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Utah Department of Transportation
Right of Way Design Performance Audit

Executive Summary

The Utah Department of Transportation (UDOT) has undertaken the Right-of-Way (ROW) performance audit to address the management challenges involved with timely and accurate ROW procurement. The Department selected Dye Management Group, Inc. (DMG) to conduct a review of the ROW design process in four key study areas – organization, business processes with a focus on Quality Control/Quality Assurance (QC/QA), technology, and staffing.

This executive summary presents DMG’s findings and recommendations. Each of the topic areas presented below are discussed in detail in the body of this Final Report.

A. Understanding UDOT’s Design Quality Problem

DMG evaluated UDOT’s ROW quality based on the rate at which summary packages reviewed at the conformity review level are returned to the designer due to errors.

Although ROW limitations can occur for several reasons, design errors appear to be a major cause. Approximately 92 percent of ROW design plans and documents are produced by consultant design firms. UDOT does not currently capture design error data on consultant work products prior to the conformity review. Thus, no data was available with which to identify the types and magnitude of errors occurring at the region QA level.

To quantify and characterize errors at the conformity review level, DMG analyzed 2013-2015 data for 99 projects. The analysis indicated the following:

- The rate of returns for summary packages at the conformity review level has decreased significantly from 76 percent in 2013 to 29 percent in 2015.
- For the sample projects, the three most frequently used design firms performed 62 percent of the design and had a conformity level return rate of 19 percent. The next three most frequently used firms performed 23 percent of the design work and had a return rate of 41 percent.
- The two most common causes of errors were incomplete or upload errors and CADD standard errors, which combined to account for 62 percent of all errors.

While the Department has shown marked improvement in reducing summary package design errors, the 29 percent return rate indicates a need for continued improvement.
B. Business Processes

ROW policies and procedures are outlined in the ROW Manual. The QC/QA for ROW is outlined in the Project Delivery Network (PDN) and addresses all ROW design products, including plans, plots, descriptions, and title transfer documents. UDOT’s QC/QA process for ROW design has three levels of review, summarized by the following:

- Both consultant and in-house ROW designers perform QC reviews on all design products and every ROW summary package using the PDN QC checklist associated with task 4J2.
- Region ROW Engineers perform a QA review on every summary package, with the review covering approximately ten percent of the completed documents. Comments are returned to the designer for corrections.
- The ROW Design Program Manager completes a second QA review, known as the conformity review, on all summary packages, reviewing between ten to thirty percent of submitted documents.

DMG finds that UDOT’s standard QC/QA process, as documented in the PDN and the Manual, is inherently sound, complies with generally accepted professional engineering practice, and is a requirement for completion of project design plans. Design errors do not appear to result from an inadequately documented process but rather from compliance with the established process. ROW reviewers are frequently faced with rejecting/redlining incorrect documents and sending them back to the consultant design firms for rework. The rework often has a significant negative effect on project schedules and budgets.

DMG identified nine points in the ROW design process where there are opportunities to improve the timely completion of quality ROW design products.

- **ROW Manual** – An outdated ROW procedures manual has resulted in multiple, conflicting, and subjective interpretations of requirements among reviewers over time.
- **Consultant Selection** – Region ROW engineers do not consistently participate in consultant selection or evaluation, which can lead to conflicts between the project region staff when the product is rejected or returned for errors.
- **Plan Development** – The implementation of the QC process at the designer level appears inadequate as evidenced by the reported return rates from the region QA reviews.
- **Region QA Review** – Multiple cycles of review and correction occur between the consultant design firms and region ROW reviewers or reviewer firms, increasing the potential for project delays and adding to ROW design costs.
- **Conformity Review** – Additional corrections are identified by the ROW Design Program Manager during conformity review, indicating the lack of attention given to error correction at the preceding levels.
- **Performance Measures** – There are no formally established performance measures for ROW design quality, applied to either in-house or consultant designers, that provide
ROW managers with performance information on the timeliness and quality of design products.

- **Internal Controls** -- ROW design staff are not consistently involved in payment authorization of consultant design firms whose work they review. ROW consultant invoices are submitted and processed outside the ROW functional units. This separation between acceptance of and payment for the work products is a significant gap in the internal controls of the design process.

- **Risk Management** -- One of the objectives of privatizing services such as ROW design is to transfer the risk of project outcomes, including schedule compliance and quality, from the contracting agency to the private organization. The failure of the ROW design consultant firms to adequately control quality on ROW packages undermines this objective.

- **Specialized expertise** – UDOT contracts with engineering firms to prepare ROW design plans and documents including title transfer documents. However, preparation of title transfer documents is an administrative function which does not require the use of specialized engineering skills. The labor pool for administrative skills is significantly larger and less costly than that of design engineers.

### C. Organization

UDOT’s current organization is a hybrid centralized/decentralized matrix structure with ROW design and QC/QA performed or overseen by region staff. All other ROW functions and conformity-level QA are performed by the central ROW division. Although ROW design is performed by the regions, the ROW Division Director has overall responsibility for the ROW program and is ultimately responsible for certifying ROW on UDOT’s construction projects.

Most of the six western states included in the peer review have a centralized ROW organization unit responsible for all functions, including design. These states perform ROW QA functions at the central level, although Colorado relies on commercial title companies to prepare and perform full QC/QA on title documents. Arizona DOT delivers ROW design services in a manner like UDOT, contracting nearly all of ROW design and using a mix of in-house and consultant reviewers to complete quality reviews.

DMG did not find any evidence that UDOT’s organizational model contributes to reduced quality of ROW products or delays in meeting project schedules. Each of the organization models reviewed can work well, if roles and responsibilities are clearly defined and responsibility and accountability are commensurate with authority. In UDOT’s case, roles and responsibilities appear to be clearly defined. With respect to responsibility, the lack of performance measures (discussed below) does not allow ROW management to sufficiently assign accountability for quality performance.
D. Technology and Management Information Systems for Managing the ROW Design Process

UDOT has an automated ROW design management process, requiring electronic submission of summary package contents through ProjectWise. UDOT’s ePM system integrates ROW tracking and reporting with other project delivery reporting modules. Project managers interviewed for the study expressed hesitation in learning the ePM ROW module in addition to the project delivery module, citing a desire to see ROW review data more closely integrated into the project delivery module.

DMG did not find any major gaps in the current application of ROW management software used by the Department. However, the Department is considering an initiative to update or replace ePM. Newer information systems and technology could provide ROW management and project managers with improved information and bring added value to the ROW design process should UDOT decide to replace ePM. Any new system considered should include performance measures data to strengthen process controls and provide improved management information.

E. Workload and Staffing Analysis

DMG looked at staffing from two perspectives: 1) human resource management and staff development, and 2) the capacity of current staffing levels to deliver the future program timely with quality products.

From a human resource perspective, DMG found two major areas of concern:

- Training – The lack of a comprehensive and continuously administered training program is a significant gap in developing ROW design expertise in both in-house and consultant resources. A defined training program could better prepare consultant and in-house staff for the ROW design field, which has a long learning curve to develop competency.
- Career Path – Turnover in ROW design staff has been an issue recently, especially in the regions. This has led to prolonged periods of understaffing. Region surveyor positions, the entry level positions for ROW design, have minimum requirements that are technical in nature and make it difficult to attract qualified candidates. To increase candidate pools and strengthen UDOT’s ability to attract career candidates, Region 2 has taken the initiative with UDOT Human Resources to define career paths for region ROW and survey functions. The Region 2 initiative should be considered for statewide implementation.

