Module 4: Reframing Key Transportation Conventions
May 12, 2006 Atlanta, GA
Instructor: Troy Russ, AICP

The primary transportation challenge of any integrated Land Use and Transportation Study is to balance the success and livability of the local community with its responsibility to accommodate regional transportation demand. Livability is focused on balancing vehicular service requirements with local business, neighborhood and pedestrian needs. Module 4 presents the how several key transportation obstacles to Livable Street Design should be approached and enable the community development community to engage transportation professionals and ensure transportation facilities are designed for communities. Key transposition conventions examined will include: project design traffic, roadway functional classifications, design speed, and roadway design standards design standards.

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Transportation Design for Communities
Executive Seminar

MODULE 4: Reframing Key Transportation Conventions

Prepared by:
Urban Design & Transportation Studio
Glatting Jackson Kercher Anglin Lopez Rinehart, Inc.

Georgia Institute of Technology
Center for Quality Growth & Regional Development
May 12, 2006
Reframing Key Transportation Conventions
Reframing Key Transportation Conventions
Reframing Key Transportation Conventions
Reframing Key Transportation Conventions

...vote carries unanimously

Get political support
Establish Design Controls

- Design Traffic
  - The Role of the Regional Model
  - Understanding the Travel Patterns – Trip Types
  - Vehicle Types
  - Defining the Context - Network and Mode Choice
  - Role of Micro-Simulation
  - Interpreting the Results – Capacity & Travel Time

- Design Speed
  - Target Speed & Context
  - Minimums vs. Maximums
  - Freight Routes
  - Roadway Safety
  - Speed / Flow Relationship
  - Speed & Roadway Geometrics

then

Determine Functional Classification

Hierarchy & Functional Class
Context

then

Establish Design Controls

- Design Traffic

then

Fit Design Elements

- Roadway Design Standards
  - Geometric (Sight Distance / Stopping Distance)
  - Dimensions
  - Design Elements – Trees / Parking / Transit Stops
  - AASHTO Design Guidelines
  - State and Local Design Standards
  - Design Variances and Exceptions

Reframing Key Transportation Conventions
Functional Classification
Establish Design Controls

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Functional Classification

Principal Arterial

Minor Arterial

Local

Collector

Principal Arterial

Reframing Key Transportation Conventions
Hierarchy & Functional Class

Functional Classification
Reframing Key Transportation Conventions
Hierarchy & Functional Class

Functional Class: Intuitive, Popular
Reframing Key Transportation Conventions
Hierarchy & Functional Class

Functional Classification
Establish Design Controls

Determine Functional Classification

Reframing Key Transportation Conventions
Hierarchy & Functional Class

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Evolution of Integrated Land Use and Transportation Plans

Reframing Key Transportation Conventions

Context

Pavement Management
Right-Of-Way Management
Access Management
Corridor Management
Integrated Land Use & Transportation Plan (Context Sensitive Solutions)
Reframing Key Transportation Conventions

Context

Urban:

Suburban:

Rural:

Highway
Arterial
Collector
Local

Parkway
Boulevard
Avenue
Main Street
Street
Lane

Urban:

Suburban:

Rural:
Reframing Key Transportation Conventions

Context

Rural-to-Urban Transect

Drawings by James Wassell
Reframing Key Transportation Conventions

Context

Urban Activity Center
Village Center
Neighborhood Center

Neighborhood

Industrial
Rural Cluster
Rural Agricultural Area

Transect Points
Frontage Elements

Reframing Key Transportation Conventions

Context

Building
Siting

Random

Address Street

Enclose Street

Parking

Individual

On Premise

Park-Once
Network Elements

Reframing Key Transportation Conventions

Context

Street Spacing

500-800'

300-500'

Street Access

Private, Uncontrolled

Shared Controlled

Alley
Reframing Key Transportation Conventions

Context

TRANSITION FROM RURAL TO URBAN
Reframing Key Transportation Conventions

TRANSITION FROM RURAL TO URBAN
Reframing Key Transportation Conventions

Context

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Reframing Key Transportation Conventions

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TRANSITION FROM RURAL TO URBAN
TRANSITION FROM RURAL TO URBAN

Reframing Key Transportation Conventions

Context
Highway Arterial Collector Local

Urban: Commercial Retail Mixed Use Residential Industrial

Suburban: Commercial Retail Mixed-use Residential Industrial

Rural: Commercial Retail Mixed Use Residential Industrial

Reframing Key Transportation Conventions Context

Parkway Boulevard Avenue Main Street Street Lane
Reframing Key Transportation Conventions

TRANSITION WITHIN AN URBAN CONTEXT
Reframing Key Transportation Conventions

Context

TRANSITION WITHIN AN URBAN CONTEXT
Reframing Key Transportation Conventions

Context

TRANSITION WITHIN AN URBAN CONTEXT
Reframing Key Transportation Conventions

Context

TRANSITION WITHIN AN URBAN CONTEXT
Roadway Design Controls
Reframing Key Transportation Conventions

**DESIGN TRAFFIC**

Determine Functional Classification

- Hierarchy & Functional Class
- Context

then

**Establish Design Controls**

- Design Traffic
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Reframing Key Transportation Conventions
DESIGN TRAFFIC – The Role Of The Regional Model

MDOT Traffic Needs

Plan

Widen
Other

Local Plans

Program

1 2 3 4 5

Project

Words

Local Input

Public Information

Engineer

Build
Anticipate Forecast
(Based on Speed)

Accommodate

Reframing Key Transportation Conventions
DESIGN TRAFFIC – The Role Of The Regional Model
Reframing Key Transportation Conventions
DESIGN TRAFFIC – The Role Of The Regional Model

Forecast (Based on Speed)

Travel

demands

Unconstrained Model Run (Based on a Limited Regional Network)

Vs.

