TEXAS DEPARTMENT OF HOUSING AND COMMUNITY AFFAIRS
An Internal Audit of Information Technology Application Controls at TDHCA
Audit Report # 22-005

Executive Summary

IT Application Controls ("ITAC") are controls that apply to systems, components, processes, and data for a given technology application. The objectives of ITACs are to ensure the proper development and implementation of specific applications, as well as the security and integrity of programs, data files, and computer operations. The most common ITACs are:

- Application internal security.
- Technology planning and change management.
- Production support.
- Input data validations and output controls.
- Database integrity and verification controls.
- Vendor management, where applicable.

OIA reviewed the IT Applications Controls in place at TDHCA and found that in general, application controls are functioning as designed. Application controls are related specifically to critical information systems software programs and are necessary for the accurate and proper processing of critical business functions on the software. The audit included areas such as input and access controls, file and data processing controls, output controls and master files and data controls. Application controls were reviewed for selected applications used by TDHCA and Manufactured Housing ("MH") to manage Program and administrative data and activity.

Findings and Observations

1. OIA recommends a review of critical systems internal security be coordinated by the Information Systems Division ("ISD") and completed by the business users twice a year due to increased job transfer and hiring activity.
2. OIA recommends that the business user community focus on proactively identifying system-run verifications when planning future changes to critical business systems, with assistance from the ISD.
3. OIA recommends that TDHCA upgrade its Central Database Suite programming language to a more secure, modern version of Java.
4. OIA recommends additional compensating controls be implemented to monitor ISD's direct access to production files.
5. OIA recommends that management evaluate all end user applications and their criticality for inclusion into the controlled ISD environment. Management could consider alternatives to Microsoft Access to allow end users to retain data reporting capabilities.
6. Current functionality in disparate Programs should be studied to determine if processes and/or program code could be shared across systems to allow for the critical business process.
7. Because of the high use of end user applications and most security to those applications is maintained via network access, OIA recommends a review of network access security by business users twice a year.

Management Response

Management agreed with our recommendations. Detailed responses are included in the body of the report.

Objectives, Scope and Methodology

OIA assessed security access controls over critical business applications including the TDHCA Central Database Suite that includes the Housing Contract System ("HCS"), Compliance Monitoring and Tracking System ("CMTS") and Community Affairs Contract System ("CACS") as well as the MH Exodus system. We conducted an internal security review with the business users for these selected systems; reviewed activities of application programmers and technicians for these systems; observed and validated application input and output controls; and reviewed database and data controls in place. OIA also held extensive interviews with business users across the Department and MH to determine the end user applications in place for critical business processes.

Mark Scott, CPA, CIA, CISA, CFE, MBA
Director, OIA

8/24/2022
Date Signed

TEXAS DEPARTMENT OF HOUSING AND COMMUNITY AFFAIRS

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GOVERNOR

August 24, 2022

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Board Members of the Texas Department of Housing and Community Affairs ("TDHCA")

RE: INTERNAL AUDIT OF THE INFORMATION TECHNOLOGY (IT) APPLICATION CONTROLS AT TDHCA

Dear Board Members:

This report presents the results of the Office of Internal Audit ("OIA") "*Audit of the Information Technology (IT) Application Controls at TDHCA*". This audit was conducted in accordance with applicable audit standards. IT Application Controls rated high on the risk assessment and was included in the approved Fiscal Year 2022 audit work plan. Application controls are related specifically to critical information systems software programs and are necessary for the accurate and proper processing of critical business functions on the software. The audit included areas such as input and access controls, file and data processing controls, output controls and master files and data controls. Application controls were reviewed for selected applications used by TDHCA and Manufactured Housing ("MH") to manage Program and administrative data and activity.

The Internal Auditing Act requires periodic audits of an agency's information systems. Internal TDHCA Information Systems Division ("ISD") staff deliver TDHCA and MH's technology with support from the Department of Information Resources ("DIR"). In addition to the ISD supported technology environment, TDHCA business users run a myriad of applications created via Microsoft-supported programs such as Excel, Access, and Word.

This report is divided into the following sections:
A. Audit Results
B. Background
C. Applications Review and Testing
a. Application Internal Security Access
b. Input and Output Controls
c. Database and Data Controls
d. End User Applications

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A. AUDIT RESULTS

OIA reviewed the IT Applications Controls in place at TDHCA and found that in general, application controls are functioning as designed. OIA assessed security access controls over critical business applications including the TDHCA Central Database Suite that includes the Housing Contract System ("HCS"), Compliance Monitoring and Tracking System ("CMTS") and Community Affairs Contract System ("CACS") as well as the MH Exodus system. We conducted an internal security review with the business users for these selected systems; reviewed activities of application programmers and technicians for these systems; observed and validated application input and output controls; and reviewed database and data controls in place. OIA also held extensive interviews with business users across the Department to determine the end user applications in place for critical business processes. Further details regarding testing procedures may be found in Section C, Applications Review and Testing.

