

NCHRP Project 17-71A

# Proposed AASHTO Highway Safety Manual, Second Edition

TRB Safety Performance and Analysis Committee  
(ACS20)  
Midyear Meeting  
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# Outline

- Project objective and scope
- Research plan
- Summary of Phase I results
- Summary of key points addressed in interim report
  - Proposed HSM outline
  - Vision of three alternative project deliverables
  - Plan for reviews and schedule
  - Publication options

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## Project Objective

- Complete work initiated as part of NCHRP Project 17-71 to develop and prepare a proposed HSM2 in a format suitable for adoption as an AASHTO publication
  - Proposed HSM2 will synthesize and incorporate relevant ongoing and completed research including completed NCHRP Project 17-71 deliverables, related documents, and user feedback to expand the scope and quality of HSM2 to increase application and improve its usability

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# Project Scope

1. Given (a) the current funding level of \$480,000, (b) a 24-month period of performance, and (c) the current status of HSM2 materials produced under NCHRP Project 17-71, develop a research plan to produce the most comprehensive, viable HSM2 suitable for publication by AASHTO
2. Given the current status of HSM2 materials produced under NCHRP Project 17-71, develop a research plan that would produce a more comprehensive, viable HSM2 suitable for publication by AASHTO than could be produced given the current resources allocated for this project (i.e., \$480,000 and 24 months), and which may require additional resources (i.e., dollars and potentially time)

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# Research Approach

## **PHASE I—ASSEMBLE RESOURCES AND PLAN PROJECT**

- Task 1—Kick-off Meeting and Project Management
- Task 2—Review Materials from NCHRP Project 17-71
- Task 3—Assessment of Research for Potential Incorporation into HSM2
- Task 4—Develop Glossary of Terms and Phrases to be Used and Avoided in HSM2
- Task 5—Prepare Interim Report

## **PHASE II—PRODUCE PROPOSED HSM2**

- Task 6—Execute Approved Phase II Work Plan
- Task 7—Prepare Project Deliverables

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## Summary of Status of Materials from NCHRP Project 17-71

- We did not find any big surprises
- All chapters need “some level” of drafting/redrafting before next/first round of reviews
  - At minimum, to address issues identified during review of preceding material by Project 17-71A panel and AASHTO Steering Committee on HSM
- Outline/structure of HSM2 could use some reorganization
  - Consider combining chapters/appendices
  - Consider changing order of chapters
  - Incorporate recently completed research

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## Summary of Assessment of Research for Potential Incorporation into HSM2

Assessed completed and ongoing research for potential incorporation into HSM2, by considering factors such as:

- Likelihood of research being completed by a suitable date
- Quality of research
- Compatibility with material in first edition of HSM that will remain in HSM2
- Compatibility with other new research considered for incorporation in HSM2
- Value to HSM2 users
- Impacts of incorporating research on overall 17-71A project budget and schedule

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## Summary of Assessment of Research for Potential Incorporation into HSM2

- NCHRP Project 17-54 (*Consideration of Roadside Features in the HSM*)
- NCHRP Project 17-58 (*Safety Prediction Models for 6-Lane and One-Way Urban & Suburban Arterials*)
- NCHRP Project 17-62 (*Improved Prediction Models for Crash Types and Crash Severities*)
- NCHRP Project 17-68 (*Intersection Crash Prediction Methods for the HSM*)
- NCHRP Project 17-70 (*Development of Roundabout Crash Prediction Models and Methods*)
- NCHRP Project 17-72 (*Update of Crash Modification Factors for the HSM*)
- NCHRP Project 17-80 (*Expansion of Human Factors Guidelines for Road Systems, Second Edition*)
- NCHRP Project 17-81 (*Proposed Macro-Level Safety Planning Analysis Chapter for the HSM*)
- NCHRP Project 17-84 (*Pedestrian and Bicycle SPFs for the HSM*)
- NCHRP Project 17-85 (*Development and Application of Crash Severity Models for the HSM*)
- NCHRP Project 17-89 (*Safety Performance of Part-Time Shoulder Use on Freeways*)
- NCHRP Project 17-89A (*HOT/HOV Freeway Crash Prediction Method for the HSM*)
- NCHRP Project 17-92 (*Developing SPFs for Rural 2-Lane Highways That Incorporate Speed Measures*)

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## Style and Usage Guide for Terms and Phrases to be Used and Avoided in HSM2

HSM2 should not inadvertently create tort liability implications in its content.

