Form FM-SE-04

Human Factors Engineering Project Plan
TEMPLATE

TEMPLATE Version: *2.0*

TEMPLATE Approval Date: *July 23, 2024*

Procedure for Using this Template to Create a Deliverable:

1. Enter your name, firm, and date in the Author Field Document control panel.

2. Replace [*bracketed text*] and empty sections with your project information and/or document content.

   Note that bracketed text in blue italics is surrounded by brackets, using the document's font, with the instructions on the content with which to replace the instructions. When you remove or highlight the entire bracketed portion and replace with text, the text should appear in the desired text format of the document. Also, the Document Title is a property/field of the document visible from the file system and will appear differently than with blue italics and can utilize the "Update Field" functionality.

3. Each section contains *instructions preceded with a checkbox ☐ for that section in blue italics.* Additional helpful information and description of the required content for that section will be indicated as well, next to the lightbulb icon 💡 .

4. Some sections also contain boilerplate text to use as a starting point. Review and modify the boilerplate content, if it exists, and add additional content as necessary to fulfill the requirement of each section. Use the Styles *H1 – H5* for section headers, *Figure Caption* for captions below figures, and *Table Caption* for captions above tables so that the Table of Contents, List of Figures, and List of Tables can be automatically updated.

5. Define acronyms at the first usage in parenthesis after the expanded term and add to the "List of Acronyms" section.

6. Delete the template title page, these instructions pages, all blue instructions, and the detailed instruction notes and examples that are identified with the lightbulb 💡 throughout the document.

7. Update the file name and file location in the document control panel by right-clicking the field, then select "Update Field."

8. Update the Headers and Footers to have the appropriate document title and version.

9. Delete the List of Tables or List of Figures if they do not contain any items.

10. Update the Table of Contents, List of Tables, and List of Figures by right-clicking and selecting "Update Field," and then select "Update entire table."

11. Have the document modified and reviewed as appropriate, and have each reviewer and modifier enter their name, organization, and date in the document control panel.

12. Submit the document for approval and go through the review/revision needed to obtain approval to finalize the document.

13. Repeat the review cycle and resubmit for approval as needed to obtain approval to finalize the document.

14. Enter the approver's name, organization, and date in the "Approved By" section of the document control panel.

15. Enter the approval date on the title page and in the footer throughout the document and update the revision history at the end of the document.

16. Remove the DRAFT watermark on the title page and the content pages by entering the Edit Header and Footer mode of the document and deleting the DRAFT image.

17. Print the document to PDF and review it outside of the Microsoft Word application.

18. Submit the Word and PDF versions of the document as the final documents.

Template Revision History

Version	Date	Name	Description
1.0	Unknown	Unknown	Original template
1.1	6/14/2018	Unknown	Updated FDOT logos on form
2.0	6/28/24	Amber Greene Steve Bahler	Updated guidance format to match ConOps

FDOT TSM&O
Transportation Systems Management & Operations

Human Factors Engineering Project Plan for: *insert project name*

Version: *insert version number*

Approval date: *insert approval date*

Form FM-SE-04 Human Factors Engineering Project Plan Template. Effective 07/23/2024
Version: [*insert version #*] Approval date: [*insert approval date*]

iv

DOCUMENT CONTROL PANEL		
File Name:	[*insert project file name*]	
File Location:	[*insert project file URL*]	
Version Number:	[*insert version #*]	
	Name	**Date**
Created By:	[*insert author name, organization*]	[*insert creation date*]
Reviewed By:	[*insert reviewer name, organization*]	[*insert review date*]
Modified By:	[*insert modifier name, organization*]	[*insert modified date*]
Approved By:	[*insert approver name, organization*]	[*insert approval date*]

Form FM-SE-04 Human Factors Engineering Project Plan Template. Effective 07/23/2024
Version: [*insert version #*] Approval date: [*insert approval date*]

v

Table of Contents

Form FM-SE-04 Human Factors Engineering Project Plan Template. Effective 07/23/2024
Version: [*insert version #*] Approval date: [*insert approval date*]

vi

List of Tables

List of Figures

No table of figures entries found.