From a staffing capacity perspective, DMG looked at both the region and central levels. Because most work is performed by consultants, the primary workload at the region level is review and QA of consultant design documents. A comparison of UDOT’s staffing with peer states showed that the design/mapping workload per FTE is in line with the neighboring states. The scope of the ROW audit did not permit a rigorous workload analysis; however, unless there is a significant future increase in the size of the highway construction program,
region staffing levels should be adequate to accomplish the program as long as UDOT continues the practice of contracting ROW design.

DMG also looked at the workload of the central office ROW Design Program Manager who is responsible to provide leadership and overall guidance to ROW design process. The position has multiple responsibilities including ROW manual preparation and upkeep, design policies and standards, training, and QA review of summary packages. DMG believes that additional resources in this area would help the Department achieve better quality ROW plans and ultimately reduce ROW design costs.

F. Recommendations

Based on our review and analysis of the current practices, as summarized above and discussed in more detail in the subsequent sections of this report, DMG recommends the following:

1. Business Processes:

   • Complete the revisions to the Department’s ROW Manual, currently underway, as soon as practical. Implement a continuous revision control process to assure Manual revisions are properly tracked, catalogued and communicated to internal and consultant design staff.

   • Establish performance measures throughout the ROW design process that a) include specific tracking of errors by type at all levels of review, b) provide for well-defined accountability, c) provide management information with which to identify continuous improvement opportunities, and d) establish performance guidelines and expectations for inclusion in consultant contracts.

   • Implement a policy/procedure to include region ROW design staff in consultant selection and evaluation.

   • Strengthen process internal controls by including region ROW staff in the review and authorization of consultant hours for payment. We recommend submission of an invoice detailing the number of hours and labor rates with every summary package. Payment of the invoice should be contingent upon resolving all errors not related to changes in the individual project’s scope. Finally, the change should be documented in standard contract language for project-specific design contracts.

   • Consider the use of administrative staff rather than engineering staff to prepare title documents and complete ownership transfers.

2. Organization and Staffing:

   • Develop and deliver comprehensive training based on the new ROW manual. Establish a continuous ROW design training program using a variety of delivery methods such as on-demand videos, online help, and periodic classroom-style updates.
• Increase the central office ROW staff by one position with a junior surveyor reporting to the Design Program Manager. This will provide for the following:
  − More oversight of the overall ROW design process
  − More program level leadership and guidance to the design process
  − Additional resources to keep the ROW Manual continuously up to date
  − Implementation of a more comprehensive training program
  − Implementation of a continuous business process improvement (BPI) program

• In line with providing additional resources as described in the previous recommendation, redefine or clarify the function of the Design Program Manager to strengthen the position’s responsibility and authority in the ROW design process. The purpose would be to formalize this position’s role in issuing and imposing compliance with ROW quality standards, conducting peer forums, delivering training, and implementing BPI.

• Consider statewide implementation of the Region 2 initiative to update position descriptions and define potential career paths for region ROW and survey functions.
I. Introduction

This report presents DMG’s findings and recommendations on the ROW management study. The report provides analysis and discussion on each of the major study topics of organization, business processes with a focus on Quality Control/Quality Assurance (QC/QA), technology, and staffing. Recommendations are presented in the last chapter of the report.

The report is submitted as a discussion draft for review by UDOT management and staff. DMG will meet with Department managers and staff in a review workshop to obtain comments and input on the report. Based on input from the review sessions, DMG will finalize the report for formal submission.

A. Project Background

Approximately twenty years ago, UDOT reorganized its central ROW Division and transferred primary responsibility for quality control to the actual ROW designer, whether in-house or consultant. The region ROW engineer/land surveyor and central ROW Division continued to provide QA reviews of the ROW design products. A significant amount of expertise has left the ROW design field over the last ten years, followed by rapid turnover of their successors. With these changing dynamics, the Department identified the following key management challenges for producing ROW design products timely and accurately:

- Region and central ROW staffing levels may not be adequate to maintain throughput
- Region and central ROW staff must use ROW design products without having input into consultant selection or payment approval, which can lead to conflicts when products do not meet expectations
- The ROW Design Manual has not been fully updated since 1996
- Multiple QC/QA review cycles are occurring too frequently, resulting in a significant impact on ROW design schedules and budgets

To better understand these challenges and identify improvement opportunities, UDOT selected Dye Management Group, Inc. (DMG) to conduct a performance audit (study) of ROW design within the Department. This report presents a discussion draft of DMG’s findings and recommendations from the study.

B. Study Scope and Objectives

The ROW study was limited to reviewing the ROW design process which consists of plan and document preparation. It did not cover ROW appraisal, acquisition or relocation.
The principal study objective was to determine how UDOT can best position itself to meet the identified management challenges and achieve high quality design products timely and efficiently. More specifically, the study aimed to accomplish the following:

- Business processes – analyze current ROW design processes to identify potential improvements in service delivery and quality
- Organizational structure – determine if the current organizational alignment is the most appropriate model for UDOT’s operating environment
- Technology – evaluate whether there are significant gaps in the Department’s current information systems and technology
- Staffing capacity – assess the capacity of UDOT’s current staffing to deliver quality products on time.

C. Project Approach

To accomplish the project objectives, DMG used established project methodologies to define current ROW practices, analyze performance, define significant issues, and identify improvement opportunities. The study tasks included stakeholder interviews, analysis of project information supplied by UDOT, peer analysis, and a review of current documentation and financial information.

DMG conducted in-person and telephone interviews with UDOT executive management, Central and region ROW managers and staff, consultants, and other parties involved in ROW design processes.

An analysis of peer states was completed using data from the Federal Highway Administration (FHWA) and information gathered during phone surveys with other state DOTs.

Manuals reviewed for the study included:

- ROW Manual of Instruction (July 2016)
- UDOT consultant Services Manual (2016)
- UDOT Project Manager Guide
- UDOT ProjectWise Guide
- UDOT Project Delivery Network Manual (v 1.12)
- UDOT Project Financial Management Manual (Fall 2012)
Additional documentation reviewed included policies, contracts and other procedural documents such as:

- Project Definition Document,
- Design Network Diagram,
- Qualitative Risk Worksheet,
- QC QA Audit Checklists,
- ePM Spreadsheet Guide,
- Position Narratives

As-Is business process maps were developed and validated with central and region staff and are included as Appendix A.

This report is provided to UDOT as a discussion draft. To complete the ROW study, DMG will meet with ROW management and other stakeholders identified by the Department to obtain comments and input of the findings and recommendations presented herein. With input from the review workshop, DMG will prepare and submit the project Final Report.
II. Analysis and Findings

The following sections present DMG’s analysis and findings of UDOT’s ROW design practices.

