

WSDOT Manual Modernization Vol. 1: Scoping

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Frances D. Harrison

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Knowledge Management Services

WSDOT Manual Modernization Vol. 1: Scoping

FINAL REPORT

Prepared for:
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Prepared by:
Spy Pond Partners, LLC
1165R Massachusetts Avenue, Suite 101
Arlington, MA 02476



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Deploying Practical Solutions Using Lean Techniques and Knowledge Management (PS AID Project)

Project Management Staffing

Leni Oman, Knowledge Strategist, WSDOT
Riley Woodward-Pratt, Information Specialist, WSDOT
Frances Harrison, Spy Pond Partners, LLC
Ralph Poole, IKnow, LLC

PS AID Project Manual Modernization Project Team

Ahmer Nizam, Business Manager, Development Division
John Donahue, Design Policy and Analysis Manager, Development Division
Chris Schroedel, Transportation Engineer 5, Development Division
Ida Van Schalkwyk, Transportation Technical Engineer, Development Division
John Tevis, Transportation Technical Engineer, Development Division
Stephanie Williams, Communications Consultant 4, Development Division
Dustin Saunders, Communications Consultant 3, Development Division
Pamela Meek, Communications Consultant 3, Communications Office
Ashley Carle, Environmental Procedures Manual Coordinator, Environmental Services Office
Chris Regan, NEPA/SEPA Program Manager, Environmental Services Office
Gary Brown, IT Business Analyst, Information Technology Division
Kate Severson, Practical Solutions Training Manager, Development Division
Amber Sanders, Lean Manager, Lean Office

Development Division Manual Stewards

Chris Schroedel (Design Manual Manager)
Stephanie Williams (Division web master)
Ahmer Nizam (Development Division Technical Services and Business Manager)
Bill Berens (Standard Plans)
Heath Bright (Bridge List)
Ashley Carle (Environmental)
Gretchen Coker (Environmental)
Barb De Ste Croix (Plan Preparation, Development Services)
Mark Gabel (Cost Estimating)
Julie Hartwig (Roadside)
Clint Hill (Electronic Engineering Data Standards)
Terry Meara (ROW)
Bill Mumma (Survey, ROW Plan Preparation)
Alex Nguyen (Highway Runoff)
Roman Peralta (Bridge Inspection)
Elsa Pond (Temporary Erosion and Sediment Control)
Abe Sahari (Hydraulics)
Scott Sargent (Bridge Design)
Larry Schofield (Consultant Services)
Glen Scroggins (Bridge Inspection)
John Tevis (ADA)
Rhonda Wiest (Utilities)
Eric Wolin (Environmental)

WSDOT Information Managers

Jeremy Bertrand (Communications)
Mark Finch (Transportation Data/GIS)
Alan Smith (GIS)
Christy Granquist (WSF Library)
Kathy Szolomayer (WSDOT Library)
Clint Hill (CAE)
Grant Rodeheaver (IT Director)
Gordon Kennedy (Data Management)
Gary Brown (Business Analysis, Application Design)
Elizabeth Lanzer (Environmental Information)
Kate Severson (Practical Solutions Training)
Kim Smeenk (Materials Lab Librarian)
Dave Richards (IT Business Analysis)
Shannon Gill (Records Management Supervisor)
Pamela Meek (Publications Office)

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16. Abstract The Washington State Department of Transportation (WSDOT) maintains several manuals that provide technical policy and procedures. These manuals are produced separately and published in PDF format. As part of a Practical Solutions Accelerated Innovation Deployment (PS AID) Project, WSDOT undertook an effort to explore improvements to the management of agency manuals in order to: Sustain/improve access to manual content and interactive capability; Streamline improvements to manual content and expedite delivery; Connect process to resources to do the work – e.g. hyperlinks to data resources; Support robust search – e.g. going beyond a straight text match by integrating use of synonyms, use of faceted search; Manage versions of content and find them as needed; Implement effective security for protected content; and Provide open access for content that is not sensitive/protected. This report summarizes the efforts to identify improvement needs, develop business requirements for manual production, publication, and use; and, scope a pilot project. Volume 2. Summarizes the work done to develop and test a pilot site.			
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Table of Contents

1. Introduction	1
Background	1
Approach.....	1
Document Organization.....	2
2. Scan of Tools	2
Wiki Software.....	2
Content Authoring/Production and Publishing Platforms.....	3
3. MoDOT Engineering Policy Guide Experience Review.....	4
4. Stakeholder Input.....	5
Scoping Workshops.....	5
User Survey	6
Project Team Visioning Session	7
5. Development Options/Requirements.....	8
6. Development/Pilot Work Plan	12
Pilot Goals and Anticipated Deliverables.....	13
Work Plan for Pilot.....	14
Appendix A. Developing an Integrated Engineering Policy Guide: The MoDOT Experience.....	26
Introduction	26
Background on MoDOTs EPG.....	27
Information Gathering Process.....	28
Summary of MoDOT Responses	28
EPG’s History Feature	33
Appendix B. Workshops.....	36
Workshop with Development Division Manual Stewards	36
Information Management Stakeholder Workshop	47
Appendix C. User Survey Response Summary	52
Appendix D. Objectives and Functional Requirements	55
Notes on Requirements and Priorities:.....	55

List of Tables

Table 1. Manual Modernization Project Goals, Objectives, and Business Processes.....	10
Table 2. Manual Modernization Goals and Project Deliverables	13

List of Figures

Figure 1. MoDOT EPG – Main Page..... 26

Figure 2. MoDOT EPG – Sample Screen 26

Figure 3. Finding the History Tab 33

Figure 4. Sample of Revision History 33

Figure 5. Sample showing how to select content versions..... 33

Figure 6. Screenshot of the manual content for the selected date..... 34

Figure 7. Sample showing how to compare two versions 34

Figure 8. Sample of the comparison for two versions of the selection on Junkyards 35

1. Introduction

Background

As part of a Practical Solutions Accelerated Innovation Deployment (PS AID) Project, WSDOT undertook an effort to explore improvements to the management of agency manuals in order to:

2. Sustain/improve access to manual content and interactive capability
3. Streamline improvements to manual content and expedite delivery
4. Connect process to resources to do the work – e.g. hyperlinks to data resources
5. Support robust search – e.g. going beyond a straight text match by integrating use of synonyms, use of faceted search
6. Manage versions of content and find them as needed
7. Implement effective security for protected content
8. Provide open access for content that is not sensitive/protected

This effort was inspired, in part, by the Missouri DOT's Engineering Policy Guide (EPG). The EPG is a wiki-based resource that provides a single reference for engineering and engineering-related guidance. It was created by combining six pre-existing separate manuals for Right of Way, Design, Bridge, Construction, Traffic and Maintenance. Missouri DOT (MoDOT) created this resource using [MediaWiki](#), an open source wiki originally created for Wikipedia.

MoDOT's EPG provided a model for WSDOT to consider as part of its current efforts to implement Practical Solutions using Lean Techniques and Knowledge Management. As MoDOT's main EPG page notes:

“MoDOT has made great strides to build a good transportation system and increase taxpayers' trust in its ability to deliver what was promised. Innovative concepts, such as Practical Design and design-build, were used to deliver those commitments and have made MoDOT a leader in the transportation industry. These forward-thinking, innovative concepts are reflected in the EPG.”

Approach

This effort involved the following tasks:

1. **Scan of Tools** – Review of available software tools available for creating an online engineering manual.
2. **MoDOT EPG Experience Review** – Conduct an interview with MoDOT EPG staff to understand the EPG development and maintenance process and identify lessons learned that may be applicable to WSDOT
3. **Stakeholder Input** – Facilitate a workshop with key stakeholders to identify objectives and concerns to be addressed in scoping development of an interactive, online body of manual content. Conduct a survey of manual users to identify usage patterns and usability concerns.
4. **Development Options/Requirements** – Identify options for future development considering platforms, scoping, and capabilities to be provided.

5. **Development/Pilot Work Plan** – identify tasks needed to move forward with development of the preferred option.

As the work progressed, the original scope was refined based on what was learned in early tasks. The initial focus on wiki solutions was broadened to a wider set of solutions for development of an interactive platform for accessing manual content. In addition, given the complexity of the needs identified within the scoping workshop, rather than creating a single set of development options, a set of goals, objectives and prioritized requirements were developed. The Development Work Plan was focused on defining activities for piloting various requirements rather than development of a production system.

Document Organization

The remainder of this document summarizes the results of the five tasks that were outlined above. Detailed products are included as appendices.

2. Scan of Tools

Two types of tools were briefly reviewed: wiki software, and content authoring, production and publication platforms. The scan focused on identifying key features that would support manual authoring, publication and use; they were not aimed at enumerating or conducting detailed evaluations of individual products.

Wiki Software

A variety of wiki software is available, including MediaWiki – the open source software behind Wikipedia, and commercial packages such as Confluence. Wiki software supports a distributed model for content creation, and enables collaborative authoring.

Features vary across wikis, but many offer capabilities for tracking changes made by individual users and the ability to view snapshots of content as it existed at prior points in time. Wikis can be open for all to edit, or they can restrict editing to authorized users. Authoring in some wikis requires learning a simple wiki markup language, though some wikis have WSIWIG (“what you see is what you get”) editing. Wikis are generally not suitable for producing professionally formatted print documents or supporting a multi-channel publishing process.

There are many wiki options available. Selection of wiki software involves evaluation of the following types of features against requirements:

- **File or Database** – whether content is managed in a database or in a file system
- **Search** – full text, wildcard, file search, autocomplete, faceted search, redirects (synonyms), ability to assign tags to pages
- **Editing** – option for WSIWIG editing
- **Content Structuring** – namespaces (content separation), subpages (hierarchies), templates, forms, moving/renaming pages, input boxes, auto-generate TOC for long articles
- **Document Management** – ability to link documents, size limits, access control, versioning/archiving, categorization, filtering, sorting
- **Export** – to XML, PDF, DOC, Print

- **QA** – ability to assign pages to editors, support review workflow, reminders, etc.
- **Interaction** – commenting, social ratings
- **Tracking** – track visitors to each page, authors of each page
- **Versioning** – version history, version comparison, change notification, related change notification (backlinks)
- **Reporting** – email digests, user/admin dashboards, orphaned articles, broken redirects, newly added pages/files, list older articles, list short/long articles, contributions by user, RSS subscriptions to changes
- **Access Controls** – ability to restrict permissions to wiki sections, pages
- **Administration** – user account manager, namespace manager, group manager, permission manager, logging, extension manager, duplicator, global search and replace, mass delete, import from XML
- **Infrastructure** - Login/centralized authentication (e.g. Active Directory), Query API – for access to metadata, Integration with external content
- **Security** – registration/login, spam prevention (e.g. via CAPTCHA), spam blacklist, access restriction by page and namespace
- **Personalization** – user preferences, user sidebars (customizable navigation to favorite topics), avatars
- **Skinning** – customizable themes, custom CSS, different styles by namespace
- **Mobile** – browse, search, view, edit, notifications

Examples of wikis that were reviewed:

- Missouri DOT’s Engineering Policy Guide: http://epg.modot.org/index.php?title=Main_Page
- WSDOT’s wiki used internally for data warehouse work: http://dokuwiki/doku.php?id=data_warehouse:cognos_docs (internal WSDOT site)
- The [Pavement Interactive](#) site developed by Pavia Systems through a Transportation Pooled Fund project
- A wiki called ‘Skybrary’ containing articles on Accident/Incident data http://www.skybrary.aero/index.php/Category:Accidents_and_Incidents – semantic wiki (Pick an incident and select browse properties on the left to see the data structure associated with the info on the page. This allows for the info to be viewed using timeline, map and faceted search.)

Content Authoring/Production and Publishing Platforms

Currently content for the manuals at WSDOT is primarily authored in Microsoft Word, formatted using InDesign and published in Adobe Portable Document Format (PDF). There are a range of other content authoring, publication and management tools that support various aspects of the authoring, production and publication process:

- **Desktop publishing software** such as Adobe FrameMaker and Microsoft Publisher. (Adobe FrameMaker has overlapping features with InDesign – InDesign has stronger layout capabilities; FrameMaker has stronger features for production of large, complex technical documents.)

- **Technical documentation packages** such as Adobe Robohelp, Help & Manual, and Madcap Flare. These packages are designed for authoring modular topic-based content that can be published in multiple forms – e.g. a printed manual and html for online help.
- **Web Content Management Systems** such as Drupal for creating, editing, and publishing web content. WSDOT has implemented Drupal for its intranet site. Drupal is an open source tool and has several optional modules available. One such module is Drupal Book. The book module allows individual authors to create web pages representing manual subsections that are tied together in a hierarchical sequence (e.g. representing chapters, sections and subsections).

Key features of authoring, production and publishing platforms may include:

- **Single source authoring with multi-channel publishing** – ability to create and maintain a single repository of source content that can be re-used, combined in different ways, and published to multiple formats (PDF, .DOCX, HTML5, WebHelp, etc.)
- **Conditions** – ability to set conditions for when and how different content elements will appear
- **Import/export capabilities** – ability to import and export content from/to a variety of file formats
- **Collaboration support** – support for co-authoring, review/comment workflow; social collaboration
- **Tagging/Metadata** – ability to tag each topic with vocabulary terms to facilitate search
- **Link Management** – ability to create, view and adjust incoming and outgoing links for each topic
- **Topic Relationship Support** – ability to create and maintain a table of related topics enabling generation of online suggestions and cross-references in printed versions
- **Glossary Integration** – ability to incorporate glossary terms into the content
- **Template support** – ability to create and use templates to standardize formatting and re-use standard content components
- **Multi-language publishing** -ability to translate content for publication in different languages
- **Mobile device compatibility** – ability to automate display of content on different screen sizes
- **Equation support** – availability of an equation editor
- **Video support** – ability to embed videos

3. MoDOT Engineering Policy Guide Experience Review

A structured interview was conducted with the manager of MoDOT’s Engineering Policy Guide (EPG) Wiki. Results of this interview are detailed in Appendix A. Key take-aways from the MoDOT experience are:

- MoDOT launched its EPG wiki in 2007, as part of a Practical Design initiative. The EPG replaced existing individual manuals from multiple divisions in the organization including construction, maintenance, design, traffic, right-of-way, environmental, and planning. The effort involved gaining consensus on common definitions across the different groups.
- The EPG content does not include engineering standards that are contractually binding. Standard Specifications, Standard Drawings, Pay Items, and Job Special Provisions, and Design Standards Letters are produced separately from the EPG. The EPG contains links to the current

versions of these documents. It also contains links to a variety of other resources, including standard forms, checklists and Quick Reference Guides

- A single group coordinates and supports the wiki. A single individual spends 80% of his time maintaining the wiki content.
- MoDOT selected the WikiMedia platform and hosts the software and data internally. They did not conduct an extensive investigation of alternative platforms for the EPG.
- The ability of the wiki to maintain a change history and produce snapshots of content as of a certain point in time are viewed as particularly valuable.
- The wiki is open to the public for viewing. However, the collaboration features of the wiki are not being used – the vast majority of edits to the content are made by a single individual. Additional wiki features are available to registered users (primarily MoDOT employees) such as subscriptions to changes.

4. Stakeholder Input

Scoping Workshops

Two scoping workshops were held on July 20th, 2017, one with manual stewards and other with information managers who would support or be impacted by this effort. Appendix B provides summaries of these workshops.

In general, participants were supportive of pursuing streamlined and coordinated processes for updating manual content and moving to a more integrated and easily searchable body of content. Key potential advantages of this approach were:

- Moving to a content-centric view of information that focuses on end users and their needs rather than organizational structure, consistent with the approach to the website.
- Improving current processes for updating content and managing review processes
- Capturing better information about who is referring to different manual sections
- Reducing the time it takes to make manual updates
- Improving interconnections across manuals and keeping content in synch, improve stability and currency of cross-references
- Improving style consistency across manual content
- Added flexibility to tailor content for different types of users
- Improving ease with which users can find relevant information and navigate across related information
- Transitioning away from PDFs which are not accessible

Both manual stewards and information managers raised a number of concerns to be considered within the scoping of the effort. These are summarized below.

