

Advanced Design Flexibility Pilot Workshop

Session 2

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WHY DESIGN FLEXIBILITY?



Related Terminology/Initiatives

- Design Flexibility
- Context Sensitive Design/Solutions (CSD/S)
- Complete Streets
- Hear Every Voice
- Value Engineering
- Return on Investment
- Risk Management
- CRAVE
- Engineering Judgment

Important Themes

- Money counts – choose projects with high return on investment
- Think **system** not just **project**
- Leverage and preserve existing investments
- Dig deep to discover the **real** problems
- Look beyond level of service and average crash rates
- Accommodate all modes
- Plan and design within the context
- Link land use and transportation investments

3 Big Reasons for Flexibility

- Address Contextual Challenges
- Serve All Modes
- Improve Return on Investment

Flexibility to Address Contextual Realities



DOT, HUD, EPA Partnership

- Provide more transportation choices
- Promote equitable, affordable housing
- Enhance economic competitiveness
- Support existing communities
- Coordinate policies and leverage investment
- Value communities and neighborhoods

Community Values

- Community's cultural and social priorities
- Accommodation of all modes (bicycle, pedestrian, transit, parking)
- Economic revitalization
- Aesthetics
- Quality of life



Environmental Challenges

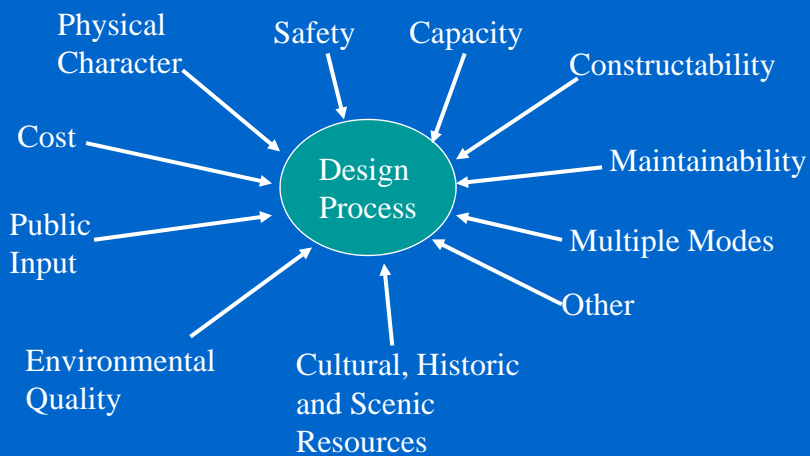
- Wetlands and water resources
- Parks and recreation facilities
- Air quality and noise
- Cultural and historic resources
- Natural resources



Multiple Modes Sharing Same Space



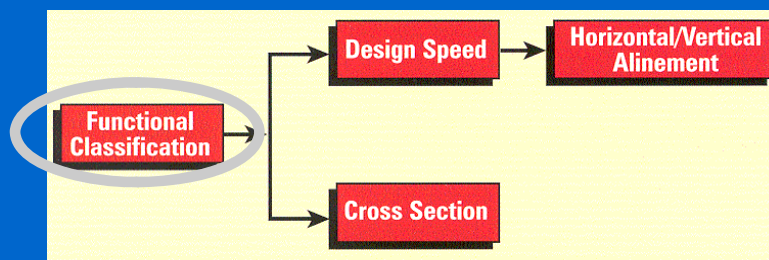
Broadening the Factors to Consider



Rethinking Basic Measures

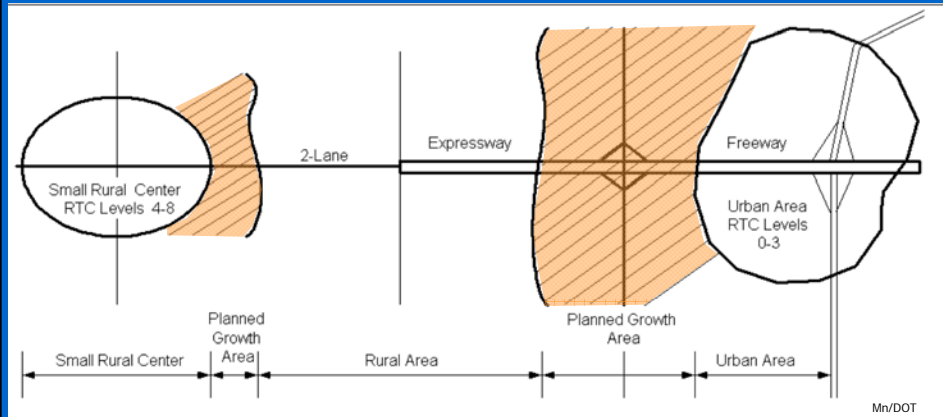
- Functional Classification
- Design Speed
- Traffic Level of Service
- Crash Rates
- Capacity