Constrained Model Run (Based on a Limited Regional Network)

Road Capacity

Desire (as if nothing else mattered)

Vs.

Need (Based on Capacity & the Network)

Accommodate

Forecast (Based on Speed)
Reframing Key Transportation Conventions

DESIGN TRAFFIC – The Role Of The Regional Model

Travel demands

Unconstrained Model Run (Based on a Limited Regional Network)

Unconstrained Model Run (as if nothing else mattered)

Vs.

Constrained Model Run (Based on a Limited Regional Network)

Desire

Vs.

Reality (Based on Capacity & the Network)

Accommodate

Forecast (Based on Speed)
Land Use generates demands on the Regional Scale (Based on a Limited Regional Network).

Travel Forecast demands on Road Capacity.

Region Solution (as if nothing else mattered).
Can't Be Improved Further
Land Use generates demands for travel forecasts at the Regional Scale (Based on a Limited Regional Network). These forecasts inform the Road Capacity at the Corridor Scale (Based on Expanded Corridor Network). The result is a Corridor Based Solution.

Reframing Key Transportation Conventions

DESIGN TRAFFIC – The Role Of The Regional Model
Establish Design Controls

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determine functional classification
Hierarchy & Functional Class
Context

then

Reframing Key Transportation Conventions

DESIGN TRAFFIC - Understanding Travel Patterns
Reframing Key Transportation Conventions

**DESIGN TRAFFIC - Understanding Travel Patterns**

- **Internal Travel** – Preserve the capacity and quality of local streets for travel made entirely within the City.

- **Local Travel** – Make selective, precisely targeted capacity improvements, on the City’s own terms, for trips beginning in (by residents of) Roswell and trips ending in (by visitors to) Roswell.

- **Through Travel** – For regional through trips - neither beginning nor ending in the City.
Reframing Key Transportation Conventions

DESIGN TRAFFIC - Understanding Travel Patterns

- Local Trips within the Corridor: 7%
- Trips That Start or End in Corridor: 52%
- Through Trips Corridor: 41%
Reframing Key Transportation Conventions

DESIGN TRAFFIC - Understanding Travel Patterns

- Through Trips Corridor: 41%
- Trips That Start or End in Corridor: 52%
- Local Trips within the Corridor: 7%
Determine Functional Classification

Hierarchy & Functional Class
Context

then

Establish Design Controls

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Fit Design Elements

Roadway Design Standards
- Geometric (Sight Distance / Stopping Distance)
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- Design Variances and Exceptions
Design Vehicles

Reframing Key Transportation Conventions

DESIGN TRAFFIC – Vehicle Types

<table>
<thead>
<tr>
<th>Street Classification</th>
<th>Design Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>Passenger Car “P”</td>
</tr>
<tr>
<td>Collector</td>
<td>Single Unit Truck “SU-30”</td>
</tr>
<tr>
<td>Local</td>
<td>Tractor-Trailer “WB-50”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Arterial: Vehicles suitable for high-volume roads.
- Collector: Smaller vehicles used on secondary roads.
- Local: Vehicles used in residential areas.

Vehicle Dimensions:
- Passenger Car: 11.0 ft x 19.0 ft
- Single Unit Truck: 20.0 ft x 30.0 ft
- Tractor-Trailer: 21.3 ft x 35.8 ft
- Arterial: 42.5 ft x 35.8 ft
- Collector: 50.0 ft x 55+ ft
- Local: 55+ ft x 55+ ft
Single Unit ("SU") Truck Turning Radius

Reframing Key Transportation Conventions
DESIGN TRAFFIC – Vehicle Types
Types of Encroachment

#1: Use full departure leg
#2: Use full approach and departure leg
#3: Encroach across departure centerline
#4: Encroach across departure and departure centerline

Permissible Encroachments

<table>
<thead>
<tr>
<th>From (Approach Street)</th>
<th>To (Departure Street)</th>
<th>Art</th>
<th>Col</th>
<th>Loc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial (Art)</td>
<td>Art</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Collector (Col)</td>
<td>Collector (Col)</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Local (Loc)</td>
<td>Local (Loc)</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>
Truck Traffic Influences Roadway Geometrics & Design Speed
Reframing Key Transportation Conventions

DESIGN TRAFFIC - Vehicle Types
Reframing Key Transportation Conventions

DESIGN TRAFFIC - Defining the Context

Determine Functional Classification
Hierarchy & Functional Class
Context

then

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Reframing Key Transportation Conventions

DESIGN TRAFFIC - Defining the Context

Same Total Lanes

More Capacity
- VMT
- Turns
- Clearance Time
- Signal Phase

Benefits of Network
Reframing Key Transportation Conventions
DESIGN TRAFFIC - Defining the Context

