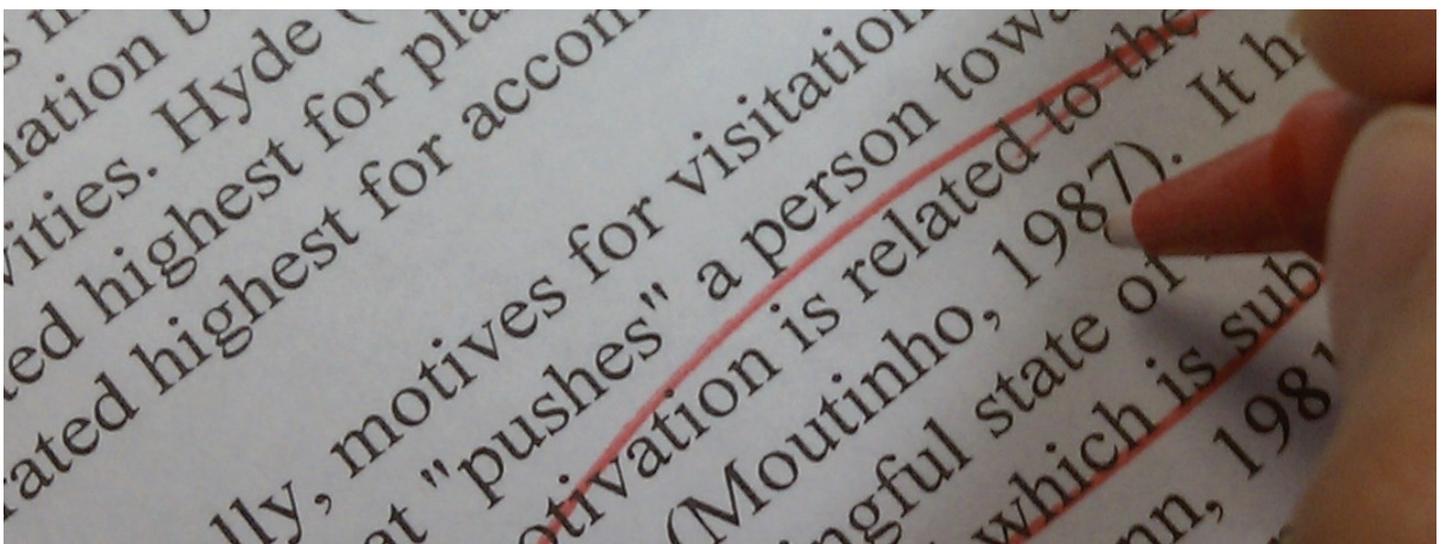


Specifications for Preparing ADOT Research Reports



Arizona Department of Transportation Research Center

Contents

Acronyms, Abbreviations, and Terms	1
About This Edition	3
Sources Used for Instructions and Specifications.....	3
<i>Color Reproduction</i>	3
Editing Process	3
<i>Publication</i>	4
<i>Report Not Published</i>	4
Writing Tips.....	4
Technical Report Front Matter	7
Cover	7
Title Page.....	7
Disclaimer.....	7
Technical Report Documentation Page (TRDP)	7
<i>Requirement</i>	7
<i>Where to Find the TRDP File</i>	7
<i>Font Size</i>	7
<i>Margins</i>	7
<i>Alignment</i>	7
<i>Fill Entire Page</i>	8
TRDP Content.....	8
Metric Conversion Page.....	12
<i>Content</i>	12
Acknowledgments.....	12
<i>Content</i>	12
<i>Style</i>	12
Table of Contents (TOC).....	12
<i>Content</i>	12
<i>Long Titles</i>	12
<i>First Element Listed in TOC</i>	13
<i>Consistency and Page Numbers</i>	13
<i>Indentation</i>	13
<i>Dot Leaders</i>	13
List of Figures and List of Tables	13
<i>Requirement</i>	13
<i>Separate Pages</i>	13
<i>Pagination</i>	13
<i>Content</i>	14
<i>Consistency and Page Numbers</i>	14
List of Abbreviations, Acronyms, and Symbols.....	14
<i>Content</i>	14
<i>Pagination</i>	14

Report Pagination	15
Introduction	15
<i>Multiple Volumes</i>	15
<i>Double Sided</i>	15
<i>Even and Odd Page Placement</i>	15
Page Numbering	15
<i>Format</i>	15
<i>Major Sections</i>	16
<i>Landscaped Pages</i>	16
<i>Oversize Pages</i>	17
<i>Appendixes</i>	17
Report Format	19
Page and Paragraph Specifications	19
<i>Columns</i>	19
<i>Font</i>	19
<i>Margins</i>	19
<i>Spacing</i>	19
<i>Paragraphs</i>	19
<i>Justification</i>	19
<i>Headers and Footers</i>	19
<i>Widows and Orphans</i>	20
<i>Headings</i>	20
Executive Summary Specifications	20
<i>Purpose</i>	20
<i>Placement in Report</i>	21
<i>Summary Elements</i>	21
<i>How to Write a Summary</i>	21
Grammar and Style	23
Word Use	23
<i>Acronyms, First Reference</i>	23
<i>Acronyms, Plural</i>	23
<i>a.m., p.m.</i>	23
<i>Use of the Word "Data"</i>	23
<i>Prefixes</i>	24
<i>Pronoun Use</i>	24
<i>Gender-Neutral Pronoun Use</i>	24
<i>States</i>	25
<i>Trademarks</i>	25
<i>United States, Abbreviating</i>	25
<i>Years</i>	25
Internet and Technology Terminology Guide	26
<i>Handling Technology Terms</i>	26
<i>URLs</i>	26

Capitalization	27
<i>Captions and Titles</i>	27
<i>References to Chapters, Figures, or Tables in Text</i>	27
<i>Names of Roadways</i>	27
<i>Portland Cement</i>	28
<i>East, West, North, and South</i>	28
<i>Position Titles</i>	28
<i>Programs or Research Items</i>	28
<i>“State,” “City,” and “Federal”</i>	29
<i>District</i>	29
Punctuation.....	29
<i>Bulleed Lists</i>	29
<i>Commas in a Series</i>	30
<i>Commas in Compound Sentences</i>	30
<i>Commas with a State or a Year</i>	30
<i>Hyphens in Modifying Phrases</i>	31
<i>Hyphens in Modifying Phrases that End in “-ly”</i>	31
<i>Em Dashes</i>	31
<i>Spacing after Periods</i>	31
<i>Parentheses and Periods</i>	31
<i>Punctuation and Quotation Marks</i>	32
<i>Smart Quotes versus Straight Quotes</i>	32
<i>Titles in Italics versus Quotation Marks</i>	32
Spelling.....	33
<i>American versus British Spellings</i>	33
<i>Spell Check</i>	33
Numbers.....	33
<i>When to Spell Out Numbers</i>	33
<i>Commas with Numerals</i>	34
<i>Decimals, Not Fractions</i>	34
Measurements, Symbols, and Equations	34
<i>English versus Metric Units</i>	34
<i>Common Unit Abbreviations</i>	35
<i>Numerals with Unit Symbols and Abbreviations</i>	35
<i>When to Spell Out Units</i>	36
<i>Percent</i>	37
<i>Slope</i>	37
<i>Time</i>	37
<i>Temperature</i>	37
<i>Symbols</i>	37
<i>Equation Numbering</i>	38
<i>Equation Placement</i>	38
<i>Creation of Equations</i>	38
<i>Equation Symbol Identification</i>	38

Figures and Tables	39
Overview	39
<i>Requirements</i>	39
<i>Quality</i>	39
<i>Margins</i>	39
Appearance and Usage	39
<i>Font Size</i>	39
<i>Placement</i>	40
<i>Spacing</i>	40
<i>Cite Sources</i>	40
<i>Copyrighted or Published Material</i>	40
<i>Numbering Figures and Tables</i>	41
<i>Number Alignment in Tables</i>	41
<i>Captions, Titles, and Axis Labels</i>	41
<i>Continuation</i>	41
<i>Units</i>	42
<i>Compare to LOF/LOT</i>	42
References	43
Overview	43
How to Cite References	43
<i>Author-Date Citation Style</i>	43
<i>Optional Bibliography Page</i>	43
<i>Unpublished Works</i>	43
<i>Interviews</i>	44
<i>Cross Check</i>	44
Formatting References Page	44
<i>Content</i>	44
<i>Placement</i>	44
<i>Source Order</i>	44
<i>Sources Cited More than Once</i>	44
<i>Format for Entries</i>	44
Reference Listing Examples	45
Permission to Use Published Materials	46
<i>Permission to Use Copyrighted Materials</i>	46
<i>Permission to Use Published Materials</i>	47
<i>Release Language</i>	47
<i>Permission Documentation</i>	47
<i>Maps</i>	47
<i>Sponsored Research</i>	47

