

# Property Management Tools and Techniques

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## Models for the Effective Management of Real Property Assets at State Departments of Transportation

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# Contents

<b>Summary</b> .....	<b>3</b>
<b>1. Introduction</b> .....	<b>1</b>
1.1 Property Management at State Departments of Transportation .....	1
1.2 Property Inventories .....	1
<b>2. Example Property Management Inventory Systems</b> .....	<b>3</b>
2.1 California Department of Transportation.....	3
2.2 Colorado DOT.....	4
2.3 Louisiana Department of Transportation and Development.....	4
2.4 Nevada DOT.....	5
2.5 North Carolina DOT.....	5
2.6 South Carolina DOT.....	6
2.7 Tennessee DOT.....	7
2.8 Texas DOT.....	8
2.9 Utah DOT.....	8
2.10 Virginia DOT.....	10
2.11 Washington State DOT.....	11
2.12 Wisconsin DOT.....	12
2.13 Other Property Inventories.....	12
<b>3. Common Property Management Challenges among State Departments of Transportation</b> .....	<b>14</b>
<b>4. Template for the Effective Management of Real Property Assets at State Departments of Transportation</b> .....	<b>16</b>
4.1 Inventory System Ideals.....	16
<b>Appendices</b> .....	<b>A1</b>

## List of Figures

Figure 1. System Diagram for NDOT's IRWIN .....	5
Figure 2. Screenshot from NCDOT's Property Inventory Spreadsheet.....	6
Figure 3. Screenshot of UDOT's Right of Way Lease Management System.....	9
Figure 4. Screenshot of UDOT's Right of Way Surplus Property Management System .....	9
Figure 5. Screenshot of VDOT's RUMS .....	11
Figure 6. Screenshot from WisDOT's Real Estate Automated Data System .....	12

# Acronyms

AARS	Appraisal, Acquisition, and Relocation
AMI	Asset Management Inventory
Caltrans	California Department of Transportation
CDOT	Colorado DOT
CLMS	California Land Management System
EDMS	Electronic Document Management System
ELMS	Excess Land Management System
FHWA	Federal Highway Administration
FRPP	Federal Real Property Profile
GIS	Geographic information systems
GSA	General Services Administration
HEPR	Office of Real Estate Services
IRIS	Integrated Realty Information System (a WSDOT system)
IRWIN	Integrated Right-of-Way Information System (a future NDOT system)
IT	Information Technology
LADOTD	Louisiana Department of Transportation and Development
MnDOT	Minnesota DOT
NCDOT	North Carolina DOT
NDOT	Nevada DOT
NYS DOT	New York State DOT
ODOT	Oregon DOT
PDF	Portable Document Format
PMI	Property Management Inventory
QCD	Quit Claim Deed
QR	Quick Response
READS	Real Estate Automated Data System
REMS	Real Estate Management System
REXUS	Real Estate Across the United States
ROW	Right-of-way
ROWIS	Right-of-way Information System
ROWMIS	Right-of-way Management System
RUMS	Right-of-way and Utilities Management System
RWPMS	Right-of-way Property Management System
SAP	Systems, Applications, and Products in Data Processing
SCDOT	South Carolina DOT
SDOT	State Department of Transportation
SDS	Smart Data Strategies
TDOT	Tennessee DOT
TRIS	Tennessee Right-of-Way Information System
TxDOT	Texas DOT
UDOT	Utah DOT
USC	United States Code
VDOT	Virginia DOT
Volpe Center	U.S. DOT John A. Volpe National Transportation Systems Center

WisDOT  
WSDOT

Wisconsin DOT  
Washington DOT

# Summary

“Property management” in the highway transportation context refers to the administration of property acquired for highway purposes to ensure that the public interest is served. The properties that State Departments of Transportation (SDOTs) oversee are valuable resources that need to be managed in order to safeguard the safe and efficient functioning of highway improvements and their related facilities. For that reason, each SDOT has the responsibility to maintain, lease, or sell its properties and to keep an inventory identifying where such lands are located.

Some SDOTs use highly functional computerized database inventories to manage their real property assets, while others have no such systems, are in the early stages of developing them, or rely on spreadsheet tools. Regardless of the approach used, however, SDOTs have faced similar challenges managing their assets. Currently, many SDOTs’ property inventories are less than user-friendly; may be too dated to be easily updated or modified by most staff members; and lack integration with geospatial tools available to other SDOT disciplines.

As such, in February and March 2012, the Federal Highway Administration (FHWA) convened select SDOTs at a series of three Property Management Regional Roundtables to discuss how agencies can overcome these and other challenges. The 11 participating SDOTs each described what they believed to be property inventory “ideals,” or aspects of a property inventory that would comprise the model system. The participants agreed that property management inventories should be simple and adaptable in terms of what the system does; how the system does those things; and, how the staff members interact with it. Specific best practices include:

- Develop interdisciplinary system requirements
- Promote property sales
- Track the right property features
- Notify others of right-of-way (ROW) encumbrance status and other pertinent information
- Track Title 23 funding
- Link to mobile devices
- Ensure limitless query and reporting capabilities
- Provide electronic signature and validation
- Automate forms
- Simplify search mechanism
- Integrate with other ROW or DOT systems, including geographic information systems
- Draft clear consultant requirements
- Incorporate data quality protections
- Balance security with ease of use
- Limit the duration of application development
- Maximize computing power
- Dedicate a staff member
- Focus on ease of data entry
- Facilitate printing
- Periodically assess whether all data fields are necessary
- Where applicable, consider deploying a limited number of modules at a time

These ideals are described in more detail in Section 4, *Template for the Effective Management of Real Property Assets at State Departments of Transportation*. Other sections of this report include

the *Introduction*, which offers a background on the general property inventory practice at SDOTs, focusing on what is required and why; *Example Property Management Systems*, which provides synopses of the property inventories used at select SDOTs; and *Common Property Management Inventory Challenges*, which describes various challenges associated with existing property inventory systems, as well as with taking the next steps toward enhanced future systems.

# 1. Introduction

The Federal Highway Administration’s (FHWA) Office of Real Estate Services (HEPR) sponsored the research reported on here to review tools and techniques that SDOTs are using to manage, or inventory, their real property assets. The report is based on information collected from SDOTs during three separate one-day meetings convened in February and March 2012 in Austin, Texas, Charlotte, North Carolina, and Sacramento, California.<sup>1</sup> The report synthesizes the content of the meetings’ discussions in order to ultimately convey the components of an ideal property management system.

## 1.1 Property Management at State Departments of Transportation

State department of transportation property, sometimes called “airspace,” includes the spaces located at, above, or below the highway’s established grade line and structures, along with property lying within the approved right-of-way (ROW) limits. In the past, an engineering-based mentality driving asset-based decisions led to a prevailing perspective that ROW was simply the land upon which transportation improvements were built. Now, SDOTs are increasingly viewing their properties as valuable assets as well, especially given the volume of properties they hold—in some states, the SDOT is among the top state agencies in terms of land ownership. Their properties are valuable resources that must be managed in order to ensure that highway improvements and their related facilities function safely and efficiently. As such, the importance of developing a precise and reliable understanding of what properties the SDOT holds; why the properties are being held; and where the properties are located is growing. Questions along these lines have historically been easier to ask than answer. However, the increased scrutiny and opportunity to leverage assets is leading to a renewed focus on the state of the property management practice at SDOTs.

“Property management” in the highway transportation context refers to the administration of property acquired for highway purposes to ensure that the public interest is served. It entails a variety of responsibilities from rental and clearance of improvements for a project to the leasing of improved airspace after a project is completed. Property management during the acquisition, or pre-construction, phase of a project involves the clearance of structures, improvements, pests, and hazardous materials from the acquired ROW. During post-construction property management, the owning agency has the opportunity to generate income from available airspace. As explained in FHWA’s Project Development Guide,<sup>2</sup> highway ROW is a capital asset that belongs to taxpayers, and the SDOT has a responsibility to conserve, protect, and obtain the highest return possible for that asset. This could include activities such as preventing encroachments, protecting access control, disposing of excess land, and renting property excess to current project needs.

## 1.2 Property Inventories

Effective property management practices can help protect the public and its investments. One component of the record-keeping process is the property inventory. Accordingly, each SDOT has the responsibility to maintain, lease, or sell its properties and to keep an inventory identifying where such lands are or, in the case of sold properties, were located. That inventory is not only essential to a successful property management program, but it is also required. Per FHWA’s property management regulation ([23 CFR 710 subpart D](#)) SDOTs should keep an up-to-date

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<sup>1</sup> See Appendix A for a list of participants at each of the regional roundtable meetings.

