Minnesota Department of Transportation

RESEARCH SERVICES

Office of Policy Analysis, Research & Innovation

Minnesota Department of Transportation Research Report Guidelines

July 2012

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Minnesota Department of Transportation
Research Report Guidelines

Prepared by

Center for Transportation Studies
University of Minnesota

July 2012

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NOTE:

Please check the following website for updates of this document and the requirements for publishing research reports:

MnDOT Research Site: http://research.dot.state.mn.us

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Acknowledgments

This guide draws ideas and some language from the following sources:

1. Upper Great Plains Transportation Institute. *Research Report Guidelines*. 2007.
2. Arizona Transportation Research Center. *Guidelines for Preparing ATRC Research Reports*. 2003.
3. Utah Department of Transportation–Research Division. *Guidelines for Preparing Utah Department of Transportation Research Reports*. 2007.
4. Washington State Department of Transportation. *Research Report Guidelines*. 2007.

Chapter 1. Understanding the Process

1.1 Report Review Process

Research reports go through a technical and editorial review process before the final submittal of the report. Here is a quick look at the report review process.

- The Principal Investigator (PI) works with the project's Technical Advisory Panel (TAP). The panel consists of the PI, Technical Liaison (TL), Project Coordinator, and other experts who may contribute to the project and provide input during the research process and the writing of the report.
- When a draft research report is ready, researchers should submit a draft submission cover sheet and a PDF file of the draft report for editorial and technical review to the Director of Research Administration at CTS. She/he records the delivery and turns it over to the Program Coordinator, who distributes copies of the report to the TL for technical review. The TL distributes it to the TAP members. The TAP members return their technical comments to the TL, who then turns them over to the Program Coordinator. The Program Coordinator then sends them all to the PI for incorporation.
- Once technical comments have been incorporated, the PI sends the draft back to the Program Coordinator so she/he can send it out for editorial review. If the need is immediate, the Program Coordinator will have both the editorial and technical reviews done simultaneously.

  (Reports must follow the editorial guidelines that are outlined in Chapter 2, *Formatting the Report*. The guidelines help ensure quality and consistency in the presentation of research results. It is highly recommended that all researchers review this chapter prior to working on a draft report. Time can be saved by following these guidelines from the beginning of the process.)

- The PI receives editorial comments from the Program Coordinator and incorporates them into the report. The TL and the Program Coordinator are available to resolve questions or concerns.
- The PI submits, in separate files, the report, the technical report documentation page, and an executive summary in one of the following formats: Microsoft Word (2007 compatible), Rich Text Format (RTF), or Unicode (UTF-8 or UTF-16) text to the Program Coordinator. CTS submits the final PDF of the entire report to MnDOT.

Chapter 3, *Preparing the Electronic File*, outlines the deliverable requirements. Use both the "draft" and "final" submission cover sheets to make sure you are including all the required deliverables during both submissions.

- A last review of the final deliverable will take place. If necessary, the PI may be asked to make minor corrections and resubmit deliverables.

1.2 Distribution

Promoting the availability of research results is an important component of advancing implementation and innovation. With electronic publishing, communicating the availability of research reports takes a different form.

MnDOT will send e-mails announcing newly published research reports to transportation practitioners on its Report Dissemination Categories list. The project's TL determines who receives the announcement. PIs may submit additional e-mail addresses.

In addition, MnDOT will continue to highlight research results and the availability of research reports in its publications and communications.

1.3 Responsibilities

Electronic publishing involves several key steps, with researchers and MnDOT sharing responsibility for the tasks involved in publishing a research report.

The following summary describes who is responsible for the key tasks.

Researchers (PIs) are responsible for the following tasks:

- Producing a PDF file of the draft research report.
- Submitting all deliverables as outlined in the deliverable section.
- Submitting e-mail addresses of those they would like to receive announcements of report availability.
- Addressing all technical comments. In cases of disagreement regarding technical or editorial content, the Project Coordinator will initiate a resolution process.
- Incorporating editorial comments.
- Adhering to these guidelines. Exceptions to the guidelines are allowed if they add to the reader's understanding of the content. These guidelines are specific to MnDOT reports and may differ from requirements of other publishing organizations.

CTS is responsible for the following tasks:

- Working with the TL to facilitate the addressing of technical comments.
- Providing editorial review.
- Reviewing draft and final reports.
- Generating report covers.
- Producing a PDF of the final report

MnDOT is responsible for the following tasks:

- Posting PDFs to the website.
- Sending e-mail announcements.

Chapter 2. Formatting the Report

These guidelines apply to research reports that are produced for the University of Minnesota's Center for Transportation Studies (CTS) and the Minnesota Department of Transportation (MnDOT). Researchers who prepare reports are responsible for following these guidelines, which help ensure quality and consistency in the presentation of research results.

2.1 Report Format

Reports must be formatted according to these guidelines. Reports that are not formatted according to the guidelines will be returned to the author, who will be responsible for revising the report.

2.1.1 General

- Follow the *Chicago Manual of Style* for guidelines related to punctuation.
- Another information source is *Guidelines for Preparing Federal Highway Administration Publications* (Chapter 5 of FHWA's *Publications and Printing Handbook)*, found here: http://www.fhwa.dot.gov/legsregs/directives/orders/h17104.htm.
- Your report will go through an editing process at the University of Minnesota's Center for Transportation Studies (CTS). The editor will primarily check for compliance with these formatting guidelines. It will be the author's role to make corrections in response to the edit. Please note that the editor will not check for grammar and spelling except in the executive summary and abstract. Frequently, grammar issues that are flagged in the executive summary are also prevalent throughout the report. It is the author's role to check the remainder of the report for these issues as well as for errors in spelling, grammar, mathematical equations, etc.
- Electronic research reports must be accessible to people with disabilities under Section 508 of the Rehabilitation Act of 1973, as amended, and required by Minnesota State law as of 2009. See section 3.1.3 Accessibility for details.
- It is the author's role to obtain permission to use copyrighted material. Permission must be obtained to use any table, photo, artwork, screenshots of online maps, or significant excerpts of text. The author will be liable for any violation of copyright laws.
- Do not use footnotes for references. However, a footnote can be used as a supplementary comment that does not warrant its own appendix. Only use an asterisk if a numeral could lead to confusion (e.g., being mistaken for an exponent).
- Be consistent in the use of capitalization, hyphens, titles, specialized terms, etc., with the exception of material that is directly quoted or imported appendix content.
- Flush left justify your report. Flush left and right justification can create irregular spacing when saved as a PDF.

2.1.2 Font

- Use the typeface Times, or a variation of Times, as the report font. Select at least 11-point type for body copy; 12-point is recommended.

2.1.3 Report Pages

- Use one-inch margins on all sides.

- Single-space the report body.
- Begin each chapter on its own page; include the chapter's title at the top of the page.
- Use Arabic numerals for page numbering in the report's body. Start page numbering with the introduction (Chapter 1). This page numbering style should end with the references.
- Leave the technical report documentation page, title page, acknowledgments, table of contents, list of tables, list of figures, and executive summary unnumbered. An exception can be made for the executive summary if you wish to use lowercase Roman numerals to distinguish it from the rest of the report.
- Center page numbers at the bottom of the page within the one-inch margin.
- Do not include author name, decorative elements, date, logos, or other information on the top or bottom of the page.
- Do not include any blank pages in the report.
- Avoid placing the last line of a paragraph by itself on a following page, particularly when it would fall on an otherwise blank page. Likewise, avoid positioning the first line of a paragraph alone on a preceding page.

2.1.4 Abbreviations

- Define abbreviations, acronyms, and symbols the first time they appear in the Abstract, the Appendix, the executive summary, and the report text, and then use the abbreviation in additional uses; for example, the Federal Highway Administration (FHWA) or the Minnesota Department of Transportation (MnDOT).

2.2 Report Contents

Organization of the report may vary depending on its subject, length, and complexity. However, in most situations reports should contain the following elements in the order shown below:

- Report cover (furnished by CTS).
- Technical report documentation page.
- Title page.
- Acknowledgments (optional).
- Table of contents.
- List of tables and list of figures (not required for reports with fewer than 10 pages).
- Executive summary (3-page maximum).
- Report body.
    - Chapter 1: introduction.
    - Subsequent chapters.
    - Final chapter: recommendations and/or conclusions.
    - References.
- Appendices (optional).

Direction on each of the above elements is provided below. Please note documents that should be sent as separate files.

2.2.1 Report Cover

CTS furnishes this item.

2.2.2 Technical Report Documentation Page

Submit the Technical Report Documentation (TRD) Page as a separate Microsoft Word, RTF, or Unicode text file. Information services and libraries use information on this page for their databases, which transportation practitioners and others access to find information.

Either fill in the following elements of a blank technical report documentation page or provide the following information:

- Title and subtitle.
- Report date.
- Author(s), name, and address of organization that conducts the research.
- Contract or grant number.
- Sponsoring agency name and address.
- Type of report (final, interim).
- Abstract (maximum 250-word summary of the report's most significant information).
- Document analysis/descriptors (also known as keywords). These are terms that would help the report be found in a Web or database search. Once you provide them, CTS library staff will adjust them per the Transportation Research Thesaurus to adhere to standard vocabulary.

An example and instructions for completing the TRD page are shown in Appendix A. If a report consists of separate volumes, a TRD page is needed for each volume.

