



# A Context Sensitive Solutions (CSS) Webinar

## MnDOT's Move to Greater Flexibility in Design



MN Trunk Highway 1 Southeast of Ely



MN CSAH 3 – Excelsior Blvd in St. Louis Park

Tuesday, December 11, 2012 – 9:30 am to 11:30 am – U of MN CECC

*Your Destination...Our Priority*





# Webinar Presenters / Panelists

- **Scott Bradley** – FASLA, Director of CSS, MnDOT
- **Jim Rosenow** – P.E., Design Flexibility Engineer, MnDOT
- **Mike Elle** – P.E., Design Standards Engineer, MnDOT
- **Julie Skallman** – P.E., State Aid Division Director, MnDOT
- **Amr Jabr** – P.E., Asst. Engineering Services Division Director, MnDOT

*Thanks to the University of Minnesota Center for Transportation Studies and their Continuing Education Conference Center for supporting this MnDOT Webinar*





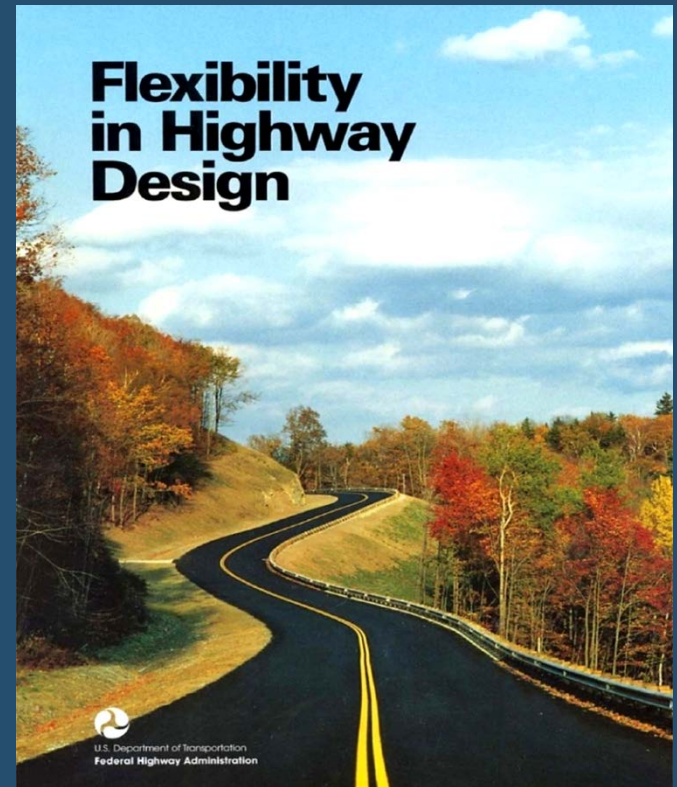
# FHWA Advocacy and Guidance in 1997

## Provocation to Think and Act Differently

Growing out of ISTEA 1991 and NHSDA 1995, **this 1997 FHWA Guide** explored and illustrated flexibilities and opportunities that already exist to balance community, environmental, safety, and mobility objectives in our transportation projects.

*Sufficient flexibility permitted to encourage independent designs tailored to particular situations*

*(Consistent with AASHTO Green Book)*



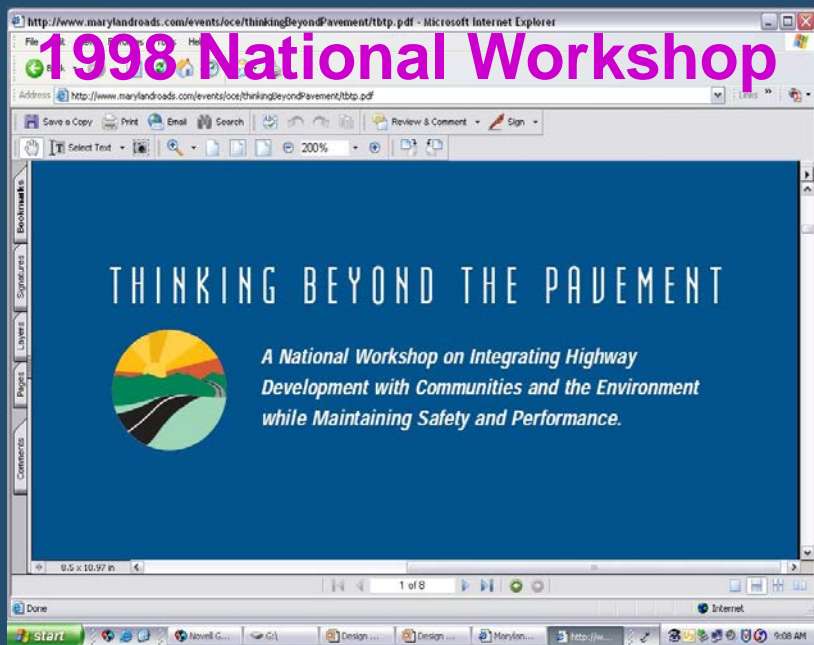
## Provoked Birth of CSS



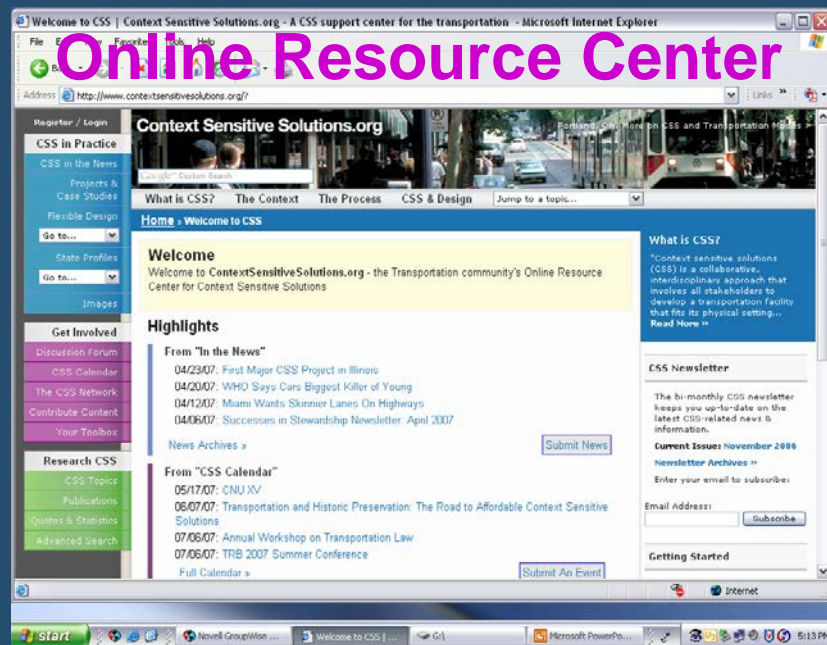


# Birth of Context Sensitive Design & Solutions

Since a 1998 Thinking Beyond The Pavement Workshop, FHWA and AASHTO have promoted Context Sensitive Design ... now Context Sensitive Solutions ... as a desired national transportation approach (Designation of 5 Pilot States to Advance the Effort ... MN, KY, UT, MD, CT)



1998 National Workshop



Online Resource Center

Articulated 15 CSD / CSS Principles

www.contextsensitivesolutions.org



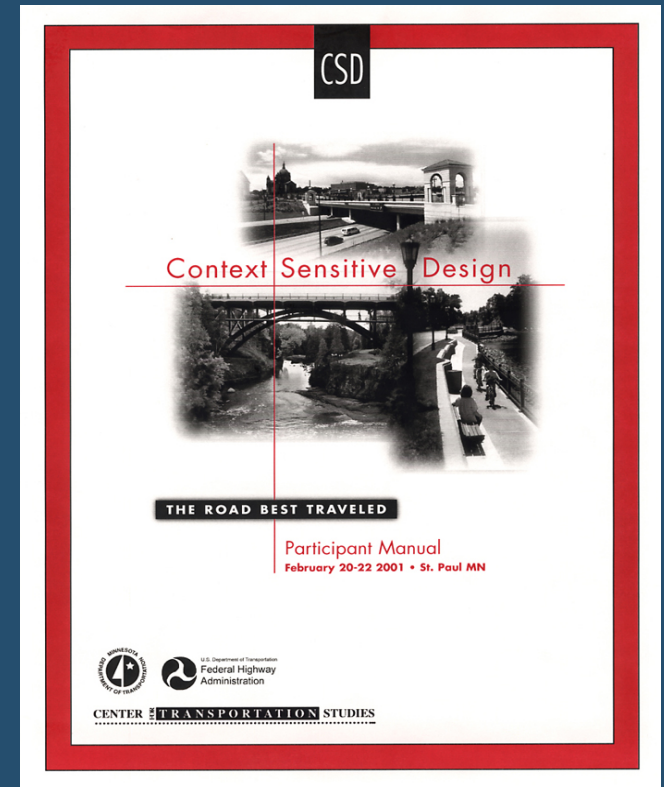


# MnDOT Was Positioned for Leadership in CSS

## Initial MnDOT “Pilot State” Effort (1999 & 2000)

As a “pilot state”, MnDOT partnered with FHWA’s MN Division & U of MN Center for Transportation Studies in advancing our CSD / CSS approach.

Assembled steering team & advisory group that guided a Principle-Based Approach, Training Development and Deployment, Development of Policy (Tech Memo) and Marketing with an emphasis on (6) Core Principles that were deemed critically important ... **many deemed Flexibility in Design as the most important principle.**



[www.dot.state.mn.us](http://www.dot.state.mn.us) (Search A to Z for Context Sensitive Solutions)





# Supporting the MnDOT Strategic Vision & Plan



## Strategic Directions:

- Safety
- Mobility
- Innovation
- Leadership
- Transparency

## Strategic Vision:

Global leader in transportation committed to upholding public needs & collaboration with internal & external partners to create a safe, efficient & sustainable transportation system for the future.

**Vision**  
Global leader in transportation, committed to upholding public needs and collaboration with internal and external partners to create a safe, efficient and sustainable transportation system for the future.

**Mission**  
Provide the highest quality, dependable multi-modal transportation system through ingenuity, integrity, alliance and accountability.