- Coordination of manual changes:
 - Careful planning and coordination to ensure that responsibilities are clear and that workflow for updates does not become overly complex.
 - Currently there are very different update cycles across the manuals – this needs to be considered. There may be an opportunity to synchronize updates.
 - Need to put in place controls needed to coordinate updates
 - Need to determine how to manage access to enable authors to edit

- Need to put in place methods to keep people informed about what content has changed
- Need to prevent fragmentation of content that could result from getting more authors involved in the update process
- Need to define expectations for updates and processes for different levels of updates - – e.g. minor “housekeeping” updates versus substantive decisions?
- If new processes are added for coordination, avoid bogging down manual stewards responsible for largely independent content.
- Version management
 - Need to manage versions
 - Important to maintain the ability to access versions of manuals as they existed at particular points in time (currently accomplished through archiving PDF versions).
- Level of effort:
 - Need to understand level of effort involved in making the transition and recognize limitations in current staff capacity to take on more work.
- Phasing and Transition
 - Need to plan how this is phased, and how to transition from the current approach to the new approach – may need to temporarily maintain two bodies of content.
- Access to Content
 - Need to maintain access to manual content in emergency situations or other times when there is no internet access
 - Desire to have paper copies to take notes on and take into the field
 - Need to ensure 508 compliance
- Records Management/Public Disclosure
 - Need to clarify what is the official “system of record” for manual content in a topic-centric, single source, multichannel publishing framework.
- Other
 - Because the Design Manual is a legal document, it would be helpful as part of this effort to explore ways to more clearly distinguish policy (must do) from procedure (how to do). At the same time, we need to recognize that undertaking changes in the style of writing (e.g. to reflect a more procedural or task orientation) would require substantial effort.
 - Compatibility with other WSDOT systems is an important consideration: the intranet and internet sites; standard forms; database platforms; spatial referencing standards.
 - Alternatives to wikis should be explored; the platform selection should be based on the business requirements.

User Survey

A survey of manual users was conducted in December 2017 to better understand how people are using the existing manuals and what issues may exist with finding relevant content or navigating across manuals. A total of 362 people responded to the survey. Roughly half of the respondents were WSDOT staff; the other half represented local government and consultants.

The most-used manuals among respondents were the design manual, the construction manual and the local agency guidelines manual. The predominant reason for using manuals was to check standards, guidance or policies.

One half of the respondents used online versions of the manuals; 15% used a mobile device to access the manuals; 17% used printed copies.

Responses to questions about the ease of finding material were mixed – indicating that findability is an issue for some but not for others. Over half of the respondents indicated that they would like the capability to do a full text search across manuals. Some users commented on the need for better intranet/internet search capabilities for manual content.

Appendix C provides a more complete summary of the user survey findings.

Project Team Visioning Session

A visioning session involving the project team was conducted to further discuss the scope and objectives for this effort. Participants were asked to brainstorm about what success would look like – with respect to:

- The manual end user experience;
- The product – i.e. the new navigable body of manual content to be produced, and
- The manual authoring and publication process.

In addition, other ideas were offered about what a successful pilot would look like. Results are shown below.

User Experience

- We don't have a daunting list of manuals users need to choose from
- Fewer manuals
- Users can find the 'policy' and know how to find the info they need when they need it
- Creating a seamless experience for users of guidance, reference and other training materials
- More real-time implementation guidance that's tried and true

Product

- System that facilitates the management of content and review input by internal and external partners (and creates an/several archive able files)
- A shared repository for all content, published or not
- A platform supports storing and queuing prospective policy updates
- Mobile format, searchable, linked to all references, showing change log
- Seamlessly interconnected manual content
- Pop up video, e-learning snippets connected to related content
- Access to examples, case studies, resources
- Navigation to deeper/connected resources/other manuals
- Customized modules
- Visual access to information
- Task based with whole world view in mind
- Web content based manuals
- Webpage – manual integration
- Search features
- More/better hyperlink flexibility amongst the manuals at the sub-section level
- Thoroughly tagged content allowing users to navigate content by subject
- Success = other divisions clamoring to emulate our format and accessibility

Process of Updating Manual Content

- Managed autonomously by subject matter but integrated with centralized assistance
- Communicating our important changes
- Content tagged for expedient access for revision by the responsible SME
- Using best practice for manual management
- A better process for content owners to publish policy and guidance. This will free them to provide more relevant updates as well as concentrate on other important tasks.
- Streamline internal and external review process
- Streamline preparation for publication and publication process
- Version control and access is managed and consistent
- Clarify what is required for maintaining a system of record for the manuals
- Change triage and prioritization
- Reinforce feedback loop – capture what is learned within the regions
- Clear information management practices. What to put where by which organization.
- Options for managing contents/comments [tools, process, gatekeeper]
- Resources to support manual management is a level playing field

Pilot Process and Results

- Use this project to illuminate the fact that policy development is part of people’s jobs – improving practices based on experience.
- Responsible staff have a role in development
- Consistent clear management expectations for engagement
- Customers can try it out and provide feedback
- Pilot represents full functionality of final product requirements
- Pilot explores the need to port over existing content
- Pilot includes a task to consider the scale of eventual full deployment
- IT staff are involved in development enough to help identify key issues about deployment
- Pilot product provides the opportunity for staff to interact with required functionality
- Improve workflow with Lean – Avoid formal workflow software until process has crystallized
- Culture, practice/expectation, tools, change commitments
- Practical solutions oriented
- A straight forward implementation for users, who will comment “why didn’t we do this sooner?” This will require a lot of work on the back end, but not necessarily hard or difficult process

5. Development Options/Requirements

A set of goals and objectives were developed covering both the manual authoring, production and publication process and the experience of manual users. Key business processes to be supported through technology solutions were also identified for each goal. Then, requirements were established based on the results of the stakeholder workshop and the input of the project team. Each requirement was further qualified as:

- Pertaining to either published manual content or draft manual content
- Required (must have), Desirable (would like to have) or Future (to be deferred)

Table 1 presents the goals, objectives and business processes. See Appendix D for the full set of requirements.

Table 1. Manual Modernization Project Goals, Objectives, and Business Processes

Goals	Objectives	Business Processes
<p>1. Expedite development and delivery of new/modified manual content</p>	<p>Reduce time required for production tasks (formatting, graphics, etc.)</p> <p>Streamline/facilitate internal review - reduce time required for solicitation and compilation of comments on updated material</p> <p>Enable more frequent updates to content</p> <p>Reduce need for interim project delivery (PD) memos</p> <p>Maintain standards for catching typographic and other errors</p> <p>Capture why changes are being made</p>	<p>Create and maintain a list of authors/owners and reviewers for each section/topic</p> <p>Identify and manage dependencies across content sections</p> <p>Solicit comments on content from designated reviewers – internal and external</p> <p>Review comments and make updates to content</p> <p>Manage review and approval process</p> <p>Edit documents for style and accuracy</p> <p>Inform content users about changes to content</p> <p>Update the content</p>
<p>2. Manage and provide access to versions of content</p>	<p>Facilitate use of current policy, procedures and guidance</p> <p>Facilitate retrieval of content that was in place at a prior point in time to respond to public records requests, claims, or other needs</p> <p>Comply with applicable records and information management laws and regulations</p> <p>Manage use of outdated manual content</p>	<p>Respond to public records requests</p> <p>Respond to claims</p> <p>Compile reference information on the state of content associated with a contract</p> <p>Maintain history of changes</p> <p>Discover and use current and historical policy, procedures and guidance</p>

Goals	Objectives	Business Processes
<p>3. Improve findability, navigability and usability of content</p>	<p>Reduce time spent by users searching for content related to a particular topic or task</p> <p>Enable users to easily navigate to related content</p> <p>Enable tailored content for specific audiences – e.g. region staff, design-build contractors</p> <p>Maintain consistency in terminology and usage across content sections</p> <p>Maintain access to content when online version is not available or convenient to use</p> <p>Clarify the distinction between policy (must do), procedure (how to do), and guidance (should do)</p> <p>Meet 508 compliance requirements</p>	<p>Create, maintain, and apply necessary classification structures</p> <p>Curate content to be referenced/linked</p> <p>Create and maintain external links</p> <p>Manage glossary terms</p> <p>Discover and use current and historical policy, procedures and guidance</p>
<p>4. Facilitate user feedback on published content</p>	<p>Improve content by facilitating feedback from the users</p> <p>Understand how different content topics are used and by whom in order to guide refinements or prioritize updates</p>	<p>Facilitate user feedback</p> <p>Analyze utilization statistics and determine priorities for updates</p>

Goals	Objectives	Business Processes
5. Manage access to content	Enable external access to content Default to open access, but build in capability to restrict access for sensitive material should this be required in the future. Limit modification of working drafts to authorized individuals Limit commenting on published material to authorized individuals Limit viewing of comments on published materials to authorized individuals	Manage content classifications Manage user credentialing process for access to restricted materials

6. Development/Pilot Work Plan

Currently WSDOT manuals are published in PDF format and made available on WSDOT’s internet site. It is not possible to do a text search across the manuals in PDFs, impeding the ability to easily find relevant all content for a search subject. In addition, the current authoring and publication process is based on outdated, paper-based processes. Responsibilities for changes are distributed across multiple individuals and update cycles vary across manuals. Manual updates are time-consuming, which sometimes leads to issuance of guidance updates via separate directives or other workarounds.

A set of requirements have been developed for a future platform for authoring, publishing and delivery of WSDOT manuals. Several possible products have been identified that could potentially meet many of these requirements. A pilot project is proposed to do a limited test of these alternative platforms and provide a functioning example of an integrated, searchable navigable body of manual content. This pilot will provide the basis for determining whether WSDOT should move forward with a new manual platform – and if so, it will recommend which platforms are most promising and what steps will be needed to implement them.

Pilot Goals and Anticipated Deliverables

Table 2. Manual Modernization Goals and Project Deliverables

Goal	Deliverables
a. Test the development of an integrated, searchable, navigable body of manual content in alternative platforms.	<ul style="list-style-type: none"> • Demo version containing selected manual sections for all platforms tested. • Demo version of a series of web pages (developed in Drupal – WSDOT’s web content management system) containing selected manual sections.
b. Evaluate ability of alternative publication methods and formats to meet established requirements (See Attachment A.)	<ul style="list-style-type: none"> • Completed requirements evaluation matrix for: <ul style="list-style-type: none"> - Drupal Book publication - Madcap Flare publication - Other publication platform (TBD)
c. Improve management of older manual versions and linked content with consideration of records retention, archiving and administrative record requirements.	<ul style="list-style-type: none"> • Draft guidance and procedures covering storage protocols for draft manual content, comments and responses, historical content and linked content materials.
d. Advance WSDOT’s practices for improving findability of manual content by leveraging and extending existing vocabulary resources.	<ul style="list-style-type: none"> • Demo versions (in a) to include links that allow users to view a glossary term definition by “hovering” over the term in the manual content. • Documented process for manual authors to tag manual sections with terms from WSDOT’s glossary/thesaurus. • Documented process for adding new terms to add to WSDOT’s glossary/thesaurus as part of the manual content authoring workflow.
e. Identify opportunities for improving the manual content production and publication process.	<ul style="list-style-type: none"> • Lean workshop(s) facilitation and recommendations report
f. Determine WSDOT’s path forward based on the pilot.	<ul style="list-style-type: none"> • Summary report of pilot activities and lessons learned with recommendations for future implementation of successful techniques/platforms. • Options matrix with advantages and disadvantages, deployment cost estimates and notes on potential customization to meet requirements. • Transition plan for phasing in new publication tools/techniques
g. Communicate pilot results and recommendations.	<ul style="list-style-type: none"> • PowerPoint slide deck communicating pilot results, recommendations and what they mean for manual stewards, engineering publications staff, communications, and manual users.

Work Plan for Pilot

The following tasks are to be conducted through a collaborative effort by WSDOT staff and a consultant team. Four tasks are to be accomplished through WSDOT's participation as a test agency in NCHRP Project 20-97, Improving Findability and Relevance of Transportation Information. These tasks are labeled "NCHRP-1, NCHRP-2, NCHRP-3 and NCHRP-4".

Task 6.1 Project Management and Meetings

Objective: Coordinate activities across WSDOT and the consultant team to ensure a successful project result delivered within the allotted budget and schedule.

Consultant Activities:

- Develop and maintain project work plan and schedule
- Plan and facilitate regular project team meetings
- Prepare meeting notes
- Coordinate tasks across the project team

WSDOT Activities:

- Review and comment on project work plan and schedule
- Participate in regular project team meetings
- Review and comment on meeting notes
- Coordinate internal WSDOT tasks

Deliverables:

- 6.1.1 Project Work Plan and Schedule (baseline + 2 updates)
- 6.1.2 Project Team Meeting Notes

NCHRP-1 Content Preparation

Objective: Split up content from the manuals into sub-sections; prepare content to be included in the pilot for ingestion into the platforms to be tested. The pilot will include eight Development Division manuals with content related to stormwater management. The NCHRP project will include these eight manuals plus an additional set of manuals.

The eight stormwater-related manuals to be included in the pilot are:

- Design Manual
- Highway Runoff Manual
- Environmental Manual
- Hydraulics Manual
- Roadside Manual
- Roadside Policy Manual
- Temporary Erosion and Sediment Control Manual
- Utilities Manual

The following *additional* manuals will be used to conduct a broader text analysis as part of NCHRP 20-97:

- Consultant Services Manual
- Cost Estimating Manual for WSDOT Projects
- Development Services Manual
- Highway Surveying Manual
- Maintenance Manual
- Plans Preparation Manual
- Right of Way Manual
- Techniques of Right of Way Plans Preparation
- Traffic Manual
- Utilities Accommodation Policy

Consultant Activities:

- Process the eight stormwater-related manuals for ingestion into Drupal and other platforms to be tested within the pilot.
- Create PDFs for each sub-section (level 3 heading) for the 18 manuals to be included in the NCHRP project analysis. PDFs for sub-sections within the stormwater-related manuals will be created by exporting the processed manual content to PDF files.

WSDOT Activities:

- Review sample SQL database and provide guidance as needed to consultant team

Deliverables:

- This task will produce intermediary products to be used in the following tasks; there are no formal deliverables.
- Chunking software used for the HTML conversion to be delivered to WSDOT

NCHRP-2 Text Analysis

Objective: Design an approach to applying descriptive metadata and taxonomy terms to manual sub-sections to increase the efficacy of search.

Consultant Activities:

- Review existing WSDOT vocabulary resources for terminology including:

- The “PS Thesaurus” [Practical Solutions Thesaurus]
- The “EngPub Glossary” [Engineering Publications Glossary]
- The “TransAsset Thesaurus” [Transportation Asset Thesaurus, developed as part of a Kent State project]
- Taxonomies developed supporting the WSDOT PMRS Engineering Content Management System
- Conduct text mining (cluster analysis and topic modeling) to validate the following potential categorization schemes for manual content:
 - Asset type (e.g. material related to traffic signals or culverts)
 - Mode (e.g. material related to pedestrian and bicycle accommodations)
 - Project delivery task/deliverable (e.g. material related to producing different components of an Interchange Justification Report) - based on WSDOT’s Master Deliverables List
 - Practical solutions life cycle stage (e.g. material related to scoping)
 - Business function (e.g. material related to preventive maintenance, asset data collection or budgeting)

This analysis may identify additional categorization schemes to consider and support a model for assigning topic categories to sections.

