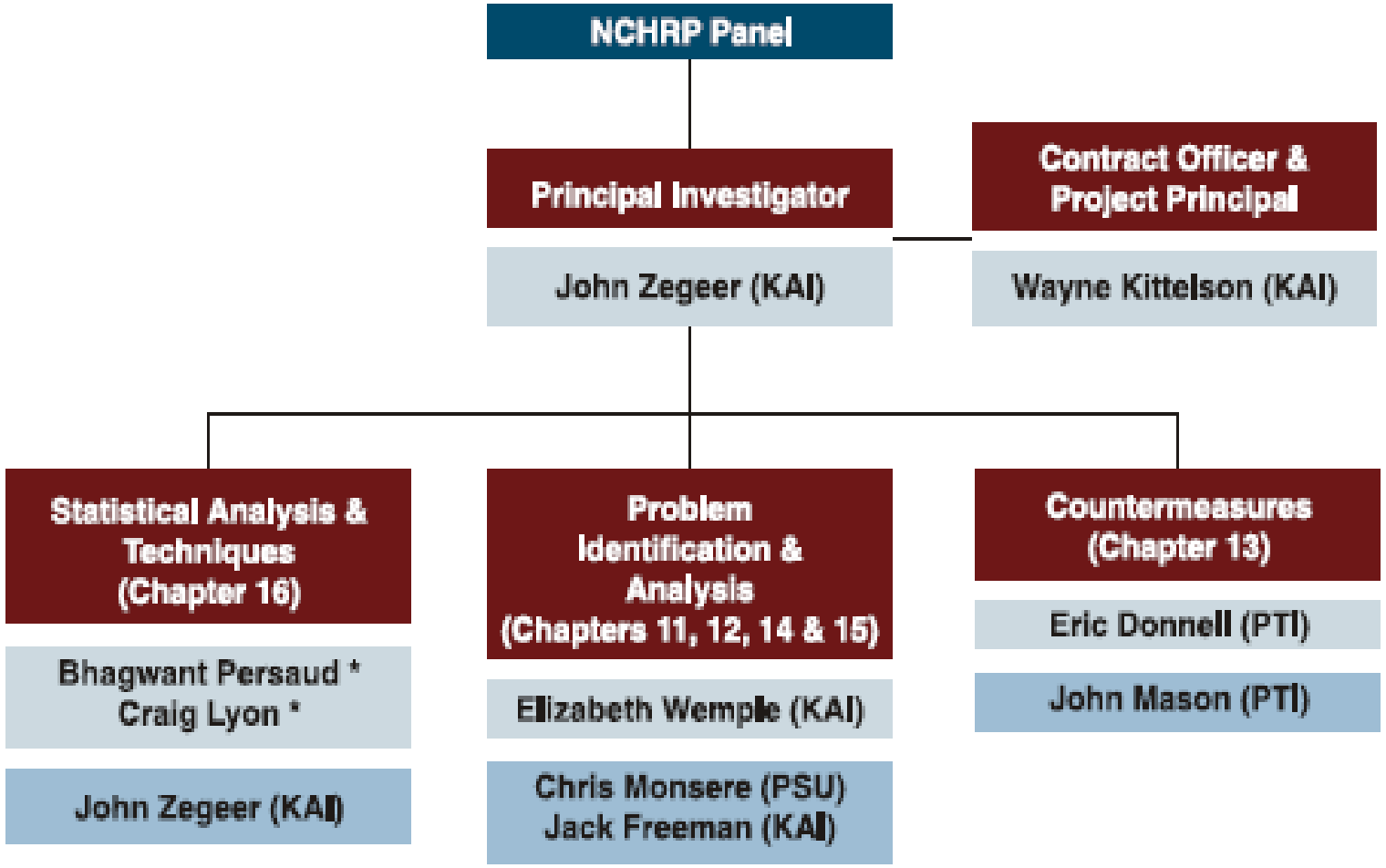
# *THE HIGHWAY SAFETY MANUAL*
## *Parts IV and V*

## *NCHRP 17-34*

## Status of Ongoing Research Activities
## January 2006

# Team Organization



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# Purpose of the Research Project

**To prepare a draft of:**
**Part IV (Roadway Safety Management)**
**Part V (Safety Evaluation)**
**of the first edition of the Highway Safety Manual**



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# Project Tasks

1. Review HSM Production Documents
2. Review Task Force guidance
3. Identify and review literature
4. Review and revise annotated outline
5. Submit Interim Report
6. Prepare selected Prototype Chapter
7. Meet with panel
8. Develop remaining chapters
9. Submit final report