- Carelessly drafted language and use of certain terms and phrases can undermine the utility of a document by allowing for misinterpretation and misuse by those in litigation against transportation agencies
- “Style and Usage Guide for Terms and Phrases to be Used and to be Avoided in HSM2” is intended to guide the research team as it drafts and revises content in the production of the HSM2

## Style and Usage Guide for Terms and Phrases to be Used and Avoided in HSM2

The context of terms and phrases determines whether or not they clearly state what is intended or if they have potential for unintended consequences.

- Style and Usage Guide categorizes terms and phrases into particular contexts to more fully illustrate why and how they should be avoided or used:
  - Subjective terms and phrases expressing personal opinion
  - Vague and ambiguous terms and phrases
  - Terms and phrases that are directive or mandatory
  - Terms and phrases setting up for failure
  - Terms and phrases that are pejorative with liability implications

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## Subjective Terms and Phrases Expressing Personal Opinion

- Adequate/sufficient
- Better/Best
- Deficient
- Desired/Desirable
- Difficult
- Excessive
- Inadequate/Insufficient
- Just
- Poor
- Preferred/Preferable
- Safe/Unsafe
- Worse/Worst

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## Vague and Ambiguous Terms and Phrases

- Care should be taken
- Often
- Problematic
- Questionable
- Safe
- Safety
- Troubling/Troublesome
- Use with Caution

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## Terms and Phrases that are Directive or Mandatory

- Essential/ Imperative/Necessary
- Mandatory
- Must
- Need/Needs
- No less than/No more than
- Regulation
- Required/Requirement
- Shall
- Should
- Standard

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## Terms and Phrases Setting Up for Failure