Lane Capacity

Capacity of Additional Through Lane (VPH)
Inside the R-O-W
Reframing Key Transportation Conventions
DESIGN TRAFFIC - Defining the Context

Inside the R-O-W
Future Desired Network

Reframing Key Transportation Conventions
DESIGN TRAFFIC - Defining the Context
Reframing Key Transportation Conventions

**DESIGN TRAFFIC - Micro-Simulation**

**Determine Functional Classification**
Hierarchy & Functional Class
Context

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Reframing Key Transportation Conventions

Micro-Simulation

Suburban Travel Distribution
Reframing Key Transportation Conventions

Micro-Simulation

Land Use Solution

Daily Traffic (000)

12 AM 6 PM

2 Lanes: 52%

3 Lanes: 37%

6 Lanes: 11%
Reframing Key Transportation Conventions

Micro-Simulation

Hourly Traffic Volume (both directions)

Urban Travel Distribution
Reframing Key Transportation Conventions

Hourly Traffic Volume (both directions)

Alternative Mode Solution
Reframing Key Transportation Conventions
DESIGN TRAFFIC - Micro-Simulation

**N-S CLV**

**E-W CLV**

**Total CLV:**
- Less than 900 free flow
- 900-1200 normal midday
- 1200-1400 typical peak hour
- 1400-1500 near saturation
- Over 1500 loaded cycles
Reframing Key Transportation Conventions
DESIGN TRAFFIC - Micro-Simulation

[Diagram of a roundabout with labels for 'Circulating' and 'Entering']

[Inset graph showing traffic volume capacities]
Reframing Key Transportation Conventions
DESIGN TRAFFIC - Micro-Simulation
Establish Design Controls

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Reframing Key Transportation Conventions
DESIGN TRAFFIC - Interpreting the Results

Capacity of Streets
LEVEL OF SERVICE DEFINITIONS

SERVICE

LEVEL DEFINITION – Operating Speed

A  Free Flow: Users unaffected by others in the traffic stream.
B  Stable Flow: Slight decline in the freedom to maneuver from LOS “A”
C  Stable Flow: Operation of the vehicle becomes significantly affected by the interaction of others in the traffic system.
D  Approaching Unstable Flow: High volumes of traffic, speeds adversely affected, and the freedom to maneuver is severely restricted.
E  Unstable Flow: Operating conditions are at, or very near capacity. All speeds are low and the freedom to maneuver is extremely difficult.
F  Exceeding Capacity: Point at which arrival flows exceed discharge flows causing queuing delays. Stoppages may occur for long periods of time because of the downstream congestion. Travel times are also substantially increased.
Intersections Improved
- Orlando/Park
- Orlando/Solana
- Orlando/Lee
- Orlando/Webster
- Orlando/Orange
- Denning/Webster

Overall Increase in Mobility

Northbound
  From 5.3 mph to 5.7 mph
  95 seconds saved over the corridor

Southbound
  From 8.1 mph to 9.1 mph
  98 seconds saved over the corridor
Reframing Key Transportation Conventions

**DESIGN TRAFFIC - Interpreting the Results**

<table>
<thead>
<tr>
<th>Intersection Level of Service (LOS)</th>
<th>Existing</th>
<th>4 Way @ Holden</th>
<th>4 Way @ Gatlin</th>
<th>Town Square</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange Avenue Capacity</td>
<td>(Poor)</td>
<td>(Fair)</td>
<td>(Fair)</td>
<td>(Very Good)</td>
<td>(Very Good)</td>
</tr>
<tr>
<td>Holden / Gatlin Movement</td>
<td>Fair</td>
<td>Very Good</td>
<td>Very Good</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>Pedestrians</td>
<td>Very Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Very Good</td>
<td>Very Good</td>
</tr>
<tr>
<td>Safety</td>
<td>Very Poor</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Very Good</td>
</tr>
<tr>
<td>Gateway, Town Center</td>
<td>Poor</td>
<td>Very Poor</td>
<td>Very Good</td>
<td>Very Good</td>
<td>Very Good</td>
</tr>
<tr>
<td>New Frontage</td>
<td>Poor</td>
<td>Good</td>
<td>Good</td>
<td>Very Good</td>
<td>Very Good</td>
</tr>
<tr>
<td>West Property Access East</td>
<td>Poor</td>
<td>Fair</td>
<td>Very Good</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Poor</td>
<td>Fair</td>
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</table>
Evaluation Criteria

- Retain and enhance the natural appearance of the landscape
- Provide a distinctive corridor identity
- Provide safe vehicular and emergency access to, from and across the corridor
- Provide safe bicycle and pedestrian crossings and circulation
- Minimize noise impacts in a context-sensitive manner
- Provide accommodation for wildlife
- Minimize light pollution of the night sky
- Minimize right-of-way requirements
- Minimize air quality impacts
- Provide motorists with a reliable transportation system and reasonably predictable travel times, within the constraints of the external network
- Accommodate a public transportation system
- Constructability
Reframing Key Transportation Conventions

DESIGN TRAFFIC - Interpreting the Results

Total Travel Time of Route 29 NB Corridor = 21m57s

Difference Between Existing and Proposed = 2m01s
Reframing Key Transportation Conventions
DESIGN TRAFFIC - Interpreting the Results

VEHICULAR SERVICE

Seconds

Large Gain

LIVABILITY
“Highway design is too important to be left to Highway Engineers.”