- Recommend an approach to tagging using both rule-based and machine learning methods

WSDOT Activities:

- Review and comment on recommended approach

Deliverables:

- Technical memo describing the results of the clustering analysis and the recommended approach to tagging

NCHRP-3 Tagging Demonstration

Objective: Demonstrate application of descriptive metadata and taxonomy terms to manual sub-sections to increase the efficacy of search.

Consultant Activities:

- Develop and apply rules and machine learning approaches for assignment of taxonomy terms to sub-sections

WSDOT Activities:

- Advise on format for deliverable
- Review and comment on technical memo

Deliverables:

- File with assigned tags and corresponding sub-section references
- Technical memo documenting rules/approaches used

NCHRP-4 Implementation Plan

Objective: Create an implementation plan detailing tasks for implementing software and processes for implementing the machine learning and auto-categorization capabilities demonstrated.

Consultant Activities:

- Conduct interviews with WSDOT staff from Information Technology (Data Management and Applications Development), Communications, and Library who might play a role in maintaining and updating auto-categorization capabilities and systems that leverage these capabilities.
- Create a draft implementation plan with a concrete set of next steps to implement and maintain capabilities for enhancing search efficacy including:
 - Acquisition and installation of available open source tools for text analytics
 - Continued refinement and application of auto-categorization rules using these tools
 - Acquisition of available commercial and open source resources for enhancing search (e.g. libraries of commonly misspelled words)
 - Configuration of search engines (Solr) to take advantage of available vocabulary resources
- Review the draft implementation plan with WSDOT staff
- Create a final implementation plan reflecting comments

WSDOT Activities:

- Facilitate scheduling of interviews with WSDOT staff
- Participate in interviews – provide consultant team with information about current WSDOT roles and responsibilities, constraints and opportunities.
- Review and comment on draft implementation plan

Deliverables:

- Draft implementation plan
- Final implementation plan

Task 6.2 Pilot Content Analysis and Navigation Design

Objective: Create a navigation architecture for the pilot content and map the content sections to each of the selected navigation elements.

Consultant Activities:

- Review content from the eight manuals and recommend navigation options to be implemented within the pilot.

WSDOT Activities:

- Meet with manual authors to identify which other manual sections are related to/dependent on the sections that they author
- Collaborate on content analysis and recommendation of navigation options
- Map each section to the elements of the selected navigation options.
- Document the relationships of sections to create a blueprint to inform future changes using a mapping tool such as Enterprise Architect or NodeXL
- Work with manual stewards to validate the mappings

Deliverables:

- Brief memo recommending navigation options
- WSDOT: tags for each manual section reflecting mappings (e.g. in spreadsheet format)

Task 6.3 Content Indexing

Objective: Create an index of the pilot manual content in Apache Solr.

Consultant Activities:

- Configure Apache Solr to index the manual content
- Crawl the collection of manual content to create the index
- Ingest available tags (created as part of NCHRP-3 and through manual assignment in Task 6.2) along with full text (use to boost relevancy scores)
- Document the indexing process

WSDOT Activities:

- Provide manually assigned tags for use in the indexing process

Deliverables:

- Brief memo describing approach to indexing

Task 6.4 Test Designation of Policy, Procedure and Guidance within Manual Content

Objective: Identify an approach to distinguish policy, procedure and guidance within WSDOT Manuals

Consultant Activities:

- Review results of the investigation with WSDOT in order to integrate results into the Web UI Design and Development task and the final report.

WSDOT Activities:

- Establish enterprise distinctions between policy, procedure, and guidance through discussions with Risk Management & Legal Services; review of the “Peabody Method” as used by Environment.
- Recruit manual stewards for the eight manuals included in the pilot (or a subset of these manuals) to participate in a process for identifying policy, procedure and guidance.
- Review the established definitions of policy, procedure and guidance with the participating manual stewards
- Facilitate a workshop in which the manual stewards complete a “markup” of selected manual sections and then compare results.
- Produce sample section(s) demonstrating formatting and/or labeling to distinguish policy, procedure and guidance (for inclusion in the UI demo in Task 6.5) – WSDOT to start with the HTML versions of content produced in Task NCHRP-1.
- Create recommended definitions of policy, procedure and guidance building on the “Peabody Method” and updated to clarify areas of ambiguity identified in the workshop

Deliverables:

- WSDOT: marked-up manual sections with policy/procedure/guidance designations; recommended definitions of policy, procedure, and guidance

Task 6.5 Implement Glossary/Thesaurus Capabilities

Objective: Demonstrate implementation of WSDOT glossary/thesaurus capabilities in support of Development Division manual users.

Consultant Activities:

- Collaborate on selection and integration of glossary terms for inclusion in the Drupal demo

WSDOT Activities:

- Publish the current glossary within the Drupal environment
- Establish a governance practice for updating glossary terms related to the manual sections included in the pilot.
 - Identify those with responsibilities and accountabilities for the relevant subject domain(s)
 - Establish a draft process for identifying new terms, vetting them, and selecting them for inclusion in the glossary
 - Test the draft process:
 - Solicit suggestions for new terms from manual authors
 - Circulate candidate terms and definitions for review and comment
 - Gain approval of new terms and definitions
 - Update the glossary with the new terms
 - Update the draft process to reflect what was learned in the testing process and document lessons learned to inform future efforts.

Deliverables:

- WSDOT: published glossary in Drupal
- WSDOT: documented governance process for adding/updating glossary terms

Task 6.6 Web UI Design and Development

Objective: Demonstrate navigation options for presenting manual content in Drupal 7/Solr.

Notes:

- Drupal version 7 to be used for compatibility with WSDOT’s current environment.
- All development to be done using consultant’s hardware/software
- Consultant to provide WSDOT with a link to demo for conducting user testing in Task 6.7.
- All of the requirements listed in task 6.7 are to be addressed within the demo – but modifications may be made per mutual agreement of consultant and WSDOT.

Consultant Activities:

- Integrate sample content sections designating policy, procedure and guidance from WSDOT into Drupal.
- Create wire frames showing navigation options
- Create wire frames showing search results display
- Build the web demo in Drupal
- Build and configure navigation and search features
- Demonstrate Drupal glossary feature

WSDOT Activities:

- Review and comment on wireframes

Deliverables:

- Link to functional prototype
- Walk-through of search and retrieval features for project team

Task 6.7 Testing and Evaluation of Web UI

Objective: Test the Web UI against established requirements

Consultant Activities:

- Test the following requirements:
 - 3.1 Provide a mechanism to navigate back to each previous page the user navigated through, and show the user's current location (required)
 - 3.2 Provide the capability to execute a full text search across material in the scope of existing manuals (required)
 - 3.3 Provide a wild card search capability (desirable)
 - *3.5 Provide option to search within linked documents or websites (desirable)

- 3.6 Provide faceted search capability – enabling users to set multiple filters and “drill down” to content of interest (desirable)
 - 3.7 Support indexing and tagging of individual content sections to enable subject-based searches and cross referencing (required)
 - 3.8 Enable access to content through multiple methods (e.g. clicking on a topic map, business process diagram or diagram of the practical solutions life cycle (desirable)
 - 3.10 Allow inclusion of links to both internal WSDOT and external resources that will help users carry out the work – people (expertise), tools and information systems, supplemental information (web pages, documents, etc.), training materials (required)
 - 3.11 Tailor display of links based on whether the user is internal or external (desirable)
 - 3.12 Provide access to a master glossary through “hovering” on a glossary term (desirable)
 - 3.13 Enable designation of policy, procedure and guidance through use of font styles or colors, collapse/expand features or other methods (desirable)
 - 3.14 Enable printing of selected content (required)
 - 3.15 Enable saving of offline copies of selected content sections (required)
 - 3.16 Meet the web accessibility standard requirements in accordance with Washington State CIO’s Policy #188 (required)
- Mark each of the above requirements with “met”, “not met”, “not tested but judged feasible”, or “not tested but judged infeasible”.

WSDOT Activities:

- Solicit participation from a panel of manual users, representing a range of familiarity with existing manual content.
- Set up and manage an end-user testing process covering the following requirements:
 - 3.1 Provide a mechanism to navigate back to each previous page the user navigated through, and show the user's current location (required)
 - 3.2 Provide the capability to execute a full text search across material in the scope of existing manuals (required)
 - 3.6 Provide faceted search capability – enabling users to set multiple filters and “drill down” to content of interest (desirable)
 - 3.8 Enable access to content through multiple methods (e.g. clicking on a topic map, business process diagram or diagram of the practical solutions life cycle (desirable)
 - 3.12 Provide access to a master glossary through “hovering” on a glossary term (desirable)
 - 3.14 Enable printing of selected content (required)
 - 3.15 Enable saving of offline copies of selected content sections (required)
- Document testing results and user feedback.

Deliverables:

- Requirements matrix documenting results of the testing and implications for future work.

Task 6.8 Publication Process Improvement Identification

Objective: Identify opportunities for improving the manual production and publication process

Consultant Activities:

- Review results of WSDOT Lean workshop(s)

WSDOT Activities:

- Establish a scope for a Lean effort documenting the manual production and publication business process(es) and identifying opportunities for improvement. This Lean effort should focus on the Design Manual process, and build on the content and process mapping that has been completed.
- Consider the following within the scoping:
 - Approval processes – both internal and external
 - Likely new challenges related to integrated authoring associated with a “component” or “topic”-centric approach to manual content development. This approach requires identifying content ownership and stewardship at a more granular level and tracking of interrelationships across content sections to ensure coordinated updates.
 - Protocols for consistent content storage locations
 - Opportunities to improve efficiencies and support currently under-resourced manuals through centralized services for manual production and publication
 - “Manual of record” needs
- Identify Lean workshop participants (involve those involved in the Design Manual processes and a sample of other manual authors)
- Conduct Lean workshop(s)
- Document the results

Deliverables:

- WSDOT: as-is process documentation and summary of recommended process changes

Task 6.9 Test Authoring and Publishing Platforms

Objective: Test alternative authoring and publishing platform for preparing manual content.

Note: Platforms identified for testing are: Drupal Book, Madcap Flare, and a third platform such as Help+Manual.

Consultant Activities:

- Advise WSDOT on approach to evaluating platform requirements and recording of results
- Advise WSDOT on use of Drupal Book

WSDOT Activities:

- Acquire copies of each platform
- Set up and configure (as needed) each platform

- Identify whether each tool supports the following requirements. (Note that some of these requirements could be accomplished through packaging other tools or through manual processes.)
 - 1.1 Store/track assignment of content owners and reviewers to different sections or groups of sections. (Required)
 - 1.2 Support use of style templates for different types of content to facilitate consistency (e.g. flow diagrams, narratives, tables) (Required)
 - 1.3 Enable content owners to edit and “produce” their own content updates without need for additional formatting steps. (Required)
 - 1.4 Enable content owners to see which other sections are related to their sections (to coordinate updates) (Desirable)
 - 1.5 Automate workflow for solicitation and collection of comments and/or approvals from stakeholders internal to WSDOT (Desirable)
 - 1.6 Provide an option to allow for threaded comments on draft content from internal stakeholders (Desirable)
 - 1.7 Automate workflow for solicitation and collection of comments and/or approvals from stakeholders external to WSDOT (Desirable)
 - 1.8 Track approvals from designated stakeholders (Desirable)
 - 1.9 Enable content reviewers to access copies of review drafts, insert comments and make suggested edits to content using track changes (Required)
 - 1.10 Enable a content author to review an integrated/consolidated set of comments and tracked changes, and accept or reject each proposed edit (Required)
 - 1.11 Provide ability for manual users to subscribe to notifications for updated content – by topic and by nature of change (Desirable)
 - 2.1 Maintain a history of changes including information on type of change, who made it, and explanation (Required)
 - 2.2 Archive content when changes are made (Required)
 - 2.3 Allow authorized users to view the change log for a selected set of sections (Desirable)
 - 2.4 Provide the capability for the WSDOT system specialist to retrieve snapshots of content that were in effect at a particular point in time (Required)
 - 2.5 Enable manual end users to dynamically view the state of a given content section at a particular point in time (via the user interface) (Desirable)
 - 4.1 Provide an option to allow users to provide comments on specific published content sections or topics (Desirable)
 - 4.2 Provide an option to allow authorized users to create a marked-up version of published content and transmit it to the content owner (Desirable)
 - 4.3 Track the number of “hits” on each section of the content or topic area (Desirable)
 - 5.1 Restrict edit privileges to authorized users by page or section of content (Required)
 - 5.2 Restrict commenting privileges to authorized users (Required)
 - 5.3 Restrict ability to view comments to authorized users (Required)
 - 5.4 Detect external users (outside of WSDOT) (Required)

- Involve a small group of manual authors/stewards to participate in the testing process
- Create test scripts for manual authors, stewards and publishers to walk through a process including:
 - Manual Authors – new content creation + review and resolution of comments on content
 - Manual Stewards – review and comment, suggested edits (markup) of existing comment; solicitation of approvals; review of change history
 - Manual Publishers – creation/updates to style templates
- Solicit and document feedback on each platform from authors, stewards and publishers

Deliverables:

- WSDOT: results of requirements evaluation and feedback

Task 6.10 Recommend Manual Information Management Improvements

Objective: Identify and implement improved practices for managing manual content and related (linked) materials

Consultant Activities:

- Review and comment on recommendations

WSDOT Activities:

- Document current storage and archiving practices for manual drafts, old versions and linked content
- Conduct a workshop to identify improved practices to provide consistent and reliable access to authoritative versions of content
- Draft guidance and procedures covering storage protocols for:
 - draft manual content
 - active manual content
 - historical content
 - comments on manual content and annotations on responses to these comments
 - linked content (e.g. when to reference external links versus obtain and archive copies of the linked materials to ensure continued access)

Deliverables:

- WSDOT: current procedures documentation
- WSDOT: draft guidance and procedures

Task 6.11 Final Report and Roadmap

Objective: Summarize results of the pilot and create a roadmap for future implementation.

Consultant Activities:

- Compile results of requirements testing from user, manual author/steward and publisher perspectives.
- Facilitate development of project team consensus on a vision for future development:
 - Pursue a “component-based” approach to the manuals or continue the current “linear book” approach?
 - Stay with PDFs, move to web pages/HTML for publication and presentation, or a hybrid?
 - Modify the manual production/publication process?
 - Implement new software for production/publication?
- Facilitate development of a transition strategy for moving from the current state to the future vision.
- Prepare a report summarizing pilot activities, findings and recommendations
- Prepare a presentation to communicate findings of the pilot
- Create a roadmap for future development
- Define tasks required to implement the initial phase of the roadmap and estimate the level of effort

WSDOT Activities:

- Collaborate on development of the vision, roadmap and transition strategy
- Review and comment on draft materials

Deliverables:

- Summary report – draft and final
- Roadmap – draft and final

Appendix A. Developing an Integrated Engineering Policy Guide: The MoDOT Experience

Introduction

WSDOT is exploring future development of an integrated online resource for delivery of content currently produced in the form of manuals. This effort was inspired by the Missouri DOT's (MoDOT) Online Engineering Policy Guide (EPG) – available at epg.modot.mo.gov/ which delivers engineering guidance to MoDOT staff and external users via a wiki. Screenshots of the MoDOT EPG main page and a sample article are shown below.

