

Interactive Highway Safety Design Model (IHSDM)

AASHTO Subcommittee on Design
July 21, 2009

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Agenda

- Overview
- Module Discussions
- Typical Applications
- Relationship to HSM
- Status and Future Plan
- Additional Resources
- Questions / Discussion



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What is IHSDM?

- A product of FHWA's Safety Research and Development Program
- A suite of software tools that support **project-level** geometric design decisions by providing **quantitative** information on the expected safety and operational performance



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What Highway Types can IHSDM Evaluate?

- Existing and proposed alternative highway geometric designs
- Facility types:
 - Two-lane rural highways (2003)
 - Multilane rural highways (2009)
 - Urban & suburban arterials (2009)



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What Benefits does IHSDM Provide?

- IHSDM results help project developers make design decisions that improve the expected safety performance of designs
- IHSDM helps project planners, designers, and reviewers justify and defend geometric design decisions



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Measures of Safety

- Nominal safety
 - Relative to design policy
- Substantive safety
 - Expected crash frequency
- Operational surrogate measures
 - Speed reduction entering curves
 - Average travel speed
 - Percent time spent following



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Evaluation Modules

- Policy Review
- Crash Prediction
- Design Consistency
- Intersection Review
- Traffic Analysis
- Driver/Vehicle



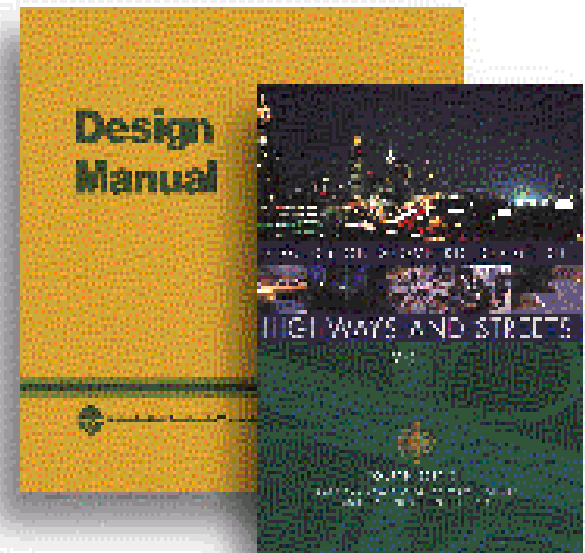
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Policy Review Module

Scope

- Checks roadway segment geometry against relevant design policy and “flags” variations



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Crash Prediction Module

Scope

- Estimates expected crash frequency based upon roadway geometry and traffic volumes



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Design Consistency Module

Scope

- Estimates 85th percentile speed profile along alignment to evaluate operating speed consistency



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Intersection Review Module

Scope

- Expert system that applies rules of good practice in a comprehensive diagnostic review of a single intersection
- Identifies possible safety concerns and typical treatments



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Traffic Analysis Module

Scope

- Traffic simulation model
- Estimates traffic quality of service measures



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Driver/Vehicle Module

Scope

- Simulates driving behavior and vehicle dynamics on a two-lane highway
- Provides profiles of predicted speed and other response variables, via a simulation of a single driver/vehicle combination



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Data Needs

- Vary by IHSDM evaluation module
- Required vs. “optional” data
- All modules required horizontal and vertical alignment
- Highway Segment Data (all modules) and Intersection Data (CPM, IRM)





IRM Diagnostic Review Evaluation Report

IHSDM Analysis Report - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Mail News RSS

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1.1.3 Diagnostic Summary

Diagnostic Review Summary - ihsdm pike/route1

Scope	Status	Concern	Feature			Comment	Treatment	
			Category	Road	Threshold		Design Improvement	Mitigation Measures
Intersection concern	Level 2	Large intersection pavement area	Skewed angle	53.05785 degrees	60.00000 degrees	Skewed intersection, large vehicle turn path	<ol style="list-style-type: none"> 1. Realign one or more legs. 2. Add channelizing islands. 3. Relocate one or more legs. 4. Close one or more legs. 5. Consider smaller design vehicle. 6. Improve drainage. 7. Realign approach. 8. Increase throat width. 	<ol style="list-style-type: none"> 1. Move stop bar.
		Insufficient ISD to right (Case B1)	ISD (horizontal)		208.50 meters	The required time for the maneuver used in the ISD calculations are for passenger cars only ; skewed intersection, horizontal curve	<ol style="list-style-type: none"> 1. Remove roadside obstacles within sight triangle. 2. Close approach. 3. Relocate approach. 4. Make leg one-way away from intersection. 5. Realign one or more legs. 6. Relocate one or more legs. 7. Close one or more legs. 8. Increase curve radius. 9. Remove roadside obstacles on inside of curve. 	<ol style="list-style-type: none"> 1. Remove roadside obstacles within sight triangle. 2. Signalize intersection. 3. Convert to all-way STOP. 4. Post advisory speed on major road. 5. Review speed limit on major road. 6. Install warning sign on major road. 7. Install flashing beacons. 8. Prohibit left turns. 9. Provide intersection lighting.