A. Design Quality Analysis

During the study, ROW management expressed concern about the quality of design products. Responding to this concern, DMG conducted various analyses to better understand the magnitude and character of design quality issues. For the purposes of this analysis, design quality performance will be measured by the return of any document in a summary package for correction or change, regardless of the reason for the request. Therefore, we made no distinction between documents returned for clerical errors versus documents returned for design errors or corrections.

In the 2013 – 2015 period, 92.3 percent of UDOT projects with ROW were designed by consultant design firms. Using data compiled by the ROW Design Program Manager, we identified 99 projects with summary packages submitted for conformity review in the 2013-2015 period.

Exhibit 1 shows the return rates have declined since 2013.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number of Projects</th>
<th>Projects with Returns on Any Package</th>
<th>Percentage of Projects with Returns on Any Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>33</td>
<td>25</td>
<td>76%</td>
</tr>
<tr>
<td>2014</td>
<td>42</td>
<td>20</td>
<td>48%</td>
</tr>
<tr>
<td>2015</td>
<td>24</td>
<td>7</td>
<td>29%</td>
</tr>
<tr>
<td>Total over three-year period</td>
<td>99</td>
<td>52</td>
<td>53%</td>
</tr>
</tbody>
</table>

Out of the three-year period, over half of the summary packages were returned for correction. That rate improved significantly in 2015, although the current 29 percent rate of return at the conformity review remains high.

To identify the causes of summary package errors, DMG looked at the types of errors that are occurring. The results of the analysis, shown in Exhibit 2, indicate that “Incomplete or Upload” and “CADD” errors account for 63 percent of all errors.
Exhibit 2: Returns by Error Type

<table>
<thead>
<tr>
<th>Year</th>
<th>Returns for Incomplete or Upload Errors</th>
<th>Returns for CADD Standard Errors</th>
<th>Returns for Deed or Clause Errors</th>
<th>Returns for Other Errors</th>
<th>Total Number of Projects with Any Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>15</td>
<td>11</td>
<td>7</td>
<td>6</td>
<td>39</td>
</tr>
<tr>
<td>2014</td>
<td>5</td>
<td>13</td>
<td>5</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td>2015</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Totals</td>
<td>24</td>
<td>30</td>
<td>17</td>
<td>15</td>
<td>86</td>
</tr>
<tr>
<td>% of Total</td>
<td>28%</td>
<td>35%</td>
<td>20%</td>
<td>17%</td>
<td>100%</td>
</tr>
<tr>
<td>Cumulative %</td>
<td>28%</td>
<td>63%</td>
<td>83%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

To see how the types of errors have progressed in recent years, DMG looked at the return rates for each error type between 2013-2015. Exhibit 3 shows that there was a general trend in reducing all types of errors during the three-year period.

Exhibit 3: Returns by Performance Measure Category by Year

![Returns by Category by Year](chart.png)

Taken together, these types of errors suggest either insufficient understanding or training in ROW design and QC/QA. The continued high return rate may also indicate that ROW designers tend to submit summary packages with insufficient QC review and rely on region or central office staff to catch errors of significance.
Data was not available to conduct a similar analysis of design errors prior to the conformity review, as UDOT currently captures design error data only on the individual project QC checklist. A physical audit of the checklists would benefit UDOT by identifying the individual firm error rates at the initial point of submission. By identifying specific error types that are occurring in the design function, the Department could tailor training to address the deficiencies and improve core competence.

**B. Business Processes**

The DMG team identified ten steps in the basic ROW design process. Most projects with ROW design adhere to this process, although individual steps may vary by region and project.

1. The environmental study establishes the initial project footprint and survey requirements.
2. A consultant firm is selected, existing ownership information is identified and the preliminary list of ROW needs is established.
3. A ROW design meeting occurs to finalize the list of parcels.
4. The UDOT ROW designer or ROW design consultant develops the ROW design documents, including plan sheets, maps, legal descriptions, cost estimates, and deeds. Plans and documents are bundled into ten-parcel summary package(s).
5. The designer, whether in-house staff or consultant firm, conducts a quality control (QC) check in compliance with the UDOT project development QC process. QC is performed on all documents in each summary package.
6. The designer uploads the ROW design documents to ProjectWise, establishes attributes, and notifies the appropriate UDOT region office (ROW design unit).
7. The region design office or their contracted review firm conducts a quality assurance (QA) review on approximately ten percent of the uploaded documents and returns comments to the designer for changes.
8. The consultant firm makes the changes, performs another QC review, uploads final documents to ProjectWise, updates ePM, and notifies the region.
9. The region ROW engineer validates that all comments are addressed and prepares a transmittal letter for the summary package in ProjectWise. The region ROW Professional Land Surveyor then signs and submits the packages to the ROW Design Program Manager.
10. The ROW design program manager completes the conformity review, a second-level QA review of between ten and thirty percent of the documents in all summary packages. If errors are found or corrections needed, the full package is returned to the region who returns to step 8 above. If no corrections are needed, the Design Program Manager updates the package status in ePM, and releases the package to the ROW project coordinator for further action.
The ten-step design and QC/QA process is inherently sound and complies with generally accepted norms for professional engineering practice. It is well defined and incorporates one level of quality control review and two levels of quality assurance reviews. Design errors do not appear to result from an inadequately documented process but rather from compliance with the established process. A full set of process maps is included in Appendix A.

1. Quality Control/Quality Assurance Sub-Process

Exhibit 4 summarizes the quality review sub-process that occurs within steps 5 through 10 above and highlights the areas of concern. The map is followed by a discussion of each of the QC/QA sub-processes, then a listing of other identified issues is presented.
Exhibit 4: ROW Summary Package Quality Review Process

Process: Right-of-Way Design  
Sub-process: ROW Summary Package Quality Control (QC) Process  
Prepared by: Dye Management Group, Inc.

Date: 10/21/2016  
Page: 1 of 1

- Prepare ROW plan sheets and title documents and assemble summary packages
- Submit to UDOT Region and upload to ProjectWise
- Conduct quality assurance (QA) review
- Enter parcel data into ePM (using template) and upload documents into ProjectWise
- Receive package(s) ready for review
- Log package for review tracking (Excel spreadsheet)
- Conduct review (within 1 business day)
- Notify region
- Make corrections, resubmit
- Send to project coordinator to begin acquisition
- Receive package(s) ready for review
- Log package for review tracking (Excel spreadsheet)
- Conduct review (within 1 business day)
- Notify region
- Make corrections, resubmit
- Send to project coordinator to begin acquisition
- Receive package(s) ready for review
- Log package for review tracking (Excel spreadsheet)
- Conduct review (within 1 business day)
- Notify region
- Make corrections, resubmit
- Send to project coordinator to begin acquisition
- Receive package(s) ready for review
- Log package for review tracking (Excel spreadsheet)
- Conduct review (within 1 business day)
- Notify region
- Make corrections, resubmit
- Send to project coordinator to begin acquisition
- Receive package(s) ready for review
- Log package for review tracking (Excel spreadsheet)
- Conduct review (within 1 business day)
- Notify region
- Make corrections, resubmit
- Send to project coordinator to begin acquisition
2. Consultant QC (Step 5)

ROW design consultants are responsible for the QC of products that they produce. This is common engineering practice for all design consulting engagements, not just ROW. Specific to UDOT’s QC/QA process, the design consultant is required to complete the project QC checklist. Owing to the relatively high number of errors noted in the Section A above, a question arises as to the diligence exercised by the consultant firms in the QC process. An analysis of summary package return rates for consultants is shown in Exhibit 5.

