FHWA-NJ-20XX-00X

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Report number to be supplied by NJDOT Research Project Manager (RPM).

Report Title to match title used on Task Order or Purchase Order Agreement.

Title font shall be Arial, 14 point, normal spacing, bold with all capitals and centered on page.

**Guidelines for Preparing**

**NJDOT Research Final Reports and Tech Briefs**

**FINAL REPORT**

February 2018

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Submitted by

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All font on this page, except for the title and report number, shall be Arial 12 point, normal spacing, non-bold with initial capitals.

In cooperation with

New Jersey

Department of Transportation

Bureau of Research

And

U. S. Department of Transportation

Federal Highway Administration

No page number on this page

**DISCLAIMER STATEMENT**

“The contents of this report reflect the views of the author(s) who is (are) responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the New Jersey Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation. “

No page number

For projects being done for NJDOT this statement can be used verbatim.

For projects being done for NJ Transit or NJ Motor Vehicles Commission the language must be adjusted accordingly.

All font on this page, except for the title, shall be Arial 12 point, normal spacing, non-bold with full page justification.

The title shall be Arial 12 point font, all capitals, bold and centered on page.

**Technical Report Documentation Page**

Please use template supplied by NJDOT

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| --- | --- | --- | --- | --- | --- | --- |
| **1. Report No.**  FHWA NJ-20XX-0XX | **2. Government Accession No.**  *Leave Blank* | | | **3. Recipient’s Catalog No.**  *Leave Blank* | | |
| **4. Title and Subtitle**  **FINAL REPORT**  Enter title and subtitle (use mixed case with initial caps for first word in title and subtitle) with volume and part numbers, if applicable. | | | | **5. Report Date**  Enter same date as report cover, month and full year: January 2017 | | |
| **6. Performing Organization Code**  Enter any/all unique numbers assigned to the performing organization, if applicable. | | |
| **7. Author(s)**  Enter name(s) of person(s) responsible for writing the report, performing the research, or credited with the content of the report. Form of entry is first name, middle initial (if applicable), last name, and any additional qualifiers. Primary author is listed first. | | | | **8. Performing Organization Report No.**  Enter any/all unique alphanumeric report numbers assigned by the performing organization, if applicable. | | |
| **9. Performing Organization Name and Address**  Enter the name and address of the organization(s) performing the research. | | | | **10. Work Unit No.**  *Leave Blank* | | |
| **11. Contract or Grant No.**  NJDOT Contract ID Number | | |
| **12. Sponsoring Agency Name and Address**  Federal Highway Administration (SPR)  1200 New Jersey Avenue, SE  Washington, DC 20590  New Jersey Department of Transportation (SPR)  1035 Parkway Avenue, P.O. Box 600  Trenton, NJ 08625.0600 | | | | **13. Type of Report and Period Covered**  Final Report, Month Year – Month Year | | |
| **14. Sponsoring Agency Code**  FHWA, NJDOT | | |
| **15. Supplementary Notes**  Conducted in cooperation with the U.S. Department of Transportation, Federal Highway Administration.  Please provide Transportation Research Center information and volume information (subtitles, volume #, etc.), if applicable. | | | | | | |
| **16. Abstract**  Enter a brief factual summary of the most significant information, including the purpose, methods, results, and conclusions of the work. When appropriate, the abstract should include advice on how the results of the research can be used. For guidance, please see ANSI/NISO Z39.14-1997 (R2015) Guidelines for Abstracts (http://www.niso.org/apps/group\_public/project/details.php?project\_id=124).  **For this page only, use 12 point font. Utilize 250 words or less for the abstract.**  In **box 21. No. of Pages:** Please provide the total number of pages of the entire document including cover, front matter, body, references and appendix. | | | | | | |
| **17. Key Words**  Enter words, terms, or phrases that identify important topics in the report. When possible, terms should be selected from the Transportation Research Thesaurus (TRT) (http://trt.trb.org) in addition to terms not found in the TRT. | | | **18. Distribution Statement**  No restrictions. | | | |
| **19. Security Classif. (of this report)**  Unclassified | | **20. Security Classif. (of this page)**  Unclassified | | | **21. No. of Pages**  # | **22. Price**  Leave blank |
| Form DOT F 1700.7 (8-72) | | Reproduction of completed page authorized | | | | |

Page number **i** not shown

**ACKNOWLEDGEMENTS**

The author(s) wish to acknowledge the customer(s), *list their name(s) here*, without whom this project would not have been possible.