- All
- Always
- Ensure
- Possible
- Will

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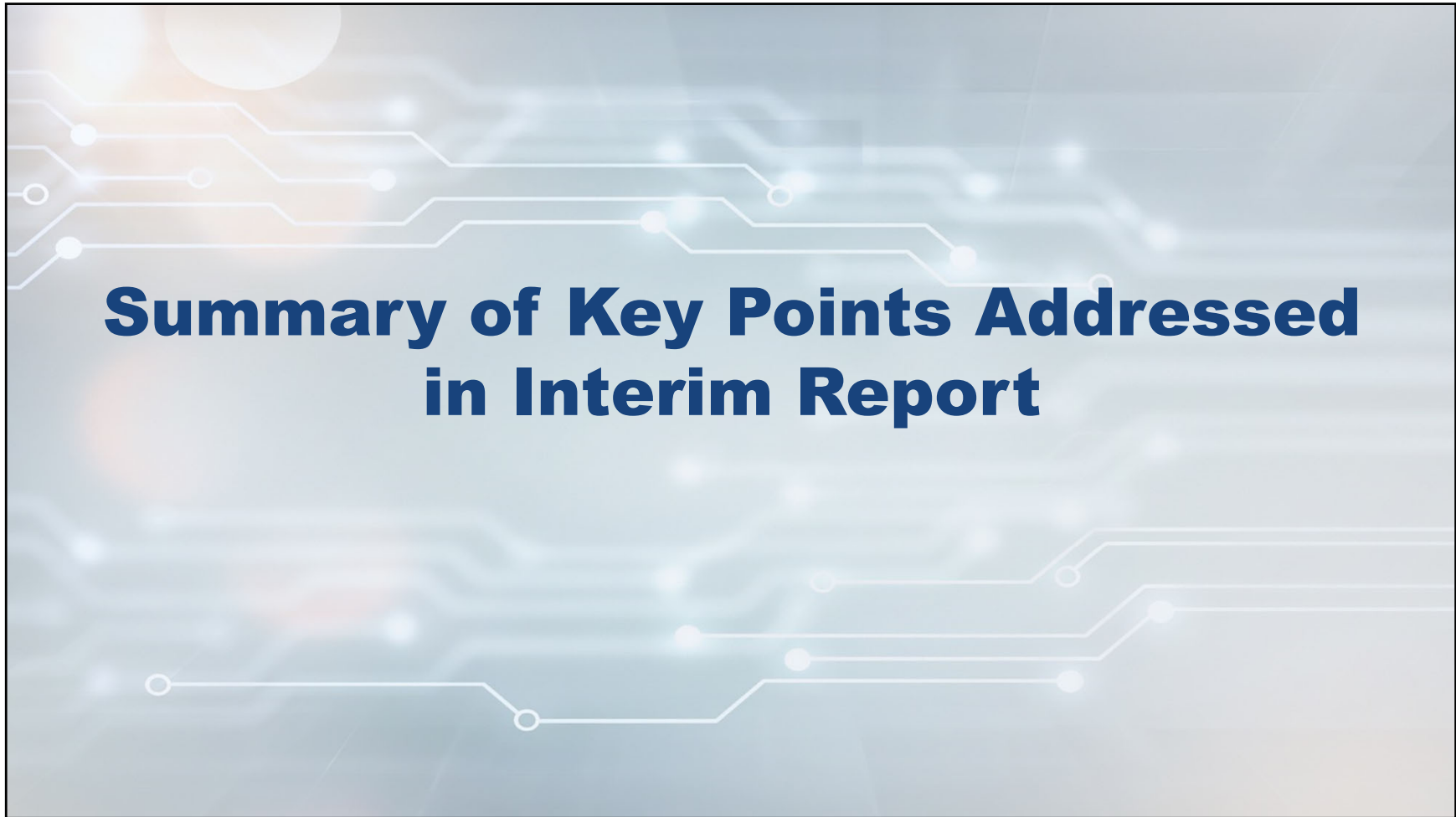
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## Terms and Phrases that Are Pejorative with Liability Implications

- A Concern/Is Concerned/Of Concern
- Danger/Dangerous
- Defect/defective
- Drop off
- Hazard/Hazardous
- Hot Spot/Black Spot
- Obstacle/obstruction
- Negative Effect
- Problem
- Risk/Risky/Risk Factors/Safety Risk/Level of Risk/Higher Risk Facilities
- Trap
- Unsafe
- Unshielded/Unprotected
- Weak/weakness

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Proposed Outline of HSM2 from NCHRP Project 17-71

HSM2 Ch.	HSM1 Ch.	Chapter Title
Preface	Preface	-
<b>Part A- Introduction, Human Factors, and Fundamentals</b>		
1	1	Introduction and Overview
2	2	Human Factors
3	3	Fundamentals
<b>Part B – Roadway Safety Management Process</b>		
4	N/A	Pedestrians and Bicyclists
5	N/A	Systemic Safety Management Process
6	4	Network Screening
7	5	Diagnosis
8	6	Select Countermeasures
9	7	Economic Appraisal
10	8	Prioritize Projects
11	9	Safety Effectiveness Evaluation
<b>Part C – Predictive Method</b>		
12	N/A	Developing, Calibrating, and Using Safety Performance Functions and Crash Prediction Models
13	10	Predictive Method for Rural Two-Lane, Two-Way Roads
14	11	Predictive Method for Rural Multilane Highways
15	12	Predictive Method for Urban and Suburban Arterials
16	18	Predictive Method for Freeways
17	19	Predictive Method for Ramps
<b>Part D – Crash Modification Factors</b>		
18	N/A	Introduction to Part D
19	N/A	Selecting Crash Modification Factors
20	N/A	Applying Crash Modification Factors
21	N/A	Developing Crash Modification Factors
Append D1	N/A	HSM Inclusion Criteria
Append D2	N/A	Adjusting Crash Modification Factors to Local Conditions
Append D3	N/A	Combining Crash Modification Factors for the Same Countermeasure