Exhibit 5: Consultant Design Firm Performance Summary

<table>
<thead>
<tr>
<th>Consultant ROW Design, 2013-2015</th>
<th>Top 3 Firms</th>
<th>Second Tier Firms</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of summary packages</td>
<td>215</td>
<td>80</td>
<td>295</td>
</tr>
<tr>
<td>Percentage of work assigned</td>
<td>62%</td>
<td>23%</td>
<td>86%</td>
</tr>
<tr>
<td>Number of returns</td>
<td>40</td>
<td>33</td>
<td>73</td>
</tr>
<tr>
<td>Percentage of packages returned for corrections</td>
<td>19%</td>
<td>41%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Six consultant design firms accounted for 85.5 percent of the design work volume. The three most frequently used consultant firms had a significantly lower rate of returns for ROW work at the compliance review than the second-tier firms. The higher return rate existing in the second tier may indicate a lack of core competency resulting from higher staff turnover, inadequate staff capacity, or lack of adequate training.

During interviews with the consultant firms, some stated that they have made an earnest effort in the recent past to improve ROW design products. Their efforts included enhanced communication and tracking to respond to the variations in requirements for the same documents between regions and projects. Information sharing among the firms is also occurring when consultant firms are contracted by some regions to provide region-level QA review. The consultant firms treat these situations as opportunities to mentor smaller, less-used firms.

Under current practice, UDOT’s design consultants are not required to meet quality performance standards, and they are paid for re-work of plans and documents. Ideally, firms would be measured when the initial summary packages are submitted to the region for review, and corrections for quality control would be defined, documented, and completed at no additional cost to UDOT.
3. Region QA Review (Step 7)

UDOT does not currently analyze the design error data from the individual project quality control checklists. To measure the region portion of the QC/QA process, DMG again looked at ROW summary packages returned at the conformity review step. From 2013 to 2015, all four regions have a relative decrease in summary packages returned with errors. Exhibits 6 through 9 show the results by region.

**Exhibit 6: Region 1 Summary Package Returns**

![Region 1 Summary Packages Returns At Conformity Review](image)

**Exhibit 7: Region 2 Summary Package Returns**

![Region 2 Summary Packages Returns At Conformity Review](image)
Based on this data, the regions have demonstrated an improvement in error identification and correction prior to the conformity review. It is important to note that the preceding exhibits measure return rates at conformity review, the last level review, not at the first-level QA review performed by the regions. Because data is not systematically captured at the region’s first level QA review, it is difficult to quantify or characterize the return rates at this point. However, based on UDOT ROW staff opinions expressed in interviews during the study, the error rate at the region QA level is higher than desired.

The high rate of multiple returns may indicate that insufficient attention is given to error corrections by the designer.

4. Conformity Review (Step 10)

Conformity review is the last step in the QC/QA process. When summary packages are error-free, the conformity review can be completed within twenty-four hours and the summary packages released to the ROW Project Coordinator for further action.
However, as shown in Section A above, in 2015 29 percent of the summary packages in the project sample contained errors, with only 71 percent released directly to the Project Coordinator without further work.

Considering both the higher-than-desired return rates at the region QA review and the double-digit rate of returns at the conformity level, there is a justifiable need for improved QC/QA in the upstream process steps.

5. Additional Issues

During our review of the current ROW design business process, we identified additional issues, which are discussed below.

6. ROW Design Manual

UDOT management has recognized for some time that the current version of the ROW Design Manual is long overdue for updating. Consultant firms interviewed for this study voiced concern that regions interpret ROW standards differently and that varying interpretations can occur between the reviewers within a region. What is considered an error that requires correction in one region may not be considered an error in another region. While some variance in interpretation of documented procedures is inevitable, it appears that the lack of an updated ROW Manual is one key factor giving rise to inconsistent interpretation and application of design standards.

7. Consultant Selection (Step 2)

Region ROW engineers do not consistently participate in the selection or evaluation of ROW design firms. The region ROW staff that is responsible for conducting QA on the design products is generally disconnected from the selection and evaluation of the firms they are reviewing. This practice can lead to conflict when design products are rejected for not meeting standards.

8. Performance Measures

Performance measures offer organizations the ability to objectively assess performance and provide information to improve process outcomes. The Design Program Manager has begun a process to systematically track ROW design quality at the conformity level. Regions do not formally track consultant performance in their quality review processes, nor are performance measures for ROW design incorporated into consultant’s project-specific contracts.

Defining performance measures throughout the ROW design process would have significant benefits for the Department. Performance measures would communicate UDOT expectations clearly; assign accountability for results; provide data to demonstrate progress on improvement initiatives; and in general, provide the basis for performance-based management. Effectively defined and implemented,
performance measures can improve efficiency and provide more transparency to external and internal stakeholders.

Performance measures should be incorporated into the consultant contracting process so that ROW design firms are accountable for meeting performance guidelines for quality products.

The primary risk associated with implementing performance measures is lack of buy-in from staff regarding the metrics to be measured and the expected levels of accountability. This risk can be mitigated by including appropriate staff members in the development of the performance measures, and communicating the role and value of performance measurement as a means for improvement.

9. **Internal Controls**

Internal controls refer to accounting and auditing processes for assuring operational effectiveness and efficiency, reliable financial reporting, and compliance with laws, regulations and policies. Internal controls for UDOT’s ROW design process could be improved by linking review of consultant design firm products with either authorization of work effort or payment of invoices.

Region ROW engineers, who perform quality assurance reviews of consultants’ work products, do not review consultant firm invoices for the work submitted nor do they have the authority to negotiate the parameters for rework and error correction.

Project managers, who are responsible for project budget and selecting, awarding and administering consultant design contracts, do not consistently and routinely review ROW consultant design work product or labor charges.

Establishing a direct link between work product submitted and authorization of payment by the region ROW for the services to develop that work product would strengthen the internal control over costs and give ROW reviewers an effective tool for enforcing the quality of consultant work product early in the review process.

10. **Risk Management**

One of the objectives of privatizing services such as ROW design is to transfer the risk – for quality as well as scope, schedule and budget - from the contracting agency to the private organization. The failure of the ROW design consultant firms to adequately control quality on ROW packages undermines this objective and transfers the risk and cost of errors back to UDOT. The implementation of quality performance guidelines on consultant work products, with payments tied to performance, would mitigate risk for the department.
11. Specialized Expertise

UDOT contacts most of its ROW design to engineering consultants to prepare design plans and documents, including title transfer documents. Preparing design plans requires a different skill set than preparing the supporting title transfer documents.