**Critical Issues/Responses**

- Agency Infrastructure**
  - Preserve the state assets and implement efficiency improvements
  - Build trust by applying smart and sustainable solutions
- Environmental concerns**
  - Model responsible stewardship with a Green approach to transportation
- Diversity and demographics**
  - Maintain a workforce that reflects the communities we serve
  - Promote an environment where the entire workforce participates and contributes to the success of our organization
- Rapid change and mobility**
  - Develop innovative methods to ease congestion and improve mobility
  - Promote a results-oriented work environment that supports flexible work schedules and telecommuting
  - Expand multi-modal transportation to create alternative means of use
- Fiscal responsibility**
  - Ensure that future investments are well planned and transparent to all stakeholders
  - Explain innovative financing opportunities
  - Uphold a high standard of fiscal accountability and responsibility

**Strategic Directions**

- Safety** - Preserve and maintain a safe, reliable and modern transportation system
  - Select transportation-related facilities and systems through the use of new and improved technology and safety measures
  - Monitor the condition of existing infrastructure in order to maintain a reliable and efficient transportation system
- Mobility** - Improve access and enhance the movement of people and freight
  - Ease congestion, reduce construction time and improve the quality of life and economic well-being of all Minnesotans
  - Provide more transit and rail options for improving mobility and accessibility in the Metro and Greater Minnesota
  - Maximize operational efficiency of intermodal facilities
- Innovation** - Promote a culture of innovation in the organization
  - Foster innovation and collaborative partnerships within the transportation community by leveraging 21st century transportation solutions
  - Develop ground-breaking, multi-modal transportation projects that will accommodate the diverse needs of all individuals and communities
  - Encourage research and technology by funding, improving and sustain solutions that balance preservation needs and address congestion issues
- Leadership** - Increase the transportation leader and employer of choice for Minnesota's diverse population
  - Mobilize a broad-based, public input and external partnerships to deliver value to the public
  - Value service, excellence and integrity to be an employer of choice
  - Provide development and advancement opportunities for all employees
  - Engage all employees to be leaders and ambassadors for MnDOT
- Transparency** - Build public trust in MnDOT
  - Develop a simple yet comprehensive tool for measuring performance across functions that is efficient, accurate, cost-effective and will show accountability to the public
  - Build relationships within local communities and encourage public involvement in developing transportation solutions
  - Effectively communicate MnDOT's long-range transportation plan, strategic plan and investment objectives, working in an ethical manner for decision making at all levels

**Core Values**

- Maintain safety as a priority
- Behave with transparency and accountability
- Promote collaboration, respect and innovation
- Value diversity and cultural capital through inclusion and opportunity
- Commit to employee well-being, development and success
- Recognize that employees are integral to MnDOT's success





# CSS & MnDOT's Strategic Vision & Plan

## CSS Designated as a Flagship Initiative in December 2009

- To integrate CSS as a business model
- To build customer relationships & trust
- To improve processes & decision-making
- To balance competing objectives
- To seek collaborative & right-sized solutions
- To improve return on investments
- To achieve 20+ CSS-correlated benefits





# Applying CSS Principles As The Foundation

(Graphic from NCHRP Report 642)

Create a lasting value for the community

Use agency resources effectively

Maintain environmental harmony

Address community and social issues

Address aesthetic treatments

Utilize a range of design choices & flexibility

Document project decisions

Track and meet all commitments

Use full range of communication strategies

Achieve consensus on purpose and need

Address alternatives and all modes

Achieve a safe facility for users and community

Use interdisciplinary teams

Involve stakeholders and the public

Seek to fully understand the context







# MnDOT's Flexibility in Design Forum

## Learning From Ourselves and Others - February, 2009

(Maryland, Massachusetts, Pennsylvania, Kentucky, Missouri, Washington, FHWA)



[www.dot.state.mn.us](http://www.dot.state.mn.us) (Search A to Z for Context Sensitive Solutions)





# MnDOT's Flexibility in Design Forum

## Learning From Ourselves and Others - February, 2009

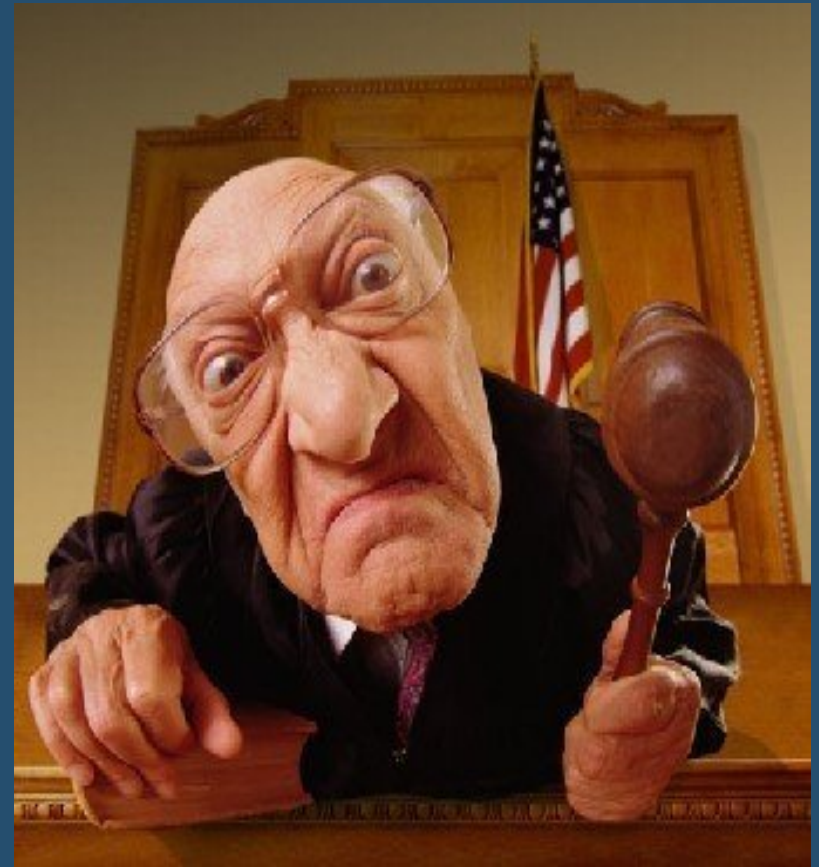
The Forum brought together leaders in the application of flexibility in design to share knowledge and experiences in helping to inform MnDOT's next steps and action planning in tailoring development and implementation of a strategic and performance based Flexibility in Design Initiative.



# Why Flexibility in Design is Important

## Born Out of Necessity:

- Revenue Limitations
- Increasing Needs
- Increasing Costs
- Deteriorating Infrastructure
- Diminishing Resources
- Complete Streets
- Socio-Economic Concerns
- Environmental Concerns
- Quality of Life Concerns ...



# A Couple of Thoughts to Take Away Today

*Even if you're on the right track, you'll get run over if you sit there.*

(Will Rogers)

*A lesson is truly learned if we modify our actions to reflect what we now know.*

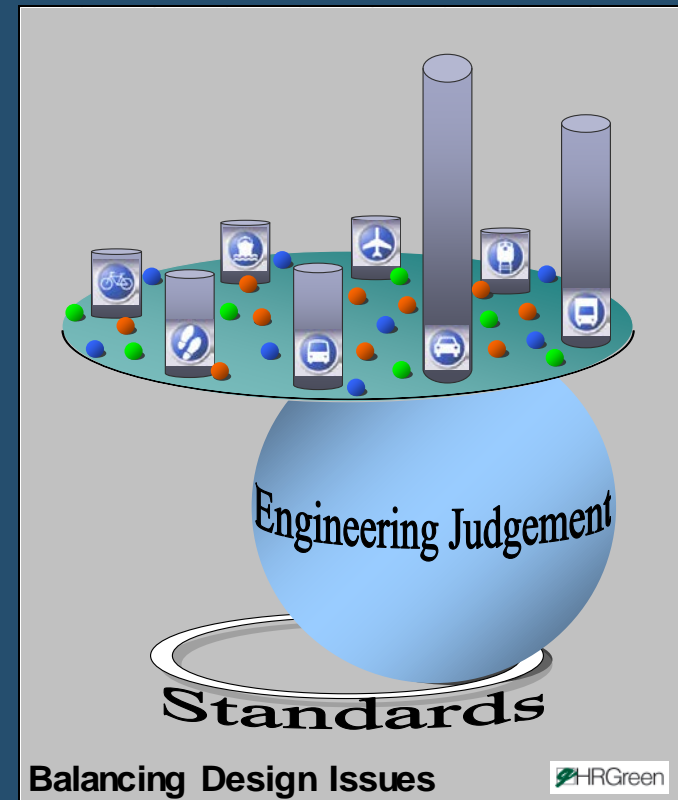
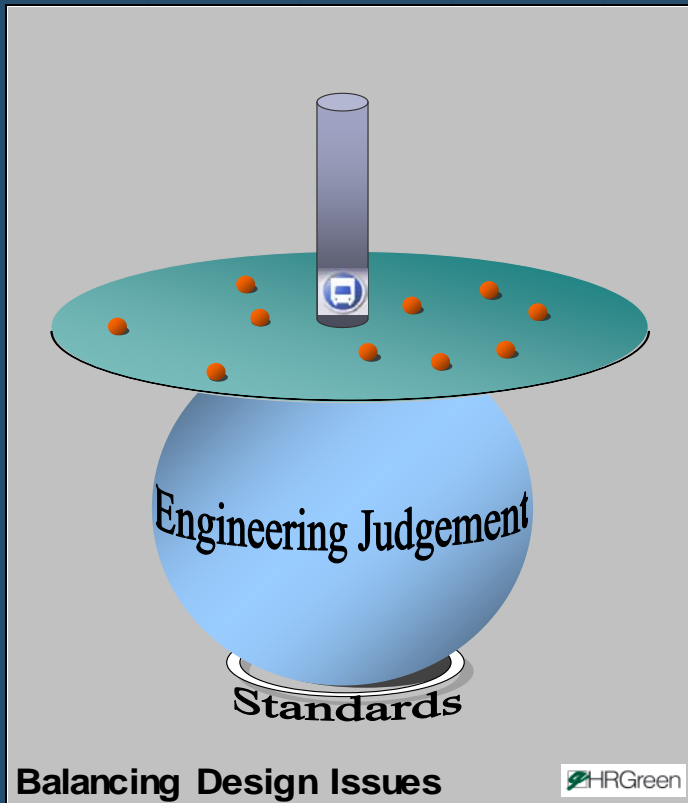
(Vernon LaPlante)

Resistance to Change?



# Some Themes – Balancing Competing Objectives

Community / Regulatory / Transportation Issues & Objectives Across Multiple Modes



It's Difficult To Balance Competing Objectives Within Overly Conservative Design Approaches & Standards





# Some Themes - Reallocating Cross-Section Space

## How Much Space Do You Really Need and For What ?



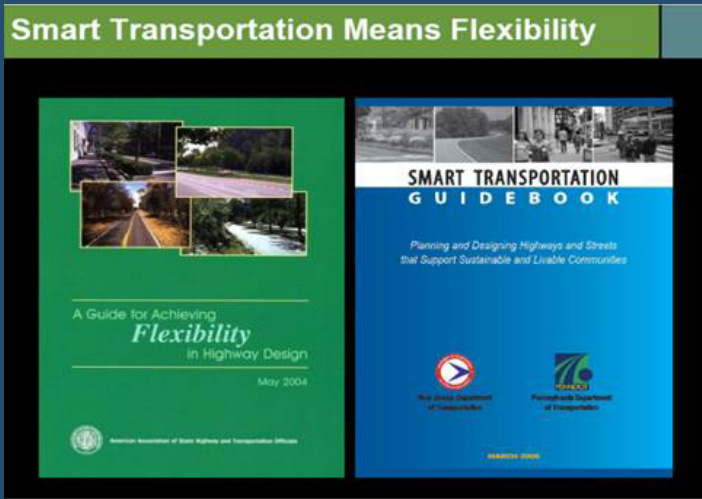
# Some Themes - Substantive vs. Nominal Safety

Nominal Guidelines & Design Standards are often seen and used as general Absolutes without adequately evaluating applicability to unique attributes

Actual Needs and Substantive Safety and Performance fall on a continuum based upon unique roadway, setting, and user attributes

