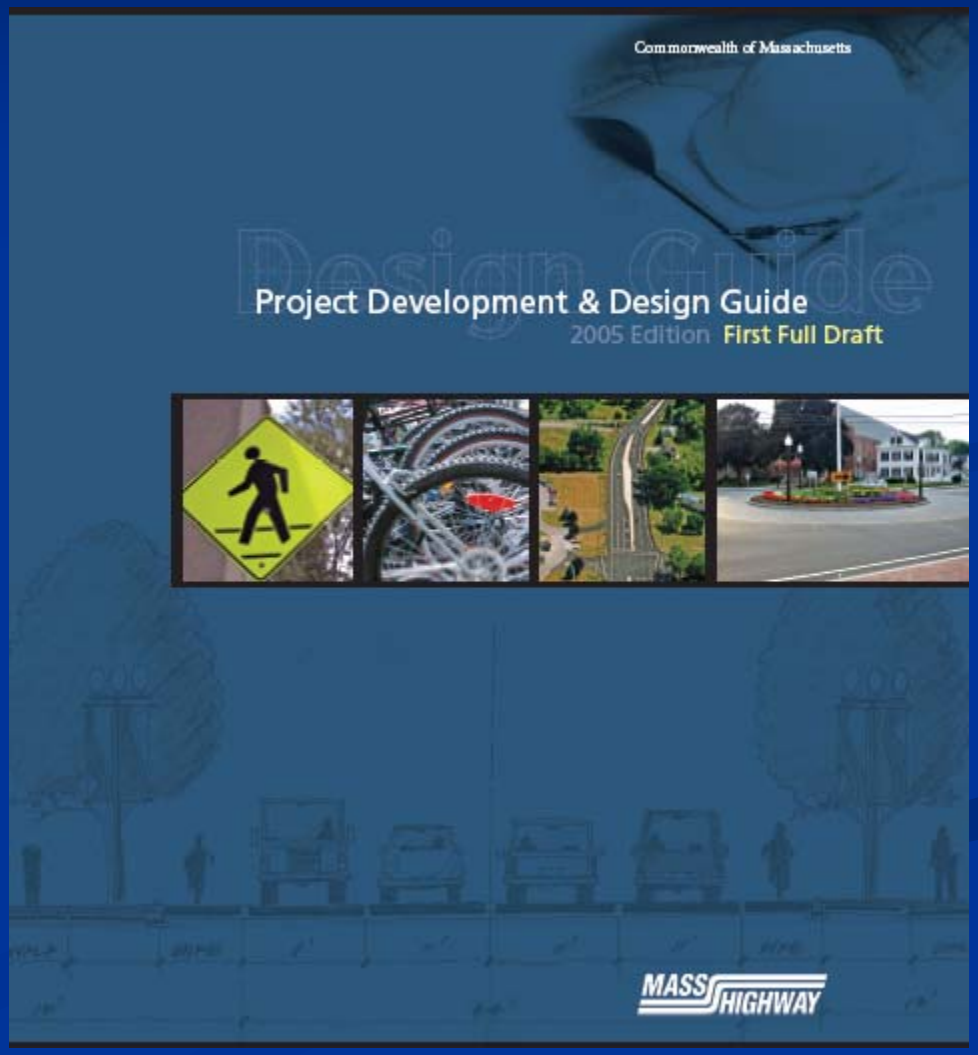
MassHighway Project Development and Design Guidebook for Planners!

Overview



Why Revise the Highway Design Manual?

- Last major revision in 1997
- Strong desire for more flexible design guidelines that better respond to community values and constraints
- A lack of guidance and inconsistent application of strategies to accommodate pedestrians and bicyclists (often viewed as an "afterthought")
- Frustration over project development "unknowns" and delays
- Back to English units!

Project Development and Design Guide
Background

- January 2003, Governor Romney announced his Communities First Policy Initiative to
  - Give communities more flexibility and input in designing local road and bridge projects
  - Help preserve the character of cities and town, and
  - Cut through bureaucratic red tape imposed by the state
- A priority of this policy was to review and revise *MassHighway's Design Manual*

Guiding Principles for Guidebook

- Provide an **integrated multimodal approach** to roadway planning and design
- Ensure that **context sensitivity** is integrated into the planning, design, and construction process
- Provide a **clear project development process**

What is CSD?