Suggestions for improvement included additional user access reviews for critical applications, additional monitoring of production access by ISD, evaluating critical end user applications for inclusion in the controlled ISD environment (including reporting), and enhance the identification and definition of input/output validation controls within requested system changes.

The audit covered activities and processes currently in place and during Fiscal Year 2022. OIA completed its IT General Controls review in FY2022; prior external reviews of IT Application Controls during the annual statewide audit covered specific Program (Texas Rent Relief or "TRR") information security and business applications. In addition, OIA completed a review of the Continuity of Operations Plan that included Disaster Recovery testing, a key component of the IT environment, during FY2020.

B. BACKGROUND

The Texas Internal Auditing Act requires periodic audits of a state agency's major systems, including major information systems. TDHCA and Manufactured Housing (MH) information systems and resources are managed by the Information Systems Division (ISD). Beyond applications that exist in the ISD supported environment, business users utilize multiple end user applications such as Excel, Access and Word. In addition to the Internal Audit Act requirement to perform periodic IT audits, the Institute of Internal Auditors ("IIA") professional practices framework and the Information Systems Audit and Control Association standards require periodic audits of various aspects of IT operations including Governance.

Based on review of the Information Technology applications in use at TDHCA and MH, OIA selected the following ISD supported systems for detailed review:

TDHCA – Central Database Suite that includes HCS, CMTS and CACS
The Central Database Suite is written in Java language that is easily used across different platforms. There is a centralized database that is the data repository for all related systems (HCS, CMTS and CACS). HCS is used to manage all appropriated funds from the original fund level to Programs then to specific contracts and related expenses to those contracts. CMTS is used by Compliance to monitor primarily the Multifamily Properties built through the Low Income Housing Tax Credit and Multifamily Direct Loans, and Multifamily Revenue Bonds. CACS manages subrecipient activity for the Community Affairs Division.

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MH – Exodus

The Exodus system is written in Oracle PL/SQL code that is specific to Oracle databases. The system is used primarily for licensing of retail sellers, installation inspection of manufactured homes, and assisting in the release of tax liens.

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C. APPLICATIONS REVIEW AND TESTING

Application Internal Security Access

For TDHCA's Central Database Suite, user roles and functions are defined based on job responsibilities. There is an overall inquiry access that can be assigned and update access is provided at a more granular level. These user roles are created at the time of development of the system. Most roles were created at the time of initial development of the Suite in 2006; there have been some added roles recently due to development of the Section 811 portion of CMTS. Overall the user security roles have remained relatively stable, with both internal and external access provided across the platform. OIA noted that MH's Exodus system also has defined user roles based on job responsibility.

OIA coordinated a business user review of all internal security access for the Central Database Suite and Exodus. Based on this review, several changes and updates were identified across the systems. It has been previously noted a high level of internal transfers and new hires due to additional Program funds from the Federal Government due to the Pandemic. Additionally, OIA noted in the IT General Controls review (Report #22-001) that the systems access request process requires an Outlook form ("System Access Request") to be completed and emailed to the appropriate parties for the required approvals. This process is not always followed within the user area to make changes; often there were no request forms in place to delete a transferred employee's access. As a compensating control to keep the access levels to the minimum required by a person's job, OIA suggests a more frequent review of these important internal systems access.

OIA also coordinated a business user review of the Exodus system and found similar circumstances. Staff transfer and change job responsibilities frequently; more instances of review are appropriate.

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Finding Number	Status Pertaining to the Recommendations and Action to be Taken	Target Completion Date	Responsible Party
22-005.01	OIA recommends a review of critical systems internal security be coordinated by the ISD and completed by the business users twice a year due to increased job transfer and hiring activity.	12/31/2022	Director of Information Systems

Management Response

TDHCA ISD agrees with observation 22-005.01 and will complete the appropriate user access reviews.

Input/Output/Processing Controls

Input controls can include validation edits, required fields, completeness checks on data entry as well as cross referencing to predefined tables to ensure that data is associated as required. Examples of these types of controls that are programmed into the system include:
- Ensuring fields are letters or numbers
- Validating that data entered matches a specifically defined range
- Requiring that certain fields are entered in order to be complete
- Narrowing down data choices to those applicable to a higher level (e.g., only 2022 Programs may be funded via 2022 federal funds)

In the TDHCA and MH selected applications, there is a wide range of input controls. It appeared that when validations are specifically defined and requested by the user, the application worked well in processing these edits. Due to variation in how mature the system is, knowledge of the end users, and the change management process used within the Agency, there appeared to be opportunities for additional input verification to be defined by the business users.

