

Geometric Design 101

Seven Corners Task Force
December 10, 2013



Presentation overview

- Project context
- Interchanges categories, forms, and types
- Ramp spacing
- Design considerations
 - Profiles
 - Multimodal
 - Weaving (freeway/signals mix)
- Access spacing
- Network basics



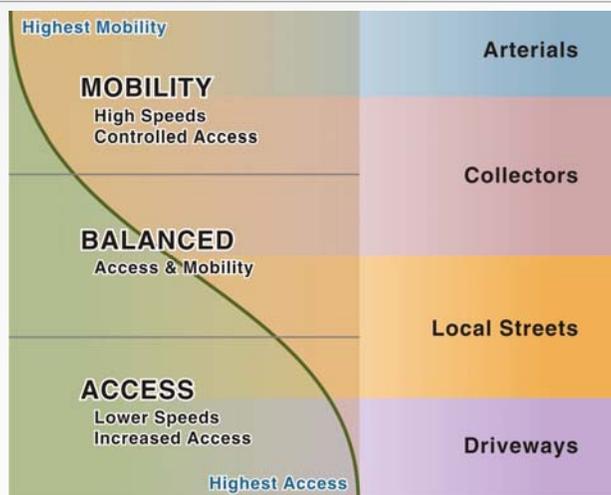
Context: Considerations

There are a variety of design contexts...here are a few to consider

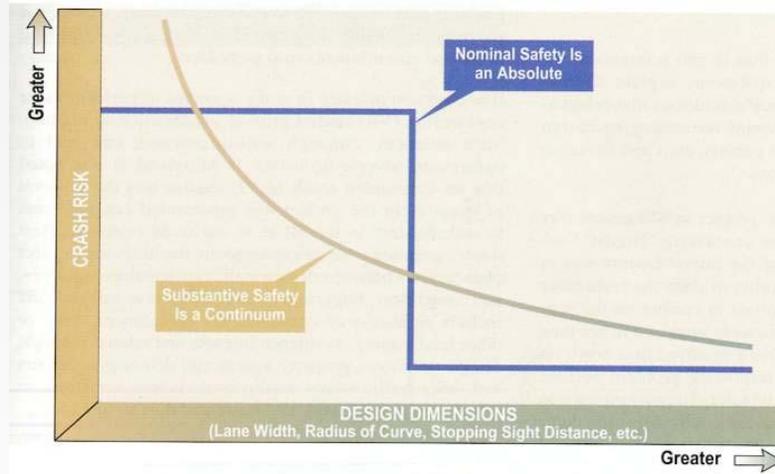
- Land use and Transportation
- Community Based Solutions
- Designing for Various Users
- Rural versus Urban
- New versus Retrofit



Context: Functional Classifications (Access/Mobility)



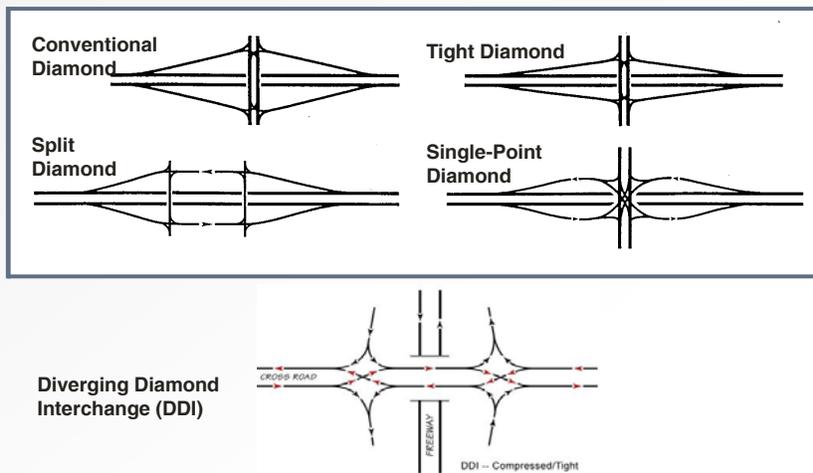
Context: Nominal Safety vs. Substantive Safety