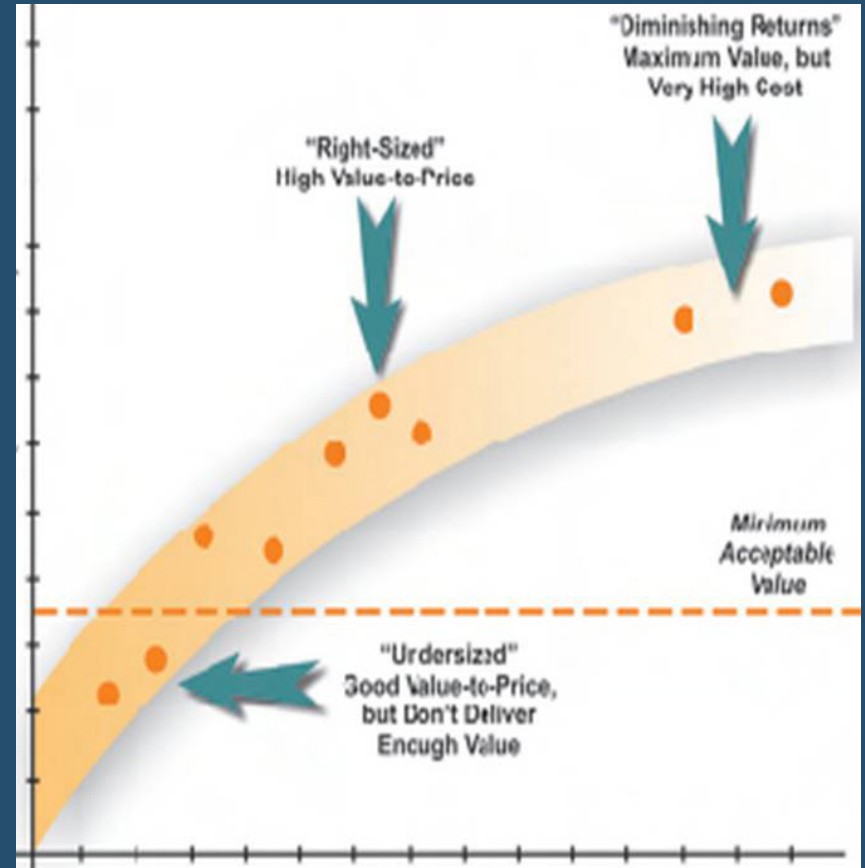


# Some Themes - Optimizing Return on Investments



Right-Sizing design elements to the point of diminishing returns for Higher Benefit to Cost Ratios and the capability to achieve greater public benefits without greater cost

VALUE (all benefits)



PRICE (cost + impacts)





# Learning From Others - KY Practical Solutions

<u>Gross Section</u>	<u>Crashes per Year</u>	<u>Cost/Mile (millions)</u>	<u>Travel Speed (mph)</u>	<u>Miles</u>
2 Lane 12 ft L, 8 ft S	2.9	\$7.2	46.7	69.4

Miles improved w/\$500 m 4/2/2008

<u>Gross Section</u>	<u>Crashes Per Year</u>	<u>Cost/Mile (millions)</u>	<u>Travel Speed (mph)</u>	<u>Miles</u>
4 Lane 12 ft L, 8 ft S	2.4	\$21.5	55.9	23.3

Miles improved w/\$500 m

Options for improving mobility and safety on their existing system of two-lane highways



# Learning From Others - KY Practical Solutions

The Improved 2 Lane Cross Section has Higher Return on Investment as compared to the 4 Lane Cross Section

At a System Level you get a 200% increase in miles you improve, a 150% increase in total crash reductions and a 9% increase in total travel time reductions ... therefore, a more Practical Solution with a \$500 million budget

## Road Improvement Example

Available budget \$500 m to improve 2 lane roads

Cross Section	Crashes per Year	Cost (millions)	Speed (mph)	Total Reductions		
				Miles	Crashes	Travel
2 Lane, 10 ft/2 ft	5.4	--	41.4	--	--	--
2 Lane, 12 ft/8 ft	2.9	\$7.2	46.7	69.4	173.5	367.8
4 Lane, 12 ft/8 ft	2.4	\$21.5	55.9	23.3	69.9	337.9

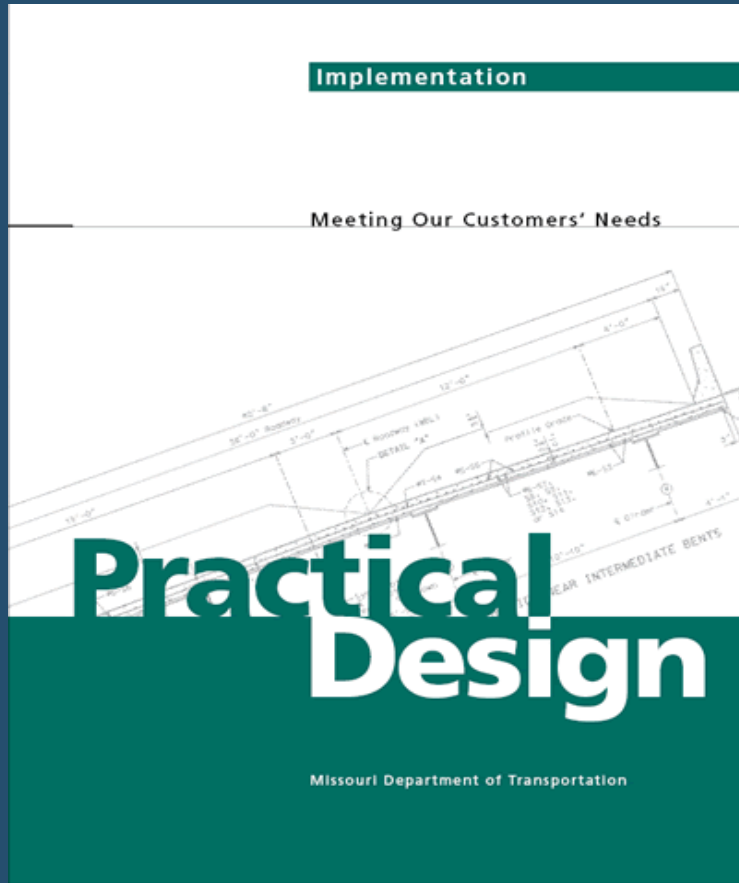
More miles, fewer crashes and fewer delays for same budget!





# Learning From Others - MODOT

## Ensuring Projects as Good Solutions for the Context ... "Right Sizing"



- Improvements considered based on their contribution to the system instead of their individual perfection
- Each District was challenged to cut the budget of their STIP by 10% while still delivering the Program
- Engineers were told to put their design manuals on the shelf and follow 3 rules:
  - 1) Every project must get safer
  - 2) Collaboration is needed in every solution
  - 3) Practical solutions must function properly without leaving maintenance challenges





# Learning From Others - MODOT



- The challenge resulted in savings of \$400 Million across a 5-year STIP
- Missouri demonstrated the largest drop in traffic fatalities in 2006 and the downward trend continued
- 5-year STIP delivered under budget
- Pavement condition went from 3<sup>rd</sup> worst to 9<sup>th</sup> best
- 83% of MODOT's major roads were elevated to good condition (up 47%)
- Customer satisfaction with MODOT rose to 78% in 2008 and 90% of the newspaper editorials were positive
- 95% of customers believed MODOT projects were the right solutions





# MN TH 100 Retrofit - St. Louis Park Case Study

## Narrowed Lanes & Shoulders to Add 3<sup>rd</sup> Lane Each Direction



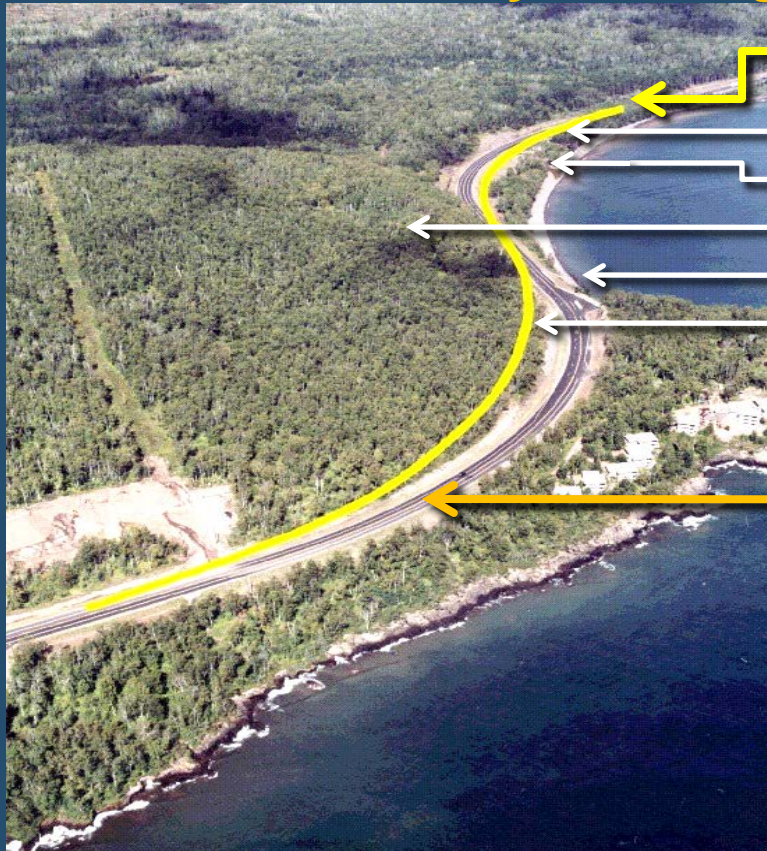
Reduced Congestion & Crashes (13:1 Benefit To Cost Ratio)





# MN TH 61 North Shore Hwy Reconstruction Case Studies

## Flexibility in Design Along Good Harbor Bay



Explored Higher Design Speed Alignments

Limited Use Safety Rest Area

Shoreline & Creek Erosion

State Park Land

Historic Overlook & Vistas

Cliff & Falling Rock Area

Commercial Development

Residential Development

Selected Lower Design Speed (55mph)

Reduced Design Speed Maximized Geometric Flexibility to Balance Competing Objectives and Reduced Costs & Annual Crashes ( 56% )





# MN TH 61 North Shore Hwy Reconstruction Case Studies

## Influencing Driver Behavior Through Schroeder, MN



Vehicle Simulator Evaluation of Potential Traffic Calming Options

Contrasting Pavement Colors had the Most Pronounced Influence



More than a 70% Decrease in the Annual Average of Post-Reconstruction Crashes





# MN TH 38 Reconstruction Case Study

2005 AASHTO Best CSS Project Award - National Best Practices in CSS Competition

## Flexibility in Design:

- Reduced design speed (50 mph) provided greater geometric flexibility to address constraints and balance the competing objectives
- Upgraded to 10-ton road but maintaining much of the existing horizontal & vertical alignments ... balanced with strategic spot and intersection improvements where accident frequency was documented
- 12' lanes, 4' paved shoulders with 2' of added reinforced soft shoulder, rumble stripes, steeper back slopes and variable ditch cross-sections to minimize adverse environmental impacts and costs







# MN TH 38 Reconstruction Case Study

## Some Lessons Learned:

- Reconstruction was advanced 10 years ahead of schedule
- **Reduced adverse impacts dramatically and costs by more than 40%**
- Non-conformance with nominal standards and geometric design guidelines, does not mean a highway will be “substantively” unsafe ... it all depends on the unique combinations of circumstances / attributes
- **Total accidents were reduced 55% + in the 5-year analysis after completion of the first reconstruction segment ... even more so in the second reconstruction segment**






# MN CSAH 3 Excelsior Blvd Case Study

## Flexibility in Design - St. Louis Park, MN

ITE

Context Sensitive Solutions In Designing Major Urban Thoroughfares for Walkable Communities