Proposed Outline of HSM2 from NCHRP Project 17-71A

HSM2 Ch.	HSM1 Ch.	Chapter Title
		Preface
1	1	Introduction and Overview to the Highway Safety Manual
<b>Part A- Fundamentals</b>		
		Introduction to Part A
2	3	Fundamentals (new suggested name - Highway Safety Principles or Road Safety Principles) • Integrate safe systems discussion
3	2	Human Factors
4	N/A	Pedestrians and Bicyclists
<b>Part B – Roadway Safety Management Process</b>		
		Introduction to Part B
5		Macro-Level Safety Planning
6	4	Network Screening
7	5	Diagnosis
8	6	Countermeasure Selection
9	7	Economic Appraisal
10	8	Project Prioritization
11	9	Safety Effectiveness Evaluation • Integrate Developing CMFs – Part D Chapter
12	N/A	Systemic Safety Management
<b>Part C – Predictive Method</b>		
		Introduction to Part C
13	N/A	Developing, Calibrating, and Using Safety Performance Functions and Crash Prediction Models
14	10	Predictive Method for Rural Two-Lane, Two-Way Roads
15	11	Predictive Method for Rural Multilane Highways
16	12	Predictive Method for Urban and Suburban Arterials
17	18	Predictive Method for Freeways
18	19	Predictive Method for Ramps
<b>Part D – Crash Modification Factors</b>		
	N/A	Introduction to Part D
19	N/A	Selecting Crash Modification Factors • Integrate HSM Inclusion Criteria – Part D Appendix • Integrate Adjusting CMFs to Local Conditions – Part D Appendix
20	N/A	Applying Crash Modification Factors • Integrate Combining CMFs for the Same Countermeasure – Part D Appendix
		Glossary (Applicable to all Parts)

## Vision of Three Alternative Project Deliverables

- Option 1 (Basic)—Retain the current \$480,000 budget and accept the research team’s vision for the document that can be prepared within that budget and schedule
- Option 2 (Menu A)—Accept the research team’s alternative vision for an enhanced HSM2, with the understanding that this will require additional funds and time
- Option 3 (Menu B)—Accept the research team’s alternative vision for the most comprehensive HSM2, with the understanding that this will require yet more funds and time than Option 2.

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# Review of Individual HSM2 Chapters

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# Ch 1. Introduction and Overview to the Highway Safety Manual

## Option 1 (Basic)

- Update based on outstanding comments (60)
- Update based on glossary (171)
- Update content consistent with new outline of HSM2

## Option 2 (Menu A)

- Reorganize chapter to begin with examples, then the organization of chapters and relationship to project development, and finally statistical analysis (medium)

## Option 3 (Menu B)

- None

## Ch 2. Highway Safety Principles

### Option 1 (Basic)

- Update based on outstanding comments (204)
- Updated based on glossary (256)
- Modify to reflect updates to HSM2
- Integrate safe systems discussion

### Option 2 (Menu A)

- **Reorganize chapter in response to Ray Krammes recommendation memo (high)**
- **Update to incorporate material from HSM1 appendices (e.g., 3A, 3B, and 3D) (low)**
- Integrate safe systems discussion (more comprehensive section) (low)
- Add examples to expound about various sections and chapters to later chapters (medium)

### Option 3 (Menu B)

- None

## Ch 3. Human Factors

### Option 1 (Basic)

- Update based on outstanding comments (246)
- Updated based on glossary (235)
- Focus will be on additional integration of human factors, insert actionable content, and distinguish between “human factors” and “driver behaviors”. Reference HFG and Primer
- SP: develop several fundamental examples

### Option 2 (Menu A)

- **Reorganize chapter for better flow and update text so it reads better (i.e., less academic) (medium)**
- **SP: develop sample problems with human factors emphasis. These could be in Ch 2 or located elsewhere as deemed appropriate (medium)**

### Option 3 (Menu B)

- Revise chapter to be more clearly organized around key highway safety and design topics that are more relevant to HSM users and – within these topics – present supporting narratives with relevant human factors concepts, research/data, and examples (high)