<sup>2</sup> FHWA Project Development Guide, Chapter 12. [www.fhwa.dot.gov/realestate/pdg12.htm](http://www.fhwa.dot.gov/realestate/pdg12.htm)



inventory of information on:

- Improvements acquired as part of the transportation project
- Property management expenses and rental payments received
- The disposition of improvements and recovery payments received
- Real property considered excess to project needs
- All authorized uses of airspace and other leases or agreements for use of the DOTs real property<sup>3</sup>

Since the parcels that SDOTs manage number in the thousands, SDOTs have developed computerized solutions to house their inventories.<sup>4</sup> Some SDOTs have highly functional, sophisticated tools to inventory their real property assets, while others are in the early stages of developing them or have chosen to use other tools, such as spreadsheets, to support the property management function. For example, some state transportation agencies have integrated Geographic Information Systems (GIS) into their ROW management operations, providing them with an accurate electronic record of parcels, sales, abandonments, trades, leases, encroachments, and road exchanges.<sup>5</sup> Others have yet to use GIS or other imaging techniques to map their properties and instead have opted to track their properties in “flat,” or static, files in software like Microsoft’s Excel.

Regardless of the method implemented and the costs associated with system development, the property inventory plays a key role organizing and overseeing the ample property assets SDOTs own or control. A limited or inaccurate inventory could result in a greater likelihood for unidentified uses or unapproved encroachments. It might also create lost opportunities for deriving income from leases or sales, among other unwanted or avoidable breakdowns.

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<sup>3</sup> See FHWA’s Project Development Guide, Chapter 12, *Property Management*, for more information: [www.fhwa.dot.gov/realestate/pdg12.htm](http://www.fhwa.dot.gov/realestate/pdg12.htm)

<sup>4</sup> FHWA has also recommended that computer applications should be considered in carrying out these functions. For example, see section 12.1.2 of HEPR’s Project Development Guide at [www.fhwa.dot.gov/realestate/pdg12.htm](http://www.fhwa.dot.gov/realestate/pdg12.htm).

<sup>5</sup> In one example, the New Mexico DOT received an FHWA Technical Specialties Honorable Mention Award in 2004 for its efforts to implement a GIS into its estate land and ROW management activities. [www.fhwa.dot.gov/real\\_estate/practitioners/rowea/previous\\_winners/2004/pg05.cfm](http://www.fhwa.dot.gov/real_estate/practitioners/rowea/previous_winners/2004/pg05.cfm)

## 2. Example Property Management Inventory Systems

Eleven SDOTs participated in the three regional roundtables informing this report (see Appendix A). Interviews with two Federal agencies—the General Services Administration (GSA) and the Department of the Interior—regarding their property inventory systems supplemented the insights provided by the SDOTs. This section provides an overview of basic aspects of the property inventory systems that the participating SDOTs use.<sup>6</sup>

### 2.1 California Department of Transportation

The California Department of Transportation (Caltrans) currently uses several property management tools. The largest of the existing tools is Caltrans' Right of Way Management Information System (ROWMIS), a tool that was developed in-house. ROWMIS includes over 31,000 active and 60,000 inactive, or archived, parcels and has data going back to the 1990s. Offering project, parcel, and acquisition information, ROWMIS was intended to help reduce inefficiencies related to ROW planning and management. ROWMIS provides staff members with a secure, centralized, web-based database and standard input/output to facilitate planning and management of highway projects and parcel acquisition. The database, which is accessible by anyone at Caltrans with an account through Oracle's web based Discoverer application, does not track excess lands, airspace leases, or information on operational/facility assets.

Some of the information not currently included in ROWMIS can be found in Caltrans' Right of Way Property Management System (RWPMS), AMI (Asset Management Inventory), and ELMS (Excess Land Management System). RWPMS includes over 3,000 parcels and 1,600 airspace leases and is the system used to maintain inventory and financial information for property Caltrans owns. Monthly, expenditure reports (revenues, abatements<sup>7</sup>, and reimbursements) are generated from RWPMS and then reconciled with data in other accounting systems in order to prepare required reports for FHWA. In parallel, the AMI contains all assets for each Caltrans District, while the ELMS is used to record, monitor, and report the status of all parcels defined as "excess land," providing the agency with a comprehensive record of accountability that facilitates management and disposition of those properties. These systems do not integrate with GIS capability although each district is in the process of digitizing ROW maps.

Another system currently under development—the California Land Management System (CLMS)—will eventually replace the existing systems, integrating the functionality provided by earlier systems (e.g., procurement, budgeting, fixed assets) with real estate functionality. Within this integrated environment, Caltrans' Division of ROW will be able to cost alternate routes for a transportation projects based upon routes passing through various parcels.

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<sup>6</sup> A comprehensive list of example ROW systems currently in use by transportation agencies is included in *NCHRP 8-55A: Developing a Logical Model for a Geo-Spatial Right-of-Way Land Management System* available at <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2326>. The report also includes a thorough description of various ROW system types, ranging from those that support a single ROW activity ("individual systems") to those that include the majority of ROW functional areas ("large enterprise systems").

<sup>7</sup> For Caltrans, "abatements" are recoveries of expenditures that have already been incurred by the department and include property damages or loss recoveries, employee salary overpayments, and jury duty fees.

## 2.2 Colorado DOT

At Colorado DOT (CDOT), property management functions are performed by both central office and region staff. The Property Management Section in the central office is responsible for maintaining the inventory of all excess, remainder, office, and maintenance site parcels including improvements. Property Management staff members in the central office also manage all properties turned over by CDOT's six regions to the Section for rental and/or disposal.

CDOT's property inventory system is based on data available in the agency's Real Estate Management System (REMS), which is a system that enables staff members to view, analyze and update detailed information on all of CDOT's facilities; its Quit Claim Deed (QCD) Book; scanned ROW plan sets from three of its six regions (the other three are currently scanning their plan sets); and Region and Central Office acquisition files. Using these data, CDOT created a number of spreadsheets that it uses to manage its properties. One spreadsheet, based on the QCD Book shows every sale CDOT has done dating back to 1952. Another maintains an excess and remainder parcel spreadsheet that tracks excess properties by CDOT Region, county, and state highway. CDOT also tracks "disposable properties," or those not needed for upcoming projects.

Once a property is sold, CDOT records the transaction—including information regarding improvements and improvements removed from the agency's insurance policy—in the QCD book and the spreadsheets. CDOT then sends a copy of the QCD to CDOT's asset management team and to the Region so that the Region can modify its ROW plans to reflect the parcel site(s).

The property management system was updated recently to integrate with CDOT's Systems, Applications, and Products in Data Processing (SAP) accounting tool. The SAP accounting module, which automatically tracks lease payments, allows users to easily sort leases, licenses, and deeds, while following the status of excess properties and contract expirations.

Moving forward, CDOT anticipates completing the scanning of its regions' plan sets, as well as linking the property inventory to a GIS in an interactive ROW data layer.<sup>8</sup>

## 2.3 Louisiana Department of Transportation and Development

The Louisiana Department of Transportation and Development's (LADOTD) current property management system is a module of the agency's larger Appraisal, Acquisition, and Relocation System (AARS), a web-based enterprise application that centrally stores detailed appraisal, acquisition, and relocation level information in an Oracle database. LADOTD owns the AARS product (rather than licensing it through a vendor organization). AARS was designed in 2001 by Xybernaut Solutions LLC to meet process/data requirements that LADOTD's management team devised. The system was first deployed in 2002 and has continued to undergo enhancements and new version releases since. As LADOTD now migrates to a SAP system, the user community consists of over 150 staff members, including Real Estate Managers, Headquarters' Agents, Headquarters' Review Appraisers, Appraisers, Field Agents, and Headquarters' Relocation Agents, and consultants.<sup>9</sup>

