

ITS Field Operational Test Summary

TransGuide

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Introduction

Transportation Guidance System (TransGuide), Phase 1, was a non-ITS funded deployment of an Advanced Traffic Management System (ATMS) in San Antonio, Texas. It was the first phase of a planned 191-mile regional ATMS for the greater San Antonio area. It installed ATMS functions on a 26-mile freeway system circumscribing the San Antonio central business district from 1993 to 1995. The shaded area in Figure 1 shows the location of the TransGuide Project, Phase I. The Texas Department of Transportation (TxDOT) developed and directed this project.

The TransGuide Field Operational Test (FOT) consisted of an evaluation of various design aspects of this TransGuide deployment. It resulted in a published document entitled "TransGuide ITS Design Report" that provides design guidance on the TransGuide system and its major components.

Project Description

TransGuide deployment, Phase 1, developed and demonstrated advanced traffic management technology on a 26-mile portion of the San Antonio freeway system. This technology included automated incident detection, verification, and response to freeway incidents including control and management of approaching traffic upstream of the incident locations. The system used sophisticated, modern technology to provide complete control of all system functions from a single traffic management center. The TransGuide project installed a dedicated fiber optic communications network to link the field components of the system to the TransGuide Operations Center (TOC). Figure 2 shows many of the important components of the TransGuide system.

The objectives of the TransGuide deployment were to:

- Help identify traffic incidents
- Provide video surveillance of the freeway system
- Support traffic management decisions based on incident characteristics
- Allow control of lane occupancy and freeway access
- Help coordinate the dispatch of emergency response units
- Support the dissemination of traffic information to the public, private industry, and the news media.

TransGuide system deployed an innovative, high-speed digital and fiber optic communications system for voice, data, and video signals. It developed traffic management software on a fault tolerant computer system that was designed to exchange information with roadside equipment including changeable message signs, lane control signals, loop detectors, and CCTV surveillance cameras.