12. Summary of Findings on Processes

Key findings in the business process analysis are:

- Design errors do not appear to result from an inadequately defined process but rather from compliance with the established process.
- The staff responsible for conducting QA reviews of consultant work products do not participate in the selection or evaluation of the design firms.
- The three most frequently used design firms have a significantly lower rate of returns for ROW work at the conformity review than do the second-tier firms, indicating that small firms may be unable to maintain core competencies for ROW design.
- In the last three years, three of the four regions have experienced a relative decrease in the number of summary packages returned for error correction at conformity review. Despite this, over half the summary packages contain errors significant enough at conformity review to require rework, indicating a need for improving upstream quality control.
- Performance measures are inadequate throughout the ROW design process.
- Internal controls for ROW design are weak because there is no link between acceptance of consultant work products and either authorization of work effort or payment of invoices.
- The failure of the ROW design consultant firms to adequately control quality on ROW summary packages transfers the risk and cost of errors back to UDOT.
- UDOT may be able to reduce costs and improve quality of title documents by contracting with specialized title companies.

C. Organization Structure

UDOT’s ROW Division is part of the Project Development Division responsible for implementing UDOT’s capital improvement program. Exhibit 10 is the ROW Division organization chart with the focus area of this study highlighted. UDOT’s current organization is a hybrid centralized/decentralized matrix structure with ROW design and QC/QA performed or overseen by region staff. All other ROW functions and conformity-level QA are performed by the central ROW division. Although ROW design is performed by the regions, the ROW Division Director has overall responsibility for the ROW program and is ultimately responsible for certifying ROW on UDOT’s construction projects.
UDOT project managers, who reside in the field regions, are responsible for full project scope, schedule, and budget. Region and central ROW staff are responsible to the project manager for the ROW portion of the project. Each region has a ROW engineer position, (although one region fills this position with a professional engineer due to his responsibilities for utilities); ROW design review staff; and land surveyors. Each region ROW unit reports to the region director, often through a preconstruction manager responsible for the full project design function. Exhibit 11 summarizes the roles and responsibilities of the different positions involved in the ROW design processes.

### Exhibit 11: Position Roles and Responsibilities

<table>
<thead>
<tr>
<th>Position Title</th>
<th>Unit Location</th>
<th>ROW Design Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>Regions</td>
<td>• Manage scope, schedule, and budget for assigned projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oversees consultant selection</td>
</tr>
<tr>
<td>Region Director</td>
<td>Regions</td>
<td>• For projects with no additional ROW acquisition required, certify project ROW for construction advertisement (via delegation of authority from ROW director)</td>
</tr>
<tr>
<td>ROW Director</td>
<td>Central</td>
<td>• Manage and oversee the ROW, Property Management, and Outdoor Advertising programs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For projects with additional ROW acquisition, certify project ROW acquisitions for construction advertisement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Develop ROW policies</td>
</tr>
<tr>
<td>Deputy ROW Director</td>
<td>Central</td>
<td>• Manage acquisition, relocation, and demolition programs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Manage lead ROW agents</td>
</tr>
<tr>
<td>Position Title</td>
<td>Unit Location</td>
<td>ROW Design Responsibilities</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| ROW Design Program Manager    | Central       | • Manage the ROW design program, including project ROW design review  
• Conduct conformance review on all ROW summary packages prior to acquisition  
• Update ROW Operations Manual  
• Maintain ROW standards  
• Train region staff  
• Facilitate annual ROW breakout sessions in UDOT engineering conferences |
| Lead ROW Agent                 | Central       | • Staff, coordinate, and accomplish project goals on assigned ROW projects (cradle-to-grave)                                                               |
| ROW Project Coordinator       | Central       | • Provide administrative support for all acquisition files and relocation claims  
• Administration of the ROW Electronic Project Management System (ePM) |
| Region ROW Engineer            | Regions       | • Assign region ROW staff to project teams  
• Manage or complete quality assurance review of ROW design documents  
• Sign and stamp completed ROW plans and submit to region ROW professional land surveyor for final signature  
• Prepare and submit transmittal letter to ROW design program manager with summary packages  
• Prepare and submit request for ROW certification with no additional ROW to region director  
• Perform ROW design on small projects with in-house staff |
| Region Professional Land Surveyors | Region     | • Review and sign project ROW plans and documents and submit to ROW Design Program Manager                                                                  |
| Region ROW Surveyors           | Regions       | • Conduct assigned project-related ROW survey tasks  
• Work with consultant firms to resolve project-related ROW issues and questions  
• Provide review and expertise in response to permit applications and other non-project ROW processes  
• Provide design and survey expertise and/or services for UDOT maintenance projects  
• Complete design documents for projects designed internally (within UDOT) |

A consistent theme among all the organizational design literature reviewed is that there is no perfect organization design and the designs that work are those that best manage the trade-offs inherent in any choice.
Centralized organization models focus the greater responsibility in a core staff unit usually located in the DOT headquarters. Colocation can result in more efficient processes and better communication by integrating the various ROW sub-functions. Decentralized organization models locate core staff in region offices to better integrate ROW into the greater project delivery/project management business line, encouraging more integration with project teams.

UDOT’s hybrid model places core technical design staff in field offices to strengthen the project delivery integration, then supplements that integration with the central staff managing the delivery and quality of the overall ROW function.

DMG conducted a telephone interviews with selected western states, focusing on ROW design, mapping and QC/QA. We contacted each state’s ROW division to confirm outsourcing statistics, determine their service delivery methods for ROW plan and document preparation, and identify what QC/QA process was used in ROW design.

We found multiple combinations of centralized and decentralized organizational models deployed by state DOTs for the ROW function. All state DOTs responding to our surveys require consultant design firms to perform QC on all products, while the ROW QA function is retained by most in a central headquarters unit. Colorado has one notable exception wherein they contract with commercial title companies for all title transfers, with the contractor performing full QC/QA on all title documents.

Exhibit 12 shows the organization models and general ROW design responsibilities in the surveyed states. Key observations are:

- Like Utah, Arizona and Colorado outsource most ROW design, either mapping/surveying or document preparation.
- Nevada and Oregon have decentralized ROW organizations where regional offices are responsible for all ROW design.
- Except for Nevada and Colorado, all respondent states perform ROW QA functions at the central level.
DMG did not find any evidence that UDOT’s current organizational model contributes to reduced quality of products or delays in meeting project schedules. Each of these organization models can work well, if authority, responsibility and accountability are commensurate with the organizational strategy and roles and responsibilities are fully defined and supported through effective performance measurement.

D. Technology and Management Information Systems

UDOT has an automated ROW design management process, requiring electronic submission of summary package contents through ProjectWise. UDOT’s ePM system integrates ROW tracking and reporting with other project delivery reporting modules.
The most significant concern expressed by project managers interviewed was their perception of a gap in ROW design review information between submittal of the ROW summary packages to region and the release of the packages by the ROW Design Program Manager. Interview comments indicated a reluctance to access an additional system (ePM) beyond the Project Delivery Network and the role of Lead ROW Agent, a member of the Acquisitions unit, as the primary contact for all ROW information.

UDOT management has initiated a review of ePM to identify potential system improvements. The newer technology available today may allow for further integration with other UDOT project delivery systems or automation of manual processes. Until such time as a system solution is implemented, we recommend the ROW Design Program Manager work with region managers, region ROW design staff, and project managers to implement strategies for closing this knowledge gap. The solution could be as simple as email reporting of summary package status at regular intervals. This work presents an opportunity for the ROW Design Program Manager to strengthen outreach and communication among process participants and stakeholders.

