineering consultant, the owner, and contractors

- ineffective systems integration
- inadequate media and public relations
- inadequate documentation for operations.

Mr. Thomas observed that many U.S. projects experience problems similar to Taipei. Among the advantages of turnkey approaches are the systems view and partnerships they encourage involving project development, finance, cash flow and work flow. There have been a number of lessons learned in the five FTA turnkey demonstrations and these include:

New Start Planning and Project Development

 Incorporating analyses of implementation options during major investment studies

 During preliminary engineering for turnkey projects as much as 60 percent of the final design for civil elements is completed as contrasted to only 30 percent for conventional projects

Final design and construction for conventional projects are separate phases as compared to one implementation phase for turnkey projects.

Turnkey Design/Build Procurement Process

 Acquisition planning, research and strategic assessment preliminary to the turnkey project decision

• Industry review of draft solicitation documents can help the public agencies allocate risks and decide whether changes in traditional procedures are warranted. All interested firms should be invited to industry outreach events.

Early Project Development

 Complete preliminary engineering and environmental assessments before initiating a turnkey procurement

- Assess project costs, schedule and financial risks
- Tailor turnkey approach to local situation

• Agency roles include rights-of-way acquisition, utility relocation, environmental mitigation, public participation and geotechnical surveys.

Procurement

Emphasize extensive project definition

Consider changing Federal/State prequalification policies

Avoid overly restrictive clauses and risk assessment

Provide clear responsibility to control integration issues

Ensure full and open competition through small and minority business participation

Establish effective cost, schedule and quality control.

Project Financing

 Consider innovative financing alternatives including contractor assisted financing, joint development of station areas, construction financing and profit deferrals

Avail all contractors of financing alternatives

 Because of the time and cost sensitivity of turnkey projects, documentation of payment procedures and processing of payment requests are extremely important.

Risk Management

- Define and clearly allocate identifiable risks
- Develop risk management approach.

Project Management

Increased need for project management control systems

Session 2: Procurement and Subcontracting

Session Chair: Subhash R. Mundle President Mundle & Associates Philadelphia, Pennsylvania

Session Highlights:

A negotiated procurement or a two-step procurement is recommended for design-build/turnkey contracts. Discussions between the owner and proposers facilitates a true "meeting of the minds"; allows crafting of tailored solutions for contractor concerns; and achieves the optimum balance of risk and price.

Federal, state and local procurement regulations

offer varying degrees of flexibility for the procurement process necessary for design-build. The federal government and most states allow turnkey for some agencies and/or projects. Some states have recently expanded regulations to permit design-build contracts. This trend is likely to continue and could be facilitated by federal incentive.

Turnkey requires a well-conceived, complex contract. Using conventional contract documents (terms and conditions) does not effectively address the melding of the design, construction, and operations elements of the turnkey contract. Some clauses that warrant special analysis and consideration include: change order, contractor job cost system requirements, audit, performance bonds and warranties.

The turnkey approach has the potential to reduce the opportunity for DBE, small and mid-sized firms. Because the number of prime contracts is reduced and "mega-teams" will be required to respond to turnkey scope, these small and mid-sized firms will likely be relegated to less visible roles, without direct client interaction. The main concern is that these firms will fail to develop the experience needed to grow and contribute meaningfully to the next project and will instead become merely "body shops."

If turnkey does not result in project completion on time within budget, it is no better than the conventional design and construction approach. Turnkey procurement was conceived to achieve project implementation with a possible savings of time and greater certainty of budget. Like all approaches, the turnkey procurement strategy must be evaluated and measured with respect to the project implementation objectives. Effective techniques implemented by some turnkey projects include: requesting industry comments on documents prior to solicitation, following a detailed and fair selection process, selecting one prime contractor for a single-point of responsibility, and establishing detailed cost elements for the fixed price to facilitate change order negotiations.