Dr. Thomas D. Larson
Federal Highway Administration
Reframing Key Transportation Conventions

DESIGN SPEED

Determine Functional Classification

Hierarchy & Functional Class
Context

then

Establish Design Controls

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Design Speed
- Speed / Flow Relationship
- Roadway Safety
- Freight Routes
- Target Speed & Context
- Minimums vs. Maximums
- Speed & Roadway Geometrics

then

Fit Design Elements

Roadway Design Standards
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DESIGN SPEED - Speed / Flow Relationship

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Reframing Key Transportation Conventions
DESIGN SPEED - Speed / Flow Relationship

Speed (MPH)

Hourly Vehicles Per Lane

Maximum Volume 25-30 Miles Per Hour

Free flow Condition
Determine Functional Classification

- Hierarchy & Functional Class
- Context

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Reframing Key Transportation Conventions
DESIGN SPEED - Roadway Safety
Reframing Key Transportation Conventions
DESIGN SPEED - Roadway Safety

Width of Grading, 70 MPH
Over 2x Width @ 50 MPH

Width of Grading, 50 MPH

Material excavated at 70 MPH is 5x greater than 50 MPH.
Impact of Road Widening
Impact of Road Widening
Reframing Key Transportation Conventions
DESIGN SPEED - Roadway Safety

30 MPH
Posted Speed

15% Speeding
Livable Transportation – Hot Topic

Reframing Key Transportation Conventions
DESIGN SPEED - Roadway Safety
Reframing Key Transportation Conventions
DESIGN SPEED - Roadway Safety

30 mph
25 mph
20 mph
15 mph
Reframing Key Transportation Conventions
DESIGN SPEED - Roadway Safety

<table>
<thead>
<tr>
<th>SPEED</th>
<th>p(killing pedestrian)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 mph</td>
<td>3.5%</td>
</tr>
<tr>
<td>31 mph</td>
<td>37.0%</td>
</tr>
<tr>
<td>44 mph</td>
<td>83.0%</td>
</tr>
</tbody>
</table>
Reframing Key Transportation Conventions
DESIGN SPEED - Roadway Safety

OUR TOWN  U.D.O.T. RECALIBRATES THE SIGNAL LIGHTS...

OK, LET'S SEE IF YOU CAN DO IT IN 3.5 SECONDS.
Reframing Key Transportation Conventions
DESIGN SPEED - Roadway Safety
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Reframing Key Transportation Conventions
DESIGN SPEED - Roadway Safety
DRIVEWAY CONSOLIDATION
129 Driveways
23 Immediate Opportunities
New Traffic Signal
Consolidate Driveways (2 to 1)
Reduce Driveway Width
Consolidate Driveway (2 to 1)
Brick Turn Lane
New Traffic Signal

Reframing Key Transportation Conventions
DESIGN SPEED - Roadway Safety
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Access Management Plan
Reframing Key Transportation Conventions
DESIGN SPEED - Freight Routes

**Determine Functional Classification**
Hierarchy & Functional Class
Context

*then*

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*then*

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- Geometric (Sight Distance / Stopping Distance)
- Dimensions
- Design Elements – Trees / Parking / Transit Stops
- AASHTO Design Guidelines
- State and Local Design Standards
- Design Variances and Exceptions
Reframing Key Transportation Conventions
DESIGN SPEED - Freight Routes

Study Steering Committee
The Consultant appreciates the oversight and direction provided by the Freight, Goods and Services Mobility Steering Committee.

Richard Harris  
Chairman
Frank Irons
Orange County Convention Center
Bob Finken
Commercial Carrier Corporation
Ben Biscan
Florida Central Railroad
Mike Hoskinson
Consultant
Malcolm McLouth
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Karen Adamson
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Bob Kamm
Brevard MPO
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CSX Transportation
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Greater Orlando Aviation Authority (retired)
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METROPLAN ORLANDO
Vince Stevens
METROPLAN ORLANDO
Reframing Key Transportation Conventions

**DESIGN SPEED - Target Speed & Context**

**Determine Functional Classification**
- Hierarchy & Functional Class
- Context

**then**

**Establish Design Controls**
- Design Traffic
  - The Role of the Regional Model
  - Understanding the Travel Patterns – Trip Types
  - Vehicle Types
  - Defining the Context - Network and Mode Choice
  - Role of Micro-Simulation
  - Interpreting the Results – Capacity & Travel Time

**Design Speed**
- Speed / Flow Relationship
- Roadway Safety
- Freight Routes
- **Target Speed & Context**

**then**

**Fit Design Elements**
- Roadway Design Standards
  - Geometric (Sight Distance / Stopping Distance)
  - Dimensions
  - Design Elements – Trees / Parking / Transit Stops
  - AASHTO Design Guidelines
  - State and Local Design Standards
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Reframing Key Transportation Conventions
DESIGN SPEED - Target Speed & Context
Reframing Key Transportation Conventions
DESIGN SPEED - Target Speed & Context