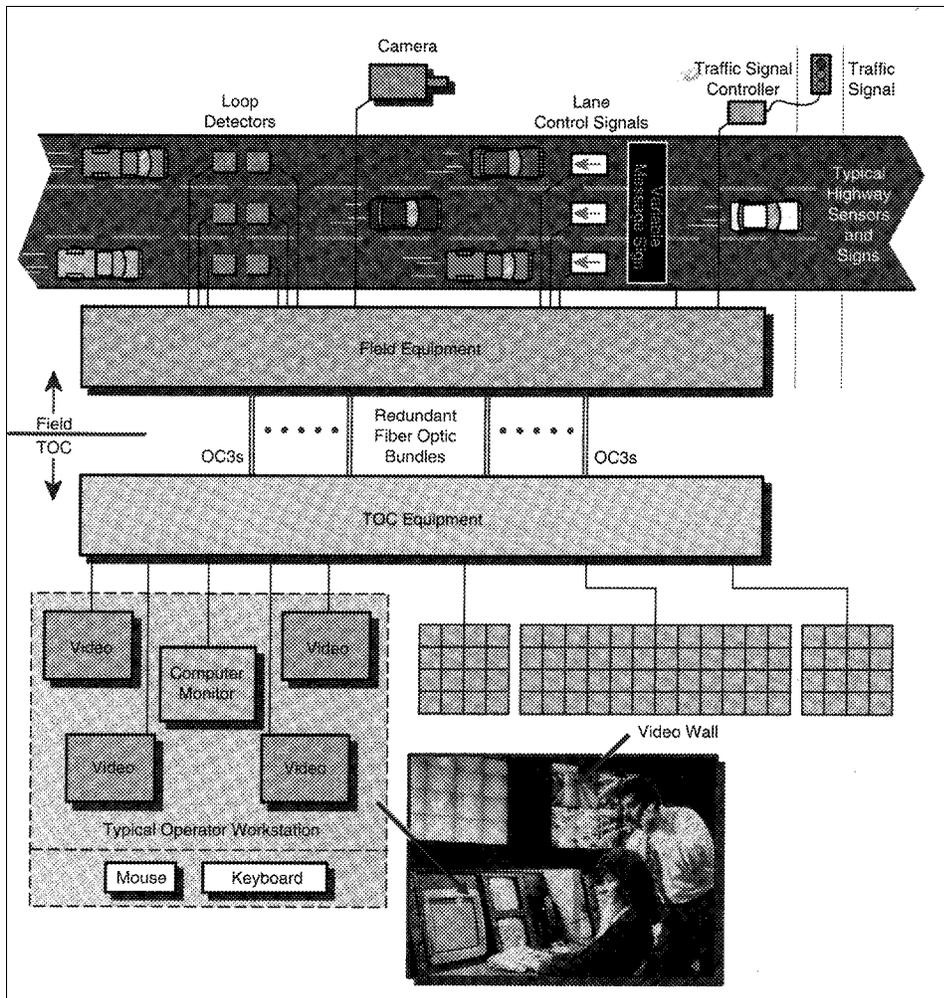


Figure 1: Important TransGuide Components—Field and TOC

TransGuide installed a network of loop detectors in freeway lanes and entrance and exit ramps and developed software-based detection algorithms to detect abnormal traffic conditions. The system alerted human operators who used a network of high magnification video cameras to verify these abnormal conditions. The TransGuide ATMS software recommended the most appropriate response plan to an incident based on a library of over 34,000 response plans (solution scenarios). Operators initiated a response plan for a specified location from the response plan library or tailored the recommended response plan if conditions required. The selected response plan activated all appropriate flow control devices including lane control signals and programmable variable message signs.

Results

The TransGuide FOT evaluated the first phase of the TransGuide deployment. The principal objectives of the evaluation were to:

- Document the architecture and system design rationale and goals

- Assess the system's success in meeting the stated incident detection goal of 2 minutes and response goal of less than 1 minute after detection
- Assess the digital communications network for cost effectiveness and benefits with respect to traditional communications systems
- Assess a representative sample of incident detection algorithms.

The evaluation resulted in a document entitled "TransGuide ITS Design Report" that conveys important information about the TransGuide Intelligent Transportation System design process. It describes design concepts and philosophies employed to meet TransGuide's goals with an emphasis on priorities and approaches. The document details important features of the completed system design and explains design and selection criteria that influenced the ultimate design choices. It defines the issues that were considered important in the design of TransGuide and illustrates how the important design decisions were made.

Some specific examples of design outputs include:

- Functional and operational requirements for the TransGuide System
- Specifications that were the defining documents in the procurement contract for fabrication, test, and delivery of TransGuide
- Detailed description of pre-engineered system responses to detected incidents (solution scenarios) and the procedures and rationale used by the system designers in developing the solution scenario library
- Detailed description of the TransGuide design that allows a basic understanding of the structure and operation of the integrated system, the system architecture, and each major system component
- Detailed description of options considered in choosing the final architecture and components and the rationale leading to design decisions
- Graphical decision tables that present the information in a condensed and easy to understand format including decision matrices used in the development of the specifications for each major system component.

The TransGuide ITS Design Report can be used as a guide in other ATMS implementation projects. The detailed design process and decision matrices enabled TransGuide planners to address the complex hardware, software, communications, and human interface issues in a systematic manner. The basic components and subsystems can be replicated in other applications and the decision matrices can be adapted to support development of similar systems.

Legacy

TxDOT continues to expand the coverage of the San Antonio freeway system using the components evaluated in the field operational test. The first phase of the TransGuide deployment led to San Antonio's selection as one of four sites for Metropolitan Model Deployment Initiative (MMDI). The MMDI introduces technologies for Advanced Traveler Information Systems. The

lessons learned from this deployment are being disseminated to the ITS community through conferences and papers prepared and presented by TxDOT personnel.

Test Partners

Federal Highway Administration

Texas Department of Transportation

References

Southwest Research Institute, TransGuide ITS Design Report, June 1995.