An ITE Proposed Recommended Practice



Context Sensitive Solutions  
In Designing Major Urban Thoroughfares  
for Walkable Communities

ite  
Institute of Transportation Engineers



Case Study in ITE's 2006 Proposed Recommended Practice Publication



# MN CSAH 3 Excelsior Blvd Case Study

- **Reduced design speed and flexibility in design** (narrowed lanes, shortened turn lanes, etc.) **reallocated space to balance stakeholder needs and objectives while also calming traffic and improving safety for all modes and users**
- **Other improvements** include on street and off street parking in shared mid-block structures, pedestrian safety and comfort amenities, off route bicycle accommodation, near and far side transit stops, public seating and green spaces to create integrated & mutually supportive transportation and land use
- **Crashes were reduced over 60 % in the first segment of reconstruction**





# MnDOT Advanced Flexibility in Design Workshops

Piloted in 2009 and Typically Offered Twice a Year

2.5 Day “Roll Up Your Sleeves” Workshop Focus Includes:

- Rationale for Using Design Flexibility
- Introduction to a Performance Based Approach & Tools
- Using Traffic Data
- Serving All Modes / Users of Transportation
- Risk Management & Safety
- Selecting Design Speed
- Allocating Space in Confined Cross-Sections & Intersections
- Designing Horizontal & Vertical Alignments
- Designing Freeway Interchanges
- Minimizing Construction Impacts
- Classroom Exercises & ADA Field Walk

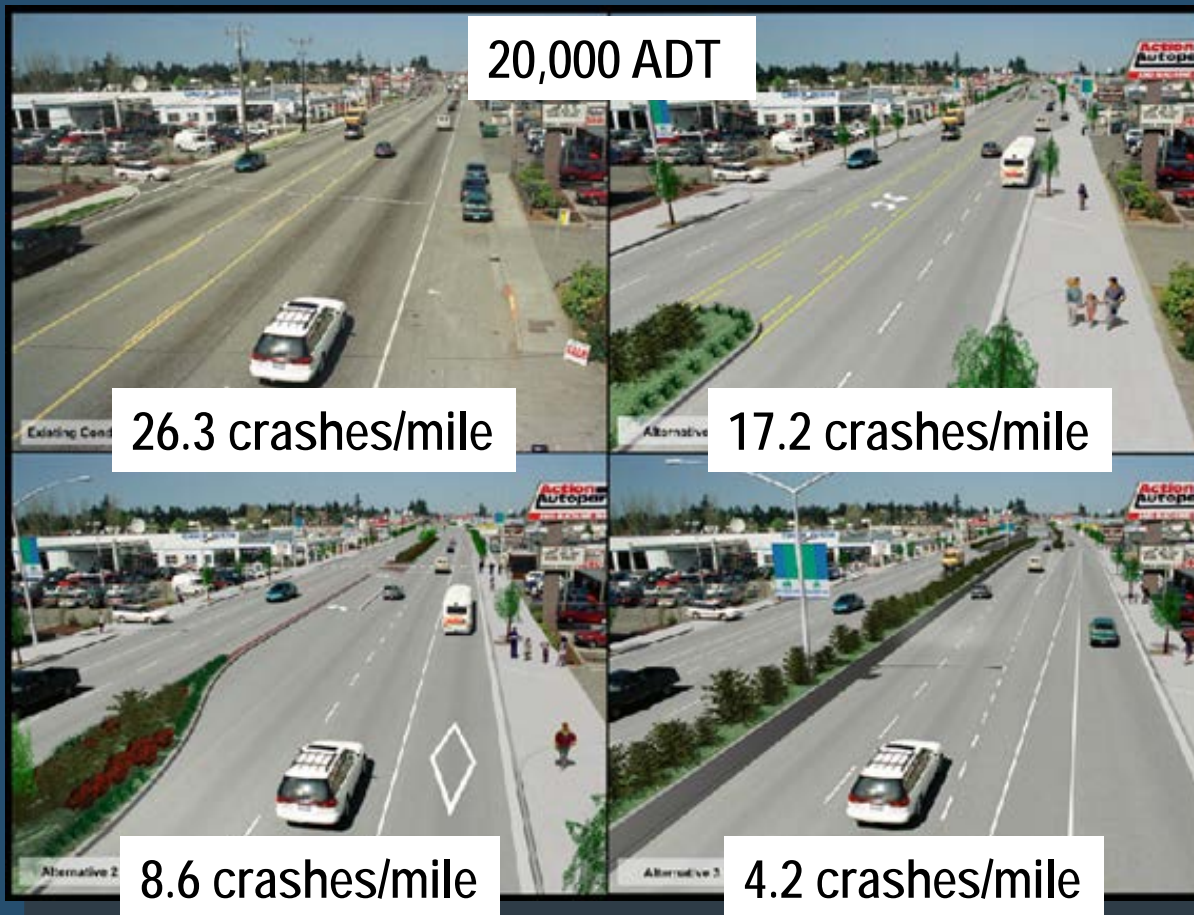
[www.dot.state.mn.us](http://www.dot.state.mn.us) (Search A to Z for Context Sensitive Solutions)



# New Tools for Performance Based Flexibility in Design

## New AASHTO Highway Safety Manual "Predictive Modeling" Tools

Existing



Option 1

Option 2

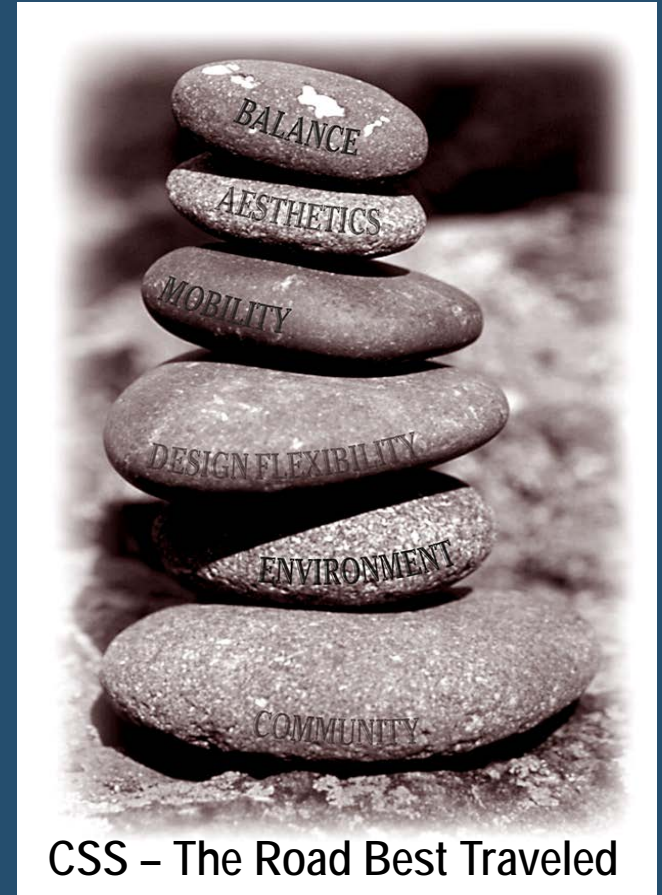
Option 3





**For Questions and More Info:**

Scott Bradley – Mn/DOT Director of CSS  
[scott.bradley@state.mn.us](mailto:scott.bradley@state.mn.us)



CSS – The Road Best Traveled

*Your Destination... Our Priority*



# 2009 Flexible Design Forum

## Breakout Sessions:

- 1) Institutional challenges
- 2) Performance objectives
- 3) Design flexibility



<http://www.cts.umn.edu/contextsensitive/worksops/flexible/documents/whitepaper.pdf>



# 2009 Flexible Design Forum

Breakout Sessions – highest-voted institutional challenges:

1. Culture, silos, authority and discretion
2. Project versus system perspective
3. **Overly conservative and rigid standards**
4. Perception that flexibility defeats safety
5. Competing performance measures





# 2009 Flexible Design Forum

Breakout Sessions – highest-voted  
institutional challenges:

6. Lack of technical knowledge, data and understanding
7. Multimodal priorities and perspectives
8. Purpose and need issues / lack of clarity
9. Design speed, speed management
10. Liability and design exception concerns





# 2009 Flexible Design Forum

## Breakout Sessions – other noteworthy concerns:

- Inconsistent application – district to district, project to project, person to person
- No common philosophy on design exceptions
- FHWA rigid and inconsistent
- Perfect being the enemy of good
- Lack of agreement on what's good enough



# 2009 Flexible Design Forum

## Highest Voted Next Steps:

1. Emphasize purpose & need and scoping process
2. Expand training and resources
3. Review and update trunk highway design standards
  - Flexibility
  - Alignment with AASHTO criteria
4. Develop and define the vision





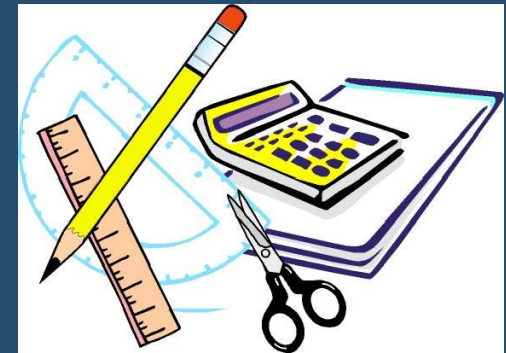
# 2009 Flexible Design Forum

## Highest Voted Next Steps:

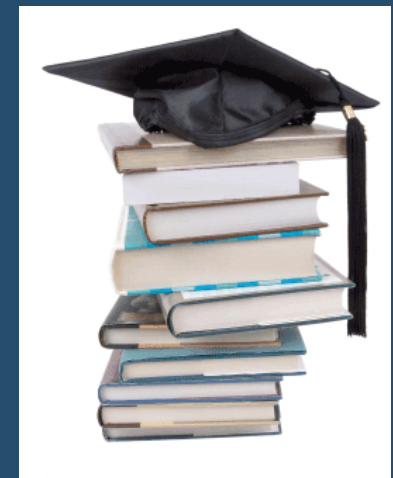
5. Involve the right people and perspectives
6. Develop policy and guidelines
7. Research, document and disseminate case studies
8. State Aid rules and standards should also be addressed



# Advanced Flexibility in Design Curriculum



- Piloted four months after the Flexible Design Forum (June 2009)
- Latest offering was last month
- Seeks to give design practitioners the expertise they need to apply flexibility
  - ...or at least orient them to the flexible design mindset and teach them how to learn more





# Advanced Flexibility in Design Curriculum

## Correlates to Next Steps:

1. Emphasize purpose & need and scoping process
2. Expand training and resources
7. Research, document and disseminate case studies



