TxDOT Internal Audit
SH 130 Management Process/Information Systems Audit (1407-1)
Department-wide Report

Introduction

This report has been prepared for the Transportation Commission, TxDOT Administration and management. The report presents the results of the SH 130 Management Process/Information Systems Audit which was conducted as part of the Fiscal Year 2005 Audit Plan. The objectives of this audit were to determine if the data systems used for the SH 130 Project are adequate for the management of the project, and that the Inspection and Material Management System (I2MS) developed by the engineering consultant for the project contains accurate data and complies with the various requirements associated with the development and use of information technology by a state agency. The report also incorporates the results of an audit conducted by the Construction Division (CST). Both of these audits focused on the SH 130 Project so an effort was made to coordinate the audit work between the two groups.

Scope

The audit by the Audit Office (AUD) was performed by Raymond Martinez (Lead Auditor) and Kent Leipold (Staff Auditor) with Allen W. Barr (Auditor-in-Charge) providing oversight for the audit. The audit work was conducted during the period of June 2004 to June 2005. It should be noted that this audit was delayed due to the expanded scope of audit work for the TTA Contracting and Financial Compliance Process Follow-up Audit (103-8F) report issued in April 2005. All work was performed in accordance with the *International Standards for the Professional Practice of Internal Auditing* of The Institute of Internal Auditors. During this audit, the major data systems associated with the SH 130 Project were identified, the associated risks were evaluated, those involved with the development and operation of the I2MS data system were interviewed, the system documentation was reviewed, a flow chart of the testing and inspection work flow in I2MS was developed and a certain amount of validation testing of I2MS was conducted to ensure that the controls in place were adequate and working as intended, and to follow-up on prior audit issues by the Project Manager's auditor. Additional meetings were also held with General Counsel staff (OGC) and Information Systems Division (ISD) staff regarding the compliance requirements for developing information technology by the department.

The audit by CST was performed by Greg Cleveland, David Belser and Jay Tarwater. The audit work was conducted during the period of February to May 2005. This audit focused on the material testing process and the associated data systems, the lab and technician qualifications, the independent assurance split/proficiency testing and the construction inspection function.

Background

The SH 130 Project is a toll project that is part of the Central Texas Turnpike 2002 Project (CTTP), which is in the Austin area. An Exclusive Development Agreement (EDA) was used to develop the project using a design/build process. To ensure that the materials and workmanship for the project reasonably conform to the requirements and to ensure compliance with federal requirements, a Quality Assurance Program for the Construction of Exclusive Development Agreement Projects was developed for the SH 130 Project. This program was based on the department's Quality Assurance Program but was modified for the unique needs of the project. This Program includes Quality Control testing by the developer, Quality Assurance testing by a sub-consultant to the Developer, Owner Verification testing by a sub-consultant to the Project Manager, Referee testing by CST and Independent Assurance by an independent engineering lab consultant.

Initially, the Project Manager recommended the use of a data system to perform the necessary calculations in order to save money on the CTTP project. TxDOT personnel evaluated existing data systems being used in other states and concluded that they would not work for the CTTP project. I2MS was then developed for the SH 130 Project by the Project Manager and its sub-provider in order to capture material test and inspection data from the Quality Assurance firm and the Owner Verification firm, perform statistical analysis of the test data (more specifically the F and t tests of the means and variances) and produce required reports for the Federal Highway Administration (FHWA) in accordance with 23 CFR 635(B) and SEP 14. The statistical reports are required by the FHWA in order to determine if the testing performed by the Owner Verification firm validates the testing performed by the Quality Assurance firm. According to the I2MS User Manuals, Version 1.0 of the data system was developed in October 2003 and Version 2.0 was developed in March 2005. There was no approval by TxDOT's Information Resource Council (IRC) for this information technology project. Whether the I2MS system will be used on other design/build projects by the department or Regional Mobility Authorities (RMAs) is unknown. According to the latest Progress Report (dated May 2005) by the GEC, the CTTP project is scheduled to open on time and within the allotted budget.

Opinion

Based on the work performed, we believe that the data systems being used for the SH 130 Project are generally serving their intended purpose, and our limited testing of the I2MS data system did not disclose any significant errors. Additionally, it appears that the issues raised by the Project Manager's auditor have been adequately addressed. Based on the work performed by CST, they think sufficient assurance and independent assurance testing is occurring on the project to assure that the work is acceptable to the department and that the personnel are qualified to perform the assurance testing. They also think the quality assurance functions are being performed as defined in the Construction Quality Control/Quality Assurance Program.

We believe that further guidance is needed from the Administration regarding the requirements that must be met when Information Technology assets are developed or purchased as a part of design/build contracts because of the anticipated use of design/build and similar contracts by the department and RMAs in the near future.

Detailed Findings and Recommendations

No. 1: The department hasn't clarified the reporting requirements for information technology assets and expenditures for CDA projects.