All font on this page, except for the title, shall be Arial 12 point, normal spacing, non-bold with full page justification.

The title shall be Arial 12 point font, all capitals, bold and centered on page.

The acknowledgement may also include the names of students, other agencies, members of the Research Project Panel (RPP) members, managers of stakeholder bureaus, and FHWA participants.

Center page number 0.5” from bottom and use Arial 12 point font, non-bold.

Please use lower case Roman numerals for page numbering materials prefatory to the beginning of the main body of the report.

Use page ii

**TABLE OF CONTENTS**

**FIRST-LEVEL HEADING (**all capitals, boldfaced)

**Second-Level Heading** (initial capitals, boldfaced) \*

***Third-Level Headings*** (initial capitals, boldfaced, italic)

Fourth-Level Heading(initial capitals)

*Fifth-Level Heading* (initial capitals, italic)

**\* Indent 0.3” or 3 spaces for each level of header**

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# executive Summary

The pages within this final report example, provide guidelines, for the creation of a NJDOT Research Final Report, Form DOT F 1700.7 (8-72) Technical Report Document Page (includes abstract) and Tech Brief. This guide provides consistence of style to the final reports and tech briefs that appear on the Research web site and are distributed throughout the State and across the Nation.

According to the principles of scientific or technical writing, the report must tell a story that summarizes the research effort. The Research Final report body should contain the following:

* **Executive Summary** – Complete, concise summation of the Background (problem), Objectives, Research Approach, Summary of work performed, data collected, and analyses performed and the distilled results, and Conclusions and Recommendations
* **Background** – A summary of the problem or reasons for conducting the research
* **Objectives** - the criteria of “success” for this particular research study
* **Introduction** – The research approach to the problem
* **Summary of the Literature Review** – what lessons from the review of the literature affected the research approach
* **Summary of the work performed** - data collected, analyses performed, and the distilled results or findings,
* **Conclusions and Recommendations** based on the work conducted, the results determined, and in support of the study objectives.
* **Implementation and Training** - conducted or recommended

The report must be concise. Get to the point quickly. The report must be crafted to take the reader the shortest time to understand the work performed and the results obtained. Time is valuable - report pertinent information that supports the conclusions. Move supporting information to the appendices. Avoid duplication of information.

All research projects are successful. They may not reach the desired results, but if the work is done according to proper scientific principles, the effort provides valuable information that was not known before the research was conducted.

Internal and external reviews of the report are important. The researcher may be too close to the work to be objective. A critical review by colleagues for technical content and by a technical writer or editor for grammar and style will enhance the final report, the research effort, and the researcher.

# INTRODUCTION

The final report package will be prepared in accordance with the **Guidelines for Preparing Research Final Reports and Tech Briefs** and must include the following:

* An unbound black and white version of the final report and tech brief (for copying)
* Ten (10) copies of the bound final report and tech brief
* CD-ROM with the final report, abstract (Form 1700), and tech brief in the latest version of Microsoft Word and PDF versions. In addition, the CD-ROM shall contain copies of spreadsheets, databases, power point presentations made at quarterly meetings, digital photos, or other worksheets and documents as deemed important by the Principal Investigator and/or the Research Project Panel (RPP) members.
* All electronic files (quarterly progress report and final report package elements) must include *only* the following document properties:
  + Title: NJDOT Bureau of Research
  + Author: full name of the Principal Investigator(s)
  + Subject: task or purchase order agreement project title, type of document, date(s)
  + Keywords: task or purchase order agreement project title, type of document, date(s), RFP **or** purchase order number and job number, task order number
* All electronic files (quarterly progress report and final report package elements) must include the following naming conventions:
  + Quarterly progress reports: University/Consultant Abbreviated Name\_YEAR\_q#\_abbreviated project name.file ext
  + Final Report: FHWA or NJ-Report Number.file ext
  + Tech Brief: FHWA or NJ-Report Number-TB.file ext

Files that are included must be in the programs of origin, such as PowerPoint, Word, Excel, etc., so that these files can be modified or corrected and re-imported into the full-text file. Art must be produced in a program that can export an interchange file format that can be imported into the full text. Photos provided must be in TIF or JPEG format.