2.2.3 Title Page

Submit the title page as a separate Microsoft Word, RTF, or Unicode text file. Provide the following information for the title page, vertically and in order:

1) Title of the report in **bold**. Note that the title is limited to 250 characters including spaces.
2) Type of report (final report, interim report, summary report, other) in **bold**.
3) Prepared by: (can be *italicized*, but not necessary).
4) Author's name(s) (only separate names if authors are from different organizations).
5) Organization(s) represented by the author(s).
6) Date (month, year) of publication (same size font as #2) in **bold**.
7) Published by (can be *italicized*, but not necessary):
   Minnesota Department of Transportation, Research Services, 395 John Ireland Boulevard, Mail Stop 330, St. Paul, MN 55155 (five lines total).
8) Any applicable disclaimer(s).

Use this disclaimer:
This report represents the results of research conducted by the authors and does not necessarily represent the views or policies of the Minnesota Department of Transportation or (author's organization). This report does not contain a standard or specified technique.

The authors, the Minnesota Department of Transportation, and (author's organization) do not endorse products or manufacturers. Any trade or manufacturers' names that may appear herein do so solely because they are considered essential to this report.

See Appendix B for title page layout.

2.2.4 Acknowledgments

The inclusion of acknowledgments is optional. The acknowledgments page recognizes the individuals and organizations that funded or significantly contributed to the research project. Keep acknowledgments to a maximum of one page. The acknowledgments page comes before the table of contents and the executive summary. See Appendix C for examples.

2.2.5 Table of Contents

General rules for the table of contents are as follows and are illustrated by example in Appendix D:

- Reports consisting of 10 or fewer pages do not require a table of contents.
- Titles for each chapter listing should read exactly as in the report body.
- Tables of contents should reflect the hierarchy of chapters and sections. Hierarchy can be reflected by indenting sections. Table of contents items should be identical to text headings. Appendix titles (but not page numbers) should be included in the table of contents.
- If chapters are written separately by different authors, their names should not appear in the table of contents, but should be noted under the appropriate chapter heading in the report body.
- The table of contents should not include a listing of any pages that are not numbered.
- Table of contents pages are not numbered.

2.2.6 List of Tables and List of Figures

If the report includes tables and figures, a list of tables and list of figures are required, following the table of contents. The list of tables and/or list of figures sequentially list each table/figure number and title, as well as the page number on which it appears. You may add the list of figures and/or list of tables on the same page as the table of contents, if space allows without going to a new page. Otherwise, begin the list of tables and/or list of figures on a new page. If the list of tables and list of figures can fit together on one page, it is permissible to have them do so.

2.2.7 Executive Summary

An executive summary is required for all MnDOT reports. Submit the executive summary as a separate Microsoft Word, RTF, or Unicode text file**.** The executive summary provides a concise synopsis of the research issue, the main findings or results, conclusions, the significance of the research, and recommendations. Limit the length of the executive summary to no more than three pages. The executive summary should be able to stand alone as a brief summary of the research project. Because it is written for a general audience, technical details should be limited.

Readers often turn first to the executive summary for an overview of the project. Because of its importance, you may be asked to rewrite or rework the executive summary to better reflect the research project findings and conclusions.

In cases of a complex research project with multiple parts, researchers may choose to prepare a summary document, usually 10 to 20 pages. This summary document may be produced as its

own report, with the approval of CTS and MnDOT. This does not replace the need for an executive summary in the main report.

In a few cases, because of patent rights or length and complexity of the material, only an executive summary will be published. In this instance, the summary will be longer and contain more detail. The decision to publish only an executive summary will be made jointly by the Technical Advisory Panel, MnDOT's Research Services (RS), the PI, and other relevant MnDOT offices. Note that a decision to publish only an executive summary does not eliminate the author's contractual requirement for submittal of a full report to MnDOT in publishable format. In these cases, the cover and box #13 of TRD will state "Summary Report."

2.2.8 Introduction

The Introduction serves as the report's first chapter. It addresses the following:

- The purpose of the report (research objective).
- A description of the research problem and its historical background.
- Research goals and the basic approach to the project.
- The scope and limits of the research. This describes what is and is not covered in the report.
- A brief overview of the general organization of the report.

Unlike the executive summary, it does not include research results, conclusions, recommendations, or implementation.

While both the Introduction and the executive summary discuss the research issue, the Introduction describes the research issue within the context of preparing the reader for what is to follow in the report. It emphasizes the historical background of the research problem, what the research attempts to discover, and the basic scheme of the procedure or methods used. The Introduction also briefly describes the general organization of the report so that the reader knows what to expect.

The Introduction will vary depending on the objectives stated in the work plan. In some cases the Introduction may mention previous research done in the report's topic field including the chief contributions of others.

2.2.9 Report Body

The report body's organization and content vary depending on the nature of the research project, but usually follow the direction that the work plan outlines. Information to be included and organization of the report will be determined during the various TAP meetings and will usually follow the direction indicated in the work plan. Most reports include the background of the research problem; the research approach and methods; an analysis of research results; conclusions; and recommendations for implementation and further testing. Segment the report into chapters numbered sequentially beginning with Arabic numeral 1. Subheadings should be distinguished by numbered subsets (1.1, 1.2, etc.) and/or through font changes and indentations as used in this document. Start each chapter on its own page, with the introduction as the report's first chapter.

Design headings to distinguish chapters, sections, subsections, etc., from each other as well as from body text and table/figure labels. Consistency is the most important aspect of heading format. Make chapter headings stand out the most (e.g., larger font, centered, bold). Make other levels of headings display hierarchy through diminishing size and/or distinction. For example:

- Level 1 chapter titles (including "Acknowledgments," "Table of Contents," "References," etc.): **Times, 14 point, bold, centered**
- Level 2 (i.e., 1.1): **Times; 12 point; bold**
- Level 3 (i.e., 1.1.1): Times; 12 point; not bold; *italics* or underline
- Table/Figure Labels: **Times; 11 or 12 point; bold; no italics or underlining**
- Body text: Times, 11 or 12 point (12 recommended); not bold; no italics or underlining

2.2.10 Conclusion and Recommendations

The final chapter within the body should generally contain recommendations and/or conclusions.

2.2.11 References

Do not cite references through the use of footnotes in the report's text. Instead, place a reference number to a citation in parentheses or brackets at the end of a sentence in the text, like this [1]. Create a reference section, at the end of the report, that lists the full citations. Full citations appear in the same order as in the report body with the corresponding number. If you cite the same reference more than once, continue to use the same number first assigned to the reference in the report body. See below for examples on preparing the references.

List complete references, including names of authors or editors; article title; chapter, book, journal, or report title; publisher or issuing agency; location of publisher; year of publication; volume and issue or report number; and page numbers.

In the main reference list, include only references cited in the text, numbered in the order in which they are first cited. If you wish to list other references that are not cited in the report, use the same format, but without numbering each. These should be listed under a separate heading, "Additional References." Place this immediately after "References" but do not list it separately in the table of contents.

Attribute unpublished material, telephone conversations, and other personal communication in the reference section. Your report may be returned to you if key information is missing.

For Web sources, include the complete URL and the date accessed. Because of the impermanence of web pages, be sure to include enough detail so that a user can find the source even if the URL changes over time.

Use the samples cited in Appendix E to establish a consistent citation style. While the first style in the examples that follow is preferable, you may use another style (such as author-date) as long as you follow it consistently throughout and include the required information.

2.2.12 Appendices

Appendices, which are placed at the end of the research report, consist of materials that support the report but are not critical in understanding project results. Appendices follow the report body.

- Label appendices by letter (Appendix A, Appendix B, Appendix C, etc.)
- Include an unnumbered title page for each appendix. The title page should include the Appendix letter (e.g., Appendix A) and the appendix title.
- Begin numbering each appendix after the title page. Use the following page numbering system for each appendix: letter of appendix followed by a dash and page number (i.e., A-1, A-2, A-3, etc., for Appendix A, B-1, B-2, B-3, etc., for Appendix B, etc.)

2.2.13 Graphics

Because some readers may print reports in black-and-white, use colors that will allow for clear and legible graphics to be printed in black-and-white. MnDOT acknowledges that this is not always possible. Clarity can be created through the use of patterns such as lines, cross-hatching, and dots.

- Provide graphics that are extractable in their original form. If they are not extractable from a Microsoft Word file, provide them in a separate (e.g., .jpg) file.
- Place graphics immediately after they are referenced in the text, at the end of the applicable chapter, or in the appendix section.
- Embed graphics in the page on which you intend them to appear in the report; do not use object links to other files.
- Make all efforts to avoid placing graphics so the report must be turned sideways for viewing. If sideways placement is unavoidable, place it so that the top of the graphic is on the left side of the page.
- Check to make sure that your colors convert properly after saving the file as a PDF document.
- Include brief captions to describe each graphic.
- To enable accessibility, include text descriptions for all images in the document, including photographs, graphs, equations, charts, illustrations, and maps.
- Keep the type size to 10 points or larger to ensure legibility.
- Number tables and figures separately and consecutively as they appear, and use a two-number format to indicate the chapter number (for example, Figure 1.1 is the first figure in Chapter One).
- Refer to each table and figure in the text.
- Place table numbers and titles above the graphic. Place figure numbers and titles below the graphic.
- Illustrations do not always look the same in printed form as they do on a computer screen. Use the highest possible resolution.
- Where possible, reference appendices in the text.