Acronyms, Abbreviations, and Terms

ADOT	Arizona Department of Transportation
Chicago	<i>The Chicago Manual of Style</i> ; a manual providing rules on language style and usage; required by ADOT
DOT	department of transportation; ADOT's counterpart in another state
FHWA	Federal Highway Administration; joint sponsor with ADOT on many research projects
LOF	List of Figures
LOT	List of Tables
NCHRP	National Cooperative Highway Research Program
NTIS	National Technical Information Service; federal depository for US research findings
PI	principal investigator; the researcher in charge of the project
PM	project manager; the ADOT contact who oversees a research project
recto	right-hand, front, or odd-numbered page in a report; opposite of verso
TAC	technical advisory committee; assists project manager in overseeing a research project
TOC	table of contents
TRB	Transportation Research Board
TRDP	technical report documentation page; the first page in an ADOT technical report; provides information about the report to NTIS; required by ADOT for technical reports; also called Form DOT F 1700.7
verso	left-hand, back, or even-numbered page in a report; opposite of recto

About This Edition

Sources Used for Instructions and Specifications

Specifications for Preparing ADOT Research Reports uses two primary published sources for editing standards and decisions. They are:

- *The Chicago Manual of Style* (15th ed. or later)
- *Merriam-Webster's Collegiate*[®] *Dictionary* (10th ed. or later)

While these specifications are meant to be comprehensive, they may not answer all of a report author's questions. The Research Center encourages authors to contact the project manager (PM) or the technical editor for clarification **prior** to the report review process.

Color Reproduction

When color is required, avoid using light colors, such as yellow or light blue. They are often not clearly visible even when printed in color.

Editing Process

The editing process starts with the PM's review of interim study products (e.g., report chapters) and continues until the final report is approved for publication. The process involves a thorough review of the grammar, punctuation, language, and format of the report's body, references, and appendixes. The report is also checked for adherence to copyright requirements.

Project reports go through the following iterative process. Steps are repeated when determined necessary by the project manager (PM):

1. The principal investigator (PI) submits an electronic draft report (interim or final report) to the PM. The draft must be compatible with Microsoft Word 2010 and must comply with these *Specifications*.
2. The PM reviews the draft and identifies needed improvements. The PM returns the draft to the PI for revision, if necessary.
3. The project's technical advisory committee (TAC) reviews the draft and suggests additional improvements. Note: PM and TAC review includes assessment of technical content, as well as editorial review.
4. The PI revises the draft report for the PM's review and approval.

[®] Collegiate is a registered trademark of Merriam-Webster, Incorporated, Springfield, Massachusetts.

5. When the report reaches the draft final stage and is approved by the TAC and the PM, the PM submits the draft to FHWA for final review and approval.
6. The Research Center's editorial staff selects an editor to edit and format the FHWA-approved report.
7. The PI responds to editorial questions with the PM.
8. The Research Center director and editorial staff review the revised draft and approve for formatting.
9. After the report is formatted, the Research Center director and editorial staff review the completed report and approve it for publication.

Publication

The report is published after the research director approves the final report. Research Center staff prepares the report for publication, posts it to the Research Center's website, and issues an announcement of the report's availability. Paper copies are mailed to those parties with a standing request and to those who have requested one.

Report Not Published

The Research Center will occasionally decide to not publish a project's report. This includes circumstances where the Research Center:

- Approves a deliverable but elects not to publish it.
- Does not approve a deliverable.
- Approves a deliverable containing classified or sensitive information.

Writing Tips

Research reports can benefit from concise, direct language that replaces wordy phrases with fewer words and reorganizes sentences. To give some guidance, the Research Center reprints, with permission, this online excerpt from Daily Writing Tips, "10 Techniques for More Precise Writing."

- **Avoid Vague Nouns**

Phrases that are formed around general nouns such as *aspect*, *degree*, and *situation* clutter sentences.

Before: "She is an expert in the area of international relations."

After: "She is an expert in international relations."

- **Use Words, Not Their Definitions**

Replace explanatory phrases with a single word that encapsulates that explanation.

Before: "The crops also needed to be marketable so that families would be able to sell any yields that exceeded what they personally required."

After: "The crops also needed to be marketable so that families would be able to sell any surplus."

- ***Avoid Noun Strings***

Reorganize sentences to eliminate series of nouns used as adjectives.

Before: “The lack of a secure transfer may hamper computer security incident response efforts.”

After: “The lack of a secure transfer may hamper responses to computer-security incidents.”

- ***Convert Nouns to Verbs***

When a sentence includes a noun ending in *-tion*, change the noun to a verb to simplify the sentence.

Before: “They will collaborate in the creation of new guidelines.”

After: “They will collaborate to create new guidelines.”

- ***Reduce Verb Phrases to Simple Verbs***

Identify the verb buried in a verb phrase and omit the rest of the phrase.

Before: “The results are suggestive of the fact that tampering has occurred.”

After: “The results suggest that tampering has occurred.”

- ***Replace Complex Words with Simple Ones***

Choose simpler synonyms for multisyllabic words.

Before: “The department will disseminate the forms soon.”

After: “The department will pass out the forms soon.”

- ***Avoid Expletives***

Don’t start sentences with *There is*, *There are*, or *It is*.

Before: “There are many factors in the product’s failure.”

After: “Many factors contributed to the product’s failure.”

- ***Eliminate Prepositional Phrases***

Use possessives to eliminate phrases starting with the preposition *of*.

Before: “The decision of the committee is final.”

After: “The committee’s decision is final.”

- ***Reduce Wordy Phrases to Single Words***

Replace phrases that signal a transition with simple conjunctions, verbs, or other linking words.

Before: “Due to the fact that the project is behind schedule, today’s meeting has been postponed.”

After: “Because the project is behind schedule, today’s meeting has been postponed.”

—**Source:** *Daily Writing Tips*, www.dailywritingtips.com

Technical Report Front Matter

Cover

The Research Center will provide the cover for reports.

Title Page

The Research Center will provide the title page for reports.

Disclaimer

The Research Center provides a standard disclaimer printed on the reverse of the title page.

Technical Report Documentation Page (TRDP)

Requirement

The report author must complete the technical report documentation page (also denoted as Form DOT F 1700.7) for the National Technical Information Service (NTIS).

Where to Find the TRDP File

The Research Center project manager will provide the author with the TRDP template.

Font Size

The author must enter TRDP information in 11- or 10-point Calibri and must maintain the same point size consistently for all entries in the TRDP.

Margins

Margins are preset in the template files, so there is no need to change them. Margins on the TRDP are 0.5 inch.

Alignment

The text in the boxes must align with the number of the box. Indents may be used in the abstract to indicate the beginning of new paragraphs.

Fill Entire Page

The TRDP must be lengthened to fill the page vertically. Adjust accordingly to fit:

- If the TRDP is too short, add blank lines following the abstract (Box 16).
- If the form extends to a second page, reduce the length of the abstract or reduce the font size of all text entries to 10 points. Do not use anything smaller.

TRDP Content

See Figure 1 for a sample TRDP. Use the following instructions for filling out the TRDP. Note that the instructions for completing a TRDP for a research report differ from those for completing a TRDP for a product reviewed as part of the Approved Products program

Box 1, Report No. — Enter as FHWA-AZ-09-644-1, where:

- FHWA = Federal Highway Administration, AZ = Arizona.
- 09 = calendar year the report is completed (published).
- 644 = project number.
- 1 = phase of report, if project produces more than one phase.
- If the report is divided into multiple volumes, list the volume number.

Box 2, Government Accession No. — Leave blank.

Box 3, Recipient's Catalog No. — Leave blank.

Box 4, Title and Subtitle — Enter entire report title, in title case (initial capital letter on significant words); precede subtitles with a colon.

Box 5, Report Date — Enter month and year the report is published.

Box 6, Performing Organization Code — Leave blank.

Box 7, Author(s) — List first name, middle initial if available, and last name of all authors, primary author first; maintain formality across all author names (e.g., all middle initials or none) unless following author preference in name style. Enter the names of the researchers, not just the company.