- CSD advances the objectives of:
  - Safety and mobility
  - Preservation and enhancement of aesthetic, historic, environmental, and community values…
- CSD incorporates societal values in our public works
- CSD is perceived as a sense of:
  - Natural Harmony
  - Cultural Order
  - Design Integrity (or Project Coherence)

CSD and Design Elements

Design is a series of trade-offs between what is desired, what is justified, and what is feasible

- Consider and understand all your design objectives, constraints and concerns before you assess design alternatives
- Use a broadly informed process and find the best balance point
- Document professional diligence in analyses and decision making processes

Guidebook Application

- When MassHighway is the proponent
- When MassHighway is responsible for project funding (state or federal-aid)
- When MassHighway controls the infrastructure (projects on state highways)
- For projects on National Highway and Federal-Aid Systems

Chapter Outline – New Chapters

1. Introduction
2. Project Development
3. Basic Design Controls
4. Horizontal and Vertical Alignment
5. Cross-Section and Roadside Elements
6. Intersections
7. Interchanges
8. Drainage and Erosion Control
9. Pavement Design
10. Bridges
11. Shared Use Paths and Greenways
12. Intermodal Facilities and Rest Areas
13. Landscape and Aesthetics
14. Wildlife Accommodation
15. Access Management
16. Traffic Calming
17. Work Zone Management
18. Plans, Specifications, and Estimates

Chapter 2 Project Development: Process Goals

- Ensure context sensitivity through an open, consensus building dialog
- Foster thinking beyond the pavement to achieve optimum accommodation for all modes
- Encourage good planning and early public outreach
- Achieve consistent expectations among project participants – *minimize surprises*
- Ensure allocation of resources to projects that address local, regional, and statewide priorities and needs

PROCESS	OUTCOMES
STEP I Problem/Need/Opportunity Identification	1. Project Need Form (PNF)
STEP II Planning	2. Project Planning Report (If necessary)
STEP III Project Initiation	3. Project Initiation Form (PIF) 3. Definition of Appropriate Funding 3. Definition of Appropriate Next Steps 3. PRC Action
STEP IV Environmental/Design/ROW Process	4. Plans, Specs and Estimates (PS&E) 4. Environmental Studies and Permits 4. Right-of-Way Plans 4. Permits
STEP V Programming	5. Regional and State TIP 5. Programming of Funds
STEP VI Procurement	6. Bids and Contractor Selection
STEP VII Construction	7. Built Project
STEP VIII Project Assessment	8. Project Assessment Form

Chapter 2
New Project Development Process

- Encourages Early Dialog with District to Define Need (Step I)
- Emphasizes Good Planning and Outreach (Step II)

Other Project Development Enhancements
Step I: Project Need Form (PNF) / PNF Review

- Identify problem/need/opportunity
- PNF reviewed by District
  - Using a interdisciplinary team approach
  - Usually includes a visit to the project site with community representatives
  - District to assist community in defining process to move project forward
  - District to advise community of need for additional planning and public outreach
- Copy provided to MPO staff to begin TIP discussions