2.3 Units of Measure

The United States Congress passed legislation in 1998 making the use of metric units of measurement by states optional for the highway industry. On January 26, 1999, the decision was made that MnDOT would revert to the English system of units. However, following the lead of the Federal Highway Administration's (FHWA) November 25, 2008 memo (see Appendix L),

MnDOT reports should utilize English units of measurement, followed by metric units in parentheses. For example, 19 inches would be written as “19 in (482.6 mm).”

Charts and graphs should be produced only with English units.

Chapter 3. Preparing the Electronic File

The requirements in this chapter are critical to facilitating the electronic publishing of research reports.

3.1 Electronic Publishing Requirements

Follow the requirements in this chapter when submitting a research report for publishing. All research reports will be disseminated in PDF using e-mail and the Internet. Our goal is to receive all draft and final report submittals in Word or a Word-compatible format and PDF. You may use whatever software you prefer to generate the report, as long as it can produce PDF files for the draft and final submittals.

Remember also to follow the editorial guidelines in Chapter 2: *Formatting the Report* when creating the report.

3.1.1 Software

- It is recommended to use Microsoft Word (compatible with Word 2007) to create the report.
- If another software is used, text must be provided in Rich Text Format (RTF), or Unicode (UTF-8 or UTF-16). The author must also submit the final PDF of the entire report.

3.1.2 Graphics

- Embed graphics into the document
- Do not use object links to other files. (An object link is a highlighted link to a separate file, often a file that contains a graphic. Even if the separate file is provided, the file may not be placed into the PDF during PDF conversion.)
- Figures and other images should be referenced and described within the text of the report.

3.1.3 Accessibility

Research projects funded by federal agencies, MnDOT and other state agencies, and the University of Minnesota are required to make electronic products accessible to people with disabilities under Section 508 of the Rehabilitation Act of 1973, as amended, and required by Minnesota State law as of 2009. See http://www.section508.gov for more information. The federal General Services Administration also has guidance and checklists for creating accessible documents. See http://www.gsa.gov/portal/content/103565.

In order to make electronic research reports accessible, please include text descriptions for all images in the document, including photographs, graphs, equations, charts, illustrations, and maps.

CTS will address other accessibility elements, including the use of heading tags to differentiate document sections and verifying table formatting.

3.1.4 Maps and Special Graphics

Some graphics cannot be easily placed within the body of a Word report.

- If the graphic is small, generate a TIF file at a resolution of 200 dots per inch and import the TIF file into your document.
- If the graphic is large or created in a specialized software, generate a PDF of the graphic from the software. Please note the PDF of the graphic will take at least one page, even if it appears less than one page.)

3.1.5 Files

- Include all parts of the report, except the title page and technical report documentation page, as one document
- Provide a separate file of the executive summary in Microsoft Word**,** RTF, or Unicode text.

3.1.6 Other Documents

- Scan those documents that are not electronically available and provide them to CTS to scan into the PDF report file.
- Scan graphics at a resolution of 200 dots (pixels) per inch.

3.1.7 Macintosh Users

- Save files with extensions for easy identification (for example, title.doc, report.PDF).

3.2 Deliverable Requirements

The Principal Investigator is responsible for providing the deliverables listed below, after addressing all technical and editorial comments. Clearly label all files. Deliverables must follow the standards set forth in Chapter 2: *Formatting the Report*.

1. High-resolution PDF file of the entire report, including all figures, tables, and appendices. CTS will create this PDF.
2. Title page file (Microsoft Word, RTF, or Unicode text).
3. Technical report documentation Page file (Microsoft Word, RTF, or Unicode text).
4. Executive summary file (Microsoft Word, RTF, or Unicode text). The executive summary must also be included in the complete report.
5. The complete report in Microsoft Word, RTF, or Unicode text format (Microsoft Word 2007 or newer is preferred). If a research report is prepared using software other than Microsoft Word, it is the researcher's responsibility to provide it in a form that can be converted easily to Microsoft Word 2007 or newer (.docx).
6. Draft and final submission cover sheets with descriptors.
7. E-mail addresses of those whom you would like to receive an e-mail announcement of the report's publication on the Internet
8. Any graphics that could be used in other communications in separate files (save as .jpg or .gif)

Chapter 4. Frequently Asked Questions

Q: What is a PDF file, and how do I prepare one?
A: Any Internet user with Adobe Acrobat Reader software can open, print, and download a Portable Document Format (PDF). PDF files are easy to load onto a website, and for the most part PDF files replicate the format of the original file. Adobe Acrobat Reader often comes with software packages and also can be downloaded at no cost to users. The PDF file is the least complicated method for researchers, MnDOT, and CTS to prepare a document for Internet use.

Q: What if I need to use special software?
A: Often researchers use specialized software to generate maps, figures, or mathematical formulas. To incorporate those maps, figures, or mathematical formulas into a document or PDF, generate a TIF file from the specialized software and import the TIF file into the document in the location where you want the graphic to appear. If this does not work, generate a PDF of the graphic from the software for CTS to insert into the final PDF report file. Please note the PDF of the graphic will take at least one page, even if it appears less than one page. If it is not possible to generate a PDF of the graphic, scan the graphic and provide the scan to CTS.

Q: What if I have documents that are not available in electronic form?
A: If you have documents as part of your report that are not electronically available, scan those documents and provide them to CTS.

Q: Who prepares the cover?
A: Do not prepare a cover. MnDOT or CTS will prepare the report cover with the correct report number and incorporate it into the final PDF.

Q: Why must I submit separate files for the title page and Technical Report Documentation Page?
A: MnDOT and CTS add information to the title page and technical report documentation page. By submitting Microsoft Word files of those documents, MnDOT and CTS can add the necessary information, generate a PDF, and incorporate them into the final PDF.

Q: Why is it important for me to provide keyword descriptors about the project?
A: Libraries and search engines use those keyword descriptors to categorize reports. Accurate keyword descriptors help users locate your report on the Web.

Q: What is covered in the editorial review?
A: The primary purpose of the editorial review is to assure conformity with the research report guidelines. The editor checks for heading format consistency, formatting of references, page numbering, table of contents formatting, and display of graphics. The editor checks the abstract and executive summary for errors in spelling and grammar, but does not check the body of the report for such errors.

Q: What if I wish to create my report with software other than Microsoft Word?
A: It is the author's role to provide MnDOT easily extractable text and graphics for the report. Microsoft Word (2007 or newer compatible) is ideal for MnDOT use. If the author finds it

necessary or beneficial to use different software, text must be provided in Rich Text Format (RTF), or Unicode (UTF-8 or UTF-16). CTS will also submit the final PDF of the entire report.

Q: Why do I need to create descriptive text for each of my graphics?
A: Research projects funded by the federal government; MnDOT and other state agencies; and the University of Minnesota are required to make electronic products accessible to people with disabilities under Section 508 of the Rehabilitation Act of 1973, as amended, and required by Minnesota State law as of 2009. This text is able to be read audibly by Adobe Acrobat, providing a description to visually-impaired users. Report text is also read by Adobe Acrobat.

Q: How do I know whether I am complying with copyright laws when using graphics?
A: Journals and online sources have varying rules on whether permission is needed to use graphics. It is the author's role to determine whether they have complied with regulations. Online map sources have rules that must be followed before using their images.

Appendix A
Instructions and Example to Complete Technical Report Documentation Page

INSTRUCTIONS TO COMPLETE THE TECHNICAL REPORT DOCUMENTATION (TRD) PAGE

To submit the Technical Report Documentation (TRD) Page, the author can submit the actual form (see page A-3). Alternatively, CTS can complete the form using the information provided by the author on a separate Word document. In either case, the author should complete the following items.

4, 5, 7, 9, 13, 16, and 17

All other item numbers should be left blank to be completed by CTS where necessary.

In the second case, the author needs to provide CTS with the same information in a separate Word document.

Instructions for these items are as follows:

Item 4 – Title and Subtitle: The title should be the same as that of the report. When a report is prepared in more than one volume, this block should show the main title plus the volume number and the subtitle for the volume being reported.

Item 5 – Report Date: Indicate the month and year of the date shown on the report title page.

Item 7 – Author(s): List name(s) as listed in the same order as on the title page.

Item 9 – Performing Organization Name and Address: Provide the name and address, including zip code, of the organization responsible for the research and preparation of the report. This should be the same as the name and address appearing on the title page.

Item 13 – Type of Report and Period Covered: State either "interim report," "draft report," "final report," etc. For interim reports, indicate the time period covered (i.e., "Summary Report 1999-2001").

Item 16 – Abstract: This is a brief (250 words or less) factual summary of the most significant information contained in the report. An abstract should state the purpose, methods, results, and conclusions of the work effort. For purpose, include a statement of goals (objectives, aims). For methods, include experimental techniques or the means by which the results were obtained. Results (findings) are the most important part of the abstract and selection should be based on one, or several, of the following: new and verified events, findings of permanent value, significant findings that contradict previous theories, or findings that the author knows are relevant to a practical problem. Conclusions should address the implications of the findings and how they tie in with studies in related fields. When a report consists of a number of volumes, include the title of each of the other volumes in each abstract. If the report contains a significant bibliography or literature survey, mention it also.

Reports presenting the results of computerized model development will use the following structure for the preparation abstracts:

- Technical Model description (nature of the model or simulator)
- Areas of model application
- Special model requirements
  - Areas of model application
  - Other special considerations

The editor will check the abstract for understandability and will make suggestions that will help the author aim it toward a lay-audience.

Description: A one- to three-sentence description will be written by the editor for use in MnDOT's ARTS database deliverable screen.