Box 8, Performing Organization Report No. — Leave blank.

Box 9, Performing Organization Name and Address — Enter name and address of organization that the principal investigator works for (followed by other organization, if applicable).

Box 10, Work Unit No. — Leave blank.

Box 11, Contract or Grant No. — If funded with state planning and research (SPR) money, format the contract number thus: SPR-PL1 (Federal program year) (project number)-(phase or volume). The program year is the fiscal year the project funding comes from:

Year	Program
2006	69
2007	171
2008	173
2009	175
2010	177
2011	179
2012	181
2013	183
2014	185
2015	187

Example: SPR-PL1 (69) 622

If project funds come from another source, enter that contract number.

Box 12, Sponsoring Agency Name and Address — Enter:

Arizona Department of Transportation
206 S. 17th Ave.
Phoenix, AZ 85007

Box 13, Type of Report and Period Covered — Enter FINAL in all caps. Entering the project period (month/year project started—month/year project ended) is optional. For example: FINAL (11/07–12/09).

Box 14, Sponsoring Agency Code — Leave blank.

Box 15, Supplementary Notes — Enter “Project performed in cooperation with the Federal Highway Administration.”

Box 16, Abstract — Include a brief (200–250 words) summary of the most significant information contained in the report. When applicable, the abstract must include advice on how the results of the research can be used.

Box 17, Key Words — Enter terms or short phrases that identify the important topics in the report; use initial caps. Choose terms from the Transportation Research Thesaurus.

(<http://trt.trb.org/trt.asp>)

Box 18, Distribution Statement — “This document is available to the US public through the National Technical Information Service, Springfield, Virginia 22161.”

Boxes 19 and 20, Security Classif. — Unless advised otherwise in writing by the Research Center, enter “Unclassified.”

Box 21, No. of Pages — Leave blank. The Research Center will calculate at the time of publication.

Box 22, Price — Leave blank.

Figure 1. Sample Technical Report Documentation Page (TRDP)

1. Report No. FHWA-AZ-YR-XXX(X)		2. Government Accession No. LEAVE BLANK		3. Recipient's Catalog No. LEAVE BLANK	
4. Title and Subtitle Title and Subtitle in Initial Capital Letters				5. Report Date MONTH, YEAR	
				6. Performing Organization Code LEAVE BLANK	
7. Author Names In Conventional Order (i.e., John A. Doe)				8. Performing Organization Report No. UTILIZE WHEN POSSIBLE	
9. Performing Organization Name and Address Name Street Address City, State Zip Code				10. Work Unit No. LEAVE BLANK	
				11. Contract or Grant No. SPR-PL-1(XX)ITEM XXX	
12. Sponsoring Agency Name and Address Arizona Department of Transportation 206 S. 17th Avenue Phoenix, Arizona 85007				13. Type of Report & Period Covered FINAL	
				14. Sponsoring Agency Code	
15. Supplementary Notes Prepared in cooperation with the US Department of Transportation, Federal Highway Administration					
16. Abstract 1. 200-300 words A brief summary of the report stating state the purpose, methods, results and conclusions of the work effort. 2. When a report consists of a number of volumes, include the title of each volume in the abstract. 3. The report number (box number 1 of this form) will incorporate the calendar year, SPR item number, and volume number, if applicable. 4. The report date (box number 5 of this form) reflects the date of the submission of the "revised" final report. This date is the date shown on the cover. 5. Contract or grant number, (box number 11 of this form), indicates the program year and the item number. 6. The type of report and period covered is shown in box number 13 of this form. The date shown corresponds to the date of contract initiation through the date of first submission of the draft final copy.					
17. Key Words Select specific and precise terms or phrases that identify principal subjects covered in the report			18. Distribution Statement Document is available to the US public through the National Technical Information Service, Springfield, Virginia, 22161		23. Registrant's Seal
19. Security Classification Unclassified	20. Security Classification Unclassified	21. No. of Pages Leave Blank	22. Price		

Metric Conversion Page

Content

The Research Center provides a metric conversion page placed after the TRDP. Leave a blank page for it to be inserted.

Acknowledgments

Content

Acknowledgments may be included if the author wishes, but are unnecessary and uncommon. Acknowledgments are the last page of the front matter.

Style

Use consistent formality for any names in the acknowledgments (e.g., all middle initials or none, all courtesy titles or none) unless individuals have a name preference.

Table of Contents (TOC)

Content

In the table of contents (titled merely “Contents”), list all chapter titles and main headings (references, appendixes, etc.) with their corresponding page numbers. Include at least first-level headings within the chapters. If second-level headings are used, list the same level of headings for all chapters. List full chapter titles as they appear in the text. For appendixes, list appendix letter (if any) and title (e.g., Appendix A: Imaging Figures). Do not list headings beyond second level.

Using autogenerated listings for the TOC is usually best, since it enables easy updating of the page number fields during editing.

Long Titles

When the chapter or section title is more than one line long, break it with a soft return where logical and do not let it get within three leader dots of the page number listed at the right margin. Indent second and subsequent lines.

Example:

**Chapter 2. Graduated Driver Licensing and Young Driver Education
in the United States. 8**

To break long lines automatically within the TOC (or other front matter lists), use the right-indent feature of the word processor. To prevent long titles from breaking based on the body of the report, use a soft return (SHIFT+ENTER) to break the title in the body of the report—it will be read by the table of contents as a space instead of a line break.

First Element Listed in TOC

The TOC begins with the first section of text—usually the executive summary.

Consistency and Page Numbers

Check to make sure that:

- All headings in the TOC read exactly like those in the text.
- The page numbers listed in the TOC correspond to their in-text referents.
- New chapters or sections begin on odd-numbered right-hand (recto) pages.

Using an autogenerated TOC is an easy way to ensure this consistency of listings and accuracy of page numbers.

Indentation

Use indentation consistently to show section subordination and coordination.

Dot Leaders

All leaders (e.g., dots separating section titles from their page references) must align. Generate leader dots automatically with the TOC function or tab function. Do not type them manually. This is also true for the List of Figures and List of Tables.

Example:

Summary of Survey Results 8

List of Figures and List of Tables

Requirement

The List of Figures (LOF) and List of Tables (LOT) are required for reports containing five or more figures or tables, respectively, and may be included at the author’s discretion if there are fewer figures/tables.

Separate Pages

In Research Center reports, the LOF and LOT are separate sections and are on separate pages, unless short enough to fit on a single page. They are grouped here for explanation because they are so similar.

Pagination

For proper pagination:

- The LOF follows the TOC (recto or verso page).
- The LOT follows the LOF (recto or verso page).
- The lists do not require right-hand placement or odd page numbers.
- The lists show printed page numbers.

Content

The LOF and LOT contain the figure and table numbers, captions, and page numbers of figures and tables, respectively. List any figures and tables from appendixes (or other back matter) as well.

Example:

Figure 1. Survey Results Gathered by Students in the Tempe, AZ, Area. 8

Consistency and Page Numbers

Check to make sure that:

- All captions in the LOF and LOT read exactly the same as those in the text.
- The correct corresponding page numbers are listed in the LOF and LOT.

List of Abbreviations, Acronyms, and Symbols

Content

If the report contains more than five or unusual acronyms, abbreviations, or symbols, provide a list in the front matter, and define them upon first reference in the TRDP abstract, the executive summary, and the main text. The list gives a helpful reference for readers, but even without the list, each acronym still needs to be defined on first use as already listed.

The list contains all acronyms used in the document; listing abbreviations and symbols used in the document is optional. If there are no abbreviations or symbols, title the page as “List of Acronyms.”

When the term being defined is not a proper name, such as technical advisory committee, do not capitalize the full phrase; of course, the acronym, TAC in this case, is in all capitals. If the phrase is a proper name, such as Arizona Department of Transportation, capitalize it appropriately.

Pagination

The list of abbreviations, acronyms, and symbols starts on its own page. The list follows the LOT directly (recto or verso page).

For more information on placement of the list of abbreviations, acronyms, and symbols, see the section in this document identifying major sections of a technical report.

Report Pagination

Introduction

Multiple Volumes

If a report is very long, it can be separated into volumes according to content. Most of the time, a single report is not more than 500 total pages (250 published double-sided sheets). The volume number is listed on the TRDP in Box 1.

Double Sided

Reports are published double-sided and must be paginated accordingly.