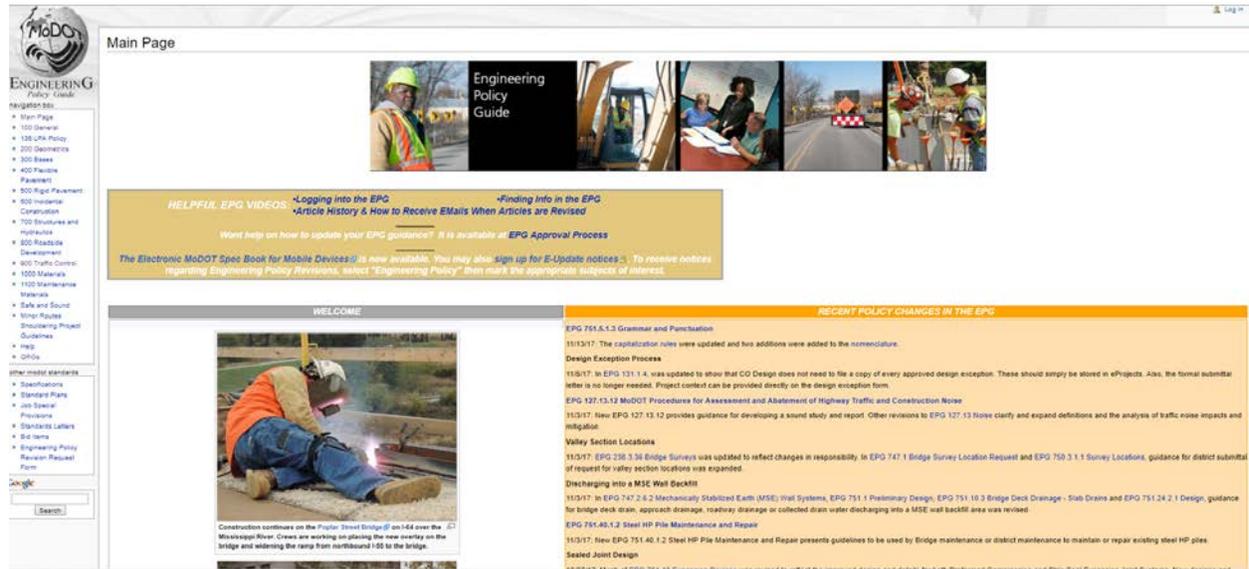


Figure 1. MoDOT EPG – Main Page

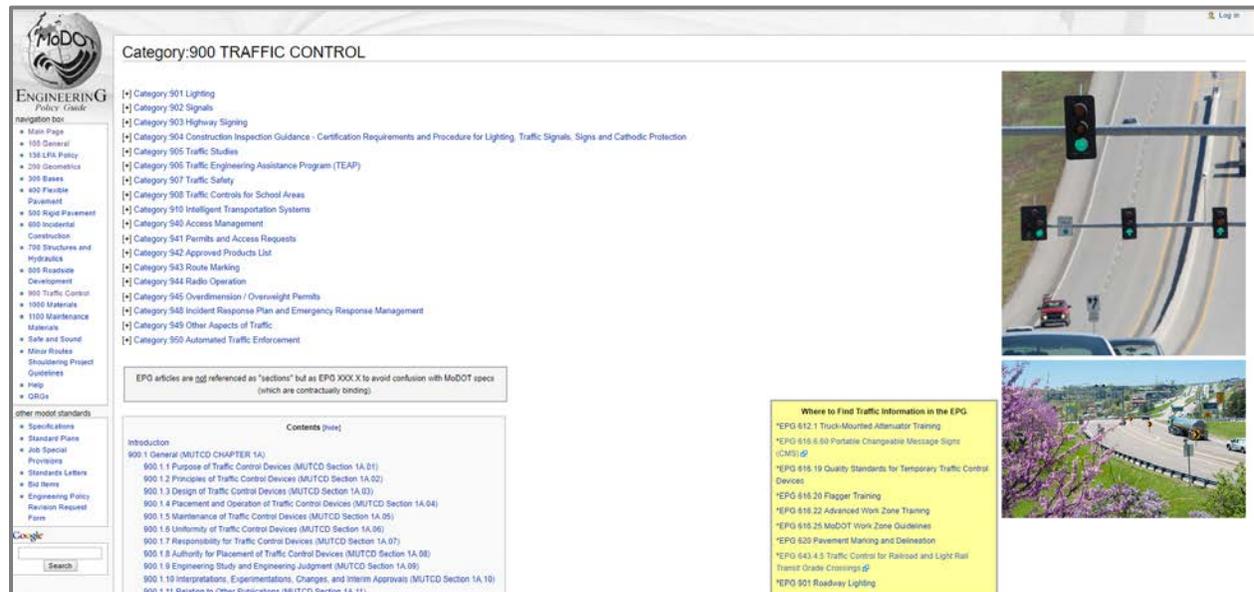


Figure 2. MoDOT EPG – Sample Screen

This memo summarizes information about MoDOT’s experience developing, deploying and using the EPG that can help to inform WSDOT’s exploration of options.

Sarah Kleinschmit and Keith Smith at MoDOT provided most of the information included in this document. WSDOT very much appreciates their willingness to spend the time to respond to our request for information in a thorough and thoughtful manner.

Background on MoDOTs EPG

MoDOT participated in a 2013 Domestic Scan on Knowledge Management (NCHRP 20-68A Task 12-04). The report from this effort provides a concise summary of what the EPG is and how it was developed:

In 2005, MoDOT incorporated the value engineering philosophy into its daily operations through Practical Design. This philosophy challenged engineers to throw out the standard “cookbook” design and specifications to allow for more innovation to deliver the same project benefits at a reduced cost. The program has flourished at MoDOT by saving more than \$1 billion. The Practical Design approach was extended to the department’s engineering policies and specifications.

In 2005, an effort was launched to develop a new Engineering Policy Guide, replacing the existing paper manuals from multiple divisions in the organization including construction, maintenance, design, traffic, right-of-way, environmental, and planning. A single group coordinated and supported the effort, but experts were enlisted to write the policies. The effort involved gaining consensus on common definitions across the different groups (e.g., what is the definition of an edge drop-off?). The new online guide... was launched in 2007 and consolidates information that was formerly spread across multiple locations (e.g., a single section on guardrail describes how to design, construct, and maintain it). It also includes links to the latest research. This guide is maintained in a wiki format, which can be easily updated and searched, and maintains a change history, which is required for legal reasons. The format allows internal and external practitioners to discuss transportation engineering successes and challenges.¹

The EPG contains the following high-level categories of information:

- 100-General
- 200-Geometrics
- 300-Bases
- 400-Flexible Pavement
- 500-Rigid Pavement
- 600-Incidental Construction
- 700-Structures and Hydraulics
- 800-Roadside Development
- 900-Traffic Control
- 1000-Materials

¹ Scan 12-04, “Advances in Transportation Agency Knowledge Management”, AASHTO (2014), http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68A_12-04.pdf

- 1100-Maintenance Materials

Most, but not all of the EPG articles are numbered corresponding to MoDOT pay items and specifications – for example, items within the 100 series do not. The EPG content does not include engineering standards that are contractually binding. Standard Specifications, Standard Drawings, Pay Items, and Job Special Provisions, and Design Standards Letters are produced separately from the EPG. The EPG contains links to the current versions of these documents. It also contains links to a variety of other resources, including standard forms, checklists and Quick Reference Guides.

The EPG distinguishes policy, procedure and guidance through the use of the verbs “Shall, Will, Should and May”. These terms are used as follows:

- Shall and Will indicate a required, mandatory, or specifically prohibitive practice. Shall and will statements shall not be modified or compromised based on engineering judgment or engineering study.
- Should indicates a recommended, but not mandatory, practice in typical situations. Deviations are allowed if engineering judgment or engineering study indicates the deviation to be appropriate.
- May indicates a permitted practice and carries no requirement or recommendation.

The EPG is publicly open for viewing. In addition, anyone can sign up for email notifications of changes in articles. Registered users can log in to the EPG and obtain access to additional features beyond the ability to view an article:

- viewing the history of an article,
- leaving comments on a discussion page,
- tracking revisions through "my watchlist",
- accessing a printable version of an EPG article and
- viewing the "what links here" (that shows all the other articles linked to the chosen article).

Information Gathering Process

An initial set of questions were prepared for MoDOT covering aspects of the EPG that were of interest to WSDOT. Questions probed into the original planning and design process; the development process; ongoing management, governance and use; and key take-aways or lessons learned. MoDOT prepared written answers to these questions. A one-hour telephone interview was set up to review answers to these questions and probe further into several topics.

Summary of MoDOT Responses

EPG Planning and Design

The original objectives of the MoDOT EPG were to provide a way to quickly and accurately update engineering policy information as well as provide a uniform source of information to cut down on inconsistencies. The EPG effort was initiated by the MoDOT Director. He assigned the task of EPG development to individuals who were serving as the standards group within the Design Division. This group was moved from the Design Division and to report to the agency Director. They were designated as “The Engineering Policy Group.”

It took four or five months to bring all the old tasks and procedures to produce standards to a halt. It took a couple more months to come up with a working concept for the wiki. During this time, the team worked full time on this assignment. Originally, the team consisted of eight people: a supervisor, five engineers, a technician and an executive assistant. The number of engineers was reduced from five to three after a few months.

The scope of the effort included all nine engineering-related manuals. While the focus was on integrating content from existing statewide manuals, some content was integrated from the St. Louis District, which had a history of developing guidance for its own district. Usually however, district guidance was excluded. The statewide divisions had the final say as to what would be considered authoritative guidance.

The key design challenge was related to the general organization or layout of the EPG. The group sought to maximize ease of use while rearranging the organization of some divisions' guidelines. Many of the individual guidance sections were brought in to the EPG "as is", though the Engineering Policy Group established some internal guidelines to edit incoming language as needed for consistency.

Conformance with Section 508 accessibility standards was not a requirement for the EPG. MoDOT reports that this "has never been a problem." However, they may consider this for future updates.

EPG Software

The EPG was developed using the Wikimedia open source software – the same platform used by Wikipedia. The wiki is hosted locally at MoDOT – the agency does not currently use "the cloud" due to access and security concerns.

The head of MoDOT's CAD unit recommended use of a wiki platform. MoDOT did not seriously investigate or consider alternatives. They like the wiki's ability to handle extremely large volumes of data, as well as its ability to maintain a change history. Originally, they anticipated that the wiki would be used to allow content users to discuss various aspects of the guidance; however, this "talk" feature proved to be unpopular. Unlike Wikipedia, editing privileges for the EPG are restricted to members of the Engineering Policy Group – and the vast majority of changes are made by a single editor.

MoDOT purchased a Google Search tool (for \$2,000) to provide an improved search experience. However, MoDOT has not been overly pleased with the performance of this tool. Aside from the fact that search results are provided as a listing without context, the results returned are not always intuitive. The search engine does give preference to keywords in titles – beyond this, limited options are available for tuning or configuration. MoDOT has not invested effort in development of a taxonomy or tagging the articles with core metadata. Another issue with the search is that it returns currently obsolete items – these are included in the wiki due to its history feature. MoDOT has implemented a workaround involving identifying these items as obsolete in the search results.

MoDOT is currently in the initial stages of investigating available options for upgrading the EPG. They are particularly interested in add-ons for wiki software that would improve the ability to search the entire wiki site for relevant information (including linked documents.) A definite timeframe for an upgrade has not been established, but is not anticipated to be completed prior to summer of 2018.

EPG Development

The EPG was developed by the Engineering Policy Group. No external consultant support was required. Once they agreed to a general layout, the engineers in the group entered the article content into the wiki, and the technician produced updated figures as needed. The supervisor managed interactions with the various divisions to obtain content.

Thousands of existing guidance pages were brought into the wiki. Existing guidance was primarily in electronic format (PDFs, MS Word, DGN) in dispersed locations across the agency. There was some amount of conversion required from paper documents. Some of the existing manuals had been posted on the MoDOT website; others weren't.

Much of the content was entered "as-is", though some standards were followed to ensure consistency, ease of maintenance (e.g. use of specific page number references is discouraged) and obvious errors were corrected. The group also sought to incorporate "Practical Design" concepts within the guidance. In general, MoDOT regards the information in the EPG as owned by the Divisions, and provides the content owners with a fair amount of flexibility.

Once the layout and general form of the EPG was determined, it took almost a year to sufficiently populate the EPG to call it a working document. A "soft launch" of the wiki occurred in late December of 2006. MoDOT estimates that it took about 5.5 man years to produce the EPG – including entry of the information, creation of the graphics, and interfacing with guidance owners/authors.

Once the EPG was completed, everyone was encouraged to use it since the manuals were no longer being updated. Most employees were positive about the EPG, though there were a few who were oppositional.

Ongoing Management and Use

Staffing

Currently a single full-time staff member – the EPG editor spends a majority (80%) of his time managing the EPG. The Engineering Policy Group consists of a supervisor who has additional duties, and three technical staff members (with Civil Engineering degrees or several years of transportation experience.) One staff member takes care of the EPG; the others take care of the contractually-binding documents managed separately from the EPG (standard plans, specifications, job special provisions.)

MoDOT's Information Systems (IS) Division is responsible for backups and maintenance of the servers hosting the EPG. MoDOT reports that IS spends very little time with the EPG on an ongoing basis.

Updates

The Engineering Policy Group has responsibility for curating new content for the EPG. Updates are considered on request. An approval process for updates has been established (see box below.) There are three levels of approval:

- **Level 1 Approval.** Routine technical matter, errata correction or clarification. These can be approved by the Policy and Innovations Engineer without comment from the district engineers, the division engineers or the Chief Engineer.
- **Level 2 Approval.** A moderate technical change, a change requiring specific expertise (e.g. structural design, etc.) or a change that impacts more than one division. These require approval from the Assistant Chief Engineer (informed by comments from the District Engineers and select Division Directors/Engineers) and FHWA. The Assistant Chief Engineer submits the final decision to the Policy and Innovations Engineer.
- **Level 3 Approval.** A complex technical change, a change that is contentious, a change that has high cost or impacts MoDOT's external conduct of business. Similar to Level 2 changes, these require approval from the Assistant Chief Engineer (informed by comments from the District Engineers and select Division Directors/Engineers) and FHWA. The Chief Engineer submits the final decision to the Policy and Innovations Engineer.

MoDOT reports that the balloting process for updates is working smoothly. One important strategy for facilitating updates is to anticipate questions that will arise during balloting for a change and be proactive about addressing them.

EPG Approval Process (from:

[http://epg.modot.org/index.php?title=Help:Contents#EPG Approval Process](http://epg.modot.org/index.php?title=Help:Contents#EPG_Approval_Process))

Proposed revisions are submitted on the Engineering Policy Revision Request Form. Just copy and paste the affected portion of your division's EPG article into a Word file. Place the Word file into revision mode and make your proposed changes to the file. (If your division's info is already in the EPG, do not email Word files of revisions to your division's old manual. Base your division's proposed revisions on EPG text, not the old manuals.) Attach this proposal to the form with the "Click here to attach a file" button. Along with the actual proposed textual revision of the EPG, provide:

- 1) Any other standard affected by the revision,
- 2) The name of the proposal's sponsor,
- 3) The proposal's summary,
- 4) The proposal's fiscal impact and
- 5) A description of any effort to engage industry and FHWA in the revision development.

Submittals are evaluated and processed on a quarterly schedule. Final decisions on proposed ballots are submitted to the Policy and Innovations Engineer for disposition.

Every submittal must document, along with the actual proposed textual revision to the EPG:

- 1) Any other standard affected by the revision. Provide electronic files of all the revisions to other MoDOT standards (Standard Plans, specs, JSPs, etc.) impacted by the proposal. Word files in revision mode are required for textual changes. DGN files are preferred for Standard Plan revisions although a redlined hard copy showing the proposed changes is also acceptable.
- 2) Sponsor. The name of the sponsor from within the division proposing the revision is required. The sponsor is the person most knowledgeable or central to the proposal.
- 3) Summary. Provide the reason why the idea should be carried out (why it is necessary or its benefit). This justification may be critical in the decision to approve the proposal or not.
- 4) Fiscal Impact. Provide a dollar estimate for the proposal's costs or savings to MoDOT. Include whatever calculations (initial savings or life cycle savings, for example) or assertions are necessary to accurately convey the proposal's financial impact. The fiscal impact must be a numeric dollar value, not simply a vague financial discussion.
- 5) Involvement. Provide a summary of any efforts undertaken during the development of the item to engage affected industry groups and the FHWA. Provide specific examples of who was involved and how that the involvement occurred. This may not be applicable to every submittal, but is critical for the determination of the associated approval level for borderline items.

