

A Case Study

# Michigan Intelligent Transportation System Center

Use of a Design/Build/Warranty Contract



Federal Highway Administration Intelligent Transportation System  
March 2000



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<b>16. Abstract</b> <p>Procurement of Intelligent Transportation System (ITS) projects with Federal-aid funds can present challenges. ITS technologies are implemented as stand-alone projects, expansions of legacy systems, or incorporated as part of traditional roadway construction projects. ITS projects often involve the application of complex telecommunications, computers, software, sensing, and electronics technologies that are not familiar to many transportation agencies, making it very difficult to develop the appropriate specifications for bidding purposes. Conventional Federal-aid construction projects are procured using a two-step project delivery approach: first, a design contract is let to design the project, and then a construction contract is let to build the project. Under Federal-aid regulations, the design contractor can be selected using a qualifications-based approach, while the construction contractor must be selected based on low bid. In many cases, however, the requirements of ITS projects cannot easily be specified at the beginning of a project. This makes it difficult to establish realistic low bids and ensure product quality.</p> <p>Many ITS projects are stand-alone in nature, and do not have to be procured under rules for construction. The installation of field devices and communications infrastructure often meets the definition of construction. However, if a project involves the development of software for the purpose of integrating field devices, then it does not meet this definition. The purpose of this series is to show that other procurement options are available under Federal-aid regulations for projects that do not meet the definition of construction.</p>			
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## Procurement Options for ITS Federal-aid Projects

### *Definition of Construction*

The term "construction" means the supervising, inspecting, actual building, and all expenses incidental to the construction or reconstruction of a highway, including locating, surveying, mapping, resurfacing, restoration and rehabilitation, acquisition of rights-of-way, relocation assistance, elimination of hazards of railway grade crossings, elimination of roadside obstacles, acquisition of replacement housing sites, acquisition and rehabilitation, relocation, and construction of replacement housing, and improvements which directly facilitate and control traffic flow, such as grade separation of intersections, widening of lanes, channelization of traffic, traffic control systems, and passenger loading and unloading areas. The term also includes capital improvements which directly facilitate an effective vehicle weight enforcement program, such as scales, and also includes costs incurred by the State in performing Federal-aid project related audits which directly benefit the Federal-aid highway program.

### *ITS Projects that are not Construction*

Section 112 of Title 23 requires competitive bidding for all construction projects. The definition of "construction" by FHWA does not include many ITS projects. If the project is just installing field devices, it is construction. However, if the project involves software to control the devices or integration of the devices with a control center or communications system, then it is not construction. Communications systems or traveler information systems that require only limited installation are not construction. Each project should be carefully examined to determine if it falls into the construction category. Many ITS projects do not.

### *Prequalification of Suppliers*

Even if a project does fall under construction, agencies can establish a pre-qualification process to insure that all bidders are qualified to perform the work. The criteria for qualification are defined by the procuring agency. However, if the ITS project is a part of a larger construction project, it is recommended that the ITS portion be made a separate procurement.

### *State Procurement Practices*

If the ITS project does not fall under construction, another alternative is to use the state's own procurement procedures in accordance with 49 CFR 18. This applies to all non construction projects. Since many states have recently established special procurement rules for technology projects, this could be advantageous to implementers ITS projects.

*However, if you use federal aid procurement practices, then there are other alternatives available, which are:*

- *Engineering or Design Services*

This contracting mechanism can be applied to a variety of ITS projects such as software development. It has also been successfully used to retain System Integrators and System Managers that can provide the entire spectrum of services required to implement an ITS Project, such as a traffic management center. This might include the specification, procurement, configuration and installation of all hardware and software to provide the functionality required. Even if field device installation is required of the system integrator, and not done under a separate construction contract, a design - build contract could be used under FHWA SEP14.

- *SEP - 14 (Special Experimental Project number 14)*

The SEP -14 process is aimed at encouraging innovative procurement practices of all types. It has been successfully used for Design -Build and Design -Build-Operate projects. However, other value oriented procurement processes can be employed using SEP-14. To use SEP-14, permission of FHWA is required, and the contract must be awarded under some form of competitive process. However, the selection criteria may vary from project to project and generally includes: value, quality of the completed product, schedule, and cost.