Even and Odd Page Placement

Because technical report files are set so they will print correctly when published double-sided, right-hand and left-hand page placement (odd and even page numbers, respectively) matters. See the following sections for detailed explanation regarding page numbering, page placement, and specialized pagination.

Two terms related to pagination that are used throughout these guidelines might be unfamiliar. A recto page refers to a right-hand, front, or odd-numbered page in a report and is the opposite of verso. A verso page refers to a left-hand, back, or even-numbered page in a report and is the opposite of recto.

Page Numbering

Format

The page number is centered at the bottom of the page. (Some pages—such as the TRDP and title page—have unprinted page numbers.) Use the following format:

- Starting with the TOC, number front matter with lower-case Roman numerals beginning with page v.
- Number the main report consecutively—from the executive summary through any appendixes—with Arabic numerals (1, 2, 3, etc.) beginning with page 1.

Major Sections

Front matter and report sections are arranged and numbered according to Table 1. The sections marked with an asterisk fall on odd-numbered pages.

New chapters (or major sections) must begin on recto (odd) pages. Insert a blank page, if necessary, to force the new chapter onto a recto page. Blank pages are completely blank, except for the printed number.

Example:

If a chapter ends on page 5, leave a blank page for page 6 and start the new chapter on page 7.

Table 1. Pagination Example

Section	Page Number Shown	Page Number Not Shown
Technical Report Documentation Page*		odd page
Metric Conversion Page		even page
Table of Contents*	v	
List of Figures	vi	
List of Tables	vii	
List of Abbreviations, Acronyms, and Symbols	viii	
Acknowledgments (optional)		
Executive Summary	1	
Chapter 1* (and each subsequent chapter)	odd page	
References*	odd page	
Appendix title page* (optional)	odd page	
Blank page (if using an appendix title page)		even page
Appendix content pages*	odd page	

* Signifies a page that must be a recto page

Landscaped Pages

Place page numbers in portrait orientation, even on landscaped pages, so that page numbers appear consistently in the same location throughout the report.

In these cases, make sure that when the printed book is turned clockwise 90 degrees, the illustration is right-side up (see Figure 2).

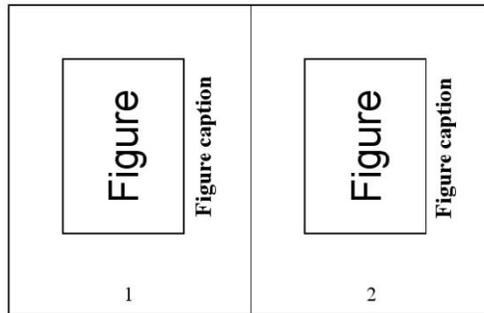


Figure 2. Placement of Landscaped Pages

Oversize Pages

Oversize pages are difficult to handle and are to be avoided unless absolutely necessary to clearly convey the page's content. If pages larger than 8.5 x 11 inches are necessary, remember that both sides of these pages will need to be assigned page numbers. When inserting a page larger than 8.5 x 11 inches:

- It is placed on an odd-numbered page.
- The back of the oversize page contains another oversize page with the subsequent even page number.

If inserting more than one consecutive oversize page, begin the series on an odd-numbered page. If the series ends with an odd-numbered page, insert a blank page after it (even numbered). If the series ends with an even-numbered page, begin the next regular-size page directly after it.

Example:

If the front of an oversized insert is page 11 and the next page will be regular size, then the back of the oversize page will be a page 12. The next regular page will be page 13.

Appendixes

If there is only one appendix, name it "Appendix," not "Appendix A." If there are more than one, designate each appendix with a letter (e.g., Appendix A, Appendix B).

There are two ways to format appendixes:

- **Heading**—The appendix may simply have an appendix heading at the top of the page (e.g., Appendix A: Survey Results) followed by the beginning of the appendix proper on the same page. This page is an odd-numbered recto page.
- **Cover page**—The appendix may begin with a cover page. If using a cover page, center the appendix designation and title in the middle of the page and use a printed page number. This cover page is a recto page. Skip the next page (blank verso), and begin the appendix information on the next page. There is no need to repeat the heading at the top of this page.

Base the style choice on the content of the appendix.

If an appendix also has references, include a reference section with it.

Report Format

Page and Paragraph Specifications

Columns

Use a single-column, full-page format.

Font

Use Calibri 11-point type for text, including table captions, figure captions, and explanatory text for equations. Print figure and table captions in bold.

Use the Calibri font for equations and text within figures and tables. Text in figures and tables can be smaller than 11-point type but not less than 7 points.

Margins

One-inch side margins and 1-inch top margins are required on all pages (except the TRDP). Margins for pages with figures and tables may be slightly smaller if necessary. TRDPs have margins set to 0.5 inch.

Spacing

Use Microsoft Word 2010's default line spacing of 1.15. Also use the default setting for spacing after a paragraph; that default is 10 points of space after a paragraph. There is no need to double space after headings or between paragraphs (see below).

Paragraphs

Do not separate paragraphs with an extra blank line. Use Word 2010's default paragraph spacing of 0 points before a paragraph and 10 points after each paragraph.

Do not indent paragraphs.

When inserting a figure or a table into text, double space to separate the paragraph from the graphic with a single blank line. This line space is in addition to the space created by the 10-point default paragraph setting.

Justification

Left-justify report text. Do not full-justify text.

Columns of numerals entered in tables must be aligned by decimal points.

Headers and Footers

Headers and footers are not permitted.

Widows and Orphans

Do not leave a single line of text alone at the top of a page (widow) or bottom of a page (orphan). Most word-processing programs have an automatic feature to prevent these.

Do not leave a heading at the bottom of a page without at least two lines of text to accompany it. If feasible, do not split bulleted lists from their introductory sentences or leave a single bullet alone at the top or bottom of a page.

Headings

Authors must number chapters using numerals without decimals (Chapter 2, not Chapter 2.0). Subsections may be titled, but are not numbered at all. Table 2 shows required sizes and styles for headings and subheadings.

Table 2. Heading and Subheading Format Styles

CHAPTER 1. TITLE OF FIRST CHAPTER (14 pt. bold, all caps, centered)
FIRST-LEVEL HEADING (11 pt. bold, all caps, flush left, separate line)
Second-Level Heading (11 pt. bold, initial caps, flush left, separate line)
<i>Third-Level Heading</i> (11 pt. italic, initial caps, flush left, separate line)
Fourth-Level Heading. (11 pt. bold, initial caps, paragraph indent followed by period, two spaces, and subsequent text on the same line; skip a line before only)

Executive Summary Specifications

Purpose

A required element of the final report, the executive summary is written for the busy, non-technical executive who lacks the time to read an entire research report. It gives a quick overview of the key points in clear, plain language. The summary presents the study's purpose and main conclusion in an interesting, logical manner that will build trust and credibility with the reader.

Placement in Report

The executive summary opens the body of the report and lies between the acronym list and Chapter 1. It starts on page 1 and is only one to two pages long (300 to 800 words), using the same font size, margins, and line spacing as the rest of the report.

Format the main heading (Executive Summary) like a chapter heading, but do not number it. (Chapter 1 immediately follows the summary, and chapter numbering begins with it.) Format the summary's subheadings consistent with subheadings in the chapters. However, summary subheadings do not need to mirror any headings appearing later in the report.

Summary Elements

The executive summary has three primary sections, which are defined by first-level headings (see page 20).

Open with a concise summary statement that briefly defines the study's purpose and the basic need or problem that the study addressed. This section may include a single optional paragraph covering the study's methodology.

Next make a specific recommendation. After a statement summarizing the study's findings, outline recommended actions geared toward the main audience.

Close with the analysis and justification for the proposed action. Put these in terms of what the reader values. Refer to only findings already mentioned in the executive summary.

How to Write a Summary

Write the executive summary after drafting the rest of the report. Use the report's headings as a tool for organizing the summary. Scan for key points and be sure to include relevant findings and information. Keep it simple and keep it short.

- Use terms the public will understand, avoiding jargon and acronyms. This section uses less technical terminology than the main report. If certain terms are absolutely essential, define them simply and clearly.
- Keep the tone matter of fact and professional but plainspoken.
- Write in short sentences about 15 to 20 words long and keep paragraphs compact. Separate different ideas into shorter sentences so that the main points are obvious and easily understood.
- Simplify language by deleting unnecessary prepositions, clichés, and overused buzz words. Replace complex or confusing words with simple, everyday words.
- Make key points directly and concisely. Avoid vague language and padded paragraphs.
- Keep numbers simple and readable by rounding them up.

