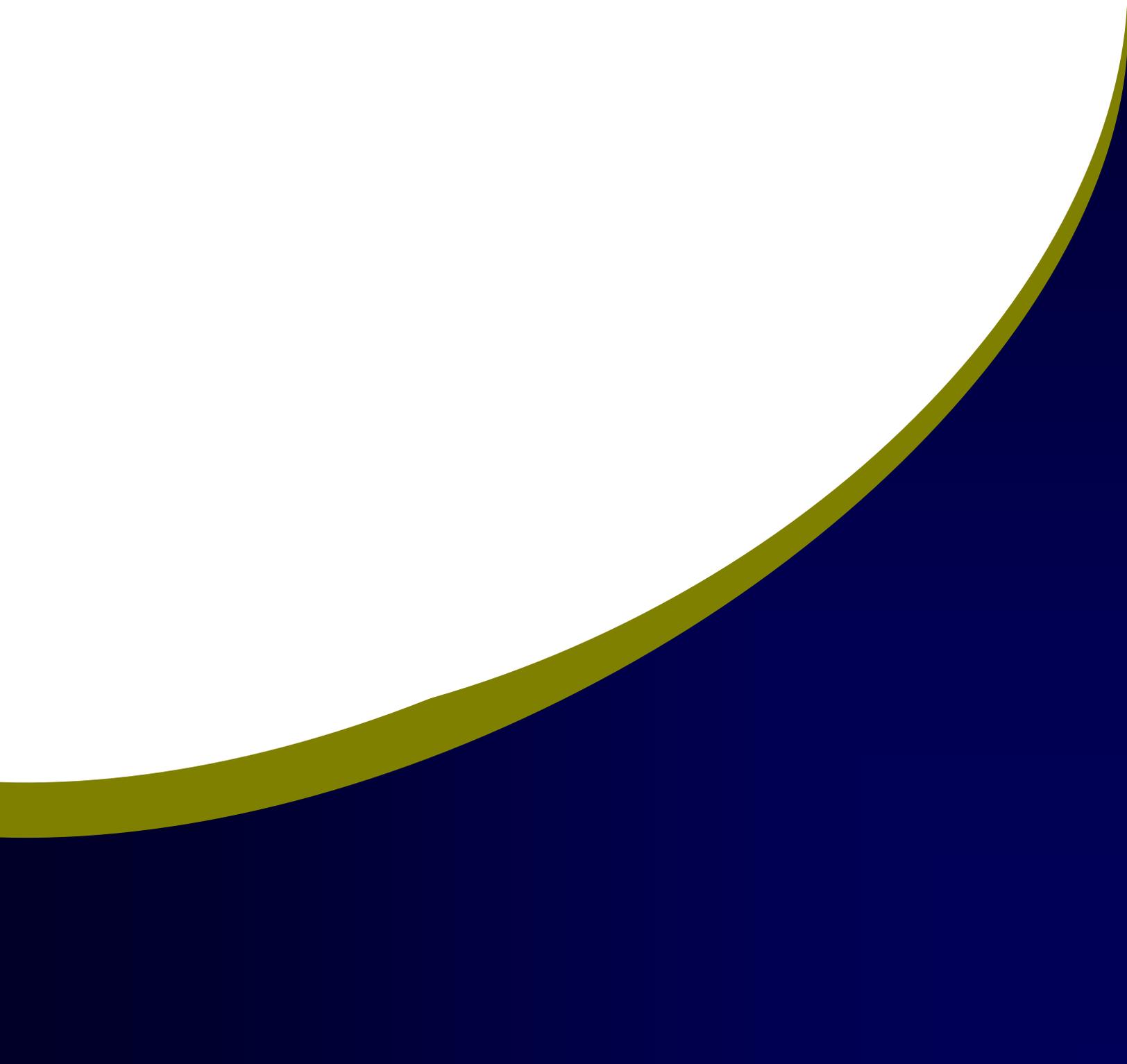


NEW MEXICO DEPARTMENT OF TRANSPORTATION

RESEARCH BUREAU

Innovation in Transportation



INTRODUCTION

The New Mexico Department of Transportation Research Bureau recognizes that our customers expect a high quality of research reporting. In order to assist principal investigators in preparing a clear and easy to read manuscript, the Bureau has published a Style Manual to be used by in-house researchers and contractors.