Context Changes
Context Changes
Maximum Design Speed, Not Minimum

i.e. Target Speed
Reframing Key Transportation Conventions

**DESIGN ELEMENTS**

**Determine Functional Classification**
- Hierarchy & Functional Class
- Context

**then**

**Establish Design Controls**
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Design Speed

- Speed / Flow Relationship
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- Target Speed & Context

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Hierarchy & Functional Class
Context

then

Establish Design Controls

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then

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Roadway Design Standards

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- State and Local Design Standards
- Design Variances and Exceptions

Reframing Key Transportation Conventions
DESIGN ELEMENTS - Geometrics
Basic Road Design Guidelines

Reframing Key Transportation Conventions
DESIGN ELEMENTS - Geometrics
Establish Design Controls

- Design Traffic
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Establish Design Controls

then

Fit Design Elements

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- Design Elements – Trees / Parking / Transit Stops
- AASHTO Design Guidelines
- State and Local Design Standards
- Design Variances and Exceptions
Reframing Key Transportation Conventions

DESIGN ELEMENTS – Dimensions

ROADWAY DESIGN ELEMENTS

INTERSECTIONS

Where ROW permits, bike lane should terminate at stop bar or crosswalk.

BICYCLE LANE AT INTERSECTION

A. Right-turn-only lane
B. Parking lane into right-turn-only lane
C. Right-turn-only lane
D. Optional right/straight and right-turn only

Note: The dotted lines in cases “A” and “B” are optional (not case “C”)

CURB RETURN RADIUS

<table>
<thead>
<tr>
<th>Radius Type</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local - Local</td>
<td>15'</td>
<td>25'</td>
</tr>
<tr>
<td>Local - Collector</td>
<td>15'</td>
<td>25'</td>
</tr>
<tr>
<td>Collector - Collector</td>
<td>15'</td>
<td>25'</td>
</tr>
<tr>
<td>Collector - Arterial</td>
<td>20'</td>
<td>50'</td>
</tr>
<tr>
<td>Arterial - Arterial</td>
<td>20'</td>
<td>50'</td>
</tr>
<tr>
<td>Arterial - Farm-to-Market</td>
<td>25'</td>
<td>50'</td>
</tr>
</tbody>
</table>

* Allow narrowing into adjacent lane by design vehicle/turning on low volume streets.

Effective Curb Radius

Intersection design should safely accommodate both vehicles and pedestrians.

To comfortably accommodate pedestrians, minimize the curb return radius and intersection pavement width to the greatest extent possible.

KEY

R1 = Radius
R2 = Effective Radius
R3 = Curb radius, measured without bike lane and parking

Example: Intersection of arterial street with collector street.

Source: AASHTO Guide for the Development of Bicycle Facilities

Source: AIA, Standards for Accessible Design

Pedestrian Crossing at Intersections

Well defined edge adjacent to direction of pedestrian flow

Source: Main Street... When a Highway Runs Through It: A Handbook for Oregon Communities
## ROADWAY DESIGN ELEMENTS

### MEDIANs

**Continuous Left-Turn**
Used on arterial streets in commercial areas with frequent driveway. If blocks are larger than 600', place pedestrian crossing with special treatment as well as pedestrian refuge island at intervals of 600’ to 1400’ (where feasible).

**Narrow Median**
Use on collector and arterial streets with infrequent driveways and intersections. Most commonly used for retrofit project where there is limited ROW. Landscape where feasible.

**Wide Median**
Use on arterial streets with less frequent driveways and intersections.

**Rural Median**
Use on collector streets.

### Optional In

<table>
<thead>
<tr>
<th>Arterials</th>
<th>Continuous Left-Turn</th>
<th>Narrow Median</th>
<th>Wide Median</th>
<th>Rural Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Activity Center</td>
<td>11'-14'</td>
<td>4'-6</td>
<td>12'-30'</td>
<td>24'-50'</td>
</tr>
<tr>
<td>Industrial</td>
<td>12'-14'</td>
<td></td>
<td>12'-30'</td>
<td></td>
</tr>
<tr>
<td>Rural Cluster</td>
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<tr>
<td>Rural Agricultural</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Collectors</th>
<th>Continuous Left-Turn</th>
<th>Narrow Median</th>
<th>Wide Median</th>
<th>Rural Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Activity Center</td>
<td>10'-12'</td>
<td>4'-6</td>
<td>10'-16'</td>
<td></td>
</tr>
<tr>
<td>Rural Cluster</td>
<td>10'-12'</td>
<td></td>
<td>10'-16'</td>
<td></td>
</tr>
</tbody>
</table>

### PLANTING IN MEDIANs

Distance from face of non-mountable curb, when tree diameter is greater than 4 inches measured 6 inches off the ground.
ROADWAY DESIGN ELEMENTS

WIDTH OF SIDEWALKS

Less Intense Development

More Intense Development

LOCATION AND DESIGN OF SIDEWALKS

On arterial and collector streets, sidewalks should be located at the outside edge of the road right-of-way, except at intersections where they should be located as shown in the adjacent graphic:

The sidewalk grade should remain consistent along a roadway corridor. At locations where a driveway crosses a sidewalk, the grade of the driveway shall match that of the sidewalk.