Form FM-SE-04 Human Factors Engineering Project Plan Template. Effective 07/23/2024
Version: [*insert version #*] Approval date: [*insert approval date*]

vii

List of Acronyms and Abbreviations

FDOT .... Florida Department of Transportation
FHWA..Federal Highway Administration
HFE .... Human Factors Engineering
HFEPP..Human Factors Engineering Project Plan
HMI.. Human/Machine Interface
ITS.. Intelligent Transportation Systems
P-SEMP.. Project Systems Engineering Management Plan

Form FM-SE-04 Human Factors Engineering Project Plan Template. Effective 07/23/2024
Version: [*insert version #*] Approval date: [*insert approval date*]

viii

A Human Factors Engineering Project Plan (HFEPP) is recommended on a project where introduction of new hardware, technology, or software results in the determination that a project is "high risk" in accordance with the Florida Department of Transportation (FDOT) Systems Engineering and Intelligent Transportation Systems (ITS) Architecture Procedure (#750-040-003) and where the new technology or software will introduce a new or modified human interface (HMI). Typically, a risk mitigation plan will accompany a high risk project. The HFEPP should be listed in the risk mitigation plan, when applicable.

1.   Overview

☐ *Adjust the following sentence as appropriate for this HFEPP.*

The Human Factors Engineering Project Plan (HFEPP) describes the management plans for the application of human factors engineering (HFE) design support as it relates to human/machine interfaces (HMI) in Florida Department of Transportation (FDOT) intelligent transportation systems (ITS) operations. The HFEPP establishes methods for the HFE engineer to use to actively participate in the development process of various HMIs. The HFE engineer will apply HFE criteria as it affects hardware and software design engineering development; evaluate user/system performance requirements via analytical techniques and simulations; and provide verification of the equipment and software design in the framework of the system operation.

1.1   Identification

Project Name: [*Insert the official project name*].
Financial Project Identification: [*Insert the financial project identification code, when it becomes available*].
Federal Aid Project Number: [*Insert the federal aid project number, when it becomes available*].

> ♀ *The Financial Project Identification Number and Federal Aid Project Number will generally not be authorized until after acceptance of the ConOps document by FHWA.*

☐ *If a system's related ConOps documentation or other systems engineering documents have been developed, describe the relationship of this document relative to the ConOps and other documentation.*

1.2   Human Factors Engineering Program Objectives

☐ *Adjust the following paragraph as appropriate for this HFEPP.*
The primary objective of the HFE program is to influence ITS product design to yield the highest level of human performance while minimizing burdens on personnel. This section describes the following [*Add content from the guidance list below, as applicable*]:

> ♀ *Processes for analyzing and assessing equipment; operator and maintenance tasks; designs for HFE requirements; design needs; and application.*
> ♀ *Processes for identifying, collecting, and providing HFE design criteria to achieve compatibility of operator-maintenance-equipment interfaces.*

- *Processes for analyzing the operator and maintainer interface so that the operational and maintenance requirements do not exceed expected operator capabilities.*
- *Development of the compatible control/display interface for rapid and accurate operation and display interpretation.*
- *Production of a safe, operable, and maintainable system.*
- *Assist in the design so that trainees, operators, and maintainers are able to use the various controls, displays, and adjustments effectively and efficiently under a variety of conditions.*
- *Provide guidelines for workstation and console designs to include ergonomic considerations in terms of user computer interfaces and ease of maintenance.*
- *Application of lessons learned to optimize design.*

1.3   Stakeholders

This section identifies stakeholders, users, and operating centers or sites that will interact with the new or modified system.

- *Include the roles and responsibilities of each applicable stakeholder or user, as appropriate.*

Table 1: Human Factors Stakeholders

Stakeholder	Project Role

1.4   Referenced Documents

☐ *Adjust the following sentence as appropriate for this HFEPP.*
This section lists standards, regulations, specifications, and drawings that will be used by the HFE program, including: [*Add content from the guidance list below, as applicable. Use a table or list format, as preferred.*]

☐ *Optionally, establish a centralized project repository to house and archive all project documentation and provide the location here (Show file path in the document control panel).*
☐ *Cite the documentation that is relevant to the project.*

- *The ConOps and other applicable systems engineering documents relative to the project*
- *Federal, state, or local government standards, regulations, and specifications*
- *Industry standards and specifications*
- *Guidance documents*

[*Suggested table format follows, if used.*]

Form FM-SE-04 Human Factors Engineering Project Plan Template. Effective 07/23/2024
Version: [*insert version #*] Approval date: [*insert approval date*]