Bedros Enfiedjian, Gardner Consulting Planners Carson, California

An overview of the resource paper "Transit Turnkey Procurement: Lessons Learned" was presented by the author. In summary:

Turnkey is viable strategy for undertaking the design, construction, operations, maintenance and finance of transit investments. Turnkey is inherently different than the conventional design, bid, build model. The five Federal Transit Administration Turnkey Demonstration projects indicate that turnkey provides for reasonable allocation of risks between the project participants; shortened project design and construction schedules; reduced owner/contractor and contractor/contractor disputes and claims, greater cost certainty; reduced owner project staff needs and; more direct and less diffused project responsibility.

Legislation

Federal legislation allowing the design/build or turnkey procurement method includes the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, the Federal Acquisition Reform Act (FARA) of 1996, Senate Bill 1124 of 1996 and FTA Circular 4220.1 D. However, several of these recent federal regulations apply only to federal government agencies such as the Army Corps of Engineers and the General Services Administration, and not to grantees. A recent 50 State Survey of Public Agency Design-build Authority indicates that, in the last five years, many states have updated their procurement legislation to permit turnkey procurement. Twenty-one states now permit design build for some agencies and/or projects, while only ten states fully permit design/build procurements. Twenty-nine states have unclear legislation or have no position. Many of the current transit turnkey projects had to enact legislation or receive waivers to permit various elements of the design/build process, as well as allow the pre-qualification of bidders.

Turnkey Strategies and Issues

Under a typical turnkey procurement, a transit agency contracts with a single private entity, the turnkey contractor, for the design, construction and delivery of a complete and operational project. In some instances, the private contracting authority is required to operate and maintain the system for a defined period of time. The private contractor is typically a consortium of private companies offering engineering and design, construction, manufacture of vehicles, finance and related support services. Some or all of the aforementioned capabilities may be included in the private consortium depending on the project particulars.

Various approaches to turnkey exist (see FIGURE 3): build-operate-transfer (BOT); build-transfer-operate (BTO); modified turnkey; separate or combined civil/systems turnkey; and super turnkey. Selection of an appropriate approach depends primarily on state and local legal requirements, local implementation objectives, available finance resources and expertise of the owner staff. Negotiation or a two-step procurement process is strongly recommended for selection of a turnkey contractor. In addition, soliciting comments from the industry on the proposed procurement documents has been quite successful and is highly recommended .

With the wide range of project development approaches offered by turnkey, acquisition planning, including whether to proceed with a turnkey implementation and, if so specifically what type of turnkey strategy, is very important. With turnkey projects more effort appears to be required in concentrated project planning and preliminary engineering with less preliminary phasing of the design, construction and contracting requirements on the part of the public sponsor.

Turnkey requires different management and professional capabilities on the part of the sponsor as contrasted to conventional procurements.

	Alternatives Analysis	Preliminary Engineering	Final Design	ROW/ Utilities	Const. Guideway	Const. Fixed Facil.	Systems	Start-up & Testing	Operations & Maint.	Funding/ Financing
Traditional Method										
Agency		Θ	•	•	Θ	Θ	$\mathbf{\Theta}$			•
Design Consultant				0	0	0	0	0		
Systems Consultant			•	0	0		0	0		
Systems Supplier					0		•	0		
Civil Contractor(s)				L						
Full Turnkey (BTO)										
Agency			0		G	G	G	G		•
Gen. Design Cons.		0	0	0	0	0	0	0		
Turnkey Contractor		0	•		•					
Full Turnkey (BOT) Agency			•		0	0	0	0		•
Gen. Design Cons.		0	Õ	0	Õ	0	0	Õ	Õ	
Turnkey Contractor		Õ	Ŏ		•			•	ě	
Modified Turnkey										
Agency		•	0		G	G	G	0	0	•
Gen. Design Cons.		0	0	0	0	0	0	0	0	
Turnkey Contractor		0	•			9				
Civil Contractor										
Superturnkey										
Agency	0	•	0		0	G	0	G	0	
Gen. Design Cons.	and the second second	0	0	0	0	0	0	0	0	
Turnkey Contractor	•	0	•			G				0
Legend: Prima Secon	ry responsibil Idary / manag	ity jement respo	nsibility	G	 Oversight responsibility Supporting responsibility 					

FIGURE 3 Public agency role in different types of turnkey contracts.