## Vision of Three Alternative Project Deliverables (Summary – Option 1 Basic)

- Option 1 (Basic)—Retain the current \$480,000 budget and accept the research team’s vision for the document that can be prepared within that budget and schedule
- A baseline version of the HSM2 that could be developed within existing resources (i.e., \$480,000 and 24 months) would primarily involve:
  - A. Responding to outstanding comments on draft chapters including editorial, style, and language comments; simple technical comments, and as many substantive technical comments or comments requiring reorganization of the chapters as practical;
  - B. Reviewing and editing chapters based on style and usage guide for terms and phrases to be used and avoided in the HSM2;
  - C. Editing chapters to be consistent with new material being added within and across chapters; and
  - D. Addressing essential technical content as practical.

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## Vision of Three Alternative Project Deliverables (Summary – Option 2 and 3)

- Option 2 (Menu A)—Accept the research team’s alternative vision for an enhanced HSM2, with the understanding that this will require additional funds and time
  - 41 Menu A items were identified as potential ways to enhance the content of HSM2 chapters
  - **For an additional \$120,000 and 12 months**, we envisioned everything under Option 1 (Basic) would be accomplished + approximately five “medium level” items from Menu A
- Option 3 (Menu B)—Accept the research team’s alternative vision for the most comprehensive HSM2, with the understanding that this will require yet more funds and time than Option 2
  - 12 Menu B items were identified as potential ways to enhance the content of HSM2 chapters
  - **For an additional \$240,000 and 24 months**, we envisioned that everything under Option 1 (Basic) would be accomplished + approximately five “medium level” items from the Menu A + approximately five “medium level” items from either the Menu A or B lists

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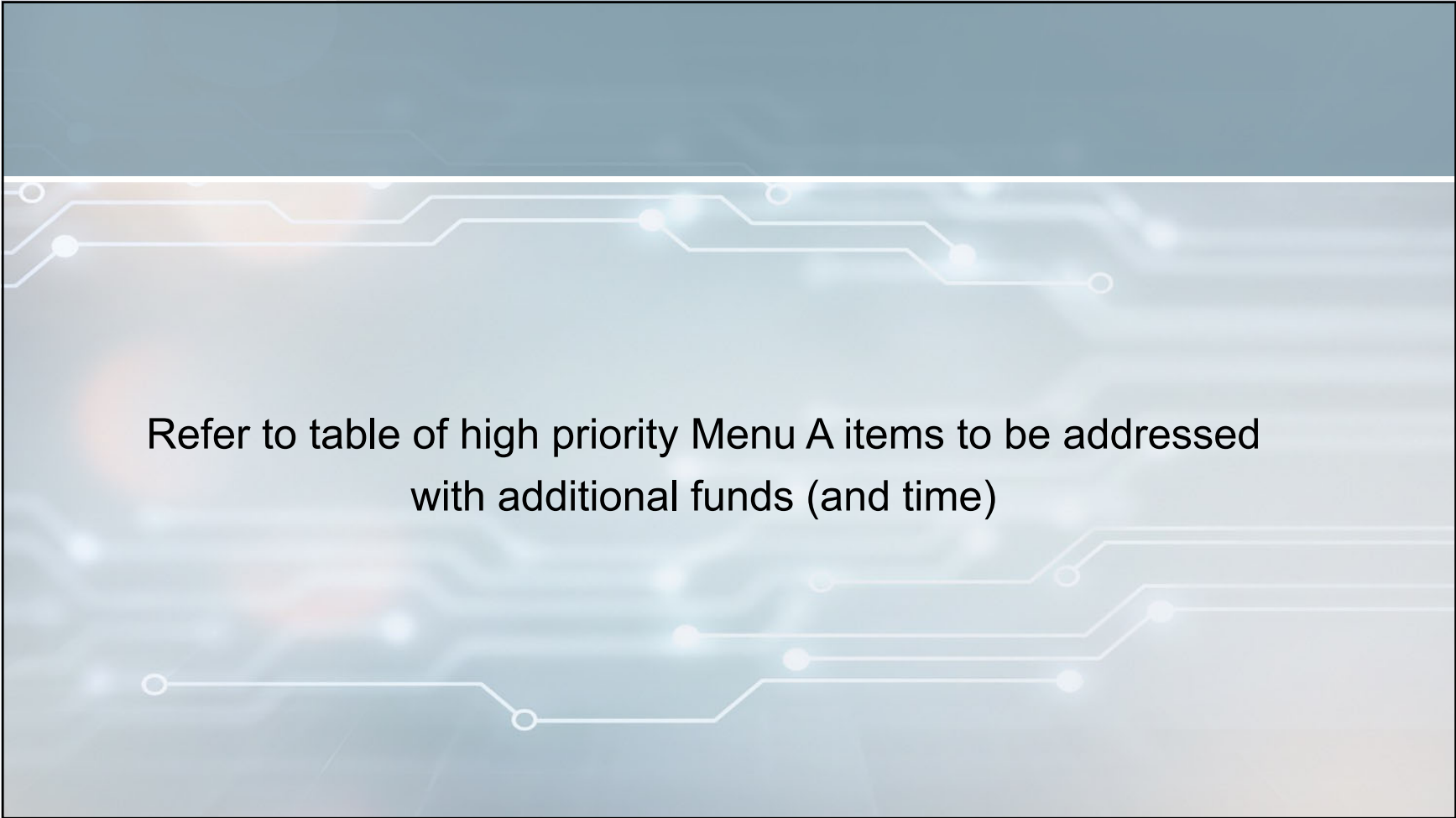
## Vision of Three Alternative Project Deliverables (Summary)