Other Project Development Enhancements
Step II: Planning

Key Planning Tasks

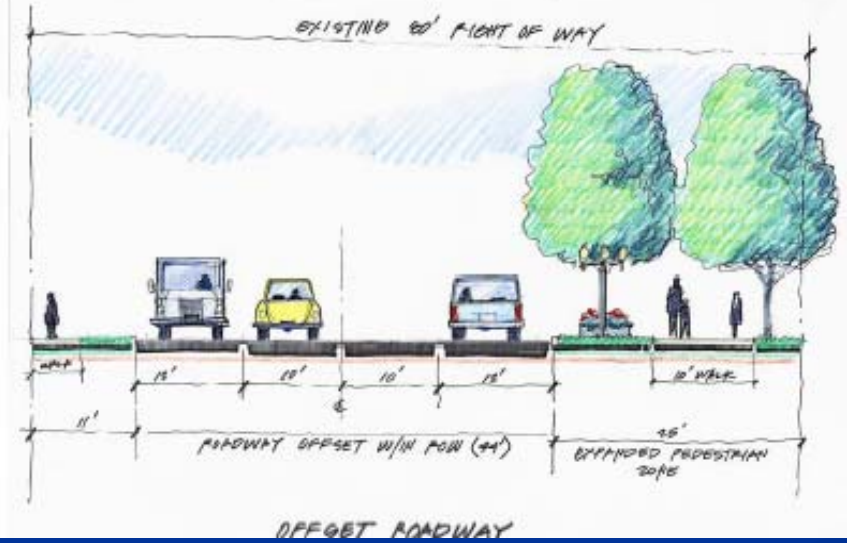
- Part A: Define Existing Context; Confirm Project Need(s); Establish Goals and Objectives
  - Inventory and Site Visit (s)
- Part B: Initial Public Outreach
  - Early Local Issues Meeting
  - Early Environmental Coordination
- Part C: Project Definition
  - Development of Alternatives
  - Evaluation and Screening of Alternatives
- Part D: Project Review and Refinement
  - Additional Public and Agency Coordination/Review
- Part E: Final Recommendations

Range of Alternatives

- Type Alternatives
  - Policy, Mode, Upgrade/New
- Location Alternatives
  - Corridor A, Corridor B, Corridor C
- Design Alternatives
  - Project elements and critical dimensions

Project Planning -
Visual Representation of Alternatives Encouraged

OFFSET ROADWAY



OFFSET ROADWAY

Corridor Need Example

Sample Corridor Details

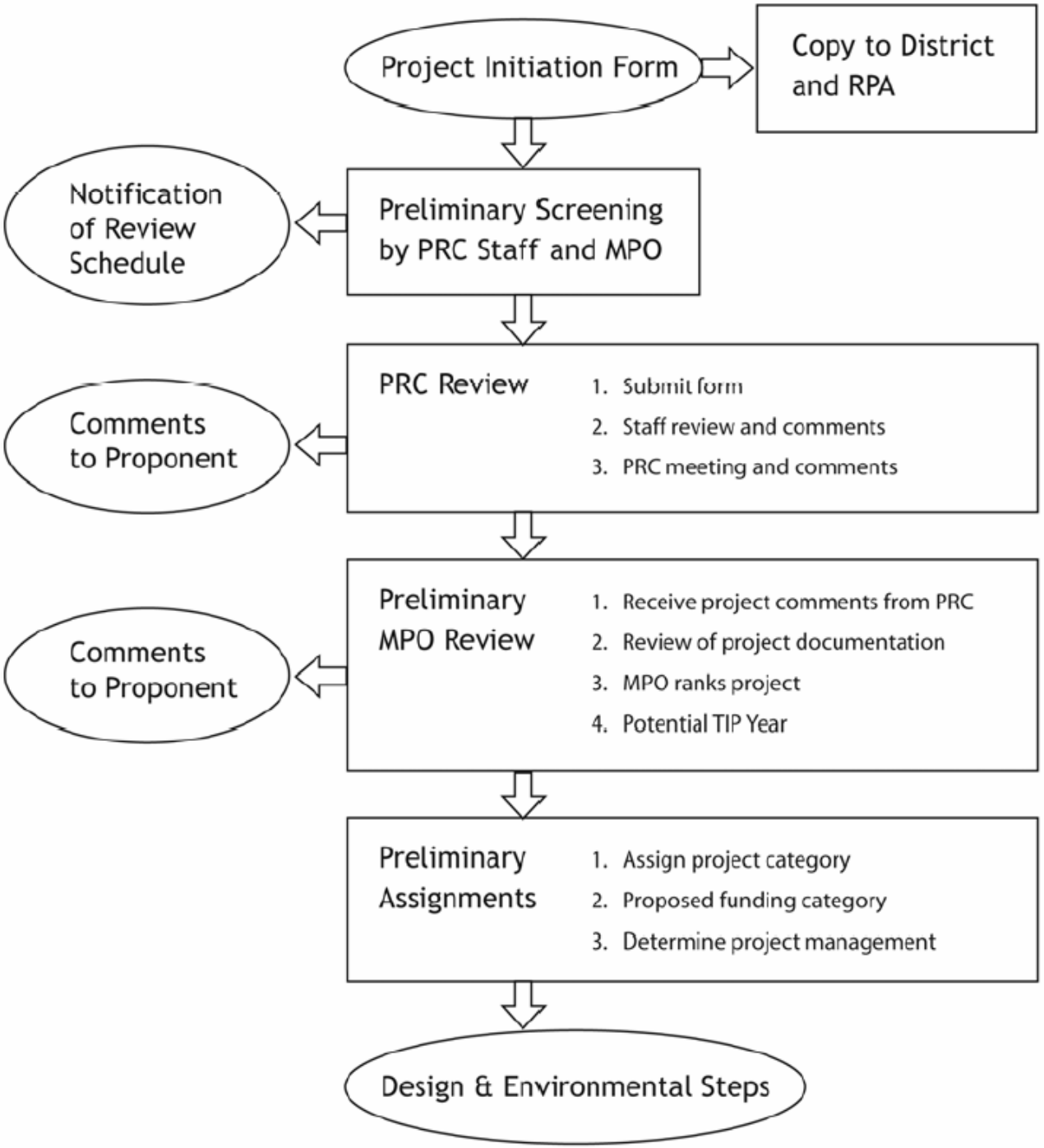
- Typical Issues/Needs
  - (1) Poor roadway and sidewalk conditions
    (2) Congestion
    (3) High crash experience
- Context & Impacts
  - Context: Suburban High Density
    - Some ROW may be needed
    - Environmental impacts typically limited.
    - Cultural resource impacts frequent.
- Community Interest
  - Typically a high level of community interest in project