Over time publishing rules change, for example, since the advent of computers and word processing it is no longer required to insert two spaces between a period at the end of a sentence and the capital letter of the beginning of a sentence when using monospace fonts (in which all the characters have exactly the same width: e.g., courier). With the advent of computers most fonts are proportional: e.g., Times New Roman, and two spaces may be used if it improves the visual break. Therefore, in addition to the Style Manual, authors should use supplemental detailed guidelines regarding grammar, usage and formatting: e.g., William Sabin, Gregg Reference Manual, *McGraw Hill Irwin*, Tenth Edition, 2005.

NOTICE

The State Commission of Public Records, State Records Center and Archives, and the State Library Division of the Cultural Affairs Department have issued a revision to Administrative Law Title 1: Chapter 25: Part 10. State agencies, and by implication contractors, are required to use the style and format in State agency publications.

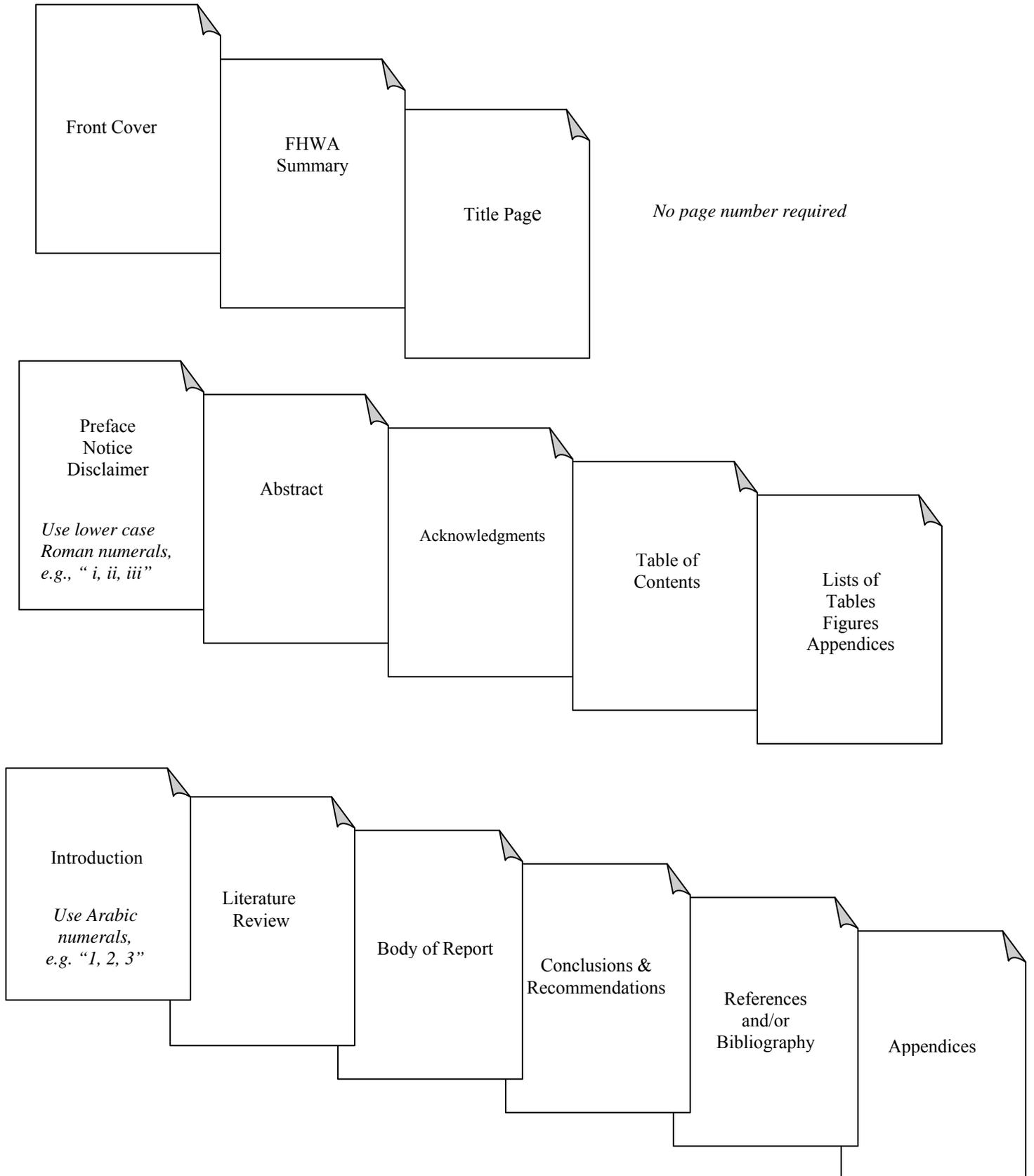
The purpose of legislation is: *To establish standards and procedures for filing, preserving and providing access to state publications and to reduce unnecessary expense to the taxpayers in connection with publications designed primarily for the purpose of reporting to, or informing, the governor, the legislature, other state agencies or the political subdivisions of this state.*

Contractors are advised that the Research Bureau Style Manual instructions marked with an asterisk are now required by New Mexico law.