E. Staffing Analysis

Leading up to the ROW study, UDOT’s management expressed concern that the Department may not be able to maintain throughput and meet expectations because of the loss of ROW design expertise in recent years and the capacity of current staffing levels. To assess UDOT’s current state, DMG looked at staffing from two perspectives: 1) human resource (HR) management, and 2) staff capacity to deliver program workloads.

1. HR Management and Staff Development

The four region ROW units have similar organized structures, with one engineer/manager over a design and survey crew. Region 4 ROW staff includes a utility coordinator, requiring a manager with a Professional Engineer (PE) license. Other regions do not require a PE license for the ROW engineer position. Exhibit 13 illustrates the region ROW staffing.

<table>
<thead>
<tr>
<th>Region</th>
<th>ROW Design Staff</th>
<th>Additional Staff in ROW Unit</th>
<th>Total Region ROW Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1 (survey)</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>2 (survey)</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>2 (survey)</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>4 (1 lead + 2 surveyors; 1 utility)</td>
<td>7</td>
</tr>
</tbody>
</table>

UDOT management is concerned about the drain of ROW design expertise due to retirements and staff turnover in the last decade. From an HR management perspective, the goal in any organization is to develop and retain experienced staff.
Internal promotions and transfers, while desirable, can often create extended vacancies within an organizational unit. Because ROW is a specialized function that requires a long time to become proficient, it is often difficult to find entry-level personnel with the required skills to fill vacancies.

Because of the difficulty in hiring and retaining staff with the requisite ROW expertise, it is imperative to have an effective training program for developing core competency within the ROW function. UDOT maintains multiple written manuals and job aids to supplement informal mentoring but provides no significant formal training. A comprehensive, effective training program could minimize UDOT risk in general but especially during times when the domino recruitment process causes long periods when vacancies go unfilled. A formal training program would help ROW management develop a skilled staff with core ROW design competency.

To develop a training program specifically tailored to UDOT’s needs, an analysis of project quality control checklists would aid in identifying the most urgent training needs by understanding what types of errors are occurring most often. This would focus training in the areas of greatest impact.

In the short-term, we recommend UDOT develop and deliver training for the updated ROW Design Manual. This training should be delivered to both internal and consultant ROW staff. Training on the Manual should help minimize differing interpretations among staff and lead to improved quality. For the longer term, UDOT should develop a more comprehensive and continual training program.

To address turnover, the Department should consider expanding the staff development initiative underway in Region 2. There, region management is collaborating with UDOT’s HR Division to rewrite ROW and survey position descriptions, with accompanying salary reviews. The Department should consider making this a statewide effort applicable in all regions.

2. Workload Capacity

Because UDOT contracts with engineering consultants for most ROW design, the regions are primarily involved with the review and QA of the consultants’ work. Some regions occasionally contract with review consultants to further augment in-house staff. From a capacity perspective, two factors will affect UDOT’s future ability to maintain throughput: 1) program size, and 2) the level of contracting for ROW design.

DMG was not able to analyze the size and makeup of the future ROW portion of the transportation program in UDOT. However, the Design Program Manager indicated that the overall future program will be similar in size, by dollar volume, and will continue to contain projects of a similar nature and size as in the recent past.

As an industry, engineering consultants are generally able to meet staffing requirements if there is sufficient lead time to staff up and develop expertise. If
UDOT continues to maintain effective communication with the consultants and provide them with future program information, there should be no reason that the consultants would be unable to meet UDOT’s workload demands.

We compared the workload of UDOT ROW design staff with four states that outsource most of their ROW design work. While peer comparisons provide only a general frame of reference, the analysis shows that UDOT ROW output per FTE is in line with other western states that outsource most of their ROW design. Given that UDOT is not currently planning to develop large projects (more than fifty parcels) beyond what is currently programmed, it appears that current region staffing levels are sufficient as long as UDOT continues its current level of contracting.

Another practice observed in multiple regions was contracting with one consultant design firm to perform region QA reviews on another consultant firm’s summary packages. This practice augments in-house staffing deficiencies and has been used as an interim process while vacant positions were being filled. Implementing the process changes recommended in this report should reduce the workload for both in-house staff and outsource consultants, making this contracting processes unnecessary.

DMG also looked at staffing levels for ROW design at the central office. Essentially only one position, the Design Program Manager, is involved in ROW design. Providing ROW design guidance, including training, is the responsibility of the Design Program Manager under the authority of the ROW Director. DMG observed that the Design Program Manager has insufficient capacity to deliver the program level guidance needed to effectively support the design function. This situation will be exacerbated if the Department elects to undertake the improvement initiatives recommended in this report. Given the need to address the design quality issues described herein and to implement the recommendations offered in this report, DMG believes supplemental staff is required to effectively and efficiently accomplish the workload of the Design Program Manager.

Key findings in the analysis of workload and staffing are:

- Region ROW units are consistently organized and have similar staff positions.
- The pool of potential candidates for ROW design positions is limited which leads to difficulty in filling vacancies with skilled staff. Staff turnover and movement in both UDOT and consultant organizations trigger domino recruitments further amplifying the problem of hiring and retaining core ROW design competencies.
- UDOT maintains multiple written manuals and job aids to supplement informal mentoring but provides no significant formal classroom-style training.
- Reliance on mentoring as the primary training delivery method puts UDOT at increased risk that new staff will be insufficiently experienced to step into more senior positions in a timely manner.
• UDOT ROW output per FTE is in line with similar neighboring states that outsource most of their ROW design. If UDOT continues its current contracting levels, there is minimal risk that current staff will be unable to meet the workload requirements in the foreseeable future based on the mix of projects currently programmed.

• The ROW Design Program Manager has insufficient capacity to deliver the program level guidance needed to support the design function effectively and implement improvement initiatives in the design process.
III. Recommendations

In this section, we summarize our recommendations and provide an action matrix for implementing the recommendations.

A. Business Processes

1. Complete the ROW Design Manual as soon as possible

Department should proceed promptly with completing updates to the ROW Design Manual. This will provide improved guidance to ROW designers and reduce the high degree of variances in interpreting design standards. The Manual would provide the basis for immediate and continuous ROW design training.

2. Develop Performance Measures

The Department should develop and implement performance measures throughout the design process. Performance measures should be defined for both UDOT staff and ROW consultant design firms. The Department will need evaluate how best to establish measures that are clearly defined, with realistic targets. To support managing performance, UDOT must capture summary package review data (errors or correction requests) at every level and occurrence of QC/QA review. Data should include number and type of errors; time measures such as date of review and date of correction; and designer and reviewer communications.

To achieve buy-in, the development initiative should include region ROW staff with consultant input. Key to the success in performance measurement programs is institutionalizing the measures. For UDOT, that would include adding ROW performance measures to employee performance reviews as well as adding them to design consultant firm contracts.

3. Revise consultant selection procedures to include region ROW input

Revising consultant selection procedures will require collaboration between the ROW Division and other organizational units that have project development responsibilities. However, it is important that ROW staff be involved in reviewing, evaluating and selecting design consultants. ROW design is a major part of the overall project delivery process, and it is often on the critical path for achieving project schedules.

ROW managers could provide valuable insight into the consultant qualifications related to ROW design. Two major benefits would result from including the ROW
managers in consultant selection: 1) ROW design quality would be enhanced and costs associated with multiple plan/document correction cycles would be reduced; and 2) by reducing the number of plan/document correction cycles, project schedule compliance would be improved.