Development of Alternatives

- Alternative typical sections addressing the needs of all users
- Intersection multi-modal accommodation and operational assumptions
- Accessibility improvements

Project Development

Step III: Project Initiation



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Chapter 2
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Other Project Development Enhancement
Design Exception Review

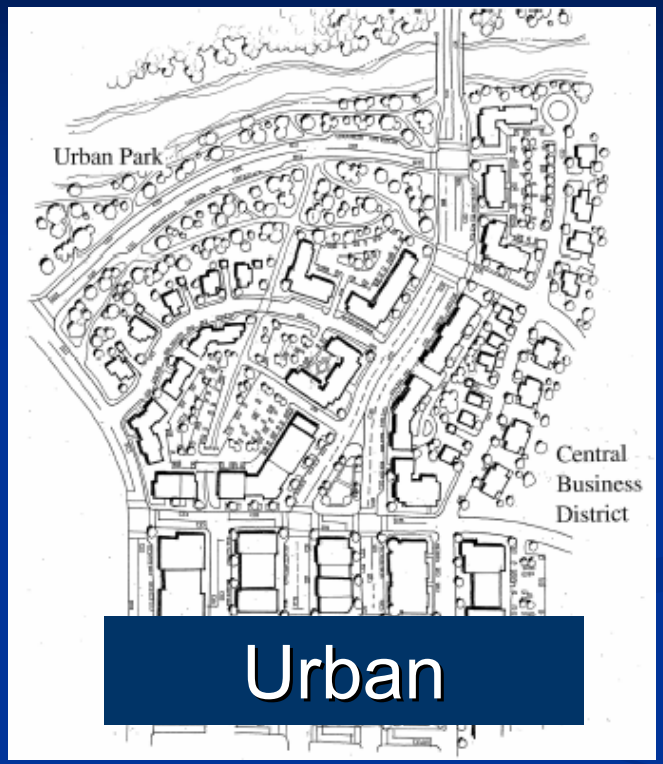
- Anticipates Design Exception Early (beginning in Planning)
- Design Exception Requests (if necessary) part of the 25 percent design review (Functional Design Report)
- Incorporates category for Footprint Road projects
- Interdisciplinary design exception review committee:
- Response to designer/proponent within 30 days of a completed request

Chapter 3 Basic Design Controls

- Roadway Context (Area and Roadway Types)
- User Groups
  - Pedestrians
  - Pedestrians requiring mobility aids
  - Bicyclists
  - Drivers (transit vehicles, trucks, automobiles)
- Transportation Demands
- Measures of Effectiveness (MOEs)
- Design Speed
- Sight Distance