When updates are made, the EPG editor can enter brief annotations describing the basis for the change. These annotations are available in the history view of an article.

Monitoring

The EPG editor tracks the number of hits by article. He uses this information to communicate with Divisions – letting them know if they are doing a particularly good job, or if this is a problem. In order to promote interest in the EPG, he maintains a listing of the top 20 EPG articles on the lower left side of the Main Page ([http://epg.modot.org/index.php?title=Main Page](http://epg.modot.org/index.php?title=Main_Page)).

Access to Historical Versions

On occasion, MoDOT is asked to produce a copy of the EPG that was current as of a particular date in the past. In many cases, the history feature of the wiki is sufficient to address these requests. This feature allows registered users to see an article as it was on a particular date. It also allows for comparison of two different dates. (See examples provided at the end of this appendix.)

The EPG is “a well-known source to everyone in the courts.” MoDOT provides a link or a word document on request. If a full copy of the EPG is needed for a particular date, the IS Division is requested to produce a copy – utilizing backups.

There is one limitation to the history feature: when material is linked to the wiki rather than stored within the wiki, the version of the linked material that existed at a particular time is not available – unless a unique URL is maintained for historical versions of linked material.

MoDOT reports that lack of ability to retrieve a particular version of a reference (due to a non-functional link) hasn’t been a problem for them. They stressed that the EPG does not contain contractually binding standards; and that historical versions of these standards are maintained separately. Updates to standards are available on MoDOT.org and are documented in quarterly design standards letters.

Off-Line Access

MoDOT does not provide off-line access to the EPG. However, they report that the EPG server is very reliable and is almost never down. They have not discussed continuity of operations concerns.

Printing

Direct printing from the wiki does not yield an output that looks like the source article – particularly for longer articles. While add-ons are available to facilitate printing from wiki software, MoDOT depends on the native features of their web browsers for printing, they copy and paste wiki content into a document for printing, or they create screen-shots of pages.

Key Takeaways and Lessons Learned

MoDOT feels that the EPG has successfully broken down the silos at MoDOT. It created a need to consider other divisions when developing policy. MoDOT is proud of their accomplishment and reports that the EPG became far more popular than they originally anticipated.

The biggest challenges were cultural in nature. Several divisions viewed their information as their own. They felt that they would lose ownership of this information by presenting it in the EPG. Other divisions needed to be made aware of the poor condition of their information.

Overt leadership advocacy was essential. Getting buy-in from content owners was key to achieving ongoing quality of the material. This was accomplished at MoDOT through a combination of management direction from the top (which got them 80% of the way); and diplomacy, patience and persistence on the part of the Engineering Policy Group staff. Over time, they were able to obtain the necessary content (sometimes by working through multiple channels) and build confidence in the product.

EPG's History Feature

This example demonstrates use of the EPGs history feature to look up what MoDOT policy on junkyards was on December 1, 2015.

The first step is to navigate to the junkyards policy – at EPG 236.17, and select the history tab.



Figure 3. Finding the History Tab

This brings up the revision history screen:

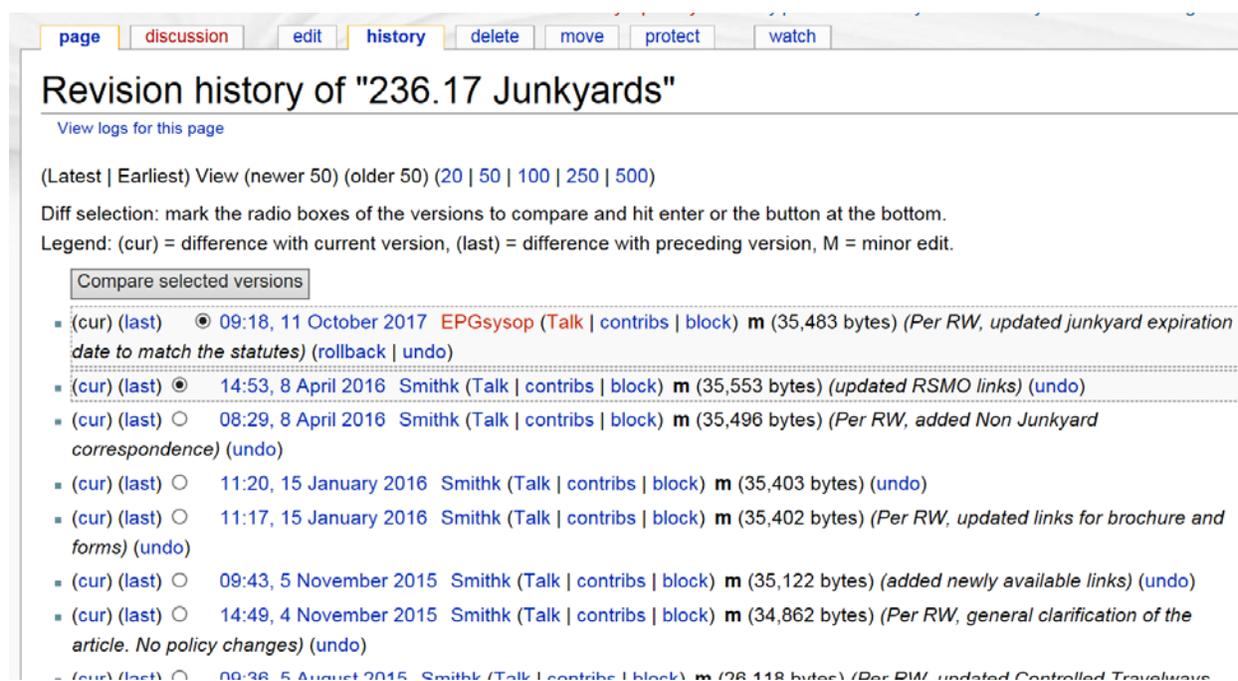


Figure 4. Sample of Revision History

Note that the last change prior to Dec. 1, 2015 was Nov. 5, 2015. Placing the cursor onto the date, the wiki underlines the date.



Figure 5. Sample showing how to select content versions

Selecting the date yields the article on that date:



Figure 6. Screenshot of the manual content for the selected date

MoDOT employees with login access to the EPG can access this view directly at the following link: is http://epg.modot.org/index.php?title=236.17_Junkyards&oldid=36358.

To compare the old article with the current one, you would return to the "revision history" page and select Nov. 4, 2015 to be compared with the latest version:



Figure 7. Sample showing how to compare two versions

This yields the following view:

236.17 Junkyards

(Difference between revisions)

Revision as of 14:49, 4 November 2015 (edit)

[Smithk](#) ([Talk](#) | [contribs](#) | [block](#))

m (*Per RW, general clarification of the article. No policy changes*)

[← Previous diff](#)

Current revision (09:18, 11 October 2017) (edit) (undo)

[EPGsysop](#) ([Talk](#) | [contribs](#) | [block](#)) [[rollback](#)]

m (*Per RW, updated junkyard expiration date to match the statutes*)

(5 intermediate revisions not shown.)

Line 1:

```
[[image:646.5 Junkyard Control.jpg|right|350px]]  
MoDOT is responsible for regulating the establishment,  
operation and maintenance of junkyards along the  
interstate and primary highway system. The Federal  
Highway Beautification Act of 1965 requires MoDOT to  
regulate junkyards under [http://www.ecfr.gov/cgi-  
bin/text-idx?  
-c=ecfr&rgn=div5&view=text&node=23:1.0.1.8.41&idno=2  
3 23 CFR Section 751]. Additionally, Missouri's rules  
and regulations regarding junkyards are located in  
[http://www.moga.mo.gov/STATUTES/C226.HTM RSMo  
Sections 226.650 to 226.720] and
```

Line 1:

```
[[image:646.5 Junkyard Control.jpg|right|350px]]  
MoDOT is responsible for regulating the establishment,  
operation and maintenance of junkyards along the  
interstate and primary highway system. The Federal  
Highway Beautification Act of 1965 requires MoDOT to  
regulate junkyards under [http://www.ecfr.gov/cgi-  
bin/text-idx?  
+c=ecfr&rgn=div5&view=text&node=23:1.0.1.8.41&idno=2  
3 23 CFR Section 751]. Additionally, Missouri's rules  
and regulations regarding junkyards are located in  
[http://www.moga.mo.gov/mostatutes/stathtml/2260000  
6501.html RSMo Sections 226.650 to 226.720] and
```

Figure 8. Sample of the comparison for two versions of the selection on Junkyards

This is the old (on the left) compared to the new (on the right). What is compared is the wiki code. Most of this code is the article's text although the changes to the files, links, text, etc. are displayed in bold red font.

Any two versions of the wiki article can be compared, not just an old one with the current version. Our wiki's history function is easy to use and quite useful.

Appendix B. Workshops

Workshop with Development Division Manual Stewards

When: July 20, 8 AM-12 PM Pacific

Where: Shaman Conf. Rm (2F22) + phone bridge

Background: The WSDOT Development Division has initiated a scoping study to explore the possibility of moving from maintaining engineering manuals in PDF form to adopting a more flexible electronic platform. This effort was inspired by Missouri DOT's wiki-based [Engineering Policy Guide](#).

Meeting Purpose: To understand WSDOT Manual Steward perspectives to be considered in moving to an electronic WSDOT Engineering Guide.

Attendees:

- Leni Oman, Manual Wiki Project Manager
- Riley Woodward-Pratt, Design Manual Research Intern
- Frances Harrison, Spy Pond Partners
- Ahmer Nizam (Development Division Technical Services and Business Manager)
- John Donahue (Design Manual Manager)
- Chris Schroedel (Design Manual Manager)
- Stephanie Williams (Division web master)
- Kate Severson (Training)
- Gary Brown (Business Analyst, Information Systems)
- Heath Bright (Bridge List)
- Julie Hartwig (Roadside Policy, Roadside Development)
- Barb De Ste Croix (Plan Preparation, Development Services)
- Larry Schofield (Consultant Services)
- John Tevis (ADA)
- Eric Wolin (Design-Build, worked on 2012 Environmental Manual update)
- Gretchen Coker (Environmental)
- Elsa Pond (Temporary Erosion and Sediment Control)
- Jeanne McCully (Temporary Erosion and Sediment Control)
- Abe Sahari (Hydraulics)
- Heather Pittman (Hydraulics – Fish Passage and Bridge Scour chapter)
- Scott Sargent (Bridge Design)
- Alex Nguyen (Highway Runoff)
- Clint Hill (Electronic Engineering Data Standards)
- Glen Scroggins (Bridge Inspection)
- Rhonda Wiest (Utilities)

Additional Invitees (not present):

- Mark Gabel (Cost Estimating)
- Ashley Carle (Environmental)

- Terry Meara (ROW)
- Bill Mumma (Survey, ROW Plan Preparation)
- Roman Peralta (Bridge Inspection)

Resources:

MoDOT Engineering Policy Guide Wiki: http://epg.modot.org/index.php?title=Main_Page

MoDOT Survey of State DOT approaches to managing manual content:
<http://research.transportation.org/layouts/15/AASHTORAC/RACSurveyResultDetail.aspx?SurveyID=335>

1. Opening Remarks

Ahmer Nizam

- Important function of HQ is to develop and communicate policy - manuals say what we are required to do; they promote consistency. They have been highly successful. But we have seen big changes in technology, the ways people communicate and use information. Need to shift to this new paradigm.
- Development Division also responsible for helping support evolution of the business practices. As the agency becomes more integrated and multimodal, we need to support integration across the silos.
- Design manual is the hub – many other manuals connect to it

John Donahue

- The Design Manual is a "go to" resource for the department – we have updated it to reflect adoption of Practical Solutions.
- We've made the transition to all electronic (PDF) – fewer people are using paper copies. It is becoming increasingly difficult to maintain the "paper paradigm" – requires skill, time and effort to do formatting (which people don't care about).
- We want our information to be interactive and customers expect that. We aren't really set up to do this in our current form.
- We were inspired by what we saw in the MoDOT EPG

Leni Oman

- This initiative will produce a charter and implementation work plan.
- We are starting with the Development Division – have Division Management support
- Need to keep in mind distinction between Policy (must do) and Guidance (should do)
- Looking to improve search of the content

2. Demo of MoDOT EPG

- Released in 2007; inspired by an effort to implement Practical Design
- Collates the content of 7 manuals: construction, design, maintenance, traffic, environment, planning...
- This is a policy guide; engineering standards and specifications are published separately (and referenced in the EPG)
- We will be interviewing MoDOT staff responsible for this – we have compiled a list of questions, but we are happy to add others that you have.

Questions for MoDOT:

- How do they manage review process involving external agencies (e.g. FHWA, state resource agencies)?
- Have they done something to improve the Google Search function
- How do they use information on use/hits?
- You said that one of the manuals consolidated was Planning – what content did that manual have? (We believe it was project planning as opposed to long range planning-related?)
- How was Section 508 compliance addressed?
- How do they address the need to refer to “frozen” versions of policy/standards in effect at a given time – e.g. for putting together Design Build contracts; or to respond to litigation or claims?
- How do they ensure access to EPG content in emergency situations (e.g. when systems are down)?
- Do they integrate district/region-specific content into the EPG? If so, how is it integrated with content from HQ for a particular topic area? (Does MoDOT have regions that are semi-autonomous?)
- Has the EPG had an effect on connecting the different silos?
- How was change from the paper manuals to the wiki handled? Was the adjustment/learning curve difficult?
- What was the size of content included in the wiki (# pages of manuals consolidated)? How many man hours did it take to produce? What skill sets were needed? Was a consultant used? What was the cost?

Comments:

- Similar to RCW Access WA site – find out what software platform they use
- WA Department of Ecology – look at the online stormwater manual
- Should we be involving others in this effort: FHWA, AAGs, Geotech (Tony Allen)?

3. Part 1: Round the Room Introductions to Roles, Manuals, Users and Related Manuals

Heath Bright

- **Manual:** Bridge List – not an engineering manual, more of a customer service resource. Helps trucking industry understand load and height restrictions.
- **Update Cycle:** every two years
- **Users:** Trucking companies, WSDOT Commercial Vehicle Services
- **Related Manuals:** none – but uses linear reference system from the state highway log
- **Comments:** responsible for federal reporting, bridge data management

Julie Hartwig

- **Manuals:** Roadside Policy Manual (requirements) and Roadside Manual (procedures) – Policy Manual tied to FHWA requirements. The procedures manual references laws, describes why we do what we do. Covers resource conservation areas, restoration requirements.
- **Update Cycle:** every 2-3 years. Current update triggered by WDFW; trying to streamline processes.
- **Users:** Landscape designers, other design engineers, occasionally by other state DOTs
- **Related Manuals:** Roadside Policy Manual and Roadside Manual are interrelated.

Barb De Ste Croix – PS&E, Plan Development Services Manager

- **Manuals:** Plan Preparation - Purpose is to ensure quality of plans included in bid packages. Specifies review procedures for 30-60-90% completion. Development Services – guidance on working with developers, procedures for gaining access to the state highway system.
- **Update Cycle:** as needed
- **Users:** Plan Preparation – Designers, CAD Operators. Development Services – Regions, others who work with developers
- **Related Manuals:** Both are related to the Design Manual.
- **Comments:** See a lot of benefit to this project

Eric Wolin

- **Manuals:** Environmental Procedures Manual – covers permitting, NEPA/SEPA, hazardous materials, etc.
- **Update Cycle:** once a year
- **Users:** Region, Modes, Environmental Staff, Consultants, Other DOTs
- **Related Manuals:** TESC, Design Manual, currently working on a manual for design-build that is due out in December
- **Comments:** recently completed an overhaul of the manual; put online.