Rethinking Functional Classification



- Classification tied to federal funding – required by law
- General Categories:
 - Arterial (Principal, A & B Major)
 - Collector
 - Local

One Solution Doesn't Fit Every Context



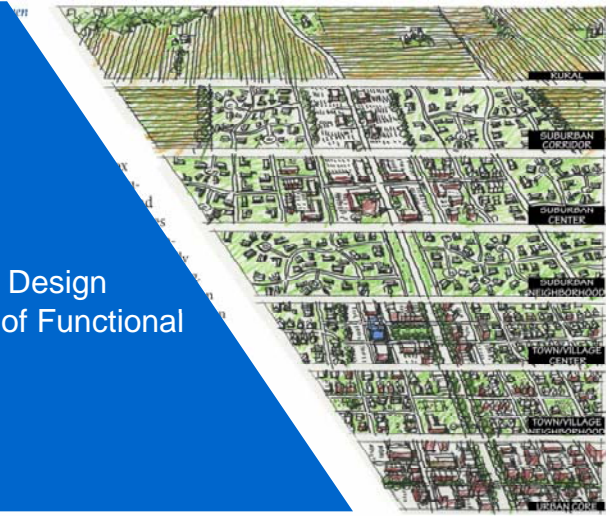
Not All Arterials Are Alike

- Some arterials carry predominantly local traffic and have many access points
- The design speed for the arterial class can be too high for an arterial serving as the “main street” of a community
- As land uses change, so should the roadway design

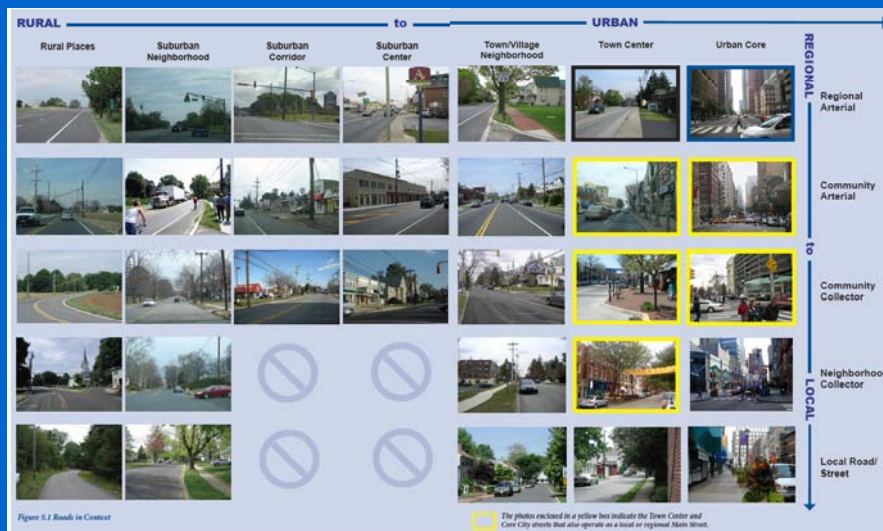


PENNDOT: Smart Transportation

Land Use Based Design
Guidance in lieu of Functional
Classifications.



PENNDOT: Smart Transportation



Broadening Measures of Effectiveness

Transportation Measures

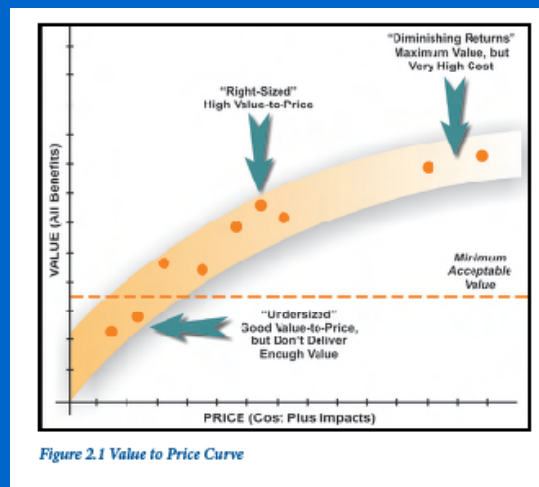
(for all users)

- Condition
- Safety and comfort
- Mode choice
- Network connectivity
- User population
- Traditional LOS
 - Travel time
 - Congestion
 - Specific measures