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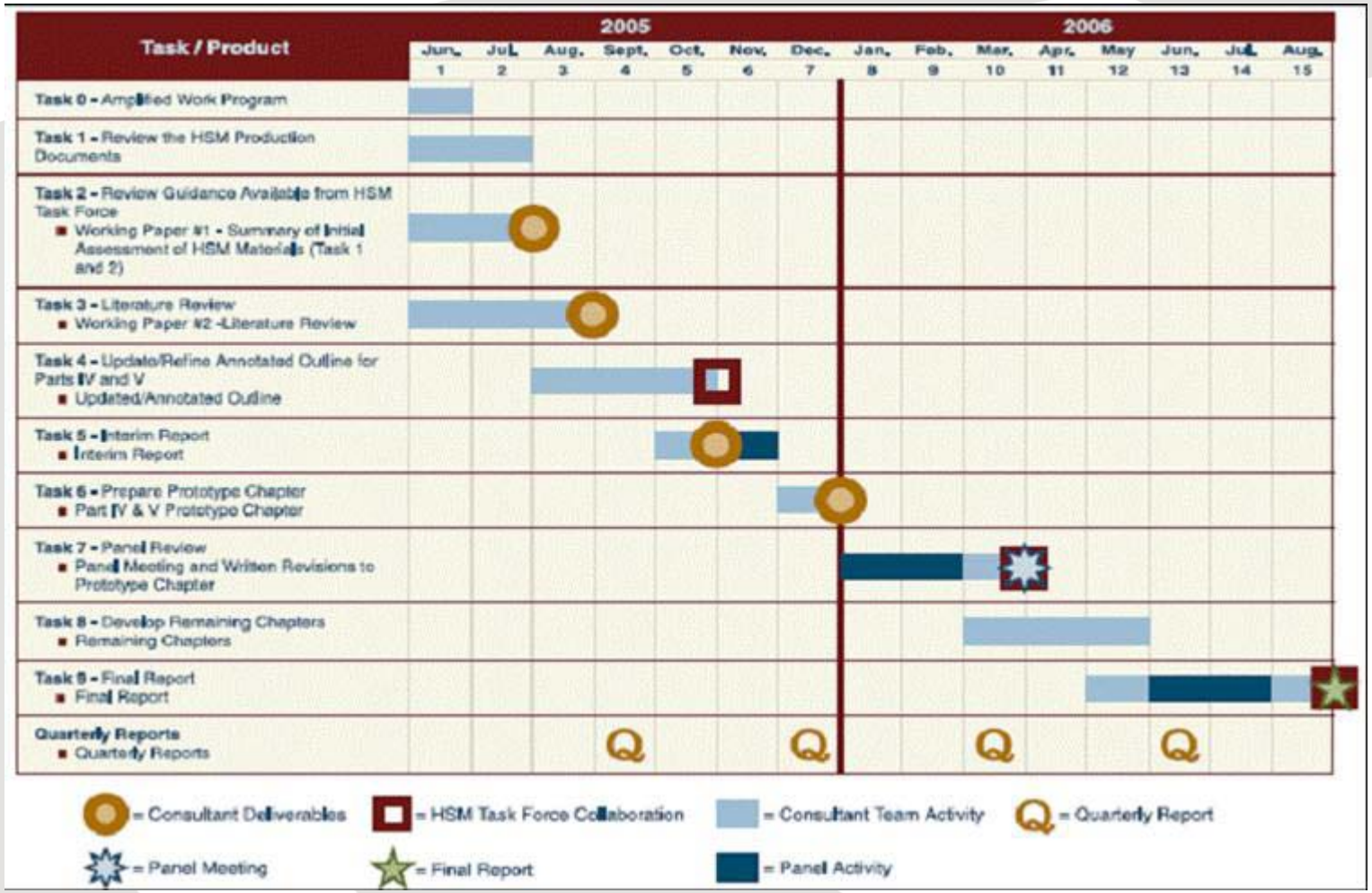
# Project Schedule



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# Six Chapters to be Prepared

11. Identification of Sites with Potential for Safety Improvement
12. Diagnosis of the Nature of Safety Problems at Specific Sites
13. Selection of Countermeasures to Reduce Accident Frequency and Severity at Specific Sites
14. Economic Appraisal of all Sites under Consideration
15. Prioritize Rankings of Improvement Projects
16. Overview of Estimating the Safety Effect of Implemented Interventions



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# NCHRP Panel Guidance
## (Aug. 23, 2005 Teleconference)

**Writing Style**

1. Write to the "target audience" identified by the Task Force
2. Present material as a learning tool or "how-to" guide (applications-oriented)
3. Provide guidance (sample problems) for data analysis

**Contents**

1. Consider research in addition to SafetyAnalyst
2. Indiana DOT, Colorado DOT, PIARC



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# Tasks 1 & 2 – Review HSM Production and Guidance Documents

1. HSM Annotated Outline
2. HSM First Edition Work Plan
3. Proposed Review Process for Part III Chapters
4. Chapter 8 – Two-Lane Highways
5. Categorization and Assessment of Results – Measures of Safety memo
6. Primary measures of safety TF minutes
7. Research Procedures and Goals
8. User Survey Results
9. “Target Audience” Definition

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# Summary of Task 1 & 2 Findings