<table>
<thead>
<tr>
<th>SIDEWALK WIDTH</th>
<th>OFF CURB (feet)</th>
<th>ON CURB (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min.</td>
<td>Max.</td>
<td>Min.</td>
</tr>
<tr>
<td>Arterials</td>
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<td>10</td>
</tr>
<tr>
<td>Rural Cluster</td>
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<td>10</td>
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<tr>
<td>Industrial</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Collector Street</td>
<td>6</td>
<td>8</td>
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<tr>
<td>Main Street</td>
<td>8</td>
<td>12</td>
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<tr>
<td>Neighborhood Streets</td>
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<td>Urban Activity Center</td>
<td>5</td>
<td>8</td>
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<tr>
<td>Village Center</td>
<td>5</td>
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<tr>
<td>Rural Agriculture</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

MINIMUM HORIZONTAL CLEARANCE WIDTH

- Posted Speed < 25 mph: 1.5 feet from face of curb
- Posted Speed ≥ 25 mph: 4 feet* from face of curb

* 1.5 feet under constrained conditions

ROADWAY RECONSTRUCTION

Provide sidewalks on both sides of the roadway for:
- Arterials in Urban Activity Centers and Rural Clusters
- Collectors in Urban Activity Centers, Village Centers, and Rural Clusters
- Neighborhood streets in Urban Activity Centers, Village Centers, and Neighborhood Centers

If ROW is constrained, may provide sidewalks on only one side of the roadway for:
- Arterials in Industrial land use type
- Collectors in Industrial land use type
- Neighborhood streets in Neighborhoods, Rural Clusters, and Rural Agricultural land use types
Reframing Key Transportation Conventions
DESIGN ELEMENTS – Dimensions

ROADWAY DESIGN ELEMENTS

**TREE SPACING IN SIGHT TRIANGLE**

<table>
<thead>
<tr>
<th>Description</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
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<td>Maximum caliper (diameter) within limits</td>
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<td>91</td>
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<td>108</td>
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</tbody>
</table>

Sizes and spacing are based on the following conditions:

A. A single line of trees in the median parallel to but not necessarily collinear with the centerline.

B. A straight approaching mainline within skew limits.

C. Trees and palms < 11” in diameter casting a vertical 6’ wide shadow based on a vehicle entering at stop bar location when viewed by mainline driver beginning at distance ‘d’.

1. Sabal palms with diameters > 11” ≤ 18” spaced at intervals providing a 2 second full view of entering vehicle at stop bar location when viewed by mainline driver beginning at distance ‘d’ (see perception diagram).

2. Sabal palms with diameters > 11” ≤ 18” spaced at intervals providing a 2 second full view of entering vehicle at stop bar location when viewed by mainline driver beginning at distance ‘d’ (see perception diagram). See FDOT 2003 Design Standards, Index No. 346 for further information.

---

**LOCATION OF SHADE TREES**

Shade trees shall be located to provide shade to users of the sidewalks and multi-use trails. On arterial and collector roadways, shade trees should be located between the travel lane and the sidewalk. To provide personal security, users of the sidewalks must be visible from vehicles in the travel lane. Landscaping located between the travel lanes and the sidewalk must not block these views. Therefore, shrubs and tree canopies should be pruned to allow visibility from vehicles in the travel lane to users of the sidewalk.

**LOCATION OF TRAFFIC CONTROL DEVICES, LIGHT POLES, AND ABOVE GROUND UTILITIES**

Traffic Control Devices will be designed and located in accordance with the Manual of Uniform Traffic Control Devices and Roadway and Traffic Design Standards.

Light Poles and Utilities if not Placed Underground:

- **No Curb - Outside of Clear Zone**
- **Curb Present - Outside of Horizontal Clearance area. If placed in sidewalk, must maintain 4 feet of unobstructed sidewalk area.**
CORRIDOR TYPE: ARTERIAL

LAND USE CLASSIFICATION: URBAN ACTIVITY CENTER

REQUICKED | OPTIONAL
---|---
Curb and gutter | On-street parking
Street and pedestrian scale lighting | Planning strip
Shade trees | Mid block pedestrian crossing
Sidewalks | Raised median
Transit stops with benches (if service is provided) | Continuous left turn lane
Pedestrian activated crossing signal at signalized intersections | Bus Shelters
Bicycle lane or wide outside travel lane

| DESIGN ELEMENT | MINIMUM WIDTH (feet) | MAXIMUM WIDTH (feet) |
---|---|---|
Vehicle lanes (when bicycle lane is present) | 10 | 12 |
Outside vehicle lane (no bicycle lane present) | 14 | 14 |
Raised median - infrequent driveways and intersections | 4 | 6 |
- short blocks, left turn lanes | 12 | 30 |
Continuous left turn lanes | 11 | 14 |
Bicycle lane | 4 | 5 |
Parking lane - with bicycle lane | 7 | 7 |
- no bicycle lane | 8 | 10 |
Planting strip | 4 | 8 |
Sidewalk - on curb | 8 | 12 |
- off curb | 6 | 10 |
ROW width | 80 | 130 |

Design Speed: 35 mph - 45 mph

Note: Where ROW permits, it is always preferred to provide a bicycle lane.
CORRIDOR TYPE: COLLECTOR STREET