General Categories of Interchanges

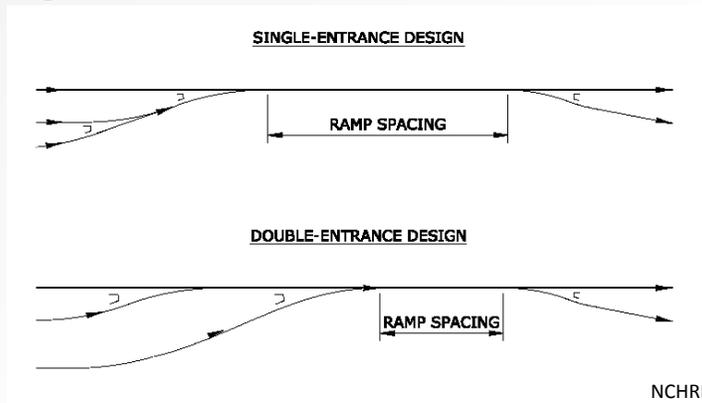
Crossroad Facility	RURAL	SUBURBAN	URBAN
Local Road or Minor Street			
Primary Highway or Major Street			
Freeway			

Interchanges - Diamond Forms



Design Elements Affecting Ramp Spacing Needs

- Single entrance (or exit) versus double entrance design

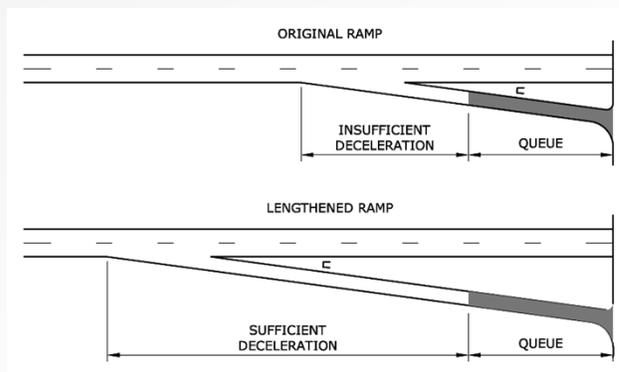


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Design Elements Affecting Ramp Design

- Queue storage needs
- Terrain and grades



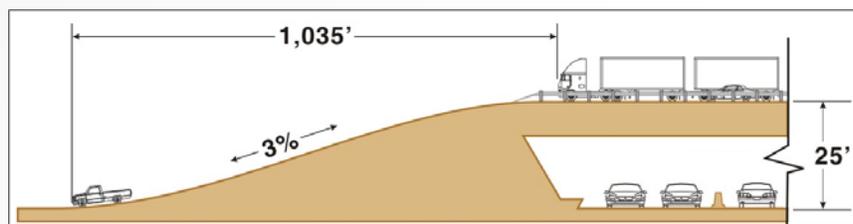
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Design Considerations: Profiles

Example:

- 17.5 ft is a typical clearance height plus 7 ft for the structure = 25 ft.
- 3% is a typical maximum design grade for a highway crossroad.
- The approaching highway crossroad would need to be approximately 1,035 feet to elevate up to 25 feet.



Pedestrian / Bike Treatments at Ramp Terminals

Figure 9.4 Preferred Treatment for Free-Flow Ramp Intersections

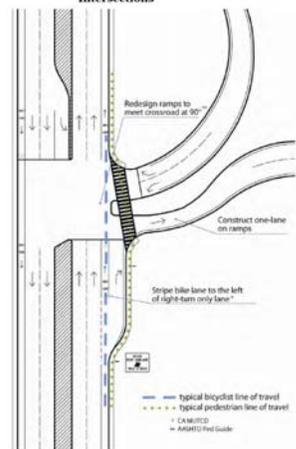
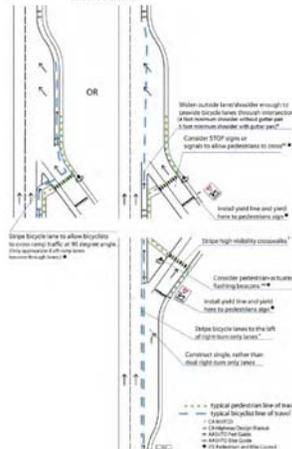
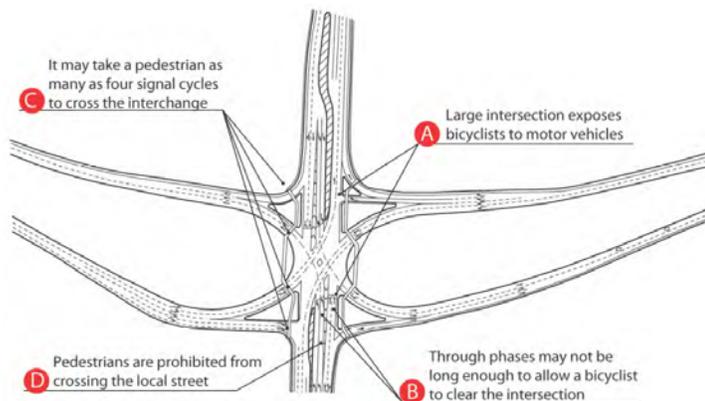


