Title of Report

**insert photo
right-click to change image**

NOTICE

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof. Any opinions, findings and conclusions, or recommendations expressed in this material do not necessarily reflect the views or policies of the United States Government, nor does mention of trade names, commercial products, or organizations imply endorsement by the United States Government. The United States Government assumes no liability for the content or use of the material contained in this document.

NOTICE

The United States Government does not endorse products or manufacturers. Trade or manufacturers’ names appear herein solely because they are considered essential to the objective of this report.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **REPORT DOCUMENTATION PAGE** | | | | | | | | | *Form Approved OMB No. 0704-0188* |
| The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.  **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.** | | | | | | | | | |
| **1. REPORT DATE** *(DD-MM-YYYY)*  (Added Just Before Publishing) | | | **2. REPORT TYPE**  Technical Report | | | | | | **3. DATES COVERED** *(From - To)*  Dates of Research |
| **4. TITLE AND SUBTITLE**  **Title of Report from Title Page** | | | | | | | **5a. CONTRACT NUMBER** | | |
| **5b. GRANT NUMBER** | | |
| **5c. PROGRAM ELEMENT NUMBER** | | |
| **6. AUTHOR(S)**  **Author Name: ORCID** [**#0000-0000-0000-0000**](https://orcid.org/)  **Author Name: ORCID** [**#0000-0000-0000-0000**](https://orcid.org/) | | | | | | | **5d. PROJECT NUMBER** | | |
| **5e. TASK NUMBER** | | |
| **5f. WORK UNIT NUMBER** | | |
| **7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**  Name of Organization  Street Address  City/State Zip Code | | | | | | | | **8. PERFORMING ORGANIZATION REPORT NUMBER**  **If Any** | |
| **9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)**  U.S. Department of Transportation  Federal Railroad Administration  Office of Research, Development, and Technology  1200 New Jersey Avenue, SE  Washington, DC 20590 | | | | | | | | **10. SPONSOR/MONITOR'S ACRONYM(S)** | |
| **11. SPONSOR/MONITOR'S REPORT NUMBER(S)**  **(Added Just Before Publishing)** | |
| **12. DISTRIBUTION/AVAILABILITY STATEMENT**  This document is available to the public through the FRA [website](https://railroads.dot.gov/elibrary-search). | | | | | | | | | |
| **13. SUPPLEMENTARY NOTES**  COR: Name of COR | | | | | | | | | |
| **14. ABSTRACT**  **A succinct description of the work and who, what, when, where, etc. Usually taken from the Introduction or Executive Summary.** | | | | | | | | | |
| **15. SUBJECT TERMS**  **Keywords should be entered by author/PM** | | | | | | | | | |
| **16. SECURITY CLASSIFICATION OF:** | | | | **17. LIMITATION OF ABSTRACT** | **18. NUMBER OF PAGES**  xx | **19a. NAME OF RESPONSIBLE PERSON** | | | |
| **a. REPORT** | **b. ABSTRACT** | **c. THIS PAGE** | |
| **19b. TELEPHONE NUMBER** *(Include area code)* | | | |