Item 17 – Document Analysis/Descriptors: This is a listing of the terms (keywords) that identify the major concept of the research. *It is especially important to identify keywords and phrases that may not appear in the report title or abstract, so as to more broadly encompass the entire research area. This will expand the field of possible terms for literature searches so that researchers can broadly identify all research sources related to their topic area.* Supplying keywords is particularly important for libraries that do not have the capability to search several different data fields, but must rely on keywords used as index entries for cataloging. For this reason, it is important to select specific and precise terms or short phrases that identify the principal subjects covered in the report.

Technical Report Documentation Page

1. Report No.	2.	3. Recipients Accession No.
MN/RC 2004-03 **[CTS]**		

4. Title and Subtitle	5. Report Date
Transportation-Related Impacts of Different Regional Land-Use Scenarios	December 2003
	6.

7. Author(s)	8. Performing Organization Report No.
Gary Barnes	

9. Performing Organization Name and Address	10. Project/Task/Work Unit No.
University of Minnesota Humphrey Institute of Public Affairs 301 19th Ave. S. Minneapolis, MN 55455	11. Contract (C) or Grant (G) No. (C) 74708 (wo) 188 **[CTS]**

12. Sponsoring Organization Name and Address	13. Type of Report and Period Covered
Minnesota Department of Transportation **[CTS]** 395 John Ireland Boulevard Mail Stop 330 St. Paul, Minnesota 55155	Final Report 14. Sponsoring Agency Code

15. Supplementary Notes
http://www.lrrb.org/PDF/200403.pdf **[CTS]**

16. Abstract (Limit: 250 words)

This research addresses the question of how different regional land-use patterns would impact travel behavior and resulting transportation costs and benefits. This report defines six hypothetical future regional land-use scenarios for the Twin Cities region, representing combinations of different styles of residential and commercial development. The traffic patterns resulting from each of these scenarios are then used to describe the resulting congestion, air pollution, and accessibility to jobs.

The results of the research indicate that the current conventional wisdom that compact development is better is at best an oversimplification. Certain types of compact development do appear to be better for certain goals, or for certain locations; however, at the same time they are often worse for other goals or other locations.

Despite some difficult methodological problems, this seems like a question worth exploring further. While it appears that land use alone cannot solve transportation-related problems, it does seem that the rate at which these problems grow can be impacted at least moderately at a regional level, and sometimes very substantially at local levels.

17. Document Analysis/Descriptors	18. Availability Statement
Land Use, Travel behavior, Traffic forecasting, Transportation costs, Congestion, Air pollution, Accessibility	No restrictions. Document available from: National Technical Information Services, Alexandria, Virginia 22312

19. Security Class (this report)	20. Security Class (this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	68 **[CTS]**	

Technical Report Documentation Page
Information

Item 4: Development and Testing of Methods for Estimating the Impact of Safety Improvements

Item 5: March, 2001

Item 7: Gary A. Davis

Item 9: Department of Civil Engineering
University of Minnesota
500 Pillsbury Drive SE
Minneapolis, MN 55455

Item 13: Final Report 1996-1999

Item 16: This report describes a Bayesian method for estimating accident rates at individual sites, which accounts for the fact that the total traffic count usually used to measure exposure is generally not known with certainty. First, an approximation for the probability distribution of total traffic conditioned on a short count sample is derived. This approximation is then used to derive a Bayes estimator of a site's accident rate, conditioned on an accident count and a short count sample is derived using the total traffic approximation. It is then shown how computation of the accident rate estimates can be carried out using Gibbs sampling. Test using actual accident and traffic data revealed that accident rate estimates based on a two-week traffic sample are almost as accurate as estimates based on full traffic counting, but that uncertainty in the estimated accident rates increases by 20-50% when a two-day count sample is used.

Item 17: Traffic Counts
Accident Rates
Gibbs Sampling

Appendix B
Example Title Page

MAINTAINING THE TRAFFIC CONTROL SYSTEM

Final Report

Prepared by:

Bapiraju Vinnakota
Department of Electrical and Computer Engineering
University of Minnesota
Minneapolis, MN 55455

March 1998

Published by:

Minnesota Department of Transportation
Research Services
395 John Ireland Boulevard, MS 330
St. Paul, MN 55155

Appendix C
Examples of Acknowledgments

ACKNOWLEDGMENT

The authors express appreciation to the Office of Maintenance and the Materials and Research Laboratory of the Minnesota Department of Transportation for support of this research, and are indebted to Dr. O.S. Kwon of the 3M Company, Minnesota, for donation of hydrogel, as well as to Dean Kourtjan of the North Star Steel Co., Minnesota, for spectrographic analysis of rebar steels.

ACKNOWLEDGMENTS

The fabrication and procedures presented in this report were developed in conjunction with Shannon & Wilson, Inc., Geotechnical Consultants, St. Louis, Missouri. The authors would also very much like to thank the following individuals and organizations for their contributions to this document.

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Alberta Research Council
Monica Penshorn – Physical Research Section, Minnesota Department of Transportation
Carol Isberg – Mn/ROAD
Office of Research Administration, Minnesota Department of Transportation

ACKNOWLEDGMENTS

The financial and logistical support provided by the Local Road Research Board, the Minnesota Department of Transportation, the Center for Transportation Studies at the University of Minnesota, Wheeler Consolidated, Inc., and Sibley County for this work is gratefully acknowledged.

Acknowledgments

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1. Kevin Kosobud, MnDOT assistant concrete engineer
2. MnDOT District 7B, Windom, maintenance personnel
3. Steve Oakey, MnDOT District 7, Mankato, materials engineer
4. Duane Pingeon, MnDOT District 7B maintenance superintendent

ACKNOWLEDGMENT

We would like to extend our deepest appreciation to the following people for their generous help and support: Ronald Lawrenz, Charles Bongo, Daniel Engstrom and Erna Janssens-Verbelen with the fieldwork: Ronald Lawrenz, Daniel Engstrom, and James Almendinger during discussions and with interpretation; and Shorn Mallman and Ronald Lawrenz by making the facilities of the St. Croix Watershed Research Station available.

This project was conducted with funding provided by the St. Croix Watershed Station, Science Museum of Minnesota, the Minnesota Department of Transportation, and from the A.W. Mellon Foundation grant to Prof. Eville Gorham, Department of Ecology, Evolution and Behavior, University of Minnesota. We greatly appreciate the help by Eville Gorham in reviewing the interim status reports and the draft of the final report.

Appendix D
Example of Table of Contents

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION …….
Background ……
Objective ……
Report Organization ……..

CHAPTER 2 LITERATURE REVIEW …….
Types of LSAM Gradations …….
Mix Design Practices ……
Summary ……..

CHAPTER 3 EXPERIMENTAL DESIGN AND MATERIALS ……..
Experimental Design ……
Materials ……..

CHAPTER 4 MIX DESIGNS ……
Marshall Mix Design ……
Volumetric Mix Design ……

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS ……..…..
Conclusions ……..……
Recommendations ……

REFERENCES ……..…….……

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APPENDIX B – Examples of Title Pages

APPENDIX C – Examples of Acknowledgments

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Table 2.2 Acceptable Criteria for LSAM (Ken DOH)

Table 2.3 Penn DOT LSAM Gradation Band

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Figure 3.1 Aggregate Gradations

Figure 4.1 Results of Marshall Mix Design

Appendix E
Examples of References

REFERENCES

Examples of references for:

Books

[1] R.L. Davis, *Large Stone Mixes: A Historical Insight* (Phoenix: National Asphalt Pavement Association, 1989).

[2] R.L. Davis (1989). *Large stone mixes: A historical insight.* Phoenix: National Asphalt Pavement Association.

Journals

[3] M. Acott, "Today's Traffic Calls for Heavy Duty Asphalt Mixes," *Roads and Bridges,* vol. 26, no. 1 (Jan. 1988), 39-45.

[4] M. Acott (1988). Today's traffic calls for heavy duty asphalt mixes. *Roads and Bridges,* vol. 26, no. 1: 39-45.

Reports

[5] P.S. Kandhal, *Testing and Evaluation of Large-Stone Mixes Using Marshall Mix Design Procedures* (Auburn, Ala.: Auburn University, National Center for Asphalt Technology, 1990).

[6] Minnesota Department of Agriculture, *Evaluation of Minnesota Agricultural Land Preservation Programs* (St. Paul: Minnesota Department of Agriculture, June 1999).

Newspapers

[7] Neal Gendler, "Fewer Metro Homes Being Built; Prices Rising," *Minneapolis Star Tribune,* 5 May 2000, Homezone section.

[8] Neal Gendler (2000). Fewer metro homes being built; prices rising. *Minneapolis Star Tribune,* 5 May, Homezone section.

Websites/Internet resources

[9] U.S. Department of Transportation, Federal Highway Administration (Internet), *1997 Federal Highway Cost Allocation Study,* August 1997 (Accessed January 1999), www.fhwa.dot.gov/policy/hcas/final/index.htm.

[10] U.S. Department of Transportation, Federal Administration (1997). Internet. *Federal highway cost allocation study,* August (Accessed January 1999), www.fhwa.dot.gov/policy/hcas/final/index.htm.

Presentations

[11] L.W. Munnich, "Transportation Finance." Presentation, Presented at Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, Minneapolis, MN, (July, 2008).

[12] L.W. Munnich. (2008) "Transportation Finance." Presentation, Presented at Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, Minneapolis, MN.