Gretchen Coker

- **Manuals:** Environmental (see above information from Eric Wolin)
- **Update Cycle:**
- **Users:**
- **Related Manuals:**
- **Comments:** organized by project delivery phase: design, environmental, construction

Larry Schofield

- **Manuals:** Consultant Services – how to acquire consultant services.
- **Update Cycle:** as needed – typically in response to regulatory changes. Starting update for 2016.
- **Users:** Project managers, other staff who need to hire consultants
- **Related Manuals:** None mentioned

John Tevis

- **Manuals:** ADA Field Guide – based on meeting federal ADA requirements. Does not cover DOT policy.
- **Update Cycle:** as needed – typically in response to regulatory changes. Starting update for 2016.
- **Users:** Statewide user base
- **Related Manuals:** Design Manual – related to pedestrian aspects
- **Comments:** none

Chris Schroedel

- **Manuals:** Design Manual – includes policy, standards and guidance
- **Update Cycle:** annually – every July
- **Users:** Core design teams in the Regions; many chapters used by local governments (ADA, barrier hardware, etc.)
- **Related Manuals:** many others – it’s a “hub” – content developed in collaboration with other units – bridge, Geotech, traffic, etc.
- **Comments:** need a more nimble way to update

Elsa Pond

- **Manuals:** Temporary Erosion and Sediment Control (TESC) Manual – policy and guidance related to stormwater watershed program
- **Update Cycle:** typically every 5 years, coincident with stormwater permit updates. (Currently requesting feedback from users on the TESC)
- **Users:** project engineers, construction inspectors, consultants, contractors
- **Related Manuals:** Environmental manual HRM, Roadside Manual, Construction Manual (chapters 3 and 8)
- **Comments:** This material used to be chapter 6 of the highway runoff manual (HRM), but was split out since customers were different. The emphasis is more on scoping than design.

Jeanne McCully

- **Manuals:** Standard specifications for erosion control.
- **Update Cycle:** as needed
- **Users:** construction inspectors, consultants, contractors, regulators, other DOTs
- **Related Manuals:** TESC and Roadside
- **Comments:** None

Abe Sahari

- **Manuals:** Hydraulics – stormwater BMPs
- **Update Cycle:** hadn’t updated for a while – currently working to complete a comprehensive update
- **Users:** ?
- **Related Manuals:** Bridge, Geotech
- **Comments:** Consultant provided comprehensive update last year – now working with FHWA and WDFW (Fish & Wildlife) to complete review and updates – one chapter at a time.

Heather Pittman

- **Manuals:** Hydraulics – she helps with Chapter 7: Fish Passage and Bridge Scour (See information provided by Abe Sahari above)
- **Update Cycle:**
- **Users:** Region and HQ Hydraulics staff, WDFW water crossing
- **Related Manuals:**
- **Comments:**

Alex Nguyen

- **Manuals:** Highway Runoff Manual (HRM)
- **Update Cycle:** Follows 5 year NPDES permit cycle
- **Users:** anyone doing stormwater design – WSDOT engineers, consultants, local agencies
- **Related Manuals:** Design, Utilities, Environmental, TESC
- **Comments:** Changes must be approved by the Department of Ecology. See: <http://www.ecy.wa.gov/programs/wq/stormwater/manual/2014SWMMWWinteractive/2014%20SWMMWW.htm>

Clint Hill

- **Manuals:** Electronic Engineering Data Standards Manual – guidance on file structures, data formats, symbology; use of ProjectWise; specifies deliverable requirements for handoffs from one group to another; ensures consistency
- **Update Cycle:** Try to update annually
- **Users:** Engineers, techs, project administrators
- **Related Manuals:** Plans Preparation Manual (references to many others)
- **Comments:** organized by project delivery phase: design, environmental, construction

Scott Sargent

- **Manuals:** Bridge Design
- **Update Cycle:** Annual update - June
- **Users:** Consultants, cities, counties, other state DOTs
- **Related Manuals:** Design, Geotech
- **Comments:** Design memoranda used for interim updates (would like to be able to update the manual itself more frequently if easier to do)

Glen Scroggins

- **Manuals:** Bridge Inspection Manual
- **Update Cycle:** Target annual updates; driven by changes in federal bridge inspection standards. Last major update was in 2012
- **Users:** bridge owners/inspectors at WSDOT (Regions) and other WA agencies
- **Related Manuals:** not connected with other manuals
- **Comments:** adding electrical and tunnel inspection content. Also manage bridge information (BEIST). Note that there is a separate Bridge Maintenance Manual (in Maintenance)

Rhonda Wiest

- **Manuals:** Utilities – guidance for utilities that are going to occupy WSDOT right of way.
- **Update Cycle:** As needed – triggered by feedback from Utilities staff and changes to related information in other manuals
- **Users:** Region utilities offices, project teams, utility companies, inspectors
- **Related Manuals:** manage Utilities Manual in conjunction with Agreement Manual and Accommodations Policy. Also related to Roadside Manual (given Scenic Byway requirements). Connected to FHWA Stewardship Agreement.

- **Comments:** Contains a lot of information in appendices that don't need to be in the body of the manual. There are many newer people in the Department that don't know about these manuals

Chris S for Bill Berends (couldn't attend)

- **Manuals:** Standard Plans Manual
- **Update Cycle:** Annually – coordinated with updates to Design Manual
- **Users:** same as Design Manual
- **Related Manuals:** Design Manual – work with Traffic, Bridge, Environmental
- **Comments:** None

4. Discussion Topic 1: Updates to Manual Content

General Question: What about the process of updating manuals is working well? What could be improved?

- User feedback, review and comment process/workflow
 - Current review processes vary – but there is interest in formalizing who should review what (e.g. keep a matrix, maintain reviewer lists) and having a defined workflow for updates.
 - In general, getting input from stakeholders is working well – regions are asked to comment within a time window.
 - Some challenge in managing ongoing comments – in between update cycles.
 - Some would like to have better awareness of who the users are
 - Some would like to have a more proactive process for soliciting feedback
 - Idea: have a reviewer list for all manuals - everyone receives a notice of manual updates and a short form to indicate interest in the review.
 - Ability to track utilization and understand who is using different sections would help with the update process
 - Would like people to be able to see review drafts.
- Coordinating updates of related materials across different manuals
 - Don't always know when another manual is being updated – update cycles are different across the manuals.
 - If a manual name is changed, cross references to that manual in other manuals aren't always updated/in-synch.
 - Would be helpful to document the connections across manuals, better understand interrelationships
 - Challenging to maintain consistency in terminology across manuals (need for global glossary?)
- Amount of time & effort it takes to get updates published
 - No resources to support formatting, which is both time and skill intensive.
 - The back and forth with Publications can be time consuming (but is useful for catching errors)
- Making sure people are aware that new versions are available

- Update announcement practices vary – Design manual distributed through Region points of contact; Bridge relies on Publishing Services; Utilities directs users to check website to be sure they are current. Electronic Engineering Standards uses ProjectWise to post current versions.
- Have had some people using old manuals, forms and don't seek updates before use. Some have had issues with consultants using older manuals.
- Project delivery memos are used to issue updates in between manual versions – causes problems sometimes because it is hard to rescind a project delivery memo – also hard to make sure people are aware that they are out there. Risk that people may put the wrong thing in a contract – creates liability issues.
- People may shop for answers if there are inconsistencies across different guidance documents.
- On the Bridge site... can see all the current memos and memos that have been incorporated into the manual.
- Question: does anyone use GovDelivery for this? (No)
- Keeping track of what has changed – and being able to go back to see what policies and guidance were in effect at a prior point in time
 - Need “frozen versions” for public disclosure, insurance claims. tracking specifications and guidance in effect at the time of contract execution.
 - Need paper copies for emergency situations when online access may not be possible.
 - Bridge, Utilities keep paper copies of prior manuals to do this now
 - Some retain electronic copies or both electronic and paper
- Other Thoughts/Issues
 - Lack of clarity about roles and responsibilities between HQ and Regions. Lots of autonomy in the Regions – flexibility to vary how things are done. How to integrate region-specific guidance with statewide guidance? Would regions have their own sub-pages/articles for a topic?
 - What is the source of record? Currently there may be MS Word source versions maintained by the owner.
 - Distinguishing policy and guidance – Environmental Manual process helped to do this and clarified responsibilities – developed template for procedures – describes who should do what.
 - Design-Build – need to be more explicit about what is NOT allowed (in addition to saying what shall or should be done) – different approach for an internal audience where you want to provide more flexibility.
 - What is the role of the Manual Stewards? Content or formatting or both.
 - Have a Manual of Manuals – focuses on style options. Work underway on standard templates (Pam Meek)

5. Discussion Topic 2: Consolidation of Manual Content

General Question: What are the advantages and disadvantages of consolidating content across manuals (like the MoDOT EPG example)?

- Advantages:
 - Opportunity to consolidate related material – e.g. safety analysis guidance, IJR/NEPA/VE connections.
 - Could provide a useful training and mentoring resource
 - Potentially more fluid editing process
 - Want to be able to reference particular sections of manuals. Directions to an online article can be more specific and stable than a page number in a manual
 - Potential ability to tailor content for different types of users
 - Could make it easier to have designated SMEs maintain specific content related to their roles (this is the approach used in the new online Environmental online guidance.
 - Could help to reduce printing? (Sustainability goal)
 - Could help with findability – evaluate using a KPI: how quickly can you get to the content you’re looking for?
 - Helpful for users to maneuver/navigate across related material. For Hydraulics, it would be very helpful for an E1 or E2.
 - Transition may take effort/adjustment but need to be able to look beyond the Development phase
 - Future state should be to get rid of PDFs – not accessible.
- Disadvantages/Concerns:
 - If my content is dispersed across the online manual, how do I know relevant changes are being made? How do you ensure people with expertise are making the changes? How do you manage who is responsible for each part? Need for more granular level of governance.
 - Don’t want to bog down the update process – especially for people whose manuals aren’t intertwined with others.
 - Concern about having “too many cooks in the kitchen”
 - Concern about potential fragmentation of material across different web pages (if HTML solutions was selected)
 - If move to the web, need for web editing skills, web design skill and effort
 - If we go to new forms, will we still need to maintain and produce PDFs? If we have to do what we do now plus more, this is a deal breaker.
 - How to comply with archiving requirements?
 - Who would maintain links and cross references?
 - Need to be able to access offline. Need to be printable.
 - Challenges in changing format and bringing long term managers along
 - Even if more granular approach was taken, would still like to be able to download all material for a subject area
- If WSDOT were to consider consolidating some of the manuals, do you have suggestions for over-arching organizational schemes or frameworks – e.g. by role, task, other (MoDOT uses standard specifications)
 - Subject

- Master Deliverables
- Project Phase
- Current Design Manual Chapters
- Transportation Lifecycle Stages (this could provide natural integration points for material from other divisions to be added later – e.g. Active Transportation)
- Other Comments:
 - May not be a lot of re-writing involved – just making better connections across different manual sections.
 - Consider using personas to design the new structure, support “anticipatory knowledge”
 - Can we have plan for a transition period where we maintain our existing manuals but add an online integrated manual? This is the approach used for Ecology. (but would be difficult to maintain 2 different versions – objective of this initiative is to reduce rather than increase effort)
 - Consider plan to integrate Construction and Maintenance manuals (external to Development Division)
 - See a lot of advantages but concerned about ending up with something different that isn’t better...
 - Think about how to phase – perhaps start with design manual and its branches, or do it based on a particular target user group (e.g. E1s and E2s – ADA, Environment, Runoff, Design, Hydraulics).
 - Target users: E1 and E2s would be a good place to start, esp. ADA, Environment, Runoff, Design and Hydraulics manuals
 - Need to recognize that some data, applications need to be restricted
 - Need to manage/restrict access to draft versions to content that users can’t access to not show as a hyperlink.

6. Discussion Topic 3: Enrichment of Manual Content

General Question: If WSDOT manuals were delivered electronically and it was easier to add and maintain links to supplemental material, what types of connections would be helpful?

- Links to tools/applications, or data sets
 - Would like to be able to connect to data and will need to manage access to that data
- Links to contact people or experts
 - Manual owner should be one point of contact – perhaps not a name but a position or office (this is currently used as a substitute for a formal expertise directory)
- Links to an agency glossary of terms
 - Yes – would like a collated glossary – though need to recognize that some terms are defined externally.
- Links to other resources:
 - Current manuals already have a variety of links – e.g. to Interim Memos.
 - Executive orders – currently disconnected from manuals, but many are related to project delivery. Currently not available for external access from Intranet site.

- Training materials, technical notes, e-learning classes
- Research – but this is a “bonus” – could be useful to reference NCHRP reports, etc. if WSDOT has endorsed/adopted the approaches described
- RCW connections
- Keep in mind that maintaining links is a lot of work
- Would be helpful to distinguish/demarcate links that are internal only
- Currently no requirement to retain copies of what the website links to. May need to be more mindful of ensuring ongoing access to these materials, particularly for external links.

7. Input on user survey

- Get input from:
 - E1s and E2s
 - Project Offices – Design Build
 - Region Environmental Offices
 - External Consultants: can work through ASCE, AGC, Consultant Services
 - Cross disciplines and training levels
 - (also may be helpful to look at web stats – use of current guidance pages)
- Training matrix (Jim Mayhew) may be helpful for identifying people
- Ask:
 - What do you do when you have a question?
 - Are you aware of what manuals exist? (Is this included in onboarding training?)
 - When/why do you look in manuals – specific questions, general education, etc.?
 - What devices do you use for accessing information – in the office, in the field?
 - Do you prefer paper documents, PDFs, websites, other?
 - How do you ensure you’ve got current content?

8. Wrap-Up: What concerns do you have that should be considered in this scoping effort?

- Maintenance of manual content – with awareness of interrelationships across sections
- Version control and ability to go back to previous versions
- Investment of time and resources for development
- Access control – internal and external
- Accessibility of electronic content – offline, emergency, COO
- 508 compliance
- Resourcing to help with the transition
- What infrastructure is needed
- Expectations for updates – do they need to be synchronized? How often will we need to do it? (takes Bridge Office 4 months to do publish)
- Keeping in mind what’s in the manual content is versus what is published elsewhere and link to it.
- How are levels of changes managed (housekeeping versus substantive decisions)
- Understanding the content has changed

- Formats – CAE does their manual in CAD - need to change?

In a “thumbs up/thumbs down” temperature check – there was mostly “thumbs horizontal” with a mix of ups and downs. People are intrigued, listening, but see a lot of issues to be addressed. Owners of design manual see several advantages of the ability to make updates in a more granular fashion opportunity to address many of the current issues with updating and create a more streamlined process.

Information Management Stakeholder Workshop

When: July 20, 1-2:30 PM Pacific

Where: Capital Conf Rm (3F21)

Background: The WSDOT Development Division has initiated a scoping study to explore the possibility of moving from maintaining engineering manuals in PDF form to adopting a more flexible electronic platform. This effort was inspired by Missouri DOT’s wiki-based [Engineering Policy Guide](#).

Meeting Purpose: To understand WSDOT Information Management perspectives to be considered in moving to an electronic WSDOT Engineering Guide.