**Standard Form 298** (Rev. 8/98)

Prescribed by ANSI Std. Z39.18

METRIC/ENGLISH CONVERSION FACTORS

| **ENGLISH TO METRIC** | | | | | **METRIC TO ENGLISH** | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **LENGTH (APPROXIMATE)** | | | | | **LENGTH (APPROXIMATE)** | | | | | |
| **1 inch (in)** | **=** | **2.5 centimeters (cm)** | | **1 millimeter (mm)** | | **=** | | | **0.04 inch (in)** | |
| **1 foot (ft)** | **=** | **30 centimeters (cm)** | | **1 centimeter (cm)** | | **=** | | | **0.4 inch (in)** | |
| **1 yard (yd)** | **=** | **0.9 meter (m)** | | **1 meter (m)** | | **=** | | | **3.3 feet (ft)** | |
| **1 mile (mi)** | **=** | **1.6 kilometers (km)** | | **1 meter (m)** | | **=** | | | **1.1 yards (yd)** | |
|  |  |  | | **1 kilometer (km)** | | **=** | | | **0.6 mile (mi)** | |
| **AREA (APPROXIMATE)** | | | | | **AREA (APPROXIMATE)** | | | | | |
| **1 square inch (sq in, in2)** | **=** | **6.5 square centimeters (cm2)** | | **1 square centimeter (cm2)** | | **=** | | | **0.16 square inch (sq in, in2)** | |
| **1 square foot (sq ft, ft2)** | **=** | **0.09 square meter (m2)** | | **1 square meter (m2)** | | **=** | | | **1.2 square yards (sq yd, yd2)** | |
| **1 square yard (sq yd, yd2)** | **=** | **0.8 square meter (m2)** | | **1 square kilometer (km2)** | | **=** | | | **0.4 square mile (sq mi, mi2)** | |
| **1 square mile (sq mi, mi2)** | **=** | **2.6 square kilometers (km2)** | | **10,000 square meters (m2)** | | **=** | | | **1 hectare (ha) = 2.5 acres** | |
| **1 acre = 0.4 hectare (he)** | **=** | **4,000 square meters (m2)** | |  | |  | | |  | |
| **MASS - WEIGHT (APPROXIMATE)** | | | | | **MASS - WEIGHT (APPROXIMATE)** | | | | | |
| **1 ounce (oz)** | **=** | **28 grams (gm)** | | **1 gram (gm)** | | **=** | | **0.036 ounce (oz)** | | |
| **1 pound (lb)** | **=** | **0.45 kilogram (kg)** | | **1 kilogram (kg)** | | **=** | | **2.2 pounds (lb)** | | |
| **1 short ton = 2,000 pounds (lb)** | **=** | **0.9 tonne (t)** | | **1 tonne (t)** | | **=**  **=** | | **1,000 kilograms (kg)**  **1.1 short tons** | | |
| **VOLUME (APPROXIMATE)** | | | | | **VOLUME (APPROXIMATE)** | | | | | |
| **1 teaspoon (tsp)** | **=** | **5 milliliters (ml)** | | | **1 milliliter (ml)** | | **=** | | | **0.03 fluid ounce (fl oz)** |
| **1 tablespoon (tbsp)** | **=** | **15 milliliters (ml)** | | | **1 liter (l)** | | **=** | | | **2.1 pints (pt)** |
| **1 fluid ounce (fl oz)** | **=** | **30 milliliters (ml)** | | | **1 liter (l)** | | **=** | | | **1.06 quarts (qt)** |
| **1 cup (c)** | **=** | **0.24 liter (l)** | | | **1 liter (l)** | | **=** | | | **0.26 gallon (gal)** |
| **1 pint (pt)** | **=** | **0.47 liter (l)** | | |  | |  | | |  |
| **1 quart (qt)** | **=** | **0.96 liter (l)** | | |  | |  | | |  |
| **1 gallon (gal)** | **=** | **3.8 liters (l)** | | |  | |  | | |  |
| **1 cubic foot (cu ft, ft3)** | **=** | **0.03 cubic meter (m3)** | | | **1 cubic meter (m3)** | | **=** | | | **36 cubic feet (cu ft, ft3)** |
| **1 cubic yard (cu yd, yd3)** | **=** | **0.76 cubic meter (m3)** | | | **1 cubic meter (m3)** | | **=** | | | **1.3 cubic yards (cu yd, yd3)** |
| **TEMPERATURE (EXACT)** | | | | | **TEMPERATURE (EXACT)** | | | | | |
| **[(x-32)(5/9)] F** | | **=** | **y C** | | **[(9/5) y + 32] C** | | **=** | | **x F** | |

****

****

For more exact and or other conversion factors, see NIST Miscellaneous Publication 286, Units of Weights and Measures. Price $2.50 SD Catalog No. C13 10286 **Updated 6/17/98**

Acknowledgments [Optional]