Appendix F
Rules for Writing Metric Symbols and Names

RULES FOR WRITING METRIC SYMBOLS AND NAMES

- Print unit symbols in upright type and in lower case except for liter (L) or unless the unit name is derived from a proper name.
- Print unit names in lower case, even those derived from a proper name.
- Print decimal prefixes in lower case for magnitudes 10^3 and lower (that is, k, m, μ, and n) and print the prefixes in upper case for magnitudes 10^6 and higher (that is, M and G).
- Leave a space between a numeral and a symbol (write 45 kg or 37 ° C, not 45kg or 37°C or 37° C).
- Do not use a degree mark (°) with Kelvin temperature (write K, not °K).
- Do not leave a space between a unit symbol and its decimal prefix (write kg, not k g).
- Do not use the plural of unit symbols (write 45 kg, not 45 kgs), but do use the plural of written unit names (several kilograms).
- For technical writing, use symbols in conjunction with numerals (the area is 10 m^2); write out unit names if numerals are not used (carpet is measured in square meters). Numerals may be combined with written unit names in nontechnical writing (10 meters).
- Indicate the product of two or more units in symbolic form by using a dot positioned above the line ($kg \cdot m \cdot s^2$).
- Do not mix names and symbols (write N·m or Newton meter, not N·meter or newton·m)
- Do not use a period after a symbol (write “12 g”, not “12 g.”) except when it occurs at the end of a sentence.

RULES FOR WRITING NUMBERS

- Always use decimals, not fractions (write 0.75 g, not ¾ g).
- Use a zero before the decimal marker for values less than one (write 0.45 g, not .45 g).
- Use spaces instead of commas to separate blocks of three digits for any number over four digits (write 45 138 kg or 0.004 46 kg or 4371 kg). This is because in the United States, the decimal marker is a period; in other countries a comma usually is used. Note that this does not apply to the expression of amounts of money.

CONVERSION AND ROUNDING

- When converting numbers from inch-pounds to metric, round the metric value to the same number of digits as there were in the inch-pound number (11 miles at 1.609 km/mi equals 17.699 km, which rounds to 18 km).
- Convert mixed inch-pound units (feet and inches, pounds and ounces) to the smaller inch-pound 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).
- In a “soft” conversion, an inch-pound measurement is mathematically converted to its exact (or nearly exact) metric equivalent. With “hard” conversion, a new rounded, rationalized metric number is created that is convenient to work with and remember.

VISUALIZING METRIC

A few basic comparisons are worth remembering to help visualize metric:

- -One millimeter is about 1/25 inch or slightly less than the thickness of a dime.
  -One meter is the length of a yard plus about 3-1/3 inches.
  -One gram is about the mass (weight) of a large paper clip.
  -One kilogram is about the mass (weight) of a softbound model building code book (2.2 pounds).
  -One liter is about the volume of a 4 inch cube (100 mm x 100 mm x 100 mm). One liter of water has a mass of 1 kilogram.
- -One inch is 1/64 inch longer than 25 mm (1 inch = 25.4 mm; 25 mm = 63/64 inch). Four inches are about 1/16 longer than 100 mm (4 inches = 101.6 mm; 100 mm = 3-15/16 inches).
  -One foot is about 3/16 inch longer than 300 mm (12 inches = 304.8 mm; 300 mm = 11-13/16 inches).
  -Four feet are about ¾ inch longer than 1200 mm (4 feet = 1219.2 mm; 1200 mm = 3 feet, 11 ¼ inches).
- The metric equivalent of a typical 2-foot by 4-foot ceiling grid is 600 x 1200 mm, so metric ceiling tiles and lighting fixtures are about 3/8 inch smaller in one dimension and ¾ inch smaller in the other.
- Similarly, the metric equivalent of a 4 by 8 sheet of plywood or drywall is 1200 x 2400 mm, so metric sheets are about ¾ inch narrower and 1 ½ inches shorter.
- "Rounding down" from multiples of 4 inches to multiples of 100 mm makes dimensions exactly 1.6 percent smaller and areas about 3.2 percent smaller. About 3/16 inch is lost in every linear foot.

The metric units in this guide are those adopted by the U.S. government (see the *Federal Register* of December 20, 1990; Federal Standard 376A, *Preferred Metric for Use by the Federal Government;* and *PB 89-226922, Metric Handbook for Federal Officials*). They are identical to the units in the following publications, which constitute the standard reference works on metric in the United States:

- ASTM E 621, *Standard Practice for Use of Metric (SI) Units in Building Design and Construction*, and
- IEEE/ASTM SI-10, *Standard for Use of the International System of Units (SI) – The Modern Metric System* (revision and redesignation of IEEE Standard 268 and ASTM E 380).

For editorial matters, also refer to:

- American National Metric Council, *Metric Editorial Guide*, and
- U.S. Metric Association, *Metric Units of Measure and Style Guide*.

Appendix G
Report Template

[Fill in sections 4, 5, 7, 9, 13, 16 and 17. SAVE THIS PAGE AS SEPARATE MICROSOFT WORD FILE.]

Technical Report Documentation Page

<table>
<tr><td>1. Report No.</td><td>2.</td><td colspan="2">3. Recipients Accession No.</td></tr>
<tr><td colspan="2" rowspan="2">4. Title and Subtitle</td><td colspan="2">5. Report Date</td></tr>
<tr><td colspan="2">6.</td></tr>
<tr><td colspan="2">7. Author(s)</td><td colspan="2">8. Performing Organization Report No.</td></tr>
<tr><td colspan="2" rowspan="2">9. Performing Organization Name and Address</td><td colspan="2">10. Project/Task/Work Unit No.</td></tr>
<tr><td colspan="2">11. Contract (C) or Grant (G) No.</td></tr>
<tr><td colspan="2" rowspan="2">12. Sponsoring Organization Name and Address</td><td colspan="2">13. Type of Report and Period Covered</td></tr>
<tr><td colspan="2">14. Sponsoring Agency Code</td></tr>
<tr><td colspan="4">15. Supplementary Notes</td></tr>
<tr><td colspan="4">16. Abstract (Limit: 250 words)</td></tr>
<tr><td colspan="2">17. Document Analysis/Descriptors</td><td colspan="2">18. Availability Statement
No restrictions. Document available from: National Technical Information Services, Alexandria, Virginia 22312</td></tr>
<tr><td>19. Security Class (this report)
Unclassified</td><td>20. Security Class (this page)
Unclassified</td><td>21. No. of Pages</td><td>22. Price</td></tr>
</table>

[Report Title]

[Title limited to 250 characters (including spaces) but may be several lines long. Add or delete blank lines to keep all this info on one page]

Final Report

Prepared by:

[Example: Author #1

Author #2
Department of Civil Engineering
University of Minnesota]

[Example: Author #3
Department of Redundancy Department
University of Texas]

[Publication Month and Year]

Published by:

Acknowledgments

[Keep Acknowledgments to no more than one page.]

Table of Contents

Chapter 1: Introduction .....

Chapter 2 .....
[Section 1] .....
[Subsection 1] .....
[Subsection 2] .....
[Section 2] .....
Chapter 3 .....
Chapter 4 .....
Chapter 5 .....
References .....
Appendix A
Appendix B
Appendix C

[If lengthy, list of tables and list of figures should start on new page.]

List of Tables

Table 1.1 [Title should match title in text] .....
Table 2.1 [Number should include chapter number plus sequential number] .....

List of Figures

Figure 1.1 [Title here, should match title in text] .....
Figure 1.2 [Title here, number should include chapter number plus sequential number] .....
Figure 3.1 [Title here] .....

Executive Summary

[The executive summary should be

- Concise. Present a synopsis of the research issue, the main findings or results, conclusions, the significance of the research, and recommendations.
- Three (or fewer) pages.
- A stand-alone summary of the research project.

Readers often turn first to the executive summary for an overview of the project. Because of its importance, you may be asked to rewrite or rework the executive summary to better reflect the research project findings and conclusions.]

PLEASE READ THE FOLLOWING 2 PAGES AND DELETE WHEN USING THIS TEMPLATE.

[Note: The first use of an **acronym** should be spelled out and followed by the acronym in parentheses: the Minnesota Department of Transportation (MnDOT). "MnDOT" is spelled Capital "M", small "n," Slash, Cap "D," Cap "O," Cap "T."]
[Full names of all authors should be spelled out on the first mention.]

[**References in the text**: List full reference information in the Reference section at the end of the report. Use one of the following two citation methods:

1) In the text, refer to a citation by placing a number in [square brackets] or (parentheses) at the end of the sentence that refers to it. The References section at the end of the document should be ordered and numbered according to the numbers assigned in the text. If you cite the same reference more than once, continue to use the number that was assigned to the reference in the report body.

2) Alternatively, you may cite references in (Author, Date) format, e.g., (Jones, 1999) in the report body and alphabetize the citations in the Reference section at the end of the document. If an author has more than one citation, order with the most recent date first in the alphabetical list.

Examples:

1) "Research on transportation is important. An early study by Johnson and Juliar examined highway right-of-ways [1]. Killdare investigated the effectiveness of stone and wood chip mulches for controlling weeds [2]. Anderson, Jones, and Sufuentes evaluated different erosion control methods [3]...."

   References at the end of the document would be listed in the following order:
   1. Johnson and Juliar
   2. Killdare
   3. Anderson, Jones, and Sufuentes

OR

2) "Research on transportation is important. An early study by Johnson and Juliar examined highway right-of-ways (Johnson and Juliar, 2002). Killdare investigated the effectiveness of stone and wood chip mulches for controlling weeds (Killdare, 1998). Anderson, Jones, and Sufuentes evaluated different erosion control methods (Anderson et al, 2003]...."