NOTICE

Research Bureau reports are distributed to over 37 libraries throughout the country, including federal depository libraries. Both the general public and professionals can access Bureau documents on our Web site. It is important that we offer consistency and quality products that give our tax payers value for their dollars. Contractors should proof their documents for typographical and grammatical errors, and check compliance with the Style Manual before sending them to the Research Bureau. See the check list in Sample Pages.

ANATOMY OF A RESEARCH REPORT



MANUSCRIPTS

MANUSCRIPT SPECIFICATIONS

Manuscript Page Setup

- **Margins:** 1 inch border for each margin.
- **Word Processor:** Word 6.0 or higher. Times New Roman 12 point for body text. See below for headings.
- **Numbering:** Insert page numbers centered in the footer of each page Select a “next page” section break after the Title Page; Lists of Tables and Figures; and Appendices. At each section break remove “Link to Previous” in headers and footers to ensure correct numbering format. See “Anatomy of a Research Report” for numbering system.*
- **Line Spacing:** Single line spacing.*
- **Printing:** Double-sided for reports. Use duplex printing. Duplex printing will require blank pages prior to chapter or new topic. The first page of the new chapter/topic should appear on the right-hand side of the open publication.*
- **Title Page:** Should include the title of the publication, names of the agency and contractor, publication date, physical address of agency, email address of agency (research.bureau@state.nm.us) and Website URL. <http://nmshtd.state.nm.us/main.asp?secid=11071>
See sample page for format. *
- **Logos:** The only logos authorized in NMDOT Research Bureau publications are those of the sponsors NMDOT and FHWA.

Electronic publications:

Format: Portable document format (PDF)* in addition to Word document. The Word document should be available to Research Bureau staff for corrections.

MAIN HEADINGS

14 point, bold

Subheads: All subheads should be flush with the left margin.

FIRST-LEVEL SUBHEAD

(all capitals, boldface, on separate line)

Second-Level Subhead

(initial capitals, boldface, on separate line)

Third-Level Subhead

(initial capitals, italic, on separate line)

Fourth-Level Subhead (initial capitals, boldface, on the same line as text, with extra letter space between the subhead and text)

Fifth-Level Subhead (initial capitals, italic, on the same line as text, with extra letter space between subhead and text)

Formatting Paragraphs

Single space. Do not indent first line after a main heading or subsequent paragraphs. Double space between paragraphs.

Widows and Orphans

Widows and orphans are those words or short phrases at the end or beginning of paragraphs left to sit alone at the top or bottom of a page — separated from the rest of the paragraph. A widow is a line of text or one word at the top of a page. An orphan is a line of text or a word at the bottom of a page.

Use a minimum of two lines of text at the top and bottom of a page.

At the end of a paragraph use at least two words on the last line of the paragraph.

Tables and Figures

Figures/tables should be embedded in the text, as close as possible to the related text. Color is permissible.

- All tabular material should be single spaced using a font no smaller than 10 points. Use the same font for all tables.
- Place titles flush left to align with the left margin of the table and highlight by using boldface. Do not submit a table with more than one part. Each part should be a single separate table with an appropriate table number and title.

- Give each column in the table a head. (In some cases, the first (stub) column may have no head). Place abbreviated measurement terms in parenthesis under the column head. All heads should be aligned in flush left format.
- To adhere to Accessibility Guidelines for the vision-impaired reader, avoid the use of “spanner” heads. For example, “Production per Year” and “Production by Day” should appear as:

Production per Year	Production per Day
------------------------	-----------------------

- Tables: Where possible align Table heading with left side of table. Where the title extends beyond the table, center the heading. Use standard table outlines per example.

TABLE 1 Percent of total land developed during study period.

Development Period	% Total Area Developed
Prior to 1986	12
1986-90	14
1990-1996	15
1996-2000	18
Total 1986-2000	59

- **Figures:** Where possible align Figures heading with left side of the figure. When the title extends beyond the table, center the heading.