# Re-think of Trunk Highway Road Design Policies

## Correlates to Next Steps:

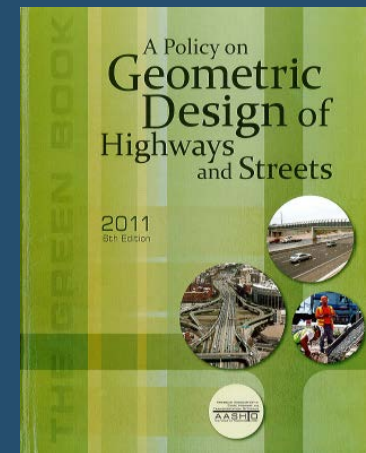
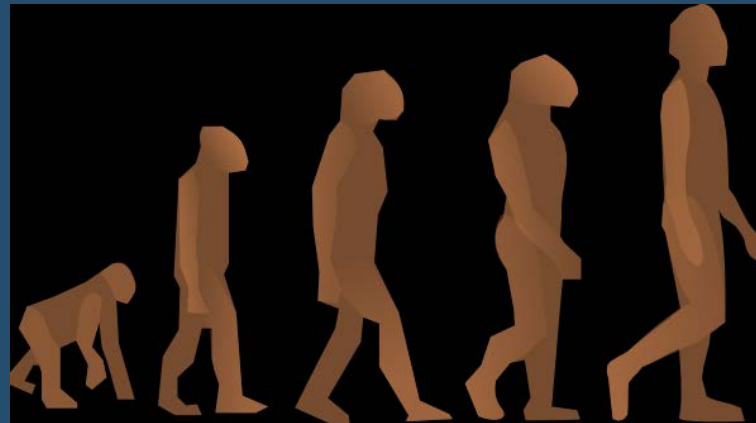
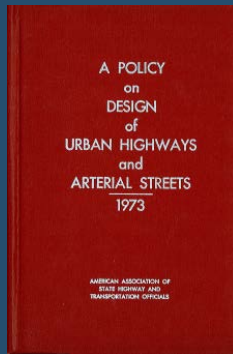
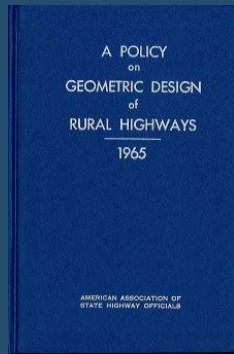
3. Review and update trunk highway design standards
  - Flexibility
  - Alignment with AASHTO criteria
5. Involve the right people and perspectives
6. Develop policy and guidelines



# Re-think of Trunk Highway Road Design Policies

Root problem:

AASHTO

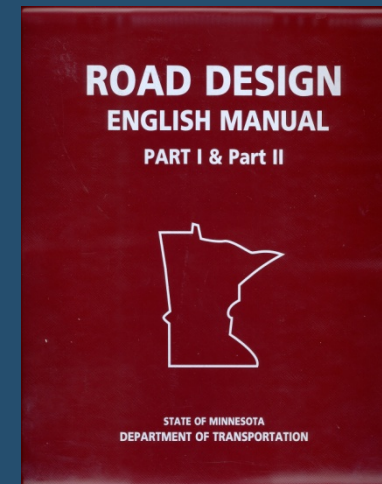
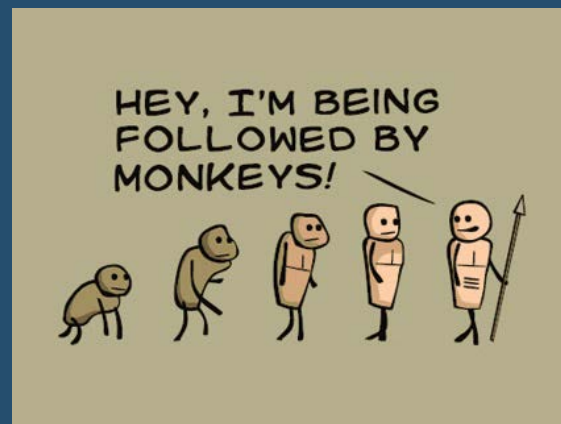
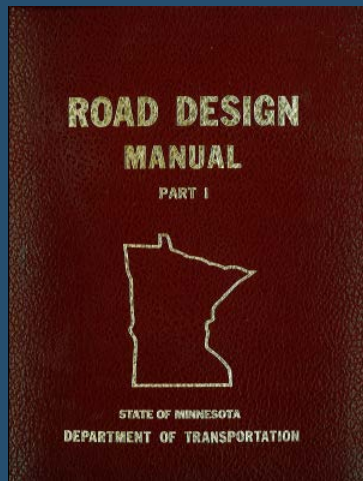




# Re-think of Trunk Highway Road Design Policies

Root problem:

## Minnesota



# Re-think of Trunk Highway Road Design Policies

## Additional/related institutional issues:

- Culture has the same inertia as written word
- 'Bigger is better' mentality
- Association of spending with benefit
- Oversimplification – i.e. one size fits all
- 'Perfect project' mentality
- Confusion with need, problem and scope





# Design Standards, Changes to the 13 Controlling Criteria

*A Move Towards Greater Design  
Flexibility*

*Mike Elle  
December, 2012*





## • “Standard” Does Not Mean “Best”

- ▶ “Unfortunate that the word “standards” should have been chosen. Strictly interpreted, the meaning would indicate that the standard design was the best design.
- ▶ Standards are merely recommended designs which are to be adhered to unless conditions indicate that a variation in the design would meet them better.
- ▶ To neglect the detailed study of local conditions often results not only in an unwarranted increase in cost, but may result in a type of construction which fits poorly the location where used”.

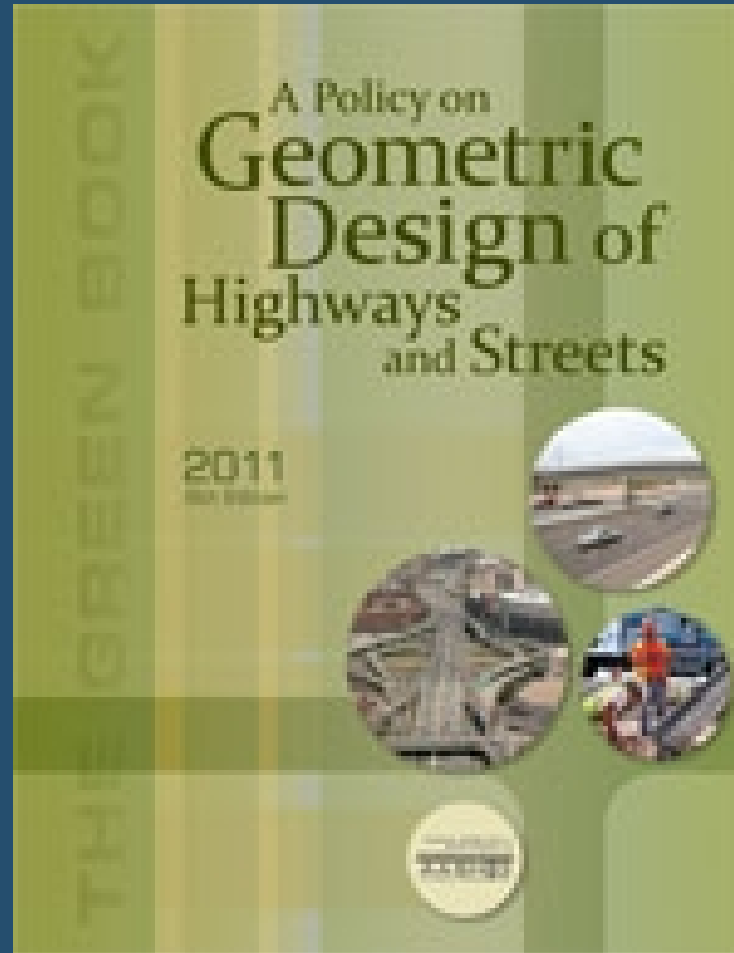
SOURCE: “The Use and Abuse of Road Standards”,  
Engineering and Contracting, Vol. 42, No. 7, (page 145), August 1914



# AASHTO

A Policy on  
Geometric  
Design of  
Highways  
and Streets.

**“GREEN BOOK”**  
**2011**





# “GREEN BOOK”

Single Print  
(\$200)

Web Single  
user (\$164)

Web 5-user  
(\$720)

Web 10-  
user  
(\$1,280)



AASHTO GDHS - 6th Edition - AASHTO A Policy on Geometric Design of Highways and Streets

My Green Book

AASHTO Green Book 2011

- AASHTO Green Book 2011
  - Table of Contents
  - Foreward
  - Executive Committee 2010-2011
  - 1. Highway Functions
  - 2. Design Controls and Criteria
  - 3. Elements of Design
  - 4. Cross-Section Elements
  - 5. Local Roads and Streets
  - 6. Collector Roads and Streets
  - 7. Rural and Urban Arterials
  - 8. Freeways
  - 9. Intersections
  - 10. Grade Separations and Interchanges
  - Index

Search:

Chapter Equations Figures Tables References Bonus Material

AASHTO A Policy on Geometric Design of Highways and Streets  
6th Edition

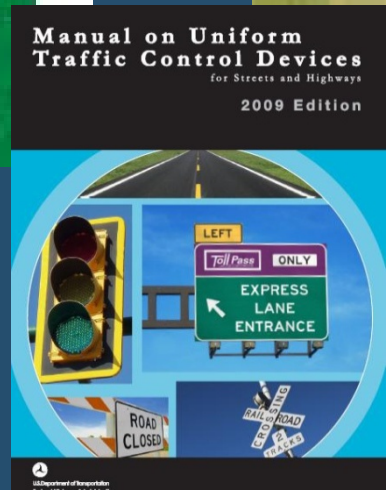
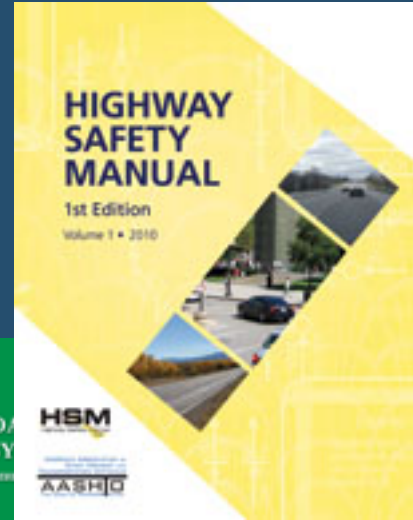
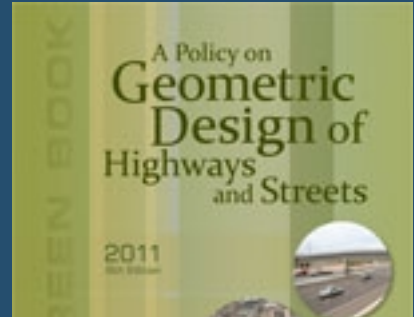
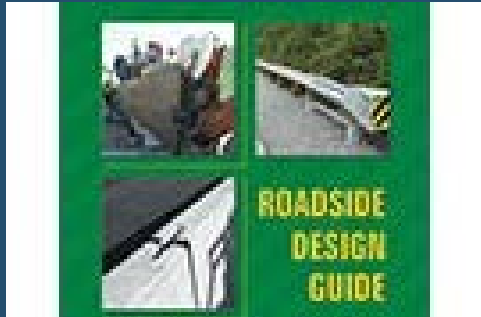
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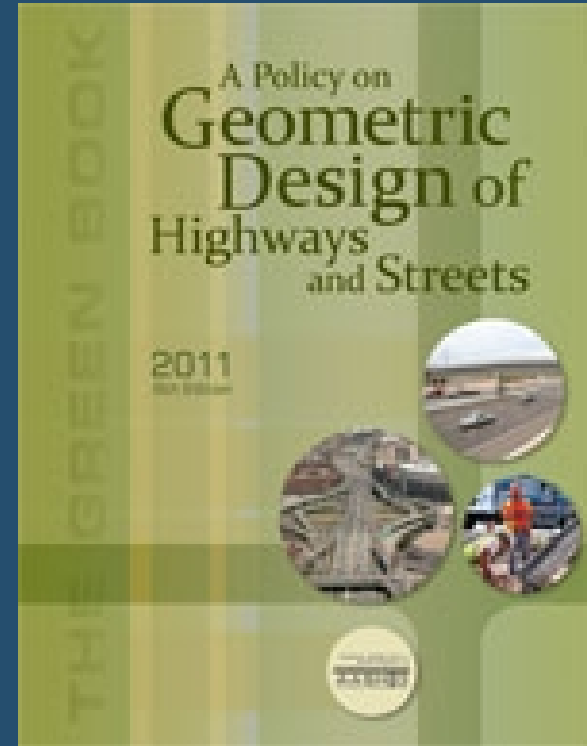
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# Roadway Design Standards, Guides, and References.