- Avoid inserting illustrations. If a table or figure in the main report could clarify the summary, refer to that page, rather than repeating the item in the summary.
- Use bullet points or numbered lists to express multiple ideas in a paragraph.

Grammar and Style

Word Use

Acronyms, First Reference

Spell out what an acronym stands for at its first use in the TRDP abstract, the executive summary, and the main text. Type the acronym in parentheses after those references.

Acronyms defined on the TRDP and in other front matter (such as the disclaimer) must be defined again on the first use in the body of the report. There is no need to show an acronym if it is not used subsequently (except in special cases, such as when the acronym is more widely known than the phrase it represents).

Example:

A high-occupancy vehicle (HOV) is very important.

Acronyms, Plural

To make a plural of an acronym, simply add an “s.” An apostrophe is not used unless the acronym is possessive.

Examples:

- Plural: High-occupancy vehicles would be HOVs.
- Possessive: The HOV’s rate of speed was excessive.

a.m., p.m.

When referring to a specific time, use a.m. or p.m., lower case and with periods.

Use of the Word “Data”

ADOT reports use the word “data” as plural and “datum” as singular.

Examples:

- The data show a significant trend.
- Researchers analyzed these data using several methods.
- This data set shows values that can be compared to the earlier data set.
- The data were analyzed according to the accepted method.
- The datum is an outlier and has been excluded from the graph.

Prefixes

Most prefixes do not require a hyphen in current usage. Simply add the prefix unless there is a chance that the new word will be misunderstood. Answers to questions about hyphenation of a particular word can be found in lists of words under each prefix in a collegiate-level dictionary.

Always use hyphens with “quasi-,” “ex-,” and “self-.”

Examples:

- semiopaque, transoceanic, semipermeable.
- ex-marine, quasi-intellectual, self-discovery.
- recover/re-cover, recreate/re-create, resent/re-sent (depending on the meaning).

Pronoun Use

Pronouns must agree in number and gender with the nouns they reference. Readers need to be able to identify clearly which noun the pronoun references (the antecedent). Usually that means that the antecedent is the last subject used before the pronoun.

Remember that pronouns must agree with the singular or plural nature of their antecedents. Singular groups (ADOT, division, team) require singular pronouns and modifiers (it, this—not they, their, or these). To emphasize the collective nature of a noun, specify the population meant: ADOT officials (plural) rather than ADOT (singular), the committee members (plural) rather than the committee (singular).

Gender-Neutral Pronoun Use

Partly because of the need for gender-neutral language these days, pronoun use is particularly troublesome for some authors.

When gender is not specified and usage calls for a singular pronoun, reword the sentence whenever possible to avoid using a gender-specific pronoun. To reword a sentence, change a singular subject to a plural subject or omit the need for a pronoun at all. (See the examples below.) Use “he or she” and “his or her” constructions in instances where a singular gender-specific pronoun cannot be avoided. Do not use “they” or “their” with a singular subject.

Examples:

- Problem: If a researcher discovers a need to retest, he . . . Possible rewording: If researchers discover a need to retest, they . . .
- Gender-specific pronoun: Each researcher examined the results. He or she reported findings to . . .

States

In report text, spell out names of states. To abbreviate state names in references, tables, and figures, use the two-letter postal code. Do not use conventional abbreviations.

Examples:

- In running text: Glendale, Arizona, is in the Valley of the Sun.
- In references, tables, and figures: New Orleans, LA.; Tempe, AZ
- Do not use: The car is registered in San Diego, Calif.

Trademarks

Try to avoid using names of trademarked products when referencing generic concepts (e.g., don't use "Excel" when "spreadsheet" is meant). When using trademarked or registered names, place the registered trademark (®) or trademark (™) symbol after the name on first reference and thereafter do not use the trademark symbol.

Indicate the trademark owner somewhere in the report, in fine print in a footnote if necessary.

United States, Abbreviating

Spell out "United States" when referring to the country as a noun. Abbreviate (without periods) when using as a modifier of some other term.

Examples:

- Spell out: The United States faces an overpopulation of deer.
- Abbreviate: The US standard allows that usage.
- Exception: According to FHWA standards, use periods when referring to a roadway, like U.S. Route 60 (U.S. 60 upon second reference).

Years

When describing decades, simply add an s. If the "19" or "20" is not used, place an apostrophe before the year to take its place. As with contractions, the apostrophe indicates that information has been left out.

Example:

during the 1980s and '90s

Internet and Technology Terminology Guide

Handling Technology Terms

Some tech terms have become commonplace and no longer need to be capitalized (e.g., web, website). Tech terms that are brand names are capitalized and use trademark symbols when applicable (e.g., Excel, Macintosh). Brand names that begin with a lowercase letter (e.g., iPod, iPad) always use the lowercase first letter, even at the beginning of a sentence.

Some terms appear frequently in technical documents. The Research Center recommends the following usage. Please note spelling and hyphenation for these terms:

- Screenshot as one word.
- Drop-down menu uses the hyphen consistently.
- E-mail as a hyphenated word.

Note capitalization with these terms:

- Macintosh; PC; personal computer.
- hypertext transfer protocol (HTTP); a transfer protocol; hypertext.
- Internet protocol (IP); the Internet; the net; an intranet.
- Open Source Initiative (the corporation); open-source platforms.
- World Wide Web Consortium; the World Wide Web; the web; a website; a web page.

The basic alphabet keys, as well as all named keys, are capitalized even if they are lowercased on a particular keyboard. Menu items and icon names are usually spelled and capitalized as in a particular application. Acronyms for file formats are rendered in full capitals. Notice that quotation marks are not necessary to designate menu items as long as they are capitalized.

- The function key F2 has no connection with the keys F and 2.
- The Option key on a Mac is similar to the Alt key on a typical PC.
- Choosing Cut from the Edit menu is an alternative to pressing Ctrl+X.
- Save the file as a PNG or a GIF, not as a JPEG.

URLs

Web addresses must be functional if feasible. If it is known that a particular web address is no longer valid, indicate that in parentheses following the link name.

In a printed work, if a uniform resource locator (URL) has to be broken at the end of a line, the break must be made:

- *After* a colon or a double slash (//).
- *Before* a single slash (/), a tilde (~), a period, a comma, a hyphen, an underline (_), a question mark, a number sign, or a percent symbol.
- *Before or after* an equals sign or an ampersand.

Never add a hyphen to a URL to denote a line break, and never allow a hyphen that is part of a URL to appear at the end of a line. Keep in mind that a manually broken link (by a space or soft return, for example) will no longer be functional.

Example:

`http://www.azdot.gov/TPD/ATRC
/Research/emphasis_areas.asp`

Capitalization

Captions and Titles

In titles, headings, figure and table captions, and the like, capitalize every word except articles (a, an, the), conjunctions (and, but, for, or, nor), and prepositions of four letters or less (to, of, in, with, etc.). When using hyphenated words, capitalize the major elements.

Examples:

- Hyphenated words: State-of-the-Art Bridge Design; Planning for Medium-Sized Communities
- Longer preposition: Travel Predictions and Models Beyond the Year 2000; Damage Observed Between Mileposts 60 and 65

References to Chapters, Figures, or Tables in Text

When referring in the text to a chapter, figure, or table, capitalized citations are required.

Example:

Chapter 1, Figure 6, Table 9

Names of Roadways

Titles of roadways must be written consistently throughout the document. Upon first reference, spell out the name: Interstate 10 (not Interstate Highway 10). The following are the ways to write titles of Interstate highways upon second reference:

- I-35
- I-35W and I-35E (no spaces)

Use “route” instead of “highway” when naming roadways other than Interstates. Roadways and highways, such as state routes and U.S. routes, are formatted on second reference as [type of roadway] [space] [number] (notice that there are no hyphens, unlike the Interstates):

- State Route 114 (first reference), SR 114 (second reference).
- U.S. Route 281 (first reference), U.S. 281 (second reference). Notice that U.S. uses periods in this case, according to FHWA standards.
- State Loop 202 (first reference), Loop 202 (second reference).

Portland Cement

The word “portland” is lower case when referring to portland cement.

East, West, North, and South

Capitalize directions with a state, city, or any other geographical region only if it is part of a proper name. Regions familiarly accepted as proper names may be capitalized. Simple directional modifiers are not capitalized when they precede a proper name.