FIGURE 1 New Mexico DOT Research Bureau Library

- When a dash (-) is used in a table, indicate its meaning in a footnote (missing data, incomplete research, data not applicable or unavailable, or problem investigated but no results)
- Check the accuracy of all totals included in tables before submitting the document
- For use of *measurements*, see section on metrication
- Do not use dots or screens

- Do not place a box or rules frame around a finished table
- Figures should be clear and legible
 - Use the same font for all figures (Times New Roman)
 - Letters and symbols must be uniform and the same size throughout the figure (e.g., if wording on the ordinate and abscissa is in 10-point type, the symbols used to identify the data points also should be in 10 point type)
 - Line weights (except for lines indicating different data series in a graph) also must be uniform.

Metrication

Authors are encouraged to provide measurements in both SI (metric) and U.S. customary units. The measurement unit of the original research should be followed by the equivalent conversion in parenthesis.

When converting U.S. customary measures of weight (force) and mass into SI units, express weight (force) in newtons and mass in kilograms; express poundforce per square inch (ibf/in.²) of pressure or stress in kilopascals (kPa). For SI units, use prefixes instead of powers of 10.

For tables and figures, provide only the units of the original research and show the base unit conversion in a footnote: for example, 1 mi=1.61 km. Alternatively, in figures, equivalent units may be shown on the top and right axes of data plots.

Metrication Conversion Table

When You Know	Multiply by	To Find
Length		
Inches (in)	25.4	Millimeters (mm)
Feet	0.305	Meters (m)
Yards (yd)	0.914	Meters (m)
Miles (mi)	1.61	Kilometers (km)
Area		
Square inches (in ²)	645.1	Millimeters squared (mm ²)
Square feet (ft ²)	0.093	Meters squared (m ²)
Square yards (yd ²)	0.836	Meters squared (m ²)
Acres	0.405	Hectares (ha)
Square miles (mi ²)	2.59	Kilometers squared (km ²)
Volume		
Fluid ounces (1 fl oz)	29.57	Milliliters (mL)
Gallons (gal)	3.785	Liters (L)
Cubic Feet (ft ³)	0.028	Meters cubed (m ³)
Cubic Yards (yd ³)	0.765	Meters cubed (m ³)
Mass		
Ounces (oz)	28.35	Grams (g)
Pounds (lb)	0.454	Kilograms (kg)
Short tons (2,000 lb)(T)	0.907	Megagrams (Mg)
Temperature (exact)		
Fahrenheit temperature (°F)	(F-32)/1.8	Celsius temperature (°C)
Illumination		
Foot-candles (fc)	10.76	Lux (lx)
Footlambert6s (fl)	3.426	Candela/m ² (cd/m ²)
Force and Pressure or Stress		
Poundforce (lbf)	4.45	Newtons (N)
Poundforce per square inch (psi)	6.89	Kilopascals (kPa)

Equations

All variables should be defined at first use, either in the text or in a where list associated with the equation.

1. Fractions in displayed equations should be stacked, in accordance with preferred mathematical practice.
2. If a displayed equation is numbered, use an Arabic numeral in parenthesis, placed flush right.
3. Carefully distinguish the following:
 - All capital and lowercase letters
 - Capital O (“oh”), lower case o (“oh”), and 0 (zero)
 - Lower case l (“el”) and number 1 (one)
 - Letter X, Greek chi, and multiplication sign x
 - Prime ‘, apostrophe ‘, and superscript ¹ (one)
 - English and Greek letters such as:
 - B and beta, upper-or lowercase k and kappa,
 - n and eta, b and nu,
 - u and upsilon, u and mu,
 - Upper- or lowercase p and rho, and w and lowercase omega

Footnotes

Do not use footnotes to the text. Incorporate the information into the text or delete the notes.

Abbreviations, Acronyms, and Symbols

Abbreviations, acronyms, and symbols must be fully defined the first time they are used in the paper; the definition should be given first, followed by the abbreviated term in parentheses.

Acknowledgement

Authors of papers that report results of research sponsored directly or indirectly by federal programs should indicate this sponsorship in an Acknowledgement section.

Appendices

Appendices are acceptable in Research Bureau reports. Include pertinent material in the paper itself or, where necessary, include a note that background materials, such as derivation of formulas, specifications, or survey forms, are available from the author or in another report, which should be cited in the reference list.

When using a PowerPoint presentation as an appendix, include notations to further explain the slide.