The draft final reports are due no later than three months prior to the project completion end date. The Research Project Manager (RPM) and Principal Investigator (PI) will formulate the schedule of section review with the Research Project Panel (RPP) members. The draft sections of the final report and tech brief will be provided in electronic format so that the changes can be tracked.

## Final Report Package Length, Format, Fonts and Elements

The length of the final report, including cover, front matter, body, references, and appendices, shall not exceed 250 pages in a single volume. When the final report exceeds 125 pages, the submission must be double sided. All final reports shall have clear plastic front presentation cover with rounded corners, black card stock back cover with rounded corners and use a 19 ring comb binding spine (compatible with comb-style binding machines). The tech brief shall be one page double-sided in length.

Reports using single line spacing shall have single spacing between paragraphs. If one-and-one-half line spacing is used, please use double spacing between paragraphs.

Margins must be at least one inch on all sides, including those pages containing figures and/or tables.

Arial 12 point normal spacing font is to be used for all text contained in the Final Report, except on Form DOT F 1700.7 (8-72) Technical Report Documentation Page.

Right-hand margins should be justified. Color may be used in the hard copy and electronic version of the final Report and tech Brief.

Widows and orphans are to be avoided by not leaving a single line of text at the top or bottom of a page. Avoid breaking pages mid-sentence.

### Pagination

Use lower case Roman numerals (e.g. ii, iii, iv, etc.) starting with page ii for the Acknowledgements page and continuing through the pages containing the Table of Contents, List of Figures, and List of Tables. The Technical Report Documentation Page (Form DOT F 1700.7 (8-72)) is always unnumbered page i.

The cover page will not show a page number, but shall be counted in the total number of pages of the report.

Front matter of the report includes the following pages: cover page, Disclaimer Statement page, Form DOT F 1700.7 (8-72) Technical Report Standard Title Page, Acknowledgements page, Table of Contents, List of Figures, and List of Tables.

The report body shall use Arabic page numbers (only one series), which shall be centered 0.5 in from the bottom edge of the page, use 12 point Arial non-bolded font and stand alone with no dash on either side of the number. Decimal numbers, hyphenated numbers, or numbers combined with letters for sections, or subsections are not permitted as page numbers.

Title pages for individual sections, appendices, etc., may be used and all appendices must include a page number.

The total page count, listed in block 21 of the Technical Report Standard Title Page Form DOT F 1700.7 (8-72), must include front matter, body of the report, references, and appendices.

Do not use number designations for appendices name. Please use one series of capitalized letters (e.g. APPENDIX A, APPENDIX B, APPENDIX C, etc.)

### Headings and Subheadings

Headings and Subheadings are to be typed as follows:

**FIRST-LEVEL HEADINGS (**all capitals, boldfaced, on a separate line**)**

**Second-Level Headings** (initial capitals, boldfaced, on a separate line)

***Third-Level Headings*** (initial capitals, boldfaced, italics, on a separate line

Fourth-Level Headings(initial capitals, on a separate line)

*Fifth-Level Headings* (initial capitals, italics, on a separate line)

Note: Do not indent the first line of any paragraph.

### Volume Format

“Volume” designates an individually bound report. When a report exceeds 250 pages of reproduction copy, including front material, body, figures, tables, references and appendices, it should be divided into two or more volumes, each to be designated by a separate report number, and by an upper case Roman numeral (example: Volume I, Volume II, etc.) as part of the subtitle. Volume information should be listed in box 15 on the Technical Report Documentation Page (Form DOT F 1700.7 (8-72)) for all volumes.

Tables of contents, lists of figures, and lists of tables in multi-volume reports should cover the contents of all volumes with volume number designations for each part (i.e. TOC (Volume #), List of Figures (Volume #), and List of Tables (Volume #) listed in volume order. If previous volumes have already been published, later volumes should follow the same practice of a comprehensive table of contents listing, including page numbers, project objectives or executive summary section.