No guidance has been provided to department personnel on "what" and "when" transportation project expenditures for Information Technology support should be reported outside TxDOT. State law (Government Code, Chapter 2054 – Information Resources Management Act) specifies that information resources technology projects must be included in the agency's strategic plan and in the biennial operating plan. The Office of General Counsel (OGC) provided their opinion that this information should be reported even though bond funds are the primary source of funding for the CTTP project. Those responsible for managing the CTTP didn't think the requirements applied to that project. In addition, the original intent wasn't to build a data system, but that decision was made because it would've been more cost effective than hiring more employees. The most recent request from the Legislative Budget Board (LBB) and the Governor's Office for this information was in April 2004 in conjunction with the Legislative Appropriations Request (LAR). Any changes from prior approvals must also be submitted to the Governor's Office and the LBB in accordance with the Appropriations Act, Article IX, Sec. 6.17.

Effect: The department might be in non-compliance with the requirements and its appropriations for information technology assets during the current biennium (or the next biennium) could be in jeopardy.

Recommendation: The Austin District should immediately coordinate this issue with the Information Systems Division, the Office of General Counsel, and the Administration to ensure compliance with the state regulations for the CTTP. The Austin District may need to determine the amounts expended for information resource technologies for the CTTP to allow the department to update the *Information Technology Detail* report to the LBB, and to report past expenditures to the Governor's Office and the LBB in accordance with the last two Appropriations Acts. Additionally, the Administration may want to provide additional guidance to the district engineers so that they understand the reporting requirements and the timing of those reporting issues for transportation projects that utilize data systems that are different from those used by the department.

Management Response and Action Plan:

ISD – ISD will coordinate preparing a BOP entry for I2MS and any other applicable CTTP data systems with the Austin District.

Austin District – A response to this finding was not provided.

Administration – The Assistant Executive Directors for Engineering Operations and Administrative Support Operations agree that the CTTP information technology costs will need to be reported to the appropriate entities. Further, they indicated that further guidance will be provided to department personnel regarding this issue.

No. 2: The department hasn't developed guidance for the appropriate oversight of the data systems developed or acquired for use on transportation projects that are not developed by the department.

The department has not yet provided guidance to those responsible for oversight of the various Information Technology assets (hardware and software) that may be utilized on transportation projects that utilize those assets for the development of the completed project. Additional oversight and monitoring of the data systems developed for design/build projects may be needed to ensure that the information for the design, right of way, and construction records for the design/build transportation projects is accurate and complete, and that the data can be transferred to TxDOT's data systems at the end of the project. As an example, the development of the I2MS data system was accomplished through an engineering contract with the Project Manager (HDR Engineering, Inc.) and its sub-provider (HB Media Group) with little involvement by information technology personnel in the district or the Information Systems Division (ISD). Further, the System Administrator and Database Administrator functions were outsourced to those firms without oversight of those functions by TxDOT personnel. Currently, there is no review or approval by knowledgeable TxDOT personnel of the programming changes made by the System Administrator or the Database Administrator, or the additions/deletions of data within the system by those individuals prior to the preparation of the quarterly reports to the FHWA. For TxDOT's internal data systems, there are approval and oversight protocols for these functions by our personnel. Additionally, the I2MS project was never approved by the department's Information Resource Council (IRC). There were early discussions between the Texas Turnpike Authority Division (TTA) and the Information Systems Division (ISD) regarding TTA's toll software support needs, and that existing ISD staff could not support their development timeframe and scaleability requirements for the CTTP project. The department's requirements for the development and management of information technology projects are included in the *Information Technology and Services Manual*. The material and testing requirements for the SH 130 project are included in the *Quality Assurance Program for Construction of Exclusive Development Agreement Projects Manual,* which includes the requirements of 23 CFR 637(B).

The department also needs to decide who will provide technical support for I2MS if it is to be used on future projects (i.e. the consultants or the Information Systems Division). The audit team tried to determine the cost for maintaining I2MS to help with this decision but was unable to obtain a figure for the two consultants involved with the system (HDR Engineering Inc. and

the HB Media Group). As a reference point, the audit team was able to determine the average amount paid to the information technology consultant to provide information technology support for the entire Central Texas Turnpike Project for the last 6 months which was about $150,000/month. This information was subsequently provided to the Administration.

A few additional minor discrepancies regarding the I2MS data system and the access documentation, the material testing process, the latest split/proficiency testing and the construction inspection process were identified and discussed with management. Some actions have already been taken by management to address these discrepancies.

Additionally, TxDOT has not developed refined procedures for the development and management of information technology needs related to Comprehensive Development Agreement (CDA) contracts that may fall outside the normal development process. As an example, should the Construction Division be the Office of Primary Responsibility (OPR) for the development of department information systems related to inspection and material testing since it is developing a new Laboratory Information Management Systems (LIMS) for conventional transportation projects.