Other Measures

- Environmental preservation
- Cultural Resource preservation
- Community enhancement
- Economic development
- Environmental justice/equity
- Impact mitigation
 - Noise
 - Air quality
 - Wildlife habitat

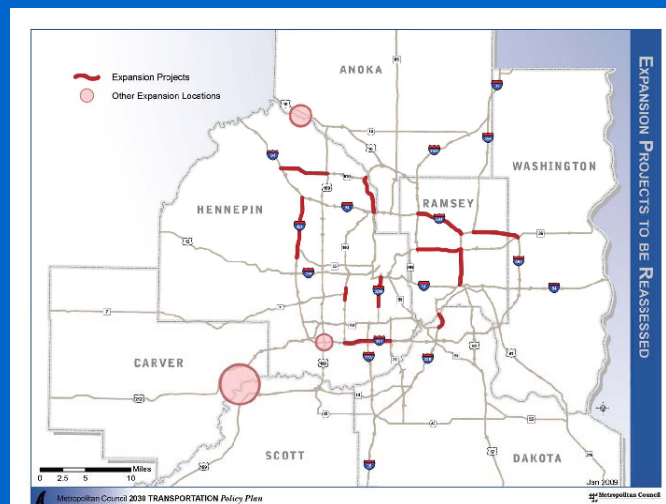
Flexibility Improves Return on Investment



Economic Changes

- Revenue sources are severely limited
- Larger system with greater maintenance requirements
- Increased construction costs
- Increased energy costs
- Increased land costs

Metro Highway Plan Revisions



Example: Missouri



“Practical Design” Initiative

- Told to put state standards on shelf and use AASHTO guidelines
- Told to base decisions on system, not project, benefits
- Told to follow three principles:
 - Every project must get safer
 - Communication among stakeholders was critical
 - Project must be practical and function properly

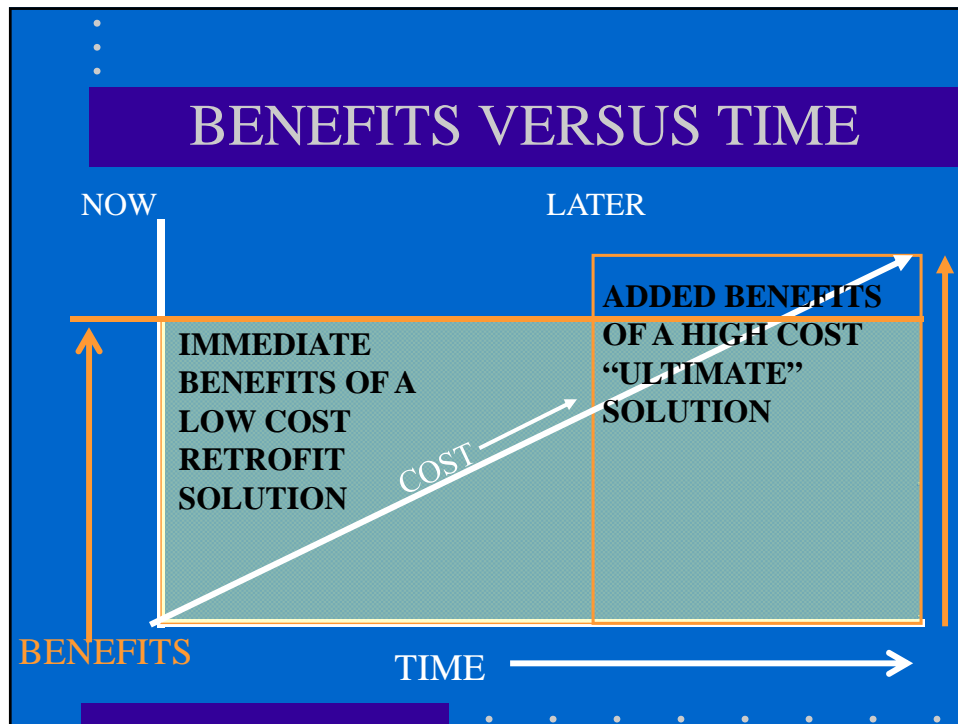
Missouri's Results

- Largest drop in traffic-related fatalities of any state in the nation in 2006, with a continued downward trend every year since
- Fatal crashes dropped below 1000 in 2007 and still further in 2008. MoDOT is on track with even better results for '09
- 11% decrease in run-off-road accidents since 2004