References

1. The reference list should contain only references that are cited in the text, numbered in the order in which they are first cited.
2. Denote a reference at the appropriate place in the text with an italicized Arabic numeral in parenthesis, e.g., (2). Do not denote text references with superscripts.
3. Do not cite as a reference personal communications, telephone conversations, or similar materials that would not be available to readers electronically or in printed form in a library or from the originating agency. Instead, cite the unpublished work in the text and enclose the author's name along with the term "unpublished data" in parentheses.
4. Do not repeat a reference in the list, and do not use *ibid*, *idem*, *op. cit.*, or *loc. Cit.* If a reference is cited more than once in the text, repeat the number assigned to the reference.
5. Use the following content guidelines and samples in preparing reference lists:

Printed Sources:

Be sure that references to printed sources are complete. Include names of corporate or personal authors or editors, or both, title of article, chapter, book, or report; publisher or issuing agency; volume and issue or report number; page numbers; location of publisher, and date of publication and URL source if available. .

TRB Publications

Dewan, S. A., and R.E. Smith. Creating Asset Management Reports from a Local Agency Pavement Management System. In *Transportation Research Record: Journal of the Transportation Research Board; No. 1853*, TRB, National Research Council, Washington, D.C., 2003, pp. 13-20.

Book

Newland, D.E. *Random Vibrations: Spectral and Wavelet Analysis*. John Wiley and Sons, Inc., New York, 1998.

CD-ROMs

References to CD-ROMs should include the same information as references to printed sources and have "CD-ROM" after the title.

Solaimanian, M., J. Harvey, M. Tahmoressi, and V. Tandon. Test Methods to Predict Moisture Sensitivity of Hot-Mix Asphalt Pavements. In *Moisture*

Sensitivity of Asphalt Pavements. CD-ROM. *Transportation Research Board, National Research Council*, Washington, D.C., 2004, pp. 77-110.

Periodical

Dawley, C. B., B.L. Hogenwiede, and K.O. Anderson. Mitigation of Instability Rutting of Asphalt concrete Pavements in Lethbridge, Alberta, Canada. *Journal of Association of Asphalt Paving Technologists*. Vol. 59, 1990, pp. 481-508.

Sansalone, M., J. M. Lin, and W. B. Streett. Determining the Depths of Surface-Opening Cracks Using Impact Generated Stress Waves and Time-of-Flight Techniques. *ACI Materials Journal*, Vol. 95, No. 2, 1998, pp. 168-177.

Websites

References to websites should include corporate or personal authors, title of document, date of document (if available), web addresses (complete URL), and date accessed by the author.

Value Pricing Homepage. University of Minnesota, Hubert H. Humphrey Institute of Public Affairs, Minneapolis.
www.hhh.umn.edu/centers/sip/projects/conpric/index.htm.
Accessed July 15, 2002.

Guide to Developing Performance-Related Specifications. FHWA-RD-98-155, FHWA-RD98-156, FHWA-RD-98-171, Vol. III, Appendix C.
www.tfhr.gov/pavement/pccp/pacespec/. Accessed March 5, 2003.

Nemmers, C. Transportation Asset Management. *Public Roads Magazine*, July 1997, www.tfhr.gov/pubrds/july97/tam.htm. Accessed Jan. 2002.

Unpublished Papers

References to unpublished papers presented at meetings should include name(s) of author(s); title of paper; and title, sponsor(s), location, and dates or year of meeting.

Corbett, J.J. Toward Environmental Stewardship: Charting the Course for Marine Transportation. Presented at 83rd Annual Meeting of the Transportation Research Board, Washington, D.C., 2004.

Program Manuals, Tapes or Other Documentation for Models

References to these items should cite the specific edition, the department responsible, and the year of release.

MINITAB User's Guide 2: Data Analysis and Quality Tools. Minitab, State College, Pa., 2000, pp. 27-52.

Undated

If a reference has no date, use “undated.”

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See sample page.

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Authors should maintain the integrity of the front page design chosen by the Research Bureau, including the color scheme.

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Retain the title selected by the Research Bureau unless permission is given by the Bureau. Contractors may use a sub-title to add clarity to the original title.

Report Number

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Completion of Form DOT F 17007.7 (8-71) is required in all reports that are funded in part by the US DOT FHWA. Authors should refer to the sample page at the end of this report to complete the report. Do NOT include comments in item *15. Supplementary Notes*.

Key Words

Key words are important to researchers. TRB has a downloadable transportation thesaurus as a guide to assist searchers. <http://www.trb.org> >Click on “Resources” at the top of the page.

TITLE PAGE

See the sample Title Page at the end of this document.

PREFACE, NOTICE AND DISCLAIMER

Preface

The Preface is a short paragraph describing the purpose of the research report. Do not place it in a box.