### Table of Contents

A table of contents is useful in most reports of more than 10 pages and is required in all reports of 10 or more pages.

Do not list front matter. List only the body of the report from page 1 through appendices. Font styles for the headings in the table of contents must match those used in the report. Each level of subordination must consistently use the particular font style used in the heading, such as all capitals, bold, etc. Wording and punctuation must also be the same in the table as in the body of the report.

Lists of figures and tables are required in reports of 10 pages or more containing any figures or tables. Entries in the lists of figures and tables must match the captions exactly in terms of capitalization, punctuation, and font style. Put the lists of figures and tables on the same page if both fit completely.

### Figures and Tables

The following caption illustrates the standard style for figure and table captions.



Figure 1. This is the correct form for punctuating, capitalizing, and centering for figure captions

Every figure must have a unique caption centered at the bottom. All captions must be in the same type style and size.

Table 1 - This is the correct form for punctuating, capitalizing, and centering for table captions

|  |  |  |
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| Font \* |  |  |
|  |  |  |
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\* Fonts in tables may be adjusted to fit the information in a legible manner (8 point or larger).

Every table must have a unique caption centered at the top. All captions must be in the same type style and size.

All figures and tables must be numbered in a single sequence from the beginning of the volume through the appendices.

All illustrations and tabular materials must be numbered and captioned as figures or tables. Place each after its first callout within the text.

### Lists

Lists should be bulleted unless the sequence of items is critical, in which case numerals followed by periods may be substituted for bullets.

Use a colon at the end of the preceding text sentence.

Use parallel rhetorical and grammatical structure in which each entry begins with a verb.

Begin each entry with a capital letter.

End each entry with a period.

### Numbers

Numbers from one through nine, used within the text, are spelled out. Use numerals for numbers 10 and above. However, if a number 10 or above is in the same sentence with a lower number, use numerals for all.

Units of money, measurement, and time (actual or implied) are expressed in numerals. These do not affect, and are unaffected by other numbers in a sentence.

### Abbreviations, Acronyms, and Symbols

Establish each abbreviation and acronym by spelling out the term the first time it is used followed by the acronym in parentheses, such as Federal Highway Administration (FHWA). In addition, if the report has many acronyms, a list of abbreviations may be included after the list of tables.

Use these abbreviations for units of measurement. Abbreviations used for units of measurement are the same for both singular and plural. Examples of some commonly used units follow:

mi for mile(s)

mi2 for square mile(s)

mi/h for miles per hour (not mph)

km/h for kilometers per hour

in for inch(es)

in3 for cubic inch(es)

m for meter(s)

ft for foot (feet)

ft3 for cubic foot (feet)

lb for pound(s)

lbf/in2 (not psi)

in2 for square inch(es)

ft/s for square foot (feet) per second

s for second(s)

Do not use periods after these abbreviations.

"Percent" should be spelled out in the text. However, the percent symbol "%" may be used in figures and tables.

### Footnotes

Use superscript figures without parentheses or brackets for footnote references.

Text footnotes begin with 1 in each section.

Footnotes must begin on the page carrying the footnote number. Avoid breaking a footnote between pages.

Footnotes should be single spaced. Indent the first line four spaces.

Footnotes to tables or figures begin with 1 for each table or figure. Use superscript numbers.

Asterisks may be used only when a numeral in a table or figure might cause confusion, such as being mistaken for an exponent.

### Punctuation

Use a hyphen between the elements of compound numbers from twenty-one to ninety-nine (when they must be spell out) and in compound adjectives with a numerical first element. For example:

24-in ruler

8- by 12-in page

3-m-wide screen

four-lane highway

3- to-1 ratio

1/2-in diameter pipe

When parentheses or brackets are used to enclose an independent sentence, the period falls inside. (See reference 1.) If the enclosed matter is part of a sentence, the period falls outside (when the enclosed matter completes the sense of the sentence).

Periods and commas should be placed inside quotation marks; semicolons fall outside quotation marks.

Use a comma after each member within a series of three or more words, phrases, letters, or figures used with "and," "or," or "nor."