Effect: If the department does not provide adequate oversight and monitoring of the data systems being utilized on the CDA projects, then the data obtained from those systems for the design, right of way, and/or construction records may not be accurate and complete. As an example, the lack of oversight and review of the System Administrator and Database Administrator's functions for the I2MS data system could allow programming changes and/or additions/deletions of inspection and material test data within the system without TxDOT's knowledge or approval in meeting its responsibilities under 23 CFR 637(B). On a larger scale, each developer under a CDA could develop other stand-alone data systems that would have to be approved by TxDOT for use and would have to be supported by TxDOT unless the data could be transferred to an existing data system used by TxDOT, such as ROWIS, SiteManager, etc.

Recommendation: The Austin District should coordinate this issue with ISD and the Assistant Executive Director for Support Operations to determine what resources may be appropriate for proper oversight of those data systems developed for the CTTP project.

Additionally, the Administration should determine the suitability for the use of I2MS on other TxDOT projects, and consider the appointment of a work group to develop more detailed policy and procedures for Comprehensive Development Agreement contracts to ensure that the department complies with all federal and state requirements related to information technology development and management, and that the IRC approves any exceptions to those requirements. A larger issue to be considered by the Administration is the extent that other stand-alone data systems should be developed for CDA projects and the methods/resources (i.e., procurement, development, management, and maintenance support) that should be used to develop and maintain those systems during the life of the highway project, particularly if the developer is responsible for maintenance activities of the project after construction is completed.

Management Response and Action Plan:

ISD – The assignment of resources to oversee data systems developed for the CTTP should occur after the future disposition of the data systems is established. Different resources will be needed depending on whether the department intends to use the applications on future projects and whether we will support the applications internally or hire a vendor to support the applications.

Austin District: - Does not agree with the finding. Response attached.

Administration – The Assistant Executive Directors for Engineering Operations and Administrative Support Operations agree that additional guidance will be provided to department personnel regarding the data systems that will be used on CDA type projects.

No. 3 The department has not adequately protected the intellectual property rights for I2MS.

The department has not complied with the policy and procedures for the protection of its intellectual property developed for the CTTP project. As we understand it, HDR Engineering, Inc., has utilized its legal staff to draft a license agreement for TxDOT for the use of the I2MS data system and associated user manuals, but the system has not been copyrighted or registered with the U. S. Copyright Office by TxDOT for its use on the CTTP by the various users (i.e., HDR Engineering, Inc., HB Media Group, Aviles, Rodriguez Engineering Laboratories, etc.). Additionally, TxDOT did not include the required language found in the *Legal Manual* for its contract with HDR Engineering, Inc., regarding the development of the I2MS software and associated manuals. During the review, we also noted that HB Media Group had indicated its copyright on the Version 1.0 of the I2MS User Manual dated October 1, 2003. The requirements and procedures for intellectual property are found in the Transportation Code, Sec. 201.205; 43 TAC Sec. 22.20-22.22; and the TxDOT *Legal Manual*. According to the *Legal Manual*, all software and related manuals are to be copyrighted and registered before its use in order to protect TxDOT's rights of ownership. The *Manual* also includes contract language so that TxDOT may protect its property rights when developed by a consultant, and allow recourse if there is infringement of those rights. In addition, TxDOT cannot utilize any outside legal services without the approval of the Attorney General in accordance with the Government Code, Section 402.0212. Outside legal services also cannot be procured through a consultant engineering contract under Government Code Chapter 2254.

Effect: Since I2MS was developed some time ago and has been in production for over a year, it is possible that TxDOT's rights of ownership have been diminished if the department failed to adequately claim and/or protect its property rights at the time of development. The property may then be considered to be within the public domain. Further, a copyright may be considered to be abandoned if the copyright notice is not affixed to the document(s). If the work is already in the public domain, then any member of the public may use it free of charge. It is also possible that any of the current users may have sold the material for use outside of TxDOT's knowledge and control, and without compensation for its development as required by the statute.

Recommendation: The Austin District should immediately coordinate this issue with OGC, ISD, and the Assistant Executive Director for Support Operations to determine the department's current rights of ownership and to initiate the proper actions to protect any remaining rights with other known users of the data system.

Management Response and Action Plan:

ISD –ISD will work with the Austin District and the Office of General Counsel as needed.

Austin District – A response to this finding was not provided.

Administration – The Assistant Executive Directors for Engineering Operations and Administrative Support Operations agree that this issue needs to be resolved for the department's benefit.

Closing Comments

The results of these audits were provided to the Austin District Engineer and staff during the exit conference on August 4, 2005; to General Counsel on August 8, 2005; to the Construction Division Director on August 9, 2005; to the Information Systems Division Director and staff on August 22, 2005; and to the Assistant Executive Directors for Engineering Operations and Support Operations on August 15, 2005. An additional meeting occurred on August 29, 2005 with the appropriate district, division and Administration personnel to better understand the issues included in the report and possible solutions to those issues. We also want to thank the Austin District and its staff for the cooperation received during this audit assignment.