LAND USE CONTEXT: URBAN ACTIVITY CENTER

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>OPTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bike lanes</td>
<td>Median</td>
</tr>
<tr>
<td>Curb and gutter</td>
<td>Parking</td>
</tr>
<tr>
<td>Planting strip</td>
<td>Bulbouts and neckdowns</td>
</tr>
<tr>
<td>Pedestrian scale lighting</td>
<td>(when parking is provided)</td>
</tr>
<tr>
<td>Shade trees</td>
<td>Bus Shelter</td>
</tr>
<tr>
<td>Sidewalks</td>
<td></td>
</tr>
<tr>
<td>Transit stop with benches, where transit service is provided</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESIGN ELEMENT</th>
<th>MINIMUM Width (feet)</th>
<th>MAXIMUM Width (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle lanes</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Bike lanes (without parking)</td>
<td>4</td>
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<td>Bike lanes (with parking)</td>
<td>5</td>
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</tr>
<tr>
<td>Narrow Median</td>
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<td>6</td>
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<tr>
<td>Continuous left turn lane</td>
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<td>Raised Median</td>
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</tr>
<tr>
<td>Planting strip</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Sidewalk</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>ROW Width</td>
<td>40</td>
<td>80</td>
</tr>
</tbody>
</table>

Design Speed: 30-35 mph
Reframing Key Transportation Conventions
DESIGN ELEMENTS – Dimensions

CORRIDOR TYPE: COLLECTOR STREET

LAND USE CONTEXT: Rural Agricultural/Industrial

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>OPTITIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bike lanes or bikeway</td>
<td>Curb and gutter</td>
</tr>
<tr>
<td></td>
<td>Planting strip</td>
</tr>
<tr>
<td></td>
<td>Lighting</td>
</tr>
<tr>
<td></td>
<td>Shade tree</td>
</tr>
<tr>
<td></td>
<td>Sidewalk</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESIGN ELEMENT</th>
<th>MINIMUM Width (feet)</th>
<th>MAXIMUM Width (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle lane</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- bike lane in travelway</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>- outside lane, no bike lane in travelway</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Bike lane (curb)</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Bike lane (no curb)</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Sidewalk</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Multiuse trail</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>ROW</td>
<td>50</td>
<td>80</td>
</tr>
</tbody>
</table>

Bikeway (Separate Multiuse Trail Optional)
Design Speed: 30-35 mph
Design Volume: Less Than 1500 vpd

Bicycle Lane
Design Speed: 30-35 mph
Design Volume: Less Than 1500 vpd

Parallel Bicycle Facility to Roadway

Rural Agricultural Area - Collector Street
Reframing Key Transportation Conventions
DESIGN ELEMENTS – Dimensions

CORRIDOR TYPE: COLLECTOR STREET

LAND USE CONTEXT: Rural Cluster

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>OPTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bike lanes</td>
<td>• Median</td>
</tr>
<tr>
<td>• Planting strip</td>
<td>• Parking</td>
</tr>
<tr>
<td>• Shade trees</td>
<td>• Curb</td>
</tr>
<tr>
<td>• Sidewalk</td>
<td>• Gutter</td>
</tr>
<tr>
<td></td>
<td>• Bulbous and medians (When parking is provided)</td>
</tr>
<tr>
<td></td>
<td>• Pedestrian scale lighting at intersections</td>
</tr>
</tbody>
</table>

Design Speed: 30-35 mph

<table>
<thead>
<tr>
<th>DESIGN ELEMENT</th>
<th>MINIMUM Width (ft)</th>
<th>MAXIMUM Width (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Vehicle lanes</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>• Median</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>(continuous left turn lane)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Raised Median</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>• Bike lanes (without parking)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>• Bike lanes (with parking)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Parking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Planting strip</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>• Sidewalk</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>• ROW Width</td>
<td>50</td>
<td>60</td>
</tr>
</tbody>
</table>
# Reframing Key Transportation Conventions

## DESIGN ELEMENTS – Dimensions

### CORRIDOR TYPE: MAIN STREET

#### Land Use Context:
**Urban Activity Center/Village Center/Rural Cluster**

<table>
<thead>
<tr>
<th>Required</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>• On-street parking</td>
<td>• Bicycle lane</td>
</tr>
<tr>
<td>• Bulb-outs with landscaping</td>
<td>• Curb</td>
</tr>
<tr>
<td>• Gutter</td>
<td></td>
</tr>
<tr>
<td>• Shade trees</td>
<td></td>
</tr>
<tr>
<td>• Pedestrian scale lighting</td>
<td></td>
</tr>
<tr>
<td>• Shelter at bus stop (if served by transit)</td>
<td></td>
</tr>
<tr>
<td>• Pedestrian crosswalk treatment</td>
<td></td>
</tr>
</tbody>
</table>

### Design Element

<table>
<thead>
<tr>
<th>Minimum Width (feet)</th>
<th>Maximum Width (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle lane width</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Bicycle lane</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Parallel parking</td>
<td>7</td>
</tr>
<tr>
<td>- with bike lane</td>
<td>7</td>
</tr>
<tr>
<td>- without bike lane</td>
<td>7</td>
</tr>
<tr>
<td>Angled parking</td>
<td>19</td>
</tr>
<tr>
<td>- length</td>
<td>28</td>
</tr>
<tr>
<td>- width</td>
<td>11</td>
</tr>
<tr>
<td>Sidewalk</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td>R/W width</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>82</td>
</tr>
</tbody>
</table>

### Parking Options

#### Parallel Parking

- Side walk: 5' 7' 5'

#### Front End Angled Parking

- Side walk: 5' 7' 8'

#### Rear End Angled Parking

- Parking: 7' 16'
- Travel Lane: 10' 11'

### Sidewalk Options

#### Stroll

- Allows for 2 way pedestrian travel and amenities such as benches and trash receptacles.