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### ACRONYMS

CCTV	Closed-circuit television
D/B/W	Design/Build/Warranty
FHWA	Federal Highway Administration
HAR	Highway Advisory Radio
ITS	Intelligent Transportation System
MDOT	Michigan Department of Transportation
MITSC	Michigan Intelligent Transportation System Center
RCBP	Request for Construction Bid Proposal
SEP-14	Special Experimental Project Number 14



## Preface

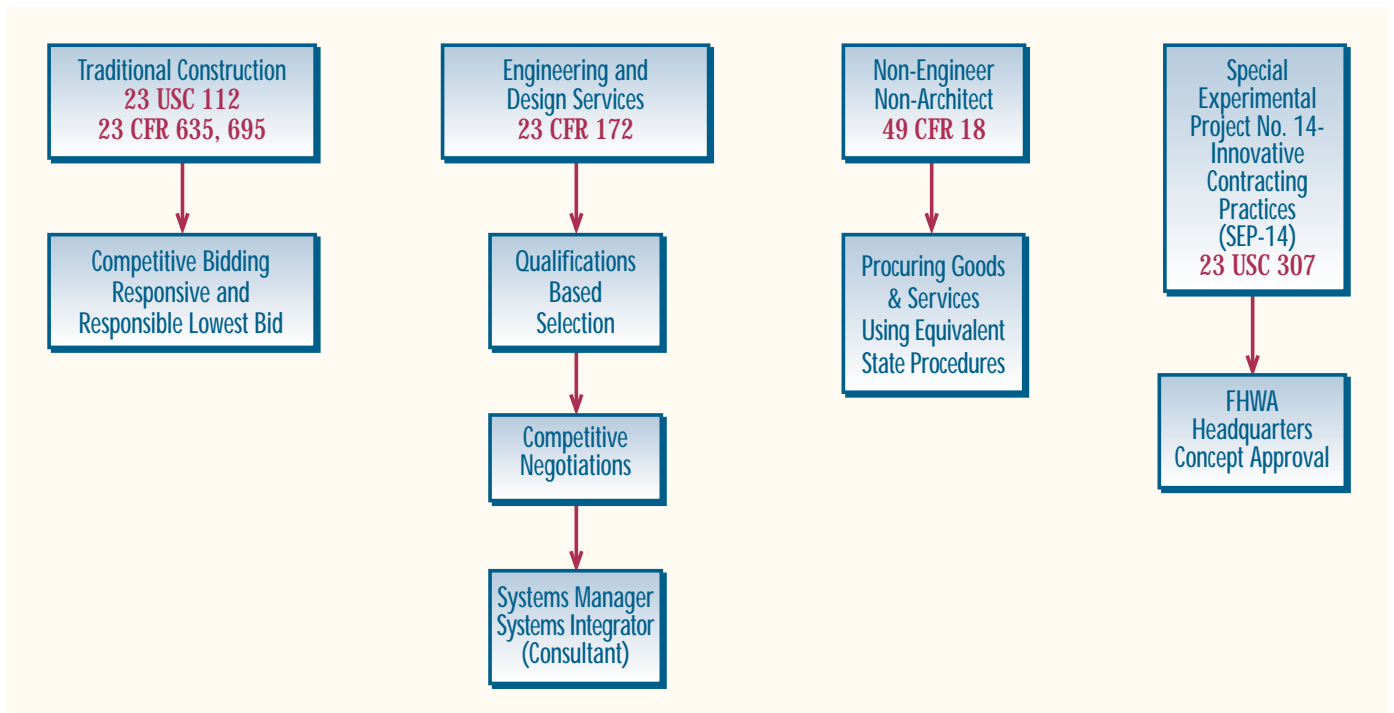
Procurement of Intelligent Transportation System (ITS) projects with Federal-aid funds can present challenges. ITS technologies are implemented as stand-alone projects, expansions of legacy systems, or incorporated as part of traditional roadway construction projects. ITS projects often involve the application of complex telecommunications, computers, software, sensing, and electronics technologies that are not familiar to many transportation agencies, making it very difficult to develop the appropriate specifications for bidding purposes. Conventional Federal-aid construction projects are procured using a two-step project delivery approach: first, a design contract is let to design the project, and then a construction contract is let to build the project. Under Federal-aid regulations, the design contractor can be selected using a qualifications-based approach, while the construction contractor must be selected based on low bid. In many cases, however, the requirements of ITS projects cannot easily be specified at the beginning of a project. This makes it difficult to establish realistic low bids and ensure product quality.