4. **Strengthen Internal Controls**

The Department should strengthen internal controls for ROW design by establishing a direct link between the region QA review and the approval of labor hours/payment for work products submitted for review. We recommend submission of the consultant design firm invoice to the ROW design manager at the time the initial summary package is submitted to the region for QA review. The ROW design manager should be responsible for coordinating with the region reviewer and project manager regarding the quality of the submitted work, authorization of additional hours for rework, and approving the total labor hours prior to submission for payment.

To improve outcomes, DMG recommends directly linking the submission of ROW design summary packages to the authorization of additional work or payment. This can be accomplished by requiring submittal of an invoice specifically detailing the effort and cost along with each summary package submitted for region review. With a separate invoice, UDOT can negotiate and authorize any additional rework as well as capture cost, performance and quality data for each summary package at this initial point of QA review.

5. **Consider using ROW document preparation specialists**

UDOT could achieve improvement in the ROW design process by privatizing the preparation of title documents separately from the preparation of design plans. This change would remove the document production from the consultant design engineering firms to commercial title (closing) firms who specialize in title document production and title transfer services. The Department should review Colorado DOT’s practices for this to determine if Colorado’s model can be adopted or revised to meet UDOT’s needs.

**B. Organization and Staffing**

1. **Increase central ROW design staff**

UDOT should increase central ROW design staff by establishing a junior engineering position under the direction of the ROW Design Program Manager to assist with those position responsibilities that can be efficiently delivered by junior staff. This position should be primarily responsible for maintaining the ROW design and other manuals, developing associated training, and maintaining design performance measures data. The incumbent should build competence by performing compliance...
reviews on ROW summary packages under supervision of the Design Program Manager.

With this new position, the ROW design manager could be more proactive in guiding the ROW design process by establishing a comprehensive training program that reduces the inconsistent application of policy and procedures, leveraging existing peer exchange communications, and building bridges between the internal stakeholders to improve the overall effectiveness of ROW design. This added resource would provide the Design Program Manager with the additional capacity to undertake the improvement initiatives recommended herein.

2. Establish a comprehensive and continuous training program

With the new ROW Design Manual essentially complete, UDOT should capitalize on its rollout to design and deliver a companion training program focused on communication of UDOT expectations and standardizing outcomes.

We recommend rollout training be delivered initially to UDOT region ROW staff in a classroom setting before being delivered to design consultant firms. There are two advantages to this approach – it builds a shared base of understanding among the UDOT staff, increasing the potential to “speak with one voice,” and it provides the opportunity to adjust the training materials to increase overall effectiveness.

To meet longer term needs, we recommend training be expanded into a continuous program designed to ease barriers to entry into the field. UDOT’s Learning University is a resource to assist in the production and delivery of training in alternative formats.

As part of the overall training program, we recommend UDOT establish and maintain regular information exchanges through annual technical sessions and peer exchange forums.

3. Refocus the responsibilities of the ROW Design Program Manager

The ROW Design Manager should be providing program level guidance to region ROW designers and facilitating the communications between the various participants in the design process. Responsibilities should include implementing peer forums, delivering training, and maintaining communication lines with region and project managers. With the addition of a junior engineering staff position, as recommended above, the Design Program Manager could devote additional time to important leadership responsibilities such as the following:

- Address the project managers’ need for information on summary package review status by increasing communication between region ROW staff and project managers until an automated solution becomes available. The strategy for increasing communications between the identified groups could be as
simple as sending the PMs an email with summary package review status on a consistent basis; or as complicated as defining and implementing an annual performance measure for region ROW staff participation on project teams.

- Oversee the implementation of the recommendations for changes in business processes identified herein.

- Implement a continuous improvement process to include monitoring innovative practices in other states and evaluating similar implementation at UDOT. FHWA’s Center for Accelerating Innovation, along with industry-based associations and research organizations, provide excellent sources of information for DOT best practices and innovation.

4. Expand the current effort to define career paths in ROW design

Region 2 has taken the initiative with UDOT Human Resources to update position descriptions and define potential career paths for region ROW and survey functions. This effort should be expanded to other regions and central ROW and integrated with the recommendations to establish performance measures.

Exhibit 14 presents our recommendations in an action matrix.
### Exhibit 14: Recommendations Action Summary

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Action</th>
<th>Recommended Action Priority</th>
<th>Recommended Responsible Party</th>
<th>Timeframe</th>
<th>Action Steps</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete the ROW Design Manual</td>
<td>Release updated manual to user community</td>
<td>High</td>
<td>ROW Director</td>
<td>1 month</td>
<td>Complete review, release to users</td>
<td>UDOT Procurement</td>
</tr>
<tr>
<td>Develop performance measures</td>
<td>Initiate study</td>
<td>High</td>
<td>ROW Design Program Manager</td>
<td>6-12 months</td>
<td>Develop statement of work, identify funding, contract the work</td>
<td></td>
</tr>
<tr>
<td>Revise consultant selection procedures to include region ROW input</td>
<td>Implement procedure to increase Region ROW design staff participation in consultant selection and evaluation</td>
<td>High</td>
<td>ROW Design Program Manager</td>
<td>1 month</td>
<td>Develop draft procedure to increase participation of reviewers in consultant firm selection and evaluation, build consensus for procedure and performance measure, implement procedure, track/manage performance</td>
<td></td>
</tr>
<tr>
<td>Strengthen internal controls</td>
<td>Develop solution to link ROW design review to the authorization or payment of invoices</td>
<td>High</td>
<td>ROW Director</td>
<td>1-2 months</td>
<td>Map and validate desired consultant design invoice process, obtain management approval, inform affected stakeholders, implement, update policy and/or manual(s)</td>
<td>ROW Design Program Manager, ROW Deputy Director, Region Project Managers, Region ROW Engineers, UDOT Procurement (contracts unit), UDOT Finance (payments unit)</td>
</tr>
<tr>
<td>Recommendation</td>
<td>Action</td>
<td>Recommended Action Priority</td>
<td>Recommended Responsible Party</td>
<td>Timeframe</td>
<td>Action Steps</td>
<td>Resources</td>
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<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Use ROW document preparation specialists</td>
<td>Research and develop recommendation</td>
<td>Medium (long-term)</td>
<td>ROW Design Program Manager</td>
<td>24-36 months</td>
<td>Research title company market and services in Utah</td>
<td>Colorado DOT, Christine Rees, ROW Manager, FHWA Office of Real Estate, American Land Title Association, National Association of Independent Land Title Agents</td>
</tr>
<tr>
<td>Increase central ROW design staff</td>
<td>Establish junior engineering position reporting to ROW Design Program Manager</td>
<td>High</td>
<td>ROW Director</td>
<td>3-4 months</td>
<td>Define position description Recruit If promoting internally, assist in domino recruitment</td>
<td>UDOT University (trainers)</td>
</tr>
<tr>
<td>Establish comprehensive, continuous training program</td>
<td>Develop and deliver training on revised manual</td>
<td>High</td>
<td>ROW Design Program Manager</td>
<td>1-2 months</td>
<td>Review project quality control checklists to identify most common errors; incorporate into training materials Complete and validate training materials Determine logistics (rooms, equipment) Publish training schedule Deliver training to internal staff Evaluate and adjust Deliver training to consultant firms</td>
<td>UDOT University (trainers)</td>
</tr>
<tr>
<td>Recommendation</td>
<td>Action</td>
<td>Recommended Action Priority</td>
<td>Recommended Responsible Party</td>
<td>Timeframe</td>
<td>Action Steps</td>
<td>Resources</td>
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</tr>
<tr>
<td></td>
<td>Develop continual training program</td>
<td>Medium</td>
<td>ROW Design Program Manager</td>
<td>4-12 months</td>
<td>Develop training materials for alternative delivery</td>
<td>UDOT University (training development staff)</td>
</tr>
<tr>
<td>Refocus ROW Design Program Manager responsibilities</td>
<td>Rewrite or reprioritize position responsibilities</td>
<td>High</td>
<td>ROW Director</td>
<td>1-2 months</td>
<td>Review position description, refocusing to reflect implementation of ROW design recommendations</td>
<td></td>
</tr>
<tr>
<td>Expand current effort to define career paths for ROW design</td>
<td>Collaborate with Region 2 and UDOT HR</td>
<td>Medium</td>
<td>ROW Design Program Manager</td>
<td>10-12 months</td>
<td>Assess current initiative for statewide application Adjust/revise as necessary Identify new audiences to expand recruiting horizon Oversee development of new or revised marketing</td>
<td>UDOT Human Resources Region 2 Pre-Construction Engineer (Chip Mason-Hill)</td>
</tr>
</tbody>
</table>
Appendix A – Process Maps Depicting Areas of Most Impact