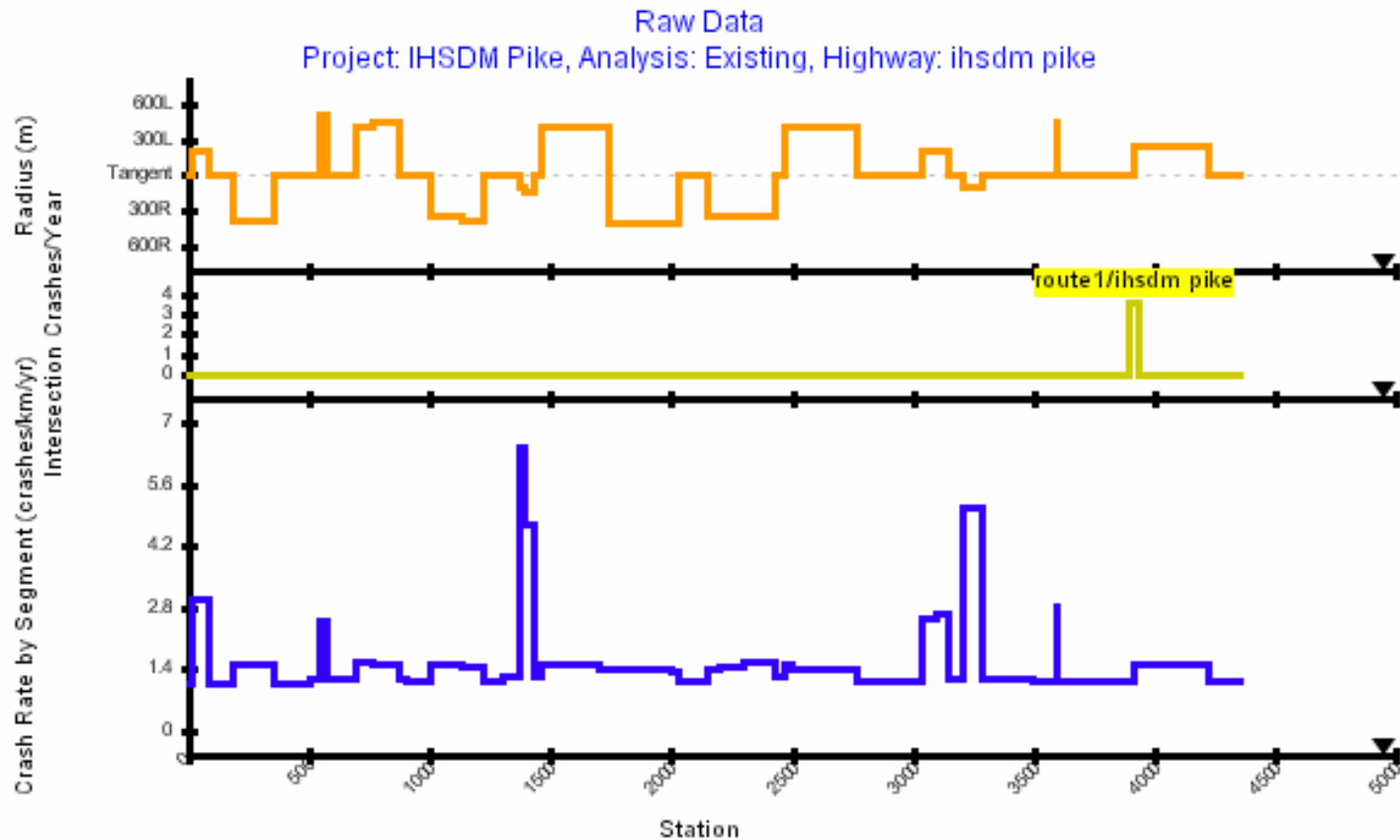
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CPM Evaluation Report

Expected Crashes Graphs



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Who Uses IHSDM?

- Those involved in the highway design process (Designers, Planners, Reviewers)
- State/Local DOTs and their consultants
- FHWA Federal Lands Highway Divisions
- Transportation Researchers
- Universities (Research and Academic Use)
- International users



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Typical IHSDM Applications

- Evaluate relative safety impacts of alternative designs for EIS
- Evaluate expected safety impacts of recently completed improvements
- Safety analysis of preliminary construction plans
- Evaluate operational impacts of passing/ climbing lanes
- In conjunction with Road Safety Audits



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Typical IHSDM Applications

- Quantify relative safety/operational performance of alternatives and compare against other (e.g., environmental, cost) impacts
- Refine alternatives to optimize safety and operational performance
- Evaluate / prioritize 3R safety improvements
- Verify design exception areas





- A. Introduction and Fundamentals
- B. Roadway Safety Management Process
(SafetyAnalyst - AASHTOWare)
- C. **Predictive Methods (IHSDM)**
 - Chapter 10 Rural, Two-Lane Roads
 - Chapter 11 Rural, Multilane Highways
 - Chapter 12 Urban & Suburban Arterials
- D. Accident Modification Factors (CRF
Clearinghouse)



- FHWA intends IHSDM CPM to be a faithful implementation of HSM Part C methodology
- Current IHSDM CPM (2-lane rural) was basis for HSM prototype chapter
- FHWA implements new models and revises 2-lane rural model once approved for HSM 1st Edition - NCHRP 17-26(02) Project

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Status / Future Plans

- Latest 2008 IHSDM Public Release
- 2009 Beta CPM Update: crash prediction capabilities matching the Highway Safety Manual, 1st edition:
 - Two-lane rural highways
 - Multilane rural highways
 - Urban & suburban arterials
- 2010 IHSDM update along with HSM - AASHTO publication



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IHSDM Resources

For additional FHWA Safety R&D program information:

www.tfhrc.gov/safety/ihsdm/ihsdm.htm

IHSDM Technical Support:

IHSDM.Support@fhwa.dot.gov; (202)-493-3407

IHSDM Wiki and software download (free-of-charge):

www.ihsdm.org

IHSDM Training Course:

FHWA-NHI-380071 in NHI catalog at

<http://nhi.fhwa.dot.gov>



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Questions / Discussion

Shyuan-Ren (Clayton) Chen

FHWA Safety R&D

clayton.chen@dot.gov

202-493-3054

Thank you!