Figure 9.5 Signage and Striping Treatments for Free-Flow Ramp Intersections



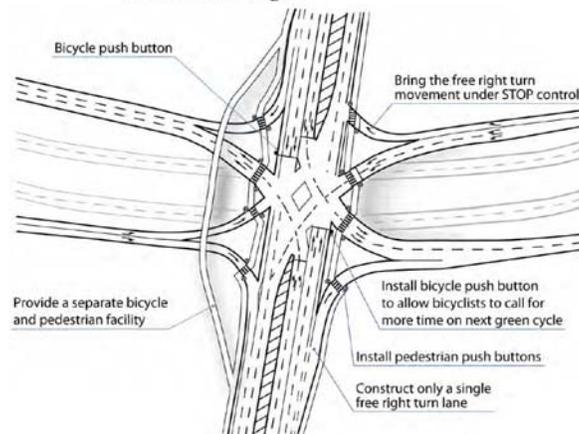
Pedestrian / Bike Treatments at Ramp Terminals

Figure 9.8 Common Pedestrian and bicycle Issues at Single Point Interchanges

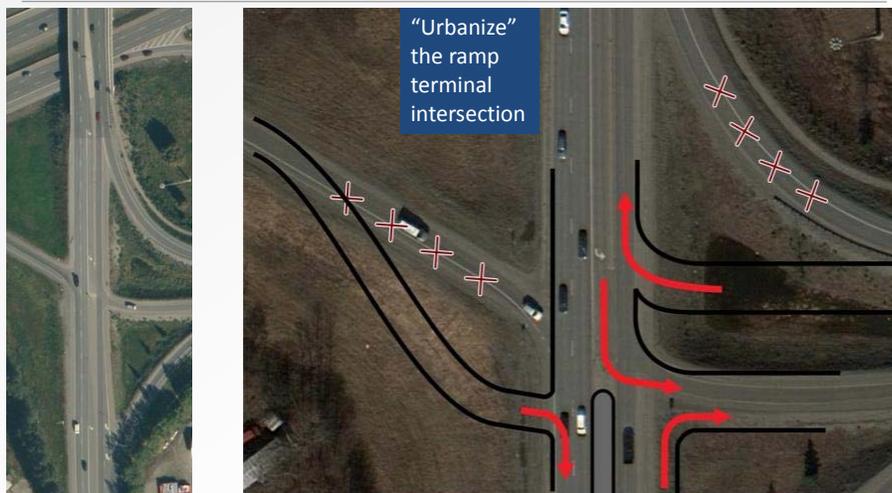


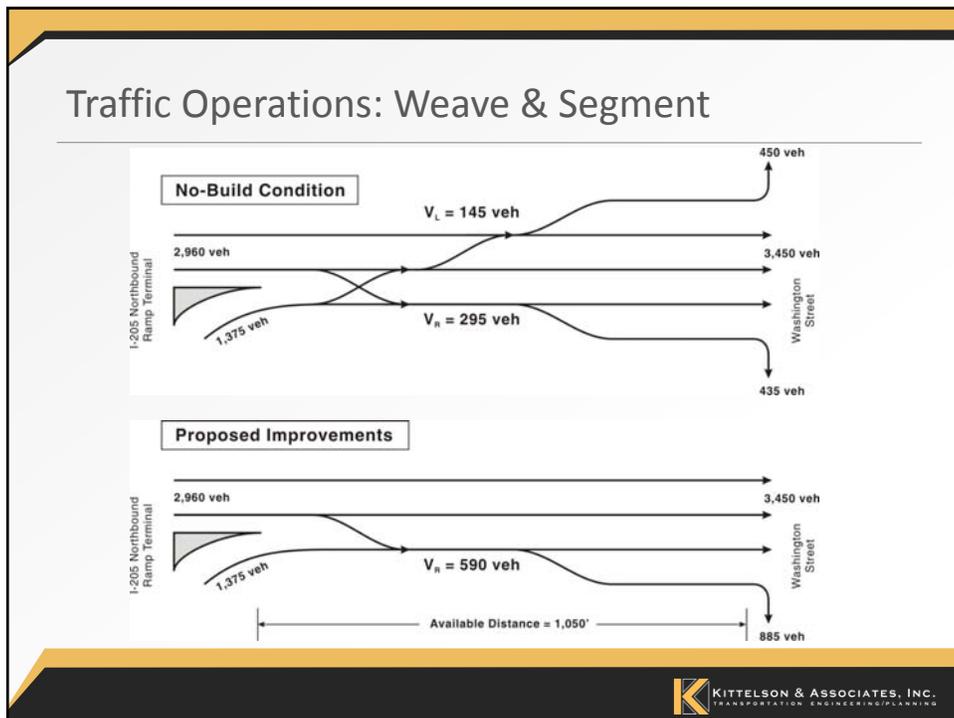