Examples:

North Carolina, West Texas or west Texas, Gulf Coast or gulf coast, Gulf of Mexico, Midwest, western United States, southern Louisiana

Position Titles

Do not capitalize a person’s position title, such as project manager, director, etc. Capitalize position titles only if they come before the name and are official titles, such as President Tyler, Congressman Smith, Director Jones, etc.

Examples:

John Smith, research assistant; Tom Smith, director of the center

Programs or Research Items

Capitalize a program or research item (database, software, etc.) only if it is an official proper name or title. If it is a generic product type, do not capitalize it.

Examples:

- intelligent transportation systems (ITS), ground-penetrating radar (GPR), ADOT districts.
- Multimodal Planning Division, the Holbrook District.

“State,” “City,” and “Federal”

Do not capitalize “state” or “federal” unless quoting laws or bills that do so. Do capitalize “state,” “city,” and other words if they refer to a specific, official governmental entity.

Example:

The State of Arizona employs many workers, and the City of Phoenix purchases supplies. The geographic area covered by the state of Arizona contains several cities, and the city of Phoenix is not far from the city of Mesa, Arizona.

District

Do not capitalize the word “district” unless it refers to a specific agency name.

Examples:

- Three ADOT districts use the technique.
- The Prescott District expects to implement it during fiscal year 2012.

Punctuation

Bulleted Lists

When a document lists complex material, it is helpful to pull the list out of the paragraph and separate it with bullets (•) for readability. Use bullets for any listing of three or more items and for listings of two items if they are longer than a line of text.

Use bulleted lists instead of numbered lists unless the items have order, ranking, or correlation to numbered data. If using a numbered list, capitalize, indent, and punctuate it the same way as a bulleted list.

When creating bulleted and numbered lists:

- Use a phrase or sentence to introduce the list and end it with a colon (:).
- Ensure that the introductory sentence clearly identifies whether all items apply (and) or whether they stand independent (or). Generally, items in the list will not contain any conjunction linking one item to another.
- For all bulleted lists, whether they are full sentences or phrases, capitalize the first word of each item—even for sub-bullet items.
- For all bulleted lists, if they are full sentences, end the item with a period (or, rarely, a question mark)—even for sub-bullet items. If the items are only phrases, do not end with a period or other form of punctuation.
- Use parallel grammatical construction within bulleted lists. For example, begin each item with a verb or a noun (depending on what is appropriate given the introductory phrase) or make each item a complete sentence. Do not mix complete sentences with phrases.

- Indent bullets .25 inch from the margin. For nested lists, indent each sub level half an inch from the level above. (This is the Word 2010 default.)
- For first-level bullets, use solid circles. Alternate with open circle bullets when building a nested list. Don't go overboard with fancy bullets.
- Don't use a blank line between the introductory sentence and the bulleted list.
- Double space between a completed list and the next paragraph.
- Do not double space between items in a list.

Commas in a Series

When listing a series within text, use a serial comma (i.e., the comma before the "and"). Especially in technical writing, using the serial comma can make the difference between a clear sentence and an unclear one.

When elements within a series contain internal commas, use a semicolon to separate the elements; otherwise the series can be confusing.

Examples:

- The authors were Smith, Johnson, and Walker. (serial comma)
- The authors were Smith, chairman; Johnson, treasurer; and Walker, secretary.

Commas in Compound Sentences

A true compound sentence contains two full sentences joined by a conjunction. A sentence with compound elements generally contains one subject and two verb phrases. Use a comma to separate the parts of a compound sentence but no comma in a sentence with compound elements.

Examples:

- This report identifies some of the key policy questions, but local officials must determine answers at the grassroots level. (compound sentence)
- This report identifies some of the key policy questions regarding the project and sheds light on some of the possible answers. (compound elements)

Commas with a State or a Year

Use a comma before and after the name of a state that follows a city. A comma also comes before and after a year that follows a month and day (but there is no comma between a month and year only).

Examples:

- Flagstaff, Arizona, is the site of Northern Arizona University.
- January 10, 2009, is the date of the meeting.
- February 2010 will be dedicated to a literature search.

Hyphens in Modifying Phrases

Place a hyphen between words that serve as a modifying phrase. The purpose of the hyphen is to help clarify for the reader that both words modify the word that follows. In certain constructions, leaving the hyphen out can prove confusing. Industry usage overrides guideline style (e.g., portland cement concrete). Check for consistency in the use of phrases or words repeated within a report.

Examples:

- Figure 1 shows a cross section. The cross-section diameter is 1 inch.
- high-resolution photograph, 12-year period, 5-m span, 5-ft wall or 5-foot wall
- crumb-rubber mixture (but no hyphen in “crumb rubber” used as a noun)

Hyphens in Modifying Phrases that End in “-ly”

If the modifying phrase contains -ly, do not use a hyphen.

Example:

a thermally induced reaction

Em Dashes

Em dashes (also denoted by 1/m) are used to separate thoughts—and insert information—within sentences. Though often represented by two hyphens (--), the proper symbol is the em dash. To create this symbol in Word 2010, type CTRL+ALT+Num-.

Spacing after Periods

Use only a single space after a closing period or other closing punctuation.

Parentheses and Periods

When parentheses or brackets enclose a stand-alone sentence, the period falls inside the parentheses. (This sentence is an example.) If the material in the parentheses is part of a sentence, the period falls outside the parentheses (like this).

When parentheses occur inside parentheses (as here [i.e., the text being read now]), the interior parentheses become brackets.

Punctuation and Quotation Marks

Commas and periods always go inside quotation marks. Semicolons and colons normally go outside quotation marks. Question marks and exclamation points depend on use.

Examples:

- The article, “How to Grow Red Tomatoes,” was replaced by “How to Grow Yellow Onions”; we finally settled on “How to Encourage Gardening.”
- Did you read “The Tell-Tale Heart”?
- He asked, “Where are you going?”

Smart Quotes versus Straight Quotes

Replace straight quotes with smart quotes and apostrophes.

Examples:

- “smart quotes” rather than "straight quotes"
- Frank’s study is late.

Titles in Italics versus Quotation Marks

Generally, when referring to documents in text, the titles of long works (e.g., books, journals) are in italics, and the titles of short works (e.g., chapters, journal articles) are in quotation marks. The titles of works that are not published (e.g., course titles) are usually set in quotation marks.

Examples:

- Place the following types of works in italics: reports, books, manuals, journals, proceedings, newspapers, and dissertations.
- Place the following types of works in quotation marks: articles, book chapters or sections, papers, pamphlets, courses, seminars, classes, and projects.

Spelling

American versus British Spellings

Use conventional American spelling for Research Center reports.

Examples of American/British spellings:

American Spelling	British Spelling
traveled	travelled
acknowledgment	acknowledgement
judgment	judgement
focused	focussed
color	colour
toward	towards
backward	backwards
defense	defence
naturalization	naturalisation
a historical	an historical

Spell Check

Using a spell check tool is helpful, but cannot ensure correct spelling. Carefully re-read the text for words that are spelled correctly but misused.

Numbers

When to Spell Out Numbers

The rules prescribed here differ from those in *Chicago* and better meet the needs of technical reports. Within a sentence, according to these rules, spelling out and using numerals may be combined.

Spell out:

- Numbers between one and nine (e.g., eight cars)
- Rankings, or ordinals, of first through ninth (e.g., the ninth car)
- A number that begins a sentence (but try to avoid this construction) (e.g., Eighty-seven percent of the people surveyed liked the idea. Preferred Construction: Of the people surveyed, 87 percent liked the idea.)

Use a numeral for:

- Numbers 10 and greater (e.g., 10 trucks)
- Rankings, or ordinals, of 10 and greater (e.g., the 10th truck, 21st century)*
- Percent (e.g., 5 percent)
- Notations with measurements (e.g., 5 m, 2 ft)
- Time when used as data (e.g., 5 seconds)

*Do not superscript ordinal numerals (e.g., 17th).

According to these rules, the following example is correct.

Example:

Researchers counted five cars and 10 trucks.

Commas with Numerals

Use commas to separate digits into groups of three when the number is greater than four digits. When a number in text is four digits, it does not have a comma (although commas might be needed in tables and figures for alignment). Dollar amounts of four digits or more may use or omit a comma.

In tabular columns that show both four-digit and five-digit or greater numbers, use commas as needed for clarity, alignment, and appearance.

Examples:

- 100,000 and 1000.
- \$1000 or \$1,000.