Many ITS projects are stand-alone in nature, and do not have to be procured under rules for construction. The installation of field devices and communications infrastructure often meets the definition of construction. However, if a project involves the development of software for the purpose of integrating field devices, then it does not meet this definition. The purpose of this series is to show that other procurement options are available under Federal-aid regulations for projects that do not meet the definition of construction.

## Background

Over the last several years, transportation agencies have used several different procurement approaches to overcome some of the problems associated with conventional two-step construction contracting applied to ITS projects. The following case study provides an overview of the Michigan Intelligent Transportation System Center Design/Build/Warranty (D/B/W) contract. The Michigan Department of Transportation (MDOT) used the D/B/W contract to expand and enhance the Detroit freeway surveillance system. The warranty provision of the contract covered extended maintenance of system components for a period of two years. D/B/W is an example of a nontraditional

### Contracting options for Federal-aid transportation procurements







contracting technique that can be used on Federal-aid projects under provisions of the Federal Highway Administration (FHWA) Special Experimental Project No. 14 – Innovative Contracting Practices (SEP-14).

SEP-14 permits agencies to implement innovative contracting practices. In a design-build arrangement, a single contractor provides design services and constructs the project under one contract. Since a single contractor is delivering the project, the public agency is relieved of the responsibility of developing a detailed design at the outset of the project. This may provide the agency with an opportunity to incorporate the latest in technology.

The development and award of the D/B/W contract required the approval of the FHWA under SEP-14 and serves as a model to other agencies interested in establishing other similar contracts to procure ITS projects.

The Detroit system has provided surveillance on 32.5 miles of freeway in the City of Detroit since 1980 and is monitored from the Michigan Intelligent Transportation Systems Center (MITSC). An expansion of the system to cover 180 centerline miles of freeway is underway. The legacy system includes ramp meters, detectors, and Closed-circuit television (CCTV) with communication via coaxial cable. The expanded system will add Highway Advisory Radio (HAR) and enhanced communications capability using fiber optic cable.

MDOT examined various contracting options for system expansion and decided that the best alternative for acquiring the expanded system was

a D/B/W contract. MDOT envisioned that a single “one stop shopping” contract with a system integrator team of system and construction engineers, software developers, designers, and builders would be established to deliver the expanded system. Under the traditional procurement approach, MDOT reasoned, one or more contracts for system designers would be required, one or more contracts for system components would be required, and one or more

contracts for system constructors would be necessary. MDOT was interested in establishing a single point of responsibility for the entire project. The use of a single contractor would provide the necessary checks and balances for ensuring acceptable system performance. MDOT also

reasoned that a single design-build contract would accelerate implementation.



## Procurement Planning

FHWA statutes require that highway construction contracts be awarded competitively to the lowest responsive bidder. Design services may be procured using a separate qualifications-based selection process. Therefore, the procurement of design and construction services under one contract does not fully comply with existing statutes and regulations. In April 1991, FHWA's Office of Chief Counsel reviewed the design-build concept for compatibility with Federal laws and regulations. It is their position that Federal-aid funds may be used in a design-build contract when approved by FHWA as an experimental project under SEP-14 and awarded using competitive bidding procedures. Some states have awarded



design-build contracts on the basis of low bid, and others have used a combination of cost and other factors. According to FHWA, a State must use cost as one of the award criteria to have a competitive process under SEP-14.