### Plaza

- Provides space for outdoor dining or cafe.

### Design Speed: 25-30 mph

#### Diagrams

- Corridor Type: Main Street
- Urban Activity Center/Village Center/Rural Cluster
- Land Use Context
- Design Elements and Dimensions
- Table: Minimum and Maximum Widths
- Parking Options: Parallel, Front End Angled, Rear End Angled
- Sidewalk Options: Stroll, Plaza
- Design Speed: 25-30 mph

*Note: Width of parking lane may be measured from line of curb, and may include all or a portion of the gutter.*
Reframing Key Transportation Conventions
DESIGN ELEMENTS – Design Elements

Determine Functional Classification
Hierarchy & Functional Class
Context

then

Establish Design Controls
Design Traffic
- The Role of the Regional Model
- Understanding the Travel Patterns – Trip Types
- Vehicle Types
- Defining the Context - Network and Mode Choice
- Role of Micro-Simulation
- Interpreting the Results – Capacity & Travel Time

Design Speed
- Speed / Flow Relationship
- Roadway Safety
- Freight Routes
- Target Speed & Context

then

Fit Design Elements
Roadway Design Standards
- Geometric (Sight Distance / Stopping Distance)
- Dimensions
- Design Elements – Trees / Parking / Transit Stops
- AASHTO Design Guidelines
- State and Local Design Standards
- Design Variances and Exceptions
Reframing Key Transportation Conventions
DESIGN ELEMENTS – Design Elements

Buildings
Reframing Key Transportation Conventions
DESIGN ELEMENTS – Design Elements

People

Buildings
Reframing Key Transportation Conventions

DESIGN ELEMENTS – Design Elements

Trees

People

Buildings
Reframing Key Transportation Conventions
DESIGN ELEMENTS – Design Elements

Lights
Trees
People
Buildings
Reframing Key Transportation Conventions
DESIGN ELEMENTS – Design Elements

Paving Material

Lights

Trees

People

Buildings
Reframing Key Transportation Conventions
DESIGN ELEMENTS – Design Elements

Drainage

Paving Material

Lights

Trees

People

Buildings
Reframing Key Transportation Conventions

DESIGN ELEMENTS – Design Elements

Speed
Drainage
Paving Material
Lights
Trees
People
Buildings
Reframing Key Transportation Conventions

DESIGN ELEMENTS – Design Elements

Sidewalks

Parking

Speed

Drainage

Paving Material

Lights

Trees

People

Buildings
Determine Functional Classification
   Hierarchy & Functional Class
   Context

then

Establish Design Controls
   Design Traffic
      - The Role of the Regional Model
      - Understanding the Travel Patterns – Trip Types
      - Vehicle Types
      - Defining the Context - Network and Mode Choice
      - Role of Micro-Simulation
      - Interpreting the Results – Capacity & Travel Time
   Design Speed
      - Speed / Flow Relationship
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      - Target Speed & Context

then

Fit Design Elements

Roadway Design Standards
   - Geometric (Sight Distance / Stopping Distance)
   - Dimensions
   - Design Elements – Trees / Parking / Transit Stops
   - AASHTO Design Guidelines
   - State and Local Design Standards
   - Design Variances and Exceptions
Reframing Key Transportation Conventions

DESIGN ELEMENTS – State & Local Design Standards

Determine Functional Classification
- Hierarchy & Functional Class
- Context

**then**

Establish Design Controls
- Design Traffic
  - The Role of the Regional Model
  - Understanding the Travel Patterns – Trip Types
  - Vehicle Types
  - Defining the Context - Network and Mode Choice
  - Role of Micro-Simulation
  - Interpreting the Results – Capacity & Travel Time
- Design Speed
  - Speed / Flow Relationship
  - Roadway Safety
  - Freight Routes
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**then**

Fit Design Elements
- Roadway Design Standards
  - Geometric (Sight Distance / Stopping Distance)
  - Dimensions
  - Design Elements – Trees / Parking / Transit Stops
  - AASHTO Design Guidelines
  - State and Local Design Standards
  - Design Variances and Exceptions
Reframing Key Transportation Conventions

DESIGN ELEMENTS – Design Variance & Exceptions

Determine Functional Classification

Hierarchy & Functional Class
Context

then

Establish Design Controls

Design Traffic
- The Role of the Regional Model
- Understanding the Travel Patterns – Trip Types
- Vehicle Types
- Defining the Context - Network and Mode Choice
- Role of Micro-Simulation
- Interpreting the Results – Capacity & Travel Time

Design Speed
- Speed / Flow Relationship
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then

Fit Design Elements

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Reframing Key Transportation Conventions