## The *Green Book* covers a wide range of geometric elements and design dimensions.

- Thirteen criteria, commonly referred to as the:  
**13 controlling criteria.**
- Identified by FHWA as having substantial importance to the operational and safety performance of any highway. Such that special attention should be paid to them in design decisions.





# Standards / Policy

Federal Highway Administration

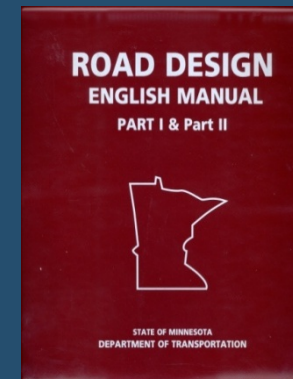
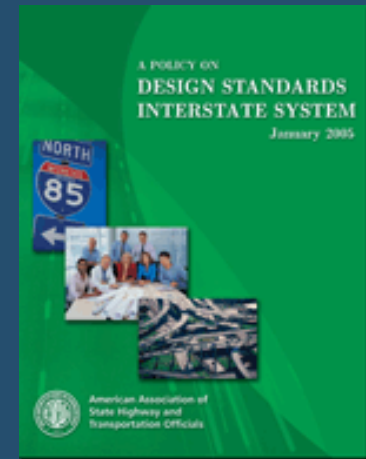
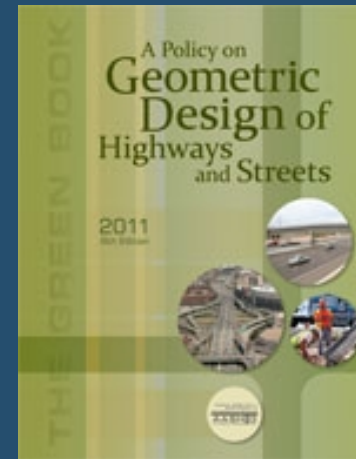


Adopts AASHTO for the NHS

Green Book | Interstate Design Standards



State Standards Must Meet Green Book Values as a Minimum



# • 13 Controlling Criteria

1. Design speed
2. Lane width
3. Shoulder width
4. Bridge width
5. Horizontal alignment
6. Super-elevation
7. Vertical alignment
8. Grade
9. Stopping sight distance
10. Cross slope
11. Vertical clearance
12. Lateral offset to obstruction
13. Structural capacity

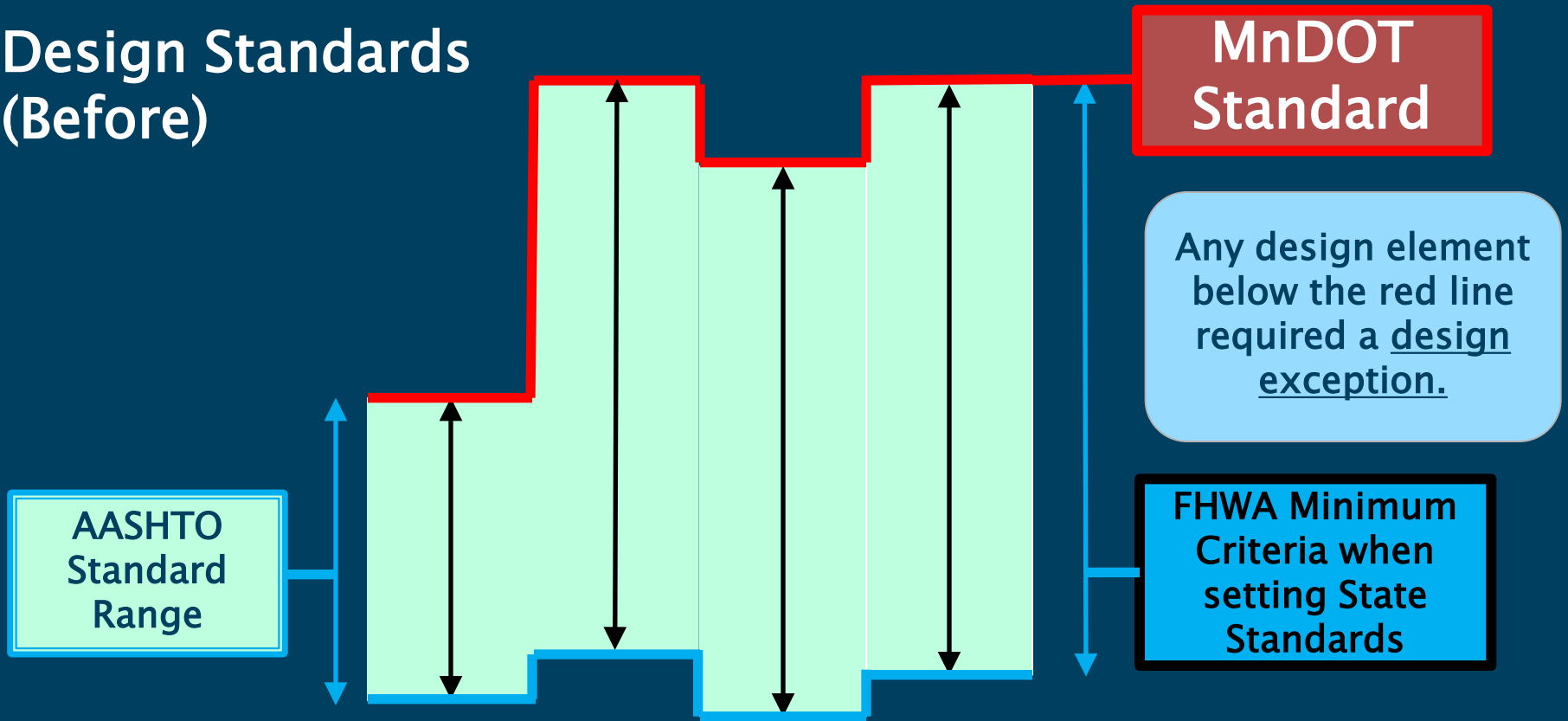


# • 13 Controlling Criteria

1. Design speed (TM)
2. Lane width (TM)
3. Shoulder width (TM)
4. Bridge width (TM)
5. Horizontal alignment (TM)
6. Super-elevation (TM)
7. Vertical alignment (RDM)
8. Grade (TM)
9. Stopping sight distance (RDM)
10. Cross slope (TM)
11. Vertical clearance (TM)
12. Lateral offset to obstruction (RDM)
13. Structural capacity (ongoing)



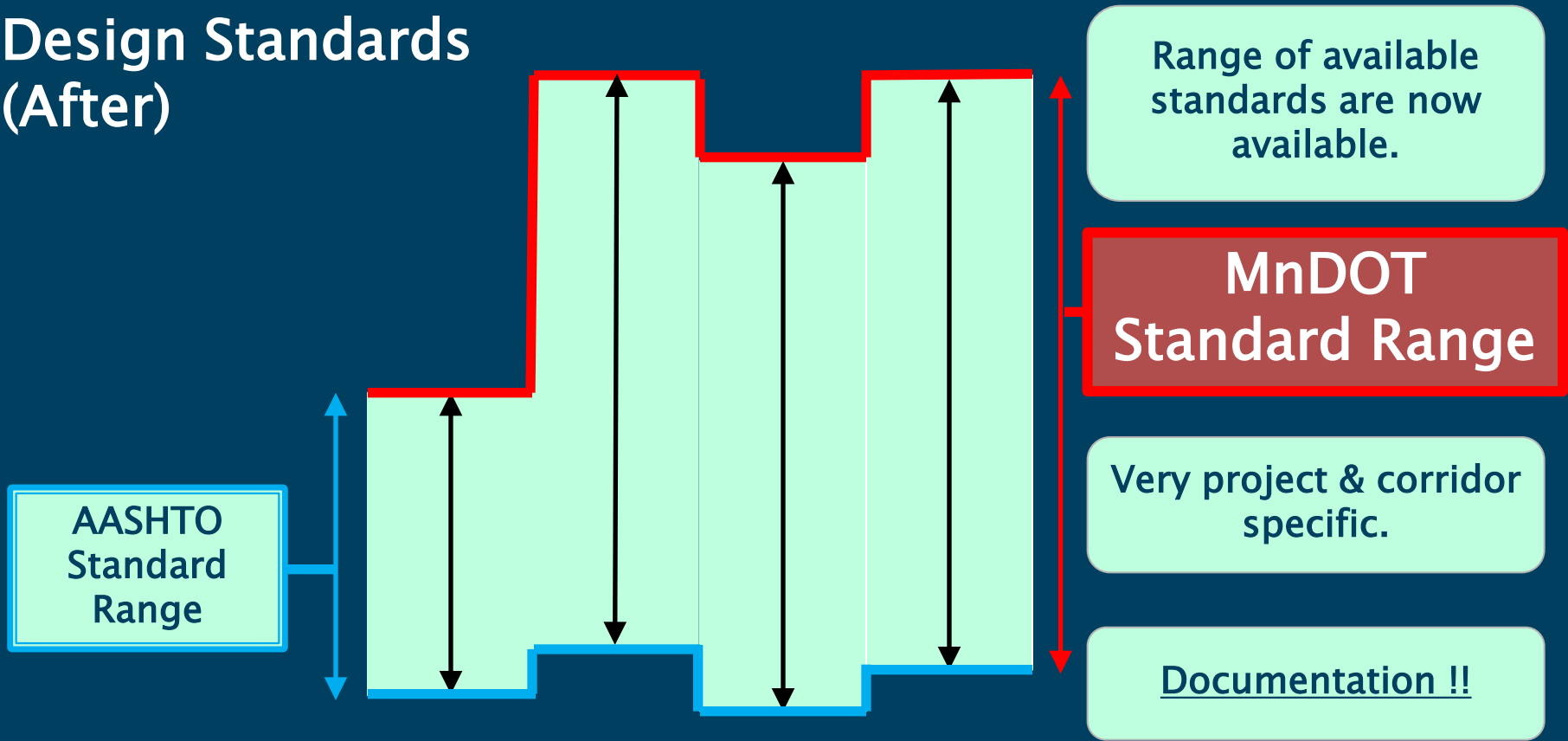
## Design Standards (Before)



*Your Destination... Our Priority*



## Design Standards (After)



*Your Destination... Our Priority*



# • 13 Controlling Criteria

1. Design speed (TM)
2. Lane width (TM)
3. Shoulder width (TM)
4. Bridge width (TM)
5. Horizontal alignment (TM)
6. Super-elevation (TM)
7. Vertical alignment (RDM)
8. Grade (TM)
9. Stopping sight distance (RDM)
10. Cross slope (TM)
11. Vertical clearance (TM)
12. Lateral offset to obstruction (RDM)
13. Structural capacity (ongoing)







# MnDOT Tech Memo Web Page

http://techmemos.dot.state.mn.us/



Minnesota Department of Transportation

Home | About Mn/DOT | Doing Business | Getting Around | 

Mn/DOT A to Z | Contact | Simple Search | Advanced Search | 

## Technical Memorandums

Mn/DOT's Active Technical Memorandums (TM) and Historical TMs Dating to 1990 are available here