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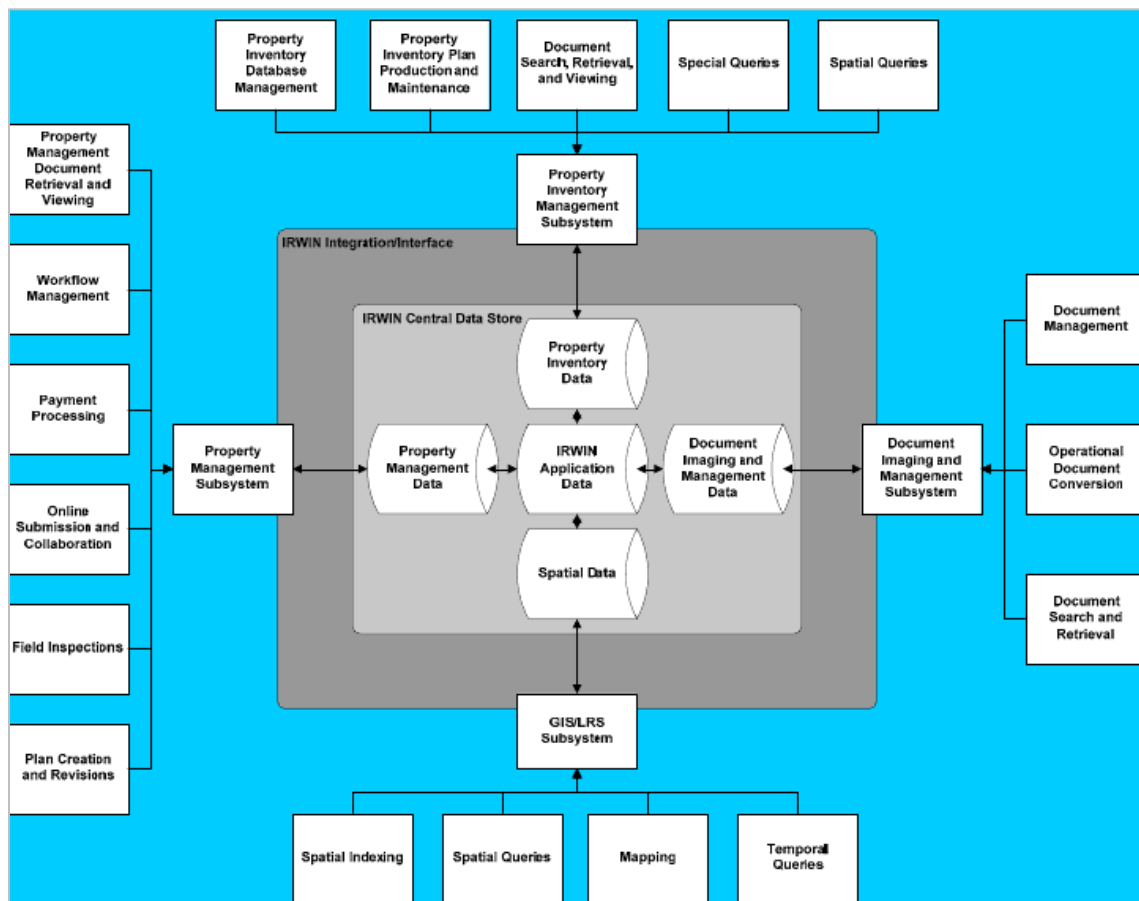
<sup>8</sup> For more information on CDOT's property inventory, see Chapter 7 of the CDOT ROW Manual at [www.coloradodot.info/business/propertymanagement/documents/Chapter7REV07-2005.pdf](http://www.coloradodot.info/business/propertymanagement/documents/Chapter7REV07-2005.pdf).

<sup>9</sup> Xriver Technologies LLC. 2008. *Appraisal, Acquisition, and Relocation System*. [www.xrivertech.com/Common/CaseStudies/CaseStudy\\_AARS.PDF](http://www.xrivertech.com/Common/CaseStudies/CaseStudy_AARS.PDF)

## 2.4 Nevada DOT

Nevada DOT (NDOT) currently uses a series of Microsoft Excel spreadsheets to inventory properties and keep track of rentals, licenses, abandonments, sales, and other property characteristics. NDOT is moving toward fully implementing a new system called the Integrated Right-of-Way Information Network (IRWIN). Partnering over several years with Smart Data Strategies (SDS) to develop IRWIN, NDOT is seeking to enhance its ROW management practice to provide real-time property information to state employees. The system, which was developed as a result of a legislative audit, has several components, including an Electronic Document Management System (EDMS), Property Inventory, Property Management, and Permit Management. It will also incorporate GIS functions, taking advantage of work done by NDOT's GIS section to create a historical road network showing most of the system changes over time. The feature will allow users to perform queries and receive results for a specific place or time. NDOT expects IRWIN to offer its staff members greater consistency and accuracy in carrying out property management responsibilities (Figure 1. System Diagram for NDOT's IRWIN).

**Figure 1. System Diagram for NDOT's IRWIN**



## 2.5 North Carolina DOT

At North Carolina DOT (NCDOT), properties are conveyed by the ROW Branch but managed by the General Services Division, which includes a property management section. NCDOT's Property Management Section is responsible for property leases, sales, acquisitions and allocations, building

demolition, and asbestos program management. It also maintains a statewide inventory of the department's 2,900 buildings.

Currently, the Property Management Section inventories NCDOT's properties primarily using a Microsoft Excel spreadsheet solution (Figure 2. Screenshot from NCDOT's Property Inventory Spreadsheet). Additional property inventory information is also separately entered into NCDOT's SAP tool for accounting purposes. As ROW claims are closed, residue information are recorded on a "residue card" and submitted to the property agent who enters the information on a master list in the spreadsheet. The residue card indicates the property's NCDOT division, county, funding, project, parcel, asset number, former owner, area, purchase price (value) and date acquired. As residue properties are sold, they are deleted from the master list and entered into the sold list, deactivating its asset number.

**Figure 2. Screenshot from NCDOT's Property Inventory Spreadsheet**

Div	County	WBS ELEMENT	TIP	PARCEL	Asset Number	Former Owner	Area / Acre	Value	Date Acquired by DOT
12	CLEVELAND	34497.2.3	R-2707A	39	154701		10.3100	\$4,725.00	1/11/2012
12	Cleveland			009	47128		0.2800	\$9,120.00	
12	Cleveland			105	96168		0.1320	\$230.00	
12	CLEVELAND	34497.2.3	R-2707A	43	153931		8.202	\$5,700.00	11/4/2011
12	Cleveland	34497.2.3	R-2707A	79	147790		0.366	\$725.00	2/11/2011
12	CLEVELAND	34497.2.3	R-2707A	27	154704		1.326	\$2,925.00	1/1/2012
12	CLEVELAND	34497.2.3	R-2707A	92	150930		0.361	\$1,400.00	6/13/2011
12	Cleveland			004	96117		0.1780	\$1,400.00	
12	Cleveland			041	96136		9.9800	\$3,500.00	
12	CLEVELAND			41	150917		9.9800	\$3,500.00	6/13/2011

Borrow pits, asphalt sites, and other miscellaneous division sites are considered assets and are entered into a Borrow Pit database for record keeping. When these properties are sold, they too are deleted from this list and added to a sold list, deactivating their asset numbers. When it is determined that residue property is required for a future ROW project, wetland credits, or mitigation, a copy of the revised plans is submitted to an NCDOT property agent who deletes the residue from the master list and enters it into a ROW "converted list," deactivating its asset number.

In the future, NCDOT plans to integrate the inventory with geospatial tools by overlaying the agency's residue properties with the State's umbrella GIS system.

## 2.6 South Carolina DOT

Operating since 1917, South Carolina DOT (SCDOT) has accrued many parcels identified as potential surplus property. Under SC Code of Laws, Section 57-5-340, "The department shall continuously inventory all of its real property [surplus property]."

SCDOT's early property management efforts focused on keeping track of sold parcels of land by assigning index numbers to each parcel of land sold that indicated the counties of the parcels and chronological order in which they were conveyed. It was later noted that parcels purchased outside of the ROW limits also needed to be identified and tracked at purchase. SCDOT determined that the most effective approach would be to index these properties at acquisition when the ROW document was turned in to SCDOT's Headquarters office. Now, a copy of the pertinent information, including the deed or easement, the appraisal summary sheet, the agent's worksheet, and a plan sheet, is forwarded to the Property Management section so it can index the information in a project file.

That inventory is currently kept in a Microsoft Access database. The database includes fields such as:

- Date updated
- Index number
- File number
- Road/Route
- Tax map number
- Tract number
- County
- City
- Road name
- Parcel size
- Grantor
- Book/Page
- Date sold
- Grantee
- Sales price
- Remarks
- Congressional District
- Date of Commission approval for sale
- Land type (economic or uneconomic)
- Land use description
- Status (For Sale, Not For Sale, ROW, MSC, Mitigation, Project Not Complete, Sold)
- A brief description of the property
- A hyperlink to view the deed and exhibit for a sold parcel

SCDOT is currently considering potential replacement off-the-shelf solutions, as well as integration with GIS in order to better meet SCDOT's present needs. For example, it has become apparent to SCDOT that, over time, some parcels were inadvertently omitted from the inventory and that reviews of county tax assessors' records are necessary to update the agency's records. This presents a challenge since different SCDOT disciplines identify and name property records in a variety of ways. Additionally, SCDOT leadership is increasingly sending requests for more accurate tracking and reporting capabilities, or information that has never previously been captured, such as past offers for sale or numbers of uneconomic<sup>10</sup> parcels owned. SCDOT anticipates that an updated inventory system with links to geospatial information in a GIS could help it address these and other issues.

## 2.7 Tennessee DOT

Tennessee DOT's (TDOT) Right-of-Way Division Relocation and Property Management Office supervises the regional field offices' relocation sections to ensure that regions adhere to Federal and division policies and procedures. TDOT's ROW Division Excess Land Office, meanwhile, is responsible for disposal of TDOT's surplus property and ROW in fee simple, legal access changes, land leases, and some licenses.