UDOT ROW Design, Project Selection and ROW Assignment Process Map

- Process: Right-of-Way Design
- Sub-process: Project Selection and ROW Assignment
- Prepared by: Dye Management Group, Inc. (validated 7/19/16)

- (1) The majority of projects (approx. 80%) have the same consultant doing both roadway plan design and ROW design. The lead ROW agent in Central Acquisitions works with the project manager to choose the ROW design and acquisition consultants (usually 2 different firms from a pre-qualified statewide pool). At the project manager’s option, the region ROW engineer may assist in selecting the ROW design consultant.

- Conduct Planning activities, identify projects, submit list for STIP inclusion
- Identify approved projects for FY work; assign project manager
- STIP submission and approval
- Selects consultant for Environmental Impact Study
- Selects design and acquisition consultant(s) (1)
- Assigns self or region ROW surveyor to project team
- Receive notification of assignment
- Project Design (includes ROW design) (B)
- Reviewing party input lacking
UDOT ROW Design, Plan Development Process Map

Process: Right-of-Way Design
Sub-process: Plan Development
Prepared by: Dye Management Group, Inc. (validated 7/20/16)

Date: 9/23/2016
Page: 1 of 1

1. Identify existing property owner and ownership/claim information
2. Obtain existing ROW, survey and utility maps and plans
3. Develop Property Owner spreadsheet, ROW Estimate, create design plan sheets

Prepare Cost Estimates, Develop Coop Modification (CAMROW) and Resource Plan (R-709 form)

Perform QC review, filling ROW Design QC Checklist

Errors found?

Yes

Correct errors

No

Conduct preliminary review

Submit to UDOT Region and upload to ProjectWise

Finalize ROW summary package(s) (map with acquisition documents)

Enter parcel data into ePM (using template) and upload documents into ProjectWise

Region ROW Unit

NO

ROW Design Consultant/Designer

B

On Review (C)

Regional Final Review

Project level coordination between project manager, lead ROW agent, central ROW property coordinator
UDOT ROW Design, Region Preliminary Review Process Map

Process: Right-of-Way Design  
Sub-process: Region Preliminary Review  
Prepared by: Dye Management Group, Inc. (validated 7/20/16)

Region and Central Project Management

- Conduct quality control review

Region ROW Engineer

- Multiple cycles occurring
- Errors found?
- QC consultant used?
- No
- Forward to QC consultant
- Complete QC review, document errors and return

ROW Design Consultant

- Complete rework and resubmit (via document reload to ProjectWise)

QC Consultant

- Prepare transmittal letter, attach to summary package
- Notify consultant to submit to Central ROW
- Deliver hard copy of summary package(s) to Central ROW

(1) Depending on region, between 10% and 100% of all summary packages selected for review prior to submission to Central ROW.
UDOT ROW Design, Conformity Review Process Map

Process: Right-of-Way Design  
Sub-process: Conformity Review  
Prepared by: Dye Management Group, Inc. (validated 7/20/16)  
Date: 9/23/2016  
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Multiple cycles occurring

Receive package(s) ready for review

Log package for review tracking. (Excel spreadsheet)

Conduct review (within 1 business day)

Errors found?

Yes

Request corrections from consultant; notify region

No

Send to project coordinator

Acquisition (E)

Make corrections, resubmit

Multiple cycles occurring

Project level coordination between project manager, lead ROW agent, other central ROW units

Region and Central Project Management

ROW Design Consultant

ROW Design Program Manager
UDOT ROW Design, Acquisition Process Map

Process: Right-of-Way Design
Sub-process: Acquisition
Prepared by: Dye Management Group, Inc. (validated 7/19/16)

Date: 9/23/2016
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- **Region and Central Project Management**
  - Project level coordination between project manager, lead ROW agent, other central ROW units

- **Lead ROW Agent**
  - Lead ROW agent authorized to offer limited incentives for quick resolution (i.e., 10% addition)
  - Requires logging of the action.

- **Acquisition Consultant**
  - Conducts all acquisition effort (contact w/ property owners, no negotiations)
  - (no UDOT staff involved in the ground work)
  - Offer accepted?
    - Yes: Relocation Services
    - No: Relocation needed?
      - Yes: Demolition needed?
        - Yes: Demolition Process
        - No: Legal Transfer Process (ROW Closer/Legal Support)
      - No: No Demolition needed?
    - Yes: Relocation Services

- **Central ROW**
  - Acquisitions unit prepares acquisition file for each owner
  - Condemnation Process
    - Yes: ROW Certification (F)

- **Office of the Attorney General**
  - Legal Transfer Process
  - ROW Certification (F)
# UDOT ROW Design, ROW Certification Process Map

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<th>Process:</th>
<th>Right-of-Way Design</th>
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<td>Sub-process:</td>
<td>ROW Certification</td>
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### Project level coordination between project manager, lead ROW agent, other central ROW units

**Local Agency Project?**

- **Yes**
  - Obtain certification from local agency and submit to UDOT project manager

- **No**
  - All construction activities within existing ROW?
    - **Yes**
      - Prepare ROW Certification Request for signature
    - **No**
      - Rate of Limitations increasing
        - Prepare ROW Certification Request with limitations and timeline for resolution(s)

**Review request memo with project manager, sign pending limitations**

**Provide 30-day notice for any monument destruction**

**Review and sign ROW Certification**

**Submit ROW Certification to Central Construction**

**Prepare full ROW package for project manager and resident engineer**

**Project manager inserts ROW limitations tasking (RL1) into project schedule**

**Construction**