1. Structure for Parts IV and V will follow the Annotated Outline
2. Measure of Safety = expected crash frequency by severity per unit time
3. Scope for 17-34 is consistent with Work Plan
4. Panel should consider Part III review process
5. Work will distill research, tools, and techniques to a practical level for the practicing engineer
6. "Target audience" = public agency staff and consultants familiar with transportation engineering and statistical procedures



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# Task 3 - Identify & Review Literature

## Chapter 11 - Network Screening

* PSI estimated by the value of the EB expected crash frequency or by the amount that the value exceeds expected crash frequency
* Kononov – hidden patterns of crashes
* Tarko & Kanodia quality control methods
* PIARC Road Safety Manual
* Relative Risk Analysis – SPF not available
* NCHRP 295 – statistical analysis in safety
* Level of Service of Safety



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# Task 3 - Identify & Review Literature

## Chapter 12 - Diagnosis of Safety Problems

* Identify crash patterns, investigate causal factors, consider site conditions, consider safety performance
* Automated Collision Diagram tools
* GIS to identify crash clusters near schools and perceived unsafe locations
* Condition Diagrams
* Crash mapping
* Road safety audits
* Level of Service of Safety



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# Task 3 - Identify & Review Literature

## Chapter 13 - Selection of Countermeasures

*** Levels of countermeasures – proven, tried, experimental**
**(source: AASHTO Strategic Hwy Safety Plan)**

*** Criteria for selecting countermeasures:**

**1) based on before-after observational study or cross-sectional study**
**2) reduce crash frequency or severity**
**3) successfully used by at least one agency**



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# Task 3 - Identify & Review Literature

## Chapter 14 - Economic Appraisal

* Methodology for calculating benefits and costs
* SafetyAnalyst assigns dollar value for crash severity
* Options to be considered:
    1) Cost Effectiveness (cost/crashes reduced)
    2) Benefit Cost Ratio
    3) Net Benefit (benefits – costs)
* SEMCOG crash analysis manual and PIARC Road Safety Manual have alt. procedures



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# Task 3 - Identify & Review Literature

## Chapter 15 - Prioritize Ranking of Projects

* Goal is to maximize safety benefits within budgetary constraints
* NCHRP 501 Integrated Safety Management Process provides ranking methods
  1) Project development ranking
  2) Incremental cost to benefit ratio
  3) Linear programming
  4) Integer programming
  5) Dynamic programming



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# Task 3 – Identify & Review Literature

## Chapter 16 – Estimating the Safety Effect

* Chapter contents:
    1) Reasons for evaluating
    2) Data needs and limitations
    3) Approach to conducting an evaluation
    4) Issues to consider
* NCHRP Synthesis 295 methodologies
    1) Observational cross-section data
    2) Conventional before-after comparisons
    3) Empirical Bayes approach
* EB technique uses SPF to address regression to the mean



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# Task 4 – Revised Annotated Outline

## Chapter 11 – Identification of Sites with Potential for Safety Improvements

11.1 Chapter Overview
11.2 Preliminary Steps in the Network Screening Process
11.3 Data Needs and Acquisition
11.4 Selection of Appropriate Methods for Network Screening
11.5 Network Screening Analysis
11.6 Methods for Identifying Sites with Potential



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# Task 4 – Revised Annotated Outline

## Chapter 12 – Diagnosis of the Nature of Safety Problems

12.1 Chapter Overview
12.2 Office Investigation
12.3 Field Investigation
12.4 Identify Causal Factors
12.5 Assess Whether Potentially Correctable Safety Concerns Exist



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# Task 4 – Revised Annotated Outline

## Chapter 13 – Selection of Countermeasures to Reduce Accident Frequency and Severity at Specific Sites

13.1 Chapter Overview
13.2 Identifying Potential Countermeasures



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# Task 4 – Revised Annotated Outline

## Chapter 14 – Economic Appraisal of all Sites Under Consideration

14.1 Chapter Overview
14.2 Assessing Expected Project Benefits
14.3 Assessing Expected Project Costs
14.4 Displaying Results



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# Task 4 – Revised Annotated Outline

## Chapter 15 – Prioritize Rankings of Improvement Projects

15.1 Chapter Overview
15.2 Alternate Ranking Methods



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# Task 4 – Revised Annotated Outline

## Chapter 16 – Overview of estimating the Safety Effect of Implemented Interventions

16.1 Chapter Overview
16.2 Purpose of Evaluating Safety Treatments
16.3 Alternate Evaluation Methods



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# Guidance from the Panel

1. In Chapter 11, include traditional methods in addition to EB
2. In Chapter 13, Panel is split on whether to include "proven" countermeasures in Part IV
3. Consolidate Chapters 12 and 13
4. Consolidate Chapters 14 and 15
5. In Chapter 15, provide some detail (beyond overview) for prioritizing methods
6. Panel is split on whether or not to consolidate Chapter 16 into Part IV
7. Chapter 16 should provide methods to estimate AMFs