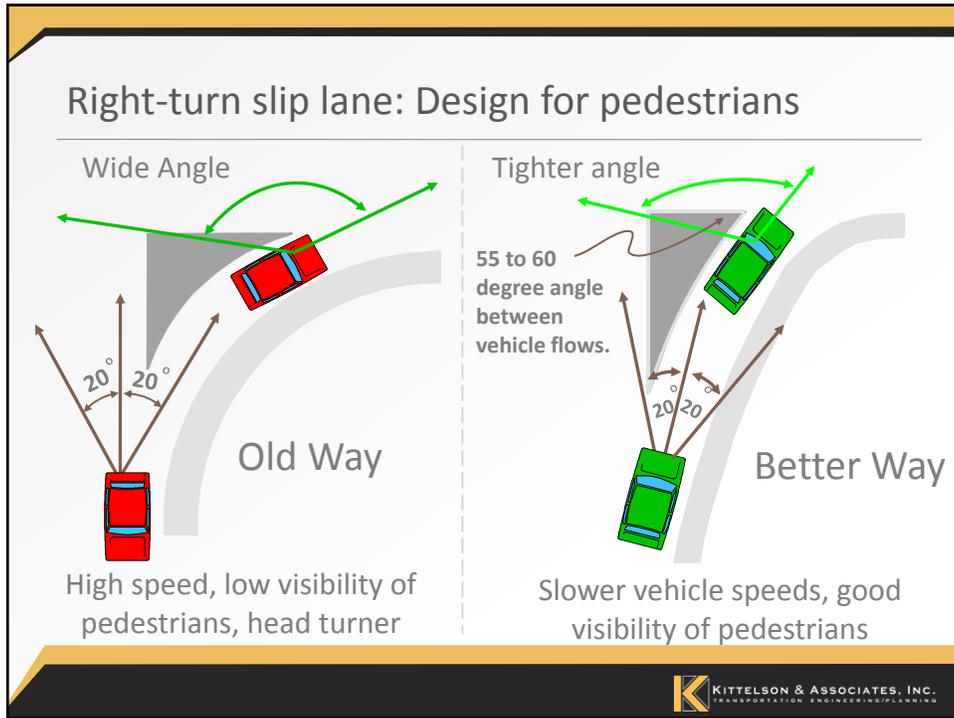
Pedestrian / Bike Treatments at Ramp Terminals

Figure 9.9 Treatments for Pedestrians and bicyclists at Single Point Interchanges



Multi-Modal Considerations at Ramp Terminals





Virginia DOT Access Spacing Guidelines

- Minimum spacing standards for commercial entrances and intersection near interchanges (multilane)