In April 1994, MDOT submitted a work plan to FHWA for approval under SEP-14. This plan contained a description of the work to be completed, along with an evaluation plan with the proposed criteria to be used in the contract selection and award process. FHWA approval was granted in May 1994.

## Scope of Services

The Request for Proposal (RFP) identified the following tasks to be completed as a result of this procurement:

- Project Management
- Engineering
- Specification Development for the Procurement of Equipment, Hardware, and Software
- Procurement of Hardware, Software, and Other Equipment and Services
- Installation
- System Integration, Test, and Evaluation of System and Subsystem Performance
- Warranty, Service, Maintenance and Training.

The contractor was required to furnish a maintenance and performance warranty for all hardware, software, and equipment for a period of two (2) years from the date of acceptance of the work. An issue arose as to whether the TMC would be staffed with maintenance personnel from MDOT, or staffing would be privatized. An extended warranty was developed to allow equipment maintenance activities to be performed by the contractor for one year beyond the normal warranty period. This provision allowed MDOT time to develop a staffing plan for system maintenance.

## Procurement Challenges

The design-build procurement approach presents several contracting issues to an agency. First, a reasonable level of design detail must be developed before contractors will feel comfortable with bidding the project. Some suggest that 30% of the design must be complete in order to bid. MDOT provided prospective bidders with a set of functional requirements detailing the various capabilities of the completed system. MDOT provided a detailed project description to the bidders, including corridors for deployment, functional requirements for equipment, and hardware and software interface design.

## Contract Evaluation and Award

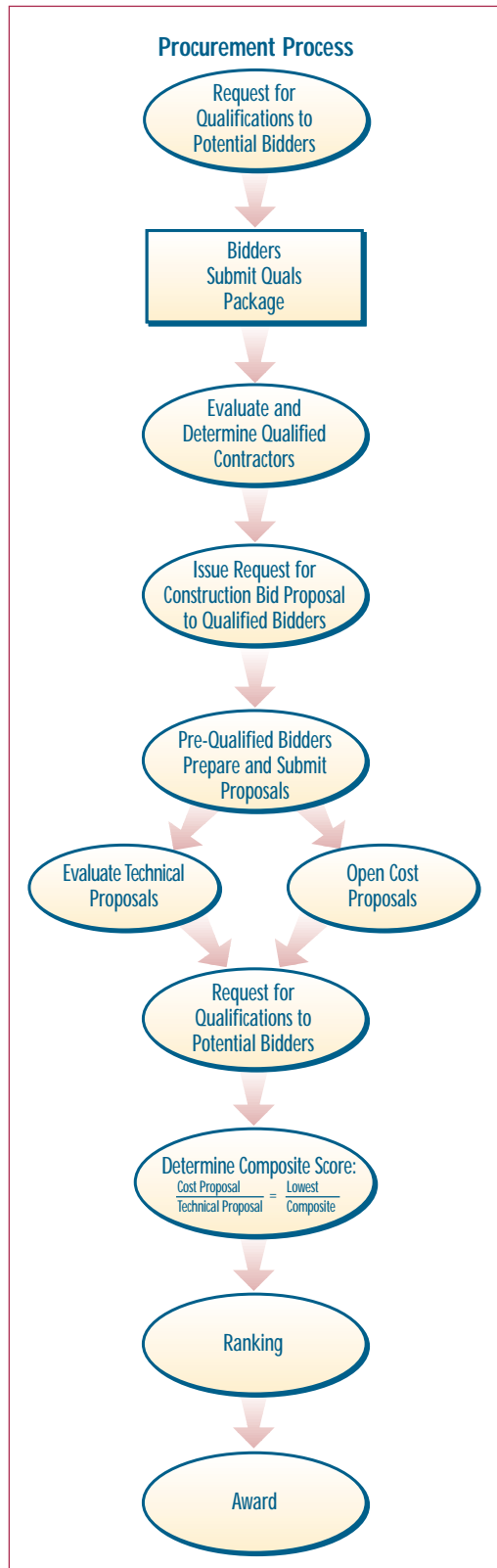
A multi-step process was followed to select the contractor. The first stage involved a pre-qualification step. Contractors who are deemed acceptable at the pre-qualification step were issued a Request for Construction Bid Proposal (RCBP). Bidders were then asked to submit a technical proposal and a separate price proposal. Technical proposals were scored based on the following factors:

### Prequalification Rating

1. Similar work in last 5 years	20 pts.
2. Qualifications and experience of team	20 pts.
3. Availability of staff	20 pts.
4. Pre-qualification statement	20 pts.
5. Team organization	20 pts.
<b>TOTAL</b>	<b>100 pts.</b>

Sealed cost proposals were then opened for all bidders receiving a score of 60 or above (on a scale of 0 to 100) on the technical proposals. A composite score was then calculated for each bid by dividing the total proposed cost by the technical proposal score. The proposal with the lowest composite score was then selected. The contract was awarded as a fixed-price contract. This procurement technique was designed to provide the agency with the best value for their investment.

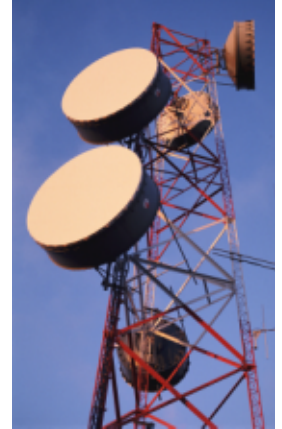




*A multi-step process was used to select a Design/Build/Warranty contractor for the Michigan Department of Transportation.*

## Current Activities

All construction activities for this project have been completed, and the system is currently in the warranty phase of the contract. A right-of-way problem arose with the construction of a communications tower, and the contractor has been relieved of any responsibility for this construction. Once the problem is resolved, a separate procurement process will be initiated to construct the tower and will likely resemble a “lowest bid” procurement. Integration of system components is not complete, as several “bugs” are being worked out of the system.



## Benefits of the Procurement Strategy

Participants in the procurement planning and acquisition process for the Design-Build program cited a number of benefits to the procurement strategy pursued in this case. Benefits include the following accomplishments:

- Minimized the time to implement system expansion
- Used a single contractor who was responsible for the entire project
- Transferred full responsibility to design-build team, eliminating imperfect knowledge transfer between designer and contractor.

This type of procurement worked well for Michigan, based on the benefits cited, and has the ability to work well for other agencies who are interested in procuring similar projects in their regions.

The best procurement process is not a sole guarantee of success; it is only one element. A good management style along with a team-based approach is necessary to achieve the full benefits of a particular procurement.



## Procurement Resources

### *Documentation*

- ITS Procurement Resource Guide, ITS Joint Program Office
  - FHWA Memorandum: Procurement Information for ITS Projects - *Discusses types of ITS projects and the alternatives available under federal aid.*
  - Virginia Department of Transportation Public-Private Procurement - Issues and Accomplishments *A lessons learned discussion of public- private partnerships*
  - Innovative Contracting Practices for ITS  
Executive Summary & Final Report - *A detailed compendium of state and federal procurement laws and options*
  - FHWA Federal-Aid ITS Procurement Regulations and Contracting Practices
- The Road to Successful ITS Software Acquisition, ITS Joint Program Office  
Executive Summary; Vol. I; Overview and Themes; Vol. II; Software Acquisition Process Reference Guide - *A discussion of the key issues and approaches to responding to those issues.*
- ITS Software: Effective Acquisition Practices, NCHRP - *This report will be available from AASHTO by the end of the year.*
- Successful ITS Procurement Case Studies (*Available 1/1/2000*)  
(All DOT documents available via the ITS web site [www.its.dot.gov](http://www.its.dot.gov))

### *Training (See NHI course listing)*

- ITS Software Acquisition; *A two day course for project managers and engineers based upon "The Road to Successful Software Acquisition".*
- ITS Procurement Using Federal Aid; (*Available 1/1/2000*) *This one day workshop, aimed at project managers and procurement officials, will concentrate on the use of various contracting approaches allowed by federal aid for ITS projects.*

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