Decimals, Not Fractions

Where reasonable, use decimals instead of fractions. Place a zero before the decimal point for quantities less than one. Industry usage in some instances (e.g., references to equipment or tools) may require use of fractions. If using fractions, use a consistent form throughout ($1/4$ or $\frac{1}{4}$).

Example:

0.25 (not $1/4$ or $\frac{1}{4}$ or .25)

Measurements, Symbols, and Equations

English versus Metric Units

The PI must give measurements in the system that was used to take them. If measurements are taken using Systeme Internationale (SI) units, the measurements must be followed in parentheses by their equivalent customary American units. Round metric values to the same number of digits as were in the American number (11 miles at 1.609 km/mi equals 17.699 km, which rounds to 18 km). Convert mixed American units (feet and inches, pounds and ounces) to the smaller unit before converting to metric rounding (10 feet, 3 inches, = 123 inches; 123 inches x 25.4 mm = 3124.2 mm; round to 3124 mm).

Common Unit Abbreviations

The following are some units and their abbreviations.

Metric Units

- liter L
- meter m
- millimeter mm
- hectare ha
- kilogram kg
- newton N
- kilopascal kPa

Do not use the prefixes deci- or deca-.

English Units

The following are some English units and their abbreviations to use:

- inch inch or inches (do not abbreviate)
- foot ft
- yard yd
- mile mi
- ounce oz
- pound lb
- ton ton
- quart qt
- gallon gal
- barrel bbl

Do not use plural forms such as lbs.

Numerals with Unit Symbols and Abbreviations

Use numerals with English and metric abbreviations and symbols in text, tables, and figures.

Example:

a width of 12 mm (not 12 millimeters)

Space:

Place a space between the numeral and the unit. Leave a space between the degree symbol and the temperature system abbreviation.

Examples:

- 5 kg (not 5kg)
- 5 ft
- 5° F

Period:

Do not place a period after the measurement abbreviation unless it is at the end of a sentence.

Example:

5 kg (not 5 kg.); but a punctuating period may appear following a metric unit at the end of a sentence, "The weight is 5 kg."

Plurals:

Do not add an "s" to symbols or abbreviations. If measurement units are spelled out rather than abbreviated, the plural form may be used.

Examples:

- 10 kg not 10 kgs
- 5 ft
- 6 yd not 6 yds

Adjectival phrase:

Use a hyphen between the numeral and the unit abbreviation when in an adjectival phrase.

Examples:

- a 5-m wall
- a 5-ft wall

When to Spell Out Units

Spell out metric or English units when not used with a numeral. Use unit abbreviations in figures and tables. In text, be consistent in using numerals with abbreviations.

Examples:

- The amount is given in meters.
- The project studied a 5-mile pavement section.

Percent

Write out “percent” in text and use a numeral with it, even for numbers less than 10. In a figure or table, use the percent sign with no space between (or include percent designation in the column heading).

Examples:

- The increase was 5 percent.
- 10% (in a table or figure)

Slope

Express slope in nondimensional ratios with the vertical component shown first and then the horizontal (V:H). Compare the same units (meters to meters, etc.). Base tapers previously shown as 8:1 will now be shown as 1:8.

Time

If units of time (seconds, hours, etc.) are specific measurements, then use a numeral with them and abbreviate. If they are more general, spell out the unit.

If using a numeral, abbreviations (with no periods) may be used for units of time:

- sec (not s)
- min (do not then abbreviate minimum as min.)
- hr
- yr

Examples:

- The project ran for two years.
- Researchers examined data at 2 sec intervals.

Temperature

When expressing temperature using a degree symbol, use the degree symbol next to the number and leave a space between the symbol and the measurement abbreviation: (10° C)

Symbols

Use the proper symbols to denote functions in equations, text, and illustrations. This includes the multiplication sign (*) and the minus sign (-).

Remember to verify the accuracy of any symbols used in the report when the manuscript is reviewed at the various publication stages.

Example:

$$5x * 10r = 35yz$$

Equation Numbering

ADOT guidelines require that equations be numbered consecutively throughout the document (e.g., Eq. 1, Eq. 2).

Equation Placement

Place the equation on a separate line, using line space to separate it from the paragraph. Indent or center each equation.

Place the equation number in parentheses flush with the right margin on the last line of the equation elements.

Example:

Eq. 1 explains my hypothesis:

$$a + b = c \qquad \text{(Eq. 1)}$$

Creation of Equations

If the report uses mathematical symbols, use the equation editor to ensure their accurate reproduction. This creates a unit that appears during PDF conversion as a graphic, but still allows the author to change the source file as needed.

If embedding mathematical symbols in text as font characters, the best choice is to use the normal text or symbol character set in Word. Do not use other character sets, because they do not convert reliably to PDF.

Equation Symbol Identification

Identify symbols after their first use to aid the reader. This usually appears in a “where” list. Be consistent throughout the document whether using a list to identify symbols or using paragraph form. Also be consistent in introducing the list (colon or not, etc.). If in paragraph form, use the semicolon (;) to separate each item in the list.

Example:

$$y = mx + b \qquad \text{(Eq. 1)}$$

Where y = the y value (ordinate)
 x = the x value (abscissa)
 m = slope
 b = y-intercept

Figures and Tables

Overview

Requirements

Figures—any graphic representation not in text form.

Tables—any graphic representation in columnar text form.

Figures and tables must be clear and legible. Labels within illustrations and text within tables must use the Calibri font. Hand-drawn or hand-written illustrations (or scanned images of hand-drawn illustrations) are usually not acceptable.

Quality

Clear, dark original line art and photographs of sufficient resolution are acceptable. Shaded areas must not obscure text, parts of figures, or table content.

Provide photographs with clear resolution in electronic form (300–600 dpi).

Create tables in Word 2010; do not import tables using some other program. Use consistent formatting for similar tables. Label rows and columns descriptively.

Align numerals in a table column by the actual or understood decimal point; do not center numerals.

The program used for the figure must be compatible with Word 2010. Research Center staff may need to resize the illustration for publication and may not have access to the illustration's original software.

Margins

Maintain 1-inch margins on pages with illustrations. Anything less may cause information to be cut off when the report is bound.

Appearance and Usage

Font Size

Illustrations must have no type smaller than Calibri 7 points. (This is in 11-point type. This is in 7-point type.) Use Calibri in a consistent size for similar illustrations throughout the report.

Placement

All figures and tables must be referenced in text. Figures must appear close to the first reference in the text, but not before. Place figures so that they do not break text that belongs together (e.g., do not break a paragraph) but so they can be seen while reading the text (i.e., on the same page or facing page).

Tables must appear close to the first reference in the text, but not before. Place tables so that they do not break text that belongs together (e.g., do not break a paragraph).

Spacing

Figures:

To separate text from the top edge of a figure, double space (insert a hard return) in addition to the 10-point space after the paragraph.

Double space between the figure's bottom edge and the figure caption.

To separate the figure caption from following text, double space in addition to the 10-point space after the caption.

When two figures are adjacent to each other, double space between the first figure's caption and the top edge of the second figure. This will be in addition to the 10-point space after the first caption.

Tables:

When inserting a table, double space between the paragraph and the table title. This is in addition to the 10-point space after the paragraph.

Do not double space between the title and the table's top edge; the 10-point space after the title's hard return will create enough space.

To separate a table from the following text, double space between the bottom edge of the table and the text.

When two tables are adjacent to each other, double space between the first table's bottom edge and the title of the second table.

Cite Sources

Document any figures, tables, or appendixes taken from another source. See the References chapter for information on how to cite sources and the use of copyrighted materials. Give complete sources for data shown if taken from another source.

Copyrighted or Published Material

See Permission to Use Published Materials (page 42) for more information.

Numbering Figures and Tables

Number figures and tables consecutively (e.g., Figure 1, Figure 2, Table 1, Table 2) in the main report. Do not number by chapter. Figures and tables in appendixes are numbered consecutively for each appendix: Figure A-1, Table B-2.

Word 2010 has an automatic feature to help with numbering figures and tables.

Number Alignment in Tables

Columns of numbers listed in tables must be aligned at the decimal point (or assumed decimal point). Do not center the numbers within the column.

Captions, Titles, and Axis Labels

Place figure captions BELOW the figure separated by one blank line. Put a period after the figure number.

Place table titles ABOVE the table separated by the 10-point space after the hard return. Put a period after the table number.