Relocation sections in regional field offices inventory and inspect vacated properties and arrange for the clearance of improvements. These disciplines use TDOT's Tennessee ROW Information System (TRIS) as the department's centralized ROW inventory database. Among other attributes, TRIS tracks the area of parcels acquired and the amounts paid on all tracts for projects dating from 1997. The database also contains information specifying uneconomic remnants. This information is also captured in "Edison," Tennessee's Enterprise Resource Planning financial system.

The TRIS database does not currently provide a means to readily access the information. An April 2011 performance audit of TDOT by the State noted that TDOT lacked a fully functional and readily accessible ROW property inventory.<sup>11</sup> Based on this finding, TDOT is currently accepting proposals to replace its existing spreadsheet-based property inventory solution with a web-based, relational

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<sup>10</sup> An uneconomic remnant results when the acquiring agency only partially acquires property, with the remaining property being determined to have little or no value to the owner.

<sup>11</sup> TDOT Performance Audit, available at [www.comptroller1.state.tn.us/repository/SA/pa10042.pdf](http://www.comptroller1.state.tn.us/repository/SA/pa10042.pdf)

database tool. It is expected that an improved property inventory system will allow TDOT to better track, maintain, and report on all ROW and potential excess land, while also taking advantage of related existing, but currently underutilized, geospatial data.

## 2.8 Texas DOT

Texas DOT's (TxDOT) Right of Way Information System (ROWIS) is the agency's current primary property management system. In place for approximately 15 years, ROWIS is a relational database, client-based server system that enables users to capture, track, and report data related to the ROW acquisition process.

ROWIS captures key attributes that can largely be categorized into four groups:

- Project level attributes: district, county, highway, control-section-job number, parcel number, etc.;
- Parcel level attributes: property type, taken area, remainder area, type of damages, type of improvements, type of acquisition, etc.;
- Time attributes: environmental clearance date, ROW release date, appraisal report date, value approved date, possession date, etc.; and
- Cost attributes: land value, damage value, improvement value, total appraised value, total approved value, total acquisition cost.<sup>12</sup>

Authorized district personnel enter records into ROWIS as activities occur on ROW-related projects.

Some TxDOT users have found that ROWIS could be improved in the way it supports the management and inventory of ROW assets after the conclusion of the acquisition process. The system also does not currently have the ability to display or link to ROW parcels on a map, which has made the cost-effective integration with the state's web-based GIS platform challenging. ROW maps have been scanned in portable document format (PDF) from 14 of TxDOT's 25 districts, and the department is discussing ways that these maps can be linked to the ROW inventory.

## 2.9 Utah DOT

Utah DOT's (UDOT) ROW Division is responsible for acquiring property needed for highway purposes and relocating displaced businesses or persons. The division also manages those properties acquired, including security, leasing, and maintenance on them. When that property is no longer needed for highway purposes (usually remnants of larger parcels), the Property Management division is responsible for its disposition.

### **UDOT currently uses an Oracle 10G ROW system to track its lease agreements (Figure 3) and surplus properties (**

**Figure 4).** The system is designed to help manage and track the SDOT's land inventory. Parcels are entered into the database upon acquisition and can then be tracked through their life cycle including leases or sales of surplus areas. Searches can be made by tenant name, parcel number, project number, and other attributes and data can be exported to create reports containing details that individual users can define, such as tenant name, project number, parcel number, lease

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<sup>12</sup> Krugler, Paul and Sergiy Butenko. 2010. *Development of Decision-Making Support Tools for Early Right-of-Way Acquisitions.*

commencement and expiration dates, rent, lease type (cell tower, billboard, vacant land, residential, air space, commercial), expenses, and sale transaction details.

Property management agents analyze reports from the system, which can be viewed by project managers, lead agents, and division directors. The reports are used to improve the efficiency of property management. The success of property management results in the coordination with statewide UDOT personnel and utilizing reports to track status, income, and expenses for each property.

UDOT anticipates future enhancements to the system that will include GIS capabilities of properties that the department currently owns, leases, or has sold.

**Figure 3. Screenshot of UDOT's Right of Way Lease Management System**

The screenshot displays a web-based application window titled "Right of Way - Leases". The interface includes a header with the user "SRRDS@PROD" and the date "07-JUN-2012 04:50". Below the header is a form with various fields for lease information:

- \*Master PIN: 2318, \*PIN: 3575, \*Project Nbr: SP -0068 (24)43, \*PIN Description: REDWOOD ROAD, 12600 SOUTH TO 10600 SOUTH, Region: Region 2
- \*Parcel #: 1B, Auth: [blank], \*Property Type: Residential, \*Status Type: Cleared, Prev. Own. Name: DISCOVERY HOMES, II
- \*Address: 11743 South Redwood Road, City: RIVERTON, Zip: 84065, \*County: SALT LAKE, \*Federal Part: [checked], Date Acquired: 04/20/2007

The main content area has tabs for "GENERAL", "Rent", "Payment History", "History", and "Misc.". The "GENERAL" tab is active, showing a "Renter" list on the left and a "Deposits" section on the right. The "Deposits" section includes fields for "Security Deposit Nonrefundable", "Security Deposit Refundable", "Refund Amount", and "Refund Date". Below these are "Renewal Clause Comments" and a "Notes" section with a table for "Note Type" and "Note".

**Figure 4. Screenshot of UDOT's Right of Way Surplus Property Management System**



## 2.10 Virginia DOT

Virginia DOT's ROW and Utilities Division first developed an electronic database of residue properties in 1977 with the advent of its ROW Management System. In 1998, the system was replaced with the ROW and Utilities Management System (RUMS), the property management system still in use today at VDOT.

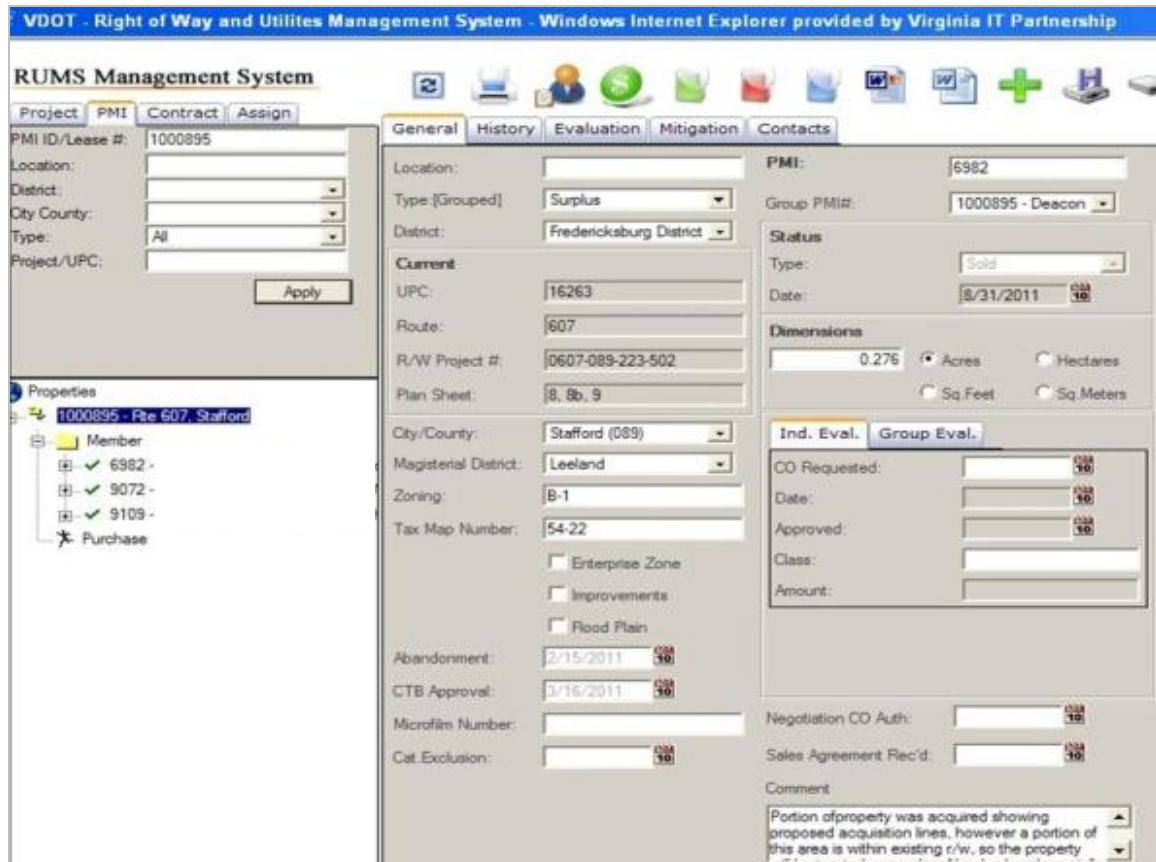
RUMS is a web-based system that tracks the real estate acquisition process on a project-by-project basis. RUMS tracks pertinent information for each parcel of land from the time it is identified as a potential acquisition in the estimate stage to the time it is disposed. The system also manages leases and sales and displays information for each step in the leasing and sales processes. Approximately 5,000 residue/surplus properties or leases are currently maintained in RUMS. A contractor was hired to develop the Oracle system, but VDOT retains ownership of the programming code created. VDOT anticipates having GIS capabilities integrated with RUMS within 24 months.