Attendees:

- Leni Oman, Manual Wiki Project Manager
- Riley Woodward-Pratt, Design Manual Research Intern
- John Donahue (Design Manual Manager)
- Chris Schroedel (Design Manual Manager)
- Ahmer Nizam (Development Division Technical Services and Business Manager)
- Jeremy Bertrand (Communications)
- Mark Finch (Transportation Data/GIS)
- Alan Smith (GIS)
- Christy Granquist (WSF Library)
- Kathy Szolomayer (WSDOT Library)
- Clint Hill (CAE)
- Gordon Kennedy (Data Management)
- Gary Brown (Business Analysis, Application Design)
- Elizabeth Lanzer (Environmental Information)
- Kate Severson (Practical Solutions Training)
- Kim Smeenk (Materials Lab Librarian)
- Dave Richards (IT Business Analysis)
- Shannon Gill (Records Mgmt. Supervisor)
- Tom Westfall (IT Application Development)
- Steve Riddle (Publications/Graphics)

Invited but unable to attend:

- Grant Rodeheaver (IT Director)
- Michelle Morgan (Data Management)
- Andy Everett (Data Catalog)

- Kara Larsen (Records Management)
- Stephanie Williams (Development Division web master)
- Kris Rietmann (Communications)
- Pamela Meek (Publications Office)
- Bill Reynolds (IT Application Development)
- Larry Gruginski (IT Application Development)

Agenda

- 1:00 – 1:15 Welcome and Opening Remarks (Leni Oman, Ahmer Nizam, John Donahue)
- 1:15 – 1:25 Brief Demo of the MoDOT Wiki (Frances Harrison)
- 1:25 – 1:40 Summary of Morning Workshop with Engineering Manual Owners (Leni Oman, Frances Harrison)
- 1:40 – 2:20 Open Discussion: WSDOT Information Management Perspectives (see questions below)
- 2:20 – 2:30 Next Steps and Follow up Items

Discussion Questions:

1. How does moving from document-centric manuals to a more flexible electronic platform support WSDOT's information management principles? (below)

1. Data and information are critical to effective business decision making at WSDOT and shall be maintained in a manner appropriate to meet business needs.
2. Data and information are strategic, long-term assets owned by WSDOT, not by individual business units. They are findable, retrievable, and shared.
3. Data and information shall be collected once, stored once, and used multiple times.
4. Data and information that is not used shall not be collected or stored.
5. Data and information that is used by multiple applications or shared across business units shall be defined and managed from an enterprise perspective and fit for a variety of applications.
6. Data and information investments will consider business priorities, program impacts, and trade-offs.
7. Data and information shall be managed to provide availability, security, and integrity—they shall be both safe from harm and accessible by those who need them.
8. Data and information governance, costs, and stewardship processes will be transparent.

- This supports principles 1,2,3,4,5 and 7
 - Supports a content-centric view of information – consistent with what we've been trying to do with the website. Have created a new information architecture, currently being tested. Focuses on users and their needs rather than organizational structure.
2. From a WSDOT information management perspective, what are the advantages and disadvantages of using an electronic platform for engineering manuals? Are there specific risks or barriers to be considered?
 - Advantages:
 - Improved navigation
 - Design Manual is a legal document. Would be helpful to have the ability to clearly distinguish policy from guidance (e.g. using expand/collapse techniques) more difficult to do in PDF
 - Risks/Concerns:
 - ADA Compliance?
 - Ability to access versions of manual content at particular points in time – e.g. when contract goes out to bid and references a specific manual, how to know what the state of the content was at that point in time?
 - From records/public disclosure perspective, important to determine which version was in effect at a given time point, track authority, address archiving. But also keep in mind that we are only supposed to retain significant changes.

- Can we ask MoDOT how they have addressed both tort liability and public disclosure concerns?
 - Need to consider access to this information in the field – using e-readers; having print copies available. WSF library – in operational settings, there is a need for hard copy.
 - Plugins exist to print wiki articles to PDF
 - Is paper better for version control?
 - Would like to link licensed content into the manuals, but consider how to manage access (e.g. ASTM standards)
 - When Environmental did their guidance update for the web, needed to write in a different style – more user-centered, task oriented. Was a lot of work. Would not want to have different “variants” of the same guidance material that need to adhere to different style guidelines. Need to consider how proposed integration would affect style guidelines
 - Important to think through and clarify what the System of Record is. If we use a wiki, would that become the source? Complex picture – there are currently source MS Word files, InDesign files produced by Publications. (Varying perspectives on this.)
 - Any official System of Record needs to be protected and backed up appropriately
 - One conceptual option: maintain a system as source of record and a second system for publishing
3. If this initiative is pursued, what implications need to be considered related to integration with library, websites, databases, data catalog, etc.?
 - Need to consider consistency and integration with WSDOT intranet and internet
 - Note that the data catalog is currently being evaluated and will likely be changing
 - Possible integration with new forms (Carly Baines). Future migration from FileMaker Pro to Word and PDF
4. This project was inspired by the MoDOT wiki example. Would pursuing a wiki solution (either open source or commercial) be compatible with current agency guidelines for software selection?
 - No “hard and fast” guidelines – based on the business requirements and the situation.
 - Have used open source (e.g. Drupal), but typically would contract out for support
5. Are there particular wiki features that are important to include (e.g. on premise data storage; use of SQL database)?
 - Ability to locate/georeferenced content using standard WSDOT referencing
 - WSDOT is a Microsoft-centric shop, SQL databases

- Some foundational guidance on cloud storage in IT manual – currently have a sub-team looking at clarifying cloud guidance – have over 50 cloud-based services now. State OCIO’s office is putting out guidance.
6. What other options (besides a wiki) might be appropriate to consider? Are there other in-house software product that may fit the requirements?
- Start by understanding the business requirements and distinguishing mandatory from “nice to have”
 - E.g. auditing usage, making changes, review and comment, subscription)
 - Consider whether WSDOT already has a tool in-house that would meet the requirements.
 - Not clear that this should be a wiki – need to understand advantages of wiki given business requirements relative to other solutions – e.g. html/web pages.
 - Ask MoDOT: Why did they choose a wiki? What wiki features are they actually using? Did they consider other options?
 - State process for publishing RCWs and WACs – Office of the Code Reviser – software and change management process they use might be worth exploring.

Appendix C. User Survey Response Summary

A web survey was conducted in December 2017, targeting both internal WSDOT and external users of WSDOT's manuals. The following text was included with the survey link:

"The WSDOT Development Division is exploring opportunities to improve practices for manual management and improve the usability of department manuals. To help us target improvements, we'd like your input on manual use and value of potential improvements. The survey will be open through December 29th and will take about 10 minutes to complete. Thank you for your time and feedback."

Survey Respondents

A total of 362 responses were received. There was close to even split between internal and external (53-47%, respectively)

External Respondents: 53% Local government, 32% Consultants

Internal Respondents:

Largest region was HQ at 26%,

Largest business units: Design at 23%, Construction at 21%

Median years at WSDOT was approximately 15 years.

Follow-up options:

31 WSDOT employee emails

18 Local government emails

24 Miscellaneous personal and corporate emails

Manual Title Usage:

Manuals that are used frequently by >10%:

Design-25%

Construction-19%

LAG-18%

[Second tier: Materials-9.4%]

Occasional use >10%

Design-32%

Construction-25%

LAG-22%

Plans Prep-14%

ADA Field Guide-12%

Highway Runoff-12%

Cost Estimates-11%

RoW-10%

Traffic-10%

Most used manuals

Design-25%

Cosntruction-20%

LAG-18%
[Second tier: Traffic-4%]

Manual Usage Patterns:

Reasons for using manuals selected by >50% of respondents

Checking standards-87%
Checking guidance-75%
Checking policies-72%

Online vs local digital vs print copy: 53% use online, 26% locally stored PDF, 17% use print; 7 of 8 'Other' comments (2% of total) indicate a preference for print for at least some uses.

PC/Laptop vs Phone, etc.: 15% of respondents use their phone or similar device.

Other resources for policy and guidance selected by >50% of respondents:

WSDOT public web pages-56%
WSOT intranet-54%
[Second tier: WSDOT Executive Orders, etc-44%]

Methods for checking updates selected by >50%:

Engineering pubs page-63%
[Second tier: Email notifications-41%]

Usability (answers are on a 5 point scale)

When you are looking for information in the WSDOT manuals, how clear it is which manual you should consult to find what you need?

56% of respondents found said it was somewhat or very clear (options 4 & 5 together).

How frequently do you need to look in more than one place to find what you're looking for?

56% of respondents picked 'Sometimes' (the middle option); remaining responses were evenly distributed.

How often do you need to follow a link to an external document (a webpage or another manual) to find what you are looking for?

77% of respondents said 'sometimes' or less but not 'never' (options 2 & 3 together)

Preference for new features (forced choice ranking; 4 respondents that reported this question was confusing or not functioning properly)

Full text searching across manuals was the most popular; 53% of respondents ranked it first
Providing a left-hand nav panel and integrating manual content were ranked second by 19% and 21% of respondents, respectively.

Narrative responses

Website Integration: Many users (approx. 8%) commented on improvements to how the manuals are presented on the WSDOT website. The most frequent comments were along the lines of asking that all the manuals (administrative and engineering) be listed in one place, sometimes combined with providing better access from the intranet. A couple of comments asked for removal of historical versions or publishing data, but more emphasized the need for access to historical versions and clear, consistent metadata.

Search: About 8% of users mentioned providing better search capability in their narrative answers. Most comments reference a generic full-text search, but two comments specifically discussed the shortcomings of the current WSDOT website search for discovering manuals and requested better functionality in finding them (as opposed to searching within them).

Update process: Approx. 10% of comments addressed themselves to the update process. These comments had multiple focuses and went in multiple directions. Several areas of repeated comments were less frequent changes to the Design Manual and improved notifications around updates.

Inter-manual organizing: 8% of comments suggested (or in, in one case, opposed) changes to the relationship between manuals. Overlapping with some comments on updating, several asked for improved consistency between manuals. Others suggested greater clarity around scope, i.e. that all cost estimating material should be in the Cost Estimating Manual and the Design Manual should reference other manuals rather than attempting to duplicate it. Several comments spoke to some degree of combination, from just Design and Roadside Design to including all the Development Division manuals (and then some) in a single wiki-based manual.

Intra-manual organizing: A diverse set of comments (approx. 10%) addressed some aspect of the internal organization of manuals. These ranged from several that advocated increasing used of graphics, to streamlining or shrinking specific publications (Design Manual and Standard Specs), to making sure internal PDF bookmarks work.

Appendix D. Objectives and Functional Requirements

Notes on Requirements and Priorities:

- **Requirements** have been identified to help WSDOT evaluate **Solutions** for developing an online version of engineering manuals. A **Solution** may be made up of multiple software applications or tools integrated together.
- **Requirements** listed in this document will be used as a checklist when evaluating the capabilities of potential **Solutions** that get reviewed
- **Requirements** represent things that the solution will *allow* WSDOT to do; they do not imply anything about what business processes or procedures WSDOT *will in fact establish*. For example, a requirement for allowing users to insert proposed changes to content does not imply that WSDOT intends to provide blanket access to all users for making modifications.
- Each **Requirement** is associated with a **Goal** – which is a broad statement of what WSDOT hopes to achieve through creating online access to its manuals.
- Each **Goal** has several related **Objectives** (how the **Goal** will be achieved)
- Each **Goal** has several related **Business Processes**, which identify the tasks or activities that are involved in creating, updating, disseminating and using engineering manual content.
- Each **Requirement** describes how the solution will support one or more **Business Processes**.
- Priorities for Requirements are as follows:
 - 1-REQUIRED – means that the solution **MUST** provide this feature
 - 2-DESIRABLE – means that this feature is highly desirable but a solution that did not offer the feature would not necessarily be ruled out
 - 3-FUTURE – means that this feature is “nice to have” but lower priority and can be deferred to a future point in time
- Each **Requirement** is labelled based on whether it pertains to review/use of DRAFT manual content or PUBLISHED manual content

Goal 1: Expedite development and delivery of new/modified manual content

- Objectives:
 - Reduce time required for production tasks (formatting, graphics, etc.)
 - Streamline/facilitate internal review - reduce time required for solicitation and compilation of comments on updated material
 - Enable more frequent updates to content
 - Reduce need for interim project delivery (PD) memos
 - Maintain standards for catching typographic and other errors
 - Capture why changes are being made
 - Ensure manual users are made aware of relevant changes as they occur
- Business Processes: what happens, why do we do it, timing, who participates, inputs and outputs.
 - a. *Create and maintain a list of authors/owners and reviewers for each section/topic:* In order to manage the revision process, WSDOT assigns responsibility for authoring the

content of particular sections of the manuals to particular WSDOT staff. Manual content also requires, at minimum, internal authorization to be officially published, and may require external approval (e.g. by FHWA).

- b. *Identify and manage dependencies across content sections:* In order to coordinate updates across different sections and ensure consistency in policy, WSDOT must track which chapters depend on content in other chapters, make this information available to chapter owners, and notify these owners when changes happen in a chapter with a dependency relationship to their own.
- c. *Solicit comments on content from designated reviewers – internal and external:* Comments from users, especially regional staff, are crucial in developing some of our manual content. WSDOT must establish an easy process to solicit and receive comments from both WSDOT employees as well as other key stakeholders.
- d. *Review comments and make updates to content:* Once comments are received, they must be aggregated and made available to chapter owners so they can be evaluated and potentially used for revising manual content.
- e. *Manage review and approval process:* When manual content is created or revised, it may undergo additional review and will require one or more approvals (at minimum, the WSDOT signing authority, and potentially other parties such as FHWA).
- f. *Edit documents for style and accuracy:* In order to ensure the quality of the manual content meets minimum standards, editing by qualified staff is required.
- g. *Inform content users about changes to content:* When manual content changes (especially to reflect changes in policy), manual users need to be notified so that they can review and understand whether and how the changes impact how they carry out their job responsibilities.
- h. *Update the content:* Manual content is revised periodically or as needed by chapter owners.