   References at the end of the document would be listed in the following order:
   1. Anderson, Jones, and Sufuentes
   2. Johnson and Juliar
   3. Killdare

Documents that you did not cite specifically but did use as sources should be listed alphabetically by author under the heading "Additional References."

Tables and Graphics:

[If possible, do not split tables across pages. If a table is so large that it goes over multiple pages, make pages end at reasonable breaking points, such as between rows.]

Table 1. Tables can have any pattern of lines and shading.

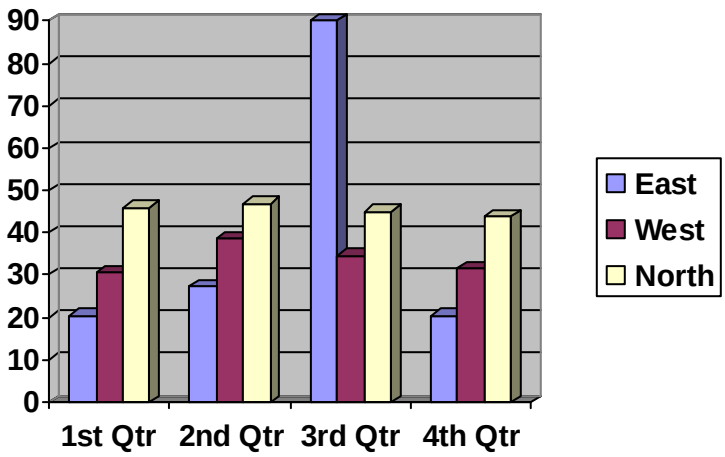


Figure 1.1. [Title Here]

[Figures and graphics **must not be linked** objects. See "Graphics" in the E-Publishing Guidelines. Any format of graph is acceptable. Type size should be 10 points or larger so it is clearly legible. Create figures and graphics so that the information displays correctly when printed in black and white.]

Equation Editor

Microsoft Word 2007 or newer has a built-in equation editor that is useful for showing complex equations. To insert an equation, click on the insert ribbon, and choose Equation.

Chapter 1
Introduction

[Text starts here. 12 point Times Roman with 1-inch margins on all sides.]

[Chapter 1 = Introduction. It outlines the research issue, the historical background, the research goals, the basic approach, and the report organization. It does not include results, conclusions, or recommendations.]

[Arrange other chapters to fit your project's content and organization.]

Chapter 2
[Title Here]

[Text starts here. All other numbered chapters follow this format and start on their own page.]

References

[Examples below show: 1. Book, 2. Journal, 3. Report, and 4. Website. See E-Publishing Guidelines (http://www.dot.state.mn.us/research), Report Format for more examples. References should be listed in the order in which they are referred to in the text. List each reference only once in this numbered list. Use the same number to refer to that text multiple times. When numbered, references do not need to be alphabetical.]

1. R.L. Davis, *Large Stone Mixes: A Historical Insight* (Phoenix: National Asphalt Pavement Association, 1989).
2. M. Acott, "Today's Traffic Calls for Heavy Duty Asphalt Mixes," Roads and Bridges, vol. 26, no. 1 (Jan. 1988), 39-45.
3. P.S. Kandhal, *Testing and Evaluation of Large-Stone Mixes Using Marshall Mix Design Procedures* (Auburn, Ala.: Auburn University, National Center for Asphalt Technology, 1990).
4. U.S. Department of Transportation, Federal Highway Administration (Internet), *1997 Federal Highway Cost Allocation Study,* August 1997 (cited January 1999), www.fhwa.dot.gov/policy/hcas/final/index.htm.

[Note: If you choose to use the (Author, Date) system instead, alphabetize this list; see page G-6 for more information.]

Appendix H
Section 508 Compliance: Making an Accessible Document

508 Compliance: Making an Accessible Document

Descriptions

Depending on who is writing the description, the figure should be described in broad terms. If the caption is sufficiently descriptive or there is analysis in the text, then the author may determine that no description beyond what is already presented is necessary.

If the figure is a graph, make sure to include parameters of the graph – what are the data lines, what is plotted on the x and y axis, what is the title, etc.

If the figure is a photograph, generally "Photograph" is an adequate description.

Equations will appear tagged as figures in the text – they will not be read well by the reader. Generally, equations can simply be described as "Equation."

Adding Descriptions

The most important thing to do to make a document accessible is to add alternative text to all figures. To add or edit alternative text:

For earlier versions of Word or for documents opened in Word 2007 that are not .docx, right click on the image and select "Format Picture…"

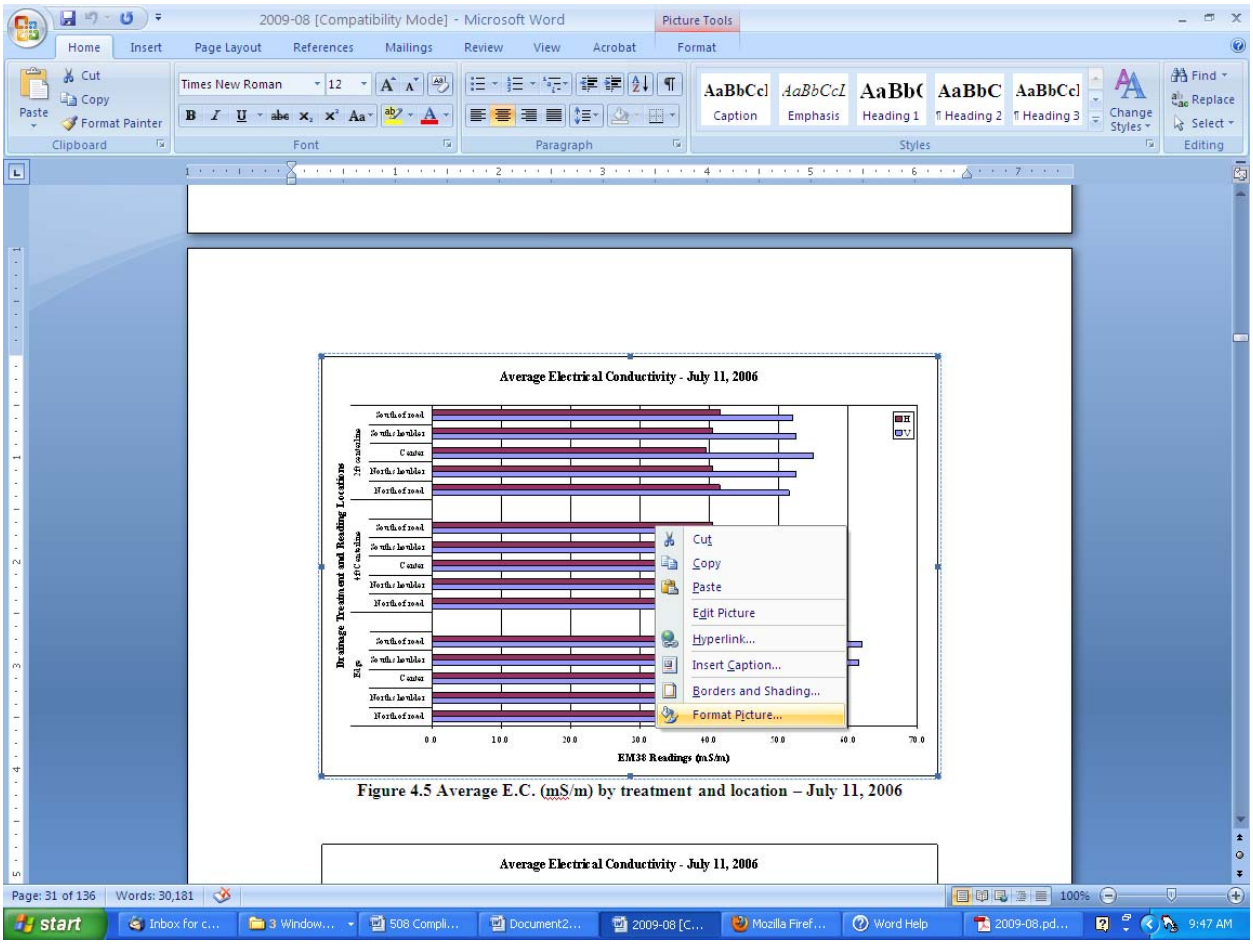
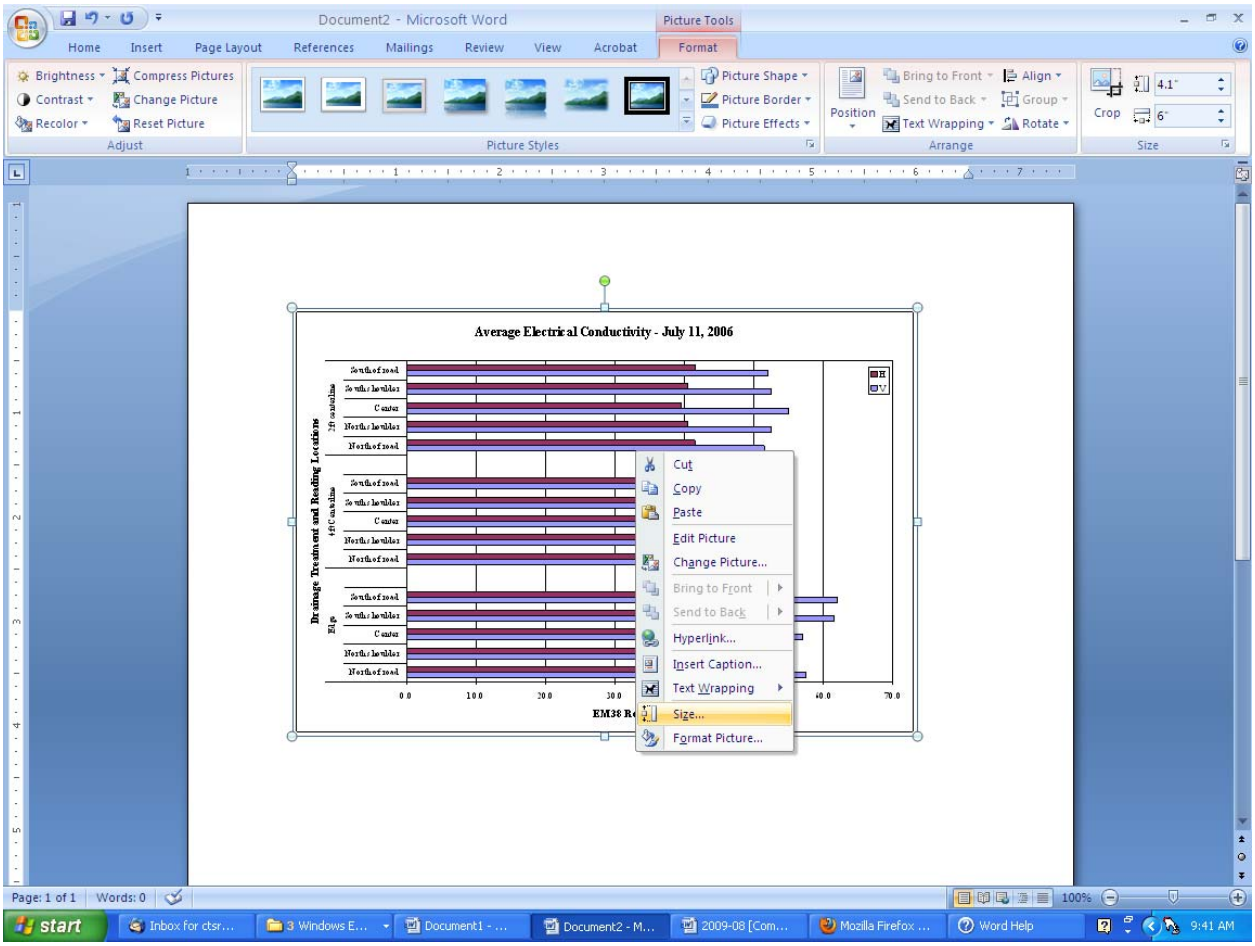