[Disclaimer](#) [Subscribe](#) [Contact Us](#)

Issuing Office:  Search By TM# / Subject:  Search Status:  YearIss.:  YearExp.:

53 Records Found Show  Records per page

Tech Memo	Subject	Status	Issue Date	Expire Date
09-12-MAT-03	Pavement Selection Process	Active	10/14/2009	9/16/2011
09-13-IM-01	Implementation of Minnesota Statewide Transportation Plan Cost-Effectiveness Policy	Active	9/22/2009	9/30/2011
09-09-MAT-02	Policy and Process for Seasonal Load Limit Starting and Ending Dates	Active	7/15/2009	6/29/2014
09-07-TS-02	Design guidelines for locating deep ponds along freeways	Active	5/29/2009	5/27/2014
09-03-ENV-01	Uniform Seed Mixtures	Active	5/29/2009	1/01/2014
08-13-TS-05	Pedestrian (Curb) Ramp Guidelines	Active	12/10/2008	12/10/2013
08-17-ENV-01	Noise Exemption	Active	12/05/2008	12/05/2013

**Quick Links**

- [Design Scene](#)
- [Metro Sample Plan](#)
- [Road Design Manual](#)
- [Standard Plans](#)
- [Standard Specifications for Construction](#)
- [Standard Plates](#)



## 2. Lane Width

### Tech Memo 12-07-TS-02

#### Traveled Lane Width Standards for State Highways

- Final selection of the traveled lane width should be thoroughly documented
- Two tables; one for Rural and the other for Urban/Suburban
- Both based on Functional Classification and design speeds, Rural adds ADT.
- Values follow Green Book, and range from 9' – 12'





## 3. Shoulder Width

### Tech Memo 12-12-TS-06

#### Shoulder Width Standards for State Highways

- Final selection of the shoulder width should be thoroughly documented
- Three tables; one for Collectors, Arterials, and Interstates/Freeways
- Based on Rural and Urban/Suburban, ADT, # of Lanes and configuration, Left and Right, usable and paved
- Numerous qualifying notes and design guidance



# 10. Cross Slope

## Tech Memo 10-05-TS-02

### Traveled Way Pavement Cross-Slopes

- Final selection of the cross-slope should be thoroughly documented.
- One Table; Pavement Cross Slope on Tangent Sections.
- Based on Functional Classification, Rural and Urban
- Numerous qualifying notes



# 10. Vertical Clearance

## Tech Memo 11-16-B-07

### Vertical Clearance Requirements for New Construction

- Final selection of the vertical clearance should be thoroughly documented.
- One Table; Vertical Clearance for Underpasses.
- Based on structure type, new bridges, and new pavement under existing bridges.
- Numerous qualifying notes and design guidance.
- Super Load OSOW corridor guidance included.





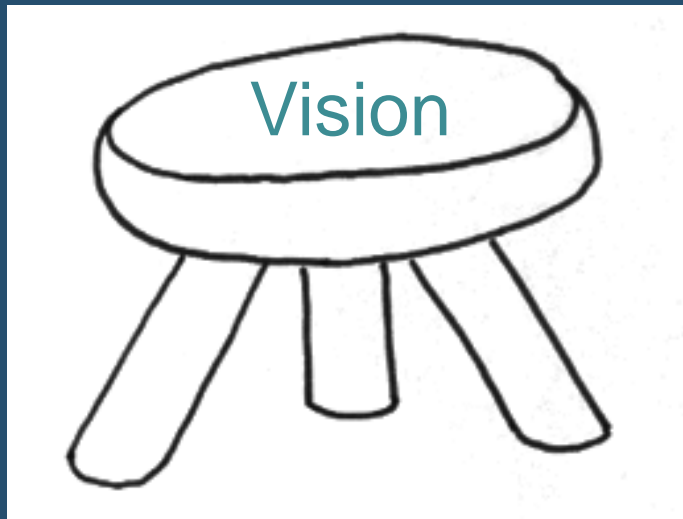
Contact: Mike Elle  
Office of Project Management  
and Technical Support  
[Michael.elle@state.mn.us](mailto:Michael.elle@state.mn.us)  
(651) 366-4622





# So, where do we go from here?

Policy



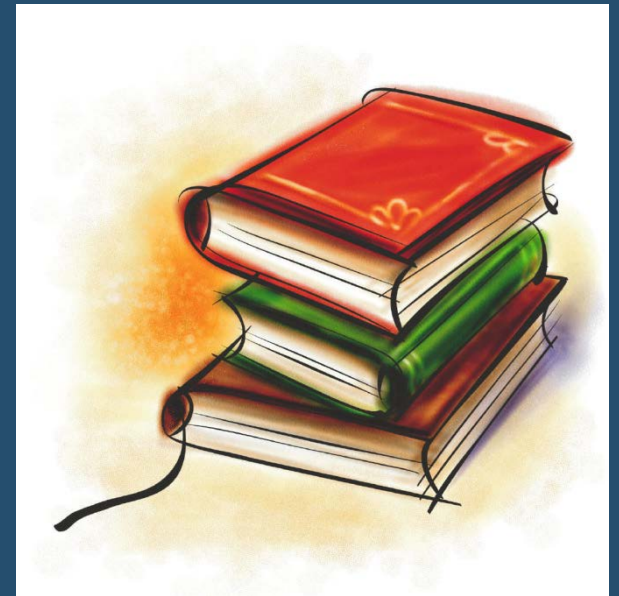
Projects

Education & Outreach



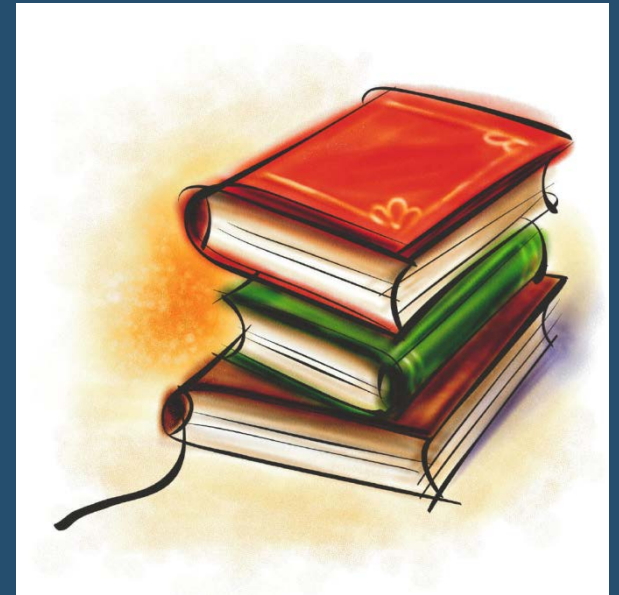
# Education and Outreach

- **Continued offerings and continuous improvement of advanced flexibility class**
- **Development of more courses?**
- **Rollout of 13 Controlling Criteria changes**



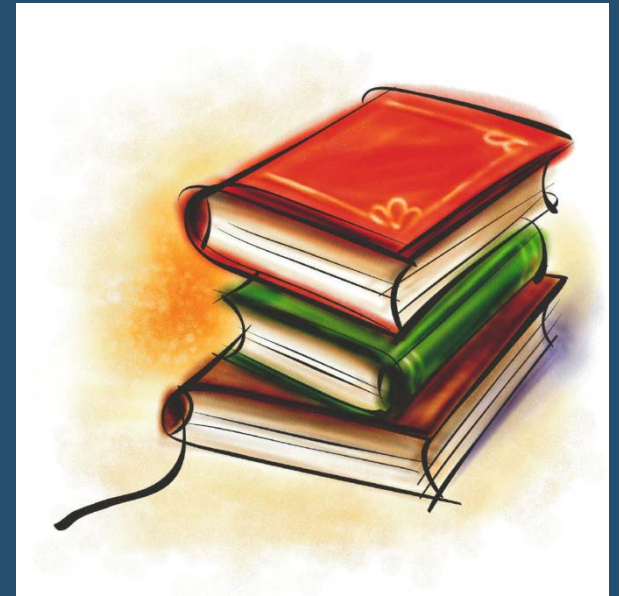
# Education and Outreach

- **13cc rollout**
  - In-person sessions at design offices
  - Ongoing customer support
- **Additional informal sessions & seminars**



# Education and Outreach

- **Goals:**
  - Broad statewide expertise
  - Everyone on board and rowing in the same direction
  - Continuous and ongoing communication
  - Feedback loop into policy refinements

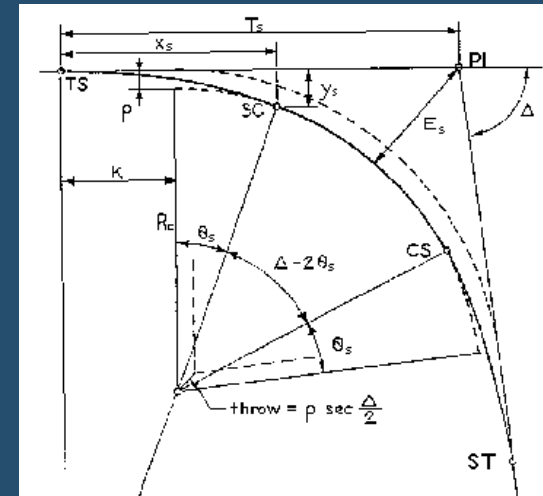




# Policy

(Specifically, road design policy and criteria)

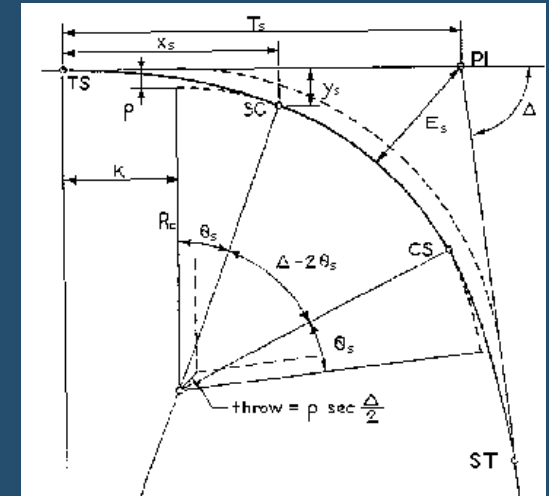
- Incorporation of 13cc revisions
  - Each on their own time frame
- ‘Flexible-ization’ and selective relaxation of the general design elements



# Policy

## MnDOT Design Policies:

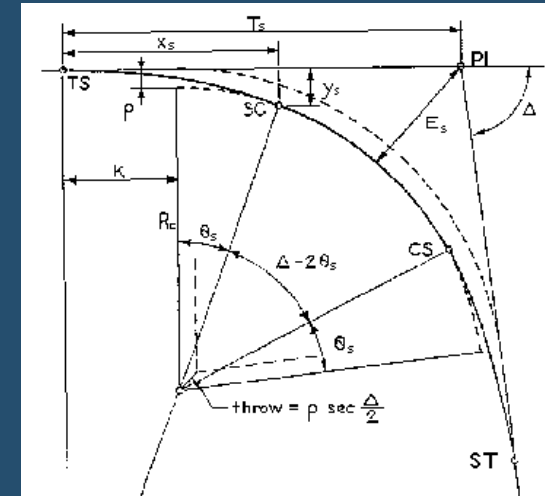
- Right-sizing and alignment with AASHTO
- Exploration of flexibility
- Innovative methods and approaches
  - Integration with the HSM
  - Other performance-based strategies