The programming language used for the Central Database Suite is Java, a well-known and solid programming language. The benefit to its use is that Java can be utilized across multiple platforms. OIA noted that the version of Java has not been updated in many years. The Java language has been upgraded by the vendor many times since then; with each upgrade, the language is made more safe and secure based on known problems. The vendor would also release security patches in between updates. ISD applied any available patches for security when released, however the language version being used (Version 1.4) is no longer supported by the vendor. The current language presents security risks that need to be mitigated, especially since there are some external facing functions to the Internet. Another benefit of upgrading the language is that the ISD gains access to several pre-coded functions within Java that could make system changes more efficient.

OIA noted that ISD has defined a Legislative Appropriations Request for a project to upgrade the Java language for all the Central Database Suite for the 2024-25 cycle. This project would address concerns regarding the Java language version.

Most output created by the Central Database Suite is in the form of views to the Central database files. At the time of the initial implementation of the Central Database Suite in 2006, a decision was made that the end users would manage their own reporting needs using Access databases that pull data from the Central Database Suite

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views. These views have not changed since the system was originally implemented, unless specific business users have requested additional fields. See more discussion below in the End User Applications section of this report.

MH's Exodus system had many outputs defined and available, such as periodic reporting by date range or within specific activities. Outputs included the ability to print mailings directly via Exodus.

During the audit period, OIA noted that another instance occurred where a security certificate was not renewed, thereby creating downtime for at least two days for MH. Refer to audit report #22-001 IT General Controls for previous findings.

Finding Number	Status Pertaining to the Recommendations and Action to be Taken	Target Completion Date	Responsible Party
22-005.02	OIA recommends that the business user community focus on proactively identifying system-run verifications when planning future changes to critical business systems, with assistance from the ISD.	3/31/2023	Director of Information Systems
22-005.03	OIA recommends that TDHCA upgrade its Central Database Suite programming language to a more secure, modern version of Java.	8/31/2025	Director of Information Systems

Management Response

TDHCA ISD staff will collaborate with the business owners of agency IT systems to gather information about observation 22-005.02 and decide what new controls and verifications can be implemented based on the outcome of the discussions and the direction of agency management. As noted above the agency included a capital budget project in its LAR request that would address observation 22-005.03. With the approval of this project TDHCA ISD would be able to upgrade this development environment.

Database and Data Controls

The Central Database Suite contains several components, one of which is the Oracle database where the data is housed for the business applications to access. The tables environment is on a relatively recent version, Oracle Version 12; the most recent version of the environment offered is Oracle Version 19.

The Oracle database documents the timing and user of transactions created in HCS, CMTS, and CACS. Within these systems, a user can identify who completed the last update. In the case that a business user erroneously updates a data field or requires adjustment to data, a Help Desk ticket is created.

OIA found that the Software Development Manager maintains access to production data via the internal security review of these systems. The purpose of this access is to allow for quick turnaround in a business emergency; for example if a report is due and a data error was made, the update is required to allow the report to be filed.

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While this situation does not occur very often, because of the direct access to production data by ISD, additional compensating controls could be implemented to monitor these instances. Monitoring when these situations occur can inform necessary changes to the system such as input verifications.

Finding Number	Status Pertaining to the Recommendations and Action to be Taken	Target Completion Date	Responsible Party
22-001.04	OIA recommends additional compensating controls be implemented to monitor ISD's direct access to production files.	03/31/2023	Manger of Software Development

Management Response

TDHCA ISD staff will discuss observation 22-001.04 to gather information and evaluate if and where compensating controls can be implemented based on the outcome of the discussions and the direction of agency management. TDHCA ISD is always open to review current controls and considering ways to improve and mitigate risk.

The Software Development Manager serves as the backup DBA for the agency. Due to small size of our IT department, many ISD staff members serve more than one role to effectively implement separation of duties as has been noted and required in past federal and state audits. In this case the Software Development Manager role would not normally have DBA access to our production database environment. However, the Software Development Manager also has the role of backup DBA. It is the backup DBA role that provides the position DBA access. The Software Development Manager does not perform any development work because of his DBA access. Ensuring that separation of duties is observed by not having both application and database access.