Figure 4.5 Average E.C. (mS/m) by treatment and location – July 11, 2006

Average Electrical Conductivity - July 11, 2006

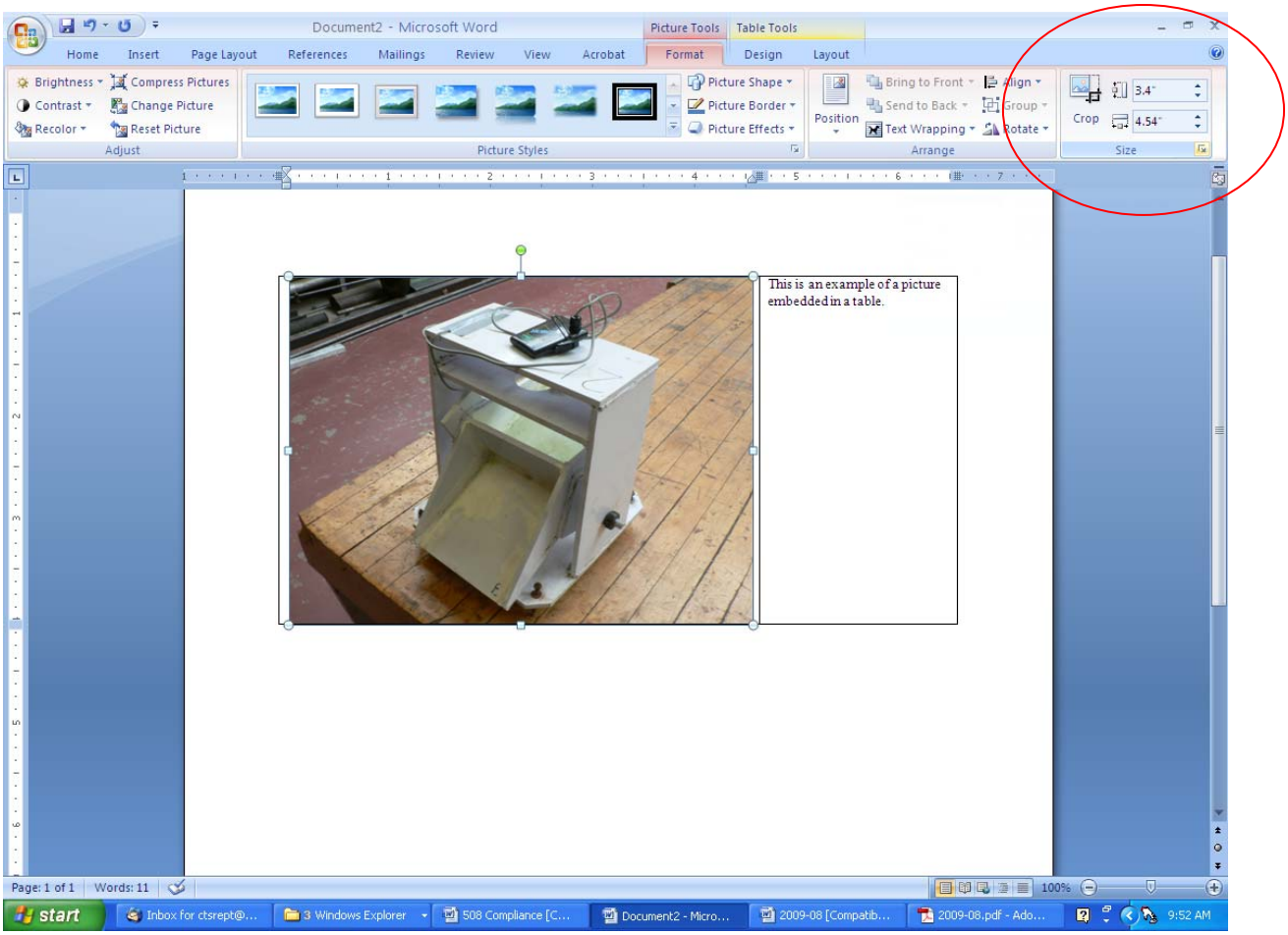
A dialog box will appear. Select the "Alt Text" tab. You can type the alternative text into the box. When you are done, click OK.

For documents created in Word 2007, right click on the picture and select "Size…"



A dialog box will open. Select the "Alt Text" tab. You can type the alternative text into the box. When you are done, click OK.

If you put a picture in a table, you cannot just right click to get the alternative text dialog box. First, highlight the picture in the table. Then, go up to the ribbon (in Word 2007) and select the "Format" tab under "Picture Tools". Go to the far right of the screen, and select the arrow in the lower right corner of the "Size" section.



A dialog box will appear. Select the "Alt Text" tab at the top. Type in your alternative text. When you are done, click OK.

Any equations that you use will also need alternative text. Follow the steps above to add alternative text.

If you use tables that you create in Word or Excel, no alternative text is necessary. However, if you place a table in as a picture (e.g. copy and paste in a screen shot), alternative text will be necessary. Follow the same process to add alternative text.