# Policy

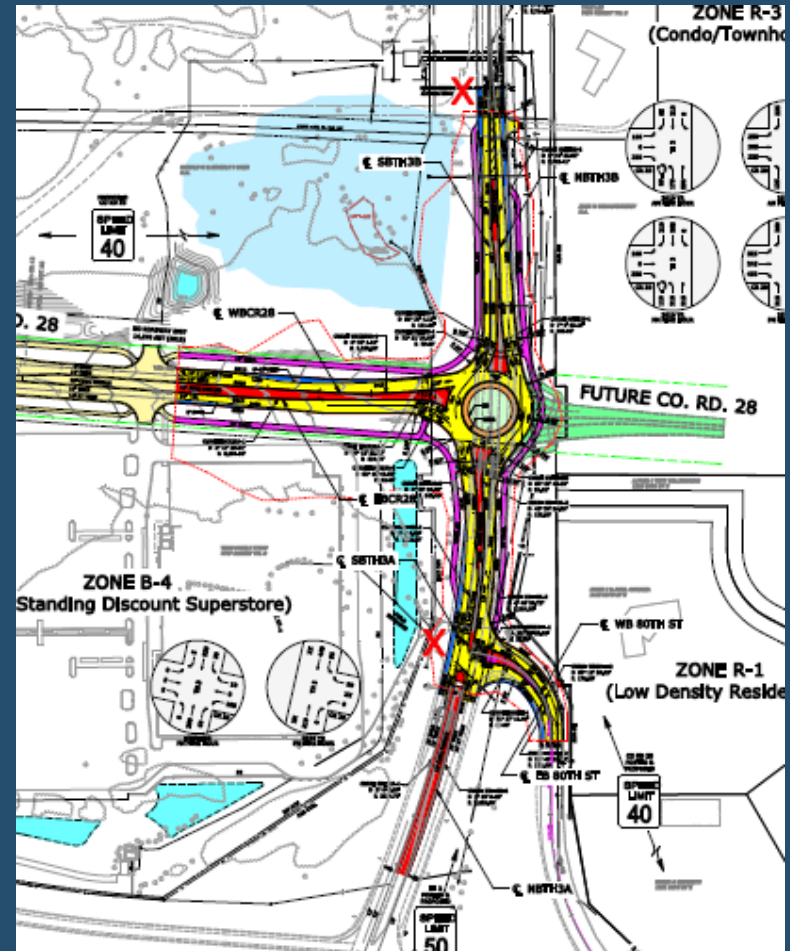
## The National Scene:

- **Green Book visioning**
  - HSM integration
  - Distinguishing between new construction and reconstruction
- **Pushing for more practical and sustainable ways of doing things**



# Projects

- Early and continuous involvement
- New methods, tools, procedures for right-sizing designs?



# Flexibility in Design Webinar

December 11, 2012

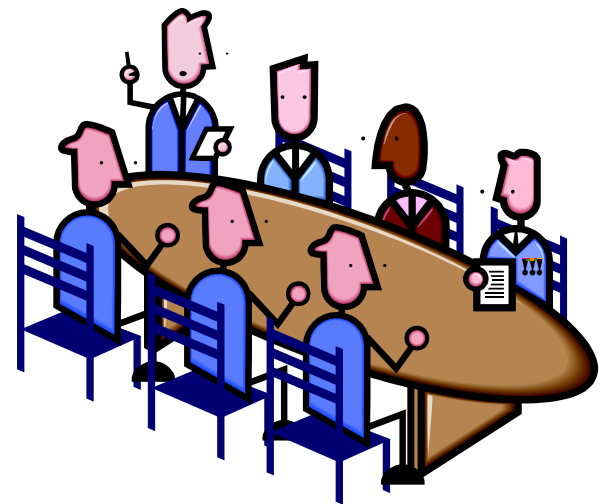
Julie Skallman

MnDOT State Aid



# Complete Streets External Advisory Group

- Meeting since July, 2010
- Advise us on implementation on trunk highways
- Suggested more progress could be made with flexibility on local roads
- Caused us to move more quickly



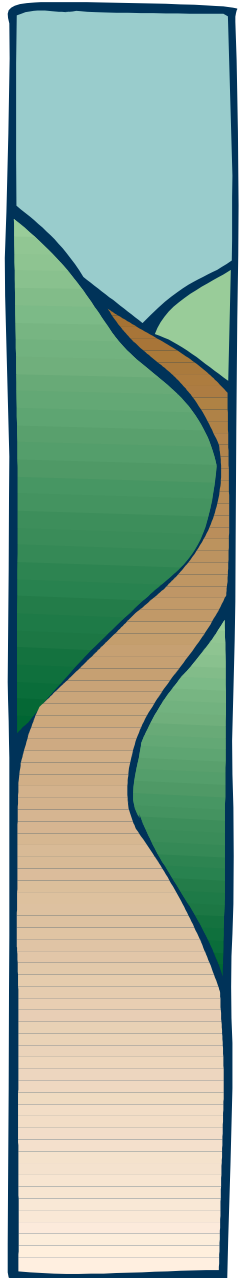
# State Aid Rules

- Required by statute
- Force and effect of law
- Variances are allowed by statute
- Apply only to CSAH and MSAS systems
- 30,000 CSAH – 3500 MSAS miles



# Local Roads

- Agency determines their own standards
- 16,000 miles of city streets
- 15,000 miles of county roads
- 60,000 miles of township roads





# State Aid Standards

- Adopted November 2012
- Allow on-road bike lanes
- Reduced width standards



[http://www.dot.state.mn.us/stateaid/  
BikePathRules/On-Road-BikePath.pdf](http://www.dot.state.mn.us/stateaid/BikePathRules/On-Road-BikePath.pdf)



## State Aid for Local Transportation



[Get Help for SALT Website or Applications](#)

### Hot Topics

[Project Tracking Mapping](#)

[MDSS Reference Guide](#)

[LRIP Project List](#)

[Best Value Procurement](#)

[Design Build for Locals](#)

[State Aid Scene](#)

[State Aid Flood and Disaster Relief Information](#)

[County Roadway Safety Plans](#)

[Curb Ramp Guidelines](#)



*MnDOT's State Aid for Local Transportation (SALT) Division works closely with local levels of government to ensure the state maintains a safe, effective and coordinated highway network.*

*In addition to funding support, staff from SALT provides technical assistance in highway and bridge design, construction and maintenance, authorizes grants for bridge construction, coordinates local federally funded projects and provides overall management of the state aid system.*

### Important State Aid Information

- [Bridge Info](#) \* Needs Citrix Client and Password
- [Bridge Grant Agreement Template](#)
- [Bridge Grant Agreement Instructions](#)
- [Comprehensive Highway Safety Plan](#)
- [EAdvert](#)
- [Electronic Communications](#)
- [Finance Forms](#)
- [FWD Project Files](#)
- [Metro State Aid](#)
- [Org Chart](#)
- [Roundabout List](#)
- [Safe Routes to School](#)
- [Sample Bond Fund Resolution](#)
- [SA Applications](#)
- [On-Road Bike Path Rules](#)
- [SA Bicycle Path Design](#)
- [SA Manual](#)



## 8820.9941 MINIMUM DESIGN STANDARDS: ON-ROAD BICYCLE FACILITY FOR URBAN; NEW OR RECONSTRUCTION PROJECTS.

<u>Functional Classification and Projected Traffic Volume</u>	<u>Design Speed</u>	<u>Lane Width (a)</u>	<u>Curb Reaction Distance (d)</u>	<u>Parking Lane Width (f)</u>	<u>Bikeway Design Roadways with Two Travel Lanes Urban Curb and Gutter</u>		<u>Bikeway Design Roadways with Four or more Travel Lanes Urban Curb and Gutter</u>
	(mph)	(feet)	(feet)	(feet)	(ADT)	(feet)	(feet)
<u>Collectors or Locals with ADT &lt;2,000</u>	<u>25-30</u>	<u>10-12 (e)</u>	<u>2</u>	<u>7-10</u>	<u>&lt;500</u>	<u>SL</u>	<u>N/A</u>
					<u>500-2,000</u>	<u>WOL 4-16 or BL5-6</u>	
	<u>35-40</u>	<u>11-12</u>	<u>2</u>	<u>8-10</u>	<u>&lt;500</u>	<u>SL</u>	<u>BL5-6</u>
					<u>500-2,000</u>	<u>WOL 14-16 or BL5-6</u>	
	<u>over40</u>	<u>12</u>	<u>2</u>	<u>10</u>		<u>BL5-6</u>	<u>BL5-6</u>
	<u>35-40</u>	<u>11-12</u>	<u>2</u>	<u>8-10</u>		<u>BL5-6</u>	<u>BL5-6</u>
	<u>over40</u>	<u>12</u>	<u>2</u>	<u>10</u>		<u>BL-6</u>	<u>BL</u>
<u>Collectors or Locals with ADT 5,000-10,000</u>	<u>25-30</u>	<u>10-12 (e)</u>	<u>2</u>	<u>7-10</u>		<u>BL5-6</u>	<u>BL5-6</u>
	<u>35-40</u>	<u>11-12</u>	<u>2</u>	<u>8-10</u>		<u>BL5-6</u>	<u>BL5-6</u>
	<u>over40</u>	<u>12</u>	<u>2</u>	<u>10</u>		<u>BL6 or PS 8 or SUP</u>	<u>BL6 or PS 8 or SUP</u>

## 8820.9941 MINIMUM DESIGN STANDARDS: ON-ROAD BICYCLE FACILITY FOR URBAN; NEW OR RECONSTRUCTION PROJECTS.

<u>Functional Classification and Projected Traffic Volume</u>	<u>Design Speed</u>	<u>Lane Width (a)</u>	<u>Curb Reaction Distance (d)</u>	<u>Parking Lane Width (f)</u>	<u>Bikeway Design Roadways with Two Travel Lanes Urban Curb and Gutter</u>		<u>Bikeway Design Roadways with Four or more Travel Lanes Urban Curb and Gutter</u>
	<u>(mph)</u>	<u>(feet)</u>	<u>(feet)</u>	<u>(feet)</u>	<u>(ADT)</u>	<u>(feet)</u>	<u>(feet)</u>
<u>Collectors or Locals with ADT 5,000-10,000</u>	<u>25-30</u>	<u>10-12 (e)</u>	<u>2</u>	<u>7-10</u>		<u>BL 5-6</u>	<u>BL 5-6</u>
	<u>35-40</u>	<u>11-12</u>	<u>2</u>	<u>8-10</u>		<u>B: 5-6</u>	<u>B1 5-6</u>
	<u>Over 40</u>	<u>12</u>	<u>2</u>	<u>10</u>		<u>BL 6 or PS 8 or SUP</u>	<u>BL 6 or PS 8 or SUP</u>
<u>Collectors or Locals with ADT &gt;10,000 and Arterials</u>	<u>30-40</u>	<u>11-12</u>	<u>4(b)</u>	<u>10</u>		<u>BL6orPS 8orSUP</u>	<u>BL6orPS8 orSUP</u>
	<u>over40</u>	<u>12</u>	<u>4(b)</u>	<u>10(c)</u>		<u>BL6orPS 8orSUP</u>	<u>PS8orSUP</u>

# Next Steps

- Monitor use of the revised standards in designs
- Identify any additional modifications needed





# Discussion / Questions

*Your Destination... Our Priority*