Both captions and titles must be:

- Bold
- Centered
- Spaced with single line spacing when extending more than one line (adjust the default setting)
- Open ended (no closing punctuation)
- Set with initial caps, but do not capitalize articles (a, an, the), conjunctions (and, but, for, or, nor), and prepositions of four letters or less (in, of, to, with, etc.).

Wrap longer captions and titles to create a balanced look with the graphics. Do not end the first line with Enter (a hard return); use a soft return (hold down Shift and Enter) to ensure appropriate spacing.

Example:

**Figure 1. Type the Caption Here Using Initial Caps,
with a Period at the End and in Bold**

Graphs must have clearly labeled axes set in Calibri in a point size large enough to be easily read (7 points or larger).

Continuation

When a figure or table continues for two or more pages, note the continuation—with “(Continued)” following the figure caption on each page. Avoid this construction when possible by breaking into separate figures or tables.

Units

Clearly identify units used in tables. Give repeated units of measure or degree in the column headings. Do not repeat these units in the columns.

Use the measurement system that the data was collected in. If in SI, give conversions at the bottom of the table.

Compare to LOF/LOT

Make sure that the listings in the LOF and LOT exactly match the captions and titles and that page numbers are correct.

References

Overview

Whenever quoting, paraphrasing, or referring to information or ideas (that do not fall into the category of “common knowledge”) from a publication or outside source, credit the source in a bibliographic reference. Do not cite secondary sources such as encyclopedias.

Use of copyrighted material is covered in the section on Permission to Use Copyrighted Materials (page 46).

How to Cite References

Author-Date Citation Style

When referring to work by another author or discussing that author’s ideas, credit the author with a parenthetical citation at the point of reference in the text. Research Center reports use the author-date system of citation: The reference is given in parentheses in the text and has the surname of the author, the source’s publication date, and, if a quote, the page that the reference was taken from. There is no comma within the parentheses. See *The Chicago Manual of Style* for more detail on this style.

Examples:

- For a single author (Dodd 2002)
- For a pair of authors (Gagnon and Dodd 2007)
- For three or more authors (Peshkin et al. 2010)

Optional Bibliography Page

If the author has not cited sources but has consulted them during research or wants to list them as additional resources, place these sources in an alphabetized bibliography after the references. A bibliography begins on the first recto page following the references.

Unpublished Works

Do not include unpublished works in the references. Cite them in the text with the author’s name, a description of the author, and the date of authorship in parentheses.

Example:

(Joe Jones, ADOT engineer, unpublished data, March 12, 2002).

Interviews

Do not include unpublished interviews (or other personal communications) in the references. Cite them in the text with the contact's position and agency, and in parentheses give the contact's name with the type and date of communication.

Example:

A planner from FHWA confirmed reasons for the choice (Joe Jones, telephone interview, March 12, 2002).

Cross Check

Make sure that each reference matches its correct in-text referent. Make sure that only works cited in the text are included in the references section.

Formatting References Page

Content

The references section must contain every source cited in the text and only those sources. Carefully check that references are not repeated in different formats.

A bibliography is optional and may contain sources that have not been cited but were consulted during the research or that are listed as additional resources for the reader. Use the same style used in the references section.

Placement

The references page comes after the main text of the report but before any appendixes. References begin on a recto page.

Source Order

Alphabetize reference entries by primary author's surname. See *The Chicago Manual of Style* for details on what element is used for alphabetizing when there is no primary author.

Sources Cited More than Once

List a source only once on the references page.

Format for Entries

Research Center reports use a modified version of the format given in *The Chicago Manual of Style*. In Word 2010, go to the paragraph menu, and under the indentation section, select a hanging indent for each reference entry (see examples on pages 45 and 46). Do not list hyperlinks for references; include the URL, along with the access date, only if noting an exclusive online source.

The first element is the author's name, which is inverted (surname first, given name, middle initial.). If more than one author, list the other authors' names in natural order. Do not substitute initials if an author's first name is given in full on the original source. For sources with three or more authors, list all authors by name in the reference entry and use "et al." in text citations.

A period separates author name from the date, which is a year only. A period separates this from the work's title. If it is a book, it is in italics, if a journal article, it is in quotes. The title is given in title case (initial caps on significant words).

A book's title is followed by the series or report number, if it is part of a series; place of publication followed by a colon; and publisher.

Journal article titles are followed by the journal name in italics and title case, the volume number, a space, the issue number in parentheses, a colon, and the page range of the entire article. The day or month of the issue may follow the page range, if needed. It is separated by a comma from the page range.

When the publisher's name includes the state name, omit the state abbreviation from the place of publication. When the state abbreviation is needed, use the two-letter postal code.

Examples:

- Phoenix: Arizona Department of Transportation.
- Thousand Oaks, CA: Sage Publishing.

When citing a source like the Federal Highway Administration (FHWA), use the acronym when citing in the text (FHWA 2008). When listing the source in the References, spell out the name followed by the acronym in parentheses.

Example:

Federal Highway Administration (FHWA). 2008. "Travel Demand Management."

Reference Listing Examples

The following source listings show examples of recommended styles.* Note punctuation and use of initials and italics. Also note that the formatting for ADOT research reports uses the FHWA report number listed on the report's TRDP.

* Some examples come from Transportation Research Board's *Information for Authors* and from *The Chicago Manual of Style*.

Book

Newland, D. E. 1988. *Random Vibrations: Spectral and Wavelet Analysis*. New York: John Wiley and Sons, Inc..

Chapter or section in a book

McGee, A. M. 2003. "Graduated Driver Licensing." In *Injury Prevention*, J. R. Millman (ed.). Chapel Hill: University of North Carolina Press.

Article in a periodical

Sansalone, M., J. M. Lin, and W. B. Street. 1998. "Determining the Depths of Surface-Opening Cracks Using Impact Generated Stress Waves and Time-of-Flight Techniques." *ACI Materials Journal* 95(2): 168–177.

Transportation Research Board (TRB) publication

Dewan, S. A. and R. E. Smith. 2003. "Creating Asset Management Reports from a Local Agency Pavement Management System." *Transportation Research Record: Journal of the Transportation Research Board* 1853: 13–20.

Government report

Von Quintus, H. L. and A. L. Simpson. 2002. *Documentation of the Backcalculation of Layer Parameters for LTPP Test Sections*. Publication FHWA-RD-01-113. Washington, D.C.: Federal Highway Administration: 2002.

ADOT research report

Dodd, Norris L., Jeffrey W. Gagnon, Susan Boe, Amanda Manzo, and Raymond E. Schweinsburg. 2007. *Evaluation of Measures to Minimize Wildlife-Vehicle Collisions and Maintain Wildlife Permeability Across Highways: Arizona Route 260*. FHWA-AZ-07-540. Phoenix: Arizona Department of Transportation.

Permission to Use Published Materials

Permission to Use Copyrighted Materials

Copyrighted figures (including photographs) and tables may not be used unless written permission of the copyright owner is obtained and provided to the Research Center. Prior use of copyrighted figures and tables in another publication does not necessarily constitute permission to use it in a specific Research Center publication.

Report authors (contractors) are responsible for securing copyright releases and including the release statement in the text; legal liability for failure to do this falls on them.

For overall copyright explanations, see <http://www.copyright.gov>.

Permission to Use Published Materials

Previously published or presented, but not copyrighted, figures and tables may be excerpted on a small scale without permission but with proper citation. The Research Center reserves the right to determine when it is necessary to obtain permission.

Citing the source of figures and tables is not a sufficient substitute for permission.

Release Language

The following release language must be used for Research Center publications:
(Name of copyright owner) hereby grants to (name of contractor) and the United States Government a royalty-free, nonexclusive, irrevocable right to use, reproduce, distribute, and sell (identify the copyrighted work, or the portion of it to which rights are granted) throughout the world.”...

Permission Documentation

Include the original copy of copyright permissions with the edit copy of the manuscript for the Research Center to maintain in the project file.

Maps

When using maps from Google Earth and Mapquest, report authors are responsible for appropriately crediting according to permissions granted by Google or Mapquest. Research Center staff can assist with this.

Sponsored Research

Before releasing any information that results from sponsored research, the report author must receive the approval of the sponsoring agency. “Release” includes publishing, presenting, posting on a website, or even informal sharing with colleagues outside ADOT.

Sponsored research includes any technical findings resulting from research, not just published project reports. It covers documents that have not yet been reviewed and approved by the sponsor or ones that the sponsor has reviewed but not approved for publication.