There are also audit controls in place that track what records any ISD DBA user account changes. The controls monitor and record field properties such as created by, modified by, created date and modified dates and should coincide with the closure date of submitted work orders for those actions. The work orders are created by and approved by the appropriate business staff.   Some parts of the database will also go so far as to capture what changes were made in the HISTORY table. This type of tracking is usually only available to tables with higher visibility in the system.

End User Applications

MH's Exodus seems to meet most of the needs of the business, with almost no critical business functions run via end user applications by Manufactured Housing. The processing in Exodus is primarily limited to tracking activities and creating reports or mailings.

For TDHCA, the decision made with the initial implementation of the Central Database Suite was that rather than building a reports and output module, the business users would manage their own data needs by building Access databases and using Excel spreadsheets along with Word documents.

Since that decision was made almost 20 years ago, business complexity and activity has increased substantially. Discussion with key personnel within the Program and Administrative Divisions revealed the purposes of these end user applications; they fell in the following categories:

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- **Workflow Management** – tracking pieces of work from one stage to the next, within and across Divisions
- **Reporting and other output generation such as mailings** – as discussed previously, reporting was out of scope in the original Central Database Suite implementation; includes critical reporting such as Performance Measures and other key reports
- **Application Processing** – accepting applications from various subrecipients, developers, individuals to access benefits offered by TDHCA
- **Quality Assurance checklists** – spreadsheets and database output to manage QA processes
- Data Calculation and Transformation – calculating business rules for an outcome; examples include the multifamily project income and rental tool currently in Excel and multiple Excel spreadsheets used to determine underwriting outcomes and asset management reviews; voluminous data downloads into Excel for the purpose of financial analysis completed by the Bond Finance Division
- **Employee productivity and coordination** – tracking how much activity is completed by employees and scheduling tasks

There are highly critical business processes currently being managed via end user applications, and the primary disadvantage of these applications from a control standpoint is a lack of audit trail and controlled change management environment. In addition, there are only two staff within the Agency who could make updates or changes to the Access reports, as the ISD does not directly support end user developed application tables, queries and reports.

The current Access version used within the Agency (primarily Access 2016) will lose support from Microsoft in 2025, with Access 2016 fully retired by 2026. The use of Access 2016 by the agency is by design. TDHCA ISD works with the divisions to stabilize all divisions across a single version of Access to make support easier and more efficient. Although, ISD does not directly support these Access databases, divisions do send help desk requests for assistance. Through TDHCA's subscription to Office 365, the agency has licenses for the latest version of Access, as well as the other productivity applications in the Microsoft Office suite. TDHCA ISD staff will meet with agency staff when appropriate, to discuss and plan the next upgrade of Access to a later version, well before Access 2016 is unsupported.

OIA noted that a project has been requested via the 2024-25 Legislative Appropriations Request to automate Multifamily functions including Real Estate Analysis, Asset Management, and Finance that may address many of these manual processes. The Community Affairs (CA) Division has also requested a project to create a state wide CA contracts system that provides for both individuals' application submission to the subrecipient as well as required reporting by subrecipients. Another opportunity to create efficiencies and value to the Department could be automating Bond Finance data downloads from external sources with the ability to complete more thorough financial analysis. OIA recommends exploring current solutions in place in other Program areas to determine if systems could manage critical business processes.

Finding Number	Status Pertaining to the Recommendations and Action to be Taken	Target Completion Date	Responsible Party
22-005.05	OIA recommends that management evaluate all end user applications and their criticality for inclusion into the controlled ISD environment. Management could consider alternatives to Microsoft Access to allow end users to retain data reporting capabilities.	8/31/2025	Director of Real Estate Analysis, Asset Management, Finance

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Finding Number	Status Pertaining to the Recommendations and Action to be Taken	Target Completion Date	Responsible Party
22-005.06	Current functionality in disparate Programs should be studied to determine if processes and/or program code could be shared across systems to allow for the critical business process.	8/31/2025	Director of Real Estate Analysis, Asset Management, Finance
22-005.07	Because of the high use of end user applications and most security to those applications is maintained via network access, OIA recommends a review of network access security by business users twice a year.	3/31/2023	Director of Information Systems

Management Response

TDHCA ISD will review the listed observations and work with divisions to discuss the observations and decide what new controls and procedures to implement based on the outcome of the discussions and the direction of agency management.

OIA extends our sincere appreciation to management and staff across the Agency and Manufactured Housing, as well as specifically the Information Systems Division for their cooperation and assistance during the course of this audit.

Sincerely,

Mark Scott, CPA, CIA, CISA, CFE, MBA
Internal Audit Director

MS/SN

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