VDOT's asset inventory process begins at the highway project scoping stage by identifying any residue property or improvements to be acquired and roadbeds to be abandoned. Each asset is then entered into RUMS, with residue and surplus parcels getting assigned an individual Property Management Inventory (PMI) number. If the property being reviewed predates the current system a new PMI number is generated in RUMS. Multiple contiguous parcels are "grouped" under a PMI Group Number and sold as one property. Similarly, improvements are assigned an individual Demolition Number, using a categorized number series depending on the improvement type. The location is distinguished as it relates to the project stationing, and disposition of each improvement is selected. Additionally, prior to conveyance of any residue/surplus property, a site inspection is performed; photographs are taken; and research is completed confirming title, acreage, the most recent project plans showing the property, zoning requirements, and other characteristics.

VDOT uses a Microsoft Share Point Portal Sight for processing its leases and sales and uses RUMS (Figure 5. Screenshot of VDOT's RUMS ) to track properties from the time of acquisition to disposal.

The portal is a one-stop site that allows users to process the sale or lease of a property and permanently maintain PMI files without physically storing those files. Users can also generate an email via the portal that provides a link to information about a given site allowing various VDOT Divisions, other agencies, municipalities, and FHWA to review each property as needed.

**Figure 5. Screenshot of VDOT’s RUMS**



## 2.11 Washington State DOT

Washington State DOT’s (WSDOT) web-based ROW management system is known as “IRIS,” short for Integrated Realty Information System. The system, which went into production in 2008 and is an implementation of Smart Data Strategies DREAMaps™ software, provides advanced reporting and workflow management that helps WSDOT efficiently track and maintain property acquisitions, financial data, and property costs. IRIS offers real-time information with scheduling and asset reporting while also providing project creation tools. It can also provide daily updates of financial status for reporting purposes.

The system offers the ability to search the database for acquisition data (e.g., project number, parcel number, and property owner) or for property management data (e.g., inventory number, lease number, and property address). A challenge that IRIS users have encountered, however, is that the system is limited in its ability to generate ad hoc reports. Because the acquisition and inventory functions are managed in the same system, the computing power and memory necessary to generate specific reports are sometimes more than what is available.

WSDOT has plans to expand the system to integrate it with GIS. The addition of GIS will provide WSDOT with complete project management capabilities, enabling the agency to easily locate properties affected by an acquisition and display them on a map for estimation. It is expected that this step may also alleviate some of the reporting challenges experienced to date.

## 2.12 Wisconsin DOT

Seeking to apply a more businesslike approach to its ROW activities, Wisconsin DOT (WisDOT) developed the Real Estate Automated Data System (READS). READS is a web-based Oracle system that tracks and manages all aspects of ROW acquisition, including maintaining over 2,000 records of excess properties. The system, which automatically maintains a modification history for the records it stores, tracks original purchase dates; surplus land sales; disposition; authorized airspace leases; demolition contracts; and potential condemnations, litigation, among other information. System users are able to obtain status updates on and generate reports for any of the department's parcels. WisDOT is currently exploring GIS integration possibilities (Figure 6. Screenshot from WisDOT's Real Estate Automated Data System).

**Figure 6. Screenshot from WisDOT's Real Estate Automated Data System**

**Real Estate Automated Data System (READS)**

Project Parcel Reports My Parcels My Ticklers Property Mgmt Setup E-Submit Acq Comps E-Help E-Manual

Land Inventory Back Edit View Plat Appraisal Split Parcel

Region Office: Green Bay (Northeast) Partition: \_\_\_\_\_ Federal ID: \_\_\_\_\_ Classification: Surplus  
 Project ID: \_\_\_\_\_ Project Highway: STH 042 Funding %: \_\_\_\_\_ Marketability: General  
 Parcel #: 1 County: Sheboygan Federal %: 0 County %: 0 Type of Disposal: Public Sale  
 Taxing Unit: Town of Mosel Tax Key Nos.: 59014185984 State %: 100 Local %: 0  
 Location Desc.: \_\_\_\_\_  
 Previous Owner: \_\_\_\_\_  
 Remnant Size: 0.572 Acres  
 Remnant Cost: 235,000.00 Parcel Acquisition Allocation  
 Appraised Value: 90,000.00 Date Acquired: 05/25/2010  
 Sale Price: 115,100.00 File No.: 045  
 Remnant Fed Fund Received by Prop. Mgmt.: 09/27/2010  
 Characteristics: Buildable, Access to Public Road, Improved Property, Contaminated, Other: Conservancy, Irregular Shape, Other  
 County Conveyance Recvd.: \_\_\_\_\_  
 County Conveyance Record.: \_\_\_\_\_  
 Bid Opening: 08/09/2011  
 Bid Sale Comments: \_\_\_\_\_  
 Completed Sale: \_\_\_\_\_

Sales Status Potential Bidders Disposition Assignments Payment Info Maintenance Documents Diary Log

Filled in by Property Management Agent Edit

Status Review Date	_____
Date Sales Pkg Sent	08/19/2011
District Checklist	Yes
District Sign Off	Yes
Federal Funding Statement	Yes
Arch Sign Off	Yes
Legal Desc Survey Map or CSM	Yes
Plat Map	Yes
Appraisal	Yes

Filled in by Central Office Edit

Date to FHWA	_____	Date to Governor	11/04/2011
Date Returned	_____	Date Returned	11/10/2011
Date to Secretary	10/27/2011	Quit Claim Signed	11/16/2011
Date Returned	11/02/2011	Request Approved by CO	11/18/2011

## 2.13 Other Property Inventories

In addition to the regional roundtables, the project team also interviewed the GSA to learn about its property management inventory systems. It was believed that any effective practices identified at the Federal level might also serve as example approaches for SDOTs.

The GSA, which owns and leases over 354 million square feet of space in 9,600 buildings in more

than 2,200 communities nationwide, uses several systems to manage Federal property, including Real Estate Across the United States (REXUS) and the Federal Real Property Profile (FRPP). The REXUS system is an Oracle web-based platform that was developed both internally and externally. The system consolidated approximately 50 applications at the regional level to allow for searching across agencies. REXUS now allows GSA to better track details about the interior space of Federal buildings, building histories, and leases and payments. While some dynamic reporting can be done, standard reports are available and data are often exported to Excel or Access for advanced reporting. Information on previously owned property is maintained offline in a file.

While REXUS tracks building information, the FRPP is an inventory of most Federally-owned property (it does not include National Parks or properties excluded for reasons of national security). All agencies in the Executive Branch are responsible for updating the database each year. They are able to do so one-by-one or by batch entering properties through an XML document. Although like most SDOT inventories it is not GIS-enabled, FRPP establishes a standard for property management terms and definitions, helping to ensure accurate and precise tracking of properties across a number of agencies.

### **3. Common Property Management Challenges among State Departments of Transportation**

The SDOTs participating in the property management Regional Roundtables were given the opportunity to discuss challenges that their respective property management programs face. Participants identified a host of obstacles and barriers regarding the property management function, not all of which were related to inventorying the SDOTs' property assets. The following section describes those challenges that were directly associated with either the property inventory systems currently in place or with taking the next steps toward enhanced future systems. It should be noted that each challenge listed does not necessarily represent a consensus reached among roundtable participants; the challenges denote common themes.

#### ***Property management inventories may not be user-friendly***

Some SDOTs indicated that the “look and feel” of their current property management inventories could not match expectations for modern computer systems. They often do not have graphical interfaces, nor do they readily tie into mapping tools. They often lack clear forms for data entry and do little to address the issues of numerous data sources and reports to track that SDOTs must confront. Sometimes several layers of security developed early on to attend to security concerns may be limiting the dexterity and efficiency of data entry.

These shortcomings—perceived or real—contribute to an opinion within some staff members that their property management inventories cannot be readily updated and that the job function itself is falling behind the times. When the costs of data entry (e.g., scanning and/or digitizing ROW maps and plans) are factored in, some SDOTs are left to question how or when they might have the funding and support to improve the user-friendliness of their property inventories.