2

Table 2: Referenced Documentation

Document Name	ID, Revision, Date, etc.	Link, or Contact Info to Obtain
Human Factors Guidelines for Transportation Management Centers	*Publication No. FHWA-HRT-16-060*	FHWA-HRT-16-060: Human Factors Guidelines for Transportation Management Centers (ntlrepository.blob.core.windows.net)

2. Organization

2.1 Organizational Structure Overview

☐ *Adjust the following paragraph as appropriate for this HFEPP.*
This section describes the organizational structure of the project. The organization includes FDOT and other agency personnel, subcontractors, customers, and users. The description includes the roles and involvements of each entity in the project relative to HFE and HMI.

[*Reference the ConOps and/or the Project Systems Engineering Management Plan (P-SEMP) for details on how the project is organized and overall stakeholder roles and responsibilities.*]

2.2 Human Factors Engineering Organization

☐ *Adjust the following paragraph as appropriate for this HFEPP.*
This section describes the HFE program organizations. The HFE engineer is responsible for the development, implementation, and maintenance of the HFE program. The HFE engineer's responsibilities include: [*Add content from the guidance list below, as applicable.*]

- *Development, implementation, and maintenance of the HFE program*
- *Identification of the HFE design requirements for implementation in the design*
- *Preparation of the hardware design checklist/guidelines, safety hazard analyses, and hazard tracking data*
- *Identification, definition, and analysis of man/machine functions related to the progression of the ITS project design*
- *Provide project management visibility of the HFE program status, significant HFE problems, and necessary improvements*
- *Participation in design reviews, working groups, and trade studies to include HFE criteria*
- *Review and evaluation of engineering and facility drawings, changes, system diagrams, and system test procedures for HFE compliance*
- *Coordinate HFE test operations*

2.3 Human Factors Engineering Internal Interfaces

☐ *Adjust the following paragraph as appropriate for this HFEPP.*
HFE is an integral part of the total project effort and maintains both internal and external stakeholder interactions and project development interactions to identify and resolve HFE issues

Form FM-SE-04 Human Factors Engineering Project Plan Template. Effective 07/23/2024
Version: [*insert version #*] Approval date: [*insert approval date*]

3

and avoid duplication of effort among the various project disciplines. Human factors engineering personnel will interface with the following areas, which should be described in detail in subsections to this paragraph: [*Add content from the guidance list below, as applicable.*]

- ♀ *Systems engineering*
- ♀ *Hardware engineering*
- ♀ *Software engineering*
- ♀ *Support engineering*
- ♀ *Safety engineering*
- ♀ *Test engineering*
- ♀ *Customer personnel*

☐ *Also, any special interfaces to support subcontractor relationships should be identified in this section, such as the detail on day-to-day interaction between the HMI engineer and other project designers or developers.*

2.4   Human Factors Engineering Visibility

☐ *Adjust the following paragraph as appropriate for this HFEPP.*
The FDOT is committed to the HFEPP and provides the management mechanisms needed to effectively influence HMI design. This section describes the HFE engineer's participation in the ITS project meetings and reviews of engineering designs for HFE issues. During project quarterly reviews, the HFE engineer will present the HFE program status, HFE influence on the design, actions accomplished, and open issues. [*Add content from the guidance list below, as applicable.*]

- ♀ *HFE involvement in project management meetings*
- ♀ *HFE involvement in project, system, hardware, and software design and review meetings*
- ♀ *HFE review of design HMI elements of system, hardware, and software design*
- ♀ *Mechanism for HFE to present HMI design recommendations to project management team and partners*
- ♀ *Mechanism for HFE to obtain stakeholder feedback and buy-in on HMI design recommendations*
- ♀ *Mechanism for finalizing and approving MHI design elements that will be implemented*
- ♀ *Mechanism for HFE to verify HMI design elements were implemented*

2.5   Human Factors Engineering in Design Efforts

☐ *Adjust the following paragraph as appropriate for this HFEPP.*
Design consultant and/or subcontractor will report to the Project Manager on all HFE issues. Designers are required to comply with all applicable HFE standards. The HFE engineer will reviews HMI designs for HFE compliance. This process is described in this section. [*Add content from the guidance list below, as applicable.*]