Plan moving forward for development of proposed content for HSM2 as agreed upon by NCHRP Project 17-71A panel, based upon discussions and priorities established at Task 5 interim meeting

- Hybrid of Option 2 (Menu A) and Option 3 (Menu B)
  - Approximately 8 to 10 high priority Menu A items identified to expand content of HSM2 chapters (beyond the baseline)
- Involves additional funds and time be added to NCHRP Project 17-71A to produce an expanded version of HSM2 (beyond what could be prepared within the original budget and schedule for the project)

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Refer to table of high priority Menu A items to be addressed with additional funds (and time)

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## Plan for Reviews

Plan for one round of review of individual chapters and one round of review of entire document

- Four groups of reviewers of individual chapters:
  - 17-71A panel members
  - 3 to 5 AASHTO members
  - FHWA representatives
  - 3 to 5 TRB representatives (or others familiar with HSM)
- Only 17-71A panel members will review entire document

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## Plan for Reviews

- Jerry Roche will consolidate comments from FHWA
- Jacobs Engineering Group will consolidate comments from
  - NCHRP 17-71A project panel
  - AASHTO
  - TRB reviews
- Prior to delivering consolidated comments to research team, NCHRP 17-71A project panel will review consolidated comments and provide guidance to research team regarding comments

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# Review and Project Schedule

RESEARCH TASK	2021												2022												ESTIMATED % COMPLETION		
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D			
Task 1: Kickoff Meeting and Project Management																										100	
Task 2: Review Materials from NCHRP Project 17-71																											100
Task 3: Assessment of Research for Potential Incorporation into HSM2																											100
Task 4: Develop Glossary of Terms and Phrases to be Used and Avoided in HSM2																											100
Task 5: Prepare Interim Report																											100
Task 6: Execute Approved Phase II Work Plan																											0
Task 7: Prepare Project Deliverables																											0

RESEARCH TASK	2023												2024												ESTIMATED % COMPLETION		
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D			
Task 1: Kickoff Meeting and Project Management																											100
Task 2: Review Materials from NCHRP Project 17-71																											100
Task 3: Assessment of Research for Potential Incorporation into HSM2																											100
Task 4: Develop Glossary of Terms and Phrases to be Used and Avoided in HSM2																											100
Task 5: Prepare Interim Report																											100
Task 6: Execute Approved Phase II Work Plan		*				x																					0
Task 7: Prepare Project Deliverables																											0

- \* Denotes when select draft chapters will be ready for review at the end of the month.
- x Denotes when a draft of the full manual will be ready for review at the end of the month.
- Denotes panel review period for draft project deliverables.