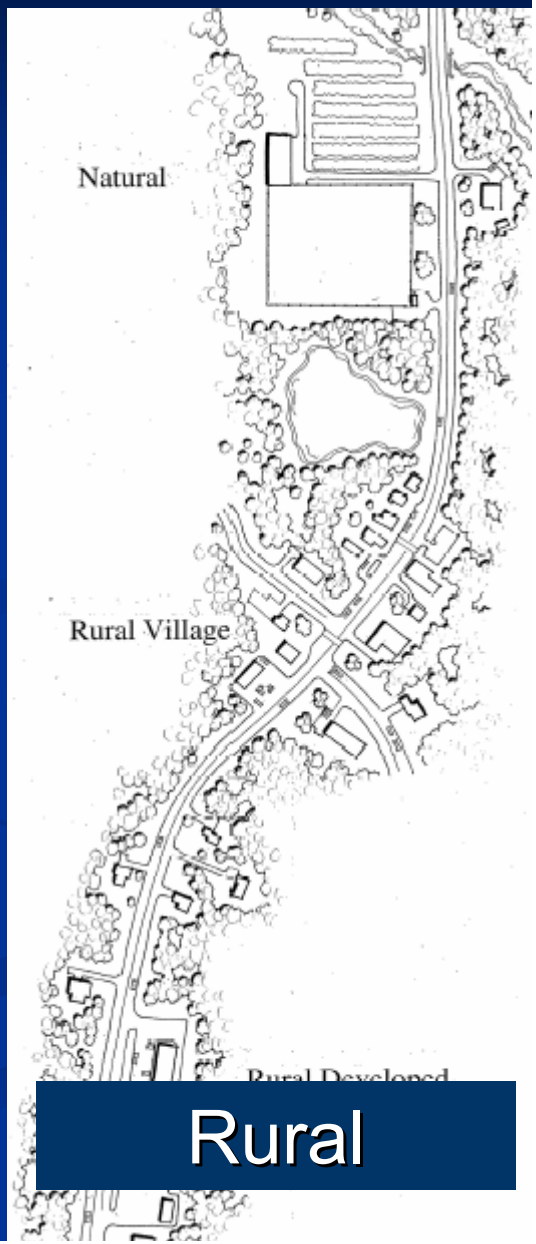
Chapter 3: Enhancement -- Area Type as a Basic Design Control

Suburban



Urban

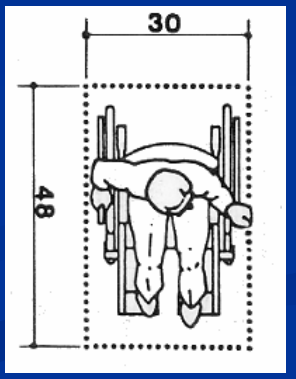
9 area types defined as a compliment to functional classification to aid with context sensitive design



Rural

Chapter 3: Enhanced Discussion of All User Groups

- Pedestrians
- Pedestrians requiring mobility aids
- Bicyclists
- Drivers
  - Transit vehicles
  - Trucks
  - Automobiles



Chapter 3: Enhancement -- Level of Service is one Measure of Effectiveness

Transportation MOE's

(for all users)

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

"Other" MOE's

- Environment preservation
- Cultural resource preservation
- Community enhancement
- Economic development
- Aesthetics
- Environmental justice/equity
- Impact mitigation
  - Noise
  - Air Quality
  - Wildlife Habitat

Chapter 3: Revised Design Speed Approach

- Design speed is a choice
- Choice of design speed needs to consider:
  - *Roadway context*
  - *Implications for pedestrian and bicycle safety and comfort*
  - *Implications for regional mobility*
- To ensure safety, the choice of design speed needs to be informed by existing operating speed and the likelihood of change associated with the design
- Flexibility is provided to allow design speeds lower, the same, or higher than existing operating speeds, depending on the project's purpose