#### ***Lack of trained SDOT staff members who can update or modify the property inventory***

Property management is an increasingly scrutinized function within SDOTs. Staff members are often being assigned more work with fewer resources. In some cases, this has resulted in SDOTs choosing to hire consulting firms to develop their property management inventory systems, which is an approach that some SDOTs suggested may be more effective in the short term versus the long term.

State Departments of Transportation can become constrained when consultants are asked to develop information technology (IT) systems. Contract terms may specify a certain contract period that is longer than the firm's staff members remain in their positions. Some SDOTs have experienced a “revolving door” of contracted IT staff. They sometimes lack longevity in their positions, potentially leaving few people who know how to update the system. Private firms may also use proprietary programming language that creates a similar issue—few have the skills necessary to make what might otherwise be straightforward system modifications. Additionally, external IT staff may not be trained to make quick judgments. This can add time to the process of making system updates, since it could require that all system changes be meticulously explained and discussed.

In cases where the inventory was or has been developed in-house, the coding language may be virtually obsolete and only understood by a few staff members. Training for new staff members or contractors in the archaic language may be cost- or time-prohibitive for a SDOT to provide.

### ***Inventorying “old” properties***

Some SDOTs struggle with inventorying properties acquired before the inventory was developed. Having “old” property data on record can mean that the property information is kept in diffuse parts of the state, such as in county courthouses, that are not easy to visit and search through and that the records are in the form of paper or Mylar maps and plans that need to be scanned and geographically referenced. Posting and storing such data by hand is obsolete, inefficient, and unresponsive to the demands of modern project management,<sup>13</sup> and converting old property records into the property inventory can be a time-consuming process that may be too labor- or cost-intensive for SDOTs to expeditiously undertake.<sup>14</sup>

Additionally, the information contained in aged property records may not match the fields required in electronic property inventory systems. This can make data summary and reporting across properties difficult.

### ***Lack of GIS integration***

Over the last two decades, transportation agencies have increasingly used GIS. As Hancock (2011) asserts, “when location is brought to bear on any fundamentally spatial activity, such as transportation, managing and analyzing information is more effective and powerful.”<sup>15</sup> Regional roundtable participants agreed, noting that the integration of GIS into their property management systems would add value by enabling a more efficient and effective way of organizing, visualizing, and sharing property inventory information across the agency. To many, a GIS-property inventory linkage represented a “dream state.”

To date, however, few SDOTs have been able to fully incorporate GIS elements into their property inventories. Reasons why this has not happened more comprehensively range from lack of funding (e.g., not enough of a current priority to allocate funds toward) to technical incompatibilities (e.g., dated inventories based on old or proprietary coding language) to institutional challenges (e.g., separate property management, IT, and GIS groups within a SDOT).

#### **Property Management and GIS at New Mexico DOT**

In 2004, FHWA recognized the New Mexico DOT for its successful integration of a GIS into its real estate land and ROW management operations. Through the use of GIS, New Mexico DOT has greatly reduced record maintenance costs as well as its response time to internal and external customer requests to a matter of minutes rather than hours or days.

The integration of GIS and property management has allowed the agency to maintain an electronic, geospatial database of parcels, sales, abandonments, trades, leases, encroachments, and road exchanges.

<sup>13</sup> Hancock, 2011. NCHRP 8-55A: Developing a Logical Model for a Geo-Spatial Right-of-Way Land Management System, available at: <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2326>

<sup>14</sup> Some regional roundtable participants pointed out a frustration that the earnings from sold properties are not typically directed back into the property management function.

<sup>15</sup> *Ibid* footnote 13.

## 4. Template for the Effective Management of Real Property Assets at State Departments of Transportation

The contexts under which SDOTs develop requirements for their property management inventories and the resulting systems vary; however, there are basic elements that are consistent across agencies. The following section describes property inventory system ideals that SDOTs participating in the Regional Roundtables as well as other select stakeholders suggested. State Departments of Transportation need not follow each of these approaches and, instead, should continue to tailor their respective systems to their own needs. The presented items, however, are potential best practices that may help SDOTs improve the foundations of their property management procedures, as appropriate.

### 4.1 Inventory System Ideals

Stakeholders from SDOTs agreed that property management inventories should be adaptable regardless of whether they are sophisticated, web-based systems or more modest tools, such as those that spreadsheets can offer. That flexibility may be expressed through what the system does (functional considerations); how the system does those things (technical considerations); and, how the staff members interact with the system (human factors considerations).

#### *Functional Considerations and Best Practices*

- **Develop interdisciplinary system requirements**

At a fundamental level, the inventory system should be able to answer the questions that ROW staff are being or anticipate being asked. State Departments of Transportation should consider formulating functional requirements for their property inventories in coordination with SDOT leaders and other SDOT disciplines to ensure that multiple perspectives are reflected and to reduce the likelihood of being asked to report on topics for which data are unavailable or not easily accessible.

- **Promote property sales**

According to SDOT stakeholders, the property inventory ideal would facilitate the sale of SDOT properties. This might include the ability to automatically populate a publicly-accessible webpage dedicated to listing properties that are on the market.<sup>16</sup>

- **Track the most appropriate property features**

In addition to parcel numbers and classes of properties, the model property inventory would have the ability to track all or some of the following:

- Surplus properties that the SDOT previously owned— in other words, the system would not “lose” records when properties are sold or otherwise disposed.
- Utility permits and milestones in the permitting process
- Current project status (e.g., active versus closed)
- Cell phone tower leases

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<sup>16</sup> In 2008, HEPR recognized the Oregon DOT’s ROW Division with a “Technical Specialties Awards” for the Division’s creation of the “ROW Data Management System.” The system gives public and contractors access to certain summary property information and forms via the Internet.

- Parcel numbers
- **Notify others of ROW encumbrance status and other pertinent information**

Obtaining property encumbrance releases on acquired property may be necessary in order to clear the property's title. The complexity of this process depends on the interest acquired and the type of title information the agency obtains. Regional roundtable participants believed an effective property inventory system would provide ROW staff members with the ability to keep all interested parties apprised of the status of ROW encumbrances and other important information. The ability for the inventory to broadcast updates would help ensure that appropriate staff members stay apprised of the best or most current information available.
- **Track Title 23 funding**

Title 23 of the United States Code (USC) outlines the role of highways, including the funding of Federal-aid highways. A potential property inventory best practice would be to ensure that the inventory system links to the agency's accounting system in order that monies from various funding streams (i.e., Title 23 funding and state funding) are kept track of separately and accurately. Alternatively, a SDOT might choose to track income generated from property sales in its acquisition system or directly in the inventory system. Either way, system users should have the ability to indicate whether federal funding was involved in the transportation project and then track how it is used moving forward.

### *Technical Considerations and Best Practices*

- **Link to mobile devices**

Participants from SDOTs noted that modern property inventories should be designed to anticipate the expansion in use of mobile devices, including phones and tablet computers, in the field. This could include the ability to scan Quick Response (QR) codes, barcodes, or other similar markings that were imprinted on assets (such as maps or signs) in order to electronically retrieve all relevant project files. It might also involve, for example, a feature to automatically capture or access online images or real-time aerial information of the parcel(s) in question, for example via Google Streetview or Google Earth. In any case, making the link to mobile devices and incorporating more visual, user friendly elements can make all property management staff members' jobs easier, while better engaging younger staff who may be more accustomed to modern-looking data interfaces.
- **Ensure limitless query and reporting capabilities**

A common recommendation among stakeholders was that ROW staff members should be able to search their agency's property inventory by any criteria. Such capability would facilitate their ability to respond to data requests. Along these same lines, the model property inventory system would allow users to generate ad hoc reports, since standardized, pre-produced reports may or may not offer the information desired for a given purpose.
- **Provide electronic signature and validation**

State Departments of Transportation with more technologically multifaceted property inventories could explore the incorporation of encrypted digital signature and validation tools into their systems. Such tools can reduce the time necessary to receive approvals, submit simultaneous copies of the signed forms to multiple recipients, and improve archiving ability.



- **Automate forms**

Where possible, the fields required in the inventory's various forms should be automatically populated to avoid duplication of work, erroneous data entry, and unnecessary clutter that detracts from the user-friendliness of the interface. Forms should also be easily modifiable so that the inventory can be adapted to evolving priorities and reporting requirements.

- **Simplify search mechanism**

In some current property management systems, users must search for property owners' names several times during a query in order to gather the information being sought. This is often due to the fact that different modules of the inventory and/or different peripheral systems were developed at different times, perhaps independently from one another. Stakeholders noted that the ideal property inventory would enable users to look up a property owner's name only once to view all of the associated information that had been input for that owner and his/her property.

- **Integrate with other ROW or SDOT systems, including GIS**

A model property inventory system would have a means by which the system itself or its users can directly interact with other contemporary systems within the agency, particularly any property acquisition systems that may exist. Property management is not a function that operates in a vacuum, and tie-ins to other SDOT activities would be beneficial. Some regional roundtable participants commented that it would be helpful if their property inventories could communicate with other systems within the agency showing milestones in the utility permitting process and/or active versus closed projects, since final maps are often only created for closed projects.