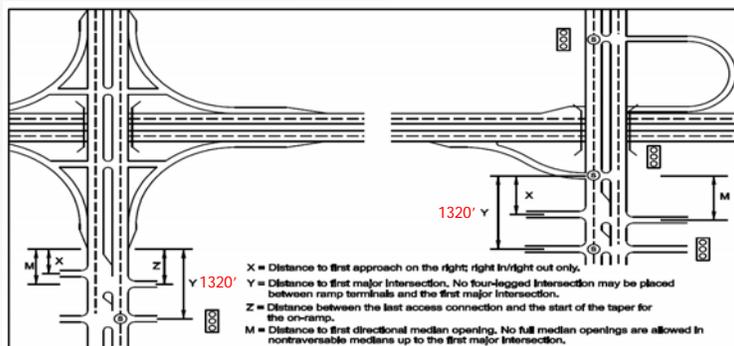


FIGURE 2-9 ACCESS CONTROL ON MULTI LANE HIGHWAYS AT INTERCHANGES



Virginia DOT Access Spacing Guidelines

- Example: Principal Arterial

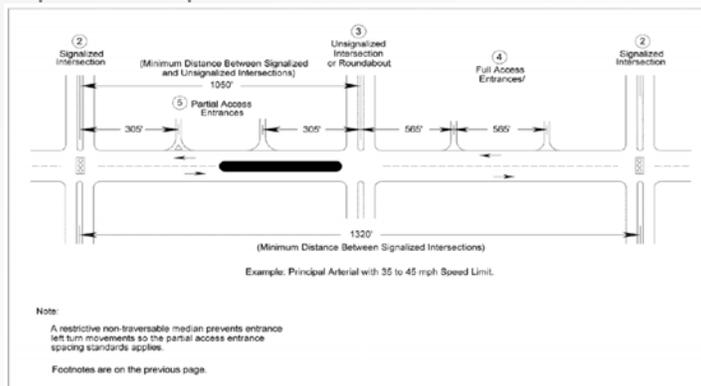
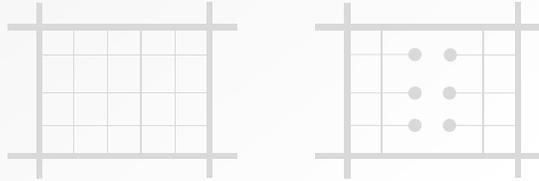


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS*



Network Basics

- Street Layouts
- Connected Street Network
- Broken Street Network



Many communities have a combination of these configurations which will make finding solutions more challenging.

Network Basics - Connected Street Network

- Effect of connected local street network

Positives:

- Traffic load is dispersed over multiple facilities
- Local trips may not have to use arterials

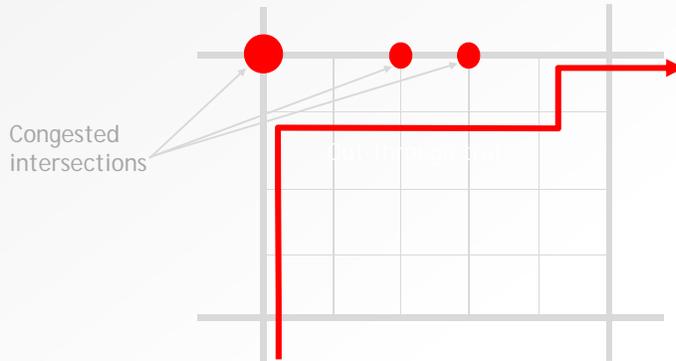


Network Basics - Connected Street Network

- Effect of connected local street network

Negatives:

- Potential for real or perceived cut-through traffic if arterial is not performing well



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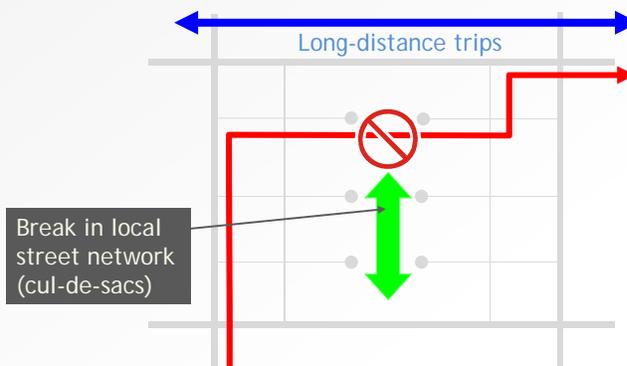


Network Basics - Connected Street Network

- Effect of disconnected local street network

Positives:

- Eliminates neighborhood cut-through traffic



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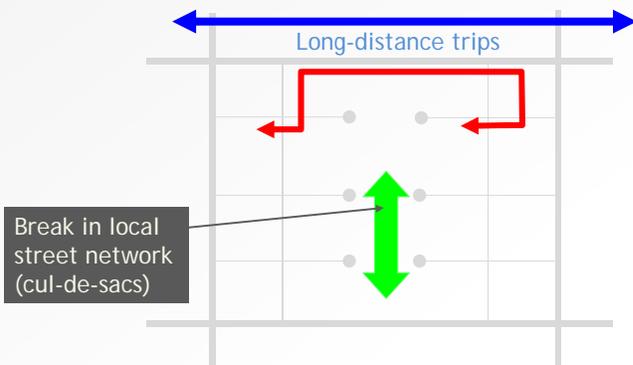


Network Basics - Connected Street Network

- Effect of disconnected local street network

Negatives:

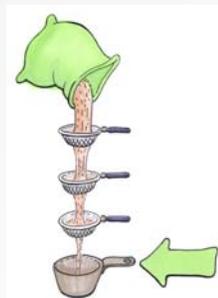
- Traffic load is concentrated on arterials
- Creates out-of-direction travel



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Questions?



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