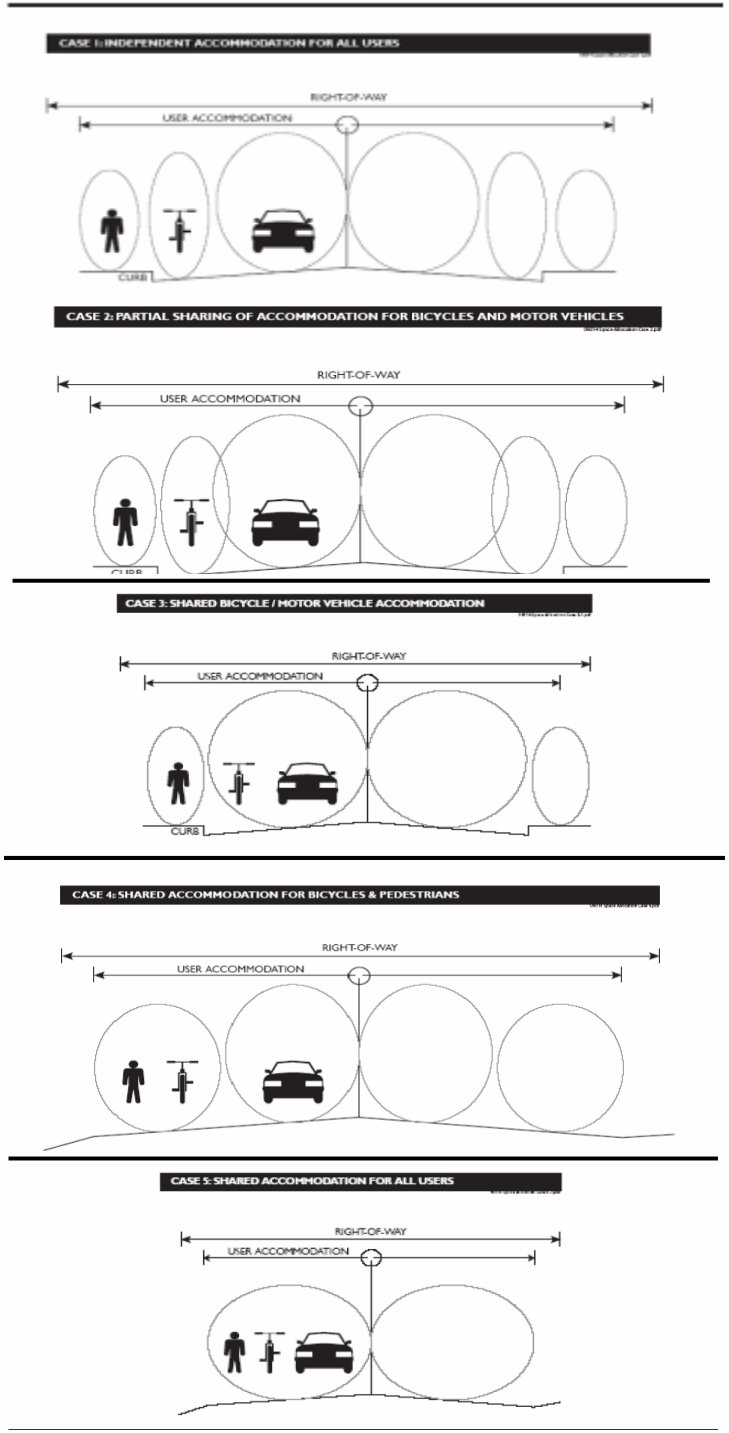
Comparison of Design Speeds

Roadway Type (Based on 1997)	1997 Manual	2005 Guidebook
Rural Arterial (Level Terrain)	60 to 75 mph	40 to 60 mph
Urban Arterial	30 to 60 mph	25 to 50 mph
Rural Collector (Level Terrain)	60 mph	30 to 60 mph
Urban Collector	30 mph (minimum)	25 to 40 mph

- Additional flexibility provided in the Guidebook by further definition of roadway and area types to reduce the ambiguity of "urban vs. rural" and terrain type

Chapter 5 Cross-Section: Flexible Multimodal Accommodation Approaches

- Descriptions have been developed for the cases :
  - Case 1: Independent Accommodation
  - Case 2: Partial Bicycle/MV Sharing
  - Case 3: Bicycle/MV Sharing
  - Case 4: Pedestrian/Bicycle Sharing
  - Case 5: Shared by All Users



Comparison of Minimum Width for Two Lane Roadways

Roadway Type	1997 Manual	2005 Guidebook
Arterial	40 ft	30 ft
Collector	40 ft	28 ft

Addenda provided some flexibility at the low end of the speed and volume range - minimum width of 30 feet for arterials (<55 mph and <400 vpd), and 20 feet for collector roads (<35 mph and <400 vpd), but these conditions rarely exist.