This integration might also include the incorporation of or linkage to a GIS component. Nearly all regional roundtable participants agreed that integrating the property inventory tools with their agencies' GIS has been or would be a technically and organizationally challenging, but critical and sometimes overdue, next step for the property management discipline. State Departments of Transportation should encourage decision makers to appreciate the wide-ranging value of geospatial information, including its pertinence to ROW activities such as property inventorying.

- **Draft clear consultant requirements**

Where consultants are employed to develop or maintain a SDOT's property inventory, their work would preferably be based on clear consultant requirements that SDOT staff members can manage closely. All terms should be plainly defined in scopes of work, and attention should be given to describing the context and specific needs of the state, as some consultants may market tools previously developed for other states.

Contract language might include stipulations that would allow the SDOT to reacquire its data if another consultant or inventory tool is used in the future; there have been cases where the code upon which a consultant's system is founded is proprietary to that firm or where the consultant "owns" the information that is entered into the system. State Departments of Transportation might also make efforts to avoid writing unrealistic scopes that lock the agency in to inflexible positions on standards, software, schedule, or methodology.

These and other similar issues might be avoided via improved contract writing. As such, SDOTs suggested that there may be a need among DOTs for training in contract writing.

- Incorporate data quality protections**

Regional roundtable participants pointed out that property inventories are only as good as the data entered into them. It was suggested that the model property inventory would provide distinct explanations for why errors occurred when they occur. In many cases currently, when data are erroneously input into inventories, users are only returned an error message indicating that something has not been accepted. More detailed clarification for what should be changed would be beneficial. This information could be supplemented by well-documented training courses or tutorials that help SDOT users learn how to input data in high-quality, standardized manners, thus reducing the likelihood of receiving error messages in the first place.
- Balance security with ease of use**

According to most Regional Roundtable participants, the ideal property management inventory would be secure, but not over-secure. Requiring too many passwords can make a system cumbersome and limit the efficiency of staff members using it. There was no recommendation as to what an inappropriate number of passwords might be, but comments suggested that this should be a topic for discussion among property management and IT staffs when SDOTs are developing or revising requirements for their respective property inventories.
- Limit the duration of application development**

Critical knowledge and skills can be lost as staff turnover occurs. By limiting the duration of application development, managers can help reduce the risk of losing expertise integral to fully deploying property management tools on schedule.
- Maximize computing power**

The property inventory ideal would rely on adequate computing power. Several SDOTs expressed that their systems had been known to time out before successfully generating requested reports. Model inventories would be constructed on IT infrastructure that had sufficient power to ensure that needed reports could be run with minimal risk of system time out.

### ***Human Factors Considerations and Best Practices***

- Dedicate a staff member**

Some Regional Roundtable participants suggested that, when possible, having a staff person whose primary job duty is working on the property inventory would be a best-case scenario. Another effective practice would be providing training to a staff member(s) to become an “understudy” to the consultant, when they have been hired, to develop an understanding of how to update and modify the inventory as necessary.
- Focus on ease of data entry**

A model property inventory would not be labor intensive to fill out. Although several different SDOT functions may use an inventory’s data, those functions should not all need to enter the same information. Where possible, developing a single point of data entry should be sufficient.
- Facilitate printing**

Reports that property inventory generates should be optimized for printing. A number of SDOTs noted that significant time could be saved if staff members did not need to reformat and

redesign information pulled from the property management inventory in order to produce a high-quality, clear, and easily legible hard copy for distribution.

- **Periodically assess whether all data fields are necessary**  
Business needs evolve over time. Keeping those needs and the associated questions derived from them, as well as any existing performance metrics, SDOTs should periodically review the data fields in their property inventories to confirm that they are not superfluous or redundant in nature. Such an activity can help ensure that staff members' productivity when inputting information in the inventory is maximized.
- **Where applicable, consider deploying a limited number of modules at a time**  
There may be a learning curve associated with new property inventory. Rolling out components gradually can help ensure that staff members are able to seamlessly adapt to the evolving business practice.

# Appendices

- Appendix A. List of Regional Roundtable Participants
- Appendix B. Literature Review of Relevant Resources and Works Cited

## Appendix A. List of Regional Roundtable Participants

### Sacramento, CA Regional Roundtable – February 8, 2012

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### Austin, TX Regional Roundtable – February 22, 2012

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<b>Virginia Tsu</b> , FHWA <a href="mailto:virginia.tsu@dot.gov">virginia.tsu@dot.gov</a>		

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### Charlotte, NC Regional Roundtable – March 7, 2012

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## Appendix B. Literature Review of Relevant Resources and Works Cited

**Blaesing-Thompson, Shawn. 2008. Washington State DOT – Digital Archiving and Spatial Enabling Real Estate Management, Proceedings of the American Association of State Highway and Transportation Officials, Geographic Information Systems – Transportation, 21st Annual Meeting, Houston, Texas.**  
[www.gis-t.org/files/svQmy.pdf](http://www.gis-t.org/files/svQmy.pdf)

This presentation describes a web-based system proposed by the Washington DOT which integrates all tabular and spatial databases and allows of retrieval of scanned documents. Methodology is provided to convert paper maps into digital maps, which are then integrated into GIS and CAD and demonstration is provided. The benefits of this system and the role of different people involved in the development of such a system are also discussed.

Key words: GIS, CAD, maps, database

**Cambridge Systematics Inc. and Data Transfer Solutions. 2008. System Planning to Support Spatially Enabled Business Process: Research of an Enterprise Geographic Information System for Transportation, Florida Department of Transportation, Tallahassee, FL.**  
[www.dot.state.fl.us/research-center/Completed\\_Proj/Summary\\_Map/FDOT\\_BDI40\\_rpt.pdf](http://www.dot.state.fl.us/research-center/Completed_Proj/Summary_Map/FDOT_BDI40_rpt.pdf)

This study formally analyzes the requirements and evaluates the business case for an enterprise system at Florida DOT. It includes a literature review pertinent to the concept of Enterprise GIS, an evaluation of past efforts in terms of a certain parameter, and uses information from past efforts to create and update missing products. The study also evaluates four enterprise GIS implementation options and determines that distributed data storage with enterprise standards is the best option.

Key words: enterprise GIS, business case

**Campbell, John, *et al.* 2009. Streamlining and Integrating Right-of-Way and Utility Processes with Planning, Environmental, and Design Processes in Australia and Canada. International Technology Scanning Program, Federal Highway Administration, U.S. Department of Transportation. FHWA-PL-09-011, NTIS, Springfield, VA.**  
[http://international.fhwa.dot.gov/pubs/pl09011/rowu\\_web.pdf](http://international.fhwa.dot.gov/pubs/pl09011/rowu_web.pdf)

This report documents a result of a study of Australia and Canada to learn about innovative practices for ROW and utility processes, sponsored by the FHWA, AASHTO, and NCHRP. It includes a variety of priorities for U.S. implementation, including the development of GIS-based ROW project and asset management systems.

Key words: corridor preservation, project development process, property management, public-private partnership, right-of-way, utility accommodation, utility coordination, utility relocation

**FHWA Office of Interstate and Border Planning and Office of Real Estate Services. August 2007. Peer Exchange on Applications of Geographic Information Systems in the Right-of-Way Area**  
[www.gis.fhwa.dot.gov/gisrow.asp](http://www.gis.fhwa.dot.gov/gisrow.asp)

This summary report of a 1.5 day peer exchange focuses on select SDOT's applications of GIS in

their ROW areas. It provides documentation of the presentations and discussions from the event, as well as lessons learned and recommendations.

Key words: right-of-way, peer exchange, SDOT, GIS

**FHWA Office of Interstate and Border Planning and Office of Real Estate Services. July 22-24, 2008. Geographic Information Systems Applications for Transportation Right-of-Way, Peer Exchange Summary Report.**

[www.gis.fhwa.dot.gov/documents/rightOfWay.asp](http://www.gis.fhwa.dot.gov/documents/rightOfWay.asp)

This summary report of a 1.5-day follow-up of the above peer exchange that documents the presentations and discussions of SDOTs regarding their ROW GIS applications. In particular, the DOTs share their progress on these applications, lessons learned, and recommendations for other SDOTs.

Key words: right-of-way, peer exchange, SDOT, GIS

**FHWA Office of Planning, Environment, and Realty. Real Estate Guide for Local Public Agencies: Property Management.**

[www.fhwa.dot.gov/realestate/lpaguide/ch8.htm](http://www.fhwa.dot.gov/realestate/lpaguide/ch8.htm)

The purpose of this guide is to explain to local public agencies the importance of ongoing property maintenance when it comes to acquired land for highways. It discusses property management activities needed before a property is closed out and those activities which occur afterwards.