Table D- 1. Requirements for Goal 1: Expedite development and delivery of new/modified manual content

Requirement	Priority	Draft or Published	Supported Business Processes
1.1. Store/track assignment of content owners and reviewers to different sections or groups of sections. <i>Comments: A content user should be able to find out who owns a particular chapter or section. A manual steward should make sure that there is a designated owner for each chapter or section.</i>	1-REQUIRED	DRAFT	a

Requirement	Priority	Draft or Published	Supported Business Processes
<p>1.2. Support use of style templates for different types of content to facilitate consistency (e.g. flow diagrams, narratives, tables)</p> <p><i>Comment: Style templates may be helpful for providing consistency and minimizing the amount of editorial work required to finalize content.</i></p>	2-REQUIRED	DRAFT	f
<p>1.3. Enable content owners to edit and “produce” their own content updates without need for additional formatting steps.</p> <p><i>Comments: The goal is to streamline the production process as much as possible while maintaining consistency and quality of the material.</i></p>	1-REQUIRED	DRAFT	f, h
<p>1.4. Enable content owners to see which other sections are related to their sections (to coordinate updates)</p> <p><i>Comment: An easy way to view dependencies across manual sections would help to make sure that different sections are kept “in synch” with each other. This is especially important in a situation where updates are being made more frequently, and more people are involved in the updating process.</i></p>	2-DESIRABLE	DRAFT	b
<p>1.5. Automate workflow for solicitation and collection of comments and/or approvals from stakeholders internal to WSDOT</p> <p><i>Comment: This is currently accomplished through emails. Automated workflow could help to make sure that the appropriate people are included in reviews and approval requests.</i></p>	2-DESIRABLE	DRAFT	c

Requirement	Priority	Draft or Published	Supported Business Processes
<p>1.6. Provide an option to allow for threaded comments on draft content from internal stakeholders</p> <p><i>Comment: Threaded comments help to build agreement on suggested changes (or highlight areas of disagreement), and make it easier for the content owner to determine how to best respond to the comments received.</i></p>	2-DESIRABLE	DRAFT	c, d
<p>1.7. Automate workflow for solicitation and collection of comments and/or approvals from stakeholders external to WSDOT</p> <p><i>Comment: Requirement 1.5 is for obtaining comments and approvals internal to WSDOT. This requirement is for obtaining comments and approvals from external stakeholders (e.g. FHWA). These requirements were split because they may involve different functionality.</i></p>	2-DESIRABLE	DRAFT	c
<p>1.8. Track approvals from designated stakeholders</p> <p><i>Comment: This ensures that there is an ability to verify that the required approvals were obtained. Automated workflow (1.5) would help to do this, but in the absence of a system that provides automated workflow, the minimum requirement is to store this information so that it can be accessed.</i></p>	1-REQUIRED	DRAFT	e
<p>1.9. Enable content reviewers to access copies of review drafts, insert comments and make suggested edits to content using track changes</p> <p><i>Comment: This requirement says that whatever solution is selected should have the revision and commenting functions that are typically part of desktop word processing software (e.g. Microsoft Word).</i></p>	1-REQUIRED	DRAFT	c, e

Requirement	Priority	Draft or Published	Supported Business Processes
1.10.Enable a content author to review an integrated/consolidated set of comments and tracked changes, and accept or reject each proposed edit <i>Comment: See comment for 1.9.</i>	1-REQUIRED	DRAFT	d
1.11. Provide ability for manual users to subscribe to notifications for updated content – by topic and by nature of change <i>Comment: Currently a very basic version of this capability is provided by GovDelivery, but this falls short of the needs</i>	2-DESIRABLE	PUBLISHED	g

Goal 2: Manage and provide access to versions of content

- Objectives
 - Facilitate use of current policy, procedures and guidance
 - Facilitate retrieval of content that was in place at a prior point in time to respond to public records requests, claims, or other needs
 - Comply with applicable records and information management laws and regulations
 - Manage use of outdated manual content
- Business Processes
 - a. *Respond to public records requests:* WSDOT needs to be able to promptly fulfill requests from the public for information including the present and past state of department policy as represented in the manuals, as well as complying with State records rules.
 - b. *Respond to claims:* WSDOT manual content, especially when it provides design standards, needs to be available for use in court
 - c. *Compile reference information on the state of content associated with a contract:* In the event that manual content is updated after a contract is signed, users need to be able to check the state of content that was in effect when at the time of signing
 - d. *Maintain history of changes:* In order to carry out the above processes, WSDOT must retain a history of the changes made to manual content.
 - e. *Discover and use current and historical policy, procedures and guidance:* The manual publication process should both direct users to the most current version of the manual and provide users access to the necessary historical information.

Table D- 2.Requirements for Goal 2: Manage and provide access to versions of content

Requirement	Priority	Draft or Published	Supported Business Processes
<p>2.1. Maintain a history of changes including information on type of change, who made it, and explanation</p> <p><i>Comment: A record of what changes were made, when, by whom, and (for significant changes) why may be needed to explain to users what is different in the newest version or what has changed between one version and another.</i></p>	1-REQUIRED	DRAFT	d
<p>2.2. Archive content when changes are made</p> <p><i>Comment: “Archiving” means to save a snapshot of the content in a location where it may be later retrieved by someone seeking a version of the content that existed at a particular point in time.</i></p>	1-REQUIRED	PUBLISHED	d
<p>2.3. Allow authorized users to view the change log for a selected set of sections</p> <p><i>Comment: Requirement 2.1 makes sure that a record of changes is maintained; this requirement makes sure there is a user interface available that allows users to view the changes for a selected set of sections.</i></p>	2-DESIRABLE	PUBLISHED	a, b, c, e

Requirement	Priority	Draft or Published	Supported Business Processes
<p>2.4. Provide the capability for the WSDOT system specialist to retrieve snapshots of content that were in effect at a particular point in time</p> <p><i>Comment: Requirement 2.2 makes sure that snapshots are archived; this requirement says that there is a user interface geared to system specialists (as opposed to end users) that enables retrieval of a snapshot for a particular point in time.</i></p>	1-REQUIRED	PUBLISHED	a, b, c, e
<p>2.5. Enable manual end users to dynamically view the state of a given content section at a particular point in time (via the user interface)</p> <p><i>Comment: This requirement goes one step further than 2.4 – it says that end users (not just system specialists) will be able to retrieve snapshots of content via a user interface. If requirement 2.4 is met without requirement 2.5, then end users will need to request snapshots from the system specialist.</i></p>	2-DESIRABLE	PUBLISHED	a, b, c, e

Goal 3: Improve findability, navigability and usability of content

- Objectives:
 - Reduce time spent by users searching for content related to a particular topic or task (particularly for casual users that don't know which specific manual to check, or for users with information needs that require material from multiple existing manuals)
 - Enable users to easily navigate to related content
 - Enable tailored content for specific audiences – e.g. region staff, design-build contractors
 - Maintain consistency in terminology and usage across content sections

- Maintain access to content when online version is not available or convenient to use (e.g. in the field)
- Clarify the distinction between policy (must do), procedure (how to do), and guidance (should do)
 - Note – look at MUTCD approach to this
- Meet 508 compliance requirements
- Business Processes:
 - a. *Create, maintain, and apply necessary classification structures:* Providing more and more robust tools for accessing content requires the development of classification structures (e.g. lists of approved topics) and the assignment of content to those classifications. As manual content is updated, ensuring that these classifications remain accurate will be an ongoing task.
 - b. *Curate content to be referenced/linked:* WSDOT manuals reference a substantial number of documents external to the manual, including both WSDOT and non-WSDOT published documents. In order to ensure currency and accuracy in these references, WSDOT needs to track the references documents and monitor changes in their content and status, or keep and control copies of these documents.
 - c. *Create and maintain external links:* WSDOT manuals link to locations on the internet, especially sites maintained by other government agencies, such as Ecology or FHWA. In order to ensure the currency and accuracy of these links, WSDOT needs to monitor these locations for changes in their content or status and update the originating links in WSDOT manuals accordingly.
 - d. *Manage glossary terms:* Providing glossary content for users requires WSDOT staff to create and maintain a list (or lists) of terms with their definition and usage notes in a format that is or can be made accessible to manual users.
 - e. *Discover and use current and historical policy, procedures and guidance:* Manual production and publications is ultimately done for the purpose of facilitating the use of this information. Users include both WSDOT employees and others accessing published material through a user interface.

Table D- 3. Requirements for Goal 3: Improve findability, navigability and usability of content.

Requirement	Priority	Draft or Published	Supported Business Processes
<p>3.1. Provide a mechanism to navigate back to each previous page the user navigated through, and show the user's current location. <i>Comment: One of the advantages of online manual content is the ability to easily navigate across various content sections (in contrast to a more linear experience reading a PDF manual.) Enabling the user to keep track of where they are, and easily return to where they have been facilitates this navigation process.</i></p>	1-REQUIRED	PUBLISHED	e
<p>3.2. Provide the capability to execute a full text search across material in the scope of existing manuals <i>Comment: One of the advantages of online manual content is the ability to search across different manuals with a single query.</i></p>	1-REQUIRED	PUBLISHED	d
<p>3.3. Provide a wild card search capability <i>Comment: This is a common search engine feature that can be used to improve search results.</i></p>	2-DESIRABLE	PUBLISHED	e
<p>3.4. Provide assisted search using typeahead and auto-suggest <i>Comment: This is a feature that can draw upon a dictionary or specialized taxonomy of terms to suggest search terms based on the initial set of characters typed by a user.</i></p>	3-FUTURE	PUBLISHED	e

Requirement	Priority	Draft or Published	Supported Business Processes
<p>3.5. Provide option to search within linked documents or websites <i>Comment: Users may want to retrieve manual content based on search terms that are not contained in the content itself, but within documents or web pages that are linked to the content.</i></p>	2-DESIRABLE	PUBLISHED	b, c
<p>3.6. Provide faceted search capability – enabling users to set multiple filters and “drill down” to content of interest <i>Comment: This feature would provide an “Amazon-like” interface for exploring the manual content based on categories such as topic, business function, asset, type (e.g. policy/procedure/guidance), etc.</i></p>	2-DESIRABLE	PUBLISHED	a
<p>3.7. Support indexing and tagging of individual content sections to enable subject-based searches and cross referencing <i>Comment: This means that each individual section or subsection of the content could have several different tags associated with it. These tags could then be used to enable a subject-based search – as well as the provision of a faceted search capability.</i></p>	1-REQUIRED	PUBLISHED	e

Requirement	Priority	Draft or Published	Supported Business Processes
<p>3.8. Enable access to content through multiple methods (e.g. clicking on a topic map, business process diagram or diagram of the practical solutions life cycle)</p> <p><i>Comment: This recognizes that different users may want to find content in different ways.</i></p>	2-DESIRABLE	PUBLISHED	a
<p>3.9. Provide flexibility to implement tailored views of content for different user types (region 1 staff; design build contractor, etc.)</p> <p><i>Comment: This is related to 3.8, but implies that by having the system recognize different user types and provide tailored views based on a login or specific link used to access the content.</i></p>	3-FUTURE	PUBLISHED	a
<p>3.10. Allow inclusion of links to both internal WSDOT and external resources that will help users carry out the work – people (expertise), tools and information systems, supplemental information (web pages, documents, etc.), training materials.</p> <p><i>Comment: This means that the solution must support linking; WSDOT must establish a policy on what to link to.</i></p>	1-REQUIRED	PUBLISHED	b, c

Requirement	Priority	Draft or Published	Supported Business Processes
<p>3.11. Tailor display of links based on whether the user is internal or external (see requirement 5.4) <i>Comment: This could allow for visual cues designating links to content that is licensed or restricted to internal WSDOT users or suppression of these links for external users.</i></p>	2-DESIRABLE	PUBLISHED	b, c
<p>3.12. Provide access to a master glossary through “hovering” on a glossary term <i>Comment: Creation of an online body of manual content provides an opportunity to establish clear and common definitions of terms used across multiple manuals.</i></p>	2-DESIRABLE	PUBLISHED	c
<p>3.13. Enable designation of policy, procedure and guidance through use of font styles or colors, collapse/expand features or other methods <i>Comment: Currently manual users need to pay attention to use of language to distinguish policy (must do), guidance (should do), and procedure (how to). Ability to classify sections or subsections based on these categories would enable the solution to provide visual cues to help users to more clearly recognize each type of content.</i></p>	2-DESIRABLE	PUBLISHED	a

Requirement	Priority	Draft or Published	Supported Business Processes
<p>3.14. Enable printing of selected content <i>Comment: Some users need access to manual content in print form for situations where they don't have access to a computer or mobile device.</i></p>	1-REQUIRED	PUBLISHED	e
<p>3.15. Enable saving of offline copies of selected content sections <i>Comment: Some users need access to locally stored versions of content for situations where they don't have access to the internet.</i></p>	1-REQUIRED	PUBLISHED	e
<p>3.16. Meet the web accessibility standard requirements in accordance with Washington State CIO's Policy #188 <i>Comment: This policy describes the minimum accessibility standard, WCAG 2.0. AA, which was developed by the W3C.</i></p>	1-REQUIRED	PUBLISHED	e

Goal 4: Facilitate user feedback on published content

- Objectives:
 - Improve content by facilitating feedback from the users
 - Understand how different content topics are used and by whom in order to guide refinements or prioritize updates
- Business Processes:
 - a. *Facilitate user feedback:* Comments from users, especially regional staff, are crucial in developing some of our manual content. In order to generate feedback, WSDOT must make these users feel their input is valued and establish an easy process to provide it.
 - b. *Analyze utilization statistics and determine priorities for updates:* Understanding relative popularity of different content sections within different user segments (internal WSDOT versus external) can help manual stewards and content owners to determine which sections are most heavily utilized, which may be one factor considered in determining frequency of updates or priorities for improvement.

Table D- 4. Requirements for Goal 4: Facilitate user feedback on published content.

Requirement	Priority	Draft or Published	Supported Business Processes
<p>4.1. Provide an option to allow users to provide comments on specific published content sections or topics</p> <p><i>Comment: The purpose here is to allow users to easily provide feedback in context so that it is meaningful to content owners</i></p>	2-DESIRABLE	PUBLISHED	a
<p>4.2. Provide an option to allow authorized users to create a marked-up version of published content and transmit it to the content owner.</p> <p><i>Comment: Note: this does not imply that the users are modifying the production version – but that they are able to begin with the current published version of content to create a marked-up version.</i></p>	2-DESIRABLE	PUBLISHED	a
<p>4.3. Track the number of “hits” on each section of the content or topic area.</p> <p><i>Comment:</i></p>	2-DESIRABLE	PUBLISHED	b
<p>4.4. Track which internal users (based on login) are reading different content sections.</p> <p><i>Comment:</i></p>	3-LATER	PUBLISHED	b

Goal 5: Manage access to content

- Objectives:
 - Enable external access to content (contractors, consultants, federal agencies, resource agencies, other DOTs, etc.)
 - Default to open access, but build in capability to restrict access for sensitive material should this be required in the future.
 - Limit modification of working drafts to authorized individuals
 - Limit commenting on published material to authorized individuals
 - Limit viewing of comments on published materials to authorized individuals
- Business Processes:
 - a. *Manage content classifications (determine which sections are sensitive or for internal use only) – [NOTE: current material is not sensitive; this is included for future flexibility]:* WSDOT may choose to create manual content that needs to be restricted from public viewing. In order to do so, it will need to create, maintain, and apply these access classifications to manual content.
 - b. *Manage user credentialing process for access to restricted materials:* In order to support potential restricted access to manual content, WSDOT must be able to track and apply login credentials for users.

Table D- 5. Requirements for Goal 5. Manage access to content.

Requirement	Priority	Draft or Published	Supported Business Processes
5.1. Restrict edit privileges to authorized users by page or section of content <i>Comment: Note that this pertains to edits of draft (not published) content. This could be accomplished by providing a separate login or with Single Sign-On based on Active Directory.</i>	1-REQUIRED	DRAFT	a, b
5.2. Restrict commenting privileges to authorized users <i>Comment: If end users are allowed to comment on published manual comment and have these comments saved, it will be important to guard against spam and other unwanted inputs.</i>	1-REQUIRED	PUBLISHED	a, b

Requirement	Priority	Draft or Published	Supported Business Processes
5.3. Restrict ability to view comments to authorized users <i>Comment: Note that the requirement just implies that the capability would exist to restrict viewing privileges if needed in the future – currently the content of WSDOT manuals is not sensitive and is open to the public.</i>	1-REQUIRED	PUBLISHED	a, b
5.4. Detect external users (outside of WSDOT) <i>Comment: This requirement would enable provision of different content views for external and internal users (see requirement 3.11)</i>	1-REQUIRED	PUBLISHED	a, b

A test strategy was developed describing how requirements are will be tested. The test strategy included the following information for each requirement:

- Testing required?
- Software to be tested (based on software capability)
- How we will test the requirement
- Whether this requirement is a near, mid or long term need
- Whether the lean task will inform implementation of this requirement
- Additional comments
- Who will be involved in the testing
 - Manual Steward
 - Content Author
 - Project Team
 - Reviewers
 - Manual Users

Americans with Disabilities Act (ADA) Information:

This material can be made available in an alternate format by emailing the Office of Equal Opportunity at wsdotada@wsdot.wa.gov or by calling toll free, 855-362-4ADA(4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711.

Title VI Statement to Public:

It is the Washington State Department of Transportation's (WSDOT) policy to assure that no person shall, on the grounds of race, color, national origin or sex, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participation in, be denied the benefits of, or be otherwise discriminated against under any of its federally funded programs and activities. Any person who believes his/her Title VI protection has been violated, may file a complaint with WSDOT's Office of Equal Opportunity (OEO). For additional information regarding Title VI complaint procedures and/or information regarding our non-discrimination obligations, please contact OEO's Title VI Coordinator at (360) 705-7082.