- ♀ *Mechanism for HFE to interact with project designers during design*
- ♀ *Use of demonstration versions, mock-ups, or techniques to present HMI design features to HME and system users prior to final design and implementation*
- ♀ *HFE role in design quality control plan relative to HMI design features*

3. HFE in Systems Analysis

☐ *Adjust the following paragraph as appropriate for this HFEPP.*
The HFE engineer's systems analysis activities generate quantitative human performance requirements for an ITS project. This section describes in detail what analyses will be performed using HFE, including: [*Add content from the guidance list below, as applicable.*]

- ♀ *Task analysis*
- ♀ *Training needs analysis*
- ♀ *User computer interface analysis*
- ♀ *Workload analysis*
- ♀ *Identification of operator/maintainer processing capabilities*
- ♀ *Manpower analysis*
- ♀ *Ergonomic analysis*
- ♀ *Equipment selection analysis*

4. HFE in Equipment Detail Design

4.1 Participation in the Design Process

☐ *Adjust the following paragraph as appropriate for this HFEPP.*
HFE engineer participation is described in more detail in this section. The HFE engineer performs an active role in the detailed design of each of the component/subsystem designs through participation with ITS project team members. By attending formal and informal system-level design reviews, reviewing drawing package submittals, and maintaining an open channel of communications, the HFE engineer is able to keep potential HFE design change recommendations highly visible.

The HFE engineer, as required, performs independent studies in the form of dynamic simulations, tests, and reviews of submitted designs. Feedback of analysis results, as well as information gained through the previously mentioned task analyses, are made to the appropriate designers and working group meetings, memorandums, design reviews, or formal direction for design change.

☐ *Add other participation details, as applicable for the project.*

5. Derivation of Personnel/Training Requirements

5.1 HMI Trainees

☐ *Adjust the following paragraph as appropriate for this HFEPP.*
This section delineates the extent of manpower analysis to be conducted, as follows: [*Add content from the guidance list below, as applicable.*]

- ♀ *Number of users or operators engaged in the function that will use the new HMI*
- ♀ *Operator or user functions and allocations that will be met by the new HMI*

    ♀ *Operator/user needs (from ConOps)*
    ♀ *Degree to which the HMI is new or a revision of an existing HMI*
    ♀ *Degree of HMI automation or manual input*
    ♀ *HMI input media (e.g., keyboard, mouse, touchscreen, keypad, etc.)*
    ♀ *HMI alert mechanism (e.g., alarms, flashing lights, texts, etc.)*
    ♀ *HMI feedback media (e.g., desktop screen, control room display wall, etc.)*

5.2   Training Needs, Development, and Delivery

☐ *Adjust the following paragraph as appropriate for this HFEPP.*

The types of training analyses to be conducted and the development of training material are discussed in this section. Training activities include: [*Add content from the guidance list below, as applicable.*]

    ♀ *Training needs analysis*
    ♀ *Training task analysis*
    ♀ *Training media selection*
    ♀ *Development of training materials*
    ♀ *Delivery of training*
    ♀ *Verification of training results*

6.   Human Factors Engineering Testing and Evaluation

☐ *Adjust the following paragraph as appropriate for this HFEPP.*

This section addresses the process to involve HFE in the system verification testing and demonstration process. It describes how the HFE engineer provides support to the test plan and procedure preparation, as well as the HFE engineer involvement, if any, in actual testing. Testing roles and techniques include: [*Add content from the guidance list below, as applicable.*]

    ♀ *Verification test plan development*
    ♀ *HFE engineer involvement in specific test plan steps*
    ♀ *Engineering measurements*
    ♀ *Use of subject-matter experts*
    ♀ *Collection of human performance data*
    ♀ *HMI engineering checklists*
    ♀ *User opinion/feedback surveys*

7.   Human Factors Engineering Task Schedule

☐ *This section should provide a complete schedule of the entire HFE program.*
☐ *If a detailed project schedule is developed in the P-SEMP or other project document, this section may reference the other document rather than repeat the schedule.*

8.   User Definitions

Table 1: Title

Figure 1: Title

DOCUMENT REVISION HISTORY			
Version Number	**Approved Date**	**Description of Change(s)**	**Created/ Modified By**

Form FM-SE-04 Human Factors Engineering Project Plan Template. Effective 07/23/2024
Version: [*insert version #*] Approval date: [*insert approval date*]

8