Missouri's Results

- Pavement condition went from 3rd worst to 9th best in nation.
- 83% of state's major roadways now in good condition – up from 47% in 2004.
- Customer satisfaction rose to 78% in 2008 – 95% of customers believe projects are right transportation solution



"Retrofit" Solutions

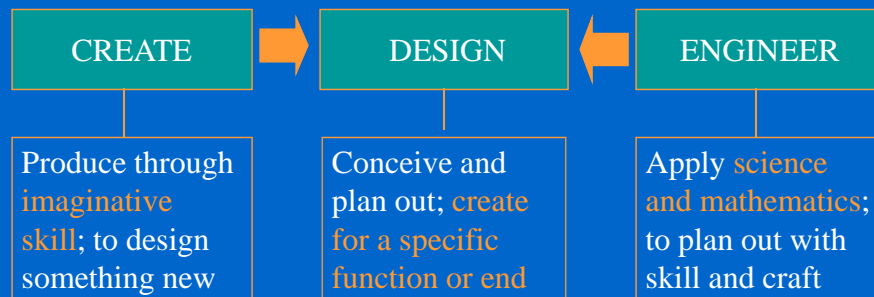
- Safety problems
- Capacity problems
- Emergency conditions
- Construction management

Example: Hwy 100



Flexibility Empowers Engineering Judgment

(Values change by minute degrees)



Source: Webster's Dictionary

Design Begins with Standards

- How things should be done in *normal* circumstances
- Make things orderly and simple – don't have to “re-invent the wheel” every time
- Based on vehicle performance, expected driver behavior and past successes
- Common reference point to *begin* a design

Engineering Judgment

- Flexibility does NOT mean there are no wrong answers
- Flexibility DOES require thought and understanding
- It requires understanding the principles underlying standards - their origin and intent re. vehicle performance and driver behavior
- It requires determining what is critical and what is optional
- It requires balancing many trade-offs

Flexibility is About Assessing Risk

- We routinely balance many factors in design decisions
- Important to understand the degree of uncertainty, confidence, or sensitivity of factors influencing design decisions:
 - Rapidly changing land development
 - Predominant traffic type, familiarity
 - Multimodal aspects of users
 - Peak vs. off-peak traffic/safety implications

Understand the REAL Problems

- Use best available information
- Use an interdisciplinary process for assessing competing interests
- Apply a high level of analysis – dig deep
- Understand the scope of potential effects
- Consider both technical and non-technical factors

Structured Decision-Making Process

- Apply engineering knowledge, best practice, experience and judgment
- Apply risk assessment in a structured decision-making process
- Mitigate risks to the extent practical
- Document the decision-making process
- Gain endorsement and approvals

Tort Liability

- Be aware but not overly concerned about tort liability
- Risk as an individual is limited in Minnesota – it rests with the organization and structure for assessing risk
- Understand and apply risk assessment
- Document your decision process

Design Flexibility Guidance

This slide features a collage of four key documents related to design flexibility. On the left is the 'Flexibility in Highway Design' report from FHWA (1997), showing a winding road through a landscape. In the center is the 'A Guide to Achieving Flexibility in Highway Design' from AASHTO (2004), with a green cover and images of highway construction. To the right is 'NCHRP Report 480: A Guide to Best Practices for Achieving Context Sensitive Solutions' (2002), a white report cover. On the far right is 'Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities' from ITE (2006), featuring a blue cover with photos of urban streets.

FHWA 1997

AASHTO 2004 "Bridging Document"

NCHRP 2002

ITE 2006

Many Other Useful Resources

This slide displays a collage of six additional transportation resources. From left to right: 'Residential Streets' (2nd Edition) from TRB; 'Traffic Calming: State of the Practice' from ITE; 'Geometric Design Practices for European Roads' from the International Technology Exchange Program (June 2001); 'Leaving A Place Better Than We Found It: Success Stories from the Visual Database of Transportation Enhancements' from ITE; 'Hear Every Voice: A Guide to Public Involvement at Mn/DOT' (June 1999) with a red cover; and 'Community Impact Mitigation: Case Studies' (May 1998) from TRB. A cartoon illustration of a person with a surveying instrument is in the bottom right corner.

Residential Streets

Traffic Calming
State of the Practice

Geometric Design Practices
for European Roads

Leaving A Place
Better Than We Found It

Hear Every Voice
A Guide to Public Involvement
at Mn/DOT

Community Impact Mitigation
Case Studies

Basic Objectives of Design Flexibility

- Establish the right program – program must address urgent problems
- Establish the right projects – needs must focus on problems
- Scale solutions to the problem - right-sizing

Problem Exercise