Notice

The notice should be stated exactly as provided in the sample.

Disclaimer

Contractors should use the full disclaimer notice. Research Bureau in-house reports should use only the last sentence: “This report does not constitute a standard or specification.”

TABLE OF CONTENTS

To set up a Table of Contents use a two-column table and hide the lines.

Use the format described in the sample page at the end of this report.

Lists of tables and figures should follow the same format. If there are only a few tables and figures they can be placed on one page. Use a separate page to separate the tables from figures if the list of tables covers 50% or more of a page.

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SAMPLE PAGES

USDOT FHWA SUMMARY PAGE

1. Report No. NM04STR-02		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Effect of Misting Rate on Concrete Shrinkage: Interim Report for Bridge Deck Concrete Mix Design				5. Report Data	
				6. Performing Organization Code.	
7. Author(s) Kelly Silliman and Craig Newtonson				8. Performing Organization Report No.	
9. Performing Organization Name and Address New Mexico State University Box 30001, MSC 3CE Las Cruces, NM 88003-8001				10. Work Unit No. (TR AIS)	
				11. Contract or Grant No.	
12. Sponsoring Agency Name and Address NMDOT Research Bureau 7500B Pan American Freeway PO Box 94690 Albuquerque, NM 87199-4690				13. Type of Report and Period Covered	
				14. Sponsoring Agency Code	
15. Supplementary Notes					
16. Abstract Concrete shrinkage at early ages can produce shrinkage cracks that reduce durability. The curing method used during construction can have a direct effect on shrinkage. To quantify the effect of mist rate on shrinkage, five concrete slabs were placed. Each slab was misted at a different rate for four hours, beginning at the start of concrete placement. After misting was completed, the slabs were covered with wet burlap for seven days. Strains in the concrete slabs were monitored for 28 days. Previous research on early-age shrinkage has shown that providing 100% relative humidity above the concrete can reduce shrinkage by as much as 300 $\mu\epsilon$ in the first four hours. Results in this paper show that over the course of 28 days, approximately 10-15% of the 300 $\mu\epsilon$ benefit is lost to increased shrinkage. Shrinkage between four hours and 28 days increased as the mist rate was increased. Misting produces a decrease in total shrinkage of approximately 73 percent. The magnitude of this decrease indicates that misting during construction would provide substantial benefits. Therefore, a field trial and demonstration project is recommended as future work.					
17. Key Words bridge deck, concrete, fogging, misting, curing			18. Distribution Statement Available from NMDOT Research Bureau		
19. Security Classif. (of this report) None	20. Security Classif. (of this page) None	21. No. of Pages 30	22. Price		

Form DOT F 1700.7 (8-72)

EFFECT OF MISTING RATE ON CONCRETE SHRINKAGE:

Interim Report for Bridge Deck Concrete Mix Design

by

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Las Cruces, New Mexico

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New Mexico State University
Las Cruces, New Mexico

Report NM05STR-02

A Report on Research Sponsored by

New Mexico Department of Transportation
Research Bureau

In Cooperation with
The U.S. Department of Transportation
Federal Highway Administration

February 2006

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PREFACE

The research reported herein evaluates the effect of mist rate on shrinkage strains in normal sized concrete slabs exposed to weather. The purpose of this work was to investigate the effectiveness of misting or fogging during construction as a method for mitigating shrinkage cracking.

NOTICE

The United States Government and the State of New Mexico do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report. This information is available in alternative accessible formats. To obtain an alternative format, contact the NMDOT Research Bureau, 7500B Pan American Freeway NE, Albuquerque, NM 87109 (PO Box 94690, Albuquerque, NM 87199-4690) or by telephone (505) 841-9145.

DISCLAIMER

This report presents the results of research conducted by the author(s) and does not necessarily reflect the views of the New Mexico Department of Transportation. This report does not constitute a standard or specification.

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REFERENCES

1. Dewan, S.A., and R.E. Smith. Creating Asset Management Reports from a Local Agency Pavement Management System. In *Transportation Research Record: Journal of the Transportation Research Board*; No. 1853, TRB of the National Academies, Washington, D.C., 2003, pp. 13-20.
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<http://www.hhh.unn.edu/centers/sip/projects/conpric/index.htm>
Accessed July 15, 2002.
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<http://www.tfjrc/gpv/pubbrds/july97/tax.htm>.
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9. *MINITAB User's Guide 2: Data Analysis and Quality Tools*. Minitab, State College, Pa., 2000, pp. 27-52.

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