Source: Enfiedjian, Bedros, "Transit Turnkey Procurement Lessons Learned," <u>Lessons Learned—Turnkey Applications in</u> the <u>Transit Industry</u> (Washington, D.C.: Federal Transit Administration, U.S. Department of Transportation, October 1997) Pg. V-16 Turnkey can benefit the sponsor with less technical and engineering resources and experience. Turnkey can also benefit the sponsor with financial and schedule constraints. The timely execution of the project through turnkey design and construction can result in cost savings due to shorter inflation periods. Recent turnkey procurements have required the private consortium to participate in the finance of the projects.

To date, the turnkey demonstration programs have exceeded DBE participation goals.

W.H. (Ray) Lytle, Jr. President RL Associates, Inc. McLean, Virginia

Turnkey is not a new procurement approach and has been used extensively in the military to achieve improved contract performance and efficiency on complex projects. Relative to conventional procurements, the magnitude and complexity of the procurement increases with turnkey. This has to do with the increased number and range of elements included in a turnkey contract relative to conventional multiple contracts.

Where possible, it is advisable to undertake a negotiated procurement. The objective is to find out as much about the contractor as possible prior to entering the procurement phases. If a negotiated procurement is not possible a two phase procurement with negotiation with the best qualified proposer is acceptable.

Pre-acquisition planning is very important in nonconventional procurements. Most important is knowing what are the objectives of the implementation and, what is legal in the state of the undertaking. Most of the changes in procurement requirements to date have not benefited turnkey contracting at other than the Federal level.

Turnkey need not preclude the involvement of small and disadvantaged businesses.

Dr. Delon Hampton Principal Delon Hampton & Associates Washington, D.C.

The turnkey approach *may* result in a shorter schedule and lower project cost, provided that the owner has:

 Staff who are knowledgeable in turnkey and wise enough to let the contractor perform without undue interference;

- A capable turnkey contractor and;
- A decision-making process in place that will provide

timely responses to the contractor during project execution.

Without these items, any expected cost savings can easily be eliminated.

The turnkey process will have an adverse impact on small and medium-sized firms (including DBE firms) for the following reasons:

Reduced number of prime contracts, and therefore a limited number of contracting opportunities.

 Higher proposal costs due to the more extensive proposals required for turnkey projects, reducing the ability for smaller firms to sustain the required investment.

Reduced quality of participation for small and mid-sized firms who will probably not have a leadership role in proposal preparation or project execution.

Minimal incentive for prime firms to include small and mid-sized firms on the team and/or in meaningful roles, reducing their ability to grow and develop expertise for the next project.

The overall participation of DBE firms will likely decrease as a result; turnkey procurement may lead to the demise of many DBE firms. Turnkey procurement offers the *possibility* of reduced cost if properly managed, but it is likely at the expense of employment and business opportunity for small and medium businesses.

Karen Hedlund Partner Nossmann, Guthner, Knox & Elliott Los Angeles, California

Although at present very few states allow it, a negotiated procurement method is strongly recommended for turnkey. A two-step bid process is an improvement over a selection based on low bid without pre-qualification, and both offer the benefit of an "apples to apples" comparison. However, both bid processes have shortcomings: bidder comments are frequently unclear; bidder "wishes" vs. cost-drivers or deal-breakers are not always discernible; and contract changes are offered to all bidders, perhaps offering unnecessary concessions of little importance to the successful bidder.

The absence of negotiation leads to decision making without communication. Negotiation allows the owner to understand and explore the real basis for concerns of the proposer. Tailored solutions can be crafted to achieve the optimum balance between risk and price. And, the contractor develops a better understanding of owner expectations. Negotiation results in "the best deal for the best price" and is more likely than a bid process to achieve a true "meeting of the minds." Negotiation can lead to optimum decisions.

Michael B. O'Connor Procurement Manager Bay Area Rapid Transit District (BART) Oakland, California

Design-build has been used in the power and petrochemical industries for many years; these industries have already achieved some "lessons learned" that we can apply to transit. Most significantly, these industries have developed a sense of when not to use the turnkey approach, as for example, on projects with high contractor risk because the proposed prices are too high.