Converting the Word Document to a PDF

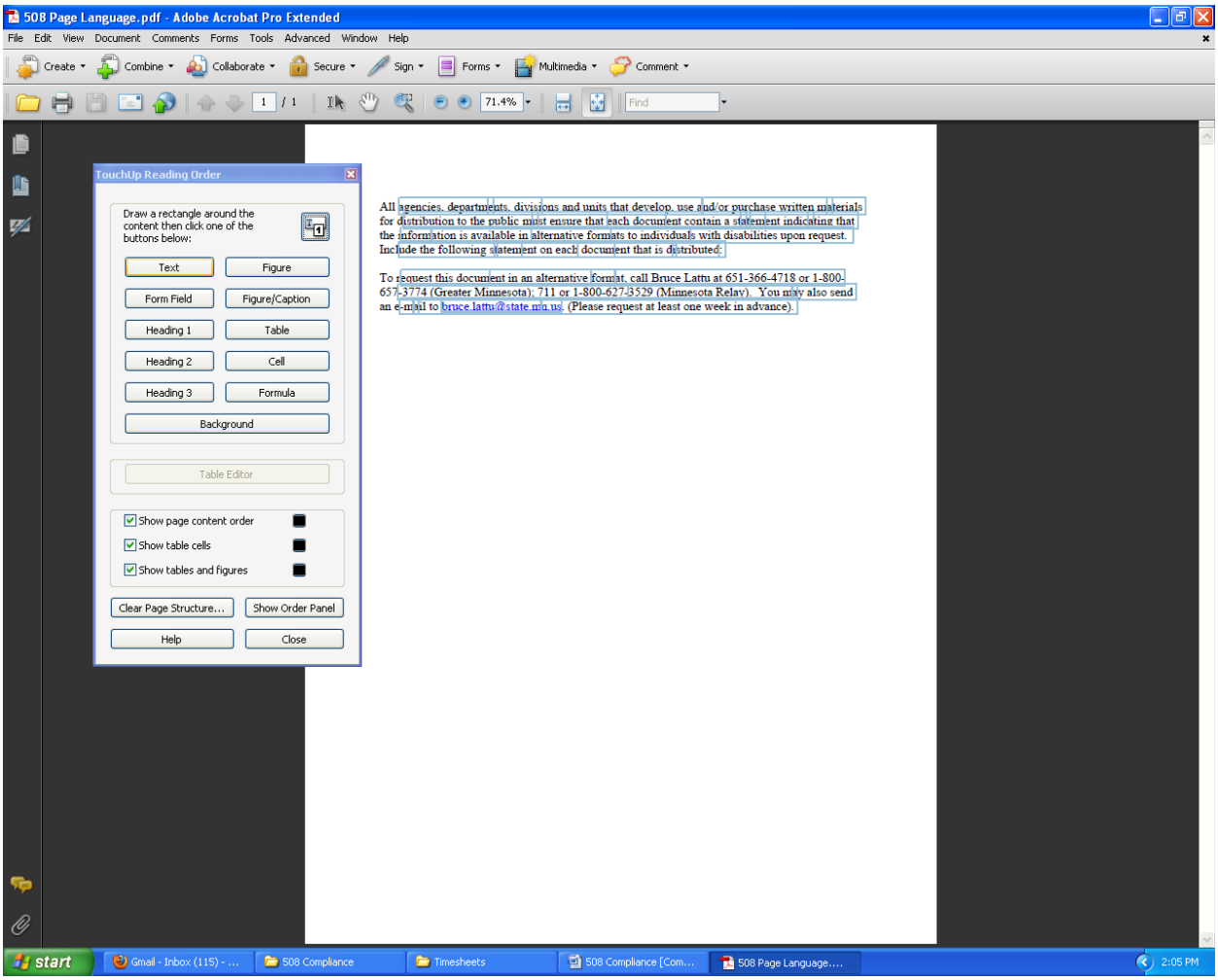
In Word 2007, there is a tab at the top labeled "Acrobat". Under that tab, select "Create PDF". Sometimes, if there are a lot of figures, a dialogue box will appear to ask you if you want to turn tagging off – select "No". The tagging is what makes the TOC, LOF, and LOT linked in the PDF and what tags a figure as a figure (with the alternative text) in the PDF.

In Word 2007, in the menu bar there should be an "Adobe PDF" menu. Select "Convert to PDF."

Tagging the Elements in the PDF

In Adobe Professional, go to the menu bar and select Tools → Advanced Editing → Touch Up Reading Order Tool.

If the PDF was created as described above, most elements of the document should be tagged in grey boxes as text, figure, or table. If it was not created this way, the elements will need to be tagged. Use the cursor to draw boxes over the different elements one at a time – text, figures, and tables. Then, once an element has been highlighted in blue lines, click the button in the toolbar that best describes what you want the element tagged as.



Adding Descriptions to Figures in the PDF

Select the figure that needs alternative text. Generally, if a figure does not have alternative text, it will say "Figure – No alternative text".

Right click the figure and select "Edit Alternative Text." The description can be copied and pasted into the dialogue box that appears.

Appendix I
Draft Submission Cover Sheet

DRAFT

MnDOT Research Report

DRAFT Submission Cover Sheet

To ease the publishing process, please complete this form and submit it with the CD containing the draft of your research report, or via email.

MnDOT Agreement No.: Work Order No.:

RSS Project Coordinator:

Title of Report:

Author(s) (List primary author first):

Have all technical comments been addressed and incorporated? ☐ Yes ☐ No

Clearly mark materials as DRAFT.

Include:

☐ Electronic file of complete report

☐ One-sided hard copy

Appendix J
Final Submission Cover Sheet

MnDOT Research Report
Submission Cover Sheet
* FINAL *
Publication Copy

After your report has been reviewed and accepted by CTS and MnDOT, complete this form and submit it with the CD containing the final publishable version of your research report. (**We do not recommend sending final version of report through e-mail**.)

* Remember to remove any electronic tags or text that identify file(s) as a draft or copy.

MnDOT Agreement No.: Work Order No.:

RSS Project Coordinator:

Title of Report:

Author(s) (List primary author first):

_____ All technical and editorial comments have been incorporated or resolved.
Author initial here

Include:

- ☐ Final report in Word format on CD, file sharing site or via email, clearly labeled with title and date
- ☐ Word files of executive summary, technical report documentation page, title page, and dissemination list
- ☐ Keywords (Descriptors): _____

  _____
- ☐ Separate files of graphics that could be used in other communications (optional)

Appendix K
Checklist for Submission of Reports

MINNESOTA DEPARTMENT OF TRANSPORTATION
RESEARCH SERVICES
CHECKLIST FOR SUBMISSION OF RESEARCH REPORTS

When you feel you are ready to submit your first copy of a draft research report, please use this list as a guideline to ensure that the basic elements of the report are included and are accurate before submitting the draft to the Center for Transportation Studies.

☐ Clearly mark the initial submission "Draft." Remove "Draft" from the Final Submission.

☐ Verify correct use of MnDOT reference; it must appear as "Minnesota Department of Transportation (MnDOT)" in first reference, then as "MnDOT" in subsequent references.

☐ All abbreviations/acronyms must be spelled out on the first reference.

☐ Report must include a table of contents, a list of figures, and a list of tables, each beginning on a separate page.

☐ Check for inclusion of an executive summary and an Introduction (*Chapter One is always the Introduction*).

☐ Report should include no headers.

☐ Footnotes should not be used to cite references. However, they can be used as supplementary comments that do not warrant appendices.

☐ Number pages starting with the introduction; center page numbers at the bottom of the page.

☐ Appendices should have their own cover page and their own numbering system (i.e., A-1, A-2, A-3, etc., for Appendix A, and B-1, B-2, B-3, etc., for Appendix B and others). Appendix cover page includes the appendix number and title, but is not numbered.

☐ Be sure the report includes a chapter on conclusions and recommendations and that they are clear.

☐ Spell-check the document; make sure all graphics are present and labeled. Do not use object links to other files.

☐ Be sure that graphics include text descriptions.

☐ Make sure all copyright permissions are secured.

☐ Please submit reports with corresponding "Draft Submission Cover Sheet" OR "Final Submission Cover Sheet."

The Electronic Publishing Guidelines can be found at:
http://www.dot.state.mn.us/research

Appendix L
Federal Highway Administration Memo

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **INFORMATION:** Update on Metric Use Requirements for FHWA documents

Date: November 25, 2008

From: Jeffrey F. Paniati
Executive Director

In Reply Refer To:
HIPA

To: Associate Administrators
Chief Counsel
Acting Chief Financial Officer
Directors of Field Services
Federal Lands Highway Division Engineers
Acting Resource Center Director
Division Administrators

The FHWA is modifying its policy on the use of metric measurements in its daily activities. The use of metric measurements will now be optional in all FHWA documents, including letters, memoranda, publications, reports, and information on FHWA Web sites.

The FHWA has long supported the conversion to metric measurements. Consistent with Section 5164 of the Omnibus Trade and Competitiveness Act of 1988 and Executive Order 12770, issued by President George H. W. Bush on July 25, 1991, we developed a 5-year Metric Conversion Plan for highway documents and plans. By 1995, the vast majority of State departments of transportation (DOT) indicated they would comply with FHWA's conversion completion date of September 30, 1996. As a result, they expended considerable financial resources to convert design, contracting, and other documents, such as *Standard Specifications*, from the inch-pound system to metric measurements in compliance with the Metric Conversion Plan.

For the Federal-aid highway program, the momentum established by the plan came to an end in 1995. Section 205(c)(2) of the National Highway System (NHS) Designation Act of 1995 prohibited us from requiring any State DOT to use the metric system during project development activities. Although the State DOT's had the option of using metric measurements or dual units (metrics/inch-pounds), all of them abandoned metric measurements and reverted to sole use of inch-pound values.

MOVING THE AMERICAN ECONOMY

Our most recent guidance on this subject was contained in a memorandum dated June 1, 2001 (posted at http://www.fhwa.dot.gov/programadmin/contracts/0601metr.cfm). It explained that Section 5164 of the 1988 Act requires all Federal Agencies to use the metric system in their procurements, grants, and other business-related activities except to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms. Therefore, FHWA continued to use metric measurements in our daily business activities except in documents intended for a broader audience, such as the general public, when dual units (metric values followed by the inch-pound value in parenthesis) were appropriate.

Given that all our partners have abandoned metric measures, we have concluded that continued mandatory use of metric measurements in FHWA's daily business activities is impractical. Accordingly, I am rescinding the prior guidance, dated June 1, 2001, on this issue. The use of metric measurements is no longer mandatory in our daily business activities. Each office may use its own judgment on the value of metric measurements or dual units based on the audience for each document. For offices that wish to use dual units, we encourage a reversal of past practice by presenting them in the format of inch-pound value followed by metric value in parenthesis.

Under the NHS Designation Act, State transportation officials may continue to decide whether to prepare documents using the inch-pound system, metric measurements, or dual measurements. This flexibility applies to all documents developed in compliance with Federal-aid requirements, including the National Environmental Policy Act and other environmental requirements.

If you have any questions, please contact Mr. Edwin Okonkwo at 202-366-1558 of the Office of Program Administration.

cc:
Office Directors