*Note: FRA staff should not be acknowledged for providing funding. If appropriate, they can be acknowledged for technical contributions.*

Contents

[Executive Summary 1](#_Toc157670152)

[1. Introduction 2](#_Toc157670153)

[1.1 Background 2](#_Toc157670154)

[1.2 Objectives 2](#_Toc157670155)

[1.3 Overall Approach 2](#_Toc157670156)

[1.4 Scope 2](#_Toc157670157)

[1.5 Organization of the Report 2](#_Toc157670158)

[2. Section 2 Title 3](#_Toc157670159)

[2.1 Subsection 1 3](#_Toc157670160)

[2.2 Subsection 2 3](#_Toc157670161)

[3. Conclusion 5](#_Toc157670162)

[4. References 6](#_Toc157670163)

[Appendix A. Appendix Heading (Optional) 7](#_Toc157670164)

[Abbreviations and Acronyms 8](#_Toc157670165)

Illustrations

[Figure 1. [ENTER CAPTION] 3](#_Toc157670166)

Tables

[Table 1. [ENTER CAPTION] 3](#_Toc157670171)

# Executive Summary

Enter Text [Maximum 1,000 words; approximately 1–1 ½ pages]

*First paragraph should introduce the research by describing who conducted the research, when it was conducted, and where it was conducted. This is a narrative summary of the research for the public and should not mention deliverables or administrative information. Use the active voice (“The research team developed…”) rather than passive voice (“The research was developed by the team…”).*

# Introduction

Text [Introductory Paragraph]

*This should be a recap of the Executive Summary first paragraph describing the research. All subsections below must be completed.*

## Background

*Describe the reasons the research was conducted.*

## Objectives

*Describe what the research aimed to achieve.*

## Overall Approach

*Describe how the team conducted the research.*

## Scope

*Describe what was and was not included in the research.*

## Organization of the Report

*List the sections of the report and what they contain. Link to the sections.*

# Section 2 Title

Text [Introductory Paragraph]

**DO NOT convert equations to images**.

## Subsection 1

Text

*Sample table and figure:*

Table . [ENTER CAPTION]

|  |  |  |  |
| --- | --- | --- | --- |
| Header 1 | Header 2 | Header 3 | Header 4 |
| Row 1 |  |  |  |
| Row 2 |  |  |  |
| Row 3 |  |  |  |
| Row 4 |  |  |  |
| Row 5 |  |  |  |

insert photo 
right-click to change image.
use "alt-text" for each image.

Figure 1. [ENTER CAPTION]

## Subsection 2

Text

Sample footnote reference.[[1]](#footnote-1)

### Subheading 1

Text

Reference in text sample (Author, Year).

### Subheading 2

Text

### Subheading 3

Text

#### Subheading 4

Text

##### **Subheading 5**

Text

# Conclusion

Maximum 500 words; approximately 1 page

*This should be a narrative summary of the research and the outcomes.*

# References

Author (Year). Book Title. In B. Author, *Book Title* (p. Pages). City: Publisher.

Author (Year). Conference Title. *Conference Publication Name* (p. Pages). City: Publisher.

Author (Year). Journal Title. *Journal Name*, *Volume*(Number), Pages.

Author (Year, Month Day). *Name of Web Page*. Retrieved from Name of Web Site: URL

*You may use* [*APA*](https://apastyle.apa.org/) *or* [*IEEE*](https://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE_Reference_Guide.pdf) *style citations and references list. Please review the guidance for each style as they have changed in recent years. Link to the digital object identifier (DOI) page where applicable.*

# Appendix A. Appendix Heading (Optional)

[Add information related to the Appendix. Insert file text here.]

# Abbreviations and Acronyms

|  |  |
| --- | --- |
| **ACRONYM** | **DEFINITION** |
| AAA | List in alphabetical order |
| BBB | List in alphabetical order |
| CCC | List in alphabetical order |
| DDD | List in alphabetical order |
| EEE | List in alphabetical order |
| FFF | List in alphabetical order |

1. [sample foot note reference] [↑](#footnote-ref-1)