Chapter 11: Shared Use Paths & Greenways

- Guidelines for the planning & design of paths and trails

Chapter 13: Landscape and Aesthetics

- The Guide advocates for improved consideration of landscaping in overall design and environmental considerations.
- This chapter provides a framework for design considerations and guidance for construction.

Chapter 16:
Traffic Calming and Traffic Management

- Description of applicability of traffic calming and traffic management to new and retrofit projects
- Describes four basic approaches
  - Narrowing the real or apparent width of the street.
  - Deflecting the vehicle path.
  - Altering the vertical profile of the vehicle path.
  - Preventing certain vehicle movements through road design, regulations or combination of both.

Traffic Calming and Traffic Management Applicability

	Arterials	Major Collectors	Minor Collectors	Local Roads
Street Narrowing				
Narrow Lanes		Δ	■	■
Raised Curbs	■	■	■	■
Street Furniture	■	■	■	■
Street Trees	■	■	■	■
Street Lighting	■	■	■	■
Spot Narrowing	Δ	■	■	■
Medians and Crossing Islands	■	■	■	■
Curb Extensions	■	■	■	■
Road Diets	Δ	Δ	■	■
Building Siting	■	■	■	■
Horizontal Deflection				
Chicanes			■	■
Crossing Islands/Short Medians	■	■	■	■
Mid-Block Traffic Circles			Δ	■
Roundabouts	■	■	■	■
Lane Offsets		Δ	Δ	■
Profile Alterations				
Speed Humps		Δ	Δ	■
Raised Crosswalks		Δ	■	■
Raised Intersections		Δ	■	■
Textured Pavement	■	■	■	■
Traffic Management	Δ	Δ	Δ	Δ

Exhibit 16-2 on page 16-6 in the Guide.

Comments/Questions?

Framingham Example

- Project Development
  - Define a problem, need, or opportunity based on objective criteria
  - Establish preliminary goals and objectives
  - Define the scope of planning and public outreach needed

Define the Project Need

- Traditional Highway Measures:
  - Level of Service
  - # of Crashes
  - Condition of the Roadway
- Non-Traditional Measures:
  - Economic Development
  - Aesthetics
  - Pedestrian & Bicyclist Considerations
  - Access Management
- Conduct Public Outreach to Define other Needs

Framingham Example - Overview

Turning Congestion

Existing Green Space

Queuing on Water Street

Framingham Example – Project Needs

Traditional MOEs

of Crashes (41)

Level of Service (E)

Poor Roadway Conditions

Other MOEs

Economic Development

Aesthetic Impacts

Pedestrian Connections

Framingham Example

- Public Outreach & Input
  - Residents
  - Business Owners
  - Users of the Facility
- Identify other needs BEFORE embarking on the project!

Framingham Example – Public Involvement

- Old Process
  - Unveil (and hide) the project at the 25% design milestone
  - AFTER much of the design has been finalized
  - AFTER $$ has been spent
  - BEFORE public input was widely solicited
- New Process – PNF Form Asks:
  - Has public outreach been conducted?
  - What level of interest was there?
  - What issues were raised?

Project Need Form (PNF) Questions

- Please provide a Description of the Project Need.
- How does the Roadway function in the community?
- Are there mobility issues for motorists, bicycles, pedestrians?
- Describe the public process associated with this project.
  - What is the level of community interest in this project?
  - What issues were raised by the public to date?

Framingham Example – Project Needs

Traditional Highway Fixes

of Crashes (41) – Identify, address conflicts

Level of Service (E) – Improve capacity

Poor Roadway Conditions – Upgrade Pavement

Other MOEs

Aesthetic Impacts – Create Greenspace

Pedestrian Connections – Provide Connections

Economic Development

Framingham Example

- Project Development will:
  - Help carry out projects effectively
  - Ensure good project planning, design, and implementation; and
  - Set the stage for long term success