Key words: property management, guide

**FHWA Office of Planning, Environment, and Realty. April 2011. Office of Real Estate Services Project Development Guide – Chapter 12: Property Management.**

[www.fhwa.dot.gov/realestate/pdg12.htm](http://www.fhwa.dot.gov/realestate/pdg12.htm)

This guide was developed by the Federal Highway Association is to assist in the development of Federal-aid ROW projects. Chapter 12 lays out step-by-step the property management responsibilities agencies have at each stage of their interaction with property acquired for ROW.

Key words: right-of-way, property management, federal-aid, guide

**Hancock, Kathleen. February 2011. NCHRP 8-55A: Developing a Logical Model for a Geo-Spatial Right-of-Way Land Management System. Transportation Research Board of The National Academies. Prepared by Virginia Polytechnic Institute and State University.**

<http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2326>

This research project, completed by the NCHRP, was developed to identify how state transportation agencies can use geographic information management systems to assist with acquisition of property and relocation of those affected. The project developed a logical model for a ROW land management system and identified ways in which the current and ideal systems could be linked. Multiple documents can be found on this project page, including the logical model and guide for implementation, final project report, appendices, and executive summaries.

Key words: right-of-way, GIS, information management systems, SDOT, case studies



**Hancock, Kathleen. 2007. Geospatially Enabling Information Management for Right-of-Way Activities, Transportation Research Board 86th Annual meeting proceedings. Washington D.C.**  
<http://pubsindex.trb.org/view.aspx?id=801705>

This paper presents several examples of different types of information systems currently in use by state agencies and how these systems have impacted their activities. It also begins to address the issues associated with moving into an enterprise information structure. It notes the challenges associated with ROW activities, including the delay of transportation projects and the resulting increased costs, and comes to the conclusion that automation of ROW functions and development of information management systems, particularly when integrated with geospatial technologies, can substantially improve performance and resource management within ROW agencies.

Key words: case studies, right-of-way, geospatial technology

**Harvey, F. 2005. Enhanced Coordination of Cadastral Information, Proceedings of the American Association of State Highway and Transportation Officials, Geographic Information Systems – Transportation, 20th Annual Meeting, Nashville, Tennessee.**  
[www.lrrb.org/pdf/200536.pdf](http://www.lrrb.org/pdf/200536.pdf)

Any Minnesota DOT (MnDOT) project that impacts property owners requires the coordination of cadastral (land ownership) and highway ROW information. MnDOT has already taken a step towards improving coordination between MnDOT offices and other government agencies with the State Parcel Map Inventory, a resource with information about the status and accuracy of cadastral information in 87 Minnesota counties. Government agencies have seen the potential in the State Parcel Map Inventory to better optimize data development and exchange through the use of GIS technologies. The finding of this project suggest that the State Parcel Map Inventory is a starting point for helping coordination, but more targeted efforts are called for.

Key words: GIS, inventory, cadastral data, right-of-way

**Krugler, Paul and Sergiy Butenko. 2010. Development of Decision-Making Support Tools for Early Right-of-Way Acquisitions. Texas Transportation Institute.**  
<http://tti.tamu.edu/documents/0-5534-2.pdf>

This report documents the work performed during phase two of Project 0-5534, “Asset Management – Texas Style.” This phase included gathering historical TxDOT ROW acquisition information, analyzing statistical information, and then developing simulation and optimization tools for TxDOT ROW sections and budget decision makers.

Key words: asset management, property management, Texas DOT

**Randazzo, Anthony and John Palatiello. 2010. Knowing What You Own: An Efficient Government How-To Guide for Managing Federal Property Inventories. Reason Foundation.**  
[http://reason.org/files/how\\_to\\_manage\\_or\\_sell\\_federal\\_property.pdf](http://reason.org/files/how_to_manage_or_sell_federal_property.pdf)

This report describes best practices that Federal agencies could use to improve property inventory tools and techniques.

Key words: property inventory, Federal property management, How-to Guide

**Randazzo, Anthony and John Palatiello. 2010. Knowing What You Own: An Efficient Government How-To Guide for Managing State and Local Property Inventories. Reason Foundation.**

[http://reason.org/files/how\\_to\\_manage\\_or\\_sell\\_state\\_local\\_property.pdf](http://reason.org/files/how_to_manage_or_sell_state_local_property.pdf)

This report describes best practices that state and local public agencies could use to improve property inventory tools and techniques.

Key words: property inventory, state and local public agency, How-to Guide

**Quiroga, Cesar, et al. 2009. Right of Way Real Property Asset Management – Prototype Data Architecture. FHWA Technical Report, FHWA/Tx-09/0-5788-1, NTIS, Springfield, VA.**

<http://tti.tamu.edu/documents/0-5788-1.pdf>

This technical report presents the results of a project to evaluate current ROW data practices at Texas DOT and other agencies, and develop and test a prototype GIS-based ROW asset data model.

Key words: right-of-way, asset management, real property

**Lambert, James H, et al. 2008. Risk-Based Framework Using Geographic Information Systems to Identify Transportation Corridors Vulnerable to Development, Federal Highway Administration Technical Report, FHWA/VTRC-08-CR8, NTIS, Springfield, VA.**

[www.virginiadot.org/vtrc/main/online\\_reports/pdf/08-cr8.pdf](http://www.virginiadot.org/vtrc/main/online_reports/pdf/08-cr8.pdf)

This study developed a comprehensive approach using GIS to identify and prioritize the needs for protection strategies in countywide corridors. Over eighty GIS data layers sourced from Virginia DOT, Fauquier County, and others were evaluated to determine appropriate factors for the analysis.

Key words: GIS application, prioritize, analysis, model, transportation corridors

**Quiroga, Cesar, et al. 2009. Utility Installation Review System – 2008 Follow-Up Report, FHWA/TX-09/5-2110-03-4, NTIS, Springfield, VA.**

<http://tti.tamu.edu/documents/5-2110-03-4.pdf>

This report summarizes work completed in 2008 on a system, called Utility Installation Review, which enables users to submit and process installation requests online, including supporting documentation such as design and construction drawings. The system also includes an online GIS-based interface that enables users to locate and query proposed installation requests using an interactive map.

Key words: utilities, right-of-way, utility permits, utility inventory, utility accommodation, GIS

**Saka, A. 2004. Geographic Information System Implementation of State Department of Transportation Right-of-Way Programs. Prepared for FHWA. DTFH61-03-H-00121, Washington, DC.**

[www.fhwa.dot.gov/realestate/rowsurvjuly04.htm](http://www.fhwa.dot.gov/realestate/rowsurvjuly04.htm)

This report, based on the case study of eight SDOTs, documents the extent GIS technology is used in the various ROW functional areas, and the pros and cons associated with such endeavors. A combination of literature review, survey and interview on GIS application in ROW revealed that, although the use of GIS technology is still very much localized and in its infancy, the SDOTs are aware of the opportunities GIS presents in streamlining the implementation

processes of ROW programs. Currently, GIS application in ROW largely involves mapping and inventory activities. A frequently cited hindrance to large-scale GIS application in the SDOTs is the lack of time and personnel resources. The general consensus is that adequate allocation of resources is necessary in order to mainstream the use of GIS in the implementation of ROW programs at the SDOTs. Best Practice Methods of GIS implementation is documented for the ROW functional areas most likely targeted for GIS application.

Key words: GIS, mapping, best practice methods, case studies, SDOT, right-of-way

**Transportation Research Board, Transportation Asset Management Committee and Spatial Data and Information Science Committee. 2006. Geographic Information Technologies for Asset Management – A Peer Exchange. Transportation Research Board, Kansas City, Missouri.**

<http://onlinepubs.trb.org/onlinepubs/circulars/ec108.pdf>

This report documents the results of a peer exchange to investigate state and local agency applications of spatial technologies for asset management, conducted by the TRB, Transportation Asset Management Committee, and Spatial Data and Information Science Committee. Included are the perspectives of each agency and a summary of their responses. Overall, it was determined that there were three major issue areas in moving spatial technology applications to the next level: managing change, data integration, and communication. Upon a thorough discussion of these issues, the peer participants identified research to address three areas of interest: temporal issues, symbology, and data and visualization models.

Key words: peer exchange, geospatial technology, data integration, property management

**Warmath, Eric. 2008. Nevada DOT's Integrated Right-of-Way Information Network project, Proceedings of the American Association of State Highway and Transportation Officials, Geographic Information Systems – Transportation, 21st Annual Meeting. Houston, Texas.**

[www.gis-t.org/files/GPSuY.pdf](http://www.gis-t.org/files/GPSuY.pdf)

This presentation summarizes the features of the IRWIN application, developed by Nevada DOT.

Key words: GIS, right-of-way, case study