Design-build requires a new generation of contract documents that incorporate the needs of three distinct elements: design, construction and operation. Melding the required pricing and procedures into one contract is a complex and challenging endeavor.

Typical post-award concerns with design-build contracts appear in the areas of managing and pricing changes, interpretation of commercial terms, and obtaining adequate cost data to support change orders. Specific recommendations for turnkey contract clauses include:

requirements for contractor job-cost systems;

pricing change orders based on the job-cost system; and

detailed audit provisions.

Amar Sapal, PE Chairman—Honolulu Public Transit Authority Senior Project Manager O'Brien-Kreitzberg, Inc. Honolulu, Hawaii

Honolulu decided to go turnkey for its transit system in an effort to achieve greater cost predictability. At the time this project was conceived, the national trend was for projects to be completed over budget, and the political climate demanded greater certainty about the real, final project cost. In addition, an FTA funding limit established that any cost increases would be paid out of local funds.

Honolulu worked through several legislative, regulatory and process restrictions to award the turnkey contract. The FTA helped to identify the real concerns and develop workable solutions for federal procurement constraints, such as accepting a \$250 million performance bond instead of the 100% bond typically required.

Suggestions for greatest effectiveness of a turnkey contract:

seek industry input on documents prior to solicitation;

 develop and follow a detailed selection procedure that includes a multi-disciplined and knowledgeable evaluation committee; and

keep the implementation objective in mind.

In addition, to keep the project cost contained:

 select one prime consultant, establishing a single point of responsibility; and

establish a fixed price with a detailed schedule of costs.

The turnkey approach is only better than conventional contracting if it actually results in a project that is within budget and on time.

Discussion

QUESTION: Would you comment on the use of design-build-operate/maintain?

ANSWER: Honolulu included five years of operations and maintenance in the turnkey contract so that the contractor would construct and de-bug the system before the agency assumed ownership. The Hudson-Bergen Light Rail Line has a fifteen year maintenance period. Benefits of this strategy include: built-in contractor warranty period; and incentive for contractor consideration of life cycle costs. Challenges include: financing, performance bond requirements; pricing contingencies; and determining the appropriate length of the operations/maintenance period.

QUESTION: What strategies help to achieve adequate DBE participation in turnkey contracts?

ANSWER: To minimize the opportunity for "bid shopping" of DBE firms, FTA policy requires that all DBE firms be identified at the time of proposal, and that no substitutions are allowed without prior approval. An incentive/disincentive clause tied to meeting DBE participation goals is also an option. (Liquidated damages may be perceived as a penalty and not enforceable in this instance; an incentive/disincentive clause will avoid this problem.)

QUESTION: How can consultants adapt to the changing environment of turnkey? What strategies would you suggest?

ANSWER: Design-build has changed the business environment for design professionals. The owner is not necessarily their client. The cost of getting new work is greater and requires more "sweat-equity" due to the increased requirements of a turnkey proposal. Study consultants who have effectively managed the transition in the power and petrochemical industries. Design-build contractors have corresponding concerns because they must learn to select and manage consultants. With time and experience, they will become more adept. The design-build process admittedly removes some of the comfort and guarantees that the professional community is used to experiencing while doing business with agencies. However, the "up side" cap is also gone; with greater risk, the profit potential is likely more significant.

QUESTION: Is a federal law feasible to permit design-build for all federally funded projects?

ANSWER: Federal laws in the area of procurement are typically permissive, not prescriptive. A prescriptive law is unlikely because the federal government is unlikely to pre-empt the states' ability to set procurement regulations. An incentive, such as was implemented with the Brooks Act, which requires the availability of design-build as an option in order to receive federal funding, may be appropriate though.

QUESTION: Is it easier for state agencies to do design-build than for non-state grantees?

ANSWER: Only three of the approximately 1400 grantees in FTA programs are considered state agencies and therefore exempt from some of the requirements of 4220; most of the FTA grantees have the same restrictions. Typically, rules governing grantees lag those that apply to government agencies. It is probable that the permissive design/build elements now available to the government agencies will be incorporated in the future .