Use semicolons to separate groups of items only when commas are already used within each group. For example, "He checked the streets, highways, and lanes; the subways, bus routes, and airlines; and the theaters, museums, and art galleries." In other instances in which intervening commas are used and confusion may result, use semicolons to separate elements containing commas.

### Equations

Number equations with a single series of Arabic numerals through the appendices. Enclose each number in parentheses at the right margin on the last line of the equation. For example:

A = b + c (1)

All variables and/or constants in the equation must be identified or explained.

### Other

Common nouns such as table 1, section 2, sample A, reference 4, appendix A, etc., should not be capitalized within the text.

The word "State" should be capitalized when referring to a geographic or governmental entity.

The words "Federal" and "Government" are capitalized, whether they appear together or alone, when referring to the Federal Government. The word "Nation" is capitalized when used as a synonym for the United States.

The prefixes and suffixes listed below generally do not require a hyphen when joined with other words:

multi

super

pre

micro

under

re

like

semi

post

However, use a hyphen with the following in all cases in which they are used as reflexive prefixes: ex-, self-, and quasi-.

Keep numbers and units of measurement or words that depend on each other for meaning together on the same line of type. (For example: chapter 5, 25 percent,

31 mm.)

### References

Reference numbers should be superscript numbers enclosed in parentheses. Place them after end punctuation. If there is more than one reference, separate them with commas, but no spaces. Example: Xxxxxxxx. (2,3,9) For more than three reference numbers, use a separate sentence in parentheses. (See references 1, 5, 7, and 18.)

Use a single series of Arabic numbers beginning with 1 and continuing through the appendices.

Each reference should be cited within the main text. Materials not specifically cited may be listed in a bibliography placed at the end of the volume on the page(s) following the references. If a reference is cited more than one time in the text, repeat the number first assigned to the reference.

References must be consistent in punctuation and in the order of elements and with the same sequence numbers.

#### Examples of References

##### TRB Publication

V. Zahavi and J.M. Ryan. “**Stability of Travel Over Time**.” In *Transportation Research Report* 750, TRB, National Research Council, Washington, D.C., 1980, pp. 70-75.

##### Book

D. Shinar, *Psychology on the Road: The Human Factor in Traffic Safety*. John Wiley and Sons, Inc., New York, 1978.

##### Periodical

J. K. Jolliffe and T.P. Hutchinson. “A Behavioral Explanation of the Association Between Bus and Passenger Arrivals at a Bus Stop” (in Japanese) *Transportation Science*, Vol. 9 No. 3, (May 1975), pp 248-282.

##### Government Reports

B.J. Dempsey. *Climatic Effects of Airport Pavement Systems: State of the Art*. Report DOT2DRD-75-196. FHWA, U.S. Department of Transportation, 1976.

# Order of Elements for Final Reports

Not all elements, from the following table, are necessarily used in all reports.

|  |  |  |
| --- | --- | --- |
| **Section** | **Page #** | **Element** |
| Front Matter | n/a | Front Cover |
| n/a | Disclaimer Statement |
| i | Technical Report Documentation Page, Form DOT F 1700.7 (8-72) **Counted as page i, but not shown on page.** |
| ii | Acknowledgments |
| iii | Table of Contents |
| ≥ iii | List of Figures |
| ≥ iii | List of Tables |
| ≥ iii | List of Abbreviations and Symbols |
| Body of Report | 1 | **Executive Summary**: complete, concise summary of the background, objectives, research approach, summary of work performed, data collected, and analyses performed and the distilled results, and Conclusions and Recommendations |
| ≥ 1 | **Background**: reasons for conducting the Research |
| ≥ 1 | **Objectives**: criteria of “success” for this particular research study |
| ≥ 1 | **Introduction:** the research approach to the problem |
| ˃ 1 | **Summary of the Literature Review:** what lessons from the review of the literature affected the research approach |
| ˃ 1 | **Summary of the Work Performed:** data collected, analyses performed and the distilled results or findings |
| ˃ 1 | **Conclusions and Recommendations:** based on the work conducted, the results determined and in support of the study objectives |
| ˃ 1 | **Implementation and Training:** conducted or recommended |
| References | ˃ 1 | References |
| ˃ 1 | Bibliography |
| Appendix | ˃ 1 | Appendix (optional) |