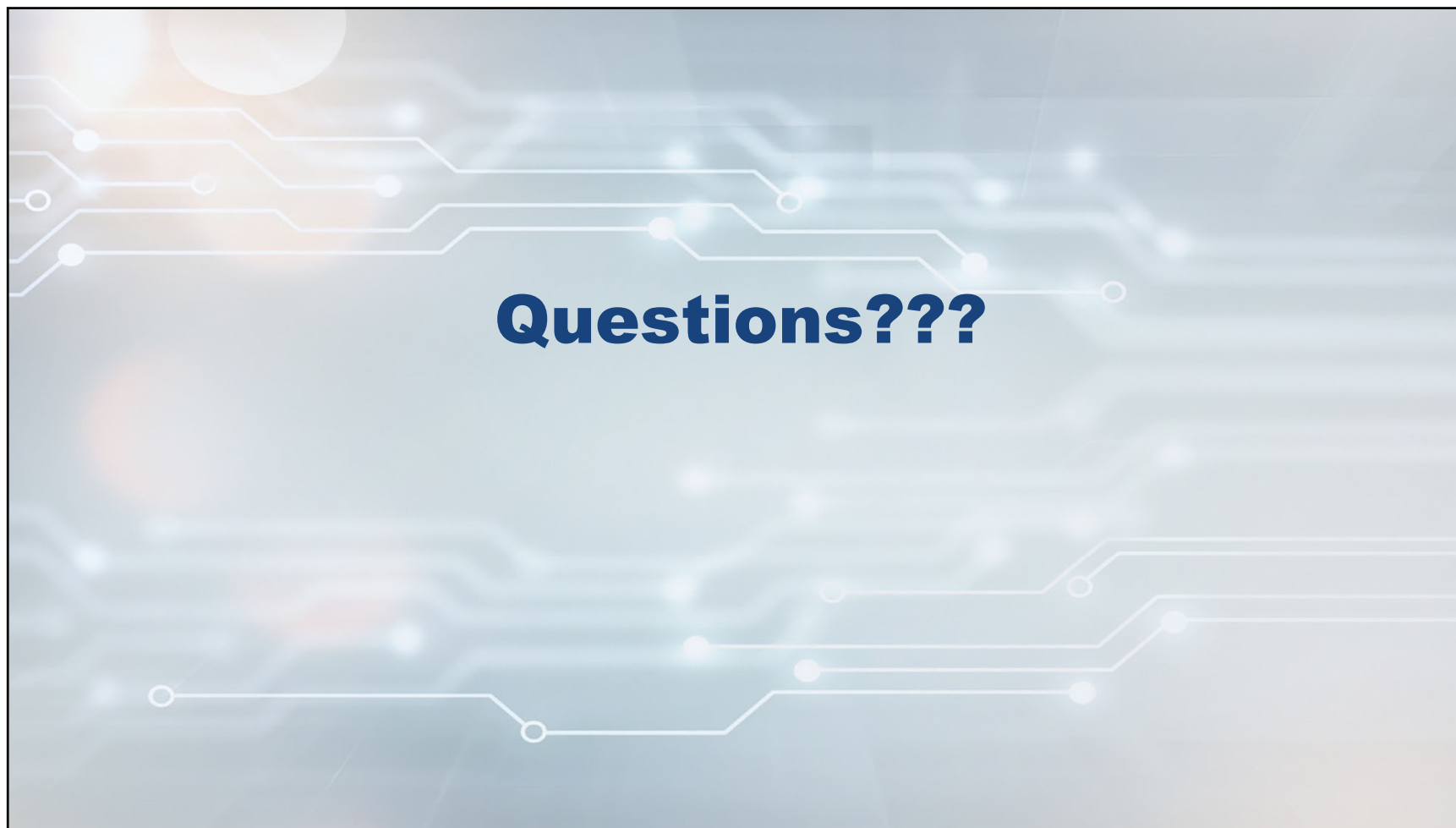
Figure 1. Planned Project Schedule.

# Publication Options

Publish as a single document

Publish in parts





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